

Precision Surface & Form Grinding Machine ACC/PSG-CA Series



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JQA-QMA10960



*Prior to and while using our products you are requested to thoroughly go through the articles on danger, warning and attention for the sake of safety described in operation manual attached to the machine and also in the warning plates mounted on the machine.
*When the products fall under the export controlled goods stipulated in "Foreign Exchange and Foreign Trade Act", it requires the license or approval of Government of Japan when exporting out of Japan.
*Specifications subject to change without notice.



Precision cutting-edge column type surface / form grinding machines built with OKAMOTO's long standing history and knowledge in surface grinding machines

CA Series

Since the first surface grinding machine in Japan was developed by Okamoto Machine Tool Works in 1953, Okamoto has been developing and providing high-precision and high-quality grinding machines as a pioneer of Japanese grinding machine manufacturers, and has gained high praise worldwide. In our 80th memorial year, we set the slogan of “Grinding Innovation”. We propose high efficiency grinding with high-rigidity grinding machine to achieve a wide variety of applications which is achieved with our column type precision surface grinding machine CA-Series, allowing grinding of large workpieces as well. It is possible to do high precision & high efficiency grinding by adopting the ultimate high-rigidity structure, high efficiency grinding wheel, and Twin-Bix, while the operability of column type model is remained as high as ever. CA1 series is the next-generation general-purpose surface grinding machine with improved load capacity and operability, CA3 series is the standard model responding to the demand of complex shapes, and CA-iQ series is the model equipped with text-free and no-skill-required iQ world standard software. CA series opens up further possibilities for surface grinding machines.

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Precision Surface Grinding Machine
CA Series

Precision surface & form grinding machine CA Series

Product Lineup

With the high rigidity design that adopts the column type, the load capacity is significantly increased from the conventional grinding machines. Abundant lineup of general-purpose/CNC, workpiece size, grinding methods, etc. is available to meet various application requirements.

General-purpose type enables standard grinding, and CNC type enables grinding of complex shapes.

General Purpose

A surface grinding machine that emphasizes versatility with simultaneous 1-axis control. The models are newly equipped with automatic dressing shift plunge function. Additionally, the development of an easy-to-use panel greatly increases the ease of conventional grinding operation.

CNC

CNC surface grinding machine is capable of form grinding with 2-axis or 3-axis control. CA-iQ series is equipped with text-free interactive software and automatic grinding data setting function, and CA3 series is capable of high-precision grinding of complex shapes.



CA1 series



CA-iQ / CA3 series

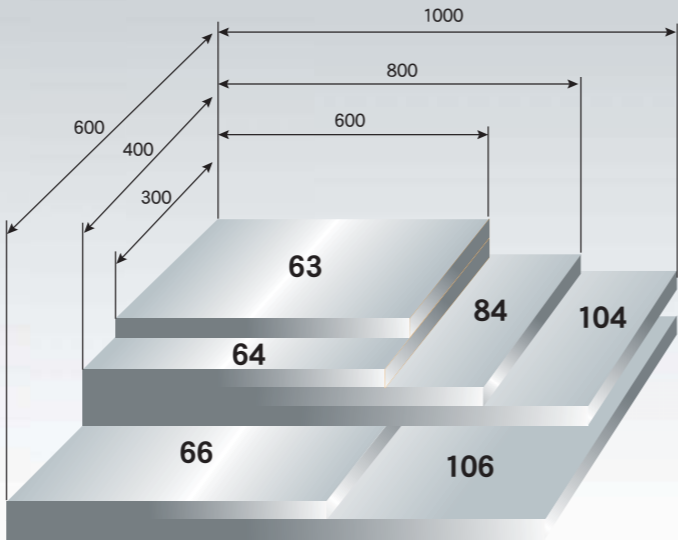
Abundant lineup that covers a wide range of grinding methods and drive systems

		CA1		CA-iQ		CA3	
Concept		High efficiency surface grinding		Software control for grinding know-how		Various options to make complex grinding easy	
Main Functions		Independent 1-axis / automatic vertical infeed Simultaneous 1-axis		Vertical / Crossfeed CNC Simultaneous 2-axis		Longitudinal / Vertical / Crossfeed CNC Simultaneous 2-axis (3-axis control)	
		standard	option	standard	option	standard	option
Interactive software	Grinding	surface	surface rough grinding shift plunge	surface complex pitch steps side	contouring combination G code	surface steps pitch	— (G code)
	Dress	peripheral	—	peripheral side	side R full R V original	peripheral side complex R types	original (G code)
Dresser		table-mounted 1 direction	overhead	table-mounted 3 direction	rotary swing overhead profile	table-mounted 3 direction	rotary swing profile
Chuck size		—		600 × 300			
				600 × 400			
				800 × 400			
				1000 × 400			
				600 × 600			
				1000 × 600			
Main options		Crossfeed & vertical scale feed back		Crossfeed & vertical scale feed back		Crossfeed & vertical scale feed back	Touch probe & on-machine measurement with CCD camera & automatic compensation

Select a model based on the grinding area determined by the chuck size

ACC/PSG106CA3

Number of control axes
Chuck size 1000 × 600 mm
MODEL NAME



Chuck size	CA1	CA-iQ	CA3
600×300	—	63CA-iQ	63CA3
600×400	64CA1	64CA-iQ	64CA3
800×400	84CA1	84CA-iQ	84CA3
1000×400	104CA1	104CA-iQ	104CA3
600×600	66CA1	66CA-iQ	66CA3
1000×600	106CA1	106CA-iQ	106CA3

CA1 Series

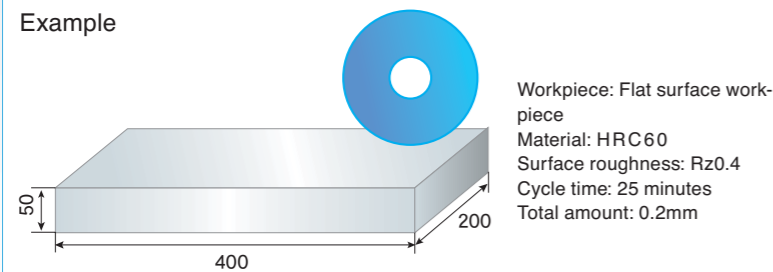
General purpose

Efficient automatic dressing function & general purpose surface grinding

- Rigid column drive system
- Best-in-class workpiece load capacity
- Automatic dressing function reduces dressing setting time.
- Shift plunge function reduces cycle time by approximately 30%.
- Operability is improved by the color touch panel.



