

TORNADO

Slant Bed CNC Turning Centers



**COLCHESTER
HARRISON**
600Group

*Advanced Turning
Technology*

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*Whatever the requirement there
is a TORNADO for Every Application*

Colchester/Harrison TORNADO turning centers provide greater accuracy due to Colchester's unique **"Duo-Stable™"** advanced machine tool construction which provides thermal and dynamic stability up to 300% greater than cast iron. Machines manufactured with **"Duo-Stable™"** technology are more accurate and provide a better surface finish.

Turning



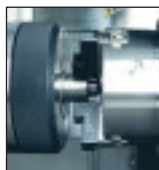
TORNADO models T-2, T-4, T-8 & T-10 CNC lathes are ideal machines for producing two axis parts.

Turning & Milling



TORNADO models T6M, T8M & T10M turning centers have a fully programmable 'C' axis and power driven tools for radial and axial milling, drilling, boring and tapping. 'M' machines increase profitability because of fewer set-ups and more machining.

Sub Spindle 'Single Hit' Turning



The addition of a sub-spindle on the TORNADO models T6MS & T8MS, enables the full benefit of 'single-hit' machining by transferring the work piece to the sub-spindle for additional turning and milling.

Y Axis Machining



Y axis machining on the TORNADO model T8MSY, allows you to take full advantage of the machine's milling capability by providing "off center line" machining of keyways and contoured surfaces.

Automated Turning



Achieve the ultimate in automated operation with "Lights-Out" capability. Using the barfeed, TORNADO turning centers can be configured with work scheduling and tool management etc. to provide true 24-7 unmanned automation.

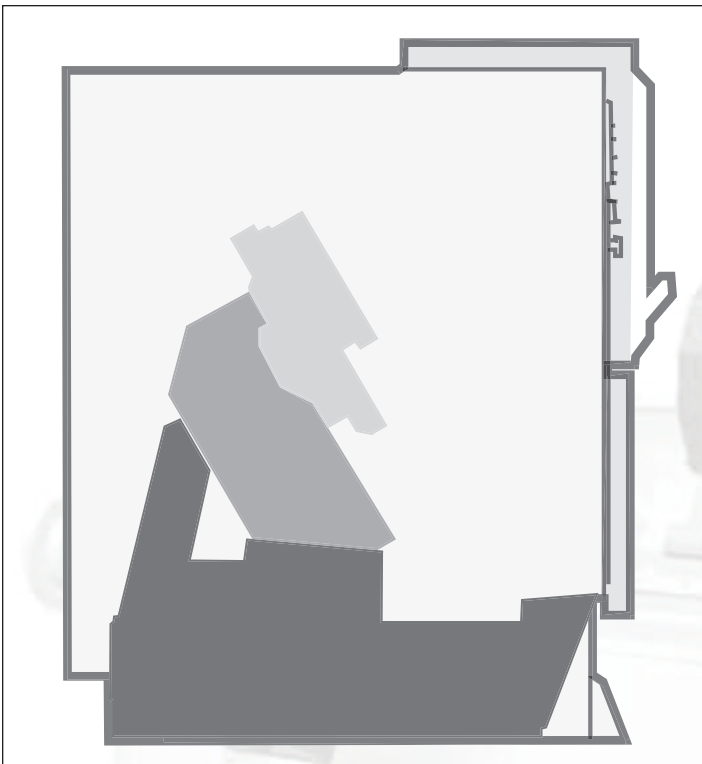
Advanced Technology

Duo-stable™...

A new concept in thermal and mechanical stability

Total engineering from the floor up...

The Colchester/Harrison TORNADO is the only CNC lathe with its own foundation. This revolutionary machine design utilizes our patented **Duo-Stable™** technology to advance generations forward in both thermal and mechanical stability. This advanced engineering design makes use of an inert polymer concrete encapsulated in a heavy duty steel reinforced base. This **Duo-Stable™** design is not only much heavier, but also greatly more thermally and mechanically stable than a traditional cast iron base.



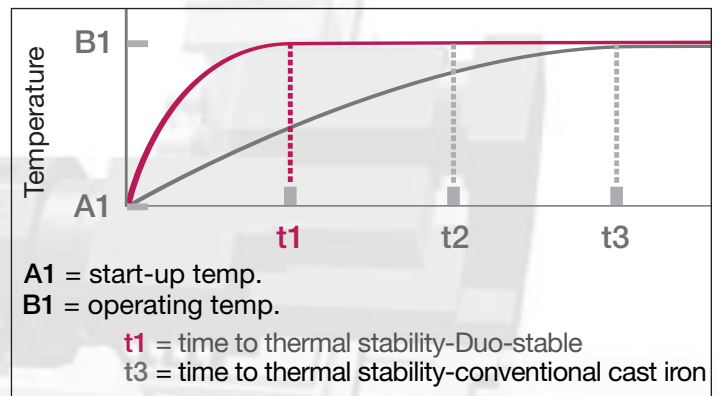
- **Carriage assembly:** Travels on precision linear rails, allowing an extremely high acceleration and deceleration response for superior positioning and repeatability accuracy.
- **60° cast iron bed:** Meehanite cast iron bed mounted on the patented **Duo-Stable™** base.
- **Foundation:** Patented **Duo-Stable™** base for maximum vibration dampening and thermal and mechanical stability.

Thermal stability...

The conventional cast iron base, used by other lathe manufacturers, takes a very long time to reach thermal equilibrium between the **hot** cutting area and the **cold** floor. Heat sources such as coolant, hot chips, hydraulic oil, transformers and motors dissipate heat into cast iron causing it to expand and contract in unpredictable manners.

Colchester's **Duo-Stable™** construction insulates the cutting area from these heat sources allowing thermal equilibrium to be reached three times faster for increased accuracy.

Thermal Stability Time Graph



Mechanical stability...

The built-in foundation of the Colchester/Harrison CNC lathes means that the height of the spindle above the foundation is at an absolute minimum, resulting in reduced vibrations during the cutting process. Stability is further improved by attaching components such as drive motor, coolant and hydraulic pumps, chip conveyor etc. directly to the foundation, isolating the cutting process for improved accuracy and surface finish.

GE Fanuc 21i TB & 18i TB Control

With 'Manual Guide i', for simple manual operation to complex machining



Two and three axis TORNADO models are fitted with the GE Fanuc 21iTB control while the five & six axis 'MS & MSY' models are fitted with the GE Fanuc 18iTB control. The latest generation 'B' controls have twice the processing speed of the previous 'A' models and are equipped with 'Manual Guide i' software. With 'Manual Guide i', operators are able to generate part programs quickly and efficiently through easy to understand conversational style prompts.

The GE Fanuc TB Series Control Features...

