

MITSUBI SEIKI

4GDN/6GCN

CNC JIG GRINDERS



MITSUBI SEIKI KOGYO CO., LTD.

Mitsui Seiki, the technical leader in machine tools has added new dimensions to Jig Grinding.

Five simultaneous axes motions, ultra-precision accuracy and uninterrupted and unmanned operation provides the efficiency and capability to take command of the exotic materials, fine ceramics, carbide and conventional materials that demand jig grinding tolerances.

High Accuracy

Classic Jig Grinder base machine construction, including the following major points.

- All major components are "box-shaped meehantie cast iron."
- 3 point supported bed to eliminate the influence of floor distortion and insure long term accuracy and reliability.
- Precision hand scraped guide ways with friction reducing mechanism allow slides to respond to fine resolution feed and also maintain geometric accuracies for long years of service.

Enhancement to the basic design with the following state-of-the-art features.

- Advanced AC digital servo system directly coupled to precision, rigidly mounted ball screws for rapid response, sable performance and high accuracy contouring capability.
- Ultra precision glass scale monitors with 10 micron graduations provide 0.1 micron (0.000004") resolution scanning head assists in sub-micron positioning.
- Low co-efficient of thermal expansion casting is used for the head stock.

Advanced Unique Design on Quil Motion Control (Z axis)

Accurately CNC controlled Z-Axis makes it possible to perform 3 dimensional complex contour grinding and precision bottom grinding.

- Ball screw driven by AC Digital servo control
- Ultra-precision glass scale feedback
- 0.0001mm (0.00001") input resolution
- Positioning accuracy $\pm 0.001\text{mm}$ (± 0.000040 ") /full stroke
- Z-Axis is simultaneously controlled with all other motions.

Advanced software makes it possible to control Z-Axis in two different modes

Z-AXIS MODE

- Z-Axis is programmed and controlled same as X and Y-Axis

OSCILLATING MODE

- Z-Axis oscillates in given stroke
- Upper/lower stroke dead points can be set; or changed by program or MDI through the keyboard/CRT
- Because oscillating stroke is controlled by CNC, repeatability of the oscillating Z-Axis is extermely accurate compared to the conventional air over hydraulic drive system
- 200 oscillating cycles/min/25mm (1")
- Programmed oscillating speed can easily be fine tuned by override switch from 0 to 150% in 10% increments

High Productivity

Versatile capacity

- Automatic Tool Changer (4GDN) (option)
20 tools capacity, BT-20 shank
- Precision spin table (option)
6" diameter, 30–600 rpm
- CT Rotary table (A- axis) (option)
300mm (12")
- W-Axis Control (Bridge up/down control by CNC) (option)
- Flood coolant system with automatic rolling paper filter (option)
Effective for heavy grinding and creep grinding

Powerful high frequency electric grinding head series

- 0.75KW (1HP) standard and botom grinding head
9,000–45,000 rpm
- 0.28KW (0.4HP) high speed grinding head
18,000–90,000 rpm
- 0.75KW (1HP) heavy duty grinding head
4,500–22,500 rpm
- 0.75KW (1HP) standard and bottom grinding head for ATC machine
(with built-in tool clamping mechanism
9,000–30,000 rpm)

High speed air turbine grinding heads

- Low speed air turbine
115,000–180,000 rpm



Advanced Intelligence Functions

Advanced intelligence functions to accomplish unattended operation

- **C-Axis Control**
Automatic tangential control
No programming is required for the C-Axis.
- **U-Axis Control**
Automatic wheel outfeed control
Wheel outfeed distance to go, outfeed increment, feed out interval, number of spark out cycles are automatically controlled.
- **Special Programmable Mirror Image**
One part program can be used to grind mating, punch and die.
- **Automatic Hole Grinding Cycle**
Perform automatic orbital grinding from hole to hole on various diameters and depths, even on workpieces with multiple surfaces.
- **Pattern Repeating Cycle**
Contouring motion repeats until predetermined size is obtained automatically combined with wheel outfeed function and macro judging capability.
- **Automatic Wheel Dressing Cycle**
Simple command brings the wheel back to the dressing position. Wheel can be dressed in various shapes with X and Y-Axis motion combined with Z-Axis motion.
- **Automatic Measuring and Compensation System (AMCS) (option)**
Spindle touch probe with advanced measuring and compensation software
- **Automatic Sizing System (patent pending) (option)**
Inprocess gauge with compensation software for contour grinding
- **Gap Elimination System (option)**
Acoustic sensor with gap eliminating software
Increases feedrate until the grinding wheel is in contact with the workpiece to shorten air cut time



