

High-precision
Gear Cutting Machine

FR SERIES
FINE PITCH FOR ROBOT, REDUCER



FINE PITCH FOR ROBOT,
REDUCER

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REDUCER

High-precision gear hobbing machine GE15FR/Plus

Item	Model	GE15FR	GE15FR Plus
Max. workpiece diameter (mm in)		φ150 φ5.9	φ150 φ5.9
Max. module DP		2.5 10.2	1.25 20.3
Axial travel (mm in)		250 9.8	250 9.8
Radial travel (mm in)		140 5.5	140 5.5
Hob	Max. diameter (mm in)	φ100 φ3.9	φ75 φ3.0
	Max. length (mm in)	150 5.9	150 5.9
	Shift (mm in)	150 5.9	150 5.9
	Speed (min ⁻¹)	600~6,000 Direct Drive	800~8,000 Direct Drive
Max. table speed (min ⁻¹)	2,000 Direct Drive	1,000 Direct Drive	
Total electric power (kVA)	35	37	
Machine weight (kg lb)	8,500 18,800	8,500 18,800	



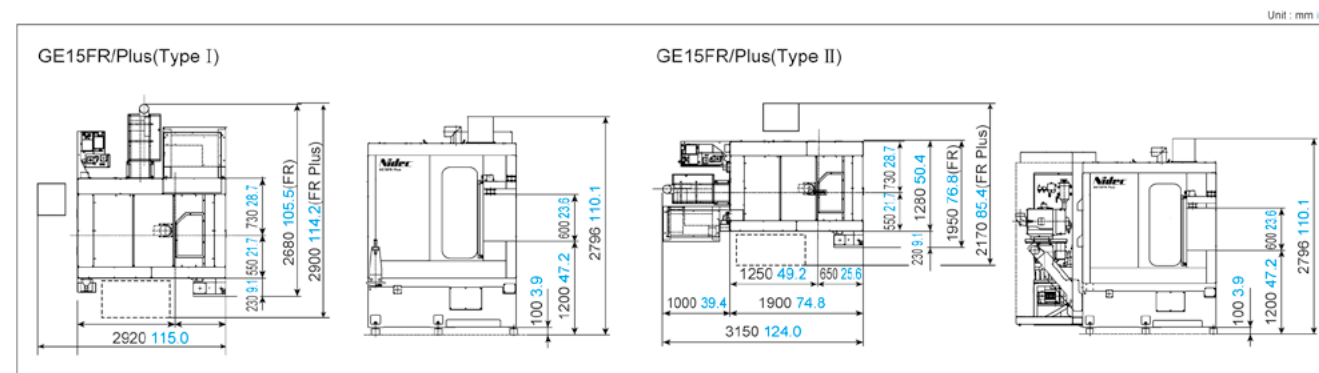
Standard equipment

High speed direct-drive spindle and table
X axis scale
Relieving software
Hydraulic and lubrication oil unit
Splash cover (fully enclosed)
Electromagnetic door interlock system
Chip conveyor
High precision hob arbor
Tail stock speed reducer
Cutter power clamp
Part clamping device
Work light / Machine status light
Light in the control box / Lamp check circuit
Spindle orientation
Hob arbor setting device
Power saving circuit / part counter / Power outlet
NC device (FANUC)
NC memory card

Conversational programming software
Manual coolant guard slide door
Two-hand operation/ circuit breaker / spindle ammeter
Ethernet interface
Maintenance tool kit
Coolant device
Fixture cleaning device
Mist collector
Coolant gun
Source pressure, residual pressure release valve
Zero point indication / Machine installation ▼ mark/
Indication (weight, tank capacity, kVA)

Options

Part fixture
Transfer unit
Automatic coolant guard door
Handy operation panel
Additional memory
Additional hob arbor
Various programming software



High-precision gear shaping machine SE25FR/Plus • SC40FR

Item	Model	SE25FR	SE25FR Plus	SC40FR
Max. workpiece diameter	External gear (mm in)	φ250 φ9.8	φ250 φ9.8	φ400 φ15.7
	Internal gear (mm in)	φ250 φ9.8 (φ120 φ4.7 + cutter dia.)	φ250 φ9.8 (φ120 φ4.7 + cutter dia.)	φ400 φ15.7 (φ250 φ9.8 + cutter dia.)
Max. module DP		2.5 10.2	1.25 20.3	4 6.35
Max. workpiece width (mm in)		60 2.4	60 2.4	115 4.5
Cutter stroke (str./min.)		180~1,800	180~1,800	50~800
Drive system (Table, Cutter head)		High-precision worm gear	Direct drive	High-precision worm gear
Number of cuts		1~4	1~4	1~4
Main motor (cont. rating) (kW/HP)		7.5 10	7.5 10	7.5 10
Number of NC axes		5	5	5
Total electric power (kVA)		24	29	31
Machine weight (kg lb)		9,000 19,900	9,500 21,000	10,000 22,100



