NTY^3-100

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

NTY^3-100

High Productivity Multitasking Machine

From diversified small-lot production to mass production

Nakamura-Tome

Innovation Technology

Creating Value

Upgraded Milling Capabilities

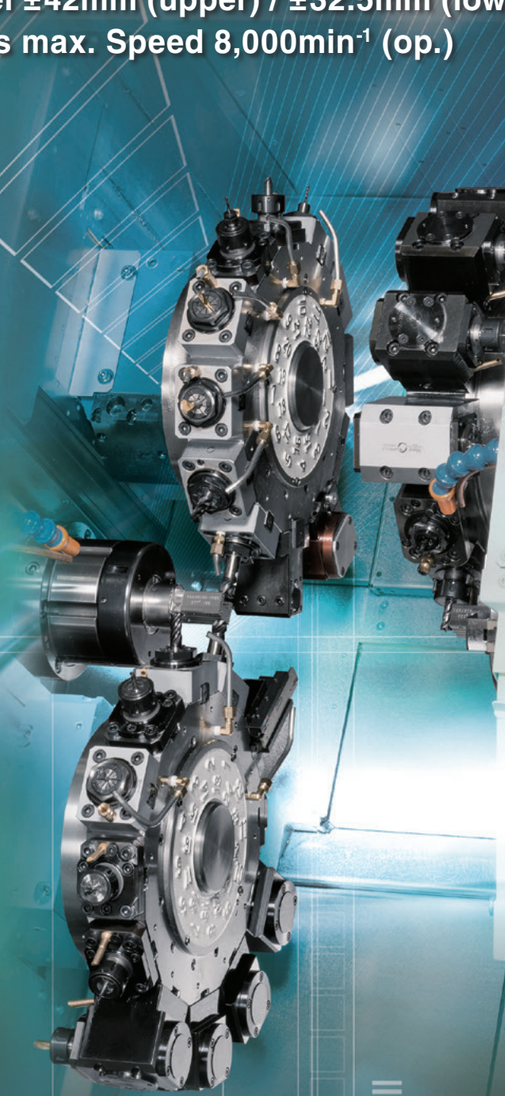
Y-axis travel ±42mm (upper) / ±32.5mm (lower)
Milling tools max. Speed 8,000min^{-1} (op.)

