- **CNC Series**
  - GA-2020CNC
  - GA-3535CNC
  - GA-35100CNC
- **CNC Series (Heavy-Duty)**
  - GAH-3540CNC
  - GAH-3580CNC
  - GAH-35100CNC
  - GAH-35150CNC

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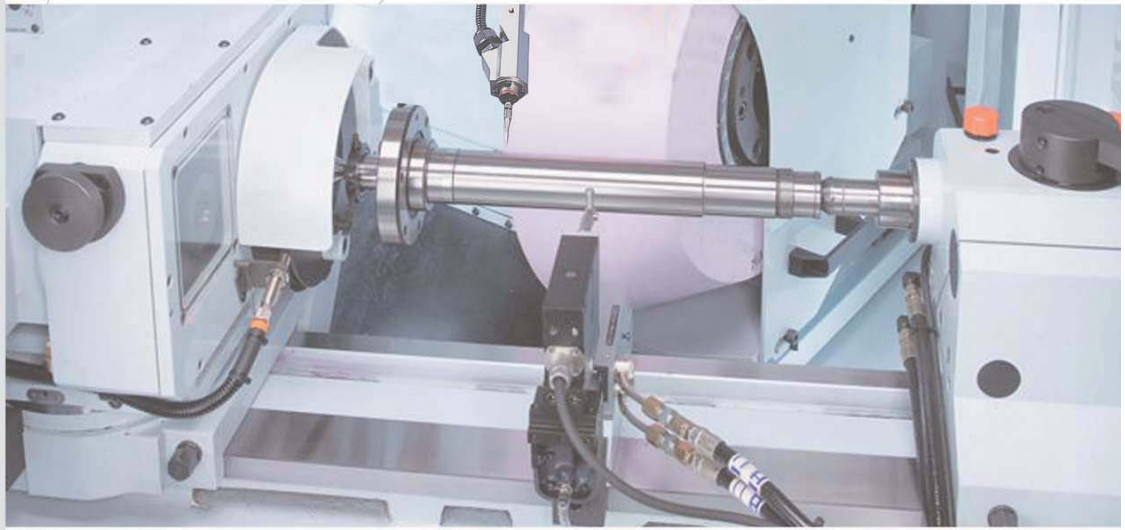
OCT, 2012

PARAGON since 1968

www.paragoncnc.com

Unparalleled, Choice CNC Grinding Solutions



Angular Cylindrical Grinding Machines

CNC Series
CNC series (Heavy-Duty)

ANGULAR CYLINDRICAL GRINDING MACHINE GA CNC SERIES

Positioning Accuracy: 1 μm
Repeatability Accuracy: ± 0.5 μm

The GA CNC Series are unique models of angular cylindrical grinding machines by PARAGON and are suitable for long, multisteps and profile cylindrical grinding with up to 1 μm positioning accuracy, which offer the best choice for high accuracy.

The main features are as follows:

- Grinding wheelhead spindle with unique hydrostatic-hydrodynamic hybrid bearings.
- Multi-function,high roundness workhead.
- Hydraulic and manual adjustable tailstock.
- Highly rigid machine base with hydrostatic lubrication on guideways.
- Heidenhain sub-μm linear scale with closeloop feedback.
- X and Z-axas have high torque servo motor directly coupled to the class C1 ballscrew(ø 40mm)

Example of Grinding Workpieces

Controller

FANUC (Standard) SIEMENS/MITSUBISHI (Optional)

- ✓ PARAGON CNC series angular 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 ABS 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.
- ✓ Colorful graphic display and 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.

ANGULAR CYLINDRICAL GRINDING MACHINE GAH CNC SERIES (HEAVY-DUTY)

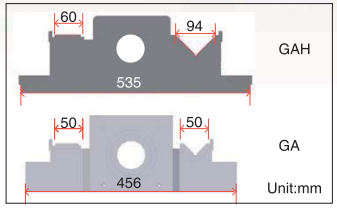
Extra Large Grinding Wheel: ϕ610x160x203.2mm

Max. Grinding Wheel Peripheral Speed: 60m/s

The new generation CNC angular cylindrical grinding machine, the GAH CNC Series (Heavy-Duty) by PARAGON,is especially designed for high-speed grinding,offering greater capabilities than the GA CNC Series.This innovatively designed machine with optimal and sturdy components can provide long service life,lessen grinding time and will bring you to a new level of grinding experience.