Example



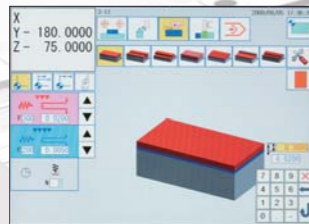
Screen Page Example

CA-iQ Series

Simple CNC interactive software

Grinding and dressing conditions are automatically calculated by using Okamoto's original iQ software

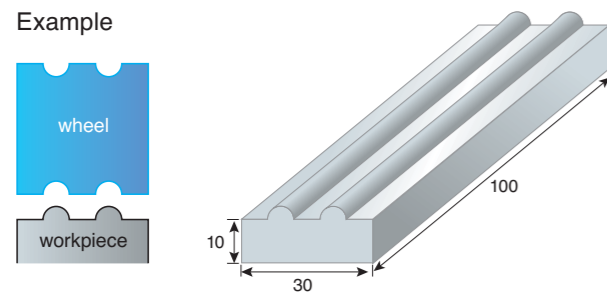
- Semi-closed cover to provide safety and to prepare the grinding environment
- Text-free interactive screen which can be set easily with the touch panel
- Simple surface, groove, pitch, steps and side grinding cycles are achievable.
- Just by entering total and fine grinding allowance, and then, wheel grain size, the optimum grinding and dressing conditions are automatically calculated.



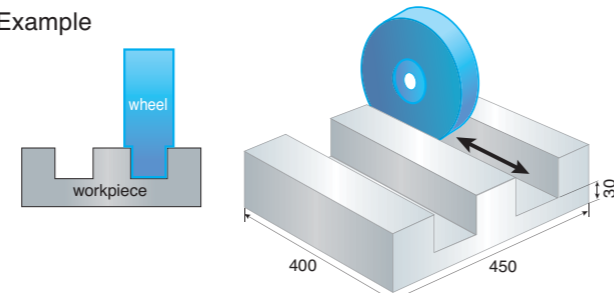
Operation Screen



Example



Example



CA3 Series

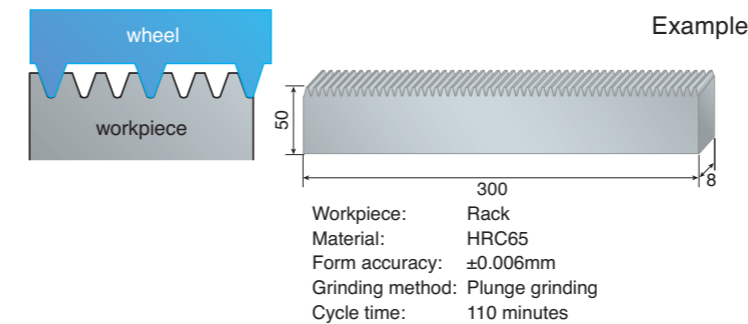
3-axis CNC

Grinding of complex shapes is supported by adding custom specifications.

- Track record data of various complex shapes
Indexing of slits and couplings, R forming of vane pumps, vertical grinding of inner ball grooves, etc.
- Various dressing methods
Simple wheel forming is automated with standard interactive software.
- Three-axis numerical control can achieve the same speed and infeed regardless of operator skill. These are the optimum grinding machines to make the grinding conditions uniform.



Operation panel



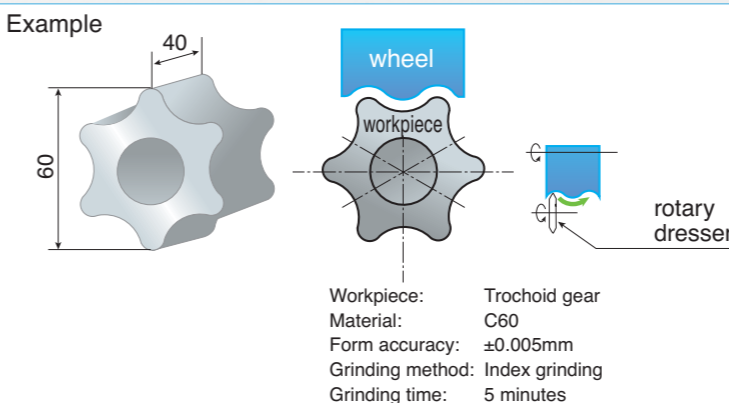
Various grinding methods and on-machine measurement / automatic compensation that enable simultaneous 2-axis or 3-axis control

- High precision ball screws are used on axes to achieve simultaneous 2-axis or 3 axis control.
- On-machine measurement and automatic compensation are possible by attaching a touch probe and CCD camera as options (OP).
- Various types of grinding cycles including multi-position, crown shape and taper grinding are supported.
- Maximum table longitudinal speed is as fast as 40 m / min. (Excluding 64CA3)



Various shapes of wheel forming are supported.

Example



On-machine measurement



Automation



Multiple axes



Precision surface & form grinding machine CA Series

Structure

High efficiency grinding with stable accuracy achieved by the high rigidity column type grinding

Ideal machine structure suitable for high efficiency grinding

T-frame structure with no overhang, longitudinal V-V guideway with excellent straightness, and high rigidity and high precision structure with carefully adjusted slideway

Column travel type is ideal for large workpiece



* Please wear protective glasses in operations.