- Direct Drawing Dimension Programming simplifies programming of complex components by using simple radius, line and angle definitions
- Multi-repetitive Cycles II G70-G76 for automatic finishing, roughing, drilling, threading and grooving cycles
- Toolpath Graphics for verification of part profile before and during machine cycle
- 10.4" Color LCD Display ■ Inch/metric data input
- Absolute/incremental programming in the same block
- Programmable increments from 0.0001" to 999.9999"
- Thread cutting lead range from 0.00001" to 4.0"
- Rigid tapping ■ G10 offset value setting
- Multiple part program storage up to 63 programs
- 64K part program memory
- Sequence number search ■ Background editing
- Constant surface speed/direct rpm programming
- Decimal point programming
- Optional stop/block delete ■ Multiple repetitive cycle
- Tool nose radius compensation
- 16 sets of tool offsets, (32 sets on 18i TB control)
- Menu programming format with operator prompts
- Automatic reference zero return ■ Absolute encoders
- Work coordinate shift ■ Run hour & part count display
- Manual pulse generator ■ RS 232 interface port
- 2 axis contouring with linear and circular interpolation
- Program test using graphical simulation for detecting errors in part programs

Use the field proven machining cycles for complex turning, drilling and milling operations.

- Bar machining ■ Threading, ID/OD
- Grooving or face-turning, ID/OD
- Center drilling, drilling, boring, reaming, tapping
- C-axis drilling and tapping by power driven tools
- C-axis cylindrical machining including polar coordinate interpolation

Using Cycles for Complex Machining is as Easy as 1-2-3-4



1 From main screen, press Soft Key under Cycle Cutting icon



2 Press Soft Key under desired Cycle icon (Thread Cycle Mode was chosen)



3 Press Soft Key under Inner or Outer icon



4 From the Thread Cycle, the operator inputs data in a well laid out input field, on screen text help with input is available

TORNADO *T2, T4*



TORNADO T2, T4, T8 and T10 2 Axis CNC Lathes are precision turning machines with the state-of-the-art G.E. Fancuc 21i TB control, available in Chucking, Bar Feed and 'Lights-Out' Models...

- Powerful G.E. Fancuc spindle drive gives spindle acceleration time of 2 sec. to top speed
- New generation G.E. Fancuc 'B' Series 21i TB CNC control system with 'Manual Guide i' has twice the processing speed as the 'A' series
- Twelve station high speed turret
- Quick changeover and set-up with VDI tooling
- Axis torque monitoring and crash detection
- High performance slideway and carriageway assemblies
- One of the smallest footprint of any machine in its range
- High quality hydraulic chucking system
- Massive cast iron 60° bed with precision ground surfaces is mounted on an extra heavy-duty unstressed, fabricated **Duo-stable™** engineered base, designed for strength, vibration absorption and thermal and mechanical stability. As a result, the TORNADO is over 20 percent heavier than comparable machines.
- Easy installation and set-up...The base design allows easy fork lift access and the three point floor mount allows quick set-up, no leveling required
- Optional CAM system software package, designed to run on virtually any PC

T8 & T10 2 Axis Turning



TORNADO CNC
Turning Centers offer
Chucker, Bar Feed
and Unmanned
'Lights-Out' models
with the versatility
that can handle
your most demanding
turning needs...

Specifications	T2	T4	T8	T10
Capacity				
Swing over bed cover	16.14"(410mm)	16.14"(410mm)	20.07"(510mm)	23.62"(600mm)
Max. turned diameter	6.69"(170mm)	9.05"(230mm)	10.23"(260mm)	14.17"(360mm)
X axis travel	6.69"(170mm)	7.87"(200mm)	9.25"(235mm)	10.63"(270mm)
Max. turning length	13.78"(360mm)	17.72"(450mm)	21.26"(540mm)	23.62"(600mm)
Spindle				
Spindle nose	A2-5	A2-5	A2-6	A2-8
Power chuck (type A/B)	6.7"(170mm)	6.7"/8.26"(170/210mm)	8.26"/10"(210/254mm)	10"/12"(254/305mm)
Front bearing I/D	3.185"(81mm)	3.54"(90mm)	4.33"(110mm)	5.12"(127mm)
Spindle bore	2.13"(54mm)	2.40"(61mm)	3.05"(77.5mm)	3.56"(90.5mm)
Bar capacity	1.65"(42mm)	2.12"(54mm)	2.59"(66mm)	3.25"(82.5mm)
Max. spindle speed (A/B) (rpm)	6000/4000	6000/4000	5000/3500	4000/3000
Spindle motor (Cont./30 min.)	5/7.5 hp(4/5.5kW)	10/15 hp(7.5/11kW)	25/30 hp(19/22kW)	25/30 hp(19/22kW)
Axes				
Rapid traverse X-axis	394 in/min(20mpm)	394 in/min(20mpm)	984 in/min(25mpm)	984 in/min(25mpm)
Rapid traverse Z-axis	787 in/min(25mpm)	787 in/min(25mpm)	1180 in/min(30mpm)	1180 in/min(30mpm)
X-axis thrust (continuous)	565 lbf	565 lbf	850 lbf	850 lbf
Z-axis thrust (continuous)	848 lbf	848 lbf	1,607 lbf	1,607 lbf
X-axis ballscrew	25x4 mm	25x4 mm	32x5 mm	32x5 mm
Z-axis ballscrew	32x10 mm	32x10 mm	40x10mm	40x10mm
X/Z-axis encoder feedback	rotary	rotary	rotary	rotary
Positioning accuracy	±0.0002(0.005mm)	±0.0002(0.005mm)	±0.0002(0.005mm)	±0.0002(0.005mm)
Repeatability	±0.0001(0.002mm)	±0.0001(0.002mm)	±0.0001(0.002mm)	±0.0001(0.002mm)
Construction				
Carriage inclination	60°	60°	60°	60°
Spindle center height	35.24"(900mm)	35.24"(900mm)	37.80"(960mm)	38.46"(977mm)
Cross slide width	8.27"(210mm)	8.27"(210mm)	10.35"(263mm)	10.35"(263mm)
Cross slide type	20mm roller guides	20mm roller guides	35mm roller guides	35mm roller guides
Width across cross guide ways	7.32"(186mm)	7.32"(186mm)	8.9"(226mm)	8.9"(226mm)
Z-axis type	25mm roller guides	25mm roller guides	35mm roller guides	35mm roller guides
Bed width - linear guide rails	11.81"(300mm)	11.81"(300mm)	15.35"(390mm)	15.35"(390mm)
Tool Turret				
Turret disc diameter	13.4"(340mm)	13.4"(340mm)	17.32"(440mm)	18.3"(470mm)
Tooling system	VDI 30	VDI 30	VDI 40	VDI 40
No. of turret tool stations	12 bi-directional	12 bi-directional	12 bi-directional	12 bi-directional
Index time	0.6 sec	0.6 sec	0.45 sec	0.45 sec
Tool shank size	3/4"x3/4"(19x19mm)	3/4"x3/4"(19x19mm)	1" x 1"(25.4x25.4mm)	1" x 1"(25.4x25.4mm)
Max. boring bar	1.25"(32mm)	1.25"(32mm)	1.5"(38mm)	1.5"(38mm)
Travel past center line	0.87"(22mm)	0.87"(22mm)	1.06"(27mm)	1.06"(27mm)
Coolant, Space & Weight				
Coolant tank capacity	26 gal.(100 litres)	26 gal.(100 litres)	40 gal.(150 litres)	40 gal.(150 litres)
Coolant pump delivery	6.6 gal/min(25litres)	6.6 gal/min(25litres)	6.6 gal/min(25litres)	6.6 gal/min(25litres)
Maximum power consumption	22kVA	24kVA	45kVA	45kVA
Dimensions: L x W	95"x52"(2413x1321mm)	95"x52"(2413x1321mm)	107"x62"(2718x1575mm)	113"x61"(2870x1550mm)
Approx. net weight	6,019 lbs.(2730kg)	6,173 lbs.(2800kg)	9,810 lbs.(4450kg)	10,030 lbs.(4550kg)
Optional Tailstock (retrofittable)				
Tailstock quill diameter	2.48"(63mm)	2.48"(63mm)	3.74"(95mm)	3.74"(95mm)
Tailstock quill taper	3MT	3MT	5MT	5MT
Tailstock quill stroke	3.94"(100mm)	3.94"(100mm)	4.92"(125mm)	4.92"(125mm)
Tailstock body travel	17.72"(450mm)	17.72"(450mm)	23.62"(600mm)	23.62"(600mm)
Max. tailstock quill thrust	1,131 lbf	1,131 lbf	1,768 lbf	1,768 lbf