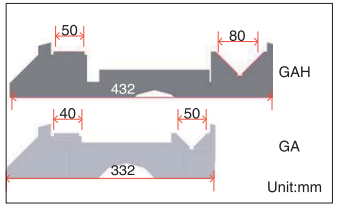
- X-axis and Z-axis greater span of guideways afford larger load capacity than GA CNC Series.
- Time-saving and high efficiency in cycle and setup. The machine can accommodate an extra large grinding wheel with 610 mm diameter and 160 mm width, which can complete multi-steps grinding at one time, greatly shortening grinding time and assuring high rigidity and precision.
- Larger grinding wheel spindle. (ϕ115x741mm)
- Z-axis class C1 ballscrew is temperature controlled by circulating coolant, achieving minimum thermal displacement effect and greater accuracy.
- Rigid and precise hydrostatic-hydrodynamic hybrid bearings on angular wheelhead.

GAH CNC Series (Heavy-Duty) Compared with GA CNC Series Type



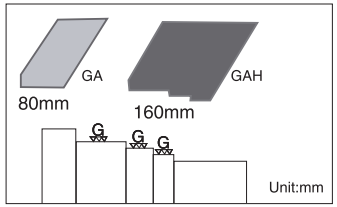
Guideway for X-axis

The GAH dimensions of X-axis are increased by 50%.



Guideway for Z-axis

The GAH dimensions of Z-axis are increased by 90%.



Grinding Wheel

The GAH extra large grinding wheel: productivity is increased by 145%.
#Diagram not to scale.

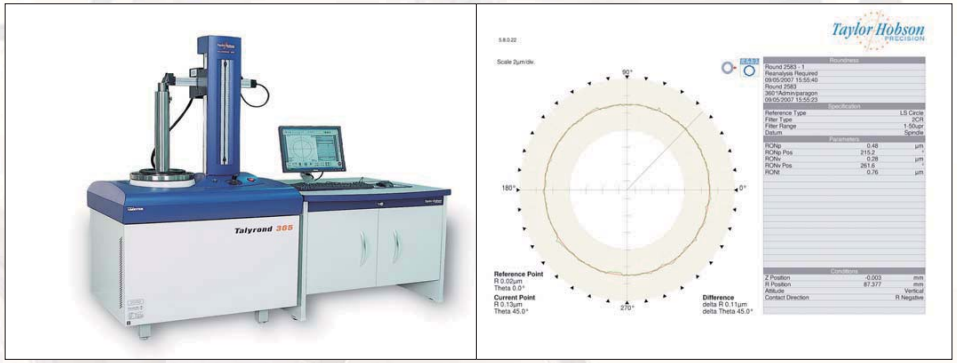
Unparalleled Quality Assurance and Control

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.

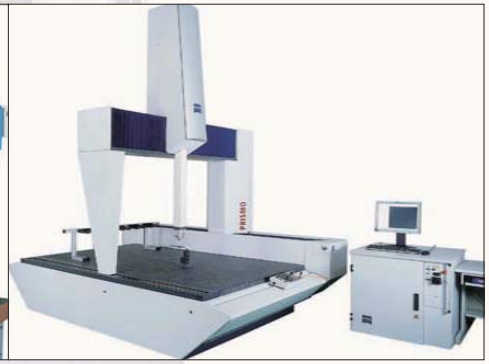
Quality Assurance

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 23,000 square meter air conditioned plant, all of which is to provide a controlled environment and to improve the quality assurance.