Good accessibility

- Column type model simplifies mounting/dismounting large workpieces.
- The height of the table surface is low to facilitate mounting/dismounting of workpieces.

*Height from the floor to the top of table: 915mm
87 mm lower when compared with Okamoto's conventional 84 type



V-V Slideway

- The longitudinal guideway uses V-V shape structure, which has good straightness and also minimizes the imbalance of oil film thickness.
- By adopting the double cylinder structure, the load capacity is greatly increased compared with conventional machines. Grinding is stable even with heavy workpieces such as mold bases.

*Load capacity is 1000 kg, which is 2.4 times when compared with Okamoto's conventional 64 type model.

*CA3 series has a different structure.



*Photo shows CA-iQ series.

T-shape Integrated Structure Frame

- Rigid T-shape integrated structure
- Fully supported table longitudinal structure. Since the slideway of the frame is longer than the table, high accuracy can be obtained over the entire chuck area regardless of the position of the workpiece on the chuck.

High rigidity structure

Highly rigid linear guide is used on the vertical and cross slideways. The structure of the column is a high-rigidity structure that has no negative effect in crossfeed.

High drainage capacity

Full enclosure for production use is equipped as a standard accessory. High coolant tank capacity supports large amount of coolant supply. The machine designs are novel while the electrostatic coating method is used to improve sheet metal quality. In addition to the two-tone standard colors, we offer special color designs that meet the world's top market share machines.



General Purpose Precision Surface Grinding Machine

CA1 Series Lineup

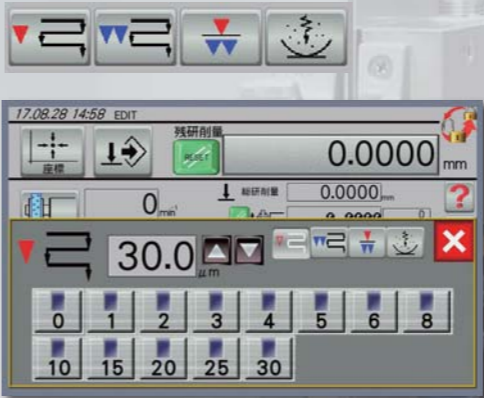
- ACC/PSG64CA1
- ACC/PSG84CA1
- ACC/PSG104CA1
- ACC/PSG66CA1
- ACC/PSG106CA1



Making your work as fast, accurate and easy as ever. The shift plunge function with automatic dressing can reduce the conventional grinding time by up to 30%.

List of Operation Pages

Grinding Setting page



The buttons are well arranged on the page. By adopting the color panel, simplified grinding is capable of being achieved.

Wheel RPM setting page



Wheel spindle RPM can be set on the touch panel. RPM is displayed simply by numerical value on the page.

Operation panel and new functions



Touch screen operation panel

New performance has been added, such as the higher efficiency grinding and the visualization of alarms with the adoption of color screen.

Automatic Dressing Function Standard



“Automatic Dressing Function” is newly equipped on CA1 series lineups. With this function, dressing can be performed during the grinding cycle, such as after rough grinding and finish grinding, making grinding further automated.

Shift Plunge Function Standard

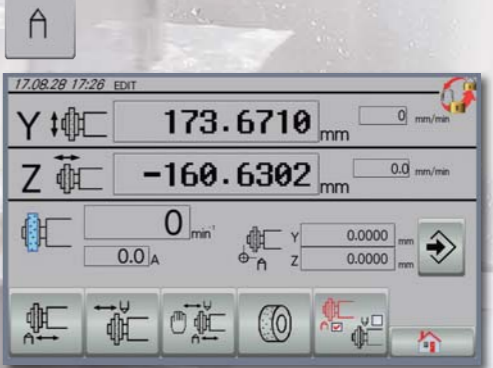
Shift plunge function is ideal for grinding with large stock removal.

Grinding status check page



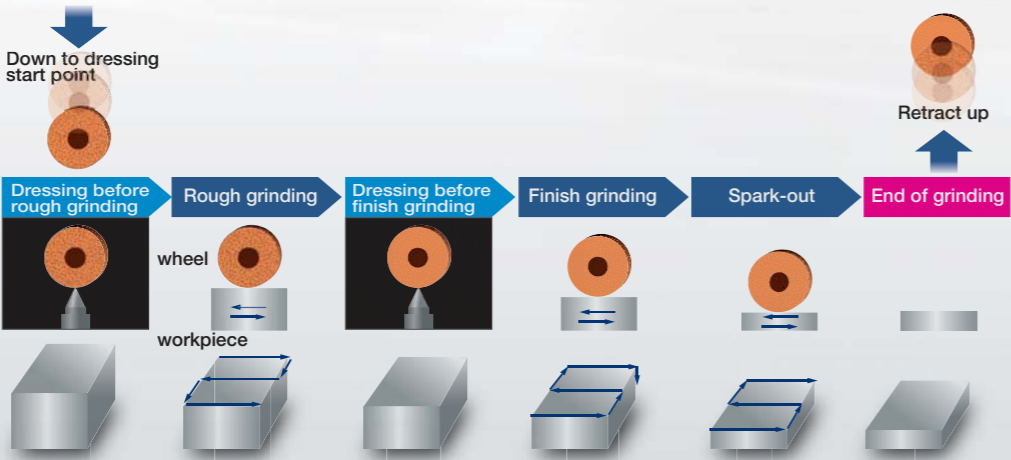
Grinding status can be confirmed on the grinding status check page, enabling efficient setup and output.

Dressing setting page



Automatic dressing is set simply by numerical values. Operation is automated by combining the automatic dressing into cycles.

