S & P

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Unparalleled, Choice CNC Grinding Solutions

Universal Cylindrical Grinding Machines

CNC Series
NC Series
Economical Series

- **CNC series**
  - GU-2020CNC
  - GU-3250CNC
  - GU-32100CNC
- **NC series**
  - GU-3250NC
  - GU-3275NC
  - GU-32100NC
- **P series (Hydraulic Driven Auto Feed)**
  - GU-3250P
  - GU-3275P
  - GU-32100P
- **S series (Hand Feed)**
  - GU-3250S
  - GU-3275S
  - GU-32100S

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JUL, 2008

UNIVERSAL CYLINDRICAL GRINDING MACHINE
CNC SERIES

Max. Grinding Wheel: Peripheral Speed 45m/s
Unique PARAGON Hydrostatic Bearings Assembled with Grinding Wheel Spindle

The GU series are compact universal cylindrical grinding machines by PARAGON, and can achieve up to 0.1μm positioning accuracy. They are suitable for long, multi-steps, and profile cylindrical grinding. Along with the optional internal grinding unit attachment, they provide more flexibility and offer the best choice for your needs. The main features are:

- Grinding wheelhead spindle with unique Hydrostatic Bearings
- Multi-function, high roundness Workhead
- Hydraulic and manual adjustable Tailstock
- Highly rigid Machine Base with Hydrostatic guideways
- X and Z-axes have high torque Servo Motor directly coupled to the class C1 Ballscrew (ϕ40mm)
- Heidenhain sub-μm Linear Scale with closeloop feedback

Example of Grinding Workpieces

Controller

FANUC (Standard)
SIEMENS/MITSUBISHI (Optional)

- ✓ PARAGON CNC series universal cylindrical grinding machines, each with a color screen have the latest technology in digital control systems.
- ✓ To give you the latest advancements in CNC technology, PARAGON provides a unique, convenient operating interface to reduce set-up time and increase efficiency. No need to perform home position return when starting machine.
- ✓ High accuracy is provided by a powerful servo Absolute Coordinate System with auto memory and highly efficient αi servo motors that directly drive ballscrews.
- ✓ Automatically memorizes the grinding wheel position in case of power failure.
- ✓ Emergency Back button for retracting grinding wheel instantly.
- ✓ Manual Pulse Generator (M.P.G.) handwheel for easy adjustment. Counter input of offset value and dressing compensation.

Applicable Industries:

- Aerospace parts
- High precision machine parts
- Hydraulic & pneumatic parts
- Automotive and motorcycle parts, etc.

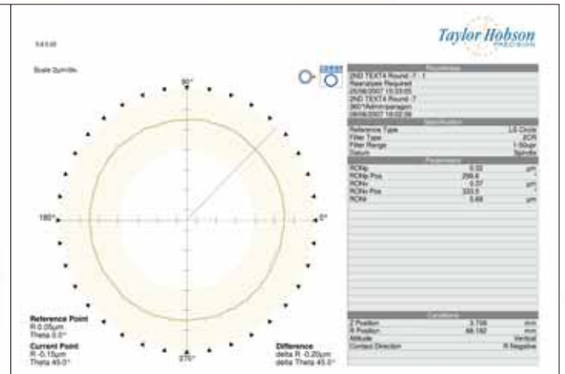
Unparalleled Quality Assurance and Control

The systematic development, production and assembly are carried out in a process oriented manner and in strict compliance with ***ISO 9001*** directives.

PARAGON's Q.C. staff conducts rigorous quality control throughout the entire manufacturing process before shipment. Our quality control process includes: **a)** Strict Incoming Materials Inspection; **b)** Geometric Accuracy Inspection; **c)** Unloaded Spindle Test and **d)** Grinding Test.

