



# **BDO-SERIES**

**(Bridge -Type) Double Column  
Vertical Machining Center**

**High Precision Structure Design**



# BDO-SERIES

## High-Rigidity, High-Precision & High-Efficiency Design Concept

### High-Rigidity

- The one-piece construction base with modular box design and optimum support maintains the machining accuracy.
- The construction base with optimum rigidity support design is proved by ultimate analysis that can guarantee maximum loading on worktable and heavy-duty cutting.

### High-Precision

- The spindle position is designed with symmetrical to center that provides stability of temperature level. Moreover, the short transmission system design reduces the heat conduction and extends the machine's life expectancy.
- X-axis and Y-axis is adopted THK linear roller guide ways.

### High Horsepower, High Rotational Speed, High Stability

- 35-HP spindle motor, 6,000 RPM two-steps automatic change gear box.
- Output torque of 642Nm (ZF gear box), offers capability of low-speed heavy cutting and high-speed precision cutting with extensive process range. (For demand of higher torque, please contact with our sales department).

### Auto Tool Change System

- The max tool diameter is 125mm & the tool length is 300mm.
- Auto tool change time is 8 sec. (Tool to Tool)

### Process Ability

- Y-axis travel: 1,600mm/2,100mm/2,600mm
- Z-axis travel: 1,000mm (standard)
- Z-axis travel: 800mm (option)
- Width of Table: 1,500mm/2,000mm/2,500mm

### Unique X Axis Transmission System

- Advantage of direct transmission leads that the leadscrew can rotate with no influence from belt tension.
- Direct transmission with speed-reduction mechanism is added to X-axis to increase the transmission torque, the thrust, and the capacity for workpiece weight.
- Z-axis is adopted oil pressure balance system and building in pressure saver which supports smooth and stability for acting in Z-axis.
- These three axis motors are adopted direct driven design that provides no back interstices as well as increases the machining efficiency and accuracy.





# BDO-SERIES

## Double Column Vertical Machining Center

### Ultimate Analysis Of Head Construction

Our head construction has been assayed by ultimate analysis. The strengthened head construction design can reduce deformation risk during machining.

