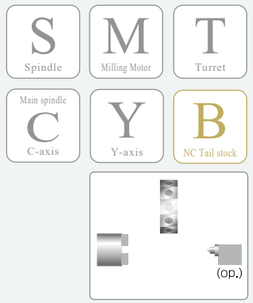
# SC-200II

## Next level machining

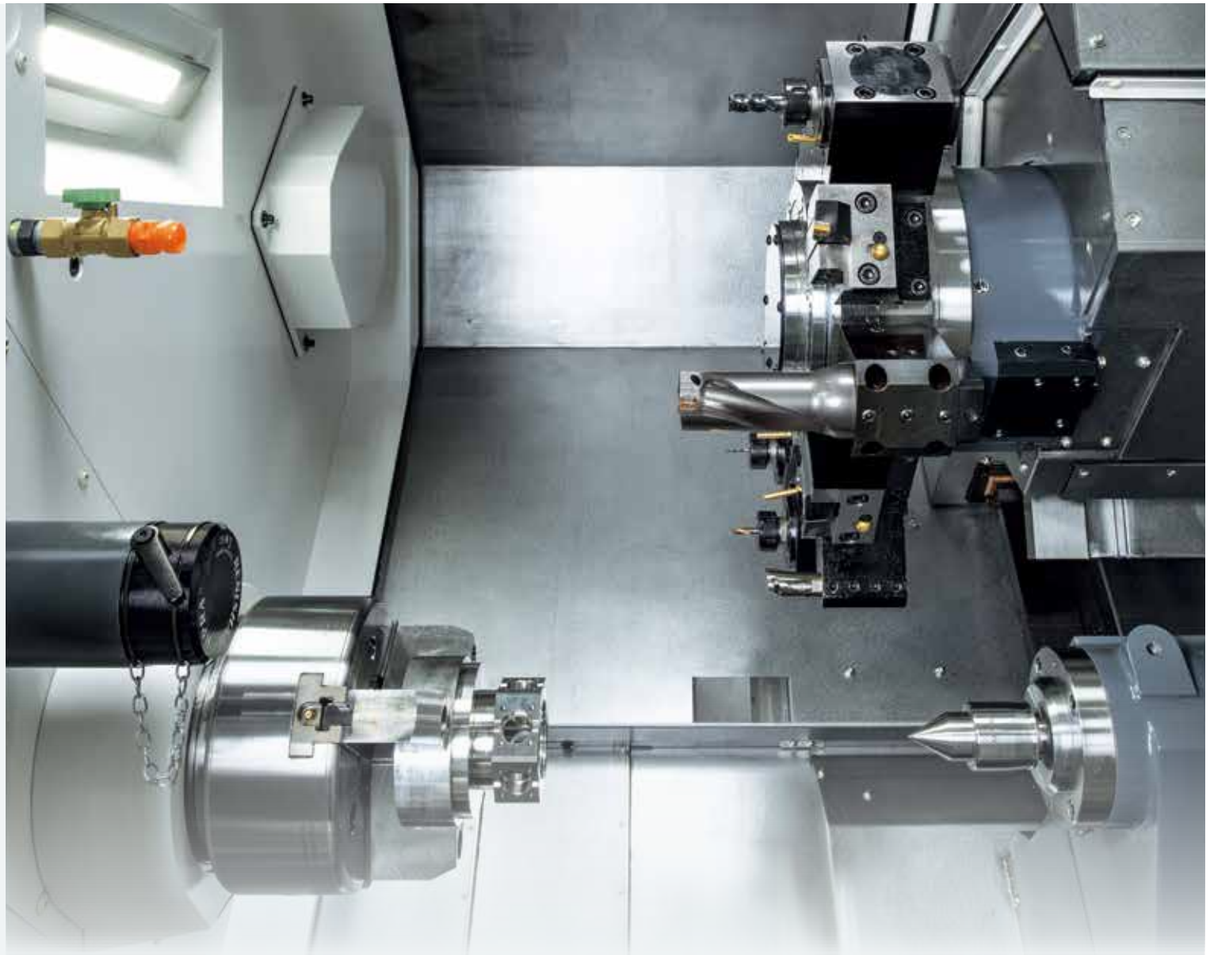
Innovative Technology
～Creating new values～

# SC-200II

The advance of SC-200!
With a highly rigid slant bed with box way slides, suitable for heavy cutting and high precision machining.
8" class single-turret machine capable of performing one-rank higher machining.