Quality Assurance

Over and Over Again, PARAGON's Dedication to Quality Wins Customer's Satisfaction and Loyalty.
In order to produce the highest quality and value-added products, PARAGON has invested a great amount in purchasing up-to-date and sophisticated automatic manufacturing equipments and measuring devices, including a CNC Horizontal Machining Center, Roundness Measuring Instrument, Roughness Measuring Instrument, Coordinate Measuring Machine, etc., and a nearly 13,200 square meter air conditioned plant, all of which is to provide a controlled environment and to improve the quality assurance.



Roundness Measuring Instrument

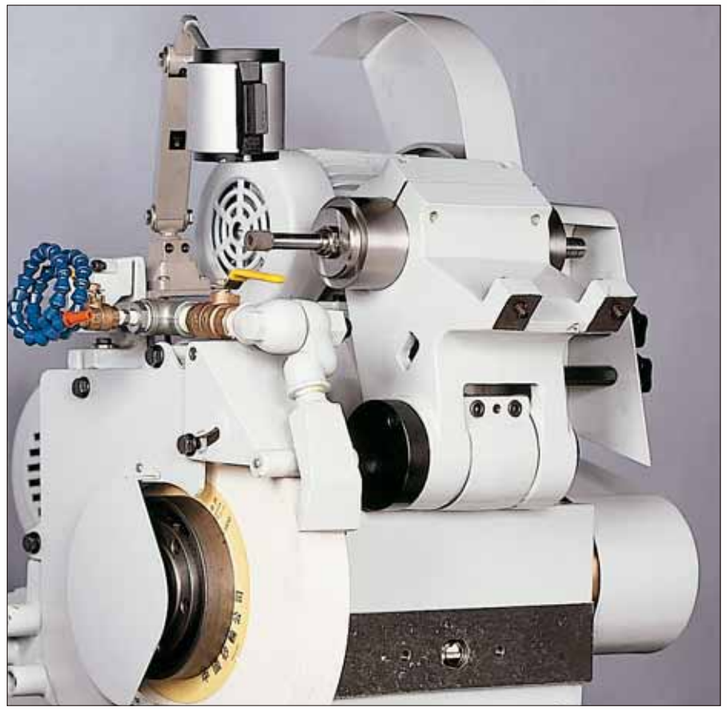
Contour / Roughness

Coordinate Measuring Machine

CNC UNIVERSAL CYLINDRICAL GRINDING MACHINE

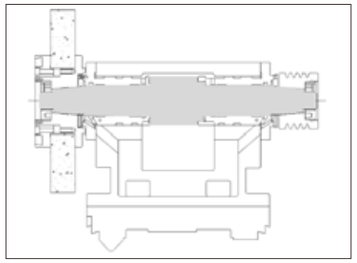
UNIVERSAL WHEELHEAD

Rigid and Precise. Hydrostatic Bearings



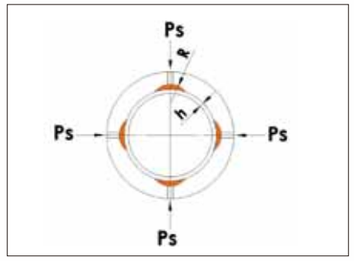
The wheelhead is driven through V-shape belts by a powerful motor (5~7.5HP) to achieve peripheral speed 45m/s. Equipped class C1 ballscrew (φ40mm) and Heidenhain sub-μm linear scale with full closeloop feedback. Overall, the machine achieves ± 0.5μm repeatability accuracy.

The compact wheelhead enables external and optional internal grinding of workpieces in the same setup, providing more flexibility. The internal grinding spindle is driven by 1 HP motor.