Model No.	Chuck Type	rpm	Max Bar
T2A	6.7" Hyd	6000	1.65" (42mm)
T2B	6.7" Hyd	4000	1.65" (42mm)
T2AB Bar Feed	Collet	6000	1.65" (42mm)
T2BB Bar Feed	Collet	4000	1.65" (42mm)
T2AL Lights-Out	Collet	6000	1.65" (42mm)
T2BL Lights-Out	Collet	4000	1.65" (42mm)
T4A	6.7" Hyd	6000	2.12" (54mm)
T4B	8.26" Hyd	4000	2.12" (54mm)
T4AB Bar Feed	Collet	6000	2.12" (54mm)
T4BB Bar Feed	Collet	4000	2.12" (54mm)
T4AL Lights-Out	Collet	6000	2.12" (54mm)
T4BL Lights-Out	Collet	4000	2.12" (54mm)
T8A	8.26" Hyd	5000	2.59" (66mm)
T8B	10" Hyd	3500	2.59" (66mm)
T8AB Bar Feed	Collet	5000	2.59" (66mm)
T8BB Bar Feed	Collet	3500	2.59" (66mm)
T8AL Lights-Out	Collet	5000	2.59" (66mm)
T8BL Lights-Out	Collet	3500	2.59" (66mm)
T10A	10" Hyd	4000	3.25" (82.5mm)
T10B	12" Hyd	3000	3.25" (82.5mm)
T10AB Bar Feed	Collet	4000	3.25" (82.5mm)
T10BB Bar Feed	Collet	3000	3.25" (82.5mm)
T10AL Lights-Out	Collet	4000	3.25" (82.5mm)
T10BL Lights-Out	Collet	3000	3.25" (82.5mm)

TORNADO *T6M &*



TORNADO T6M, T8M & T10M 3 Axis CNC Lathes are true precision turning centers with Turret Mounted Powered Tooling, controlled from the state-of-the-art G.E. Fanuc 21i TB control. 'M' models have all the machine design features as the 2 axis models with the added production flexibility of live tooling...

- TORNADO T6M, T8M & T10M offers milling power for both radial and axial milling, drilling, boring and tapping operations
- Live third axis turret mounted tooling adds flexibility and large production gains by cutting the number of set-ups and operations
- TORNADO "M" models are fitted with a linear scale on the X axis to maintain high accuracy even during 'off center' operations
- Powerful live tooling drive motor for real milling power, 5 hp on T6M & T8M, 7.5 hp on T10M
- High powered tool cutting speeds, up to 5000 rpm on T6M models and 4000 rpm on T8M & T10M models
- Twelve station high speed bi-directional turret with 12 powered stations on T6M & T10M models and 6 powered stations on T8M
- C axis positioning increment of 0.001° is fully programmable
- C axis contouring selected by M-code
- Quick changeover and set-up with VDI 30 tooling on T6M models and VDI 40 on T8M & T10M models
- Optional CAM system software package, designed to run on virtually any PC, developed for more complex 3 axis programming
- Available in Chucker, Barfeed and Unmanned 'Lights-Out' models

T8M T10M 3 Axis Turning



TORNADO 3 Axis CNC Turning Centers offer Chucker, Bar Feed and Unmanned 'Lights-Out' models. Equipped with 12 station turrets with 12 power stations and VDI 30 tooling on the T6M, 6 power stations and VDI 40 tooling on the T8M and 12 power stations and VDI 40 tooling on the T10M

Specifications	T6M	T8M	T10M
Capacity			
Swing over bed cover	17.32"(440mm)	20.07"(510mm)	23.62"(600mm)
Max. turned diameter	8.46"(215mm)	11.42"(290mm)	14.17"(360mm)
X axis travel	7.87"(200mm)	9.25"(235mm)	10.63"(270mm)
Max. turning length	17.72"(450mm)	21.26"(540mm)	23.62"(600mm)
Spindle			
Spindle nose	A2-5	A2-6	A2-8
Power chuck (type A/B)	6.7"/8.27"(170/210mm)	8.26"/10"(210/254mm)	10"/12"(254/305mm)
Front bearing I/D	3.54"(90mm)	4.33"(110mm)	5.12"(127mm)
Spindle bore	2.52"(64mm)	3.05"(77.5mm)	3.56"(90.5mm)
Bar capacity	2.12"(54mm)	2.59"(66mm)	3.25"(82.5mm)
Max. spindle speed (A/B) (rpm)	6000/4000	5000/3500	4000/3000
Spindle motor (Cont./30 min.)	15/20 hp(11/15kW)	25/30 hp(19/22kW)	25/30 hp(19/22kW)
Min. spindle speed for full power	1000 rpm	1000 rpm	750/565 rpm
Axes			
Rapid traverse X/Z-axis	984/1181 ipm(30/25mpm)	984/1181 ipm(30/25mpm)	984/1181 ipm(30/25mpm)
X/Z-axis thrust (continuous)	800/1,000 lbf	1,330/1,610 lbf	1,330/1,610 lbf
X/Z-axis ballscrew	32x8/32x10 mm	32x8/40x10 mm	32x8/40x10 mm
X/Z-axis encoder feedback	linear/rotary	linear/rotary	linear/rotary
Positioning accuracy	±0.0002(0.005mm)	±0.0002(0.005mm)	±0.0002(0.005mm)
Repeatability	±0.0001(0.002mm)	±0.0001(0.002mm)	±0.0001(0.002mm)
Construction			
Carriage inclination	60°	60°	60°
Spindle center height	36.81"(920mm)	37.80"(960mm)	38.46"(977mm)
Cross slide width	9.45"(240mm)	10.35"(263mm)	10.35"(263mm)
Cross slide type	20mm roller guides	35mm roller guides	35mm roller guides
Width across cross guides ways	8.15"(207mm)	8.9"(226mm)	8.9"(226mm)
Z-axis type	20mm roller guides	35mm roller guides	35mm roller guides
Bed width - linear guide rails	12.91"(328mm)	15.35"(390mm)	15.35"(390mm)
Tool Turret			
Turret disc diameter	14.57"(370mm)	17.32"(440mm)	18.5"(470mm)
Tooling system	VDI 30	VDI 40	VDI 40
No. of turret tool stations	12 bi-directional	12 bi-directional	12 bi-directional
Index time	0.45 sec	0.45 sec	0.45 sec
Tool shank size	3/4"x3/4"(19x19mm)	1"x1"(25.4x25.4mm)	1"x1"(25.4x25.4mm)
Max. boring bar	1.25"(32mm)	1.57"(38mm)	1.57"(38mm)
Travel past center line	1.06"(27mm)	1.06"(27mm)	1.06"(27mm)
Live Tooling			
C-axes min. increment	.001°	.001°	.001°
Power driven stations	12	6	12
Power station servo motor	5 hp	5hp	7.5hp
Rotating tool shank size	DIN5482 15x12	DIN5482 17x14	DIN5482 17x14
Maximum tool speed	5000 rpm	4000 rpm	4000 rpm
Maximum collet size	0.625"(16mm)	0.75"(19mm)	0.75"(19mm)
Coolant, Space & Weight			
Coolant tank capacity	26 gal.(100 litres)	40 gal.(150 litres)	40 gal.(150 litres)
Coolant pump delivery	6.6 gal/min(25 litres/min)	6.6 gal/min(25 litres/min)	6.6 gal/min(25 litres/min)
Maximum power consumption	45kVA	45kVA	50kVA
Dimensions: L x W	103"x65"(2616x1651mm)	107"x62"(2719x1575mm)	107"x62"(2719x1575mm)
Approx. net weight	8,818 lbs.(4000kg)	10,031 lbs.(4550kg)	10,251 lbs.(4650kg)
Optional Tailstock			
Tailstock quill diameter	2.48"(63mm)	3.74"(95mm)	3.74"(95mm)
Tailstock quill taper	3MT	5MT	5MT
Tailstock quill stroke	4.13"(105mm)	4.92"(125mm)	4.92"(125mm)
Tailstock body travel	21.25"(540mm)	23.62"(600mm)	23.62"(600mm)
Max. tailstock quill thrust	1,131 lbf	1,768 lbf	1,768 lbf

