

APEENDIX

**1 SPECIFICATIONS**

**1-1 Machine Specifications**

(1) Standard features

Item		Unit	Description	Remark	
Capacity	Max. turning diameter	mm (in)	270 (10.63)		
	Standard turning diameter	mm (in)	215 (8.46)		
	Distance between spindle noses	mm (in)	Max.1100/min.250 (max.43.31/min.9.84)		
	Max. turning length	mm (in)	780 (30.71)		
	Max. bar size (Round bar)	mm (in)	71 (2.80) (L-side) /65 (2.56) (R-side)	L, R 1)	
	Chuck size	mm (in)	210 (8.72)	L, R	
	Turret force (X-axis)	(X1/X2-axis)	N	11000/11000	
	Turret force (Z-axis)	(Z1/Z2-axis)	N	9000/6000	3)
	Turret force (Y-axis)	(Y-axis)	N	6000	
Axis travel	Axis travel (X1/X2-axis)	mm (in)	185 (7.28)/195 (7.68)		
	Axis travel (Z1/Z2-axis)	mm (in)	780 (30.71)		
	Axis travel (Y-axis)	mm (in)	± 60 (± 2.36)		
	Axis travel (B2-axis)	mm (in)	850 (33.46)		
L-spindle	Spindle speed	min <sup>-1</sup>	4000		
	Number of spindle speeds	Step	Stepless		
	Spindle nose		A1-8		
	Hole through spindle	mm (in)	85 (3.35)		
	Front bearing inner diameter	mm (in)	120 (4.72)		
	Hole through draw tube	mm (in)	72 (2.83)		
	Spindle support		2 points		
	Spindle center height	mm (in)	1228 (48 35)		
	Runout of spindle end face	mm (in)	0.003 (0.0001)	Accomplished by ISO230/1	
	Runout in spindle radius direction	mm (in)	0.003 (0.0001)	Accomplished by ISO230/1	

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	Item	Unit	Description	Remark
R-spindle	Spindle speed	min <sup>-1</sup>	4500	
	Number of spindle speeds	Step	Stepless	
	Spindle nose		A2-6	
	Hole through spindle	mm (in)	80 (3.15)	
	Front bearing inner diameter	mm (in)	110 (4.33)	
	Hole through draw tube	mm (in)	66 (2.60)	
	Chuck size	mm (in)	210 (8.27)	
	Spindle support		2 points	
	Runout of spindle end face	mm (in)	Within 0.003 (0.0001)	Accomplished by ISO230/1
	Runout in spindle radius direction	mm (in)	Within 0.003 (0.0001)	Accomplished by ISO230/1
C-axis (L/R Spindle)	Index mechanism		V-belt deceleration + drive	
	Max. programmable index angle		± 99999.999	
	Least input increment		0.001	
	Least command increment		0.001	
	Rapid index speed	min <sup>-1</sup>	600	
	Cutting feedrate	° /min	1-4800	
	Index accuracy	"	Within 40	2)
	Repeatability	"	Within ± 30	2)
	Simultaneously controlled axes		3-axes X+Z+C	
	C-axis clamp		Disk clamp	
	Braking torque	N·m	224.4	
	C-axis connecting time	s	1.5	Included zero return time
	Index accuracy for rotating shaft	"	Within 0.025	Accomplished by ISO230/2

1) Bar size available is limited depending on chuck inner diameter used.  
 2) Indicates the accuracy of C-axis in the only forward direction. (Measured 7 times)  
 3) The machining ability with Z-axis is different, because the servomotor of Z<sub>1</sub> and Z<sub>2</sub>-axis is different.

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	Item	Unit	Description	Remark	
Upper turret	Turret head type		Dodecagon		
	No. of tool stations		24		
	Number of turret index position		24		
	Turret head outside diameter	mm (in)	365 (14.37) (Distance across flats)		
	Turret thickness	mm (in)	100 (3.94)		
	Tooling clearance	mm (in)	600 (23.62)		
	Turret index motor		Servo motor		
	Turret index/positioning mechanism		Curvic coupling ( $\phi$ 205mm/8.07in)		
	Turret clamping force	kN	30		
	Tool size	mm (in)	Europe	U.S.A.	
			20(0.79) 25(0.98)	19.05(3/4) 25.40(1.00)	
	I. D. turning tool mounting bore diameter	mm (in)	25(0.98), 32 (1.26)		
	Index time (1 ST/Half rotation)	s	0.7	4)	
	Index time (1 ST)	s	0.3	4)	
	Chip to chip	s	—		
Lower turret	Turret head type		Dodecagon		
	No. of tool stations		24		
	Number of turret index position		24		
	Turret head outside diameter	mm (in)	365 (14.37) (Distance across flats)		
	Turret thickness	mm (in)	100 (3.94)		
	Tooling clearance	mm (in)	600 (23.62)		
	Turret index motor		Servo motor		
	Turret index/positioning mechanism		Curvic coupling ( $\phi$ 205mm/8.07in)		
	Turret clamping force	kN	30		
	Tool size	mm (in)	Europe	U.S.A.	
			20(0.79) 25(0.98)	19.05(3/4) 25.40(1.00)	
	I. D. turning tool mounting bore diameter	mm (in)	25(0.98), 32(1.26)		
	Index time (1 ST/Half rotation)	s	0.7	4)	
	Index time (1 ST)	s	0.3	4)	
	Chip to chip	s	—		