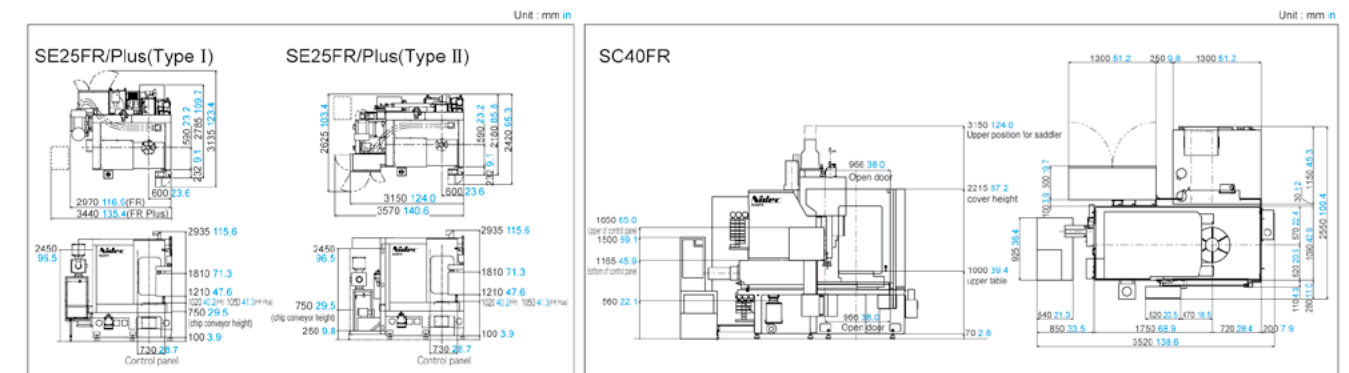
Standard equipment

[SE25FR Plus] High speed direct-drive table and cutter head
[SE25FR and SC40FR] High-precision specification (high precision master wheel etc.)
X axis scale
Changeable relieving amount
Hydraulic and lubrication oil unit
Splash cover (SE25FR / Plus : fully enclosed, SC40FR: High cover)
Electromagnetic door interlock system
Chip conveyor
Cutter arbor
Cutter arbor setting device (SE25FR, SC40FR)
Cutter power clamp (SE25FR, SC40FR)
Spur guide
Part clamping device
Work light / Machine status light
Light in the control box / Lamp check circuit
Power saving circuit / part counter / Power outlet
NC device (FANUC)
NC memory card

Conversational programming software
Manual coolant guard slide door
Two-hand operation/ circuit breaker / spindle ammeter
Ethernet interface
Maintenance tool kit
Coolant device
Fixture cleaning device
Mist collector
Coolant gun
Source pressure, residual pressure release valve
Zero point indication / Machine installation ▼ mark/
Indication (weight, tank capacity, kVA)