Model No.	Chuck Type	rpm	Max Bar
T6MA	6.7" Hyd	6000	2.12"(54mm)
T6MB	8.26" Hyd	4000	2.12"(54mm)
T6MAB Bar Feed	Collet	6000	2.12"(54mm)
T6MBB Bar Feed	Collet	4000	2.12"(54mm)
T6MAL Lights-Out	Collet	6000	2.12"(54mm)
T6MBL Lights-Out	Collet	4000	2.12"(54mm)
T8MA	8.26" Hyd	5000	2.59"(66mm)
T8MB	10" Hyd	3500	2.59"(66mm)
T8MAB Bar Feed	Collet	5000	2.59"(66mm)
T8MBB Bar Feed	Collet	3500	2.59"(66mm)
T8MAL Lights-Out	Collet	5000	2.59"(66mm)
T8MBL Lights-Out	Collet	3500	2.59"(66mm)
T10MA	10" Hyd	4000	3.25"(82.5mm)
T10MB	12" Hyd	3000	3.25"(82.5mm)
T10MAB Bar Feed	Collet	4000	3.25"(82.5mm)
T10MBB Bar Feed	Collet	3000	3.25"(82.5mm)
T10MAL Lights-Out	Collet	4000	3.25"(82.5mm)
T10MBL Lights-Out	Collet	3000	3.25"(82.5mm)

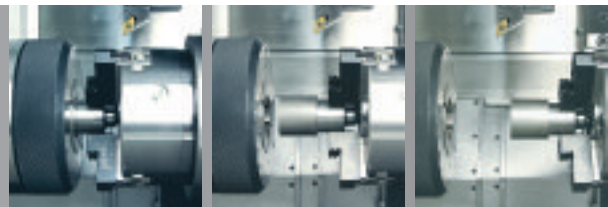
TORNADO *T6MS &*



TORNADO T6MS and T8MS 5 Axis CNC Lathes are true 'Single-hit' turning centers with the addition of a powerful sub spindle and controlled from the state-of-the-art G.E. Fanuc 18i TB control for 5 axis programming. 'MS' models have all the machine design features as the 2 & 3 axis models and add production flexibility with a sub-spindle and live tooling...

- The addition of the sub spindle allows 'Single-hit' machining. By transferring the workpiece to the sub spindle for additional turning and milling, the part can be completed in a single operation
- TORNADO T6MS and T8MS offer milling power for both radial and axial milling, drilling, boring and tapping operations on either spindle
- The sub spindle is driven by a powerful 7.5 hp (5kW) drive motor on the T6MS and 10 hp (7.5kW) drive motor on the T8MS
- High speed turning: up to 6000 rpm on T6MS models and 5000 rpm on T8MS models
- Sub-spindle chuck and collet capacity: 5.1" (130mm) chuck and 1.3" (33mm) collet on T6MS models and 6.7" (170mm) chuck and 1.69" (43mm) collet on T8MS models
- TORNADO 'MS' models are fitted with a linear scale on the X axis to maintain high accuracy even during 'off center' operations
- Twelve station high speed bi-directional turret with 12 power stations
- B & C axis positioning increment of 0.001° is fully programmable
- Quick changeover and set-up with VDI 30 tooling on T6MS models and VDI 40 on T8MS models
- Optional CAM system software package, designed to run on virtually any PC, developed for more complex 5 axis programming
- Available in Chucker, Barfeed and Unmanned 'Lights-Out' models
- Ethernet Link. Allows remote access to the CNC control for part program transfer, supervisory control, data acquisition, diagnostic and maintenance functions.

T8MS 5 Axis Turning



TORNADO 5 Axis 'Single Hit' Machining... The addition of a Sub-Spindle and the G.E. Fanuc 18i TB Control for 5 axis programming with 'Manual Guide i' software allow quick and easy set-ups, making the TORNADO MS models true 'Single Hit' Machining Centers

Model No.	Chuck Type	rpm	Max Bar
T6MSA	6.7" Hyd	6000	2.12"(54mm)
T6MSB	8.26" Hyd	4000	2.12"(54mm)
T6MSAB Bar Feed	Collet	6000	2.12"(54mm)
T6MSBB Bar Feed	Collet	4000	2.12"(54mm)
T6MSAL Lights-Out	Collet	6000	2.12"(54mm)
T6MSBL Lights-Out	Collet	4000	2.12"(54mm)
T8MSA	8.26" Hyd	5000	2.59"(66mm)
T8MSB	10" Hyd	3500	2.59"(66mm)
T8MSAB Bar Feed	Collet	5000	2.59"(66mm)
T8MSBB Bar Feed	Collet	3500	2.59"(66mm)
T8MSAL Lights-Out	Collet	5000	2.59"(66mm)
T8MSBL Lights-Out	Collet	3500	2.59"(66mm)

Specifications	T6MS	T8MS
Sub-Spindle Linear Pos. (A-axis)		
Width across cross guide ways	9.52"(242mm)	9.52"(242mm)
Guide way type	35mm roller guide	35mm roller guide
Min/max jaw to jaw travel	.79"/18.5"(20/470mm)	0"-23.62"(0/600mm)
Travel	17.7"	24.61"
A-axis ballscrew	32 x 10 mm	32 x 10 mm
A-axis rapid traverse	1,181 in/min(25m/min)	1,181 in/min(25m/min)
Sub-Spindle Rotational (B-axis)		
Spindle	DIN 6353	DIN 6353
Chuck dia.	5.1"(130mm)	6.7"(170mm)
Spindle bore	2.165"(55mm)	2.165"(55mm)
Drawtube (diameter x length)	1.57"x14.57"(40x370mm)	1.57"x17.08"(40x370mm)
Spindle speed	6000 rpm	5000 rpm
Spindle motor	7.5 hp(5kW)	10 hp(7.5kW)
B-axis min increment	.001°	.001°