Standard Grinding Cycle



Self-diagnosis function (I / O check)



When a problem occurs with the machine body, it can check the failure and disconnection of the defective part.

Recipe registration function (OP)



When repeatedly using the same grinding conditions, registering the grinding conditions contributes to productivity improvement and versatility.

CNC Precision Surface Grinding Machine

CA-iQ Series

Lineup

ACC/PSG63CA-iQ
ACC/PSG64CA-iQ
ACC/PSG84CA-iQ
ACC/PSG104CA-iQ
ACC/PSG66CA-iQ
ACC/PSG106CA-iQ

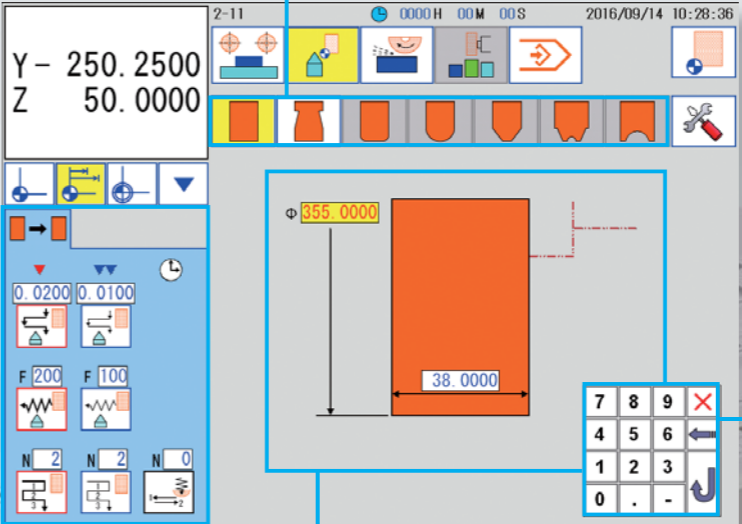
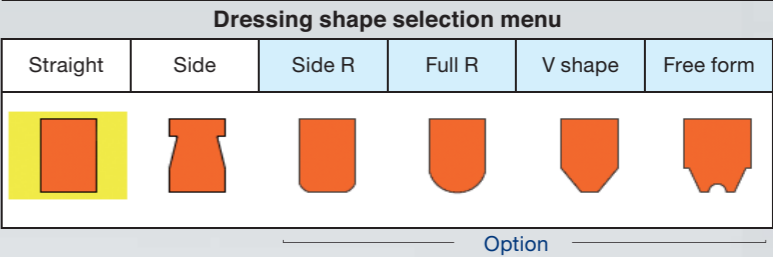


Surface grinding and form grinding have been considered to be skill-requiring operations.
iQ software drastically simplified data entry with innovative ideas.

Dressing Data Page

Simple wheel forming is automated with standard interactive software.

With iQ software, it is possible to easily perform wheel forming with an interactive method.



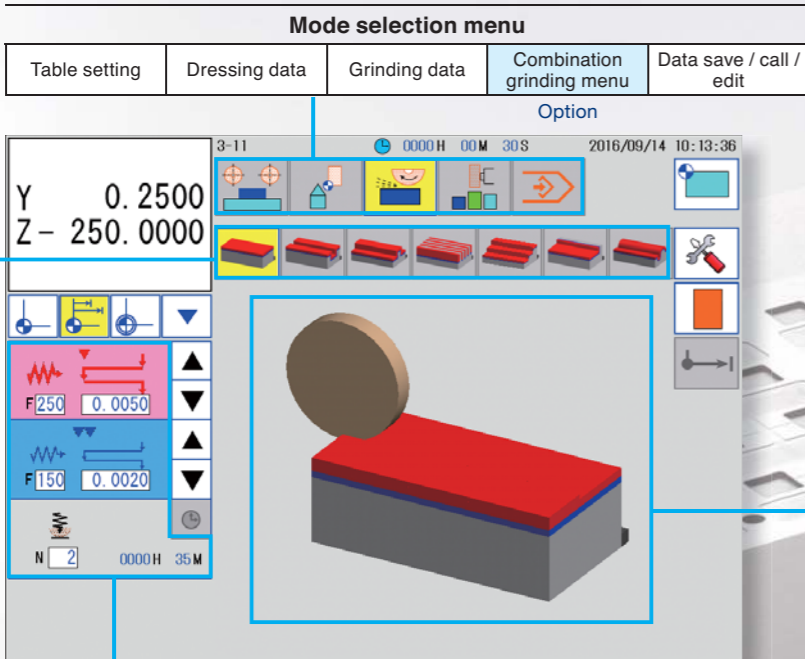
Numeric key input

iQ Automatic Data Creation Function
Optimum dressing condition is set by entering the wheel grain size.

Select the dressing shape according to the workpiece shape, and enter the values with the touch keys.

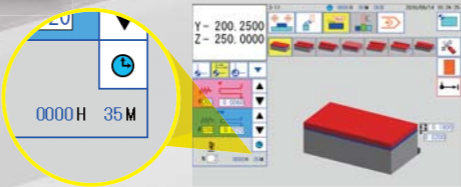
Grinding Data Page

First enter the total stock removal and fine stock removal, then entering the wheel grain size, the optimum grinding conditions are automatically created for all shapes and grinding methods.

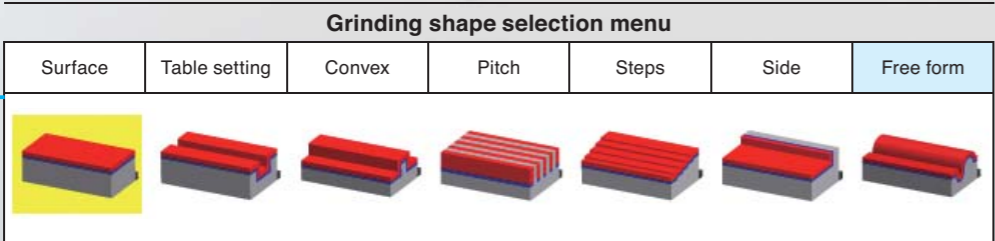


iQ graphical current grinding position display
This displays which position is being ground.