## Next level machining

It carries out great machining rigidity and stability, with a highly rigid slant bed with box-way slides.

Although it is an 8" class machine, it holds a maximum turning diameter of 390mm and a tool swinging diameter of 620mm, thus ensuring a machining area equivalent to that of a 10" class machine.

The output of the spindle motor has been increased to 15/11kW (Op. 18.5/15kW) making it superior to the previous model. In addition to the improved spindle motor output, the Bar capacity and Y-axis slide travel have also been improved to give it the ability to achieve one-rank higher machining capacity.

## Easier to use, more efficient
## Next level machining

■ Main spindle

| Standard | Option |
|---|---|
| Bar capacity Φ65mm<br>Spindle speed 4,500min-1 | Bar capacity Φ71mm<br>Spindle speed 4,500min-1 |
| Spindle motor 15/11kW | Spindle motor 18.5/15kW |
| | Spindle motor 15/11kW |
| | Spindle motor 18.5/15kW |

■ Turret

Standard

| | |
|---|---|
| Y axis slide travel | ±50mm |
| Milling spindle speed | 6,000min-1 |
| Milling motor | 5.5/3.7kW |

| Standard | Option |
|---|---|
| Type of turret head Dodecagonal | Type of turret head Hexadecagon |
| Number of milling stations / Number of indexing positions 12 / 24 | Number of milling stations / Number of indexing positions 16 / 16 |


### Milling and Y-Axis standard

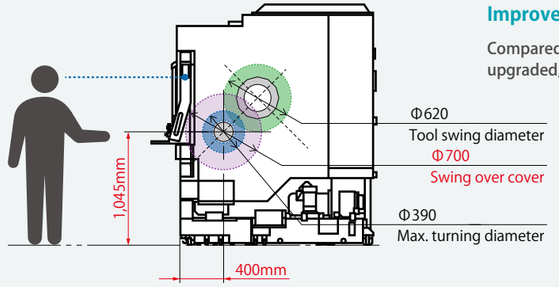
### NC tailstock(op.)

The Tailstock body movement is program controlled by the NC control servo drive. The setting can be easily done on the NT NURSE screen for a maximum of 12 settings.

■ Tailstock(op.)

Option

| | |
|---|---|
| Driving system | NC control servo-driven type |
| Quill taper | MT-4(Rotating center), MT-3(Built-in center) |
| Range of thrust force | 2.5 - 6.5kN |




### Improved swing, and machining diameters

Compared to the previous model, the machining product range has been upgraded, giving it the ability to perform one-rank higher machining.

### Stress-free

For best accessibility, the distance from machine front to spindle, and the spindle height have been improved. The control panel height was designed for optimum operator comfort. Ergonomically designed for a more comfortable posture.

### Nakamura-Tome FANUC 0i-TF Plus 15 inch touch screen

With a movable operation panel, the angle can now be adjusted by the operator.


### Tool setter(op.)

Can be configured for a detachable, or for an automatic swing-down type tool setter.

### Chip conveyor(op.)

Can be configured for ejection from the side or from the back.

### Parts catcher type A(op.)

Discharging of remnants and finished parts can be automated.

Option

| | |
|---|---|
| Diameter | Φ22 - Φ71mm |
| Length | 20 - 150mm |
| Weight | 0.1 - 3.0kg |

### User friendry

Redesigned to make it easier to refill the lubrication oil tank.