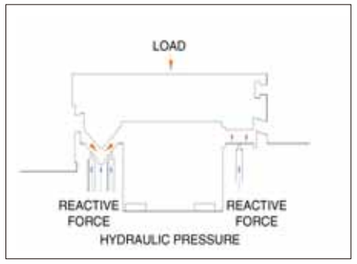
Spindle

The grinding wheel spindle is made of high quality alloy steel (SNCM-439) and treated through: normalized, tempered, carburized hardening and then sub-zero treatment (below zero degrees celcius). Its hardness is more than HRC 62°. Then follows precision grinding processes: rough grinding, semi-finish grinding, finish grinding and lapping. The lapping process assures superior surface finish and greatly enhances spindle life and stability and deformation free performance throughout its durable service life.



Hydrostatic Bearings

- PARAGON'S unique design for accuracy assurance features: (a) no metal to metal friction (b) no overheat and no deformation (c) no oil leakage as no oil seal is installed.
- Equipped with a hydraulic and lubrication system with independent temperature control, providing minimum thermal displacement effect.

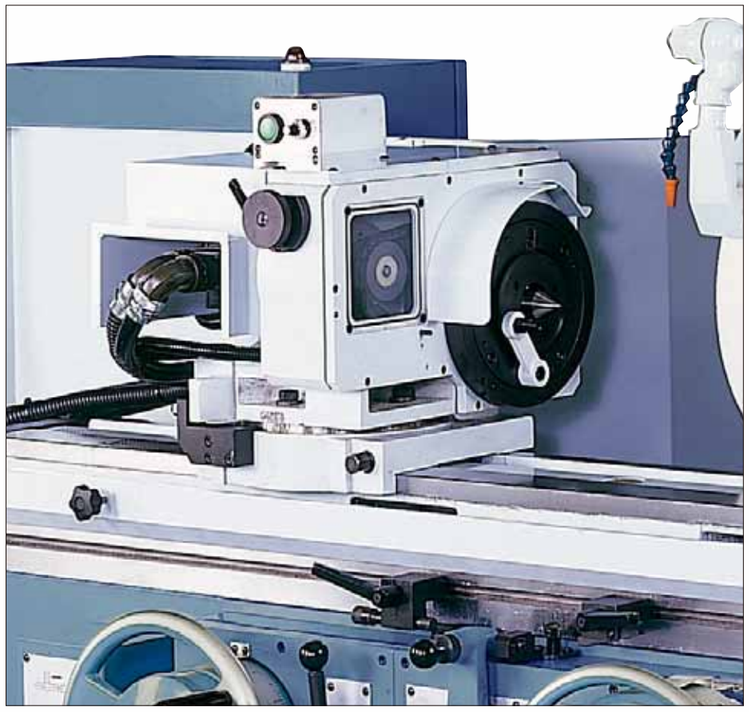


Hydrostatic Guideways

- Hand scraped and features an oil lubrication system which reduces the metal friction and guarantees constant high accuracy.
- Equipped with a hydraulic and lubrication system with independent temperature control, providing minimum thermal displacement effect.

WORKHEAD

Multi-Functional. High Precision Bearings.



The workhead's rigid design, driven by servo motor, features reliable and precise operation. NN roller bearings and angular contact bearings in the workhead spindle reduce edge stress and friction, improving concentricity and surface finish of workpieces. The table is enabled to swivel between -30° ~ 90° .

Sensor

This technology optimizes the grinding processes:

- Rotation rpm monitoring.
- Belt status indication. Alarm will be activate if belt is broken.
- Easy loading and unloading of workpieces to reduce set-up time.

Belt Tension Adjustment

Used to assure full power transmission.

Spindle Nose

Workhead can be equipped with rotary cylinder, chuck and fixture applications for easier grinding of various workpieces.

TAILSTOCK

Flexible and Easy Operation

The rigid tailstock is equipped with hydraulic actuated barrel retraction by foot paddle and manual handle for easy workpiece loading and unloading. It is designed for the use of M.T.4 taper centers.

Center pressure can be adjusted for high precision which is required for small and thin workpieces.

Unique fixed-type wheel dresser featuring constant coordinate position without calibration. Diamond tool holder mounted beside tailstock. (For CNC Series)

Taper Correction Adjustment (Optional)

The fine adjustment makes the finest possible taper correction in the range below 1 μm possible when grinding between centres.