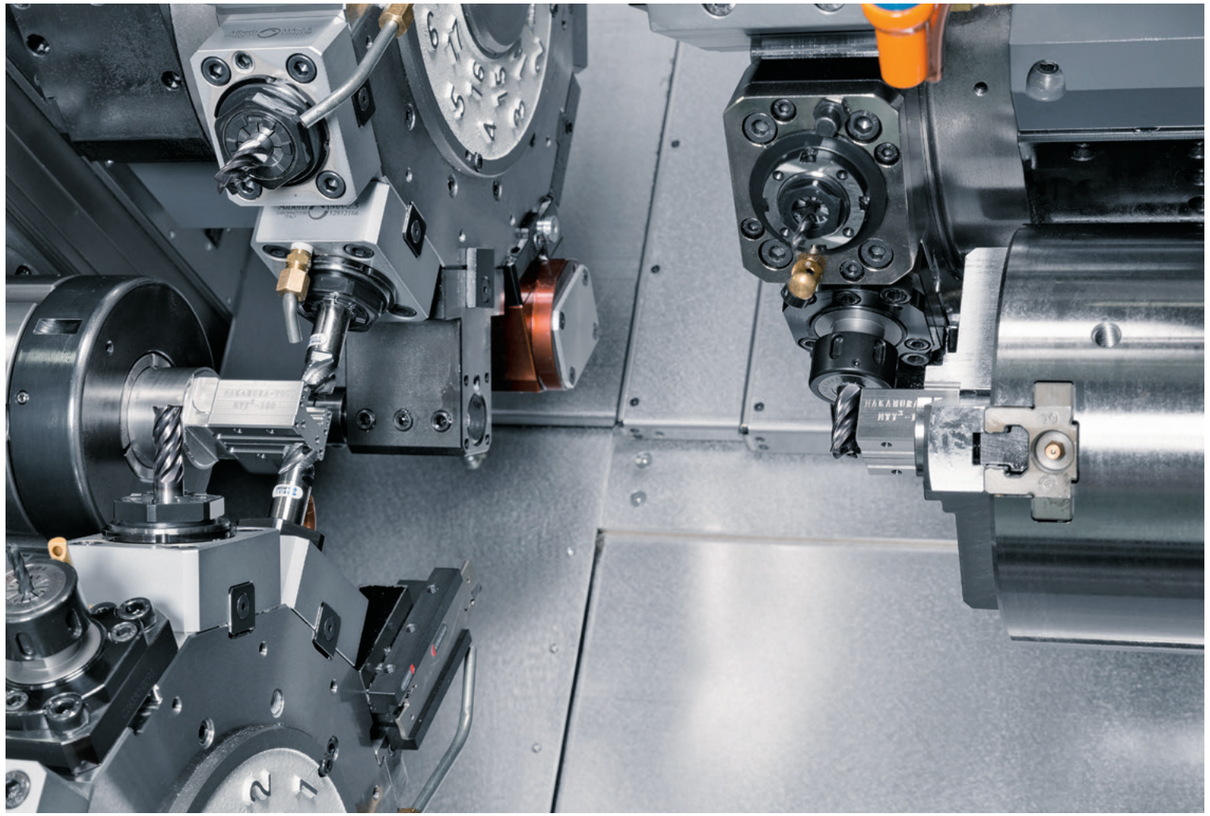
One hit machining

Finished parts, complete in one set up

M×3 Three Milling Motors

Y×3 Three Y-axes

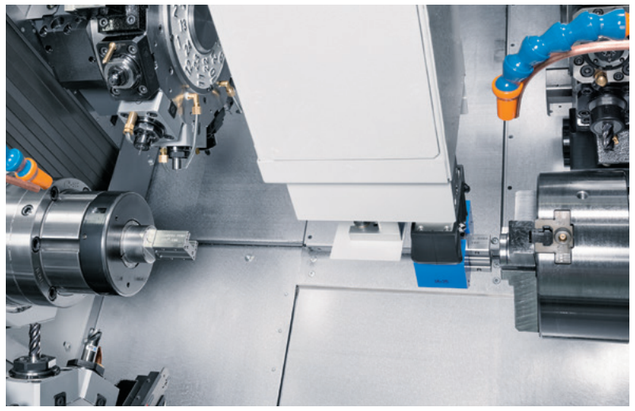


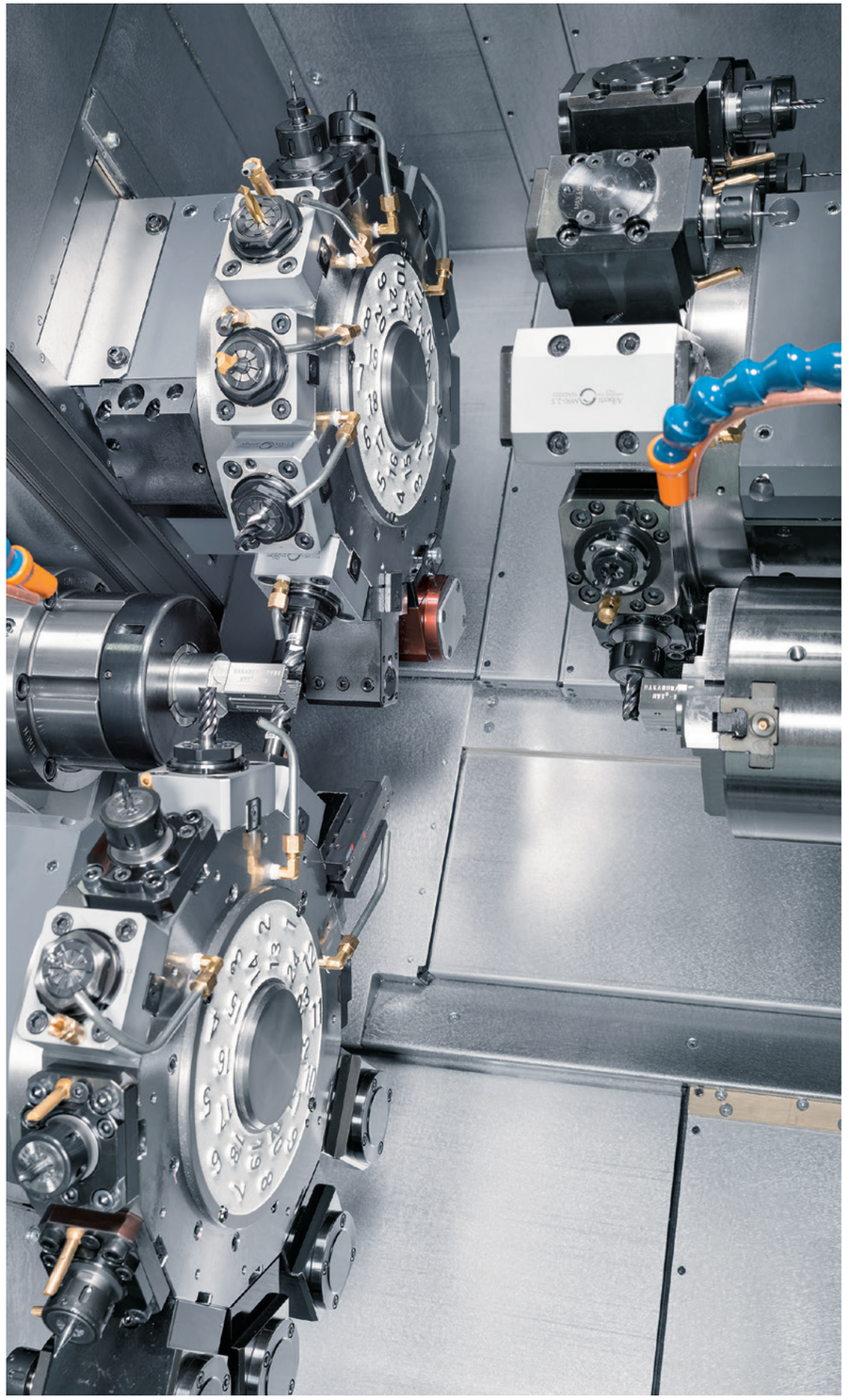


High Productivity

Top Leader of One-hit Machining

- No Work in Process
- Less setup time
- Complete in one setup





15-Station Turret

45

15 - Station

15 + 15 + 15

12-Station Turret

72

12 / 24 - Station

24 + 24 + 24

Up to 72 tool stations for turning tools and 36 stations for driven-tools.

Milling on all three turrets

M×3

Milling-tool motor
7.1/2.2kW × 3

Y-axis on all three turrets

Y×3

Y-axis travel
12st : ±42.0mm (Upper)
±32.5mm (Lower)
15st : ±31.0mm

NTY³-100 Compact 3-Turret Machine with 45 Milling Tools (15-St. Turret op.)

19″ Color LCD Touch Panel

NT Smart X

T×3 Three turrets | M×3 Three Milling Motors | Y×3 Three Y-axes | S×2 Twin-Spindles | C×2 C-axes | B2 B-axis

■Capacity		ϕ42mm	ϕ51mm (op.)	ϕ65mm (op.)
Max. turning diameter	12st.	175mm	200mm	
	15st.		190mm	
Max. turning length		588mm	570mm	
Distance between spindles		max. 820mm / min. 200mm		
Bar capacity		ϕ42mm	ϕ51mm	ϕ65mm
Chuck size	L / R	165mm (6") / 165mm (6")		
■Axis travel				
Slide travel (X1 / X2 / X3)	12st.	135 / 150 / 135mm	150 / 150 / 141mm	
	15st.	145 / 145 / 130mm		
Slide travel (Z1 / Z2 / Z3)	12st.	245 / 245 / 578mm	227 / 245 / 560mm	
	15st.	202 / 202 / 560mm		
Slide travel (Y1 / Y2 / Y3)	12st.	±42 / ±42 / ±32.5mm		
	15st.	±31mm		
Slide travel (B)		620mm		
■Spindle L, R				
Spindle speed		6,000min^{-1}	5,000min^{-1}	4,500min^{-1}
Spindle motor output (L / R)		11/7.5kW	11/7.5kW (op. 15/11kW)	
■Turrets				
Number of turrets (Upper / Lower)		2 / 1		
Driven-tool spindle speed		6,000min^{-1} (op. 8,000min^{-1} Only for 12-station turret)		
Drive motor		7.1/2.2kW (op. 5.5/2.2kW)		
Type of turret head / Number of indexing pos.	12st.	Dodecagonal drum turret / 24		
	15st.	15-station turret / 15		
Drive type / Number of driven-tool stations	12st.	Individual rotation / 12		
	15st.	Individual rotation / 15		
■General				
Floor space (L×W×H)		3,428mm × 2,257mm × 1,930mm		
Machine Weight (incl.control)		9,500kg		

* Either 12-station turret or 15-station turret specification must be chosen for all turrets.

