MX-100

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

As you like…

Innovation
Technology
～Creation of new values～

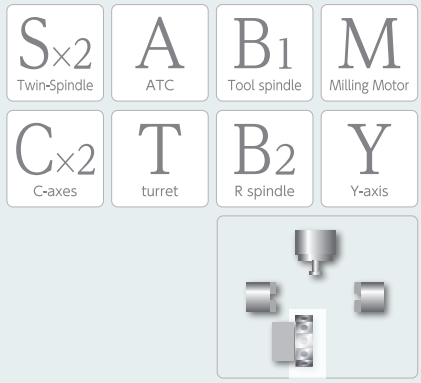
MX-100

State-of-the-art, compact high-precision Multitasking Machine, with the capabilities of a Machining Center and a Turning Center, featuring advanced software, smart features and up to 96 tools, to ensure high-productivity machining of a wide range of parts, and to smartly meet the needs of various manufacturing sectors.

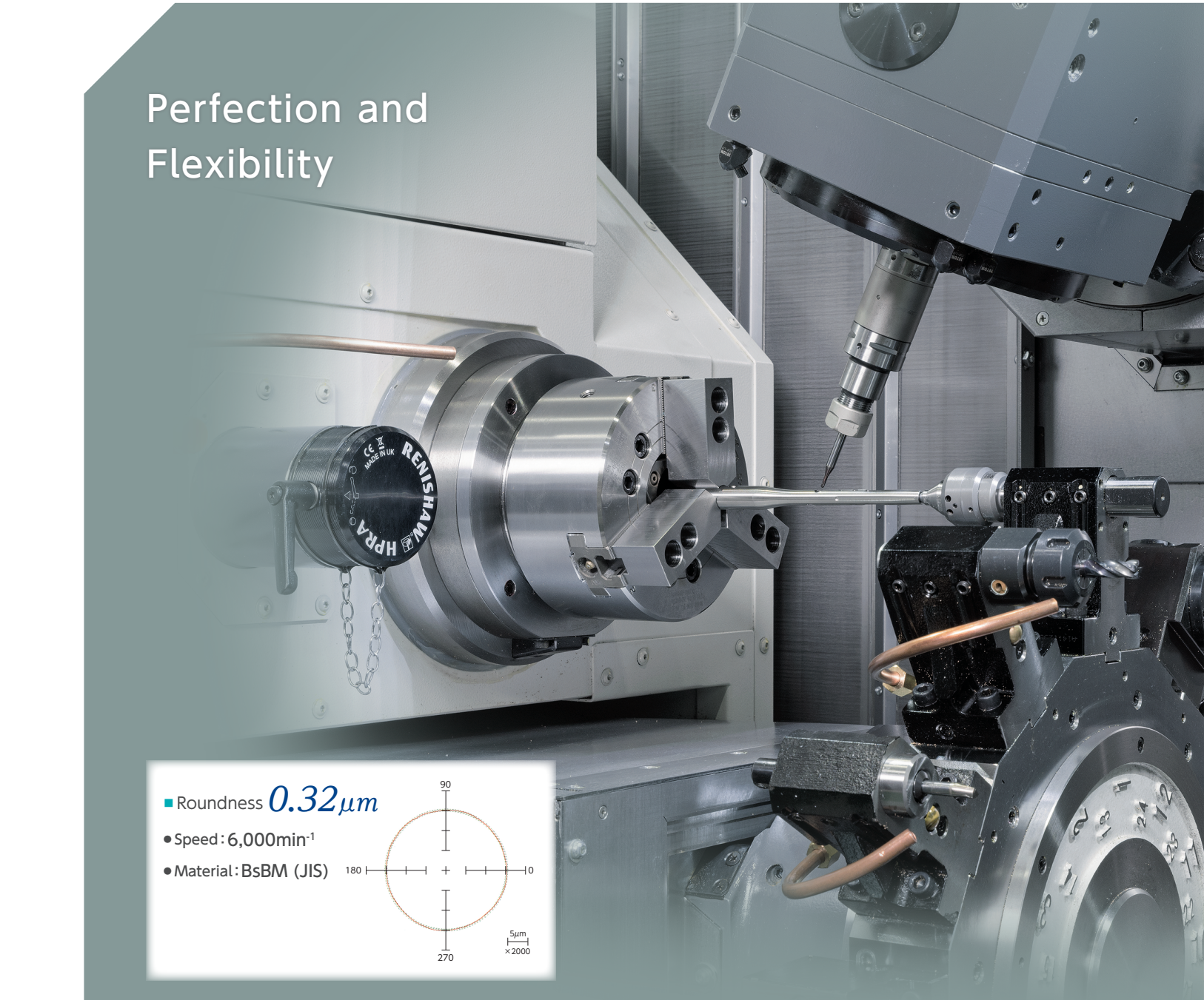
Compact, High Precision, Multitasking Turn-Mill Center

- Milling･Y-axis standard
- ATC tool spindle standard
- ATC tool spindle motor 11/7.5kW

  Spindle speed12,000min^{-1} (op. 20,000min^{-1})
- ATC storage capacity 36 tools (op. 48, 72 tools)
- X-axis travel up to 50 mm below spindle center.
  Y axis travel ± 105 mm with respect to the spindle center
- Floor space 4,350mm x 2,795mm
- Lower turret milling motor power 7.1/2.2 kW
  with Max. speed 6,000 min^{-1}
- Eco-friendly: Grease lubrication of slide axes.
- Advanced software and Smart features.



Perfection and Flexibility



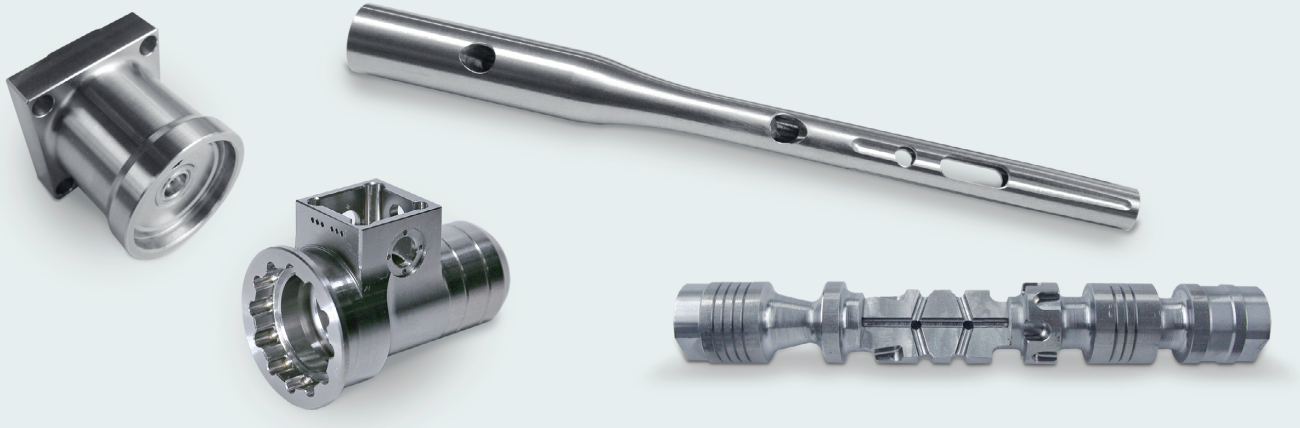
- Roundness *0.32μm*
- Speed : 6,000min^{-1}
- Material : BsBM (JIS)

The MX-100 is a compact Multitasking Machine with a wide machining range, and up to 96 tools (72 tools for ATC (op.) & 24 for lower turret),ensuring versatility and maximum performance in a small footprint.