Air Blast

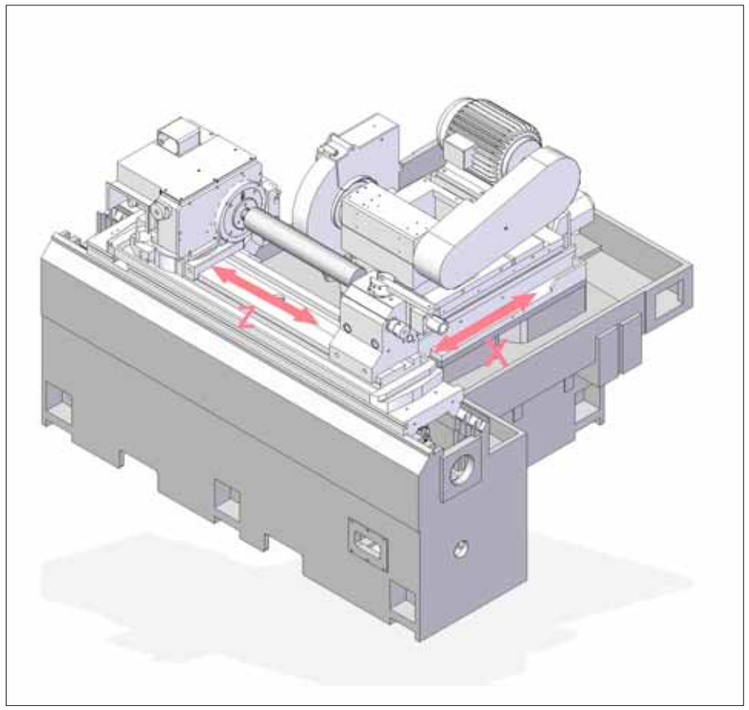
Tailstock equipped with air inlet for easy manual movement.

Table Taper Correction Device

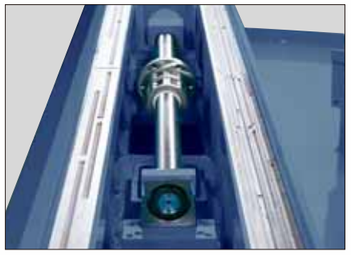
The fine adjustment makes the finest table taper correction possible.

MACHINE BASE

New Structural Design Concepts

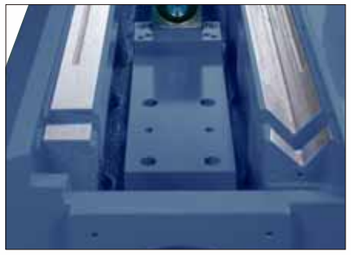


The machine base is manufactured from high quality Meehanite cast iron, with low center of gravity, featuring rigidity over 10^8 N/m and natural frequency over 150 Hz, analyzed by advanced Finite Element Method (FEM). Along with vibration stress release, these outstanding structural features assure high strength, maximum damping capability and longer service life.



Class C1 Ballscrews

Features hydrostatic lubrication, low friction coefficiency, and is pretensioned for increased rigidity and high positioning accuracy, providing minimum feeding accuracy in 0.1 μm.



Guideways

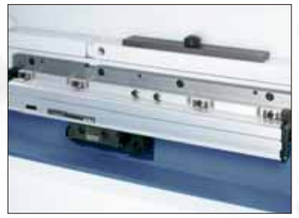
- Machine Base with extra wide V and Flat guideways on base combined with great span in between exhibit outstanding stability during grinding operation.
- Extra fine hand scraped over the entire contact surface of guideways and an oil lubrication system guarantee high accuracy and maximum durability for axes movement.