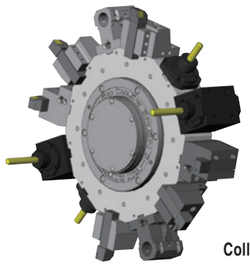
NTY³-100

NTY³-100 Machine Structure

Stable Accuracy Ensured

High-rigidity turret

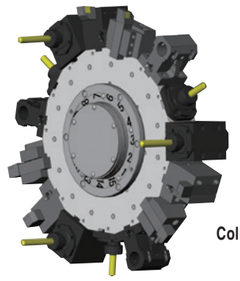
72 stations



12 / 24 - Station Turret

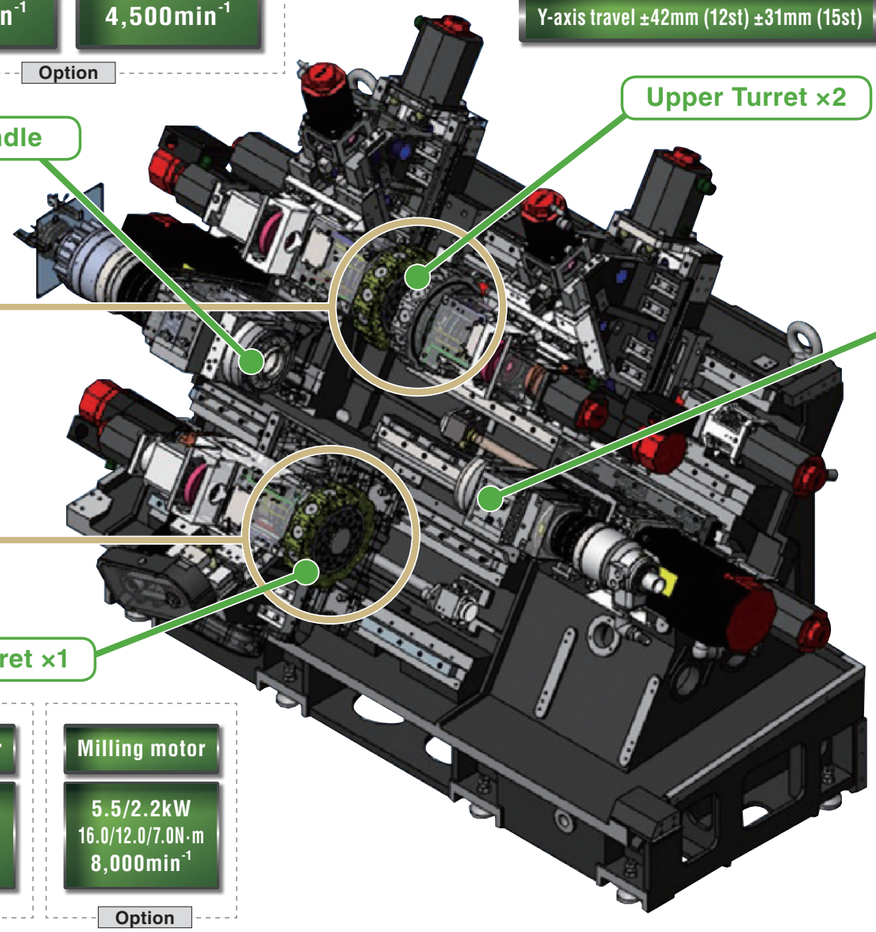
Turret type	Dodecagonal
Number of tools	24
Number of indexing pos.	24
Number of driven-tools	12 × 3
Max. Speed of driven tools	6,000min⁻¹ (op. 8,000min⁻¹)
O.D. turning tool	□20/16mm (24st)
I.D. Boring	ϕ25mm
Collet diameter for driven tools	ϕ1 - ϕ14mm
Tool swing diameter	485mm
Max. turning diameter	175mm (ϕ42mm) 200mm (ϕ51mm, ϕ65mm)

45 stations



15 - Station Turret

Turret type	15 - station turret
Number of tools	15
Number of indexing pos.	15
Number of driven-tools	15 × 3
Max. Speed of driven tools	6,000min⁻¹
O.D. turning tool	□20/16mm (24st)
I.D. Boring	ϕ25mm
Collet diameter for driven tools	ϕ1 - ϕ14mm
Tool swing diameter	562mm
Max. turning diameter	175mm (ϕ42mm) 190mm (ϕ51mm, ϕ65mm)



Left Spindle

Bar capacity ϕ42mm	Bar capacity ϕ51mm	Bar capacity ϕ65mm
Spindle motor 11 / 7.5kW 6,000min⁻¹	Spindle motor 11 / 7.5kW 5,000min⁻¹	Spindle motor 11 / 7.5kW 4,500min⁻¹
C-axis C-axis synchronization	15 / 11kW 5,000min⁻¹	15 / 11kW 4,500min⁻¹
Standard	Option	

Upper Turret ×2

Milling motor	Milling motor
7.1/2.2kW 16/8N·m 6,000min⁻¹	5.5/2.2kW 16.0/12.0/7.0N·m 8,000min⁻¹
Standard	Option

Y-axis travel ±42mm (12st) ±31mm (15st)

Lower Turret ×1

Milling motor	Milling motor
7.1/2.2kW 16/8N·m 6,000min⁻¹	5.5/2.2kW 16.0/12.0/7.0N·m 8,000min⁻¹
Standard	Option

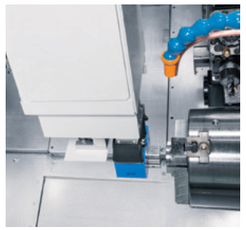
Y-axis travel ±32.5mm (12st) ±31mm (15st)

Right Spindle

Bar capacity ϕ42mm	Bar capacity ϕ51mm	Bar capacity ϕ65mm
Spindle motor 11 / 7.5kW 6,000min⁻¹	Spindle motor 11 / 7.5kW 5,000min⁻¹	Spindle motor 11 / 7.5kW 4,500min⁻¹
C-axis C-axis synchronization	15 / 11kW 5,000min⁻¹	15 / 11kW 4,500min⁻¹
Standard	Option	

Parts catcher G

Option



		ϕ42mm	ϕ51 / ϕ65mm
Workpiece size	Diameter [mm]	ϕ12 - 42	ϕ12 - 65
	Length [mm]	15 - 150	
	Weight [kg]	1.5	3.0
Method		Swing / Gripper	
Cycle time [sec.]		6.0	
Ejecting method		Belt conveyor & Chute	

NTY³-100 High-Performance Turning and Milling Motors.

From simple to complex parts
One hit machining from raw material to finished part

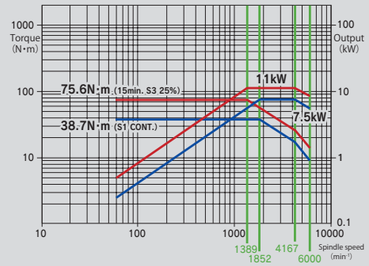
S×2 Twin-Spindle — NTY³-100

Simultaneous machining with synchronized
left and right spindles contributes to faster cycle times.