Specifications	T6MS	T8MS
Capacity		
Swing over bed cover	19.88"(505mm)	26.06"(662mm)
Max. turned diameter	8.66"(220mm)	11.81"(300mm)
X axis travel	5.79"(147mm)	7.46"(190mm)
Max. turning length	17.72"(450mm)	21.26"(540mm)
Spindle		
Spindle nose	A2-5	A2-6
Power chuck (type A/B)	6.7"/8.26"(170/210mm)	8.26"/10"(210/254mm)
Front bearing I/D	3.54"(90mm)	4.33"(110mm)
Spindle bore	2.52"(64mm)	3.05"(77.5mm)
Bar capacity	2.12"(54mm)	2.59"(66mm)
Max. spindle speed (A/B) (rpm)	6000/4000	5000/3500
Spindle motor (Cont./30 min.)	15/20 hp(11/15kW)	25/30 hp(19/22kW)
Min spindle speed for full power	1000 rpm	1000 rpm
Axes		
Rapid traverse X/Z-axis	984/1181ipm(30/20mpm)	984/1181 ipm(30/20mpm)
X/Z-axis thrust (continuous)	800/1,000 lbf	1,330/1,610 lbf
X/Z-axis ballscrew	32x8/32x10 mm	32x8/40x10 mm
X/Z-axis encoder feedback	linear/rotary	linear/rotary
Positioning accuracy	±0.0002(0.005mm)	±0.0002(0.005mm)
Repeatability	±0.0001(0.002mm)	±0.0001(0.002mm)
Construction		
Carriage inclination	60°	60°
Spindle center height	37.79"(960mm)	38.78"(985mm)
Cross slide width	9.45(240mm)	10.23"(259mm)
Cross slide type	30mm roller guide	35mm roller guide
Width across cross guide ways	8.15"(207mm)	8.9"(226mm)
Z-axis type	30mm roller guide	35mm roller guide
Bed width - linear guide rails	12.91"(328mm)	15.31"(389mm)
Tool Turret		
Turret disc diameter	10.63"(270mm)	12.6"(320mm)
Tooling system	VDI 30	VDI 40
No. of turret tool stations	12 bi-directional	12 bi-directional
Index time	0.33 sec	0.33 sec
Tool shank size	3/4" x 3/4"(19x19mm)	1" x 1"(25.4x25.4mm)
Max. boring bar	1.25"(32mm)	1.57"(38mm)
Travel past center line	1.06"(27mm)	1.06"(27mm)
Live Tooling		
C-axes min. increment	.001°	.001°
Power driven stations	12	12
Power station servo motor	5 hp	5 hp
Rotating tool shank size	DIN5480 16x0.8	DIN5482 20x0.8
Maximum tool speed	5000 rpm	4000 rpm
Maximum collet size	0.625(16mm)	0.75(19mm)
Coolant, Space & Weight		
Coolant tank capacity	26 gal.(100 litres)	40 gal.(150 litres)
Coolant pump delivery	6.6 gal/min(25 litres/min)	6.6 gal/min(25 litres/min)
Maximum power consumption	45kVA	50kVA
Dimensions: L x W	103"x65"(2616x1651mm)	115"x66"(2916x1651mm)
Approx. net weight	8,818 lbs.(4000kg)	10,031 lbs.(4650kg)

TORNADO T8MSY



TORNADO T8MSY 6 Axis CNC Lathes are the ultimate turning centers with Y-axis machining, allowing the operator to take full advantage of the machine's milling capability by providing 'off center line' machining controlled by the state-of-the-art G.E. Fanuc 18i TB control. The T8MSY has all the machine design features as the 2, 3 & 5 axis models...

- In addition to the sub spindle, the T8MSY turning center offers Y-axis machining, allowing you to take full advantage of the machines milling capability by providing 'off center line' (± 1.57 " 40mm) milling for the accurate machining of keyways, flat and contoured surfaces
- The sub spindle is driven by a powerful 10 hp (7.5kW) drive motor
- TORNADO T8MSY offer milling power for both radial and axial milling, drilling, boring and tapping operations on either spindle
- High speed turning, up to 5000 rpm
- Sub-spindle has 6.7" (170mm) chuck and 1.69" (43mm) collet capacity
- TORNADO 'MSY' is fitted with a linear scale on the X axis to maintain high accuracy even during 'off center' operations
- Twelve station high speed bi-directional turret with 12 power stations
- B & C axis positioning increment of 0.001° is fully programmable
- Quick changeover and set-up with VDI 30 tooling
- Optional CAM system software package, designed to run on virtually any PC, developed for more complex 5 axis programming
- Available in Chucker, Barfeed and Unmanned 'Lights-Out' models
- Ethernet Link. Allows remote access to the CNC control for part program transfer, supervisory control, data acquisition, diagnostic and maintenance functions.

6 Axis Turning



6 Axis TORNADO's are the ultimate in Turning Centers with Y-axis 'off center line' Milling, Sub-spindle operation, Turret Mounted Powered Tooling, all controlled by the G.E. Fanuc 18i TB Control with 'Manual Guide i' Software

Model No.	Chuck Type	rpm	Max Bar
T8MSYA	8.26" Hyd	5000	2.59"(66mm)
T8MSYB	10" Hyd	3500	2.59"(66mm)
T8MSYAB Bar Feed	Collet	5000	2.59"(66mm)
T8MSYBB Bar Feed	Collet	3500	2.59"(66mm)
T8MSYAL Lights-Out	Collet	5000	2.59"(66mm)
T8MSYBL Lights-Out	Collet	3500	2.59"(66mm)

Specifications T8MSY

Sub-Spindle Linear Pos. (A-axis)

Width across cross guide ways	9.52"(242mm)
Guide way type	35mm roller guide
Min/max jaw to jaw travel	0"-23.62"(0/600mm)
Travel	24.61"
A-axis ballscrew	32 x 10 mm
A-axis rapid traverse	1,181 in/min(25m/min)

Sub-Spindle Rotational (B-axis)

Spindle	DIN 6353
Chuck dia.	6.7"(170mm)
Spindle bore	2.165"(55mm)
Drawtube (diameter x length)	1.57"x17.08"(40x370mm)
Spindle speed	5000 rpm
Spindle motor	10 hp(7.5kW)
B-axis min increment	.001°

Y Axis Specification

Y axis stroke	±1.57" (40mm)
Tooling type	VDI 30
Tooling stations	12 power driven
Max power tool speed	5000 rpm

Specifications T8MSY

Capacity

Swing over bed cover	26.06"(662mm)
Max. turned diameter	11.81"(300mm)
X axis travel	7.46"(190mm)
Max. turning length	21.26"(540mm)

Spindle

Spindle nose	A2-6
Power chuck (type A/B)	8.26"/10"(210/254mm)
Front bearing ID	4.33"(110mm)
Spindle bore	3.05"(77.5mm)
Bar capacity	2.59"(66mm)
Max. spindle speed (A/B) (rpm)	5000/3500
Spindle motor (Cont./30 min.)	25/30 hp(19/22kW)
Min spindle speed for full power	1000 rpm