Roundness Measuring Instrument

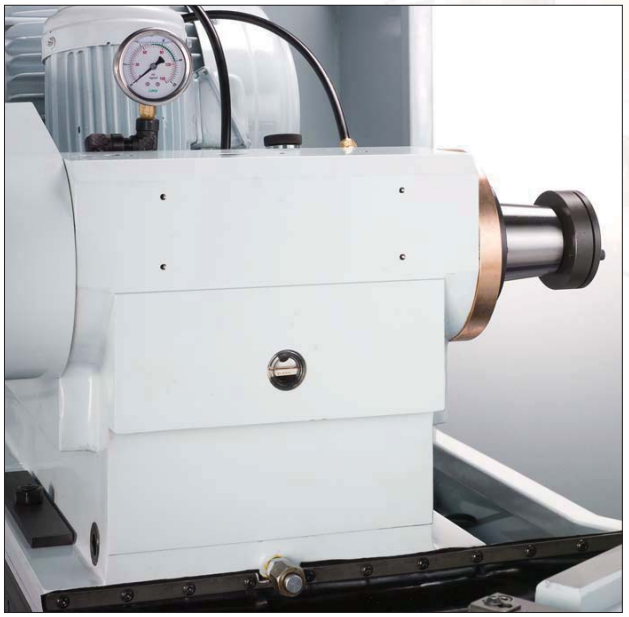
Contour / Roughness



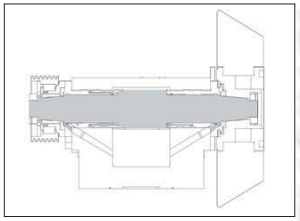
Coordinate Measuring Machine

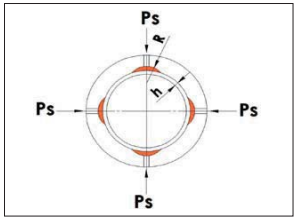
ANGULAR WHEELHEAD

Rigid and Precise Hydrostatic-Hydrodynamic Hybrid Bearings

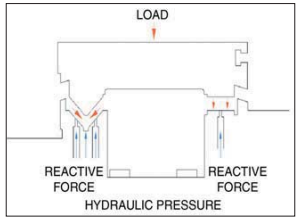


The wheelhead is driven through V-shape belts by a powerful motor and equipped with a hydraulic/lubrication system with independent temperature control to provide the least thermal displacement effect, class C1 ballscrew (ϕ 40mm) and Heidenhain sub-μm linear scale with full closeloop feedback. Overall, the machine achieves $\pm$ 0.5 μm repeatability accuracy.





Hydrostatic-Hydrodynamic Hybrid 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 (d) grinding capacity greater than hydrostatic bearing only.

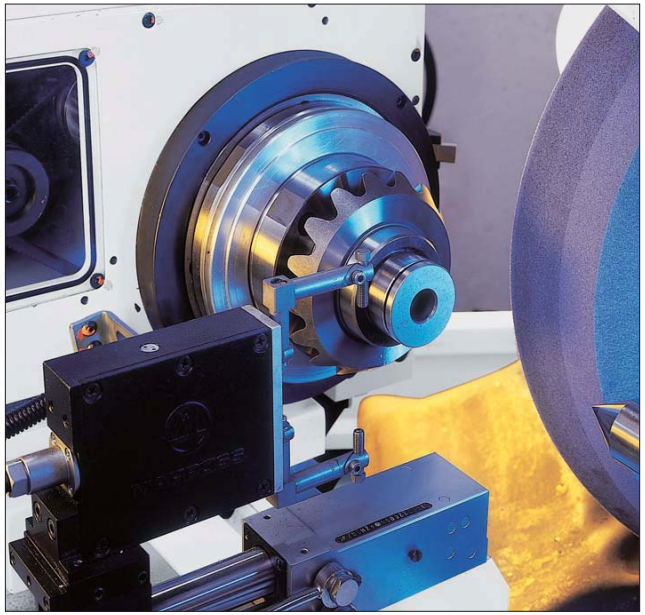


Hydrostatic Guideways
Hand scraped and features an oil lubrication system which reduces the metal friction and guarantees constant high accuracy.