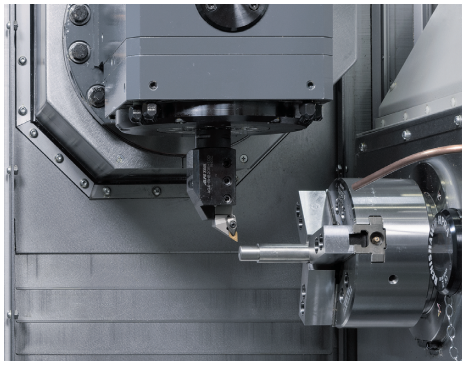
The built-in spindle motors feature superior cutting capabilities, with the possibility to upgrade the left spindle to 15/11 KW motor (Bar capacity Dia. 65mm Op.),ensuring higher performance and more rigidity.

With the MX-100, Nakamura-Tome continues its pursuit to offer not only high-accuracy and high-rigidity, but also to ensure the highest performance and the most outstanding cutting capabilities.

Machining capability



Turning



L-Spindle

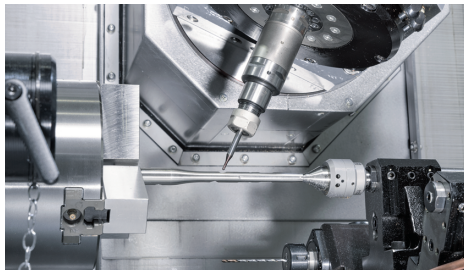
- Spindle motor 11/7.5kW
  15/11kW(op.)

R-Spindle

- Spindle motor 11/7.5kW

- Cutting cross section
  2.25mm²/rev
- Depth of cut 5mm
- Feed 0.45mm/rev

Milling



Tool spindle

- Spindle motor 11/7.5kW
- Max. RPM 12,000min⁻¹
  20,000min⁻¹(op.)
- B-axis swiveling range ±95°
- Y-axis travel ±105mm
- Metal Removal Rate 57.30cc/min

Lower turret

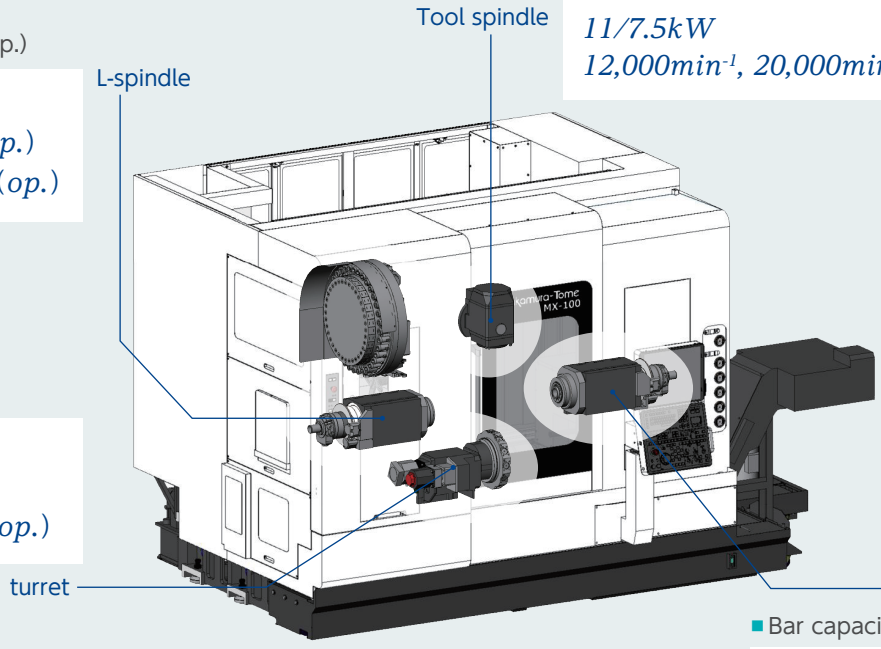
- Motor Power 7.1/2.2kW
- Speed 6,000min⁻¹
  8,000min⁻¹(op.)
- Metal Removal Rate 18.88cc/min

Solid performance.
Combining the Capabilities of a Machining Center and a Turning Center.

■ Bar capacity ϕ51, ϕ65mm(op.)

L-Spindle motor
11/7.5kW, 15/11kW(op.)
6,000min^{-1}, 4,500min^{-1}(op.)

Lower turret motor
7.1/2.2kW
6,000min^{-1},8,000min^{-1}(op.)

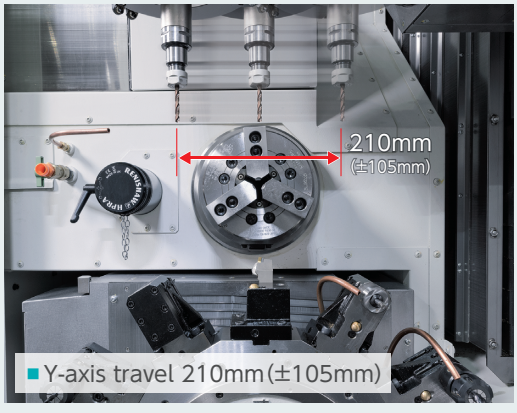


Tool spindle motor
11/7.5kW
12,000min^{-1}, 20,000min^{-1}(op.)

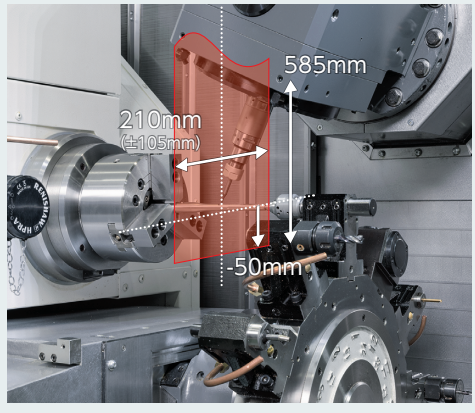
■ Bar capacity ϕ51mm

R-Spindle motor
11/7.5kW
6,000min^{-1}

Ensuring a large work envelope in a compact machine



■ Y-axis travel 210mm(±105mm)



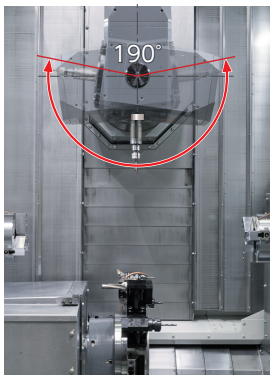
High accuracy machining.