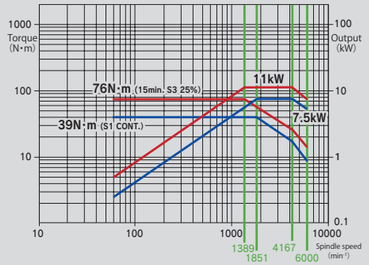
Left & Right Spindle Motors

11 / 7.5kW

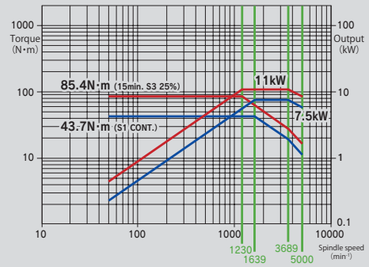
Standard
Max Rotational Speed : 6,000min⁻¹ ϕ42mm



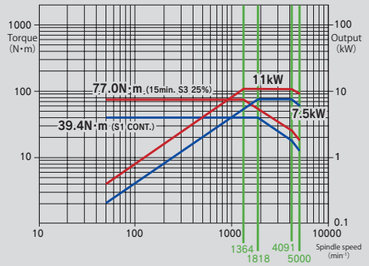
Standard
Max Rotational Speed : 6,000min⁻¹ ϕ42mm



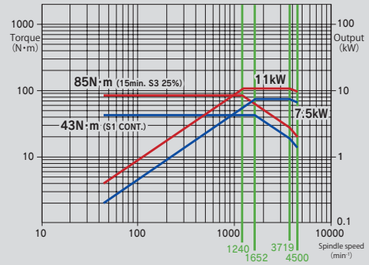
Option
Max Rotational Speed : 5,000min⁻¹ ϕ51mm



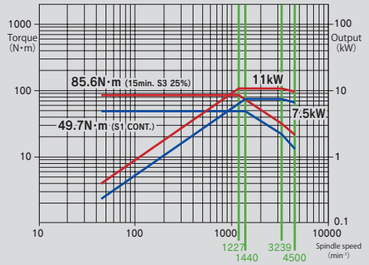
Option
Max Rotational Speed : 5,000min⁻¹ ϕ51mm



Option
Max Rotational Speed : 4,500min⁻¹ ϕ65mm



Option
Max Rotational Speed : 4,500min⁻¹ ϕ65mm



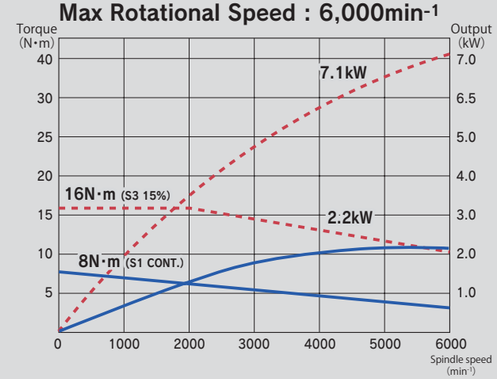
Y×3 Three Y-axes / M×3 Three Milling Motor — NTY³-100

In addition to milling or drilling simultaneously with upper and lower turrets,
improved chip-removal capabilities contribute to drastically faster cycle times.

Upper & Lower Milling Motors

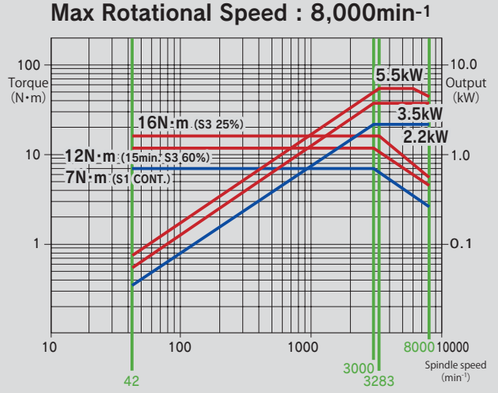
7.1 / 2.2kW

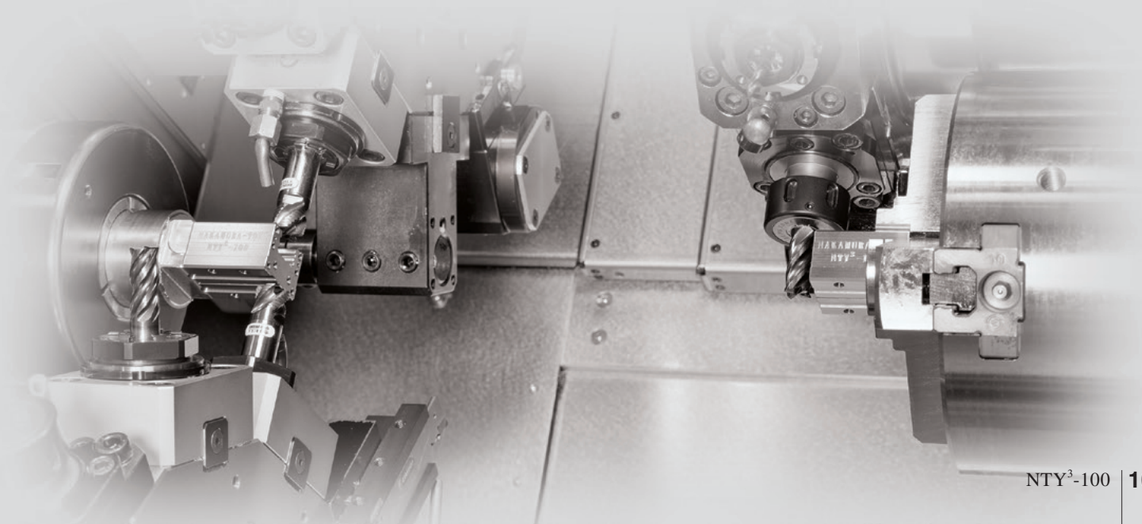
Standard
Max Rotational Speed : 6,000min⁻¹



5.5 / 2.2kW

Option
Max Rotational Speed : 8,000min⁻¹





NT SmartX

Full Operator Support from Ease of Use to Reliability

Main features of NT SmartX

Standard

- NT WORK NAVIGATOR
- Airbag (Overload detection)
- NT NURSE
- Status Display Function
- Setup Display
- Trouble Guidance
- Productivity Function
- Warm up Function
- Smart Support
- Drop Converter
- Cut in check
- Program Optimizer
- NT Machine Simulation
- NT Collision Guard
- NT Thermo Navigator AI
- Digital Chuck Interlock
- NT Manual Guide i
- One touch MDI
- 3D Smart Pro AI

19 inch color LCD touch panel
QWERTY keyboard
PC memory 8 GB
Original Menu screen
Voice Guidance
Multi-Touch Screen
Touch pad

Cut in check

Nakamura-Tome AI

■ Powered by AI as standard equipment

- NT Thermo Navigator AI
- 3D Smart Pro AI

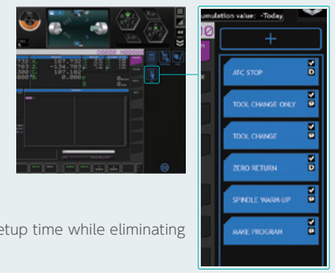
Digital Chuck Interlock

Set the Chuck Open and Close detection position easily.
The chuck open / close position is set up on the NT SmartX screen.
Setup time and machining cycle time are reduced.