ACCESSORIES

Optimized Performance and Customized Automation

Touch Probe (CNC Series Optional)

The reliable touch probe can quickly and accurately detect the end face position on workface, reducing idle time and boosting productivity.



Heidenhain Sub-μm Linear Scale for X-axis (CNC Series Standard)

Gap Eliminator / Crush Control (CNC Series Optional)

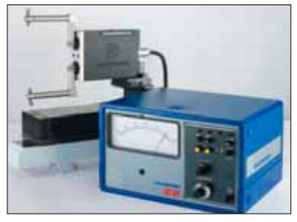
This device will automatically detect the setting up or machining condition. If any abnormal condition occurs, the grinding wheel will rapidly retract for safety.

Dynamic Wheel Balance Device. (CNC Series Optional)

Rotary-type Dressing Unit (CNC Series Optional)

Two types of Rotary Dressing Unit can be supplied. One type is with small diamond wheel for dressing of normal grinding wheel. One type is with small aluminum oxide wheel for truing the surface of new diamond grinding wheel to enhance grinding accuracy.

Grinding Wheel Dismounting Device (Optional)



Automatic in-process Gauge (CNC Series Optional)

This device automatically and continuously measures the workpiece being machined and compares the actual size to pre-set values, bringing the workpiece to the accurate dimension.

Proximity Sensor (Optional)

Match Grinding (Optional)

Two matching parts are specifically gauged and selected for fit ground, calibrated to match each other to ensures precise I.D./O.D. fits, as required by fuel injection pump, hydraulic valve and power steering, etc.

Match Grinding (Optional)

GRINDING EXAMPLES

Face Grinding
Grinding a face with workhead set 90 degrees from an ordinary position.

Plunge Grinding
Automatic infeed allows excellent results in short face grinding.

Taper Grinding
Grinding a tapered workpiece held between centers or by chuck. Table is easily swiveled for this operation.

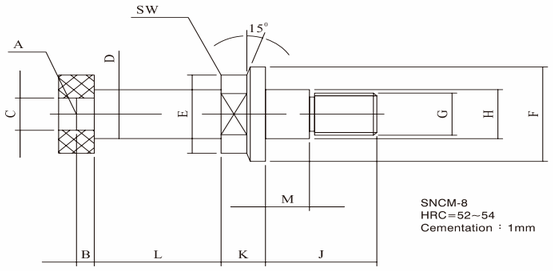
Traverse Grinding
Automatic intermittent infeed and hydraulic table-traverse for efficient traverse grinding jobs.

Shoulder Grinding
Grinding diameter and adjacent shoulder on a workpiece held between centers in a single infeed.

Internal Grinding (Optional)
Grinding an internal diameter with a hinged type internal grinding attachment.

GREASE-PACKED BELT DRIVEN TYPE

Quill



NOTE: The ratio of grinding hole diameter to length is 1:3. Maximum length is 150 mm.

GRINDING WHEEL φ	HOLE φ	SPINDLE TYPE (r.p.m.)	SIZE												
			A	B	C	D	L	E	F	G	H	J	K	SW	M
70-80	80-150	grease -8,000	M8	12	12	40 40	50 106	50	57	M26×2.0P	28	42	16	41	18
30-70	40-80	grease -10,000 oil mist -20,000	M8	10	10	20 25 30	50 70 90	32	38	M16×1.5P	17	29	15	24	12
15-30	25-40	grease -20,000 oil mist -30,000	M6	8	8	16 20 24	40 58 80	24	32	M14×1.5P	15	27	10.5	19	11
10-15	16-25	grease -30,000 oil mist -40,000	M4	8	6	10 13 16	25 30 40	21	26	M10×1.5P	10.5	21	9.5	17	9
8-10	13-16	grease -40,000 oil mist -50,000	M4	/	/	8 10 12	25 30 40	17	23	M8×1.25P	8.5	19	8.5	14	7
6-8	10-13	grease -50,000 oil mist -60,000	M4	/	/	6 7 8	20 25 30	15	20	M7×1.0P	7.5	18	7	11	7