Thanks to large Y-axis travel and 50mm X-axis travel beyond the spindle center, various machining operations can be performed without rotating the C-axis, such as square milling in the X-Y plane or deep hole drilling in the X-axis direction, ensuring faster cycle time and higher precision.

Machine structure

Floor space (Machine only)
*not including chip tank or chip conveyor.

Standard specification
L3,200mm × W2,485mm × H2,650mm

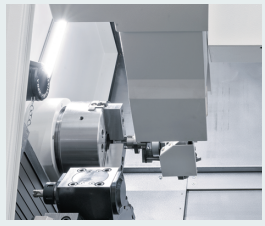


Max. tool diameter
(Without adjacent tool)

Max. tool length

ATC
36 (op.48,72)

Compact loader
is available.



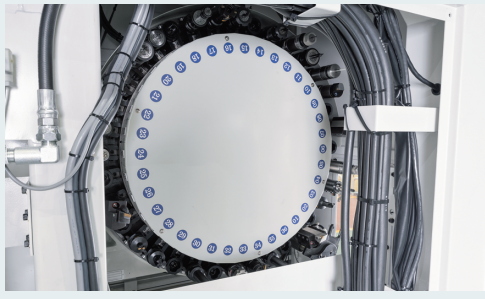
NT SmartX

96stations

Up to 96 tools available!

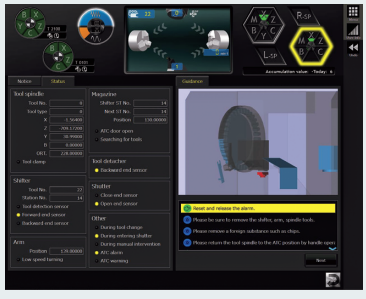
In addition to 36 (op. 48 or 72) ATC tools for Tool Spindle, up to 24 turning tools (12 milling tools) can be mounted on lower turret.

36 (op.48,72) ATC tool



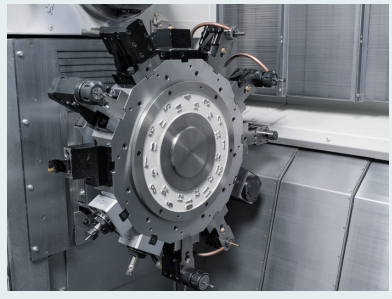
Max Tool diameter	55mm (80mm Without adjacent tool)
Max. tool length / Max tool weight	180mm・4kg
Tool shank type	CAPTO C4/ SANDVIK
Tool change time	1.3 Sec

ATC Maintenance Navigator



In addition to information about the ATC status and position of the Alarm, the step by step ATC recovery guidance screen, ensure fast ATC recovery and shorter machine down time.

Lower turret



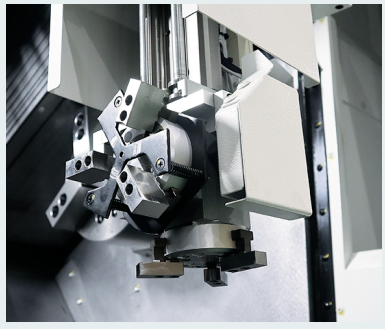
Type of turret head	Dodecagonal drum turret / 24st
Number of tools	24 tools (turning tool)
Number of driven-tool stations	12
Milling tool size	Φ1～Φ14mm

Various Options to Meet Customers Needs.
Total Provider for Peripheral Equipment.

Whether it is machine set up, cutting chip management,
higher efficiency or improved productivity,
Nakamura-Tome offers top class peripheral equipment,
which boosts the performance of our Multitasking Machines.
As a total solution provider with numerous achievements,
Nakamura-Tome offers complete solutions, including
Multitasking Machines complemented with a variety
of peripheral equipment.

Option lineup

Parts Catcher Type G



Compact Loader

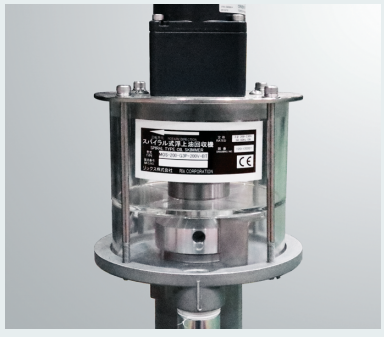
and many others ...
For not Listed Items, please contact your Nakamura-Tome representative.

Fire protection damper

Connection Duct for Oil Mist Collector

In-process measuring system

Chip conveyor



Oil skimer

Signal tower

Coolant pump

NT Smart X

Full Operator Support from Ease of Use to Reliability.

3D Smart PRO
Original Menu screen
Voice Guidance
Multiple-Touch screen
Windows 8.1

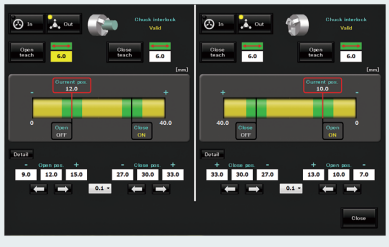
Cut in check

- 19 inch color LCD touch panel
- PC memory 8 GB
- QWERTY keyboard
- Windows 8.1
- Touch pad
- USB 2.0 Port × 2

Main features of NT SmartX

Standard

- NT Work Navigator
- Airbag (Overload detection)
- NT Nurse function
- Status Display Function
- Setup Display
- Trouble Guidance
- Productivity Function
- Warm up Function
- Tool spindle loading Operation function
- Parts Catcher G Operation Function
- NT Machine Simulation
- NT Collision Guard
- NT Multitasking Office (op.)
- NT Thermo Navigator AI
- NT Smart Sign
- Digital Chuck interlock
- One touch MDI function



Digital Chuck Interlock

Set the detection position of open end and closed end of chuck arbitrarily.
The chuck open / close position is set on the NT Smart X screen.
Setup time and machining cycle time are reduced.

One Touch MDI

This function is to register in advance frequently used cycle programs such as home position return and tool exchange, and call with one touch.

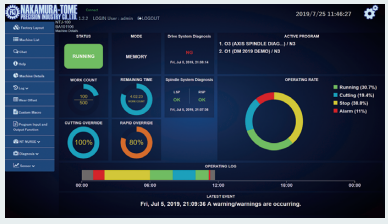
Reduce programming and setup time, while eliminating input errors.