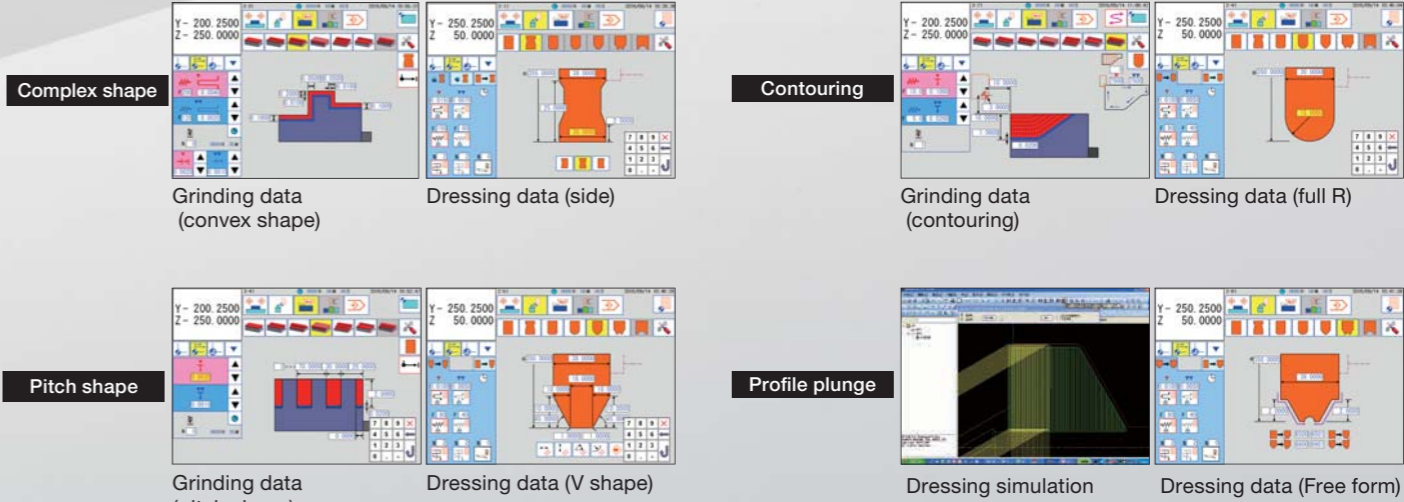
iQ automatic data creation
First enter the total stock removal and fine stock removal, then inputting the wheel grain size, the optimum grinding conditions and dressing conditions are automatically created.



Cycle time prediction function



Example of iQ grinding & iQ dressing page combinations



CA3 Series Lineup

ACC/PSG63CA3
ACC/PSG64CA3
ACC/PSG84CA3
ACC/PSG104CA3
ACC/PSG66CA3
ACC/PSG106CA3



Various Dressers

Standard

■ 3-Direction Dresser

Standard Accessory Dresser. Dressing for surface grinding and simple form grinding is available.



Option

■ Rotary Dresser & Single-Point Dresser

Rough dressing is performed with a rotary dresser, and fine dressing is performed with a single-stone dresser. Wheel forming is done efficiently and precisely.



Option

■ Swing type single-point dresser

Single-point dresser is recommended for wheel micro forming, and rotary dresser is recommended for mass production.



Option

■ Profile Rotary Dresser

This is a method to create the required wheel shape by pressing the wheel (profile), which is suitable for mass production grinding.



Option

■ Rotary Dresser

Rotary Dresser makes it possible to dress more efficiently than 3-direction dresser. Wear can be reduced, too.



Option

■ CNC indexing device & swing type rotary dresser

CNC indexing device can grind round workpieces. Grinding can be performed more efficiently in combination with a rotary dresser.



*CA3 option

3-axis control equipped on CA3 series enables complex form grinding.
A variety of dressing and on-machine measurements break new grounds in grinding.

Various Grinding Software & Cycle (OP)

In addition to the standard interactive grinding methods, various OP software is available for CA



Crown shaped grinding

High precision crown shaped grinding is available.



Contour grinding

The contoured part can be ground by synchronizing the longitudinal and crossfeed axes.



Multi-position grinding

Workpieces with different height and length can be mounted on the chuck for grinding efficiently in one cycle. Grinding up to 5 areas in one cycle is possible.

High-performance applications (OP)

It realizes the automation of complex grinding with variety of OP for your customized grinding.



1 axis of swiveling wheel spindle is added

For workpieces with complex grooving, it is possible to equip one more axis of swiveling wheel spindle. It can grind workpieces such as helical gears and broaches.



CCD camera

For on-machine measurement after grinding, a non-contact type CCD camera can be equipped. Automatic grinding compensation after checking can also be equipped.



Touch probe

For on-machine measurement after grinding, a touch probe (contact type) can be equipped. Automatic grinding compensation after checking can also be equipped.



Automation with robot

It also supports automatic workpiece supply with an articulated robot consult by Okamoto.



Automation with sensors

We can propose the automation specialized for surface grinding using various sensors, based on your request.



Multi-axis

When performing multi-axis grinding such as aspherical grinding, we can propose the combination with a workpiece indexing device.