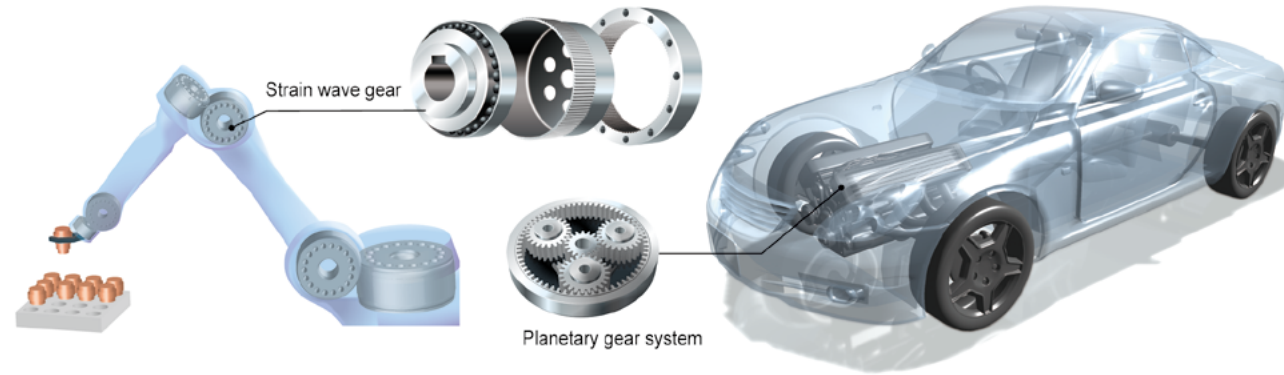
Options

Part fixture
Transfer unit
Automatic coolant guard door
Handy operation panel
Additional memory
Additional hob arbor
Various programming software



High-precision gear cutting machine “FR series” dedicated to small module gears for EV’s planetary gear system and high-precision reducers for robots

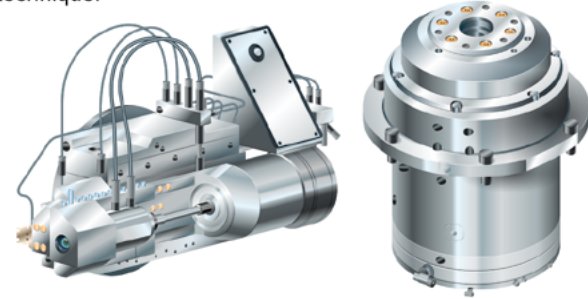
There are increasing demands for more precise reducers in the globally expanding robot markets. FR series is thoroughly pursuing improved rotational accuracy of spindle and table. We can offer the best solution for precision gear cutting along with our originally developed small module cutters.



High-precision gear hobbing machine GE15 FR/Plus

High-precision direct-drive spindle and table

The spindle and table achieve stable rotation moving even at max. speed, owing to its design to reduce heating and vibration during high speed rotation and sophisticated assembling technique.



Suppressing thermal displacement in high precision gear cutting

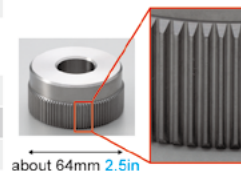
FR series is equipped with x axis scale as standard, which leads to stable repeatability.

Sample (GE15FR Plus)

Work spec.		Cutter spec.	
Module	0.4mm 0.02in	Outer diameter	32mm 1.26in
Number of teeth	160	No. of hob starts	One start
Helix angle	0°	Material	Carbide
Tooth width	15mm 0.59in		
Material	SCM415		

Cutting condition

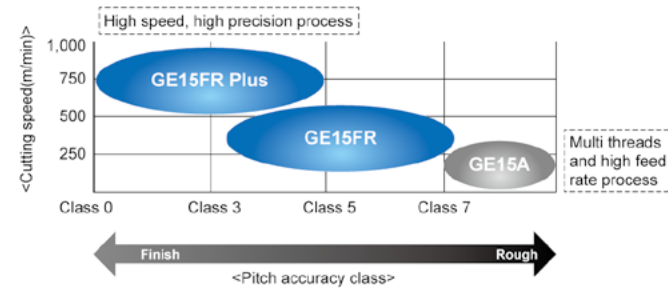
Hob rotation speed	8000min ⁻¹
Cutting speed	804m/min
Ax. feed	0.4mm/t.rev



Pitch accuracy Class 0 achieved

Appropriate for high speed and high precision small module gear cutting

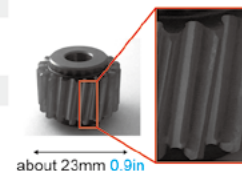
FR series meets demand for small module gears that require high pitch accuracy like high-precision reducers. Especially GE15FR Plus is suitable for high speed and high precision gear with large number of teeth using its high speed spindle at maximum speed 8000 min⁻¹.



Sample (GE15FR)

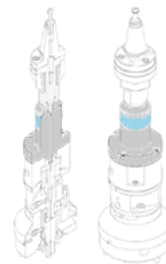
Work spec.		Cutter spec.	
Module	1.25mm 0.05in	Outer diameter	46mm 1.81in
Number of teeth	18	No. of hob starts	One start
Helix angle	8°	Material	Carbide
Tooth width	14mm		
Material	SCM415		

Actual cutting time 18.7sec.