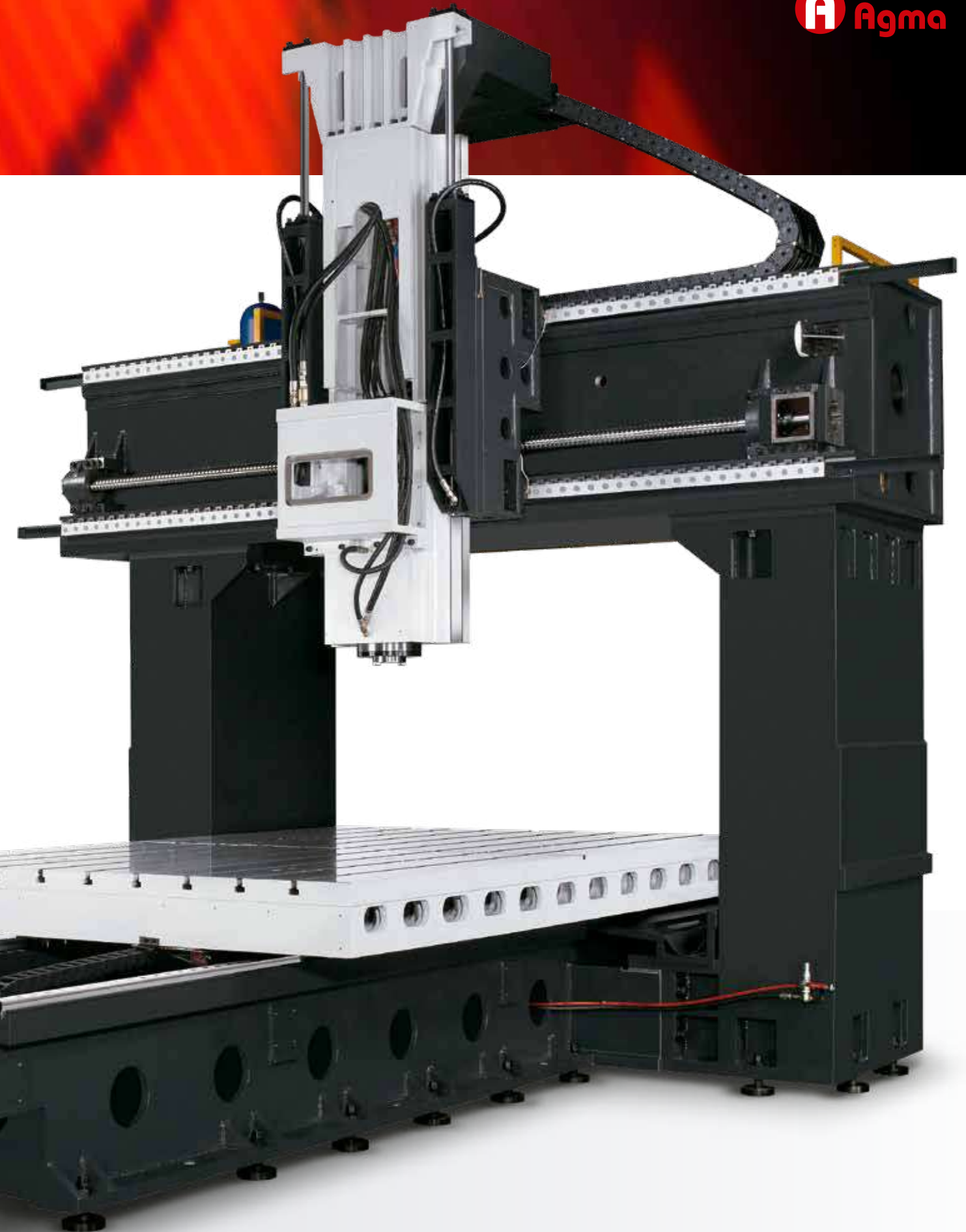
### X AXIS TRANSMISSION WAY

Direct transmission provides the following advantages for the speed reduction mechanism:

- The ball screw rotates with no influence from belt tension.
- The responses of the motor are directly sent to the ball screw.
- The backlash is minimized.
- The positioning accuracy is excellent.
- The torque and the thrust forces are increased.

\* Y-axis gantry adopts modular box-type girder design with the high span linear guide ways supporting. The wide Y-axis design is suitable for big workpiece and chips collection.





# BDO-SERIES

Perfect Structure Design  
High Quality Guarantee

- Y-axis is adopted modular box girdle construction design with the high span linear guide ways supporting. Therefore, the wide Y-axis is suitable for big items cutting and chips collection.
- One-piece construction design is Agma's persist in design concept. High-stability body provides capability for higher accuracy machining. It is not only able to carry a heavy workpiece, but also to perform heavy cutting with the highest-level accuracy in industry.
- When table width is more than 2,500mm, the base is designed to be evenly supported by four roller-line rails (rail width 45mm). The design is appropriate for carrying load and increases the life of the linear guide ways, reduces deformation of table, and meets the requirement of machine accuracy.

## CHARACTERISTICS OF THERMAL-DEFORMATION COMPENSATION SYSTEM

- The thermal deformation compensation system includes measurement of thermal deformation, thermal deformation math model developed based on the measured thermal deformation, and compensation card that executes the compensation process. It enhances machining accuracy, solves thermal deformation problem, and increases the cutting accuracy.

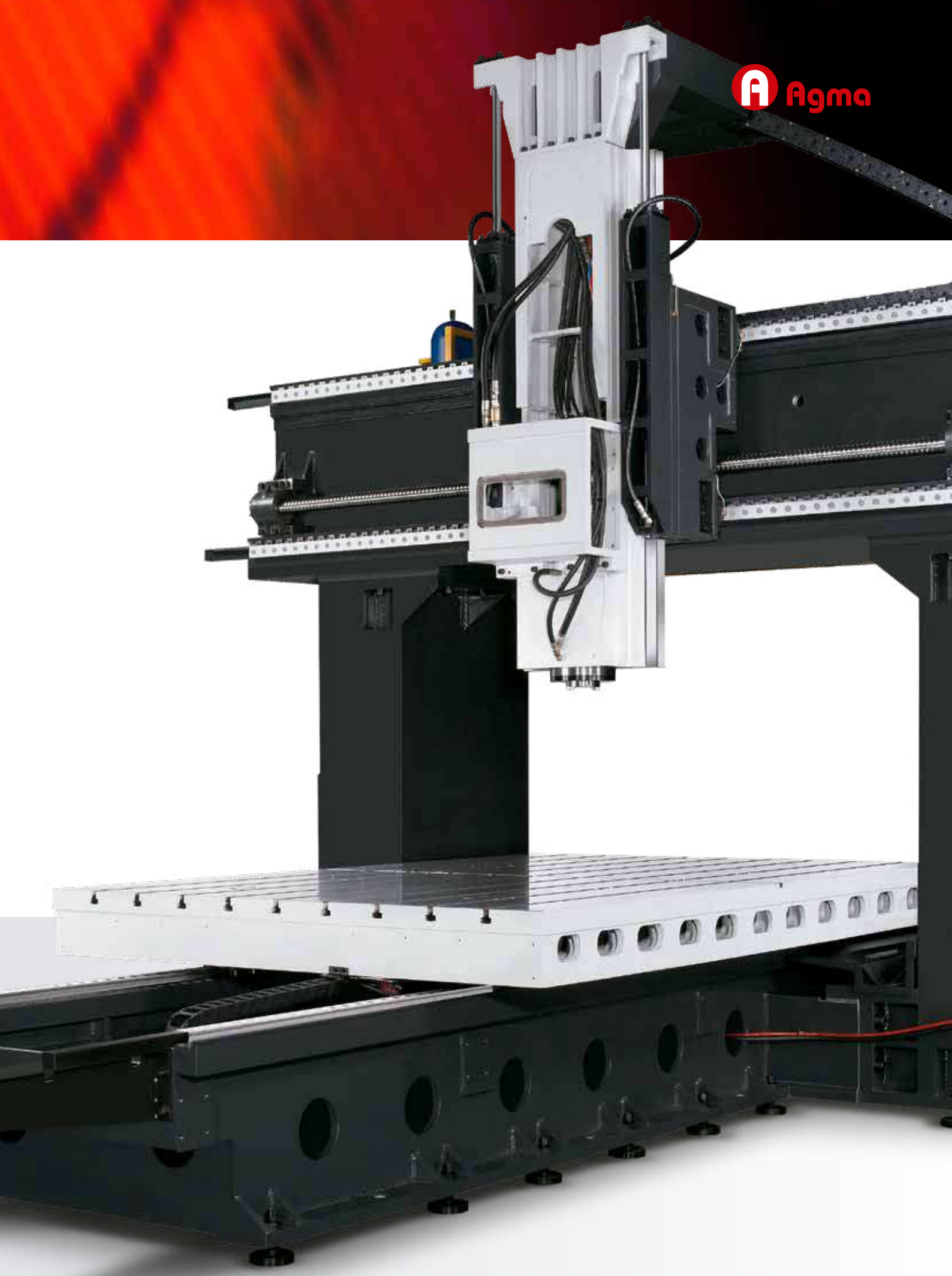
## THERMAL DEFORMATION COMPENSATION MODEL IS THE ADVANTAGE FOR MOLD MAKING INDUSTRY