NT Smart Sign

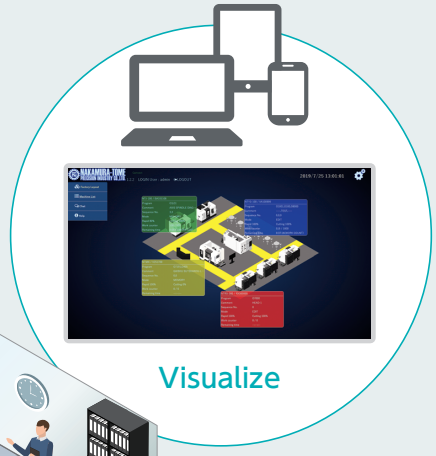
Nakamura-Tome IoT software

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

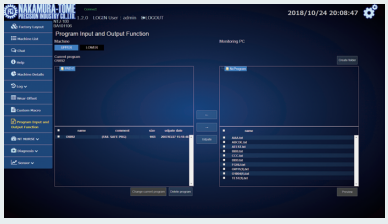
■ Monitoring



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



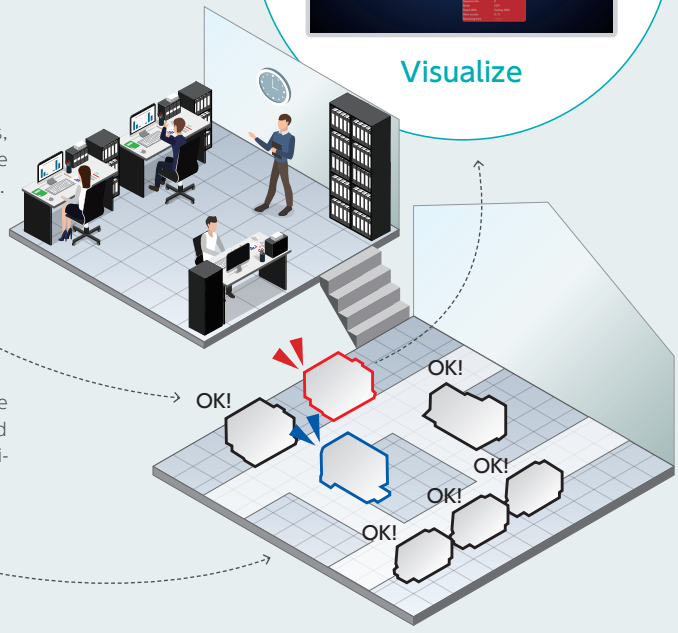
■ Data Input / Output



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 dedi-
cated 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

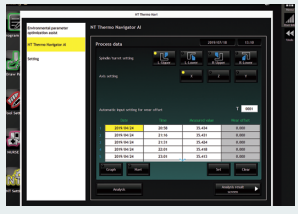
Acquired Data analyzed with NT Thermo Navi AI

Feedback

Standard for NT Smart X

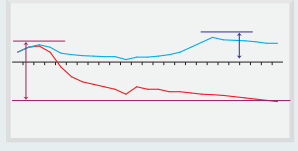
Powered by AI

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

Double safety features for maximum protection

NT Machine Simulation / NT Collision Guard + Airbag

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

NT Machine Simulation

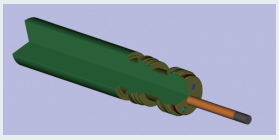
NT Machine Simulation is for Virtual Collision Checking of NC Programs without axis movement.

By checking in advance the chuck and the tool, the tool and the cover, etc. and checking the machining process etc., the risk of a machine collision when actually moving the machine can be reduced.

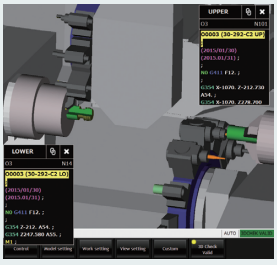
It can simulate while checking the remaining movement amount and modal information

It can override the settings for fast feed and cutting feed individually.
Simulation by process, single feed is possible.

Image shown here is of a 2-turret machine



During part simulation, several display screens are available, such as tool view, turret view or machine view.



It can show or hide the machining program.
In addition, the display of the program is color-coded for each word, and this color scheme can be set arbitrarily from the option setting screen.

NT Collision Guard

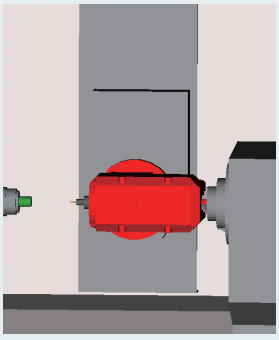
Preventive safety technology - Machine collisions are avoidable!

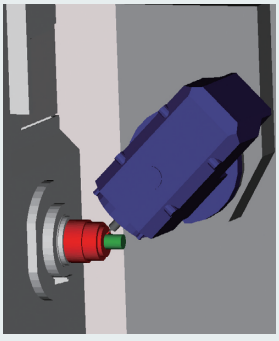
Available in automatic mode or in manual mode.
Using registered 3D models of machine, chucks, tools, holders and parts, machine collisions can be monitored and prevented in real time during automatic, manual or jog movements.
Even turret indexing is monitored to prevent collisions, drastically reducing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

Tool 3D Model setup was simplified.

After turret rotation, the tool being indexed is read from the program, and the corresponding tool 3D model is automatically displayed, or can be changed from a pre-registered tool 3D Model list if necessary.

Image shown here is of a Tool spindle machine





Airbag (Overload detection)

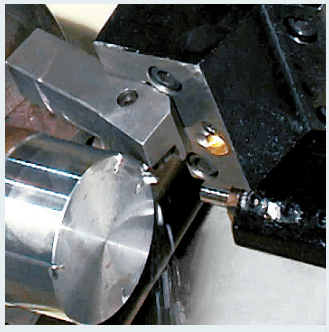
Compared to other machines, Nakamura-Tome machine will not break after the slightest collision. The "Airbag Function" minimizes the damage that may occur during a collision.

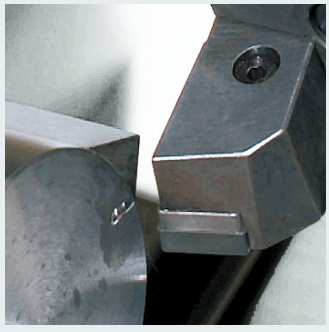
If a machine collision occurs,
there is good reason to be assured: Airbag !

Barrier?
Even with barrier function, machine collisions may occur

When the machine collision,there is no reason to panic. Nakamura-Tome is...

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





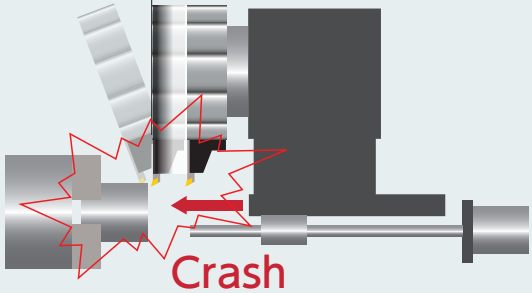
Without Airbag

Machine will not be stop immediately.
The slide continues to move even after collision.

With Airbag

Retraction within 0.001 sec

Crash !
Within 1 milliseconds after the crash, servo motor-feeding direction is reversed and the machine stops in EMG mode.