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Item		Unit	Description	Remark	
Rotary tool spindle (Upper /Lower turret)	Spindle speed range	min <sup>-1</sup>	3600		
	Number of spindle speeds	Step	Stepless		
	Number of tool mounting positions		12		
	Types of holder and tool size			Straight holder	φ 2 ~ φ 20
				Cross holder	φ 2 ~ φ 20
			Straight tap holder	M3 ~ M10	
			Cross tap holder	M3 ~ M10	
Saddle	Configuration		45		
	Ball screw diameter	(X1/X2-axis)	mm (in)	40/40 (1.57/1.57)	
		(Z1/Z2-axis)	mm (in)	40/36 (1.57/1.42)	
		(B2-axis)	mm (in)	36 (1.42)	
		(Y-axis)	mm (in)	36 (1.42)	
	Ball screw pitch	(X1/X2-axis)	mm (in)	10/10 (0.39/0.39)	
		(Z1/Z2-axis)	mm (in)	12/10 (0.47/0.39)	
		(B2-axis)	mm (in)	10 (0.39)	
		(Y-axis)	mm (in)	6 (0.24)	
	Distance between slides	(X1/X2-axis)	mm (in)	280/295 (11.02/11.61)	
		(Z1/Z2-axis)	mm (in)	470/370 (18.50/14.57)	
		(B2-axis)	mm (in)	470 (18.50)	
		(Y-axis)	mm (in)	325 (12.80)	
	Positioning accuracy	(X1/X2-axis)	mm (in)	0.005 (0.0002)~ 0.030 (0.001)	Accomplished by ISO230/2
		(Z1/Z2-axis)	mm (in)	0.005 (0.0002)~ 0.050 (0.002)	Accomplished by ISO230/2
		(B2-axis)	mm (in)	0.005 (0.0002)~ 0.050 (0.002)	Accomplished by ISO230/2
(Y-axis)		mm (in)	0.005 (0.0002)~ 0.030 (0.001)	Accomplished by ISO230/2	
4) Time of clamp/unclamp is not included in the time since they are performed during slide movements.					

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Item		Unit	Description	Remark	
Cutting feedrate	Rapid traverse	(X1/X2-axis)	mm/min (in/min)	16000 (629.92)	
		(Z1/Z2-axis)	mm/min (in/min)	27000 (1062.99)	
		(B2-axis)	mm/min (in/min)	27000 (1062.99)	
		(Y-axis)	mm/min (in/min)	6000 (236.22)	
	Cutting feed	(X1/X2-axis)	mm/min (in/min)	1 to 4800 (0.04 to 188.98)	
		(Z1/Z2-axis)	mm/min (in/min)	1 to 4800 (0.04 to 188.98)	
		(B2-axis)	mm/min (in/min)	1 to 4800 (0.04 to 188.98)	
		(Y-axis)	mm/min (in/min)	1 to 4800 (0.04 to 188.98)	
	Jog feed	(X1/X2-axis)	mm/min (in/min)	0 to 1260 (16 steps) (0 to 49.61)	
		(Z1/Z2-axis)	mm/min (in/min)	0 to 1260 (16 steps) (0 to 49.61)	
		(B2-axis)	mm/min (in/min)	0 to 1260 (16 steps) (0 to 49.61)	
		(Y-axis)	mm/min (in/min)	0 to 1260 (16 steps) (0 to 49.61)	
Drive motor	L-spindle drive motor		kW	15/11 (Wide area)	Torque 382 N·m
	L-spindle drive motor (Option)		kW	18.5/15 (Wide area)	Torque 589 N·m
				22/18.5 (Wide area)	
	R-spindle drive motor		KW	15/11 (Wide area)	Torque 382 N·m
	R-spindle drive motor (Option)		KW	18.5/15 (Wide area)	Torque 589 N·m
	X1/X2-axis drive motor		kW	2.5/2.5	
	Z1/Z2-axis drive motor		kW	2.5/1.8	
	B2-axis drive motor		kW	1.8	
	Y-axis drive motor		kW	1.2	
	Turret base drive motor		kW	1.2	
	Rotary tool drive motor		kW	5.5/3.7	Torque 39.2 N·m
	Hydraulic unit pump motor		kW	2.2	
Lubrication pump motor		kW	0.017×2P		
Coolant pump motor		kW	0.18	For standard specification	