- Spindle & structure thermal deformation compensation
- Overcome the influence of ambient temperature.
- Suitable for long machining hours with same accuracy for mold making.
- The machine can work anytime, no need to warm up the machine in advance.



- \* Strong structure
- \* The new design of large column width

**730mm for BDO-2217 & BDO-3217, but 1,000mm for all other series increases the contact area, the rigidity, and stability.**



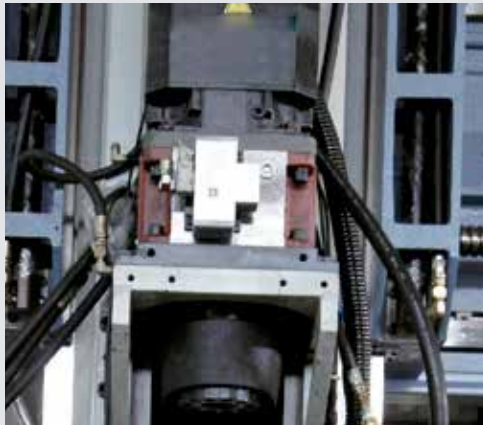
# BDO-SERIES

## Different Types of Spindles Are Available



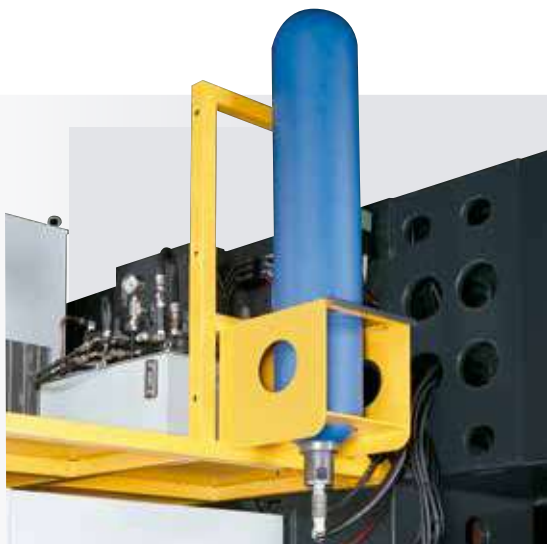
### GEAR- DRIVEN SPINDLE

The gear-driven spindle provides spindle speed of 4,000rpm and 6,000rpm with high output torque which is the best choice for frequent heavy-cutting operations.



### ZF SPINDLE

ZF spindle has higher torque than belt-driven spindle. ZF spindle provides higher rotational speed than gear driven does. ZF gear box has 1:4 speed reduction ratio mechanism. It enlarges output torque by 4 times. It offers an extra choice for users who needs high rotation speed and high torque for machining operation.



