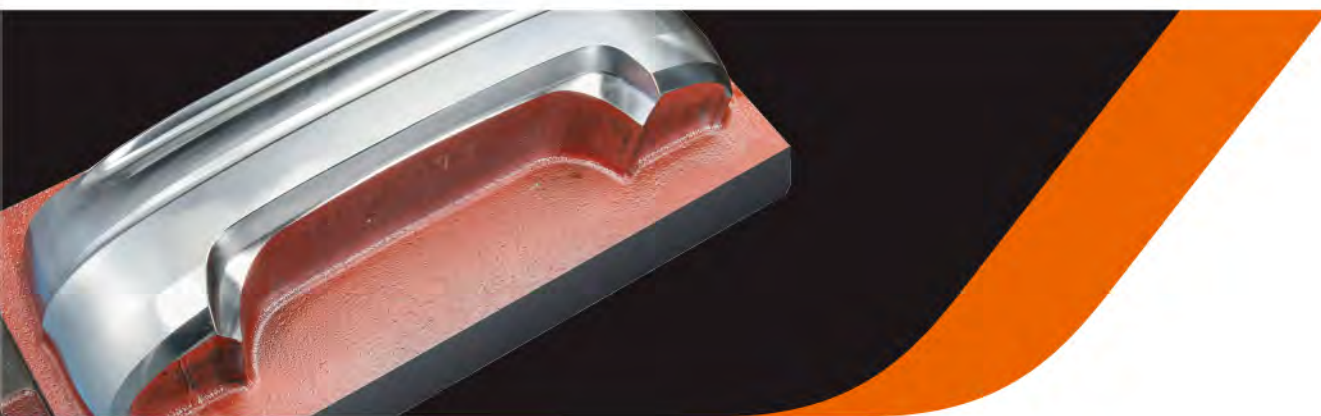


SF SERIES



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SF-E-202011

SF SERIES

High Efficiency Double Column Machining Center



SF series the Most Popular Machining Center

- ▶ High Cost-performance ratio
- ▶ Complete range of specification
- ▶ Fulfill various kinds of machining requirements

Apply on parts and molds machining, in particular.
Strong structural design and manufacturing quality
ensure best machining performance and accuracy.

- ▶ Spindle speed: 6,000~12,000 rpm
- ▶ Rapid traverse: 24 m/min
- ▶ Cutting feed rate: 10 m/min
- ▶ X-axis travel: 2.1/ 2.6/ 3.1/ 4.1 m
- ▶ Y-axis travel: 1.6/ 2.0/ 2.3/ 2.7 m
- ▶ Z-axis travel(box way): 800/ 1,020 mm
- ▶ Z-axis travel(linear way): 800/ 1,000 mm



Photo: SF-3116 model with enclosed sheet metal guard with roof (opt.)



Photo: SF-2116 model with enclosed sheet metal guard without roof

Optimal Rigid Structure Configuration



X axis

Ultra-wide base with high rigidity table enlarge table load capacity and ensures the best dynamic leveling accuracy.

X axis with backlashless gear deceleration mechanism transmission enhances axial thrust by 3 times, and significantly improves the axial thrust feed.



Y axis

3 linear guide ways with large span stepped design makes spindle head closed to beam structure which effectively increases machine's rigidity and cutting load.

Direct driven feeding system eliminates transmission error between servo motor and ball-screw and lead to high position accuracy.

These design feature guarantee best surface quality and surface precision during high speed cutting.