▲Video

* This feature does not mean zero impact

NT Work Navigator

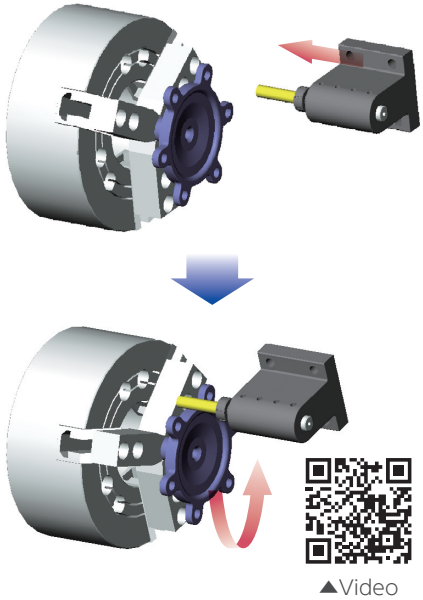
X Y Z B C

Advanced NT Work Navigator !

A new upgrade makes it possible to navigate with the X and Y-axes. Many parts with irregular outer surfaces, requiring coordinate recognition with X or Y-Axis, become within the range of NT Work Navigator.

No fi xtures required

Machining parts with non-round shapes, such as forgings or castings requires that the raw part coordinates be recognized by the CNC control.
In order to achieve this without requiring extra cost or additional options, the NT Navigator is used.
It works just by touching the part with a simple inexpensive probe (mostly 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 Navigator is a cost cutting feature in multitasking machines, eliminating the need for positioning fixtures and special clamping devices.