The Latest, Most Advanced and Reliable CNC

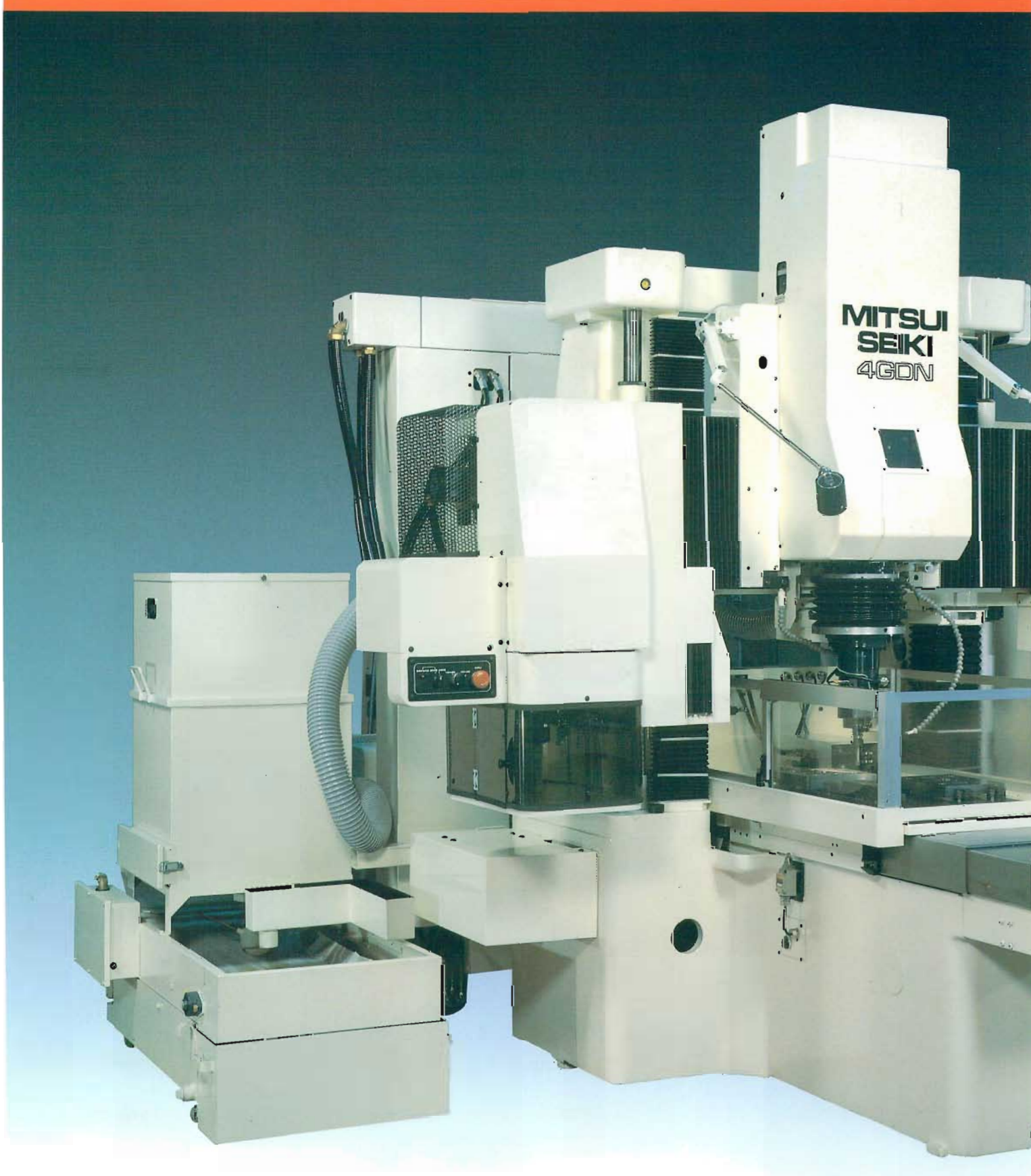
CNC unit is 32 bit CPU equipped high speed state of the art control (FANUC System 15M or MELDAS 330HJ) includes:

- 0.0001mm (0.00001") resolution
- 4 to 6 axes (X, Y, Z, C, A, W) control
- C-Axis automatic tangential control
- Special programmable mirror image
- Part program memory
- Custom macro
- Cutter radius compensation C
- Tool offset memory
- 14" color CRT
- U-Axis position display



4GDN

MITSUI SEIKI INTRODUCES
Unmanned Operation of Ultra-precision Jig Gri



S NEW CONCEPTION CNC JIG GRINDER

Grinding has been perfected with the introduction of the 4GDN.