Axes

Rapid traverse X/Z-axis	984/1181 ipm(30/20mpm)
X/Z-axis thrust (continuous)	1,330/1,610 lbf
X/Z-axis ballscrew	32x8/40x10 mm
X/Z-axis encoder feedback	linear/rotary
Positioning accuracy	±0.0002(0.005mm)
Repeatability	±0.0001(0.002mm)

Construction

Carriage inclination	60°
Spindle center height	38.78"(985mm)
Cross slide width	10.23"(259mm)
Cross slide type	35mm roller guide
Width across cross guide ways	8.9"(226mm)
Z-axis type	35mm roller guide
Bed width - linear guide rails	15.31"(389mm)

Tool Turret

Turret disc diameter	12.6"(320mm)
Tooling system	VDI 40
No. of turret tool stations	12 bi-directional
Index time	0.33 sec
Tool shank size	1" x 1"(25.4x25.4mm)
Max. boring bar	1.57"(38mm)
Travel past center line	1.06"(27mm)

Live Tooling

C-axes min. increment	.001°
Power driven stations	12
Power station servo motor	5 hp
Rotating tool shank size	DIN5480 16x0.8
Maximum tool speed	5000 rpm
Maximum collet size	0.625(16mm)

Coolant, Space & Weight

Coolant tank capacity	40 gal.(150 litres)
Coolant pump delivery	6.6 gal/min(25 litres/min)
Maximum power consumption	50kVA
Dimensions: L x W	115"x66"(2616x1651mm)
Approx. net weight	10,031 lbs.(4650kg)

Automated Turning



Magazine Barfeed
System and
'Lights-Out' Package



Magazine Barfeed Unit, Completely Integrated with the TORNADO CNC Turning Center, Operated and Controlled Directly from the Fanuc 21i/18i TB Control System...

- No mechanical stops to set
- Automatic measurement of each bar loaded
- Automatic calculation of pieces to be machined from each bar
- Text pages on screen for production schedule facility
- Work scheduling to produce a variety of components automatically

The Innovative 'Lights-Out' Package Integrates the TORNADO Turning Center and the MBF1000 Barfeed System to offer 24 Hour Unmanned Operation...

- Cost efficient and unmatched productivity
- Colchester/Harrison MBF1000 barfeed automation software
- Part probing plus probing routines
- Chip and parts management system
- Production scheduling
- Tool management system
 - Tool life monitoring
 - Tool wear/breakage detection
 - Sister tool replacement routines
- In process gauging

Specification	T2	T4/T6M/MS	T8/M/MS/T10/M
Bar Capacity			
Round inch	.23"-1.65"(6-42mm)	.23"-2.04"(6-54mm)	.23"-2.59"(6-66mm)
Hexagonal A/F Max	1.41"(36mm)	1.77"(45mm)	2.20"(56mm)
Square A/F Max	1.14"(29mm)	1.41"(36mm)	1.77"(45mm)
Maximum length of bar stock			
		39.37"(1000mm) (T2/T4)	43.3"(1100mm) (T6/T8/T10)
Material rack capacity			
		1"(25mm) - 20 pieces	1.5"(45mm) - 12 pieces
		2.5"(65mm) - 7 pieces	
3 Push Rod diameters			
		.23"(6mm), .39"(10mm), .71"(18mm)	
Master liner			
		For supporting bar stock in headstock spindle	
Feed/load			
Bar feed to spindle liner	Full positioning by integral servo drive		
Bar load to guide vee	Electrically driven multi-vee pick and place from adjustable table		
Bar stock preparation			
Bar guide within spindle	Chamfer not required - de-burr only		
	.0197"(.05mm) -.0394"(1mm) clear support bushings or liners		
Vee guide adjustment			
	Manual unclamp/clamp lever with handwheel height adjustment		
Total working travel			
	46.69"(118mm)		
Bar pusher rapid traverse rate			
	Same as lathe		
Programming			
	Programming pages on G.E.Fanuc 21i/18i TB for operation and unmanned running including height adjustment		
Overall dimensions			
	66.9"(170mm) L x 40.2"(102mm) W x 46.1"(117mm) H		

Optional Equipment

A wide range of optional equipment is available to customize your TORNADO into the exact machine for your 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. The lower speed option offers higher torque and greater chuck capacity.

Hydraulic tailstock. Suitable for bar and shaft turning, it is manually positioned complete with hydraulic quill. Quill operation is programmable and hydraulically operated for automated operations.

Chip conveyor. Ultra simple and reliable conveyor for the automatic removal of chips and other debris.

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

Renishaw workpiece measuring probe. Optically coupled LP2 probe provides 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.

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

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

Generic bar feeder interface. Suitable for most popular makes of bar feeders.

Workholding Options

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

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

Tooling Options #30 and #40 Shanks

VDI Toolholders. Wide range of turning toolholders, long and short form, standard & inverted styles. Boring bar, Morse taper, collet chucks and power driven toolholders for live tooling machines.

Software Options

COLCAM. CAM software has been developed by Colchester to reduce programming times on all Colchester/Harrison 2, 3, 5 and 6 axis machines. Equally suitable for other CNC machines including machining centers.

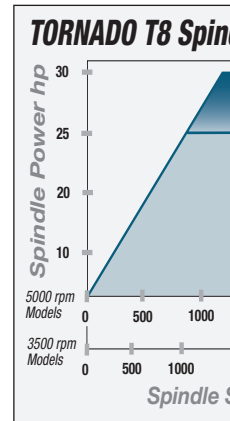
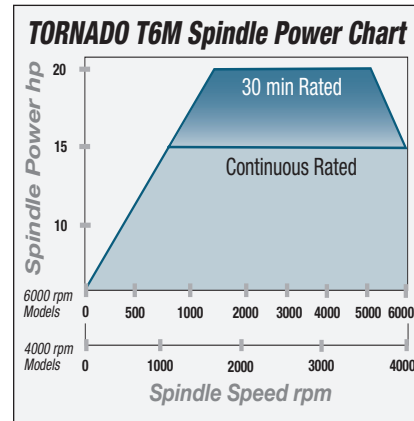
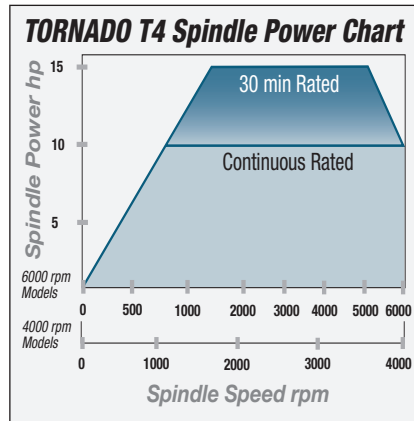
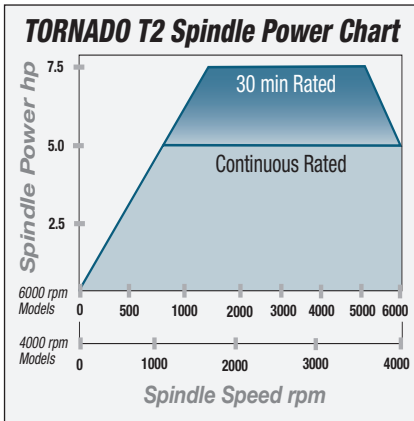
Ethernet Link. Allows remote accessing of the CNC to extract data for part program transfer, supervisory control, data acquisition, diagnostic and maintenance functions. (Standard on MS models)