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. 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 guaranteeing deformation free performance throughout its durable service life.

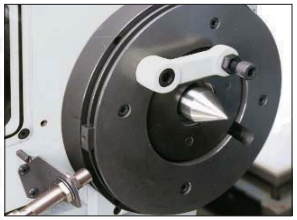
WORKHEAD

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



Sensor

This technology optimizes the grinding processes:

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

Belt Tension Adjustment

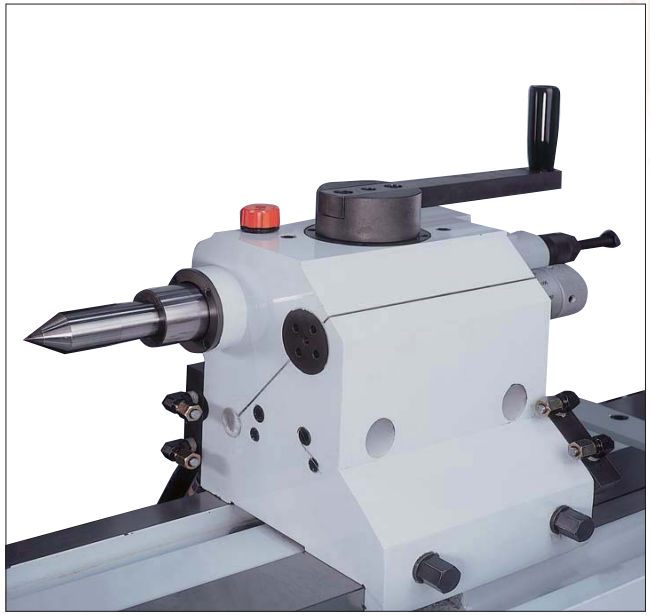
Used to assure full power transmission.

Dressing Unit

Unique fixed-type wheel dresser featuring constant coordinate position without calibration. Diamond tool holder mounted beside workhead table.

TAILSTOCK

Flexible and Easy Operation

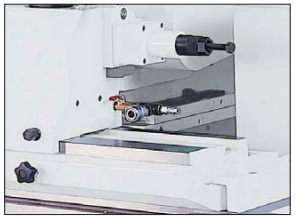


The rigid tailstock is equipped with a hydraulic actuated barrel retraction by foot paddle and manual handle for easy workpiece loading and unloading. It is designed for the use of M.T.4 taper centers.

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

Micro Taper Adjustment

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



Air Impulsion

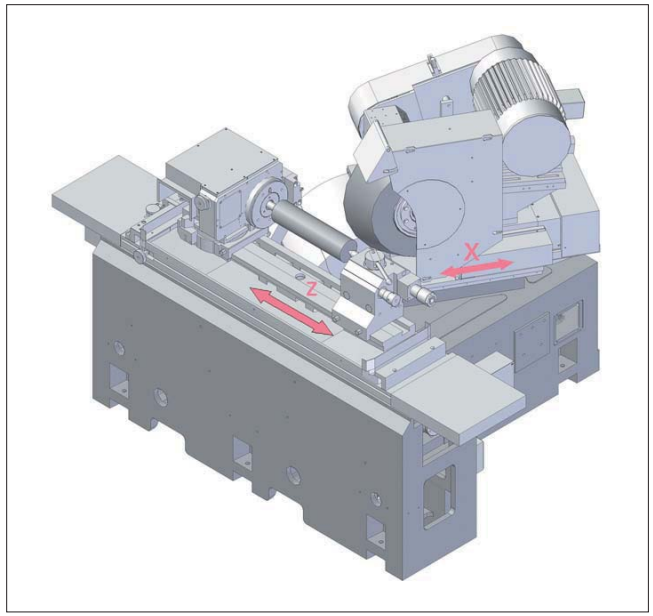
Tailstock equipped with air inlet for easy manual movement.