*CA3 option

Standard Accessories

	CA1 Series	CA-iQ Series	CA3 Series	CA-iQ Series Standard Cycle
Standard Wheel	●	●	●	Surface grinding
Grinding Wheel Adaptor	●	●	●	Complex
Wheel Spindle Continuously Variable Inverter	●	●	●	Pitch
Standard Electromagnetic Chuck	●	●	●	Steps
Automatic Demagnetizing Controller, Adjustable Chuck Power	●	●	●	Side
Fan Cooler for Oil Coolant	●	●	—	Peripheral dressing
Grinding End Time Prediction	—	●	—	Side dressing
Short Circuit Breaker	●	●	●	
1-Direction Dresser & Dressing Coolant System	●	—	—	
3-Direction Dresser & Dressing Coolant System	—	●	●	
1-Direction Flexible Nozzle for Coolant Supply	●	—	—	
3-Direction Flexible Nozzle for Coolant Supply	—	●	●	
Constant Water Supply for Drain Gutter	●	●	●(Except 63)	
Necessary Tools and Tool Box	●	●	●	
Leveling Bolts and Plates	●	●	●	
Auto Dressing Function	●	●	●	
Shift Plunge Function	●	●	●	
Graphic Interactive Software	—	Surface, complex, pitch, steps, side	Surface, pitch, steps	

Proposal of High Efficiency Grinding

TWIN-BIX

Fine bubble generator TWIN-BIX has the effect of improving grinding fluid permeability and preventing clogging of the wheel by the Coanda effect and the cavitation phenomenon.

By increasing the permeability of the grinding fluid, it is possible to improve the cooling performance and suppress grinding heat.

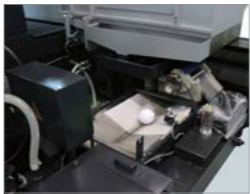


Optional Accessories

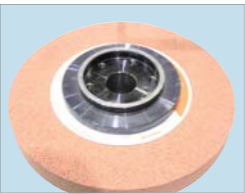
		CA1 Series	CA-iQ Series	CA3 Series
Coolant System	Coolant System with magnetic separator	●	●	●
	Coolant System with manual paper filter	●	●	●
	Coolant System with automatic paper filter	●	●	●
	Coolant System with magnetic separator, with manual paper filter	●	●	●
	Coolant System with magnetic separator, with manual paper filter, with automatic coolant temperature regulator	●	●	●
	Coolant System with magnetic separator, with automatic paper filter, with automatic coolant temperature regulator	●	●	●
	Dust Collection Hood	●	●	●
	Oil Mist Collector	●	●	●
Chuck	Electromagnetic Chuck, oil cooling type, with demagnetizing controller	●	●	●
	Electro-Permanent Magnetic Chuck, with demagnetizing controller	●	●	●
	Electromagnetic Chuck Interlock	●	●	●
Dresser	Overhead Dresser, ratchet type	●	●	●
	CNC Overhead dresser (with compensation)	—	●	●
	Rotary Dresser (single-axis positioner, double-axis positioner)	—	●	●
	Foldable 3-Direction Dresser	—	●	—
Spare Wheel Adaptor	Vertical Rotary Dresser (installed on chuck top face)	●	●	●
	Spare Wheel Adaptor	●	●	●
	Wheel Adaptor for GRIND-X micro balancer	●	●	●
	Wheel Adaptor for automatic wheel balancer	●	●	●
Wheel Balancer	Wheel Balancer (with balance arbor)	●	●	●
	Balance Arbor (roller type, for BW-360)	●	●	●
	GRIND-X Micro Balancer	●	●	●
	Automatic Wheel Balancer	●	●	●
Work Light	LED Light	●	●	●
GRIND-X Hydraulic & Lubricant		●	●	●
Custom Color		●	●	●
Temperature Controllers	Oil Cooled Wheel Head (oil cooled pump installed)	●	●	●
	Automatic Oil Temperature Regulator	●	●	●
	Constant Coolant Supply for Top of the Table	●	●	●
On-Machine Measuring Device	CCD Camera	—	—	●
	Touch Probe	—	—	●
Others	Spindle Motor Power Up 5.5kw⇒7.5kw 7.5kw⇒11kw 11kw⇒15kw (high rigidity wheel spindle & large taper for 11 kw and 15 kw)	●	●	●
	Scale Feedback Model	●	●	●
	Timer of Total Run Time	●	●	●
	Calendar Timer	●	●	●
	Auto Shut Down Function	●	●	●
	Wheel Form Programing Software EDELAC Win	—	●	●
	Operation Panel, freestanding	—	—	●
	GRIND-X Warpage Correction Jig: SG Master	●	●	●
	Fine Bubble Generator TWIN-BIX	●	●	●

*We have more optional accessories not listed here. Please contact your local sales representative.

CA-iQ Series	Optional Software
	Side R , Full R, V Shape, Original Shape Dressing Programs
	G Code Program
	Automatic Programing Software EDELAC Win
	Universal Grinding Software
	Contouring Software



Coolant System



Wheel Adaptor



Micro Balancer



Wheel Balancer

CA3 Series	Optional Software
	Contouring
	Crown shape
	Multi position
	On-Machine Measurement
	Full automatic surface grinding SELF