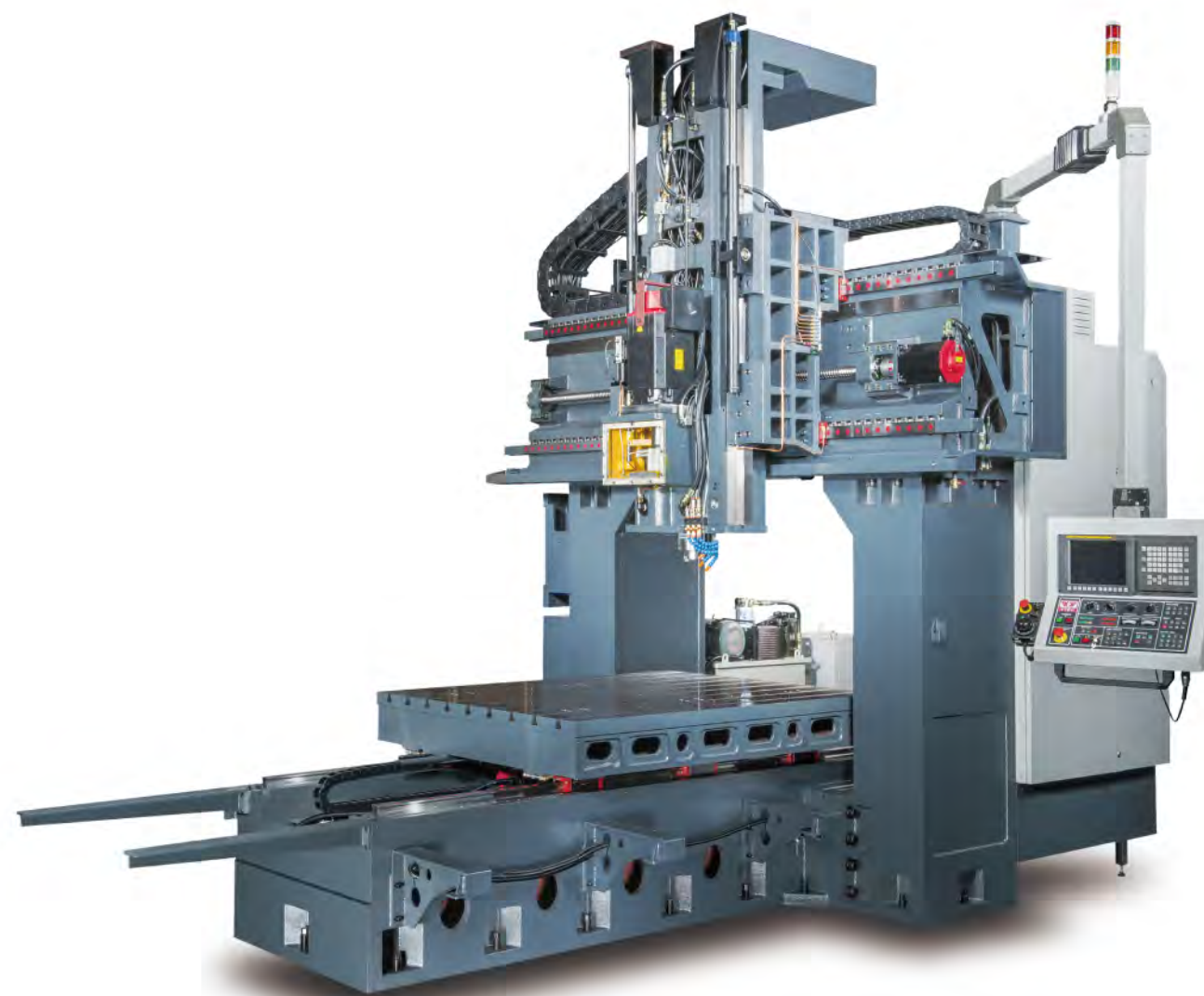
Z axis

Z axis 15m rapid traverse and high acceleration/deceleration performance achieve contour accuracy of high speed mold machining.

Economical twin hydraulic cylinders with compressed Nitrogen assistance counterweight system, achieve:

- Smoother movement
- Z-axis holds it position when power failure happens
- Excellent performance on electricity saving

- ▶ Whole casting structure provides long term accuracy stability.
- ▶ Ultra-wide column structure with big dimension section provides the best rigid support of spindle and YZ axis.
- ▶ Ambient Temperature Compensation and Spindle Thermal Compensation functions can be chosen to ensure the accuracy change within 0.02mm which influenced by environmental temperature change.



SF-2116 model with gear type spindle 6,000rpm

High Speed and Precise Accuracy Cutting Performance



Bumper

- Mold surface with high smooth Ra0.8
- Fine cutting at acute angle with micro processing and clearing trails
- FC300
- D16R8 Ball End
- Follow periphery
- 0.08 mm pitch
- 4,000 mm/min feed rate
- 1,000 x 400 x 350mm



Mold Base High Feed Machining

- Vc 220m/min usage
- 10 m high feed machining
- 300 cc/min material removal rate (Direct-driven spindle)
- 0.006 mm high position accuracy of boring hole (Pitch 400x700mm)
- S45C
- D40R1 high feed milling tool
- Ap 25mm ; Ae 1.2mm ; F10,000mm/min
- 800 x 550 x 250mm



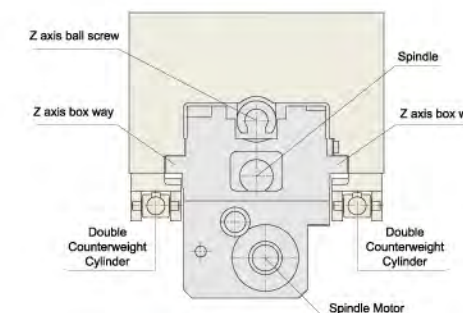
Mask Core

High speed and precise machining
High contour precision

- 86% point accuracy <0.012mm
- 99% point accuracy <0.02mm
- S45C
- D12 R6 Ball end
- 45° Projection cutting
- 0.05 mm pitch
- 10,000 rpm
- 4,000 mm/min feed rate
- 300 x 200 x 100 mm

Optimal Central Symmetric Spindle System Design. Strong, Stable, Durable and Scalability

- Minimum distance between spindle center and Z-axis roller way not only shortens cutting lever arm but also significantly improves rigidity.
- Symmetric spindle gravity configured, Z-axis ball screw, spindle center and spindle motor configured at gravity point of Z-axis box structure centerline provide the best feed precision and thermal equilibrium.
- Gear spindles are made of Japan-made JIS-0 grade gears.
- 2-step gear type spindle provides high torque and high speed characteristics to ensure heavy cutting ability on surface finish.



Cutting Ability



Face milling:

Tool dia.:125mm
Cutting feed:1,000mm/min
Cutting width:100mm
Cutting depth:6mm
Removal rate:600cc/min



High feed machining:

Tool dia.:40mmx4inserts
Cutting speed:2,400rpm
Cutting feed:10m/min
Cutting depth:1mm
Cutting width:32mm
Removal rate:320cc/min



Indexable insert drilling:

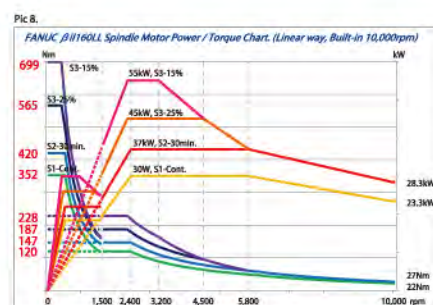
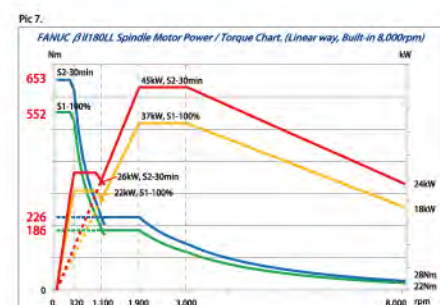
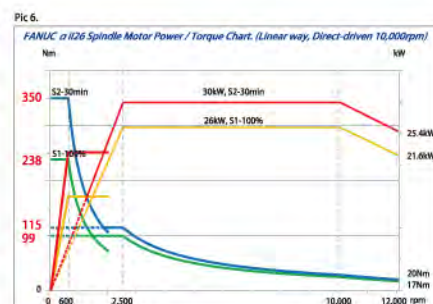
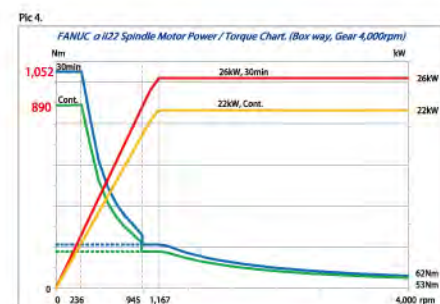
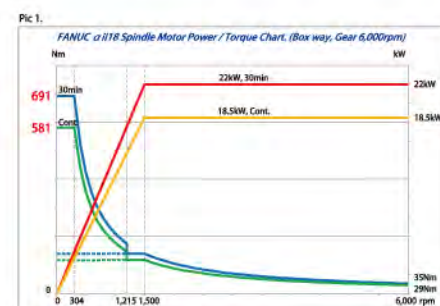
Tool dia.:32mm
Cutting speed:1,500rpm
Cutting feed:500mm/min
Cutting depth:30mm
Removal rate:400cc/min
Coolant through spindle

spindle power=22/26kW, speed=4,000rpm, material=S45C(mid carbon steel)
position = 1/2x(z travel)

Spindle Power and Torque Charts

FANUC Controller

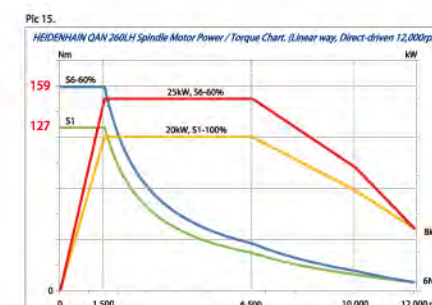
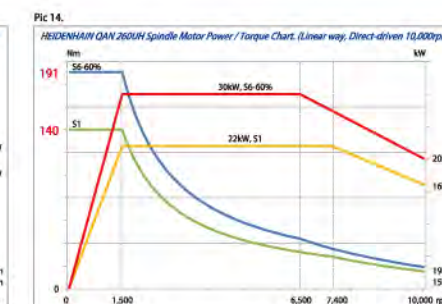
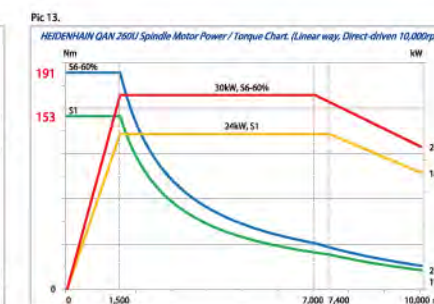
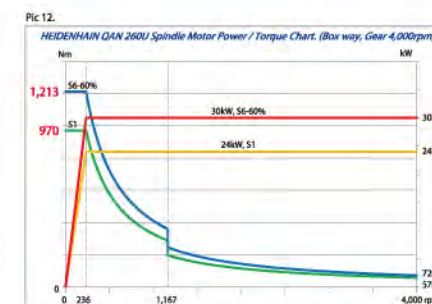
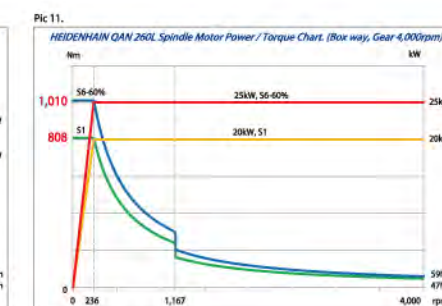
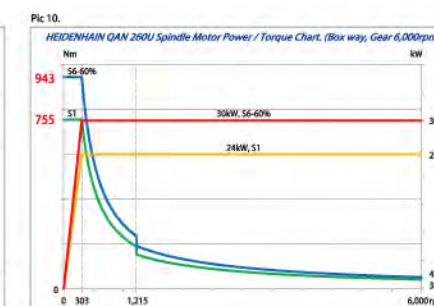
Driven type	Pic. No.	Motor type	Speed(rpm)	Power(KW)	Torque(Nm)	Tool type
Box Way						
Gear	1	FANUC α il 18 (STD)	6,000	18.5 / 22	581 / 691	# 50
	2	FANUC α il 22	6,000	22 / 26	691 / 817	# 50
	3	FANUC α il 18	4,000	18.5 / 22	748 / 890	# 50
	4	FANUC α il 22	4,000	22 / 26	890 / 1,052	# 50
Linear Way						
Direct-driven	5	FANUC α il 22	10,000	22 / 26	140 / 166	# 50
		FANUC α iIT 22	10,000	22 / 26	140 / 166	# 50
	6	FANUC α il 26	10,000	26 / 30	238 / 350	# 50
		FANUC α iIL 26	12,000	26 / 30	238 / 350	# 40
Built-in	7	FANUC Bii180LL	8,000	L: 22 / 26 H: 37 / 45	L: 552 / 653 H: 186 / 226	# 50
	8	FANUC Bii60LL	10,000	L: 18.5 / 30 H: 30 / 55	L: 352 / 699 H: 120 / 228	# 50