One Touch MDI

This function is to register frequently used program blocks or cycles, such as zero return or tool change, and call them again with one touch.

Reduce programming and setup time while eliminating input errors.



NT Smart Sign

Nakamura-Tome IoT software

※Please refer to the NT Smart Sign exclusive catalog for details.

■ Monitoring

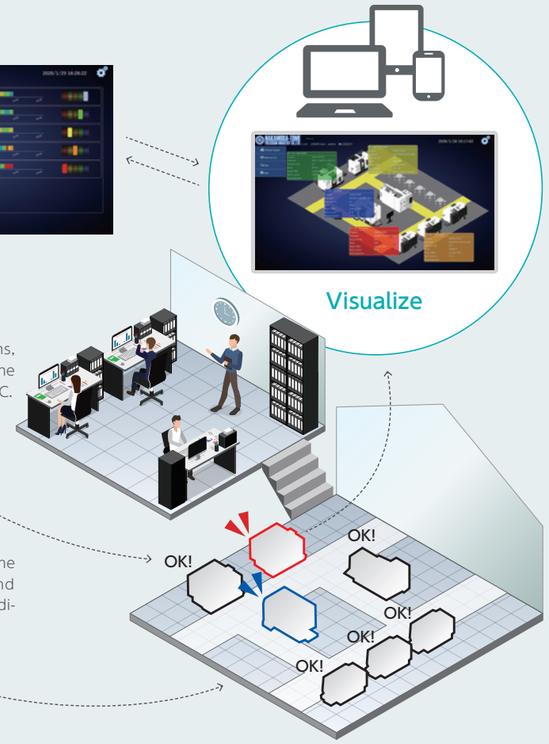
Real-Time Monitoring of machine running conditions, in addition to visualizing alarm history and past events.

■ Data Input / Output

Input and output programs, tool data and other machine data from the monitoring PC.

■ Diagnosis

Diagnose problems with the machine servo drives and spindle drives, using a dedicated program.



NT Thermo Navigator AI

Thermal Growth Compensation using AI.

Compensation model built using AI machine learning.

① Time
② Measured Dimensions
③ Retrieval of Wear Offset Data

Acquired Data analyzed with NT Thermo Navigator AI

Feedback

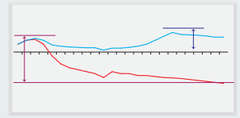
Standard for NT Smart X

Powered by AI

Time and measured dimension data are input into a dedicated AI Learning software, to build an optimized thermal growth compensation model.

High Precision Thermal Growth Compensation

The compensation value is calculated from acquired data.
The more data is input, the more accurate is the compensation value.

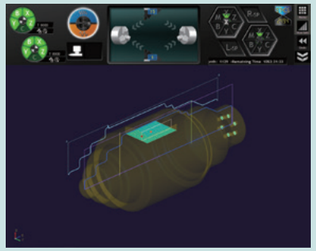


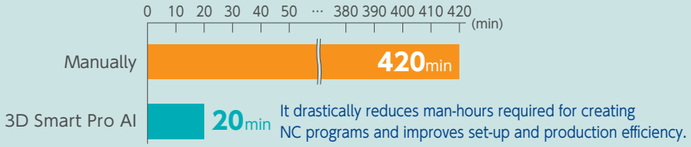
— Pre-correction thermal displacement data
— Thermal displacement data after correction

3D Smart Pro AI

AI analysis NC programming support function

From the 3D CAD drawing, AI automatically analyzes “model geometry”, “machining path”, “machining tools”, “machining conditions”, and “machining process sequence”, to create NC programs for all processes from raw material to finished product.





It drastically reduces man-hours required for creating NC programs and improves set-up and production efficiency.

3 useful features available with 3D Smart Pro AI

2. Optimization of machining processes

In addition to defining the required machining processes, AI proposes a suitable machining process sequence.

1. Transfer setting

Once the transfer position is set, the machining area and transfer program are created.

3. Tolerance setting

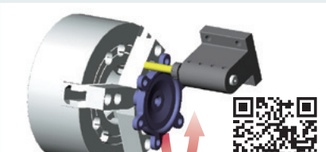
Once the tolerance value is input, the target value for machining can be set.

NT WORK NAVIGATOR

X Y Z B C

No fixtures required

Machining parts with non-round shapes, such as forgings or castings require that the raw part coordinates be recognized by the CNC control.
It works just by touching the part with a simple inexpensive probe (mostly a round bar mounted on a tool holder) and using the torque control feature of the servo-motor, which is to record required coordinates in the CNC.
The NT WORK NAVIGATOR is eliminating the need for positioning fixtures and special clamping devices.



▲Video

Double safety features for maximum protection

NT Machine Simulation / NT Collision Guard + Airbag (Overload detection)

The machine comes protected with dual safety features: "NT Machine Simulation / NT Collision Guard" to prevent a collision beforehand, and the "Airbag Function" minimizes damage to the machine in case of collision.

NT Machine Simulation

Machine collisions are avoidable with Preventive safety technology!

By checking in advance for interference between chucks and tools, or between tools and covers, etc, in addition to checking the machining processes, the risk of a machine collision is drastically reduced, and the machining processes can be optimized.

Simulation is performed while checking the remaining movement amount and modal information.

It is possible to override the settings for rapid and cutting feed individually. Additionally, simulation by process or by single block is possible.

By process
Single feed

Image shown here is of a 2-turret machine

NT Collision Guard

Available in automatic or manual mode. Using the built-in 3D models on the machine, chucks, tools, holders, and parts, machine collisions can be monitored and prevented in real-time during automatic, manual, or jog movements. Even turret indexing is monitored to prevent collisions, drastically reducing collision risks, especially during machine setup.