### CROSS-BEAM BACK HOLDER DESIGN

The design of the back holder of cross-beams neatly aligns hydraulic unit, cooling machines, and spare parts, etc., and meets the requirement of CE regulations. This design offers two advantages:

1. More free spaces for operators
2. Easy to maintain





### BT-50 SHORT END SPINDLE

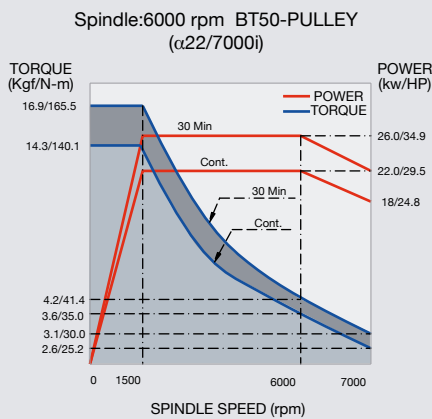
Spindle speed:6,000rpm. BT-50 taper adopts short spindle end design with use of gear box. This is suitable for heavy cutting. Spindle torque could reach 572Nm.

### BT-50 EXTENDED LONG-END SPINDLE (opt.)

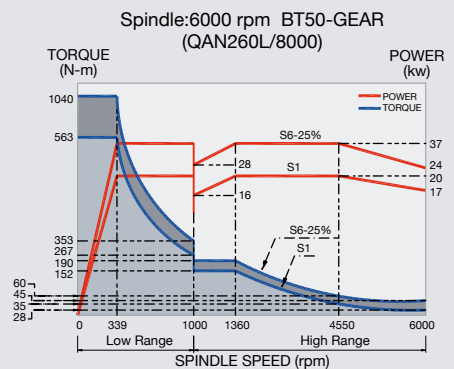
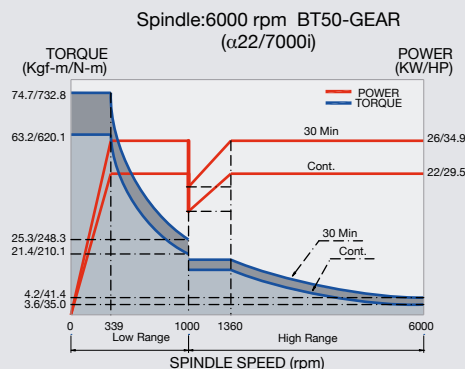
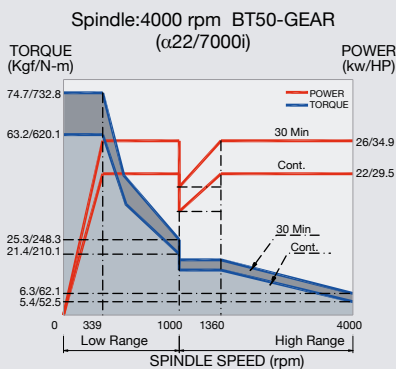
The design of the extended long-end spindle is especially suitable for deep hole machining. BT-50 inside hole taper and 6,000rpm spindle are standard design. 8,000 rpm spindle is available. It is very suitable for large mold machining.

### Spindle

- The ultimate analysis illustrates the high rigidity construction design is optimum to restrain vibration and maintain stability of machining.
- The united high-precision spindle is adopted the ball bearing support design that can well endure vibration of machining.
- Spindle is adopted floating oil pressure tool clamp design.

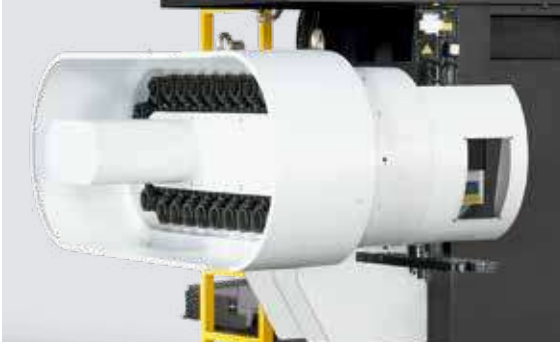


### SPINDLE POWER CURVES DIAGRAM



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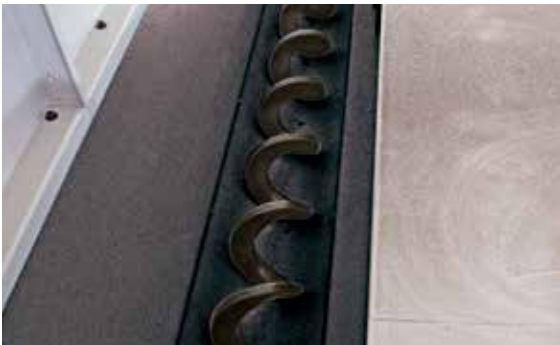
## Standard Accessories – Complete In Every Line