- Multi-purpose CNC Jig Grinding machine enabling unmanned high precision contour chop grinding.
- Automatic grinding wheel changer is offered as an option.

WORKING RANGE

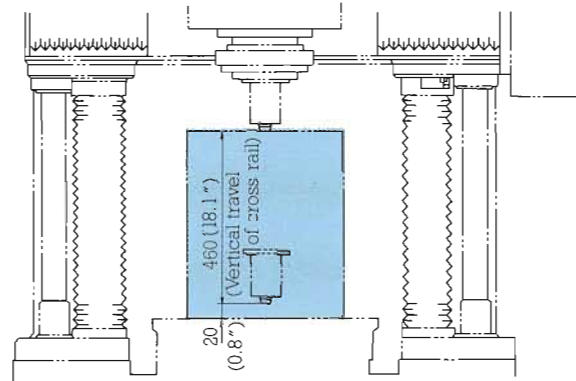
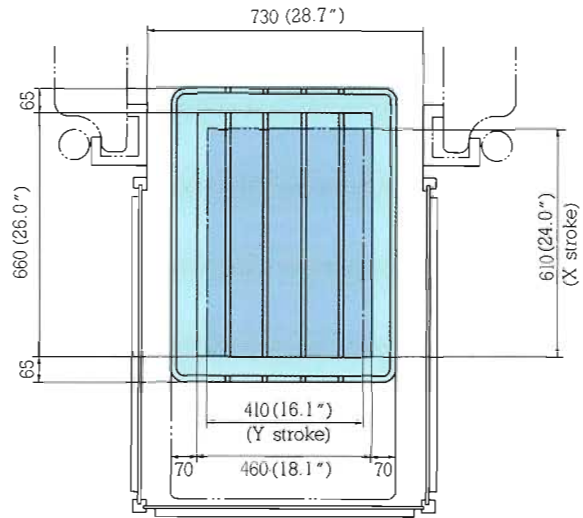


Photo: With ATC



6GCN

MITSUI SEIKI INTRODUCES

Unmanned Operation of Ultra-precision Jig Grinding



S NEW CONCEPTION CNC JIG GRINDER

ing has been expanded to large workpiece with the introduction of the 6GCN.

- Unmanned ultra-precision Jig Grinding of new materials, fine ceramics, carbide, etc.

WORKING RANGE

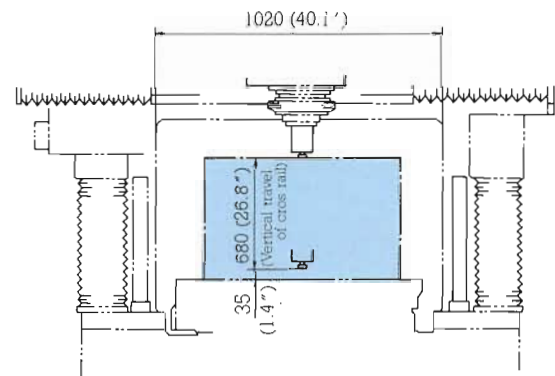
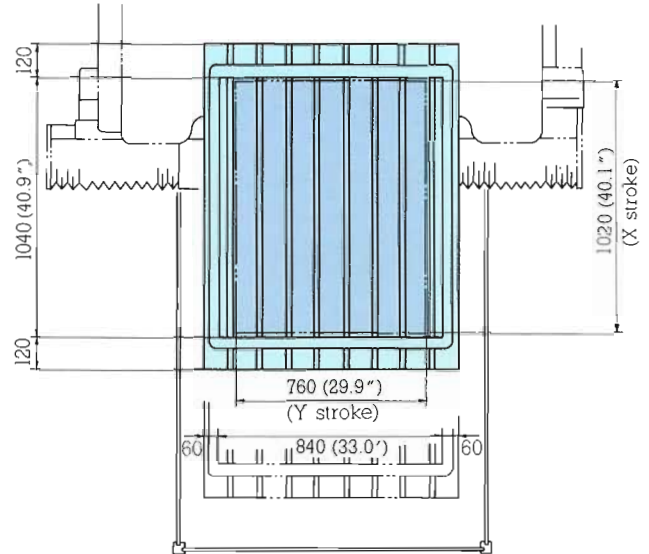