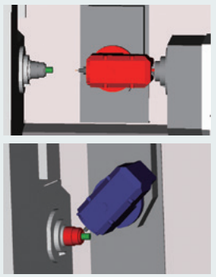


Image shown here is of a Tool spindle machine

Airbag (Overload detection)

Compared to other machines, Nakamura-Tome machines will not break after the slightest collision. The "Airbag Function" minimizes the damage that may occur during a collision.

If a machine collision occurs, there is good reason to be confident: Airbag !

When the machine collides, there is no reason to panic.

The Airbag (Overload detection) of the machine tool significantly reduces the impact of a collision and protects the machine.

Barrier? Even with barrier function, machine collisions may occur

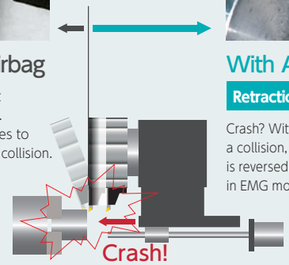
Without Airbag

Machines will not stop immediately. The slide continues to move even after a collision.

With Airbag

Retraction within 0.001 sec

Crash? Within one millisecond after a collision, the servo motor direction is reversed, and the machine stops in EMG mode.

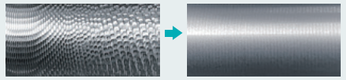


▲Video

* This feature does not mean zero impact

Chatter Canceller

Reduce the chatter and vibration by changing the spindle speed up/down continuously during cutting. This function can be turned ON/OFF simply by M code.

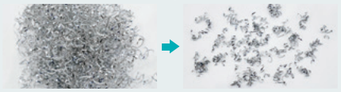


OFF ON

* It does not guarantee that the function works without chatter and vibration.
* Chatter and vibration reduction depend on the setup and the cutting condition.

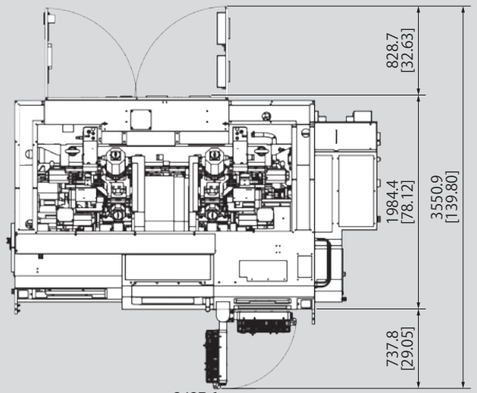
Oscillation cutting (op.)

By oscillating the tool for a certain period, the chips are cut into small pieces. It can be activated easily by using a simple Fanuc G-code and resolve workpiece damage issues caused by chips twined around the part.

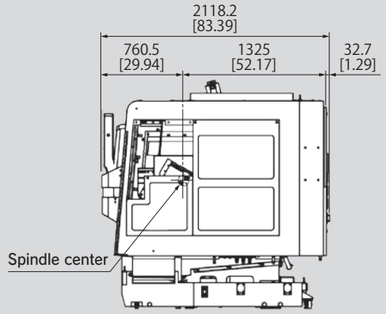


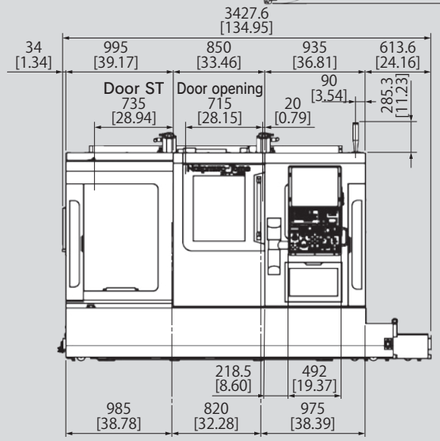
Material : Aluminum
Cutting speed : 200mm/min
Cutting depth : 1.0mm
Cutting feed : 0.1mm/rev

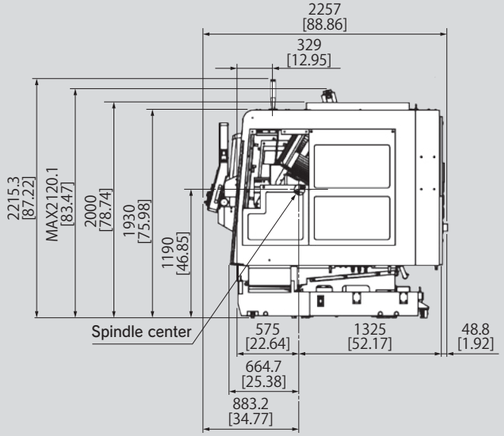
Machine Dimensions



Dimensions : when control panel is stored away for transport.



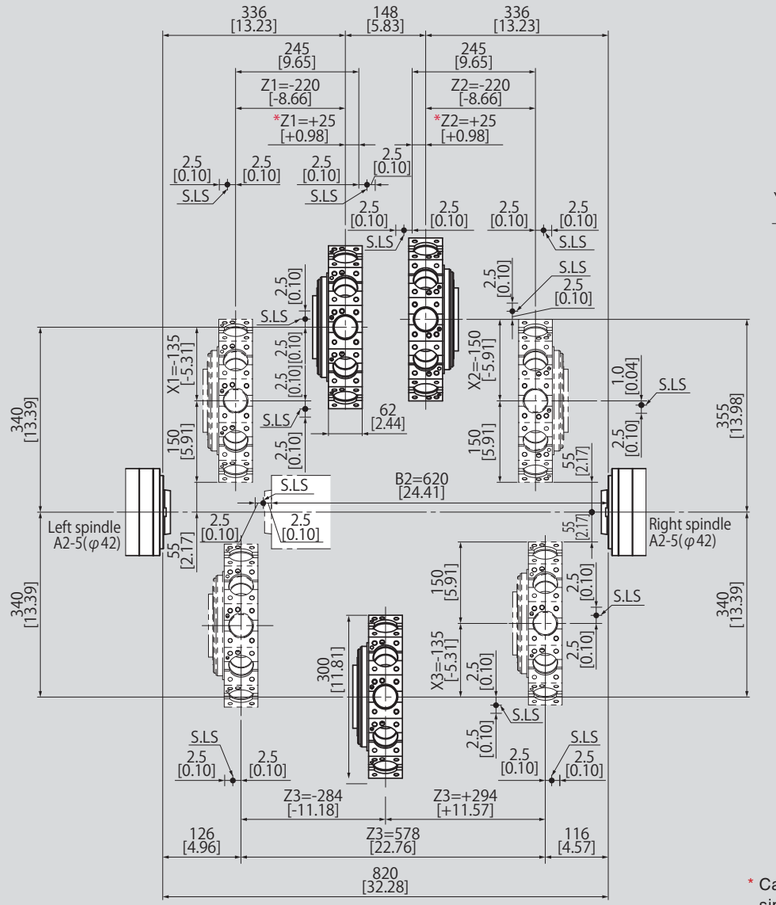


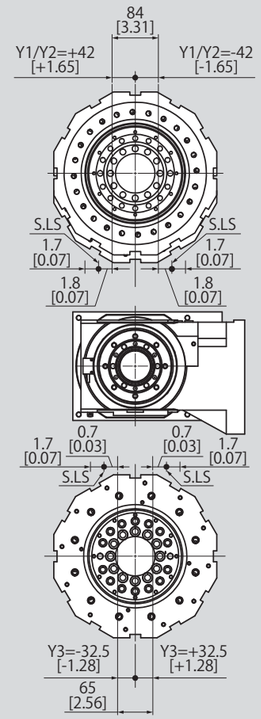


Unit : mm[inch]