32 Tools Atc



Oil Circulating Cooling System For Spindle



X-Axis Twin Chip Screws On Table Sides



Exchange Tool Arm



Footswitch For Tool Unclamping



Automatic Lubrication System



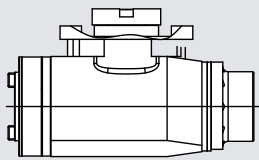
Heat Exchanger For Electrical Cabinet



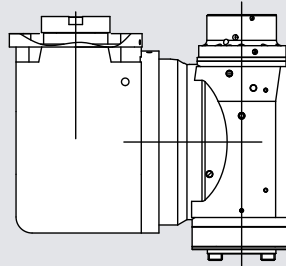
Gas Storage Tin

## All Kinds Of Addition Heads(opt.)

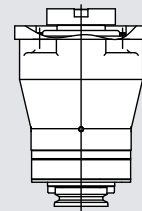
**90° ANGULAR HEAD**



**MULTIANGULAR MILLING HEAD**



**EXTEND HEAD (300L/500L)**

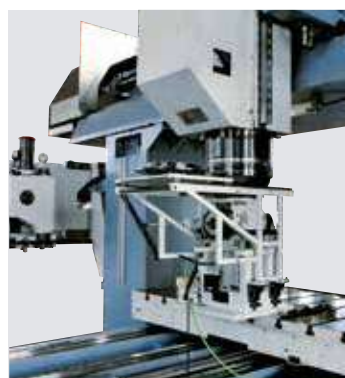


		<b>90° Angular Head</b>	<b>Multiangular Milling Head</b>	<b>Extend head-300L/500L</b>
Max. Output Power	kw(hp)	11 (15)		15 (20)
Spindle Taper		BT50 (7/24)		
Max. Rotation Speed	rpm	3500		
Tool Clamping Method		Manual Bolt		
Index Method		Auto 5 degree Index		No Index

## Option Accessories



Auto 90 degree head warehouse beside ATC



Auto 90 degree head warehouse on table



Semi Auto 90 degree head warehouse by swivel arm



60 VERTICAL HORIZONTAL ATC.

# BDO Series Specification

MODEL	BDO-2217	BDO-2223	BDO-3217	BDO-3223	BDO-3228	BDO-4217
<b>TRAVEL</b>						
X AXIS (WORK TABLE)	2,200mm(86.6")		3,200mm(125.9")			
	2 LINEAR GUIDE WAYS 3*2 SLIDING BLOCKS		2 LINEAR GUIDE WAYS 4*2 SLIDING BLOCKS	2 LINEAR GUIDE WAYS 5*2 SLIDING BLOCKS	4 LINEAR GUIDE WAYS 5*4 SLIDING BLOCKS	2 LINEAR 7*2 SLIDING
Y AXIS (SADDLE)	1,600mm(63")	2,100(82.7")	1,600(63")	2,100mm(82.7")	2,600mm(102.4")	1,600mm(63")
Z AXIS (HEAD)	2 LINEAR GUIDE WAYS 2*2 SLIDING BLOCK					
	1,000mm(39.4")/(opt800mm(31.5"))					
	2 BOX GUIDE WAYS					
DISTANCE FROM SPINDLE NOSE TO TABLE SURFACE	210-1,200mm(8.3"-47.2")/ (opt 210-1,000mm(8.3"-39.4"))					
DISTANCE BETWEEN COLUMN	1760mm(69.3")	2360mm(92.9")	1760mm(69.3")	2360mm(92.9")	2860mm(112.6")	1760mm(69.3")
<b>WORK TABLE</b>						
TABLE SIZE	2000mm*1500mm (78.7"*59.1")	2000mm*2000mm (78.7"*78.7")	3000mm*1500mm (118.1"*59.1")	3000mm*2000mm (118.1"*78.7")	3000mm*2500mm (118.1"*98.4")	4000mm*1500mm (157.5"*59.1")
T-SLOT SIZE	7x22mmx200mm	9x22mmx200mm	7x22mmx200mm	9x22mmx200mm	11x22mmx200mm	7x22mmx200mm
DISTANCE FROM TABLE SURFACE TO GROUND	830mm(32.7")	885mm(34.8")	830mm(32.7")	870mm(34.3")	890mm(35")	870mm(34.3")
MAX. TABLE LOAD	6,000kgs (13,200lbs)	8,000kgs (17,600lbs)		10,000kgs (22,000lbs)		
<b>SPINDLE</b>						
SPINDLE TAPER (BT/CAT)	BT50/CAT50					
SPINDLE SPEED RPM(BT50)	6,000rpm(P & G)(opt.8,000/10,000rpm)					
<b>FEED RATE</b>						
RAPID TRAVERSE(X/Y/Z)	20/20/10M/Min.(787/787/393IPM)			12/12/10M/Min.(472/472/393IPM)		
CUTTING FEEDRATE(X/Y/Z)	1~8000mm/min					
<b>MOTOR</b>						
SPINDLE BT50 (CONT. /30 MIN.)	22/26kw(30/35HP)					
AC SERVER MOTOR(X/Y/Z)	X,Y,Z:7KW-30NM					
COOLANT PUMP	1250W					
LUBRICATION PUMP	60W					
OIL CIRCULATING COOLANT SYSTEM FOR SPINDLE	1220W					
<b>ATC</b>						
MAGAZINE CAPACITY FOR ARM TYPE	32 TOOL/(OPT.40/60 TOOL)					
MAX. TOOL DIAMETER(WITH ADJACENT POCKET EMPTY)	BT50-Ø125MM					
MAX. TOOL LENGTH	300mm(11.74")					
MAX. TOOL WEIGHT	20Kg(44lbs)					
Tool Change Time(T TO T/C TO C)	8/12 SEC.					
<b>ACCURACY</b>						
POSITIONING ACCURACY	±0.01 mm			±0.015 mm		
REPEATABILITY ACCURACY	±0.003 mm					±0.005 mm
<b>MISC.</b>						
AIR PRESSURE	6 Kg / cm <sup>2</sup>			6 Kg / cm <sup>2</sup>		
POWER SUPPLY	50KVA, 220V, 3 PHASE, 50/60HZ			50KVA, 220V, 3 PHASE, 50/60HZ		
MACHINE WEIGHT	26,000kgs (57,200lbs)	28,000kgs (61,600lbs)		31,000kgs (68,200lbs)	36,500kgs (80,300lbs)	32,000kgs (70,400lbs)
MACHINE DIMENSION (L×W×H)	6760*5100* 3900mm	6760*6960* 3900mm	8530*5100* 3900mm	8530*6960* 3900mm	8530*7505* 3900mm	10110*5100* 3900mm
CONTROLLER	OiMD/31iMB					