### GR-203 High-Speed(op.)

The whole process from loading a blank material to unloading a finished part can be automated.

* The image is of NTY3-100.

## FANUC 0i-TF Plus with iHMI
## 15 inch touch screen control

■ Tool Manager

Tooling information such as tool life and geometry value can be managed.

■ Maintenance Manager

Maintenance information such as the life of consumable parts can be managed, and each item can be customized.

■ Servo Viewer

By testing a measurement, the load, position, and speed of each axis are read and visualized with a waveform.

■ Manual

All Manuals can be viewed. Manuals can be added or deleted.

## Full Operator Support from Ease of Use to Reliability

### Smart Support

Processes using original Nakamura-Tome G-codes were registered as fixed forms. Programs can be easily created by inputting data through an interactive 3D guidance window.

### Digital Chuck Interlock

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

## NT Smart Sign

### Nakamura-Tome IoT software

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

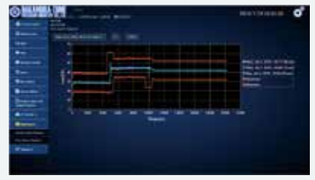
■ Monitoring

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

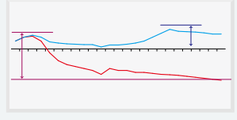
Feedback

### 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

# Featuring Functions to Make Efficient Programs, Faster

## Advanced NT NURSE

※Depending on machine specifications, some functions are not available.

All-in-one software!

NT Nurse is software that provides the operator with user-friendly support for operation, programming and production on the machine. Among vital features are phase recognition (a must for multitasking), direct chucking to prevent positioning error during transfer, and perfect synchronization of the left and right hand spindles.

Among other features, are the load monitor for detecting tool wear and tool breakage, tool life management, operation condition monitoring, in addition to many other features to simplify programming, set up, operation and production, all offered in one single package.

### Useful functions


Tool Counter


Tool Life


Operation Condition of each Tool


Energy Saving

* The screen image is from NT SmartX

## Airbag (Overload detection)

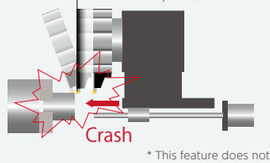
**When the machine collides, there is no reason to panic.**

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


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.

Barrier?
Even with barrier function, machine collisions may occur



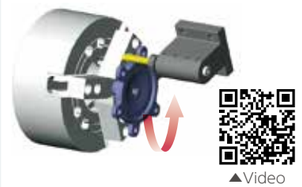

▲Video

* This feature does not mean zero impact

## NT WORK NAVIGATOR

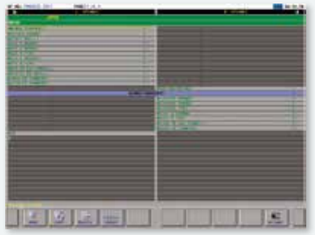
No fixtures required

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

## NT Manual Guide i (LUCK-BEI II)

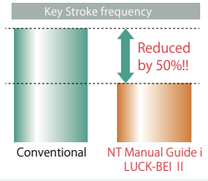
A programming guidance system with the ability to generate NC programs (ISO/EIA G-code programs) easily. Processes created in conversational mode can be cut, copied or pasted ensuring flexibility. Additionally, several cycles such as part-transfer cycle, requiring waiting M-codes, are readily made with the "NC program editing support function". The "NC program simulation function" can be used to check created- programs by tool-path simulation or solid-model animation.


▲Process Editing Function
NT Manual Guide i automatically recognizes each process and lists all processes. Operator can easily change and optimize the program by moving processes, copying processes or adding waiting-functions.


▲Fixed-form sentence function
NT Manual Guide i contains more than 300 types of fixed form sentences. Operator can select these fixed form sentences for the program from a menu screen.