G.E. FANUC Control System Options

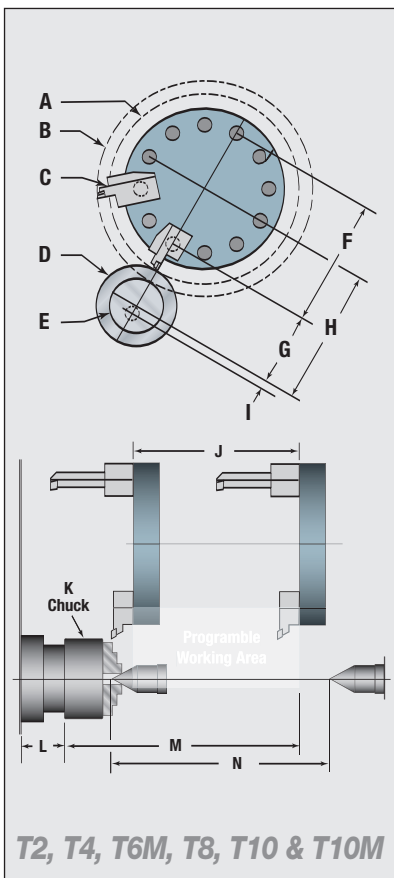
Custom macro 'B' • 16 additional pairs of tool offsets (total 32 pairs) • Thread cycle retract • Variable lead threading • Stored stroke limit • Extended part program edit • Multiple optional block skip • Expanded memory to 128K total.



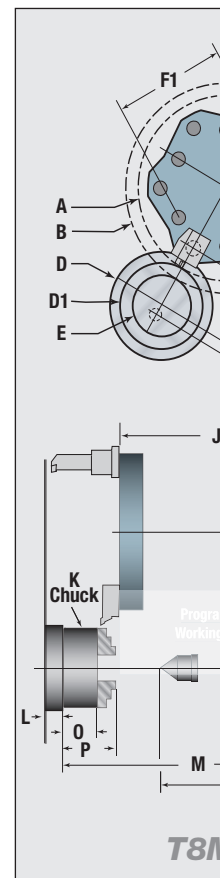
Spindle Power



Turret, Tooling Stroke and Traverse Dimensions

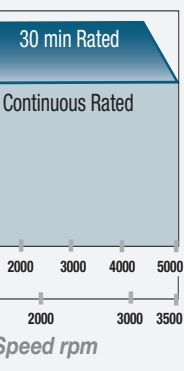


Model	T2	T4	T6M	T8	T10	T10M
Standard Tool A	15.75" (400mm)	15.75" (400mm)	16.38" (476mm)	18.35 (466mm)	20.71" (526mm)	20.31" (516mm)
Extended Tool B	17.91" (455mm)	17.91" (455mm)	18.74" (476mm)	20.94" (532mm)	23.31" (592mm)	22.91" (582mm)
VDI Tooling C	#30	#30	#30	#40	#40	#40
Max. Standard Tool D	6.69" (170mm)	9.06" (230mm)	9.06" (230mm)	10.23" (260mm)	7.07" (179.5mm)	7.26" (184.5mm)
Max. Extended Tool E	4.53" (115mm)	6.89" (175mm)	6.1" (155mm)	7.64" (194mm)	5.77" (146.5mm)	5.96 (151.5mm)
F	10.63" (270mm)	10.63" (270mm)	11.81" (300mm)	13.39" (340mm)	15.75" (400mm)	15.35" (390mm)
G	5.91" (150mm)	7.09" (180mm)	6.5" (165mm)	7.6" (193mm)	9.56" (242.5mm)	9.74" (247.5mm)
H	11.22" (285mm)	12.4" (315mm)	12.4" (315mm)	14.29" (363mm)	17.42" (442.5mm)	17.42" (442.5mm)
I	1.06" (27mm)	1.06" (27mm)	1.06" (27mm)	1.65" (42mm)	1.08" (27.5mm)	1.08" (27.5mm)
Work Travel J	13.78" (350mm)	17.72" (450mm)	17.72" (450mm)	21.26" (540mm)	23.62" (600mm)	23.62" (600mm)
Chuck K	6.7" (170mm)	6.7" (170mm)	6.7" (170mm)	8.27" (210mm)	10" (265mm)	10" (265mm)
L	3.7" (94mm)	3.7" (94mm)	3.5" (89mm)	2.05" (52mm)	2.36" (60mm)	2.36" (60mm)
M	19.49" (495mm)	23.43" (595mm)	23.62" (600mm)	27.36" (695mm)	27.8" (706mm)	27.8" (706mm)
Tailstock Body Travel N	21.26" (540mm)	21.26" (540mm)	21.26" (540mm)	23.62" (600mm)	23.62" (600mm)	23.62" (600mm)

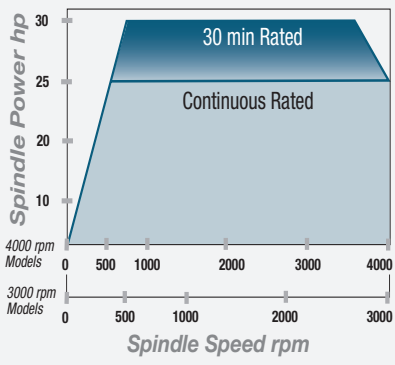


TORNADO's powerful spindle drive motor provides exceptional low end torque for a maximum operating range at full horse power