CNC Overhead Dresser



EDELAC Win



LED Light



Automatic Oil Temperature

Specification

CA1 Series Specifications

Item			Unit	64CA1	84CA1	104CA1	66CA1	106CA1
Capacity	Table Working Surface Size		mm	605×400	805×400	1016×400	605×600	1016×600
	Table Travel Distance		mm	800×440	1000×440	1200×440	800×652	1200×652
	Distance from Top of the Table to Bottom of the Wheel (standard wheel)		mm	22.5~522.5			-2.5~497.5	
	Standard Chuck Dimensions		mm	600×400×85	800×400×85	1000×400×100	600×600×100	1000×600×100
	Table Load Capacity (including accessories)		kg	1000			1500	
Table Longitudinal Feed (X axis)	T Slot (Width x Qty)		—	—				
	Longitudinal Feed Speed (average)		m/min	3~25				
Column Cross Feed (Z axis)	Cross Manual Feed	Feed per M.P.G. Handwheel Revolution	mm	0.1/1.0/5.0				
		Feed per M.P.G. Handwheel Graduation	mm	0.001/0.01/0.05				
	Cross Automatic Feed	Intermittent Feed	mm	0.5~20				
		Continuous Feed Speed	mm/min	0.1~2000				
Wheel Head Vertical Feed (Y axis)	Manual Infeed	Feed per M.P.G. Handwheel Revolution	mm	0.01/0.1/1.0				
		Feed per M.P.G. Handwheel Graduation	mm	0.0001/0.001/0.01				
	Automatic Infeed (traverse & plunge)	Rough Grinding	mm	0.0001~0.03				
		Fine Grinding	mm	0.0001~0.01				
	Feed Speed (F code command)		mm/min	—				
	Sparkout Count		time	0~10				
	Vertical Rapid Feed Speed		mm/min	0~1000				
Grinding Wheel	O.D. x W x B		mm	φ350×38×φ127			φ400×50×φ127	
	Rotation Speed (with Wheel Spindle Continuously Variable Inverter)		min ⁻¹	200~2500				
Motor	Wheel Spindle		kW	5.5			7.5	
	Hydraulic Pump		kW	2.2			3.7	
	Vertical Feed		kW	1.5				
	Cross Feed		kW	0.75				
Power Consumption			KVA	15			20	
Floor Space	Width x Depth x Height		mm	3710×3150×2200	3940×3150×2200	4440×3150×2203	3570×4040×2280	4440×4040×2280
Weight	Net Weight		kg	4500	5500	7000	6300	7500

CA-iQ Series Specifications

63CA-iQ	64CA-iQ	84CA-iQ	104CA-iQ	66CA-iQ	106CA-iQ
605×300	605×400	805×400	1016×400	605×600	1016×600
750×340	800×440	1000×440	1200×440	800×652	1200×652
-25~320	22.5~522.5			-2.5~497.5	
600×300 ×80	600×400 ×85	800×400 ×85	1000×400 ×100	600×600 ×100	1000×600 ×100
700	1000			1500	
-					
3~25					
0.01/0.1/1.0/5.0					
0.0001/0.001/0.01/0.05					
0.5~20					
0~1000					
0.01/0.1/1.0					
0.0001/0.001/0.01					
0.0001~0.9999 (can be set arbitrarily in unit of 0.0001)					
0.0001~0.9999 (can be set arbitrarily in unit of 0.0001)					
1000					
0~99					
0~1000					
φ350×38×φ127				φ400×50×φ127	
500~2500					
3.7	5.5			7.5	
2.2				4.0	
1.3					
0.85					
15				20	
2800×3200 ×2200	3700×3200 ×2200	3950×3200 ×2200	4450×3200 ×2200	3950×3650 ×2280	4450×3650 ×2280
4500		5500	7000	6300	7500

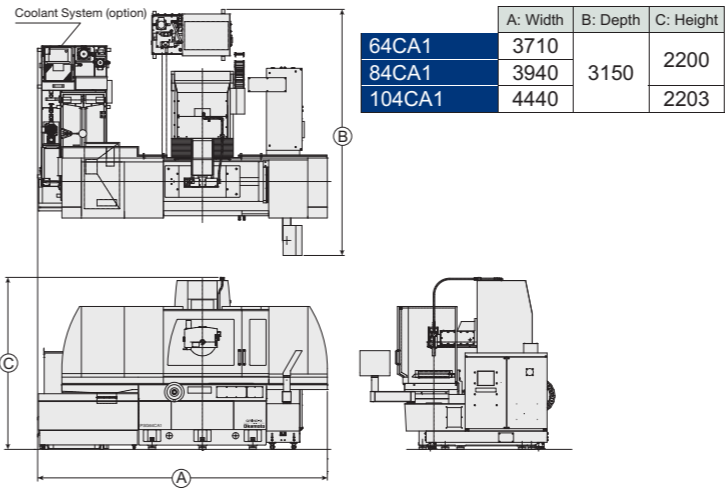
CA3 Series Specifications

Item		Unit	63CA3	64CA3	84CA3	104CA3	66CA3	106CA3
Capacity	Table Working Surface Size	mm	605×300	605×400	805×400	1005×400	605×600	1016×600
	Table Travel Distance	mm	750×340	800×440	1000×440	1200×440	800×652	1200×652
	Distance from Top of the Table to Bottom of the Wheel (standard wheel)	mm	-25~320	5~505			-20~480	
	Standard Chuck Dimensions	mm	600×300×80	600×400×85	800×400×100	1000×400×100	600×600×100	1000×600×100
	Table Load Capacity (including accessories)	kg	700		700 (for table speed 40 m/min)		1500	
	Table Top Height (from floor)	mm	915	935				
Table Longitudinal Feed (X axis)	T Slot (Width x Qty)	mm×No.	—	17×3				
	Feed per Handwheel Revolution	mm	0.01/0.1/1/10					
	Feed per Handwheel Graduation	mm	0.0001/0.001/0.01/0.1					
	Feed Speed (F code command)	mm/min	0~40000	0~25000	0~40000			
	Jog Feed Speed	mm/min	0~1000					
	Rapid Feed Speed	mm/min	40000 (Manual: 10000)	25000 (Manual: 10000)	40000 (Manual: 10000)			
Wheel Head Vertical Feed (Y axis)	Feed per Handwheel Revolution	mm	0.01/0.1/1					
	Feed per Handwheel Graduation	mm	0.0001/0.001/0.01					
	Feed Speed (F code command)	mm/min	0~2000					
	Jog Feed Speed	mm/min	0~1000					
	Rapid Feed Speed	mm/min	2000					
Column Cross Feed (Z axis)	Feed per Handwheel Revolution	mm	0.01/0.1/1/10					
	Feed per Handwheel Graduation	mm	0.0001/0.01/0.01/0.1					
	Feed Speed (F code command)	mm/min	0~2000	0.0001/0.01/0.01/0.1				
	Jog Feed Speed	mm/min	0~1000					
	Rapid Feed Speed	mm/min	2000	4000				
Grinding Wheel	O.D. x W x B (type 1 flat)	mm	φ350×38×φ127	φ350×38(Max50)×φ127			φ400×50×φ127	
	Rotation Speed (with spindle inverter)	min ⁻¹	500~2500					
Motor	Wheel Spindle	kW	3.7	5.5			7.5	
	Longitudinal Feed	kW	5.5					
	Vertical Feed	kW	1.2	2.5				
	Cross Feed	kW	0.75	1				
	Oil Cooling /Lubrication	W	0.005 (lubrication)	180				
Power Consumption		KVA	25		28	30	22	25
Floor Space	Width x Depth x Height	mm	3200×3200×2250	3710×3300×2200	3950×3300×2200	4500×3300×2200	3450×3650×2280	4440×3650×2280
Weight	Net Weight	kg	4500		5500	7000	6300	7500

