SP / LP series

SP / LP SERIES

Ultra Performance Bridge Type Machining Center

THE ULTIMATE MACHINING POWER

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THE ULTIMATE MACHINING POWER

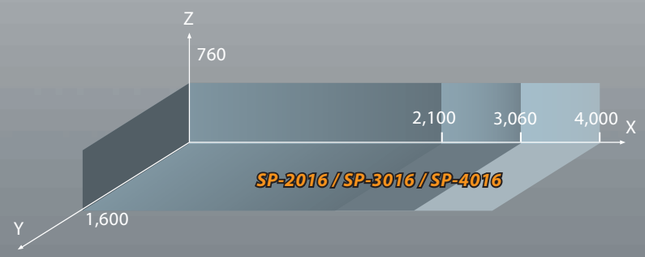
AWEA MECHANTRONIC CO.,LTD.

ULTRA PERFORMANCE
BRIDGE TYPE MACHINING CENTER

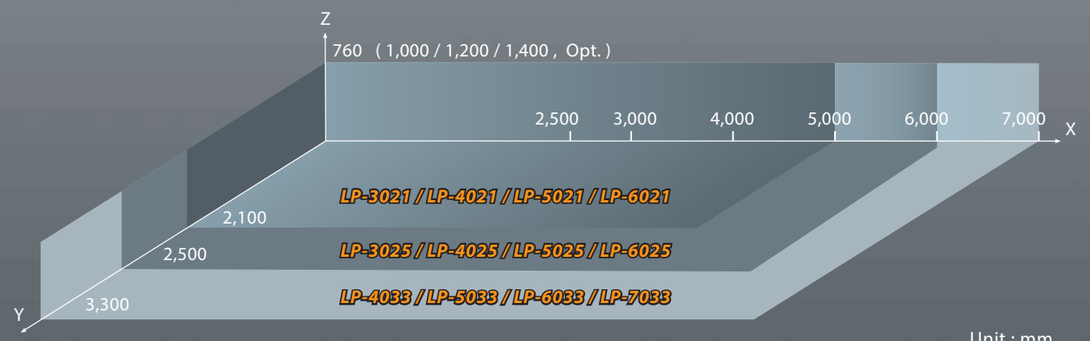
AWEA is pleased to introduce the SP/LP series bridge type vertical machining centers with advanced machining abilities and progressive technology skills. The SP and LP series bridge type vertical machining centers combine strong spindle power and a super rigid machine structure with high quality automation equipment. The full product line provides high efficiency, high productivity machining capabilities. The SP and LP series can be broadly applied in the automotive, precision mold, aerospace, and energy industries.

The LP series can be equipped with an automatic head changer and a vertical / horizontal ATC system, turning it into a 5-face machining center and providing more cutting flexibility to meet your demands of today and tomorrow.

SP SERIES PRODUCT MAP



LP SERIES PRODUCT MAP



Unit : mm

SP Series 2016 / 3016 / 4016

Ultra Performance Bridge Type Machining Center

Due to our advanced developing skills and strict assembly process, the SP series ultra performance bridge type machining center provides optimum rigidity, accuracy, and efficiency.

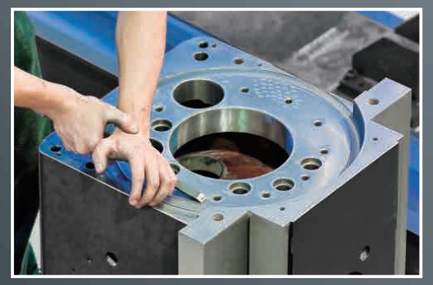
- The modular spindle design offers cutting flexibility for various working conditions.
- Super rigid roller type linear guide ways on the X and Y axes provide heavy-duty cutting, fast movement and low friction capabilities.
- The Z-axis is equipped with hardened and precision ground super rigid box guide ways, which are optimal for heavy-duty cutting conditions. (Opt. : The Z-axis can be adopted with roller type linear guide ways if equipped with high speed direct drive spindle.)