UNIVERSAL CYLINDRICAL GRINDING MACHINES

GU-3250 / GU-3275 / GU-32100

- Swing Over Table: 320mm
- Max. Load Held Between Centers:150kg
- Grinding Wheel Peripheral Speed: 33m/sec
- Max. Workpiece Diameter to be Ground: ϕ 280mm
- Distance between Centers: 500mm/750mm/1000mm
- Touch-sensing Screen PLC Interface

✓ NC Series

✓ P Series: (Hydraulic Driven Auto. Feed)

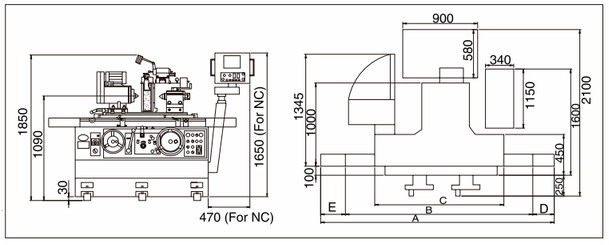
✓ S Series: (Hand Feed)

ACCESSORIES

ACCESSORIES	GU-2020CNC	GU-32CNC	GU-32NC	GU-32 S/P
CNC Controller (FANUC/SIEMENS/MITSUBISHI)	O	O	X	X
Accumulator	△	△	△	△
Inverter	△	O	△	△
Linear Scale for X-axis	O	O	△	△
Linear Scale for Z-axis	△	△	△	△
Touch Probe	△	△	X	X
In-process Gauge	△	△	△	△
Gap eliminator/Crush Control	△	△	X	X
Coolant System with Pump	O	O	O	O
Oil Mist Separator	△	△	X	X
Paper Filter	△	△	△	△
Magnetic Coolant Separator	△	△	△	△
Electric Cabinet Air Cooler	△	△	△	△
Electirc Cabinet Heat Exchanger	O	O	X	X
Wheel Balancing Stand & Arbor	△	△	△	△
Cam Locked Driving Dog	△	△	△	△
Adjustable 3-point Steady Rest	X	△	△	△
Hydraulic Steady Rest	X	△	△	△
Work Holder	X	△	△	△
Micro feed Dressing Holder	X	X	△	△
Tailstock-mounted Dressing Holder	O	O	△	△
Table-mounted Dressing Holder	△	△	O	O
Vibration Meter	△	△	△	△
Internal Grinding Attachment	X	△	△	△
Grinding Wheel + Flange	O	O	O	O
Jig Crane for Grinding Wheel	X	△	X	X
Rotary-type Dressing Unit (For Diamond Grinding Wheel)	X	△	X	X
Grinding Wheel Dismounting Device	X	△	X	X
Dynamic Wheel Balancer	△	△	X	X
ID Spindle	X	△	△	△
Hydraulic Tank with Pump	O	O	O	O
Oil Cooler	△	O	△	△
Enclosed Splash Guard	△	△	X	X
Micro Taper Adjustment of Tailstock	△	△	△	△
Hydraulic / Manual Tail Stock	△	O	△	△
Proximity Sensor	△	△	△	△
Scroll 3-jaw chuck with Black Plate	△	△	△	△
Hydraulic 3-jaw Chuck + Rotary Cylinder	△	△	△	△

O Standard Equipment △ Optional Equipment X Not Applicable

MACHINE LAYOUT



	GU-3250 NC/P/S	GU-3275 NC/P/S	GU-32100 NC/P/S
A	2810mm	3665mm	4630mm
B	2260mm	2865mm	3580mm
C	1555mm	2020mm	2475mm
D	275mm	400mm	525mm
E	275mm	400mm	525mm

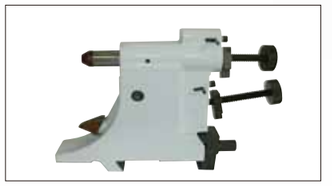
OPTIONAL ACCSSORIES


Micro feed dressing holder.