Photo: 6GCN

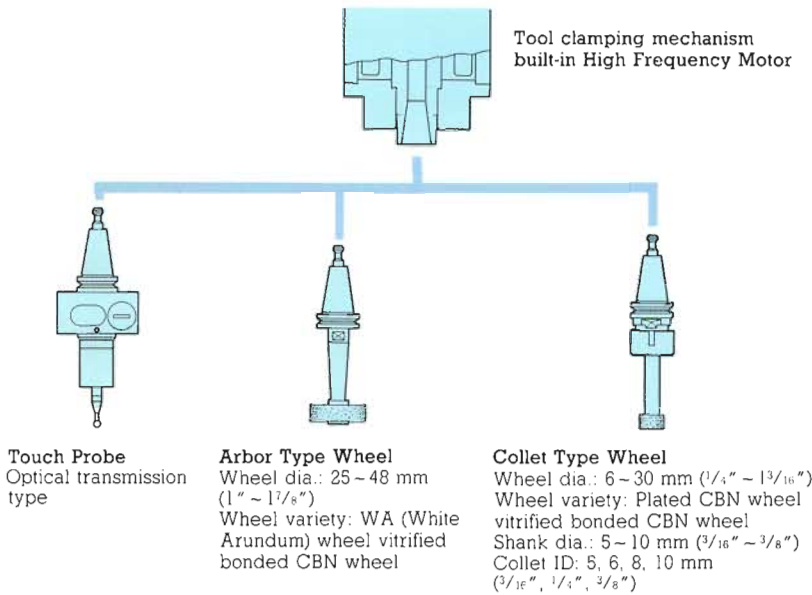


SPECIFICATIONS

STANDARD MACHINE SPECIFICATIONS

	4GDN	6GCN
Working range		
Longitudinal travel of table	610 mm (24.0")	1020 mm (40.2")
Transverse travel of spindle saddle	410 mm (16.1")	760 mm (29.9")
Vertical travel of cross rail	460 mm (18.1")	680 mm (16.8")
Distance between columns	730 mm (28.7")	1120 mm (44.1")
Max. distance from table surface to grinding spindle nose	480 mm (18.9")	715 mm (28.1")
WORK TABLE		
Working surface	790×600 mm (31.1"×23.6")	1280×960 mm (50.4"×37.8")
Nos. of T slot	4	8
Rapid feed	5000 mm/min. (196.85" ipm)	
Fine feed	0.1 ~ 2000 mm/min (0.01 ~ 78.74" ipm)	
Permissible load	750 kg (1650 lbs)	1200 kg (2640 lbs)
SPINDLE SADDLE		
Rapid feed	5000 mm/min. (196.85" ipm)	
Fine feed	0.1 ~ 2000 mm/min (0.01 ~ 78.74 ipm)	
CROSS RAIL		
Speed of cross rail elevating	500 mm/min.	560 mm/min.
SPINDLE		
Planetary motion speed	5 ~ 300 rpm	
Max. Radial adjustment of planetary motion on dia.	φ4 mm (dia. 0.16")	
Min. graduation of radial adjustment on dia.	φ0.001 mm (dia. 0.00005")	
C AXIS		
Rapid feed	2600 deg./min.	
Fine feed	0.1 ~ 2600 deg./min.	
QUILL		
Vertical travel	140 mm (5.50")	
(Power reciprocating range)	135 mm (5.30")	
Number of cycle	200 cycle, 25 mm (1.0" ipm) stroke/min.	
GRINDING HEAD (Accessories)		
High frequency motors (For lower speed range)	9000 ~ 45000 rpm (Max. output 0.75 kW, 1 HP)	
WORKING CAPACITY		
Hole ground without adaptor	Max. φ100 mm (dia 3.9") (Min. φ0.5 mm (dia. 0.02"))	
Hole ground with adaptor	Max. φ310 mm (12.2")	
Taper angle ground	0 ~ 3°	
POSITIONING ACCRACY		
X, Y, Z axis	±0.001 mm/Full stroke	
MACHINE DIMENSIONS		
Machine weight	4300 kg (9460 lbs)	9000 kg (19800 lbs)
Power consumption	16 kVA	18 kVA