(SP-2016 model shown with optional manual attachment head storage)

SP Series 2016 / 3016 / 4016

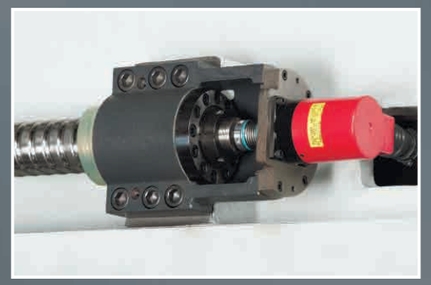
Ultra Performance Bridge Type Machining Center

- The bridge and the base are cast in one piece each to provide maximum structural integrity.
- Hand scraped contact surfaces ensure optimum assembly precision, strong mechanical integrity and perfect load distribution.
- The rib reinforced work table reduces vibrations while increasing machining stability.
- Employing the Finite Element Analysis (FEA) in the design process assured optimal rigidity and helped in reducing the machine weight.



Precision Hand Scraping

All contact surfaces are meticulously hand scraped to ensure maximum precision and rigidity.



Precision Feedback System

The semi-closed loop system with encoders directly connected to the ball screws ensures high repeatability and positioning accuracy.

Axial Torque Clutch

The ball screws are equipped with mechanical torque clutches to minimize damages in case of over load issues or a crash.

LP Series 3021 / 4021 / 5021 / 6021 / 3025 / 4025 / 5025 / 6025 4033 / 5033 / 6033 / 7033

Ultra Performance Bridge Type Machining Center

Complete product line with full range specifications, the LP series can be equipped with a high flexibility automatic head changer and a vertical / horizontal ATC system to provide full automation 5-face machining capability.

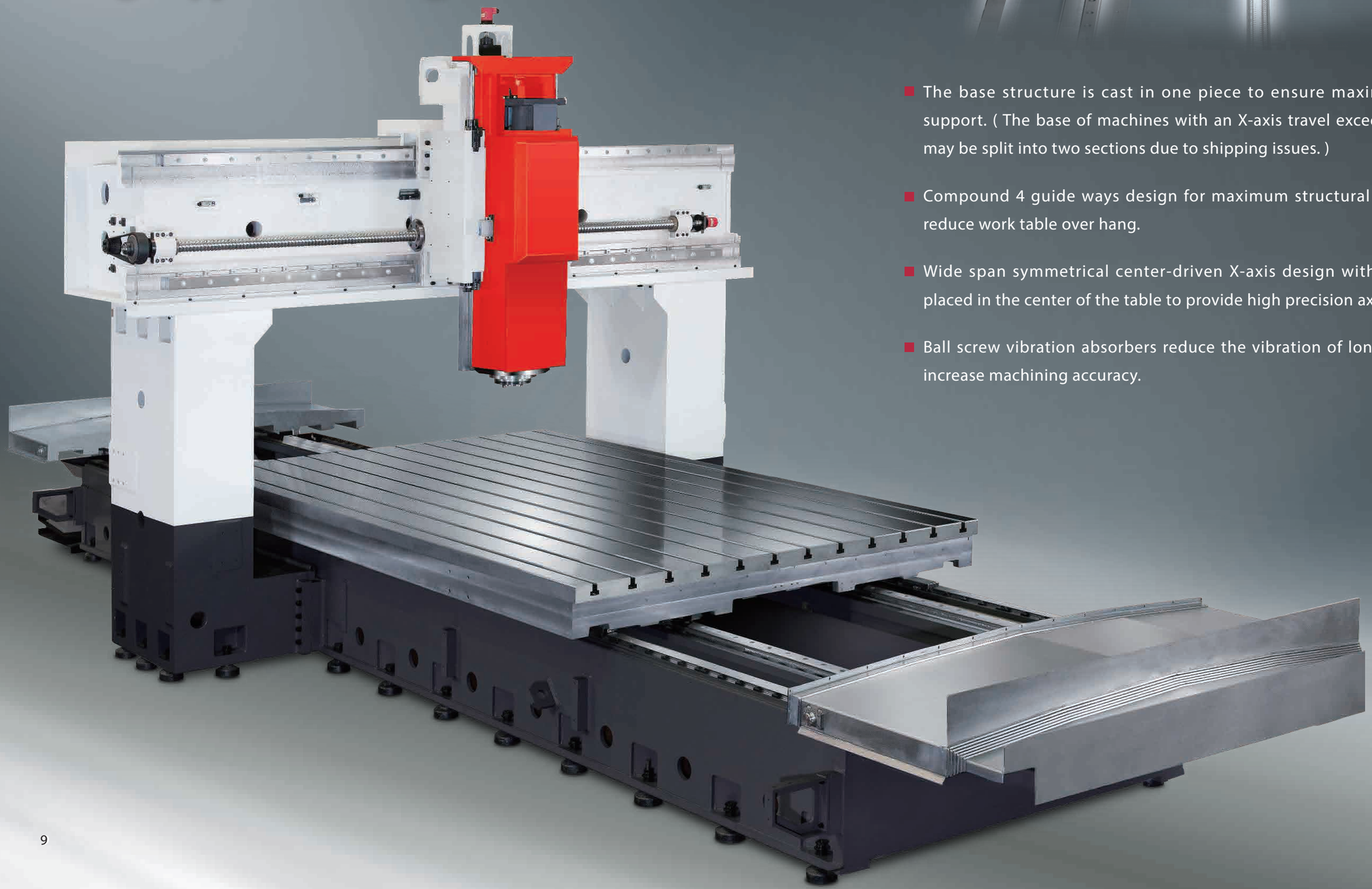
- The modular spindle design provides cutting flexibility for a wide variety of working conditions.
- The Z-axis is equipped with hardened and precision ground super rigid box guide ways, which are optimal for heavy-duty cutting conditions. (Opt. : The Z-axis can be a dopted with roller type linear guide ways if equipped with high speed direct driven spindle.)
- Super rigid roller type linear guide ways on the X and Y axes provide heavy-duty cutting, fast movement and low friction capabilities.