Spindle Power and Torque Charts

HEIDENHAIN Controller

Driven type	Pic. No.	Motor type	Speed(rpm)	Power(KW)	Torque(Nm)	Tool type
Box Way						
Gear	9	HEIDENHAIN QAN 260L	6,000	20 / 25	628 / 786	# 50
	10	HEIDENHAIN QAN 260U	6,000	24 / 30	755 / 943	# 50
	11	HEIDENHAIN QAN 260L	4,000	20 / 25	808 / 1,010	# 50
	12	HEIDENHAIN QAN 260U	4,000	24 / 30	970 / 1,213	# 50
Linear Way						
Direct-driven	13	HEIDENHAIN QAN 260U	10,000	24 / 30	153 / 191	# 50
	14	HEIDENHAIN QAN 260UH	10,000	22 / 30	140 / 191	# 50
	15	HEIDENHAIN QAN 260LH	12,000	20 / 25	127 / 159	# 40
		HEIDENHAIN QAN 260LH	12,000	20 / 25	127 / 159	# 50

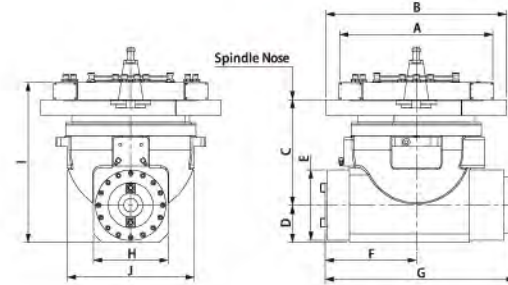


Auto Multi-Angle Head Attachment

AC 90° angular head



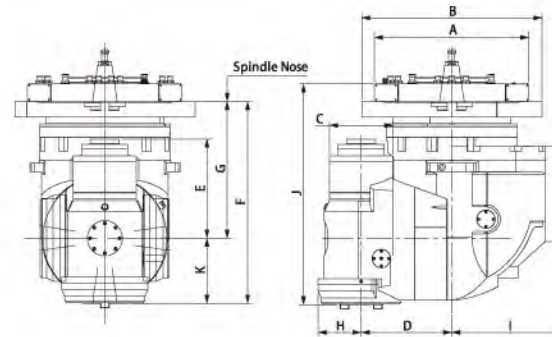
Item	AC 90° angular head	
	G2	G3
Max. speed	3,000rpm	5,000rpm
Max. power	26kW	
Tool clamping	Auto hydraulic clamping	
Head clamping	Auto hydraulic clamping	
C-axis indexing	Auto 1°/5°	
Machining coolant	External nozzle	External nozzle
Coolant Through Spindle(opt.)	20 bar. / 70 bar.	
A	Φ436	Φ435
B	Φ436	Φ512
C	300	300
D	100	106
E	Φ200	Φ200
F	259	259
G	515.7	539
H	212	212
J	Φ352	Φ360



AC 2-axis head



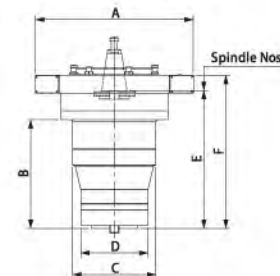
Item	AC 2-axis head	
	G2	G3
Max. speed	3,000rpm	4,000rpm
Max. power	26kW	
Tool clamping	Auto hydraulic clamping	
Head clamping	Auto hydraulic clamping	
C-axis indexing	Auto 1°/5°	Auto 1°/5°
B-axis indexing	Auto 5°	Auto 1°/5°
Machining coolant	External nozzle	Spindle ring cutting coolant system
Coolant Through Spindle(opt.)	20 bar. / 70 bar.	
A	Φ436	Φ435
B	Φ436	Φ512
C	Φ200	Φ178
D	350	258
E	300	281
F	573.5	559
G	388.5	330
H	122.5	106
I	329.5	206
J	627.3	585
K	259	185



AC extended head



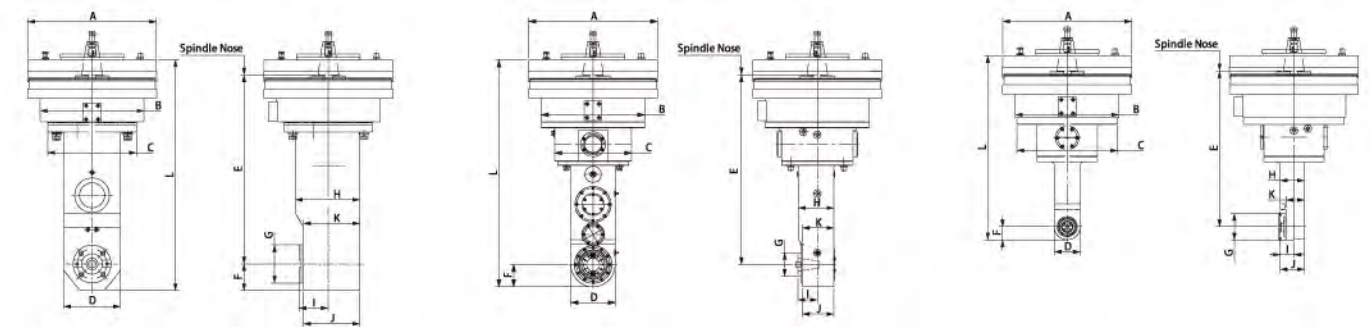
Item	AC extended head 300mm		AC extended head 420mm	
	G2	G3	G2	G3
Max. speed	4,000rpm	5,000rpm	4,000rpm	5,000rpm
Max. power	26kW			
Tool clamping	Auto hydraulic clamping			
Head clamping	Auto hydraulic clamping			
C-axis indexing	Auto 1°/ 5°			
Machining coolant	External nozzle	External nozzle	External nozzle	External nozzle
A	Φ436	Φ435	Φ436	Φ435
B	300	300	427	427
C	Φ230	Φ230	Φ230	Φ230
D	Φ185	Φ185	Φ185	Φ185
E	374	381	501	501