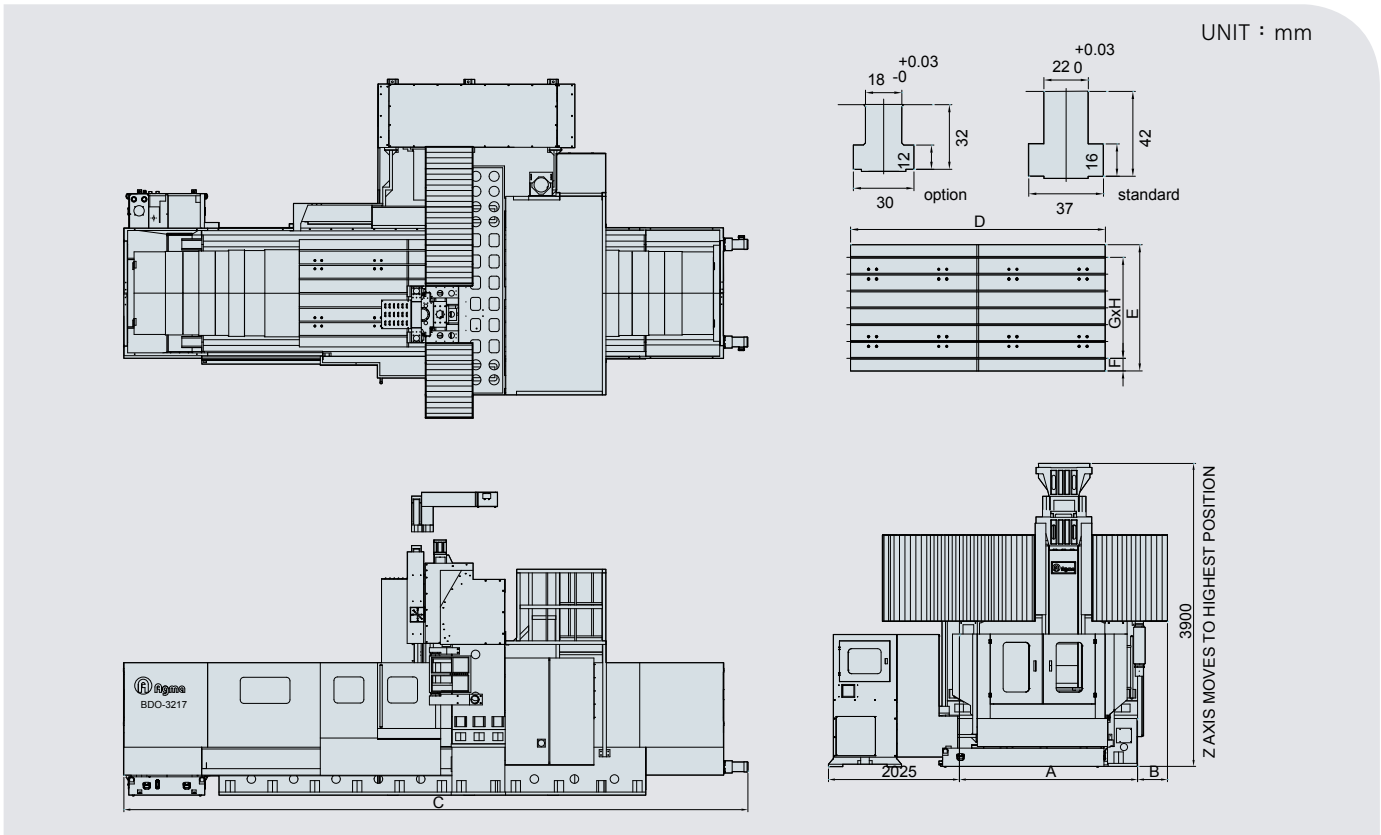
\*SPECIFICATION IS SUBJECT TO CHANGE WITHOUT FURTHER NOTICE.