SPECIFICATIONS OF AUTOMATIC TOOL CHANGER



Grinding Head	High Frequency Motor with built-in tool clamping mechanism
Out put power	0.75 KW (1 Hp)
Nos. of pole	4
Speed	9,000 ~ 30,000 rpm
Lubrication	Oil & Air
Spindle inner taper	NT20
Automatic tool changer	Arbor change type
Wheel diameter	6 ~ 48 mm (1/4" ~ 1 7/8")
Tool shank	BT20 with unified pull stud (retention knob)
Tool selection	Random
Tool clamping method	Pull stud retention type
Tool storage	Tool Pot Magazine Type
Nos. of tool	20 tools
Max. wheel dia.	48 mm (1 7/8")

ACCESSORIES GROUP 1

	4GDN	6GCN		4GDN	6GCN
Circular dividing table	φ300 mm (11.8")	φ800 mm (31.5")	Compound table	360 × 260 mm	
Tilting rotary table	φ230 mm (9.0")	φ450 mm (17.7")	NC Rotary table 300 CTN	300 mm	

ACCESSORIES GROUP 2

High frequency motor (high range/0.28 kw)	18,000 ~ 90,000 rpm	Arbor for grinding wheel (for HFM-H)	φ3 mm
Dust collector		Eccentric adaptor	
Mist coolant system		Set of loose wheels, 30 pcs.	8, 10, 15 mmφ
Work lamp		Set of grinding wheels with shank, 55 pcs.	1, 1.5, 2, 3, 4 mmφ with φ3 mm shank 25 pcs B140P 5, 6, 8 mmφ 30 pcs WA60/mV
Slot grinding attachment	type A φ30 mm type B φ45 mm	Set of grinding wheels for slot grinding attachment 20 pcs, WA 60/mV	φ30 mm, φ45 mm
Reference square type 11		Steel cabinet	
Three jaw scroll chuck	outer φ100 mm inner φ30 mm		
Receiver			

ACCESSORIES GROUP 3

High frequency motor for heavy duty grinding	type HFM-P, 4,500 ~ 22,500 rpm	Bearing changing tool for high frequency motor for heavy duty grinding	
High speed air turbine	100,000 ~ 180,000 rpm	Bearing changing tool for air turbine low range	
Air compressor, 7.5 kw		Spare bearings	air turbing
Air dryer (refrigerator type)			slot grinding attachment spindle A, B, C, D
Slot grinding attachment	type C φ60 mm type D φ75 mm		high frequency motor (high/low)
Special type dresser	Magnetic stand type holder Hand type holder		HFM-P, heavy duty grinding motor
	Single point diamond dresser 90, 60	Arbor for grinding wheel (low, high frequency motor)	
	Forming dresser, plain type	Arbor for grinding wheel (for HFM-H)	
	Multi diamond powder dresser	Collets (for HFM-L, H)	
	Impregnated dresser	Copy dresser for slot grinding	
Set of workpiece clamping elements	100 × 500 × 16h6 mm (2 pcs.)	Radius dresser for slot grinding	
Parallel blocks		High precision vise	
Right angle plate		Universal vise	
Locating microscope		Indexing head	
Reference square type 1		Observating microscope for slot grinding	
Observating microscope		Universal sine bar	
Bearing changing tool for high frequency motor low/high range			

SPECIAL EQUIPMENTS AND FUNCTIONS

High frequency stationary inverter for heavy duty grinding	5 kVA	Automatic tool changer	0.75 kw, 9,000 ~ 30,000 rpm, 20 tools
Indicator holder for heavy duty grinding		Collet holder for ATC	
Arbor for heavy duty grinding	S type L type	Collect for ATC tool holder	
CBN grinding wheel for heavy duty grinding	loosed wheel type cup type	Arbor for ATC tool holder	
Wet grinding unit with paper filter	0.75kW, 3P tank 100 lit pump 100 W, 3P, 45 lit/min	Automatic sizing device	
		Automatic measuring and compensation system	