Table Taper Correction device

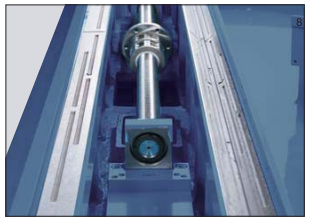
The fine adjustment makes the finest table taper correction possible.

MACHINE BASE

New Structural Design Concepts

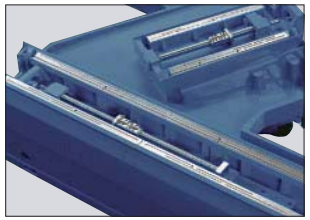


The machine base is manufactured from high quality Meehanite cast iron, low center of gravity, featuring rigidity over 10^8 N/m and natural frequency over 150 Hz, analyzed by advanced Finite Element Method (FEM). Along with vibration stress release, these outstanding structural features assure high strength,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



Class C1 Ballscrews

Feature hydrostatic lubrication, low friction coefficiency, and are 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.

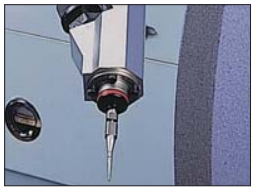
Hand-Scraping

Extra fine hand scraped over the entire contact surface of guideways and oil lubrication system guarantee high accuracy and maximum durability for axes movement.

CNC ANGULAR CYLINDRICAL GRINDING MACHINE

ACCESSORIES

Optimized Performance and Customized Automation



Touch Probe (Standard)

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

Gap Eliminator / Crush Control (Optional)

You can get both or one of the devices according to function and needs; Gap Eliminator: signal detection of G.W. and workpiece contact, rapidly approaches workpiece for grinding to save time. Crush Control : This device will automatically detect the setting up or machining condition. If any abnormal condition occurs, the grinding wheel will rapidly retract for safety.

Rotary-type Dressing Unit (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.

Automatic In-process Gauge (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.

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.

Inverter for Grinding Wheel Spindle (CNC Series Optional)

Multi-step variable speed change in the G.W. allows easy testing to enhance grinding efficiency and precision level. When G.W. is wearing out, it maintains constant peripheral speed, grinding efficiency and surface precision through the controller. Gradual activation and halt avoid affecting life-expectancy of hydrostatic spindle and eliminate strident noise caused by belt.

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

Grinding Wheel Dismounting Device (Standard)

Dynamic Wheel Balance Device. (Optional)

Match Grinding (Optional)

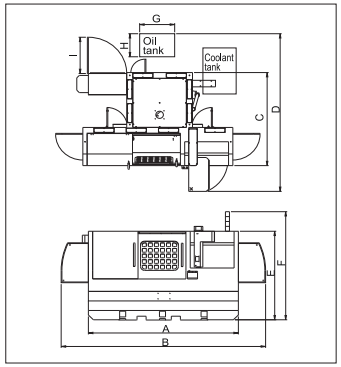
Robot (Optional)

ACCESSORIES

	GA-2020CNC	GA-35 Series	GAH-35 Series
CNC Controller (FANUC/SIEMENS/MITSUBISHI)	O	O	O
Accumulator	△	△	△
Inverter	△	△	△
Linear Scale for X-axis	O	O	O
Linear Scale for Z-axis	△	△	△
Touch Probe	O	O	O
OD In-process Gauge	△	△	△
Gap eliminator/Crush Control	△	△	△
Coolant System with Pump	O	O	O
Oil Mist Separator	△	△	△
Paper Filter	△	△	△
Magnetic Coolant Separator	△	△	△
Electrical Cabinet Air Cooler	△	△	△
Electrical Cabinet Heat Exchanger	O	O	O
Wheel Balancing Stand & Arbor	△	△	△
Cam Locked Driving Dog	△	△	△
Adjustable 2-point steady rest	△	△	△
Hydraulic Steady Rest	X	△	△
Workpiece Holder	△	△	△
Table-mounted Dresser Holder	△	△	△
Slide-mounted Dresser Holder	O	O	O
Vibration Meter	△	△	△
Grinding Wheel + Flange	O	O	O
Jig Crane for Grinding Wheel	X	△	O
Rotary Dressing Unit (For Diamond Grinding Wheel)	X	△	△
Grinding Wheel Replacement Device	X	O	O
Dynamic Wheel Balancer	X	△	△
Diamond Dresser	O	O	O
Hydraulic Tank with Pump	O	O	O
Hydraulic Oil Cooler	O	O	O
Fully Enclosed Splash Guard	△	△	△
Micro Taper Adjustment of Tailstock	△	O	O
Hydraulic / Manual Tailstock	△	O	O
Workpiece Chucked Indicator Device	△	△	△
Scroll 3-jaw chuck with Back Plate	△	△	△
Hydraulic 3-jaw Chuck + Rotary Cylinder	△	△	△