AC milling head



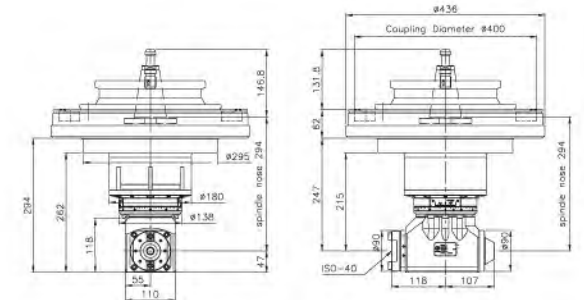
Item	AC milling head(Large)		AC milling head(Medium)		AC milling head(Small)	
	G2	G3	G2	G3	G2	G3
Max. speed	800rpm		800rpm		800rpm	
Max. power	26kW		11kW		8kW	
Tool clamping	Manual		Manual		Manual	
Head clamping	Auto hydraulic clamping		Auto hydraulic clamping		Auto hydraulic clamping	
C-axis indexing	Auto 1°/5°		Auto 1°/5°		Auto 1°/5°	
Machining coolant	External nozzle		External nozzle		External nozzle	
A	Φ436	Φ435	Φ436	Φ435	Φ436	Φ435
B	Φ350	Φ350	Φ350	Φ350	Φ350	Φ350
C	Φ300	Φ300	Φ240	Φ240	Φ240	Φ240
D	192	192	150	150	88	88
E	640	640	642	642	528.5	528.5
F	90	90	75	75	44	44
G	Φ128.5	Φ128.5	Φ126.5	Φ126.5	Φ90	Φ90
H	218	218	120	120	226	226
I	99	99	65	65	46	46
J	205	205	122.8	122.8	86	86
K	535	535	410	410	264.5	264.5



Small AC 90° milling head



Item	Small AC 90° milling head
Max. speed	2,500rpm
Max. power	9kW
Tool clamping	Manual
Head clamping	Auto hydraulic clamping
C-axis indexing	Manual 1°
Machining coolant	External nozzle



AC 90 degree angular head exchange on horizontal type (opt.)

- Applied when AC 90 degree head or AC milling head is equipped for auto tool change.

Intelligent Multi-Face Machining

5-axis Level Tool Point Center Management TCPM

Each type of head attachment with tool center point management, takes vertical workpiece as origin benchmark, and converts the workpiece coordinates to any new specified plane of workpiece coordinates automatically.

Auto Coordinates Tool axis 3D Conversion

3-axis mechanical coordinates system can be automatically converted to machining coordinates system, easily achieving face milling, end milling, drilling and rigid tapping machining operations in different directions.

Head Attachment Dimensions Correction

Intelligent compensation on each type of head attachments. The compensation including rotation center, tool size, workpiece coordinates system correction management. It greatly simplifies the complexity of programming and operation to achieve perfect auto multi-angle machining.



Accurate Kinematic Compensation



Auto Compensating Attachment Heads:

Auto compensating horizontal head center and spindle center.
Auto compensating mechanism mass center and revolution center.

3D Coordinates Management:

- 1.V/H tool length and diameter compensation.
- 2.V/H working coordinate affine transformation.
- 3.V/H manual interrupting.
- 4.V/H 3D rigid tapping.

Heavy Cutting Ability

Through Cutting Depth Test to Show Excellent Heavy Cutting Rigidity

Test SPEC.: 22/26kW, 4,000rpm spindle with G2 Series

Head attachment	Extended head	90 degree angular head	2-axis head
Tool type	BT-50 face milling tool-diameter $\phi 125/5$ edge		
Cutting material	S45C	S45C	
Spindle speed(rpm)	600	600	
Feed rate(mm/min)	1000	1000	
Machining width(mm)	100	100	
Machining depth	4	5	
Removal rate(cc/min)	400	500	



Auto Head Storage Unit



● Table type head bracket



● Auto swiveling arm type head bracket (on operation side)



● Manual swiveling arm type head bracket(on operation side)



● Multi-heads magazine(magazine side)

Tool Magazine



● Floor-standing vertical-horizontal type tool magazine(opt.)



● Extended head exchange on vertical type(opt.)



● AC 90 degree angular head exchange on horizontal type(opt.)



● Vertical type tool magazine to save floor space, 40 tools magazine (60 tools opt.)



● Floor-standing vertical type tool magazine(opt.)



● Auto tool exchange, tool to tool 3 sec. in vertical type

CNC TalkBox

Monitoring Software for Supporting Multiple Controllers
Make Production Management Clear at A Glance



Intelligent Factory Management Can Be in Everywhere

CNC TalkBox possesses computing, storage and industrial Internet functions. After computing, the production information can be uploaded to the cloud database or mobile devices to achieve the less hardware managements and the optimal mobile data exchanging capacity.

Economic

Small hardware devices for rapid introduction of industrial Internet of Things (IoT).

Stable

Timely record of production log is a benefit to analyze process and increase production capacity.

Expandable

Complete data collection can make better decisions for process, dispatch, tool and material management.