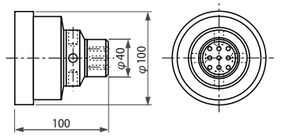

▲Simulation
Accurate simulation of turning and milling operations using a 3D solid model.

By introducing the “automatic cutting condition setting function”, the number of key strokes required to make a program were reduced by 50% reduced, compared with the previous NT-Manual guide version.




### Automatic Cutting-Condition Setting Function

By setting the material type and required surface roughness, cutting conditions are automatically generated. These can be also changed depending on customer’s experience.



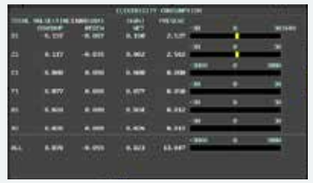


By selecting the material, cutting conditions B are automatically input.


By setting the surface roughness, machining conditions are automatically input

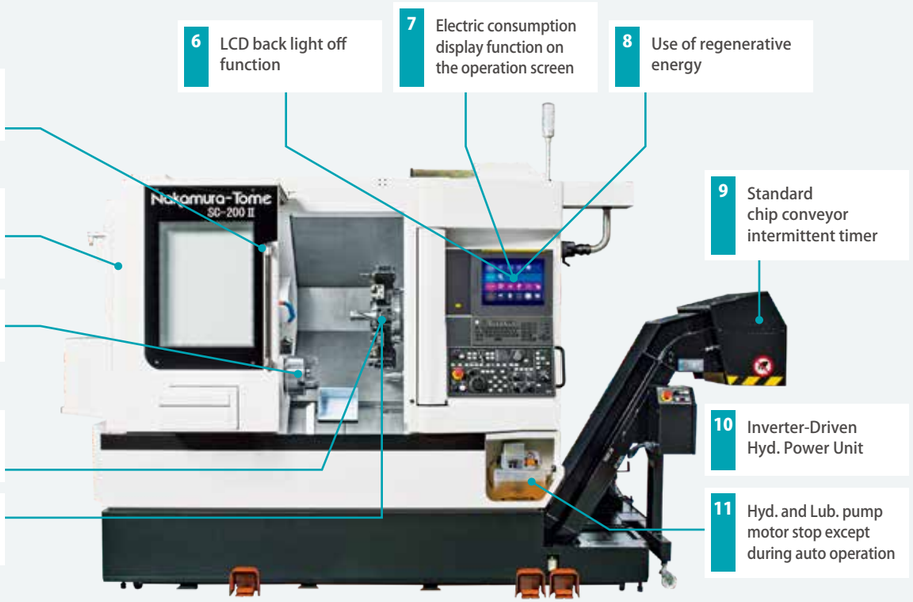

Cutting conditions. End mill

## Nakamura-Tome is committed to the environment as an eco-friendly manufacturer



**Power consumption monitoring screen**

Equipped with a power regeneration system that returns energy to the power source when the motor decelerates.