O Standard Equipment △ Optional Equipment X Not Applicable

MACHINE LAYOUT



	GA-3535CNC	GAH-3540CNC	GAH-3580CNC	GAH-35100CNC	GAH-35150CNC
A	2975	3450	4040	4400	5040
B	4055	4110	5180	5380	6180
C	2000	2000	2000	2000	2000
D	3380	3380	3380	3380	3380
E	1860	1860	1860	1860	1860
F	2260	2260	2260	2260	2260
G	950	950	950	950	950
H	800	800	800	800	800
I	760	760	760	760	760

Unit:mm

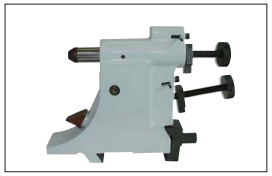
OPTIONAL ACCESSORIES


Hydraulic 3-jaw Chuck + Rotary Cylinder


Oil mist separator

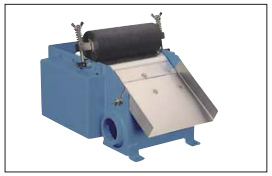

Workpiece Holder


Vibration meter


Adjustable 2-point steady rest


Cam-locked driving dog


Scroll 3-jaw chuck with back plate


Magnetic coolant separator

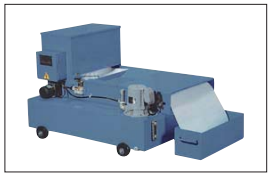

Paper filter


Table-mounted dresser holder

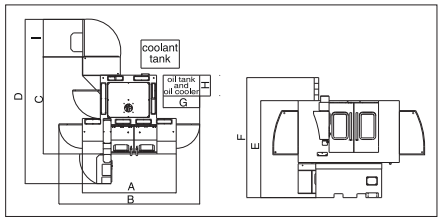

Workpiece chucked indicator device


Balancing stand and arbor


Electrical cabinet air cooler

MACHINE LAYOUT

GA-2020CNC



GA-2020CNC			
A	1800	F	2160
B	2700	G	700
C	2300	H	400
D	3150	I	720
E	1770		

Unit:mm

SPECIFICATIONS

MODEL		GA-2020CNC	GA-3535CNC	GA-35100CNC
CAPACITY				
Swing over table	mm	200	350	350
Distance between centers	mm	200	350	1000
Max. grinding diameter	mm	ϕ160	ϕ320	Ø320
Max. grinding wheel dimensions	mm	ϕ355x50x127	ϕ510x80x203.2	Ø510x80xØ203.2
Max. load held between centers	kg	30	150	150
Max. grinding wheel peripheral speed	m/s	33(45)	45	45
CONTROL SYSTEM				
Controller			FANUC / SIEMENS / MITSUBISHI	
FEED SLIDE				
X-axis minimum resolution increment	mm	0.0001	0.0001	0.0001
X-axis rapid traverse speed	m/min	6	6	6
Z-axis minimum resolution increment	mm	0.0001	0.0001	0.0001
Z-axis max. traverse speed	m/min	8	8	8
Z-axis can be swiveled manually in deg.	deg.	-0.5~7.5	-0.5~5	-0.5~+5
WORKHEAD				
Spindle speed	r.p.m.	5-750	5-750	5~750
Center		M.T.3	M.T.4	M.T.4
Swivel angle (counterclockwise-clockwise)	deg.	–	90°~30°	90° / 30°
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	80	80	85
Wheelhead lubrication	L	24	45	45
DRIVEN MOTORS				
Wheel spindle	HP	3	7.5 (10HP Optional)	7.5(10HP Optional)
Wheelhead feed (servo motor)	kw	1.2	3.0	3.0
Spindle driver (servo motor)	kw	0.75	1.2	1.2
Table feed (servo motor)	kw	1.2	3.0	3.0
Hydraulic pump	HP	1	1	1
Wheel spindle lubricant	HP	1	1	1
Coolant pump	HP	0.25	0.5	0.5
Oil cooler	HP	1	1	1
OTHERS				
Machine dimensions (WxDxH)	mm	1,800 x2,300 x 2,160	2,975 x 2,000 x 2,260	3,440x2,000x2,260
Machine weight	kg	2,700	4,300	4,900