Safe, Friendly and Reliable Operation Device

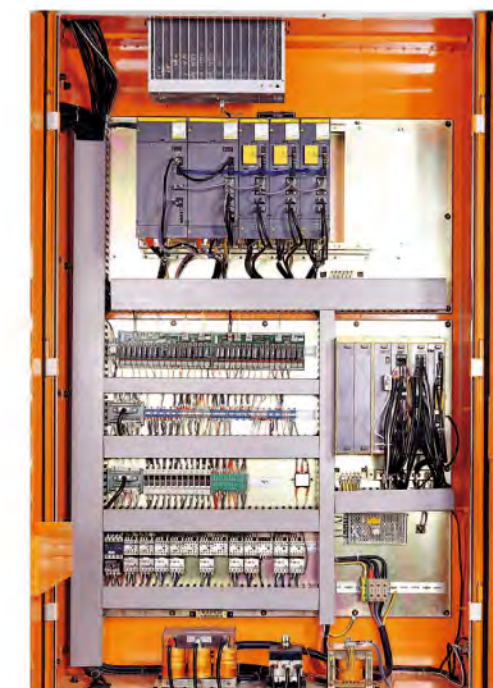
- Safe and reliable electrical circuit design
- CE compliant safety circuit design
- CE compliant EU regulation electrical parts for whole machine
- Anti-interference design on motor power cables
- Heat exchanger for electrical cabinet
- Hardware overtravel limit protection
- Motor overload and voltage phase failure protection
- Main power protecting device
- Ethernet and RJ45 interface
- USB port(opt.)



● Fast tool length measurement device at magazine side for mold cutting



● Coolant through spindle



● Centralized auto lubrication system

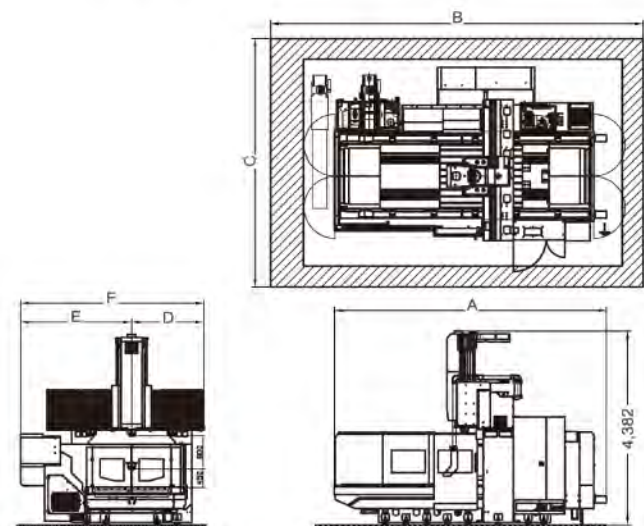


● Modularized machine design for oil cooling device and hydraulic unit



● Multi-segment sliding door at operation side and external door in front and back side. Swiveling arm type operation panel is standard and overhead pendulum type operation panel is option.

Machine Dimension

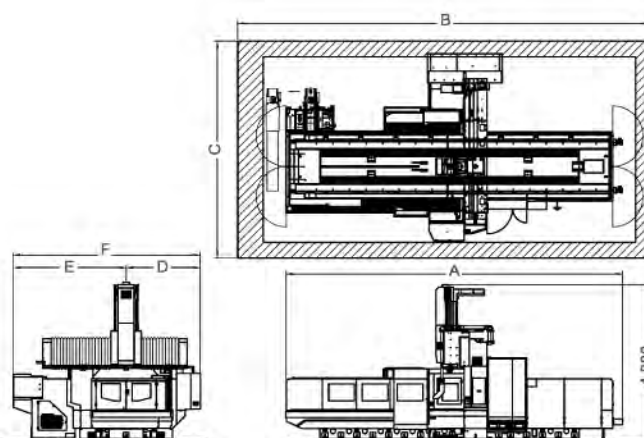


SF-xx16/20 dimension

(Vertical type tool change: standard column height , box-way Z axis 800 mm)

Unit:mm

Model	A	B	C	E	D	F
SF-2116	6,565	9,400	5,900	2,435	1,545	3,980
SF-2616	7,565	10,400				
SF-3116	8,565	11,400				
SF-4116	10,565	13,400	6,300	2,635	1,745	4,380
SF-2120	6,565	9,400				
SF-2620	7,565	10,400				
SF-3120	8,565	11,400				
SF-4120	10,565	13,400				

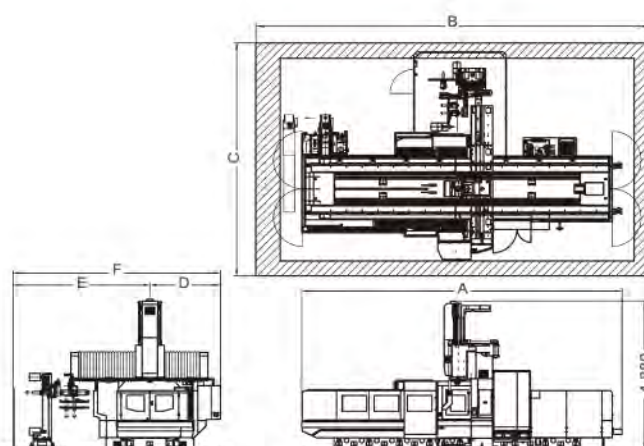


SF-xx23/27 dimension

(Floor-standing vertical type tool change: columns add 200mm, box-way Z axis 1,020 mm)

Unit:mm

Model	A	B	C	E	D	F
SF-2123	6,565	9,400	6,600	3,340	2,135	5,475
SF-2623	7,565	10,400				
SF-3123	8,565	11,400				
SF-4123	10,565	13,400	7,000	3,540	2,335	5,875
SF-2127	6,565	9,400				
SF-2627	7,565	10,400				
SF-3127	8,565	11,400				
SF-4127	10,565	13,400				