BDO-4223	BDO-4228	BDO-5223	BDO-5228	BDO-6223	BDO-6228	BDO-8223	BDO-8228
4,200mm(165.4")		5,200mm(204.7")		6,200mm(244.1")		8,200mm(322.8")	
GUIDE WAYS BLOCKS	4 LINEAR GUIDE WAYS 7*4 SLIDING BLOCKS	2 LINEAR GUIDE WAYS 8*2 SLIDING BLOCKS	4 LINEAR GUIDE WAYS 8*4 SLIDING BLOCKS	2 LINEAR GUIDE WAYS 11*2 SLIDING BLOCKS	4 LINEAR GUIDE WAYS 11*4 SLIDING BLOCKS	2 LINEAR GUIDE WAYS 12*2 SLIDING BLOCKS	4 LINEAR GUIDE WAYS 12*4 SLIDING BLOCKS
2,100mm(82.7")	2,600mm(102.4")	2,100mm(82.7")	2,600mm(102.4")	2,100mm(82.7")	2,600mm(102.4")	2,100mm(82.7")	2,600mm(102.4")
2 LINEAR GUIDE WAYS 2*2 SLIDING BLOCK							
1,000mm(39.4")/(opt800mm(31.5"))							
2 BOX GUIDE WAYS							
210-1,200mm(8.3"-47.2")/ (opt 210-1,000mm(8.3"-39.4"))							
2360mm(92.9")	2860mm(112.6")	2360mm(92.9")	2860mm(112.6")	2360mm(92.9")	2860mm(112.6")	2360mm(92.9")	2860mm(112.6")
4000mm*2000mm (157.5"*78.7")	4000mm*2500mm (157.5"*98.4")	5000mm*2000mm (196.9"*78.7")	5000mm*2500mm (196.9"*98.4")	6000mm*2000mm (236.3"*78.7")	6000mm*2500mm (236.3"*98.4")	8000mm*2000mm (315.1"*59.1")	8000mm*2500mm (315.1"*98.4")
9x22mmx200mm	11x22mmx200mm	9x22mmx300mm	11x22mmx200mm	9x22mmx200mm	11x22mmx200mm	9x22mmx200mm	11x22mmx200mm
870mm(34.3")	890mm(35")	870mm(34.3")	890mm(35")	870mm(34.3")	890mm(35")	870mm(34.3")	890mm(35")
10,000kgs (22,000lbs)	12,000kgs (26,400lbs)	13,000kgs (28,600lbs)	14,000kgs (30,800lbs)	16,000kgs (35,200lbs)		20,000kgs (44,000lbs)	
BT50/CAT50							
6,000rpm(P & G)(opt.8,000/10,000rpm)							
10/10/10M/Min.(393/393/393IPM)							
1~8000mm/min							
22/26kw(30/35HP)							
X,Y,Z:7KW-30NM							
1250W							
60W							
1220W							
32 TOOL/(OPT. 40/60 TOOL)							
BT50-Ø125MM							
300mm(11.74")							
20Kg(44lbs)							
8/12 SEC.							
± 0.02 mm							
± 0.02 mm							
6 Kg / cm <sup>2</sup>							
50KVA, 220V, 3 PHASE, 50/60HZ							
35,000kgs (77,000lbs)	38,500kgs (84,700lbs)	42,000kgs (92,400lbs)	45,500kgs (106,700lbs)	46,000kgs (101,200lbs)	49,500kgs (108,900lbs)	53,000kgs (116,600lbs)	54,500kgs (119,900lbs)
10110*6960* 3900mm	10110*7505* 3900mm	12000*6960* 3900mm	12000*7505* 3900mm	15300*6960* 3900mm	15300*7505* 3900mm	17800*6960* 3900mm	17800*7505* 3900mm
OiMD/31iMB							