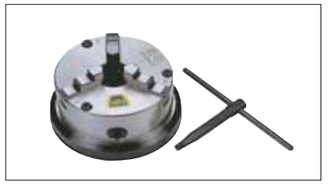

Tailstock-mounted dressing holder.


Oil mist separator.


Hydraulic wheel forming attachment. (mounted on wheelhead).

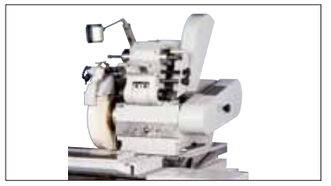

Adjustable 2-point steady rest.


Adjustable 3-point steady rest.


Scroll 3-jaw chuck with black plate.


Electric cabinet air cooler.


Cam-locked type work driving dog.

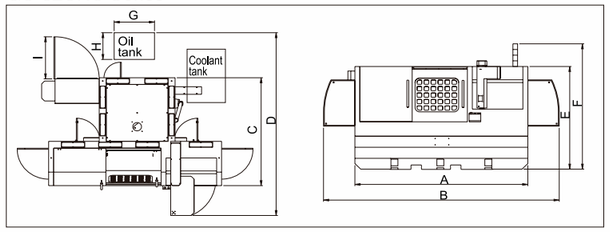

Internal grinding attachment.


Magnetic coolant separator.

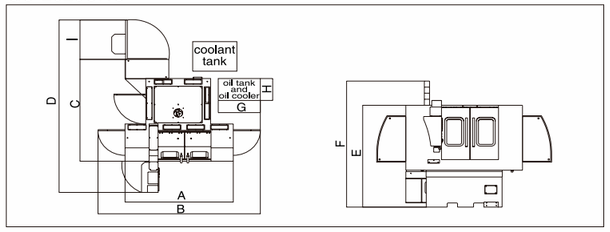

Paper filter.

MACHINE LAYOUT

GU-32CNC Series



GU-2020CNC



	GU-2020CNC	GU-3250CNC	GU-32100CNC
A	1800	3000	4200
B	2700	4000	5650
C	1860	2000	1900
D	3150	3380	2800
E	1770	1860	1860
F	2140	2260	2260
G	700	950	950
H	400	800	800
I	720	760	750

Unit:mm

SPECIFICATIONS

MODEL		GU-2020CNC	GU-3250CNC	GU-32100CNC
CAPACITY				
Swing over table	(mm)	200	320	320
Distance between centers	(mm)	200	500	1,000
Max. grinding diameter	(mm)	ϕ100	ϕ280	ϕ280
Max. grind wheel dimensions	(mm)	ϕ355x50x127	ϕ405 x 56 x 127	ϕ405 x 56 x 127
Max. load held between centers	(kg)	30	150	150
Max. grinding wheel peripheral speed	(m/s)	33(45)	45	45
CONTROL SYSTEM				
Controller		FANUC	FANUC	FANUC
FEED SLIDE				
X-axis minimum resolution increment	(mm)	0.0001	0.0001	0.0001
X-axis rapid feed rate	(m/min)	8	6	6
Z-axis minimum resolution increment	(mm)	0.0001	0.001	0.001
Z-axis rapid feed rate	(m/min)	10	8	8
Z-axis can be swiveled manually in deg.	(deg.)	-7.5~0.5	-0.5~+7.5	-0.5~+5
WORKHEAD				
Spindle speed	(r.p.m.)	0~1,200	0~1,000	0~1,000
Center		M.T.3	M.T.4	M.T.4
TAILSTOCK				
Hydraulic sleeve retraction	(mm)	25	35	35
Center		M.T.3	M.T.4	M.T.4
TANK CAPACITY				
Hydraulic tank	(L)	32	45	45
Coolant tank	(L)	24	80	80
Wheelhead lubrication	(L)	80	45	45
DRIVEN MOTORS				
Wheel spindle	(HP)	3	5	5
Wheelhead feed (servo motor)	(kw)	1.2	1.6	1.6
Table feed (servo motor)	(kw)	1.2	3.0	3.0
Spindle driver (servo motor)	(kw)	1.2	1.2	1.2
Hydraulic pump	(HP)	1	1	1
Wheel spindle lubricant	(HP)	1/4	1	1
Coolant pump	(HP)	0.24	0.25	0.25
Internal grinding	(HP)	1	1	1
OTHERS				
Machine dimensions	(mm)	2,700 x 3,150 x 2,140	4,000 x 3,380 x 2,260	5,650 x 2,800 x 2,260
Machine weight	(kg)	2,500	3,500	4,000