Pitch accuracy class 1 achieved

Tooling parts



Automatic chuck

- For thin work pieces
Hydraulic mandrel fixture
- For small diameter work pieces
Collet type / Solid type

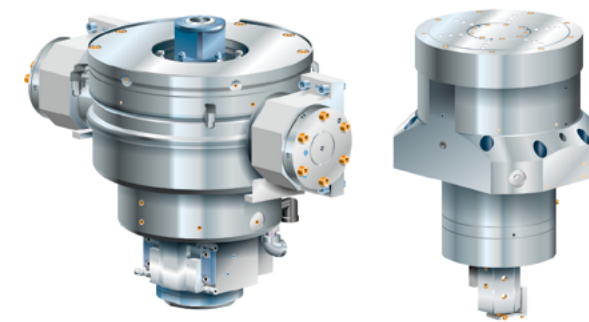
High-precision gear shaping machine SE25FR/Plus • SC40FR

The machine configuration enables high precision gear cutting

SE25FR Plus

SE25FR Plus is the high-end machine of high precision shaping machines, which is equipped with the table and the cutter head using direct drive technology deliberately designed.

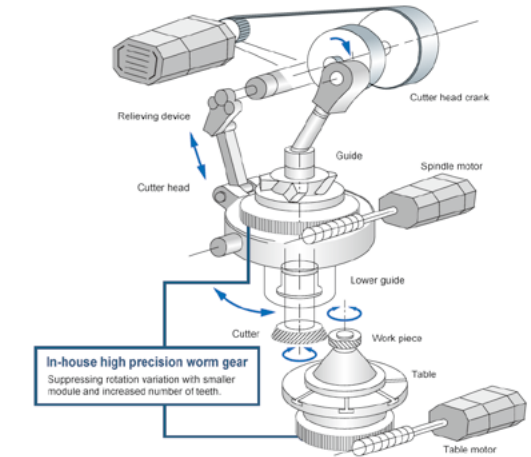
The table axis is equipped with MP scale* offering scale feedback achieving high-rotation accuracy.



* In-house precision rotary scale

SE25FR•SC40FR

SE25FR•SC40FR are equipped with the table and the cutter head which use in-house made worm gear sets to suppress rotation variation.



Suppressing thermal displacement in high precision gear cutting

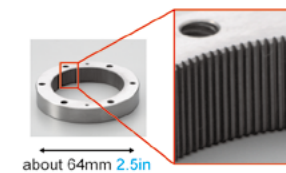
FR series is equipped with x axis scale as standard, which leads to stable repeatability.

Sample (SE25FR Plus)

Work spec.		Cutter spec.	
Module	0.4mm 0.02in	Number of teeth	106
Number of teeth	162	Coating	Mighty Shield μ
Helix angle	0°		
Tooth width	13mm 0.51in		
Hardness	approximately HB 300		

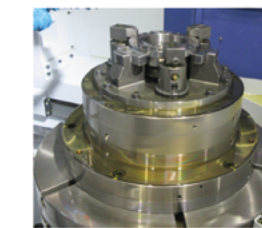
Cutting condition

Number of strokes	750 str/min
Cutting speed	63.6 m/min
Circumferential feed	0.416 mm/str
Radial feed	0.002 mm/str
Cutting time	2.08 min



Pitch accuracy Class 0 achieved

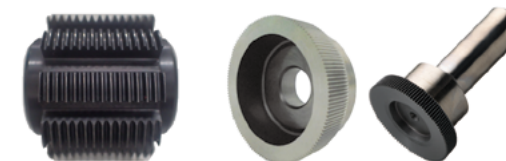
Tooling parts



Automatic chuck

- For easily distorted work pieces
Diaphragm type fixture
- For general ring gears
Outer diameter collet type fixture

Precision small module cutter



Hobs

Shaper cutters

- Not only involute tooth profile, special tooth profile possible
- Minimum module 0.1
- Mighty shield μ is the newly developed coating dedicated to high-precision small module gears. Its thin and uniform coating doesn't affect tooth profile of workpieces.
- Nidec's original recoating technology can reduce cutter tooth profile change
- Applicable of cutters made of high speed steel or carbide steel



Inquiry

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Machine specifications such as dimensions etc., are fixed using SI units including the metric system.
In case data are shown in other units in blue, such as inches, pounds and gallons etc. they are for reference only and the formal data
in black supersedes any equivalent data given in blue when fractions caused by conversion become an issue.
Specifications are subject to change without prior notice.
The export of this product is subject to Japanese Governmental approval.