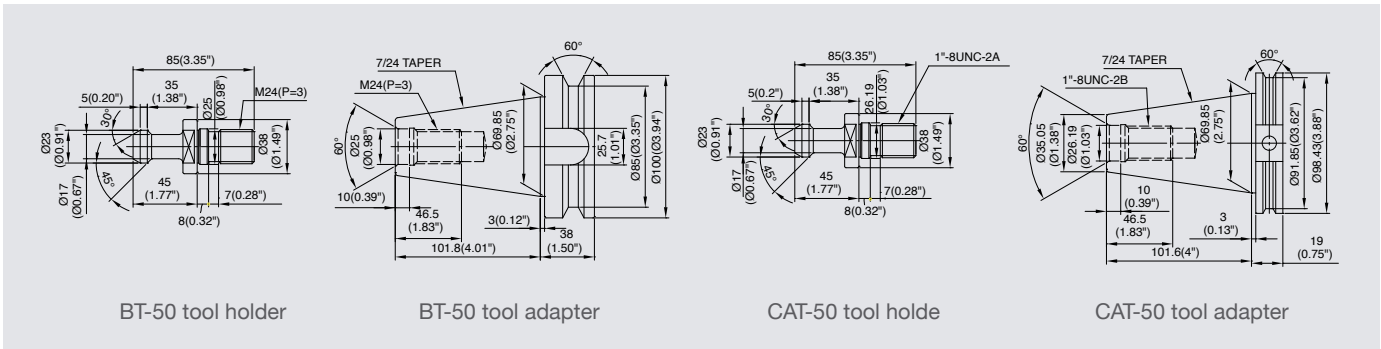
# Accessories

Standard : ● Option : ○ Not Available : ✕

ITEM	MODEL	BDO-2217	BDO-2223	BDO-3217	BDO-3223	BDO-3228	BDO-4217	BDO-4223	BDO-4228	BDO-5223	BDO-5228	BDO-6223	BDO-6228	BDO-8223	BDO-8228
Belt Driven 6,000 RPM Spindle		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gear Driven 6,000 RPM Spindle		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Belt Driven 8,000 RPM Spindle		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Three Axis Crashproof Mechanism		●	●	●	●	●	●	●	●	●	●	●	●	●	●
X-Axis Circulating Decoder Feedback		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Twin Hydraulic Counter Weight Cylinder		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Movable Manual Pulse Generator		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Centralized Automatic Lubrication System		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Enclosure Splash Gurd (Without Roof)		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Enclosure Splash Guard (With Roof)		○	○	○	○	X	○	○	○	○	X	X	X	X	X
32 Tools ATC		●	●	●	●	●	●	●	●	●	●	●	●	●	●
40 Tools ATC		○	○	○	○	○	○	○	○	○	○	○	○	○	○
60 Tools ATC		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Flood Coolant System		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Twin Chip Screw On Table Side		●	●	●	●	●	●	●	●	●	●	●	●	●	●
RS-232 Interface		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chain Type Chip Conveyor		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oil Skimmer		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Quartz Work Lamp & Fluorescent Lamps		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Program End Warm Lamp		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Wash Gun & Pneumatic Interface		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rigid Tapping		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Movable Manual Pulse Generator		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tool Box (Include One Set Of Tools For Adjustment)		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Footswitch For Tool Unclamping		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Foundation Bolts & Adjustable Bolts		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Maintenance & Operation Manual		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Controller Fanuc OiMD		●	●	●	●	●	●	●	●	●	●	●	●	●	●
4th Axis Preparation		○	○	○	○	○	○	○	○	○	○	○	○	○	○
90° Angular Head		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Multiangular Milling Head		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Extend Head- 300L		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Extend Head -500L		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Head Warehouse		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Linear Scale Feedback System For X,Y,Z Axes		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Auto Tool Length Measurement		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Auto Work Piece Measurement		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Coolant Through Spindle A Type (20/70 bars - Closed Hole)		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Coolant Through Tool		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Z Axis Travel 800mm		○	○	○	○	○	○	○	○	○	○	○	○	○	○



## TOOL ADAPTER DIMENSION



MODEL	A	B	C	D	E	F	G	H	T-slot
BDO-2217	2775	350	7100	2000	1500	150	200	7	18
BDO-3217	2775	350	8750	3000	1500	150	200	7	18
BDO-3223	3440	450	8750	3000	2000	200	200	9	18
BDO-3228	4050	600	8750	3000	2500	250	200	11	18
BDO-4217	2975	350	10750	4000	1500	150	200	7	18
BDO-4223	3440	450	10750	4000	2000	200	200	9	18
BDO-4228	4050	600	10750	4000	2500	250	200	11	18
BDO-5223	3440	450	12000	5000	2000	200	200	9	18
BDO-5228	4050	600	12000	5000	2500	250	200	11	18
BDO-6223	3440	450	15300	6000	2000	200	200	9	18
BDO-6228	4050	600	15300	6000	2500	250	200	11	18
BDO-8223	3440	450	17800	8000	2000	200	200	9	18
BDO-8228	4050	600	17800	8000	2500	250	200	11	18