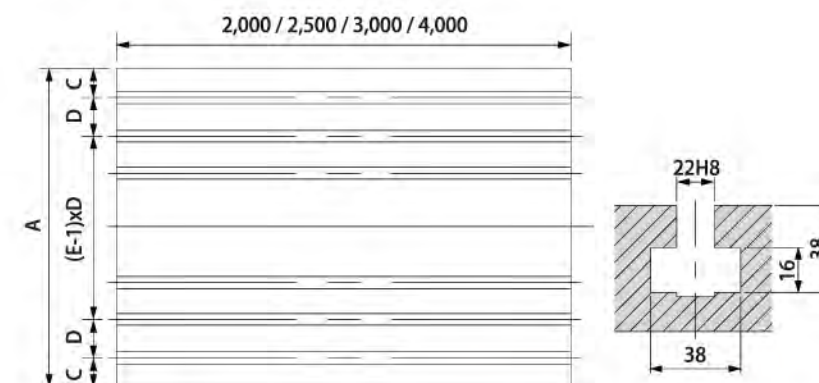
SF-xx23/27 dimension

(Floor-standing vertical-horizontal type tool change, multi-heads magazine: columns add 200mm , box-way Z axis 1,020 mm)

Unit:mm

Model	A	B	C	E	D	F
SF-2123	6,565	9,400	7,400	4,530	2,135	7,260
SF-2623	7,565	10,400				
SF-3123	8,565	11,400				
SF-4123	10,565	13,400	8,000	4,730	2,335	7,460
SF-2127	6,565	9,400				
SF-2627	7,565	10,400				
SF-3127	8,565	11,400				
SF-4127	10,565	13,400				

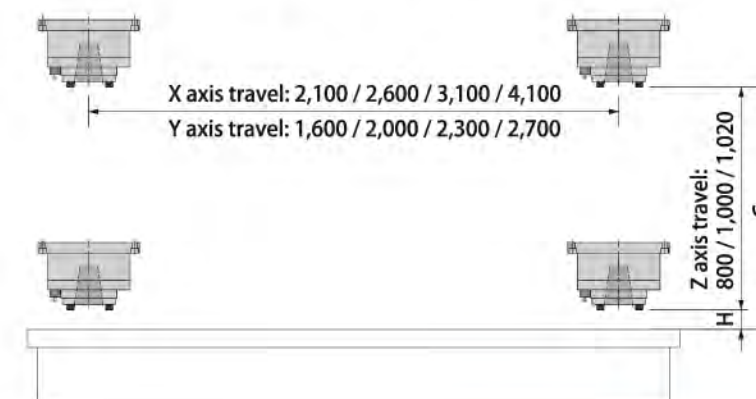
Table and T-slot



Unit:mm

	A	C	D	E (pcs)
SF-xx16/23	1500	110	160	9
SF-xx20/27	1800	100	160	11

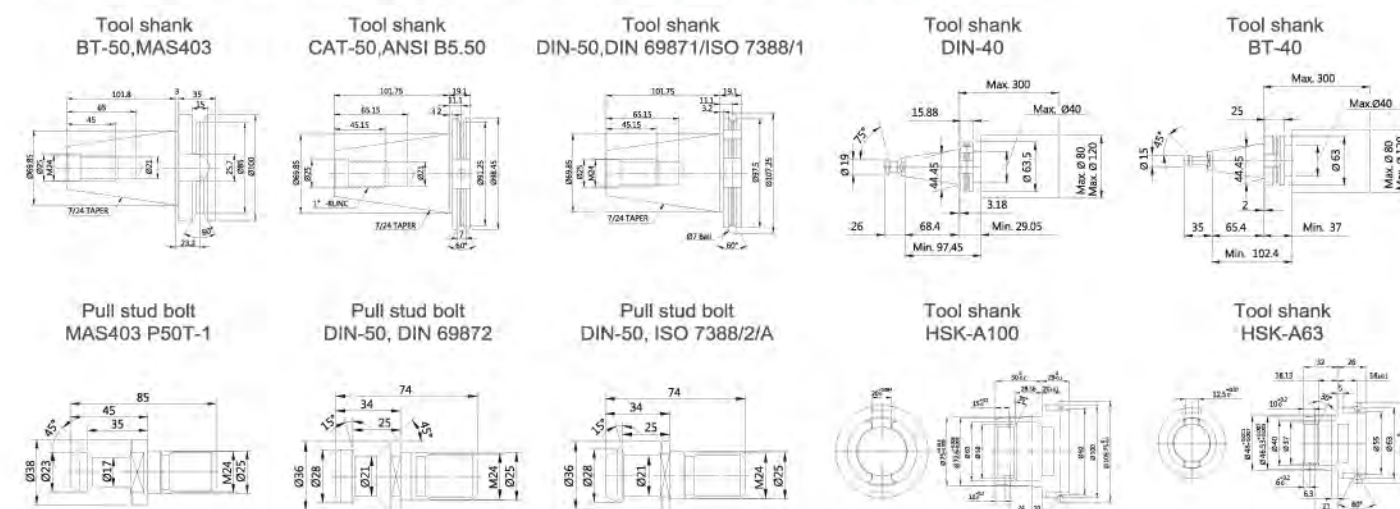
Working Range



Unit:mm

Spindle type	Box way		Linear way			
	Gear type		Direct-driven		Built-in	
Z axis travel	800	1,020	800	1,000	800	1,000
H	150	130	128	128	113	113
G	950	1,150	928	1,128	913	1,113