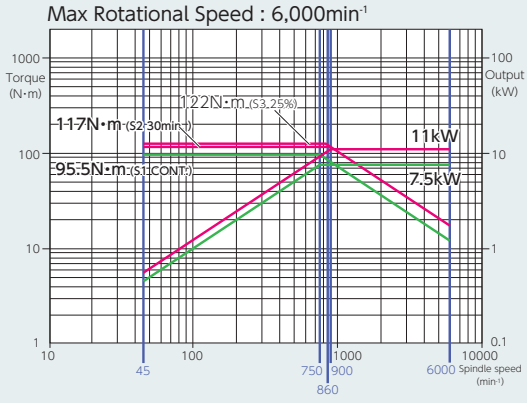


▲Video

Torque/Output Chart

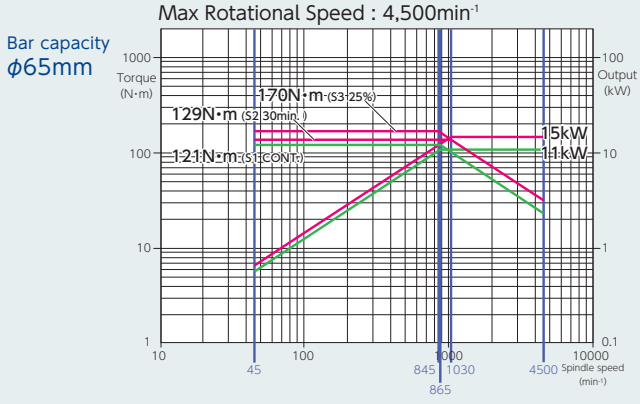
L/R Spindle motor — Standard

Bar capacity
ϕ51mm

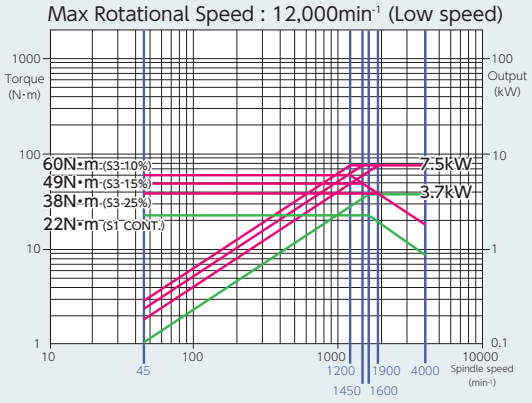


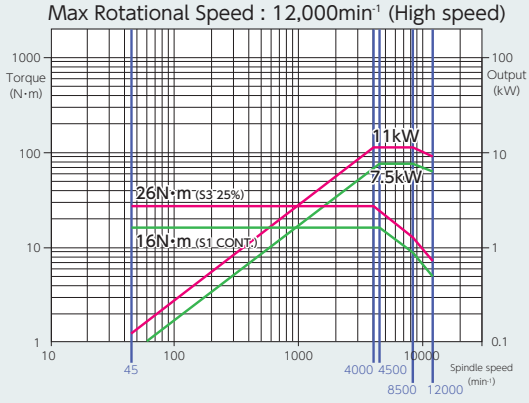
L- Spindle motor — Option

Bar capacity
ϕ65mm

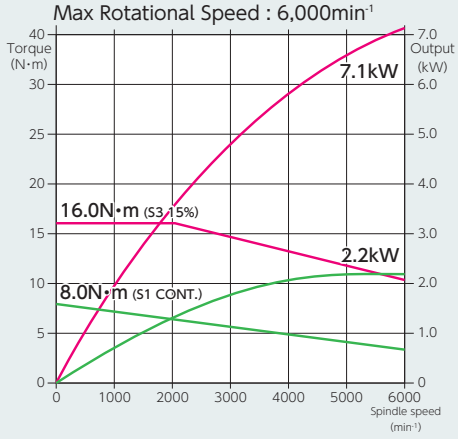


Tool spindle motor — Standard



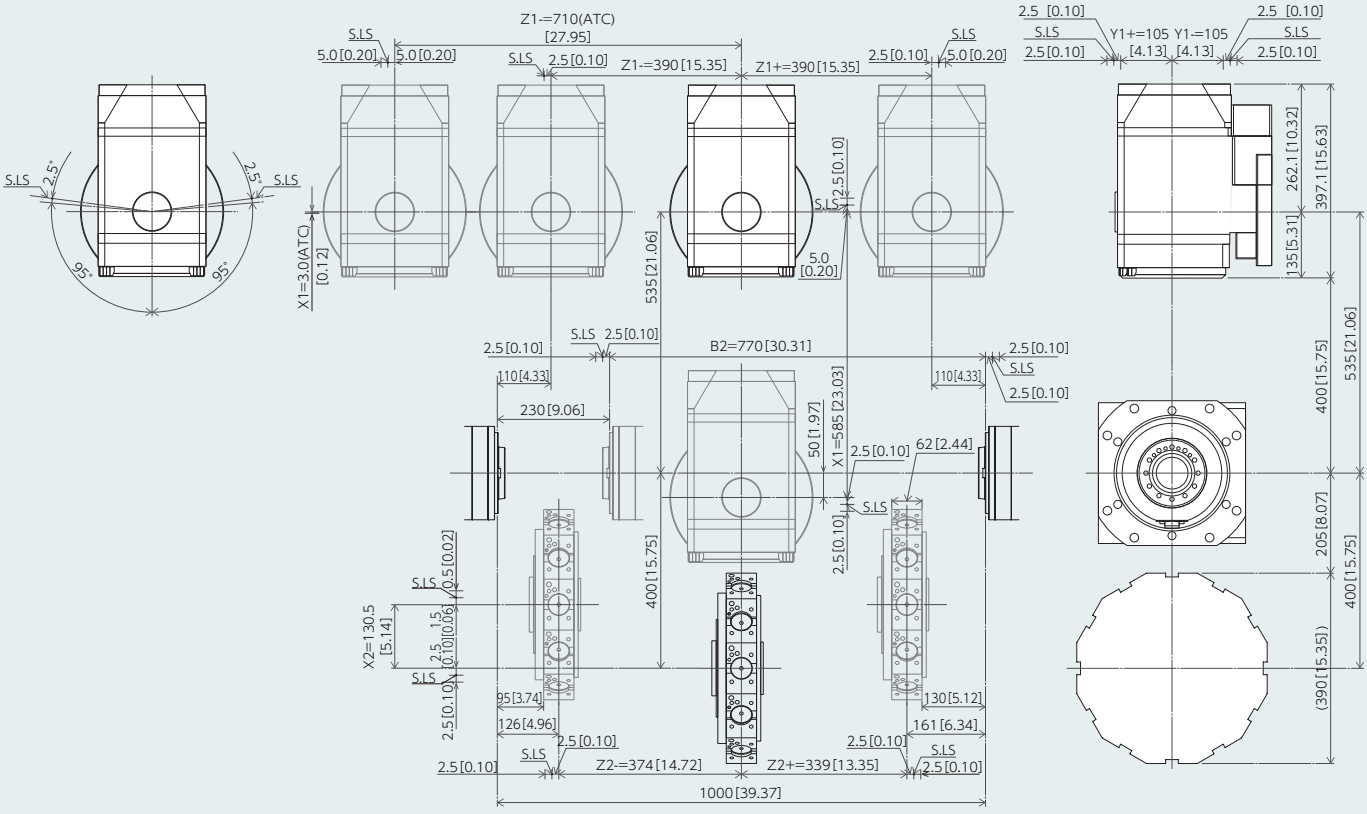


Milling motor — Standard



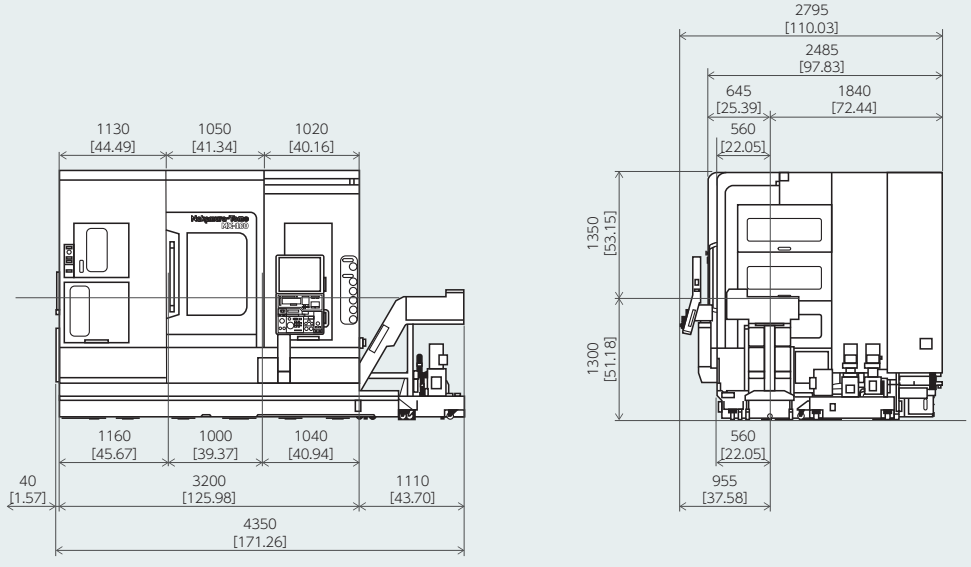
Torque/Output Chart
Travel Range / Floor Space

Travel Range



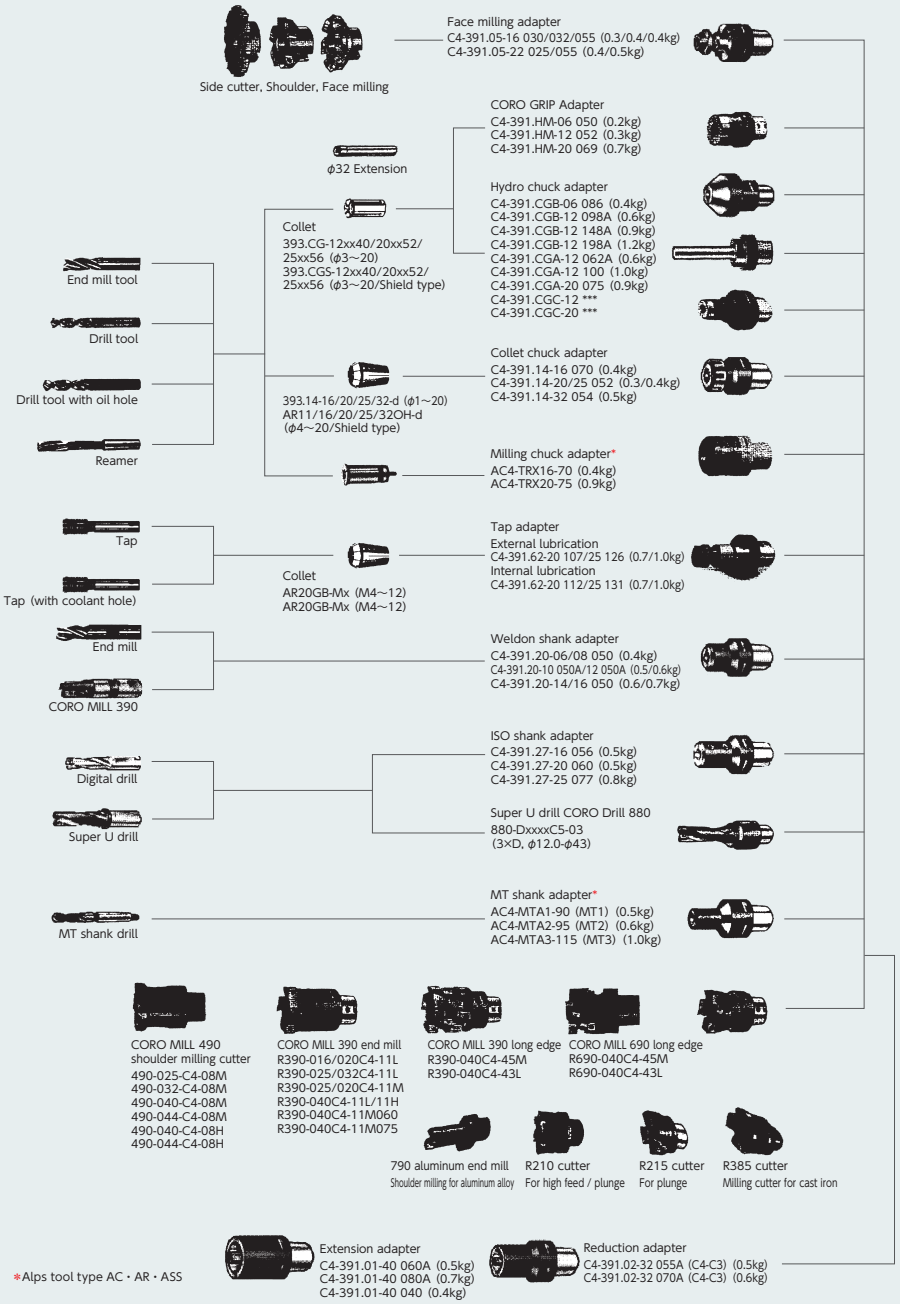
mm [inch]