1 Work light off function

2 Operation panel fan stop except during auto operation

3 Motor fan stop except during auto operation

4 Servo power off except during auto operation

5 Energy saving mode for each axes acc. / dec.

6 LCD back light off function

7 Electric consumption display function on the operation screen

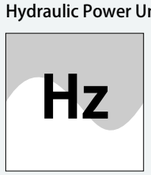
8 Use of regenerative energy

9 Standard chip conveyor intermittent timer

10 Inverter-Driven Hyd. Power Unit

11 Hyd. and Lub. pump motor stop except during auto operation

**Inverter-Driven Hydraulic Power Unit**




Cut down power consumption by approx. 21%

* Reference figure when hydraulic power is ON

**Reduction of lubrication oil consumption**

Cut down lubricating oil consumption by approx. 54%

* Compared with SC-200

**Recovery rate of waste oil**

Standard approx. 43.7%

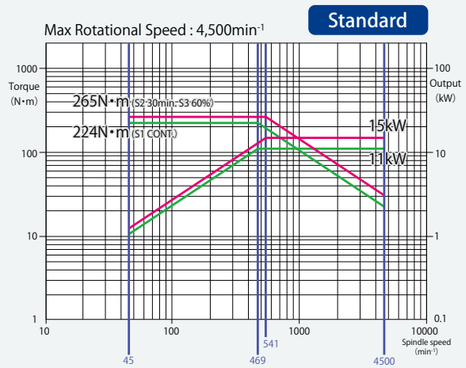
NC tailstock approx. 34.1%

* Expected figure

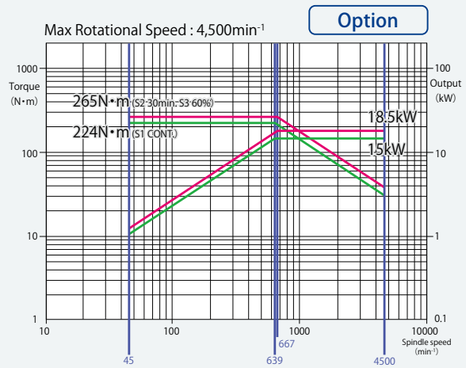
## Torque / Output Chart

### Main spindle

Bar capacity φ65 / φ71(op.)
15/11kW

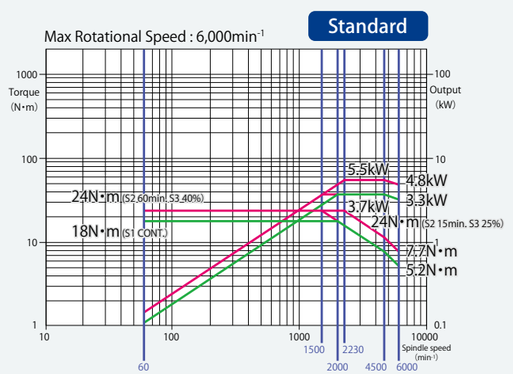



Bar capacity φ65 / φ71(op.)
18.5/15kW

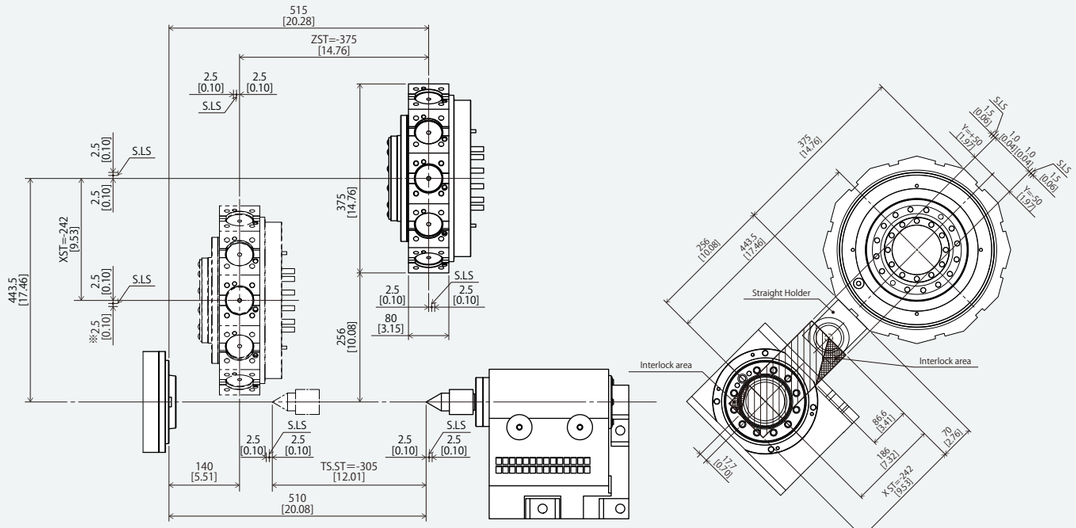



### Milling motor

5.5/3.7kW



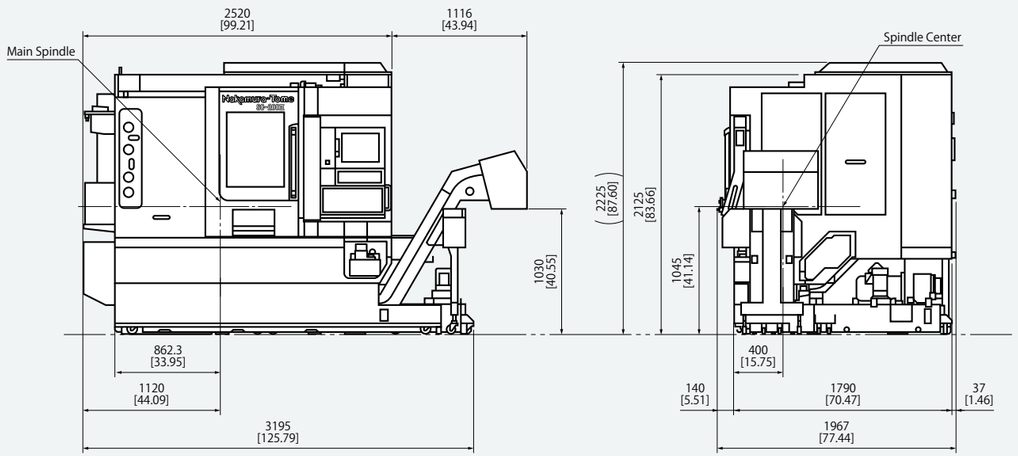

## Travel Range




※It is only for specifications without Y-axis.

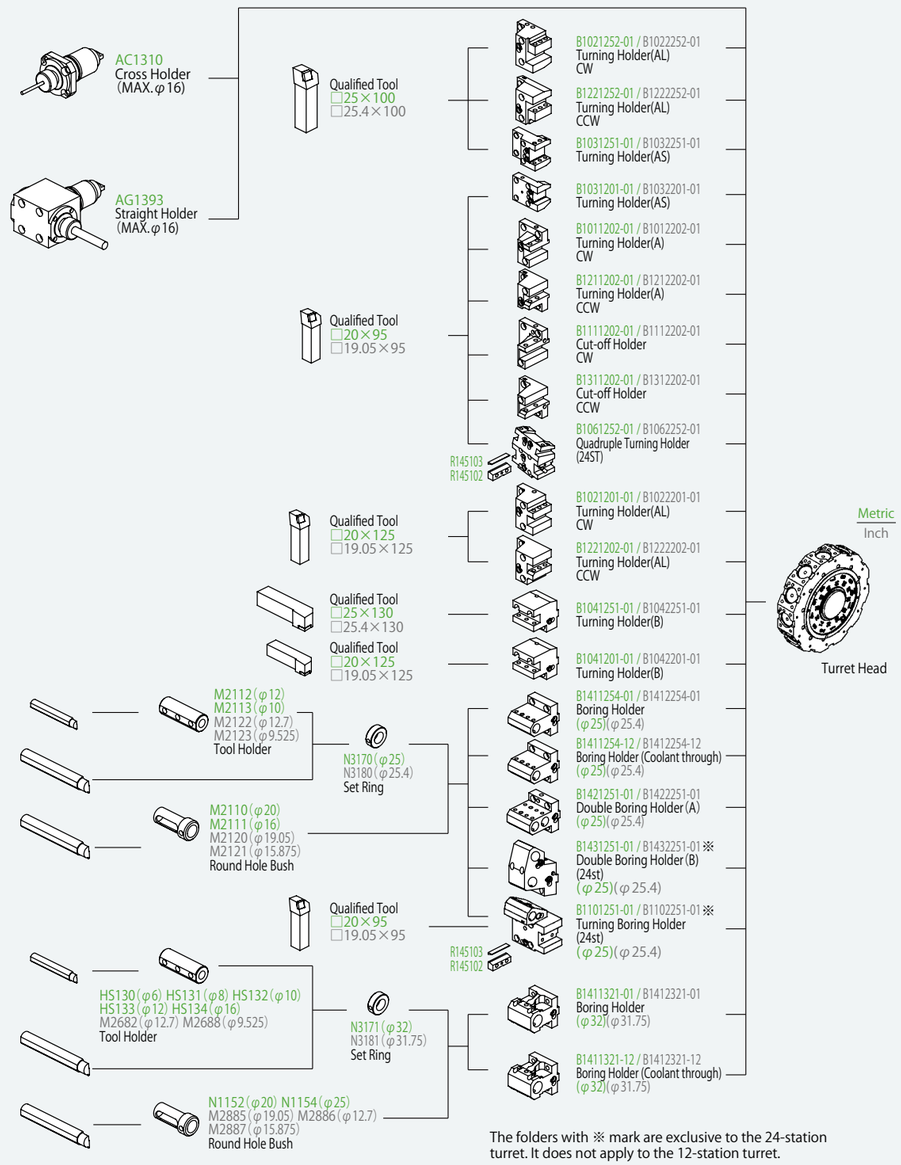
mm[inch]