Tool Shank and Pull Stud Dimension



Specification | SF-xx23/ xx27 Series

MODEL			Unit	SF-2123	SF-2623	SF-3123	SF-4123	SF-2127	SF-2627	SF-3127	SF-4127
TRAVEL											
X axis			mm	2,100	2,600	3,100	4,100	2,100	2,600	3,100	4,100
Y axis			mm	2,300				2,700			
Z axis	Box way		mm	800 / 1,020 (Opt.)				800 / 1,020 (Opt.)			
	Linear way		mm	-				-			
Distance from spindle nose to table	Box way	Z axis=800	mm	450~1,250 (column+300)				450~1,250 (column+300)			
		Z axis=1,020	mm	230~1,250 (column+300)				230~1,250 (column+300)			
	Linear way	Z axis=800	mm	450~1,250 (column+300)				450~1,250 (column+300)			
		Z axis=1,000	mm	250~1,250 (column+300)				250~1,250 (column+300)			
Distance from spindle center to column			mm	453				453			
Distance between columns (port width)			mm	1,700				2,100			
TABLE											
Dimension			mm	2,000x1,500	2,500x1,500	3,000x1,500	4,000x1,500	2,000x1,800	2,500x1,800	3,000x1,800	4,000x1,800
T-slot(Width x Number x Pitch)			mm	22 x 9 x 160				22 x 11 x 160			
Max. table load			kg	8,000	9,000	10,000	12,000	8,000	9,000	10,000	12,000
SPINDLE											
Spindle motor(cont./30 min. rated)			kW	18.5 / 22 (22 / 26 Opt.)				18.5 / 22 (22 / 26 Opt.)			
Spindle speed	Box way	2-step gear	rpm	6,000 / 4,000 (Opt.)				6,000 / 4,000 (Opt.)			
	Linear way	Direct-driven	rpm	-				-			
		Built-in	rpm	8,000 (Opt.) / 10,000 (Opt.)				8,000 (Opt.) / 10,000 (Opt.)			
Spindle taper			-	ISO 50				ISO 50			
FEED											
Cutting feed rate			mm/min	1~10,000				1~10,000			
Rapid traverse (X / Y / Z)			m/min	24 / 20 / 15				18 / 20 / 15	24 / 20 / 15		18 / 20 / 15
X / Y / Z motor power (FANUC)			kW	4 / 4 / 4				7 / 4 / 4	4 / 4 / 4		7 / 4 / 4
ACCURCY											
Positioning accuracy	Refer to JIS B6333	mm	±0.005 / 300, ±0.010 / Full travel				±0.005 / 300, ±0.010 / Full travel				
	Refer to ISO 10791	mm	P0.018				P0.020	P0.018		P0.020	
Repeatability	Refer to JIS-B6333	mm	±0.003				±0.003				
	Refer to ISO 10791	mm	Ps0.015		Ps0.018		Ps0.015		Ps0.018		
ATC											
ATC capacity	Vertical type tool change	pcs	-				-				
	Floor-standing type vertical tool change	pcs	32 / 40 (Opt.)				32 / 40 (Opt.)				
	Floor-standing type V/H tool change	pcs	32 / 40 (Opt.) / 60 (Opt.)				32 / 40 (Opt.) / 60 (Opt.)				
Max. tool weight			kg	18				18			
Tool size (DxL) (Full tools)			mm	Ø 125				Ø 125			
Max. tool size (DxL) (Next pocket empty)			mm	Ø 180				Ø 180			
Tool shank			-	BT50 / CAT50				BT50 / CAT50			
Pull stud			-	P50T-1				P50T-1			
OTHERS											
Power requirement			kVA	50				50			
Machine net weight			kg	22,500	24,500	26,500	30,500	21,000	23,000	25,500	29,500
Machine gross weight			kg	26,000	28,000	30,000	34,000	24,500	26,500	29,500	33,500
Floor space (LxWxH)	Vertical type tool change	m	-				-				
	Floor-standing type vertical tool change		9.4 x 6.6 x 4.9	10.4 x 6.6 x 4.9	11.4 x 6.6 x 4.9	13.4 x 6.6 x 4.9	9.4 x 7.0 x 4.9	10.4 x 7.0 x 4.9	11.4 x 7.0 x 4.9	13.4 x 7.0 x 4.9	
	Floor-standing type V/H tool change		9.4 x 7.4 x 4.9	10.4 x 7.4 x 4.9	11.4 x 7.4 x 4.9	13.4 x 7.4 x 4.9	9.4 x 8.0 x 4.9	10.4 x 8.0 x 4.9	11.4 x 8.0 x 4.9	13.4 x 8.0 x 4.9	

Optional Accessory for Head Attachment

- 21 Sub working table
- 22 Rotary table
- 23 Interface reserved for fourth axis
- 24 Spindle cutting load hardware protection
- 25 Z axis retract function at power failure
- 26 Anti-collision and process simulation software
- 27 Remote monitoring software-Professional
(CNC TalkBox)
- 28 Auto tool length measurement
- 29 Auto workpiece coordinate measurement
- 30 Transformer
- 31 Auto warm up
- 32 Thermal compensation system

- 1 Z axis travel 1,020mm(box way spindle head, for AC head attachment)
- 2 AC 90 degree angular head/ AC extended head/ AC 2-axis head
- 3 AC milling head/ small head/ customized head attachment
- 4 Manual 90 degree angular head/ extended head/ universal head
- 5 Manual swiveling arm type head bracket on operation side
(one head attachment)
- 6 Auto swiveling arm type head bracket on operation side
(one head attachment, one cover)
- 7 Multi-heads magazine on magazine side(For SF-xx23/27)
- 8 Coolant through spindle function is available on AC90 degree angular head and AC 2-axis head.

● For the specification of each model, please contact our sales representatives.