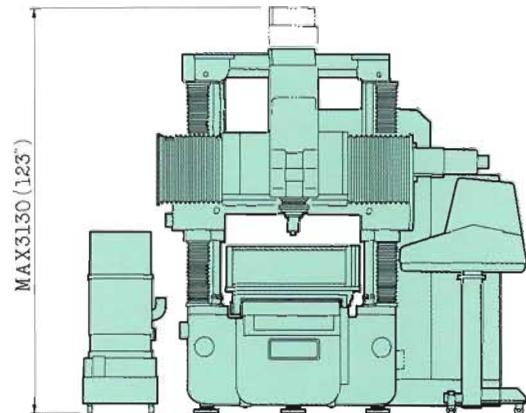
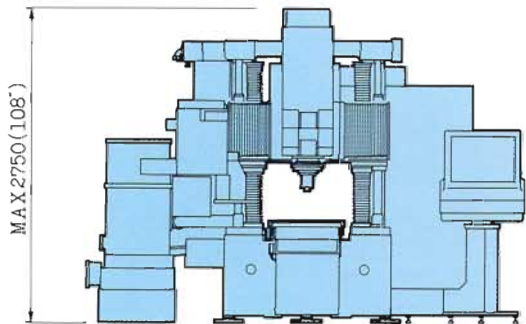
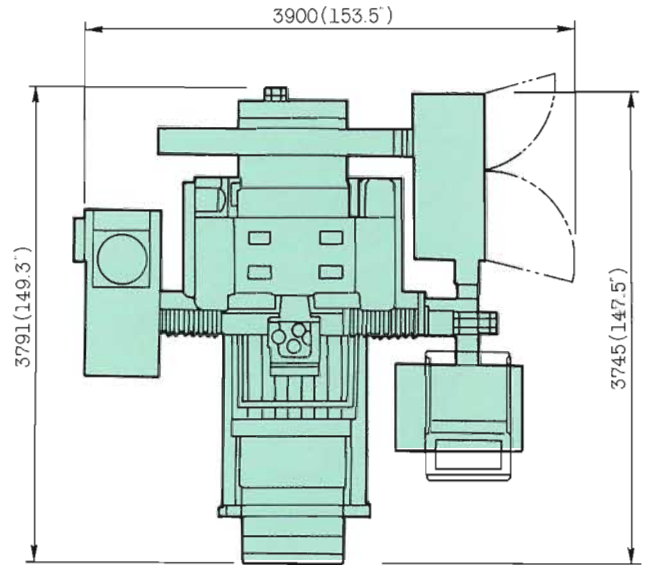
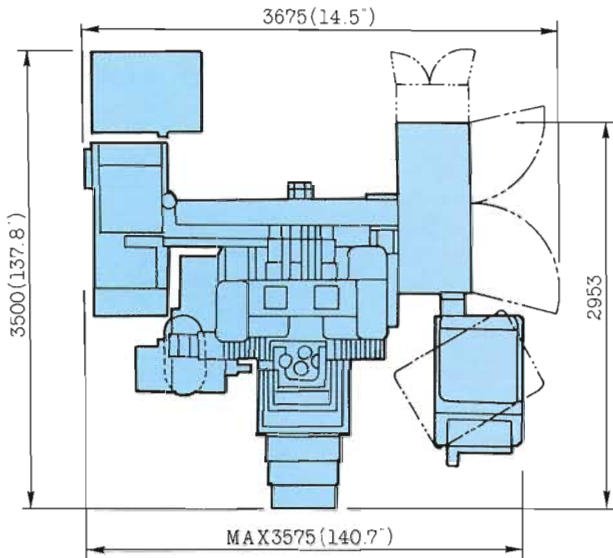
OPTIONAL FUNCTION FOR FUNUC 15MA

Single direction positioning	Sequence number comparison stop	Stroke check before move	
Herical interpolation, B	Restart of program	Remote buffer interface	
F1 digit	Handle interruption	Floppy disc adaptor 3	
Automatic corner override	Addition of registerable program	3.5" floppy disc plate P1	
Programmable data input	Part program storage & editing	Graphic display function, type A	
Coordinate system rotation		Optional block skip addition	
Inch and metric conversion	Input/Output interface	Background graphic	
Optional angle chamfering corner R			
Scaling	Stored stroke check 2		

MACHINE LAYOUT

4GDN

6GCN



All the specifications indicated in this brochure are subject to change without prior notice.



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