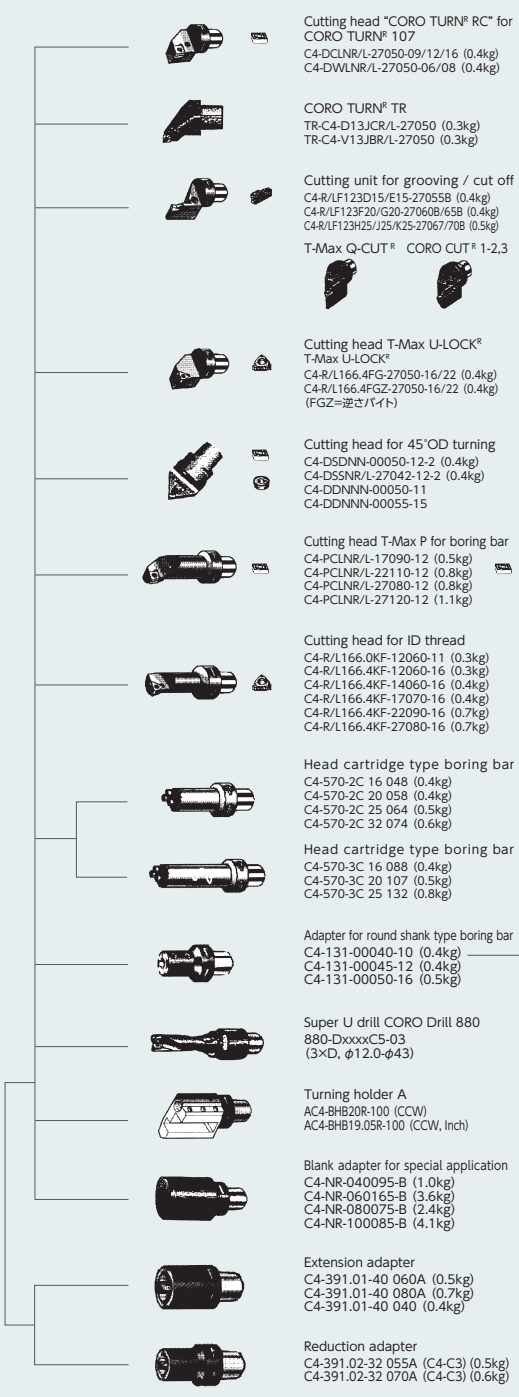
Floor Space



mm [inch]

Tooling System





OD Face turning
CORO TURN® 107
C4-SCLCR/L-27050-09/12 (0.4kg)
C4-SDJCR/L-27050-07/11 (0.4kg)

turning
C4-NF123G20-00070B (0.5kg)
C4-NF123J25-00077B (0.5kg)

CORO CUT® SL
Adapter 0°, 45°, 90°
for SL

CORO THREAD 266 cutting head
C4-266R/LFG-27050-22 (0.4kg)
C4-266R/LFGZ-27050-22 (0.4kg)
(FGZ=逆さバイト)

C4-PSDNN-00050-12/15 (0.4kg)
C4-PSSNR/L-27042-12 (0.4kg)

CORO TURN® 107
C4-SCLCR/L-11070-09 (0.3kg)
C4-SCLCR/L-13080-09 (0.4kg)
C4-SCLCR/L-17090-09/12 (0.5kg)
C4-SCLCR/L-27080-09/12 (0.7kg)

C4-R/L166.4KF-15065-22 (0.4kg)
C4-R/L166.4KF-19070-22 (0.4kg)
C4-R/L166.4KF-22090-22 (0.7kg)
C4-R/L166.4KF-27080-22 (0.8kg)
(逆さバイトの場合は KFZ タイプ)

(steel)
C4-570-2C 40 073 (0.8kg)
C4-570-2C 16 041R/L (0.4kg)
C4-570-2C 20 047R/L (0.4kg)

(vibration absorption)
C4-570-3C 32 154 (1.3kg)
C4-570-3C 40 073 (1.8kg)

Cutting head for
CORO TURN SL type

Sleeve

Steel boring bar
ϕ6, 8, 10, 12, 16

Carbide boring bar
ϕ6, 8, 10, 12, 16

C4-391.50-40 120-B (1.3kg)
C4-391.50-80 120-B (4.3kg)

Metric
Inch

Turret Head

A1021201-01
A1022201-01
Turning Holder (AL)
Forward

A1221201-01
A1222201-01
Turning Holder (AL)
Reverse

A1111201-01
A1112201-01
Cut-off Holder
Forward

A1311201-01
A1312201-01
Cut-off Holder
Reverse

A1061201-01
A1062201-01
Double Turning Holder

Qualified Tool
□20×90
□19.05×90

C26330
Cross Holder
(Max.ϕ14)

H26333
Straight Holder
(Max.ϕ14)

A1041202-01
A1042202-01
Turning Holder (B)

Qualified Tool
□20×90
□19.04×90

A1411253-01
A1412253-01
Boring Holder
(ϕ25) (ϕ25.4)

A1411253-12
A1412253-12
Boring Holder
(Coolant through)
(ϕ25) (ϕ25.4)

N3170 (ϕ25)
N3180 (ϕ25.4)
Set Ring

M2112 (ϕ25-ϕ12)
M2113 (ϕ25-ϕ10)
M2122 (ϕ25.4-ϕ12.7)
M2123 (ϕ25.4-ϕ9.525)
Tool Holder

M2110 (ϕ25-ϕ20)
M2111 (ϕ25-ϕ16)
M2120 (ϕ25.4-ϕ19.05)
M2121 (ϕ25.4-ϕ15.875)
Round Hole Bush

24ST

A1431254-01
A1432254-01
Double Boring Holder (B)
(ϕ25) (ϕ25.4)

A1091252-01
A1092252-01
Turning Boring Holder (AL)
(□16,ϕ25) (□15.875,ϕ25.4)

A1081164-01
A1082264-01
Quadruple Turning Holder (AL)
(□16) (□15.875)