*Design and specifications are subject to change without prior notice

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SPECIFICATIONS GU-32NC/S/P Series

MODEL		GU-3250	GU-3275	GU-32100
CAPACITY				
Swing over table	(mm)	320	320	320
Distance between centers	(mm)	500	750	1,000
Max. grinding diameter	(mm)	ϕ280	ϕ280	ϕ280
Max. grinding wheel dimensions	(mm)	ϕ405 x 56 x 127	ϕ405 x 56 x 127	ϕ405 x 56 x 127
Max. load held between centers	(kg)	150	150	150
Max. grinding wheel peripheral speed	(m/s)	33	33	33
Wheelhead swiveling angle	(deg.)	+30°	+30°	+30°
Wheelhead handwheel feed stroke	(mm)	160	160	160
Wheelhead automatic rapid feed stroke	(mm)	40	40	40
Wheelhead automatic infeed stroke	(mm)	0.001	0.001	0.001
Movement per turn handwheel	(mm)	1	1	1
CONTROL SYSTEM (NC Series)				
NC Series controller (PLC control)		PROFACE	PROFACE	PROFACE
Wheelhead feed (Servo Motor)	(kw)	0.4	0.4	0.4
FEED SLIDE				
X-axis minimum resolution increment	(mm)	0.001	0.001	0.001
X-axis rapid feed rate	(m/min)	6	6	6
Z-axis minimum resolution increment	(mm)	0.01	0.01	0.01
Z-axis rapid feed rate	(m/min)	4	4	4
Z-axis can be swiveled manually in deg.	(deg.)	0~8	0~5	0~5
Z-axis movement per turn of handwheel	(mm)	12.5(1.25)	12.5(1.25)	12.5(1.25)
Z-axis min.automatic reciprocating stroke	(mm)	10(14)	10(14)	10(14)
WORKHEAD				
Spindle speed	(r.p.m.)	0~700	0~700	0~600
Center		M.T.4	M.T.4	M.T.4
Swiveling angle (counterclockwise-clockwise)	(deg.)	90° - 30°	90° - 30°	90° - 30°
TAILSTOCK				
Hydraulic sleeve retraction	(mm)	35	35	35
Center		M.T.4	M.T.4	M.T.4
TANK CAPACITY				
Hydraulic tank	(L)	60	60	60
Coolant tank	(L)	80	80	80
Wheelhead lubrication	(L)	25	25	25
DRIVEN MOTORS				
Wheel spindle	(HP)	5	5	5
Spindle driver (servo motor)	(kw)	1	1	1
Hydraulic pump	(HP)	2	2	2
Wheel spindle lubricant	(HP)	1	1	1
Coolant pump	(HP)	0.25	0.25	0.25
Internal grinding	(HP)	1	1	1
OTHERS				
Machine dimensions	(mm)	4,450 x 2,800 x 1,890	5,650 x 2,800 x 1,890	5,650 x 2,800 x 1,890
Machine weight	(kg)	2,800	3,700	3,900

*Design and specifications are subject to change without prior notice