## Machine Dimensions




mm[inch]

## Tooling System




The folders with ※ mark are exclusive to the 24-station turret. It does not apply to the 12-station turret.

## ■ Capacity

| | | | |
|---|---|---|---|
| Max. turning diameter | 12st | Φ65 | Φ71(op.) |
| | 16st(op.) | 390mm<br>340mm *1 | |
| Distance between centers(op.) | | max.510mm / min.205mm | |
| Max. turning length | | 317.8mm | |
| Bar capacity | | Φ65mm | Φ71mm |
| Chuck size | | 8" | 10" |

## ■ Axis travel

| | |
|---|---|
| X-Axis slide travel | 242mm |
| Z-Axis slide travel | 375mm |
| Y-Axis slide travel | ±50mm *2 |

## ■ Rapid feed

| | |
|---|---|
| X-Axis rapid feed rate | 24m/min |
| Z-Axis rapid feed rate | 36m/min |
| Y-Axis rapid feed rate | 6m/min *2 |

## ■ Main spindle

| | | |
|---|---|---|
| Spindle speed | 4,500min$^{-1}$ | 4,500min$^{-1}$ |
| Spindle speed range | Stepless | Stepless |
| Spindle nose | A2-6 | A2-6 |
| Hole through spindle | 80mm | 80mm |
| I.D. of front bearing | 110mm | 110mm |
| Hole through draw tube | 66mm | 72mm |

## ■ 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 | Disk clamp |
| C-axis connecting time | 1.5s |

### ●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 the 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, expansion 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.

## ■ Turret

| | | |
|---|---|---|
| Type of turret head | 12st | Dodecagonal |
| | 16st(op.) | Hexadecagon *1 |
| Number of Indexing positions | 12st | 24 |
| | 16st(op.) | 16 *1 |
| Tool size (square shank) | | □20mm, □25mm |
| Tool size (round shank) | | Φ25mm, Φ32mm |

## ■ Milling

| | | |
|---|---|---|
| Rotary system | | Individual rotation |
| Milling spindle speed | | 6,000min$^{-1}$ |
| Spindle speed range | | Stepless |
| Number of milling stations | 12st | 12 |
| | 16st(op.) | 16 *1 |
| Tool size | | Straight holder Φ1mm ～Φ16mm |
| | | Cross holder Φ1mm ～Φ16mm |

## ■ Tailstock (op.)

| | |
|---|---|
| Driving system | NC control servo-driven type |
| Travel | 305mm |
| Rapid feed | 8m/min |
| Quill taper | MT-4(Rotating center),<br>MT-3(Built-in center) |
| Quill diameter / Quill stroke | - |
| Range of thrust force | 2.5-6.5kN |