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Item		Unit	Description	Remark
Power requirements	Power supply a)	kVA	74.8	For standard specification 8)
	Power supply b)	kVA	86.6	For LR18.5/15 8)
	Air pressure supply	Nl/min MPa	150 to 200 0.5-0.7	6)
Tank Capacity	Hydraulic unit	L	50	
	Lubrication unit	L	4.6 (Effective 3.3)	
	Coolant unit	L	350	
Pump delivery	Hydraulic pump delivery	L/min	25	
	Hydraulic pump delivery pressure	MPa	3.5	
	Lubrication pump delivery (50/60Hz)	Cm <sup>3</sup> / 5min.	4.8	
	Lubrication distribution		Intermittent quantitative distribution	
Pump delivery	Coolant pump delivery (50/60Hz)	L/min	75/90	For standard specification
General	Machine height	mm (in)	2266 (89.21)	
	Floor space a)	mm × mm (in × in)	4280 × 2518 (168.50 × 99.13)	Included chip tank
	Floor space b)	mm × mm (in × in)	4888 × 2518 (192.44 × 99.13)	Included side installed chip conveyor
	Maintenance space	mm (in)	4950 × 3700 (194.88 × 145.67)	
	Weight with sub spindle (incl. NC unit)	kg	14500	
	Noise level	dBA	Less than 80	
	Vibration level (Workhead)	v	Less than 10	
	Vibration level (Saddle)	v	Less than 10	
	Name plate		English	
	Chuck pressure adjustment		Tool activity type (Without knob)	
Machine work light	Type		Fluorescent lamp	
	Lamps	W	12	
	Operating voltage	V	24	
NC unit			FANUC 18i-TB	

6) Air pressure supply setting varies depending on the conditions of the air blow.  
8) Bar feeder and chip conveyor are included.

## APEENDIX

### (2) Optional features

	Item		Unit	Description	Remark
Parts catcher Type A (For L unit)	Type			Swing bucket type	9)
	Work- piece size	Capacity	φ mm (in)	71 (2.80)	
		Length	mm (in)	150 (5.91)	
		Weight	Kg	3	
	Ejection type			Chute type	
	Chute box capacity		Pcs.	5	7)
	Unloader drive			Hydraulic	
Cycle time		s	5		
Parts catcher Type G (For R unit)	Type			Swing handy type	
	Workpiece size	Capacity	φ mm (in)	71 (2.80)	
		Length	mm (in)	150 (5.91)	
		Weight	kg	3	
	Ejection type			Conveyor type	
	Chute box capacity		Pcs.	—	
	Unloader drive			Hydraulic, pneumatic	
Cycle time		s	6.0		
Tool setter Manual	Type			Removable handy type	Available for L and R units
	Measurement accuracy		mm (in)	±0.030 (±0.001)	
Tool setter Automatic	Type			Automatic swing-in type	Only for L unit
	Unloader drive			Hydraulic	
	Measurement accuracy		mm (in)	±0.010 (±0.0004)	
Chip conveyor (Installed at the side of the machine)	Outlet direction			Right side of machine	
	Type			Hinge type	
	Drive motor		kW	0.1	
	Conveyor carrying Capacity		m <sup>3</sup> /h	0.2	
	Conveyor chain speed		m/min (in/min)	0.9/1.1 (35.43/1.1)	
	Chip bucket capacity		m <sup>3</sup>	0.2	
Chip conveyor (Installed at the rear side of the machine)	Outlet direction			Rear side of machine	
	Type			Hinge type	
	Drive motor		kW	0.1	
	Conveyor carrying Capacity		m <sup>3</sup> /h	0.2	
	Conveyor chain speed		m/min	0.9/1.1	
	Chip bucket capacity		m <sup>3</sup>	0.2	
High pressure coolant GRUNDFOS			kW	0.55×2	