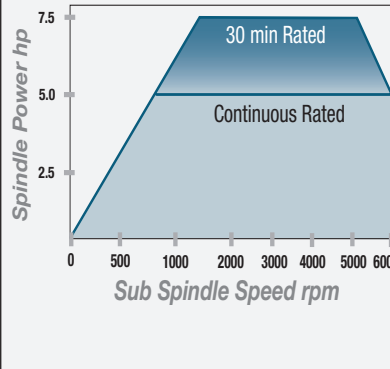
Spindle Power Chart



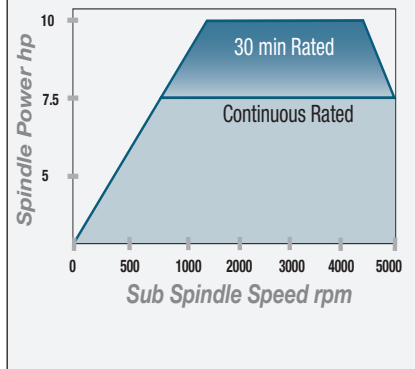
TORNADO T10 Spindle Power Chart



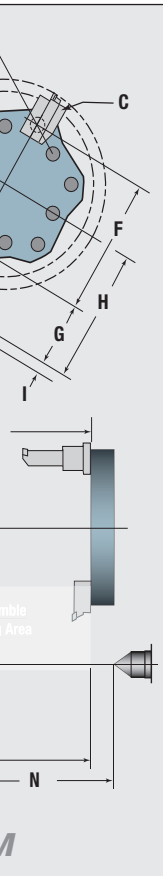
TORNADO T6MS Sub Spindle Power Chart



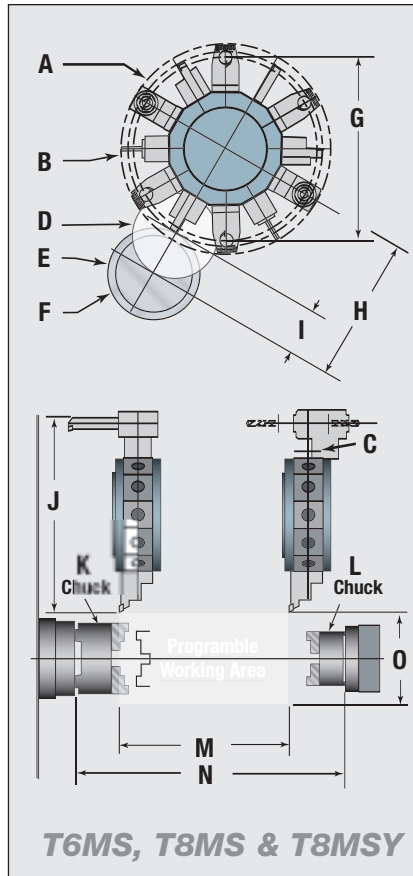
TORNADO T8MS Sub Spindle Power Chart



TORNADO's offer a large range of working strokes, traverse limits and swing capacities

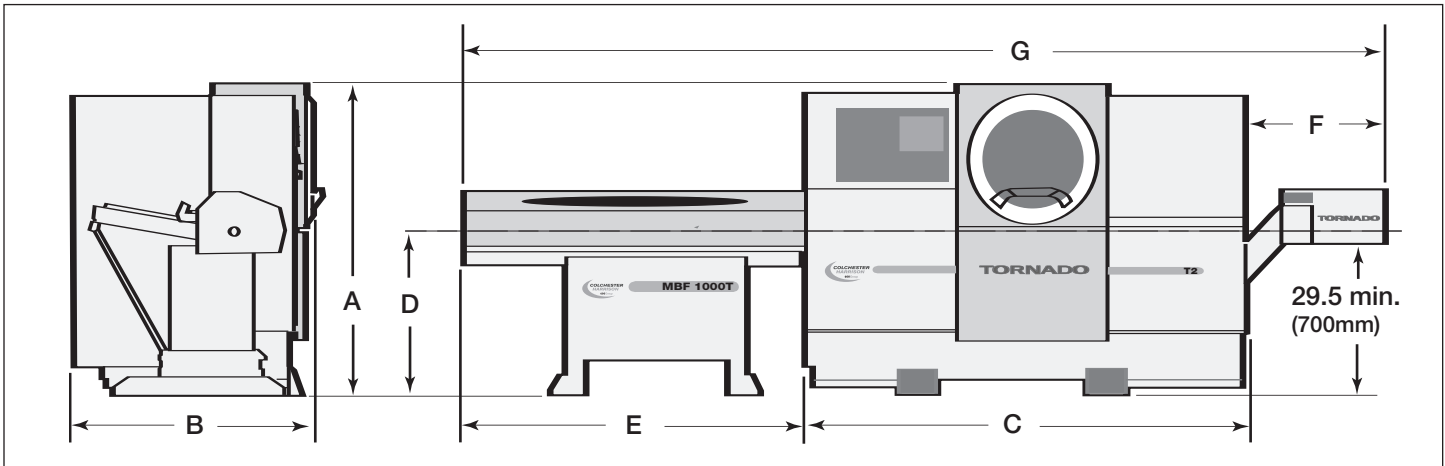


Model	T8M
Standard Tool A	19.52" (496mm)
Extended Tool B	22.13" (562mm)
VDI Tooling C	#40
Max. Dia. Std. Holder Inner Position D	11.42" (290mm)
Max. Dia. Std. Holder Outer Position D1	9.05" (230mm)
Max. Extended Tool E	6.44" (164mm)
F	14.57" (370mm)
F1	12.2" (310mm)
G	7.01" (178mm)
H	14.29" (363mm)
I	2.24" (56.9mm)
Work Travel J	21.26" (540mm)
Chuck K	8.26" (210mm)
L	2.05" (52mm)
M	27.36" (695mm)
Tailstock Body Travel N	23.62" (600mm)
O	3.66" (93mm)
P	5.74" (146mm)



Model	T6MS	T8MS	T8MSY
Tool Tip Swing Over Cover A	19.88" (505mm)	26.06" (662mm)	19.88" (505mm)
Tool Tip Swing Over Saddle Wing B	18.35" (466mm)	23.77" (603mm)	18.35" (466mm)
VDI Tooling C	#30	#40	#30
To Clear B.Bar D	8.07" (205mm)	9.25" (235mm)	8.07" (205mm)
Max. Turned Diameter E	8.66" (220mm)	11.81" (300mm)	8.66" (220mm)
To Clear Index F	7.28" (185mm)	6.16" (157mm)	7.28" (185mm)
G	17.32" (440mm)	20.47" (520mm)	17.32" (440mm)
H	13.58" (345mm)	16.61" (422mm)	13.58" (345mm)
I	4.92" (125mm)	6.38" (162mm)	4.92" (125mm)
Standard Tooling J	18.5" (470mm)	21.77" (553mm)	18.5" (470mm)
Chuck K	6.7" (170mm)	10" (254mm)	10" (254mm)
Sub. Spindle Chuck L	5.12" (130mm)	6.7" (170mm)	6.7" (170mm)
M	17.72" (450mm)	21.02" (534mm)	21.02" (534mm)
Tailstock Body Travel N	27.09" (688mm)	35.04" (890mm)	35.04" (890mm)
O	8.66" (220mm)	11.81" (299mm)	11.81" (299mm)

Machine Dimensions



Model	T2	T4	T6M	T6MS	T8/T8M	T8MS/MSY	T10/MS
Machine Height A	66.9" (1700mm)	69.9" (1700mm)	73.2" (1860mm)	73.2" (1860mm)	76.8" (1955mm)	77.8" (1975mm)	77.8" (1975mm)
Machine Width B	51.6" (1312mm)	51.6" (1312mm)	64.8" (1647mm)	64.8" (1647mm)	61.8" (1570mm)	65.7" (1670mm)	65.7" (1670mm)
Machine Length C	94.7" (2405mm)	94.7" (2405mm)	102.6" (2605mm)	102.6" (2605mm)	106.3" (2700mm)	114.6" (2910mm)	114.6" (2910mm)
Center Height from Floor D	35.24" (895mm)	35.24" (895mm)	36.81" (935mm)	36.81" (935mm)	37.79" (960mm)	38.78" (985mm)	38.78" (985mm)
MBF1000 Barfeed Length E	66" (1675mm)	66" (1675mm)	66" (1675mm)	66" (1675mm)	66" (1675mm)	66" (1675mm)	66" (1675mm)
Chip Conveyor Length F	30.1" (765mm)	30.1" (765mm)	38.4" (975mm)	38.4" (975mm)	35.6" (905mm)	42.3" (1075mm)	42.3" (1075mm)
Length with Barfeed & Chip Conveyor G	190.7" (4845mm)	190.7" (4845mm)	206.9" (5255mm)	206.9" (5255mm)	207.9" (5280mm)	222.8" (5660mm)	222.8" (5660mm)

Specifications and design are subject to change without notice or obligation.

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