W145102
W145103
Clamp piece

Qualified Tool
□16×80
□15.875×80

MX-100

■ Capacity

Max. turning diameter(Tool spindle /Lower turret)	305mm / 220mm
Distance between spindles	max.1,000mm / min.230mm
Max. turning length	870mm
Bar capacity	ϕ51mm / ϕ65mm (op. only for L)
Chuck size	6" / 8"

■ Axis travel

Slide travel X1	585mm
Slide travel X2	130.5mm
Slide travel Z1	780+320(at ATC)mm
Slide travel Z2	713mm
Slide travel Y1	±105mm
Slide travel B2	770mm

■ Left spindle	ϕ51mm	ϕ65mm(op.)
Spindle speed	6,000min^{-1}	4,500min^{-1}
Spindle speed range	Stepless	Stepless
Spindle nose	A2-5	A2-6
Hole through spindle	63mm	80mm
I.D. of front bearing	100mm	120mm
Hole through draw tube	52mm	66mm

■ Right spindle	ϕ51mm
Spindle speed	6,000min^{-1}
Spindle speed range	Stepless
Spindle nose	A2-5
Hole through spindle	63mm
I.D. of front bearing	100mm
Hole through draw tube	52mm

■ ATC Tool spindle

Tool spindle speed	12,000min^{-1} , 20,000min^{-1} (op.)
Swiveling range	190° (±95°)
Tool shank type	CAPTO C4 , HSK-T40 (op.)
Number of tools	36, (op. 48,72)
max. tool diameter / without adjacent tool	55mm / 80mm
max. tool length	180mm

■ Lower turret

Type of turret head	Dodecagonal drum turret
Number of tool stations	12 (Max.24)
Number of Indexing positions	24
Tool size (square shank)	□20mm (12st) / □16mm (24st)
Tool size (round shank)	ϕ25mm

■ Milling (Lower turret)

Rotary system	Individual rotation	
Milling spindle speed	6,000min-1 , 8,000min-1 (op.)	
Spindle speed range	Stepless	
Number of milling stations	12	
Tool size	Straight holder	ϕ1mm ～ϕ14mm
	Cross holder	ϕ1mm ～ϕ14mm

■ Drive motor

L-spindle	11/7.5kW , 15/11kW (op.)
R-spindle	11/7.5kW
Tool Spindle	11/7.5kW
Milling (Lower turret)	7.1/2.2kW

■ General

Height	2,650mm
Floor space (L × W)	4,350mm ×2,795mm
Machine weight (incl. control)	17,000kg

■ Power requirements

power supply	42.2kVA (46.3kVA) (L spindle 11/7.5kW)
	45.4kVA (49.4kVA) (L spindle 15/11kW op.)

●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.)

②In 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•Control Specification

■ Items

Control type	FANUC 31i-B (2-PATH)

■ Controlled axes

Controlled axes	9 axes
Least command increment	Upper : 5axes (X1, Z1, C1 (C2) , Y, B1 axis) Lower : 4axes (X2, Z2, C2 (C1) , B2 axis)

■ Input command

Least input increment	X,Z,Y,B2 : 0.001mm/0.0001inch (diameter for X-axis),) , C,B1 : 0.001°
Least command increment	X : 0.0005mm / Z,Y,B2 : 0.001mm / C,B1 : 0.001°
Max.programmable dimension	±999999.999mm / ±39370.0787in , ±999999.999°
Absolute / incremental programming	X, Z, Y, C, B (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, Z : 1 ～ 8000mm/min, 0.01 ～ 315inch/min (1 ～ 4800mm/min, 0.01 ～ 188inch/min) Y : 1 ～ 8000mm/min, 0.01 ～ 315inch/min (1 ～ 4800mm/min 0.01 ～ 188inch/min) C : 1 ～ 4800° /min B1 : 1 ～ 8000° /min (1 ～ 4800° /min) B2 : 1 ～ 8000mm/min, 0.01 ～ 315inch/min (1 ～ 4800mm/min 0.01 ～ 188inch/min) feed / rev 0.0001 ～ 8000.0000mm/rev (0.0001 ～ 4800.0000mm/rev) 0.000001 ～ 50.000000inch/rev The maximum cutting feed rate is the value in AI contour control mode. It is also on with G316 command. The values in parentheses are normal values
Dwel	G04
Feed per minute / Feed per revolution	G98 / G99
Thread cutting	G32F designation
Thread cutting retract	Standard
Continuous thread cutting	Standard
Handle feed	Manual pulse generator 0.001/0.01/0.1mm (per pulse)
Automatic acceleration / decelaration	Standard
Linear accel./ decel. After cutting feed interpolation	Standard
Rapid feed override	Low /25/50/100% (changeable to every 10% by NT Setting screen)
Cutting feedrate override	0 ～ 150%, 10% (each 10%)
AI contouring control I	G5.1
L- Spindle override	50%～ 120% Set every 10%
R-Spindle override	50%～ 120% Set every 10%
Tool Spindle override	50%～ 120% Set every 10%

■ Program memory

Part program storage length	1Mbyte Total 2560m (Upper/ Lower : Each 1280m) 2Mbyte Total 5120m (op.) 4Mbyte Total 10240m (op.) 8Mbyte Total 20480m (op.)
Part program editing	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of registerable programs	Total 2,000 programs (Upper/ Lower : Each 1,000 programs) Total 4,000 programs (op.)
Program storage memory	Backed up by battery
Multiple program simultaneous 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 Smart X
Operation panel : Display	19" color SXGA LCD touch panel
Operation panel : Keyboard	QWERTY keyboard

■ Programming assist function

Circular interpolation R programming	Standard
Direct drawing dimension programming or Chamfering/Corner R	Standard (Direct drawing dimension programming is standard)
Canned cycle	G90, G92, G94
Multiple repetitive canned cycle	G70 ～ G76
Multiple repetitive canned cycle II	G71, G72
Canned cycle for drilling	G80 ～ G89
Sub program	Standard
Custom macro	Standard (common variable#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

■ Mechanical support

Rigid tap	Standard
Spindle synchronised control	Standard
C axis synchronised control	Standard (G496 C1, fast forward positioning)
Spindle orientation	Standard
Tool spindle orientation	Standard : 4 positions (90° × 4/ M785/ M786/ M787/ M788)
	Maximum : 12 positions (30° × 12/ G419)

■ ECO function

Servo motor power off	Standard (changeable by NT Setting screen)
Motor acceleration / deceleration output limit	Standard (changeable by NT Setting screen
Servo motor energy saving acceleration / deceleration G code	G356/G357
Automatic lighting off	Standard (changeable by NT Setting screen)
Automatic monitor off	Standard (changeable by NT Setting screen)

NAKAMURA-TOME PRECISION INDUSTRY CO., LTD.

http://www.nakamura-tome.co.jp

Netsuno 15, Hakusan city, Ishikawa, 920-2195 Japan
Phone : +81 76 273 8100 Fax : +81 76 273 4312
E-mail : nt-jpn@nakamura-tome.co.jp

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