## ■ Drive motor

| | |
|---|---|
| Main spindle motor | 15/11kW , 18.5/15kW(op.) |
| Milling motor | 5.5/3.7kW |

## ■ General

| | |
|---|---|
| Height | 2,125mm |
| Max. height of movable part | 2,225mm |
| Floor space (L x W) | 3,195mm ×1,967mm |
| Machine weight (incl. control) | 7,500kg |

## ■ Power requirements

| | |
|---|---|
| Power supply | 24.0kVA(26.9kVA)<br>(Main spindle 15/11kW) |
| | 27.3kVA(30.2kVA)<br>(Main spindle18.5/15kW) |

*1 16st cannot be selected for specifications without milling
*2 Y-axis cannot be selected for specifications without milling
With or without Y-axis can be selected for specifications with milling

## ■ Items

| | |
|---|---|
| Control type | Nakamura-Tome FANUC (0i-TF Plus) |

## ■ Controlled axes

| | |
|---|---|
| Controlled axes | 4 axes(X, Z, C, Y) |
| Simultaneously Controlled axes | 4 axes |

## ■ Input command

| | |
|---|---|
| Least input increment | X,Z,Y：0.001mm/0.0001inch<br>(diameter for X-axis),<br>C：0.001° |
| Least command increment | X：0.0005mm / Z,Y：0.001mm / C：0.001° |
| Max. programmable dimension | ±999999.999mm /<br>±39370.0787in , ±999999.999° |
| Absolute/ Incremental programming | X, Z, C, Y / U, W, H, V |
| Decimal input | Standard |
| Inch / Metric conversion | G20 / G21 |
| Programmable data input | G10 |

## ■ Feed function

| | |
|---|---|
| Cutting feed | feed/min X, Z：1～8000mm/min, 0.01～315inch/min<br>(1～4800mm/min, 0.01～188inch/min)<br>Y：1～6000mm/min, 0.01～236inch/min<br>(1～4800mm/min, 0.01～188inch/min)<br>C：1～4800°/min<br>feed/rev X, Z：0.0001～8000.0000mm/rev<br>(0.0001～4800.0000mm/rev)<br>Y：0.0001～6000.0000mm/rev<br>(0.0001～4800.0000mm/rev)<br>0.000001～50.000000inch/rev<br>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<br>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 screen) |
| 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 | 2Mbyte Total 5120m | 1000 |
| Parts program editing | delete, insert, change | |
| Program number search | Standard | |
| Sequence number search | Standard | |
| Address search | Standard | |
| Program storage memory | Battery backup | |
| Background editing | Standard | |
| Call of sub-program in a memory card | Standard (Invoked by M200 / Not including memory card) | |
| Extended part program editing | Standard | |

## ■ Operation and display

| | |
|---|---|
| Operation panel : Display | 15-inch color LCD touch panel |
| Operation panel : Keyboard | Separate type MDI unit<br>(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 |
| Sub program | Standard |
| Custom macro | Standard(common variables #100 - #149, #500 - #549) |
| Additional custom 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

| | |
|---|---|
| Spindle rigid tapping | Standard |
| Spindle orientation | Standard(any angle is available within 360° , Control unit: 0.088° ) |
| Milling rigid tapping | Standard |
| Polygon function | Standard |

## ■ ECO functions

| | |
|---|---|
| Servo motor power off | Standard(Switch on Power Saving Mode in NT Setting screen) |
| Control of motor output during acceleration and deceleration | Standard(Switch on Power Saving Mode in NT Setting screen) |
| G code for servo motor energy-saving during acceleration and deceleration | G356/G357 |
| Fan motor stop | Standard |
| Automatic light off | Standard(Switch on Power Saving Mode in NT Setting screen) |
| Automatic monitor off | Standard (Switchover on the iHMI setting monitor) |

# NAKAMURA-TOME PRECISION INDUSTRY CO., LTD.

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Cat.No.0190E00012211N