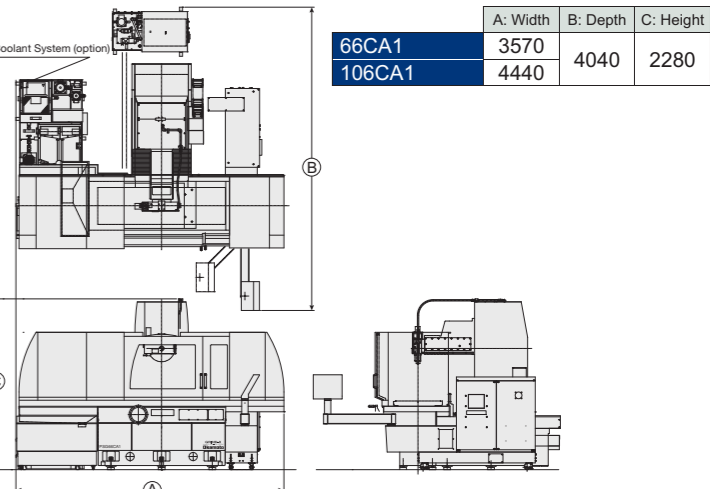
Outline Drawing

CA1 Series Outline Drawings

64/84/104CA1

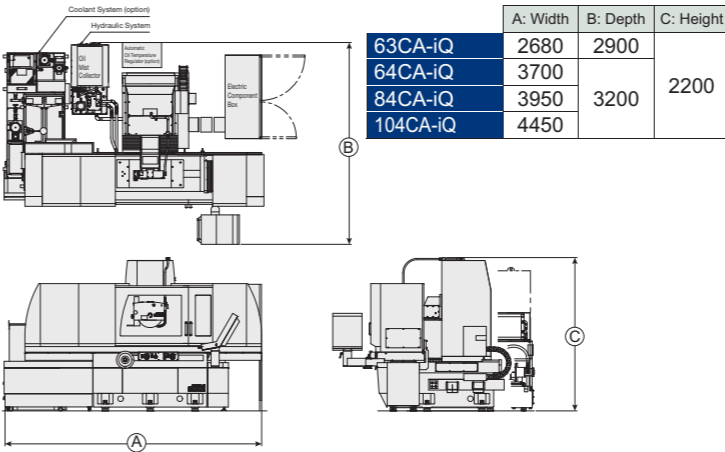


66/106CA1

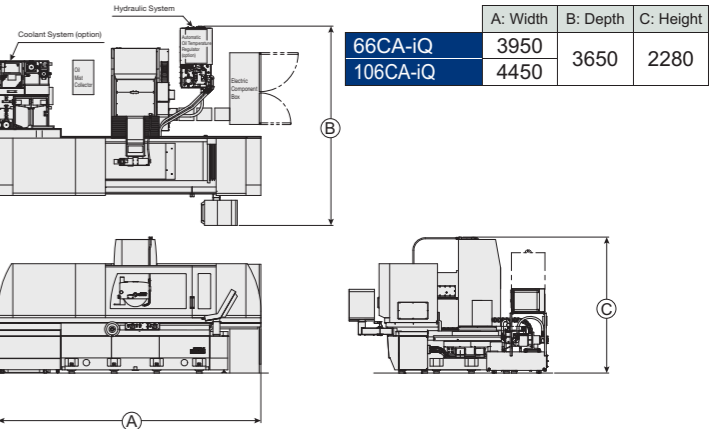


CA-iQ Series Outline Drawings

63/64/84/104CA-iQ

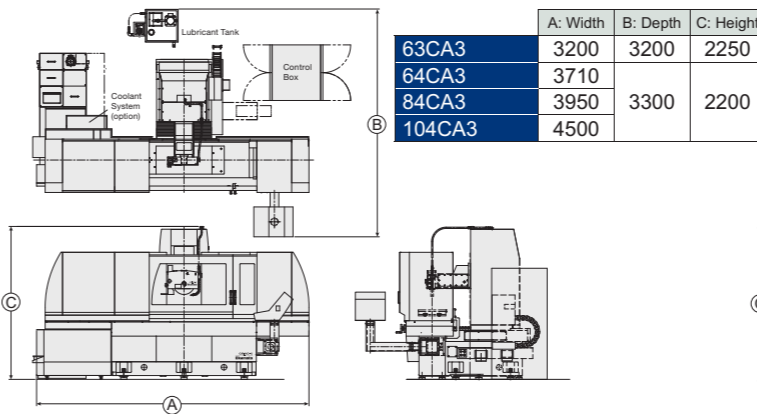


66/106CA-iQ



CA3 Series Outline Drawings

63/64/84/104CA3



66/106CA3