Travel Range

Left Spindle ϕ42, Right Spindle ϕ42





* Cannot move both upper Z-axes simultaneously in + direction from their home positions

Unit : mm[inch]

NTY3

3T 3Y 3M SERIES

NTY³-100

NTY³-150

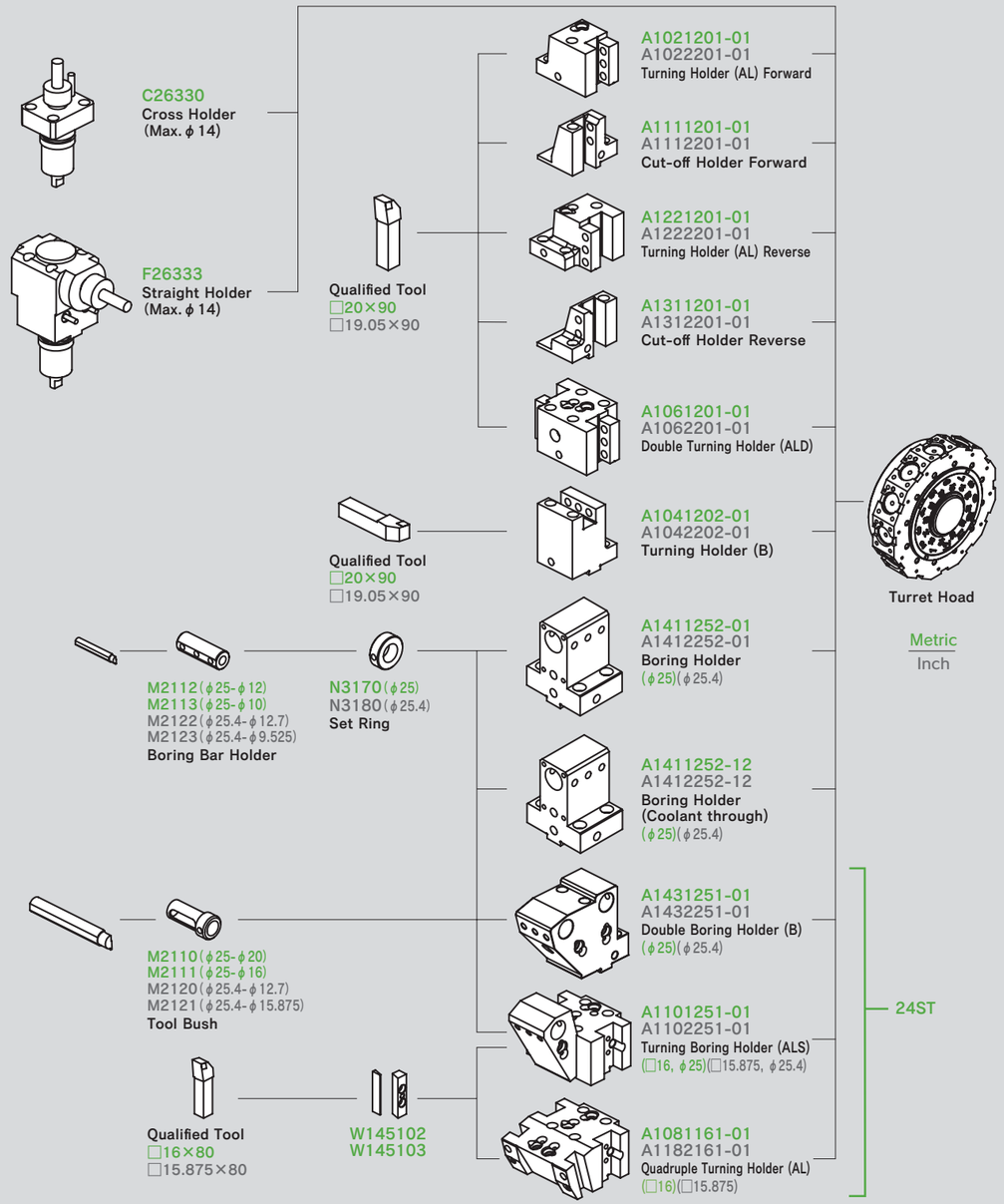
NTY³-250

ϕ42 — Bar Capacity — ϕ80

6” — Chuck Size. — 8”

Tooling System

*For standard turret



Safety quality specifications

Various interlocks, such safety fences, auto extinguisher devices, and other safety related equipment may be required. These have to be selected during the configuration of the machine.

① Safety devices include electromagnetic door lock, chuck interlock, hydraulic pressure switch, air pressure switch, short circuit breaker and quill interlock. (Door interlock and chuck interlock are standard equipment.)

② In case of automation, various safety fences may be required, such as work stocker safety fences, robot safety fences, ...etc.

During the configuration of machine specifications, please discuss these requirements with the Nakamura-Tome machine sales representative.

Precautions on the use of cutting fluids and lubricating oils

· Some types of cutting fluids (coolant) are harmful to machine components, causing damages such as peeling of paint, cracking of resin, expanding of rubber, corrosion and rust build up on aluminum and copper.
To avoid causing damage to the machine, never use synthetic coolants, or any coolants containing chlorine. In addition, never use coolants and lubricating oils which contain organic solvents such as butane, pentane, hexane and octane.

· Machine warranty terms are void for any claims or damage arising from the use of inappropriate cutting fluids or lubricating oils.