*Design and specifications are subject to change without prior notice
*The machine dimension and weight are based on standard equipment

SPECIFICATIONS

MODEL		GAH-3540CNC	GAH-3580CNC	GAH-35100CNC	GAH-35150CNC
CAPACITY					
Swing over table	mm	350	350	350	350
Distance between centers	mm	400	800	1000	1500
Max. grinding diameter	mm	ϕ320	ϕ320	ϕ320	ϕ320
Max. grinding wheel dimensions	mm	ϕ610x160x203.2	ϕ610x160x203.2	ϕ610x160x203.2	ϕ610x160x203.2
Max. load held between centers	kg	150	150	150	150
Max. grinding wheel peripheral speed	m/s	45(60 Optional)	45(60 Optional)	45(60 Optional)	45(60 Optional)
CONTROL SYSTEM					
Controller			FANUC / SIEMENS / MITSUBISHI		
FEED SLIDE					
X-axis minimum resolution increment	mm	0.0001	0.0001	0.0001	0.0001
X-axis rapid traverse speed	m/min	6	6	6	10
Z-axis minimum resolution increment	mm	0.0001	0.0001	0.0001	0.0001
Z-axis max. traverse speed	m/min	8	8	8	12
Z-axis can be swiveled manually in deg.	deg.	-0.5~5	-0.5~5	-0.5~5	-0.5~4.5
WORKHEAD					
Spindle speed	r.p.m.	5-750	5-750	5-750	5-750
Center		M.T.4	M.T.4	M.T.5	M.T.5
Swivel angle (counterclockwise-clockwise)	deg.	90°~30°	90°~30°	90°~30°	90°~30°
TAILSTOCK					
Hydraulic sleeve retraction	mm	35	35	35	35
Center		M.T.4	M.T.4	M.T.5	M.T.5
TANK CAPACITY					
Hydraulic tank	L	45	45	45	45
Coolant tank	L	160	160	160	160
Wheelhead lubrication	L	45	45	45	45
DRIVEN MOTORS					
Wheel spindle	HP	20	20	20	20
Wheelhead feed (servo motor)	kw	3.0	3.0	3.0	3.0
Spindle driver (servo motor)	kw	1.2	1.2	1.8	1.8
Table feed (servo motor)	kw	3.0	3.0	3.0	3.0
Hydraulic pump	HP	1	1	1	1
Wheel spindle lubricant	HP	1	1	1	1
Coolant pump	HP	0.75	0.75	0.75	0.75
Oil cooler	HP	1	1	1	1
OTHERS					
Machine dimensions	mm	3,450 x 2,000 x 2,260	4,040 x 2,000 x 2,260	4,400 x 2,000 x 2,260	5,040 x 2,000 x 2,260
Machine weight	kg	6,600	7,000	7,200	8,500

*Design and specifications are subject to change without prior notice
*The machine dimension and weight are based on standard equipment

CNC ANGULAR CYLINDRICAL GRINDING MACHINE