Machine Specifications

■Capacity		ϕ42mm	ϕ51mm (op.)	ϕ65mm (op.)
Max. turning diameter	12st	175mm	200mm	
	15st		190mm	
Max. turning length		588mm	570mm	
Distance between spindles		max. 820mm / min. 200mm		
Bar capacity		ϕ42mm	ϕ51mm	ϕ65mm
Chuck size		6"		
■Axis travel/Rapid feed				
X1/X2/X3 axis slide travel	12st	135/150/135mm	150 / 150 / 141mm	
	15st	145 / 145 / 130mm		
Z1/Z2/Z3 axis slide travel	12st	245/245/578mm	227 / 245 / 560mm	
	15st	202 / 202 / 560mm		
Y1/Y2/Y3 axis slide travel	12st	±42/±42/±32.5mm		
	15st	±31mm		
B-axis slide travel		620mm		
X1/X2/X3 axis rapid feed rate		20m/min		
Z1/Z2/Z3 axis rapid feed rate		40m/min		
Y1/Y2/Y3 axis rapid feed rate		8m/min		
B-axis rapid feed rate		40m/min		
■L/R spindle				
Spindle speed		6,000min^{-1}	5,000min^{-1}	4,500min^{-1}
Spindle speed range		Stepless	Stepless	Stepless
Spindle nose		A2-5	A2-5	A2-6
Hole through spindle		56mm	63mm	80mm
I. D. of front bearing		80mm	90mm	110mm
Hole through draw tube		43mm	52mm	66mm
■C-axis				
Least input increment		0.001°		
Least command increment		0.001°		
Rapid speed		600min^{-1}		
Cutting feed rate		1-4,800°/min		
C-axis clamp		Dsik clamp		
C-axis connecting time		1.5s		
■Upper/Lower turret				
Type of turret head	12st	Dodecagonal drum turret		
	15st	15 stations turret		
Number of tool stations	12st	12		
	15st	15		
Number of Indexing positions	12st	24		
	15st	15		
Tool size (square shank)		□20mm		
Tool size (round shank)		ϕ25mm		
■Milling				
Rotary system		Individual rotation		
Spindle speed	12st	6,000min^{-1} (op. 8,000min^{-1})		
	15st	6,000min^{-1}		
Spindle speed range		Stepless		
Number of milling stations	12st	12		
	15st	15		
Tool shank		Straight holder ϕ1mm-ϕ14mm		
		Cross holder ϕ1mm-ϕ14mm		
■Drive motor				
L/R spindle		11/7.5kW	11/7.5kW (op. 15/11kW)	
Milling spindle		7.1/2.2kW (op. 5.5/2.2kW)		
■General				
Machine height		1,930mm		
Floor space		3,428mm×2,257mm		
Machine weight (incl. control)		9,500kg		

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Control Specifications

■Items			
Control type	FANUC 31i-B 3-PATH		
■Controlled axes			
Controlled axes	13 axes		
Simultaneously controlled axes	L-upper	4axes (X1, Z1, C1, Y1)	
	R-upper	4axes (X2, Z2, C2, Y2)	
	Lower	4axes (X3, Z3, C3 [C1, C2], Y3, B2)	
■Input command			
Least input increment	0.001mm / 0.0001inch (diameter for X-axis), 0.001°		
Least command increment	X:0.0005mm, Z:0.001mm, C:0.001°, B2:0.001mm, Y:0.001mm		
Max. programmable dimension	±999999.999mm (±39370.0787inch, ±999999.999°		
Absolute / Incremental programming	X, Z, C, Y, B2 (absolute only for B2) / U, W, V, H		
Decimal input	Standard		
Inch / Metric conversion	G20 / G21		
Programmable data input	G10		
■Feed function			
Cutting feed	feed/min X : 1 - 8000mm/min, 0.01 - 315in/min (1 - 4800mm/min, 0.01 - 188in/min) Z : 1 - 8000mm/min, 0.01 - 315in/min (1 - 4800mm/min, 0.01 - 188in/min) C : 1 - 4800°/min Y : 1 - 8000mm/min, 0.01 - 315in/min (1 - 4800mm/min, 0.01 - 188in/min) B2 : 1 - 8000mm/min, 0.01 - 315in/min (1 - 4800mm/min, 0.01 - 188in/min) feed / rev : 0.0001 - 8000.0000mm/rev (0.0001 - 4800.0000mm/rev) 0.000001 - 50.000000in/rev The maximum cutting feed rate is the value in AI contour control mode. In normal operation, It is enabled with G316 command. The values in parentheses are normal values.		
Dwell	G04		
Feed per minute / Feed per revolution	G98 / G99		
Thread cutting	G32F designation		
Thread cutting retract	Standard		
Continuous thread cutting	Standard		
Variable lead threading	G34		
Handle feed	Manual pulse generator 0.001/0.01/0.1mm (per pulse)		
Automatic acceleration/deceleration	Standard		
Linear accel./ decel. after cutting feed interpolation	Standard		
Rapid feed override	Low/25/50/100% (can be set from 0-100 in 10% intervals on NT Setting)		
Cutting feedrate override	0-150%, (each 10%)		
AI contouring control I	G5.1		
Spindle override	50%-120% Set every 10%		
■Program memory			
Part program storage length / Number of registrable programs	512byte Total 1280m		1000
	1Mbyte Total 2560m(op.)		1000
			2000
	2Mbyte Total 5120m(op.)		1000
			4000
	4Mbyte Total 10240m(op.)		1000
			4000
	8Mbyte Total 20480m(op.)		1000
			4000
Part program editing	delete, insert, change		
Program number search	Standard		
Sequence number search	Standard		
Address search	Standard		
Program storage memory	Battery backup		
Background editing	Standard		
DNC operation through memory card	Standard(not including memory card)		
Extended part program editing	Standard		
■Operation and display			
HMI (Human Machine Interface)	NT SmartX		
Operation panel : Display	19-inch color SXGA LCD touch panel		
Operation panel : Keyboard	QWERTY keyboard		
■Programming assist functions			
Circular interpolation R programming	Standard		
Direct drawing dimension programming or Chamfering/Corner R	Standard(Direct drawing dimension programming is standard)		
Canned cycles	G90, G92, G94		
Multiple repetitive canned cycles	G70-G76		
Multiple repetitive canned cycles II	G71, G72		
Canned cycles for drilling	G80-G89		
Axis recomposition	Standard (used for L C-axis control · R C-axis control from the lower side)		
Sub program	Standard		
Custom macro	Standard(common variables #100-#149, #500-#549)		
Additional customer macro variables	Standard(After addition, #100-#199, #500-#999)		
Luck-bei Ⅱ / NT Manual Guide i	Standard		
Abnormal load detection function	Standard		
NT WORK NAVIGATOR	Standard(not including contact bar)		
NT NURSE	Standard		
■Machine support functions			
Rigid tapping	Standard		
Spindle synchronised control	Standard		
C axis synchronised control	Standard(G496 C1. rapid feed positioning)		
Spindle orientation	Standard		

Nakamura-Tome

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Cat.No.0147E02022308N-1702