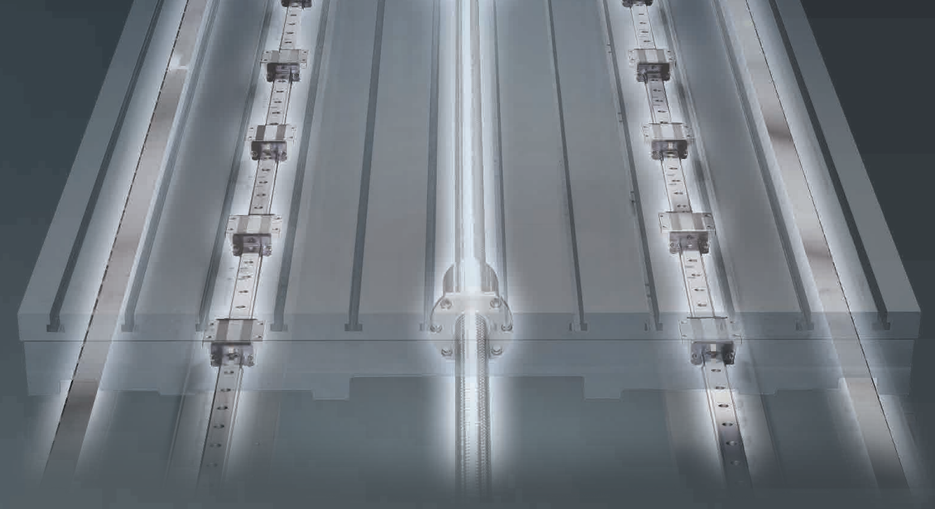
LP-6025 fully enclosed splash guard with roof (Opt.)

LP Series

3021 / 4021 / 5021 / 6021 / 3025 / 4025 / 5025 / 6025
4033 / 5033 / 6033 / 7033

Ultra Performance Bridge Type Machining Center





- The base structure is cast in one piece to ensure maximum structural support. (The base of machines with an X-axis travel exceeding 6,000 mm may be split into two sections due to shipping issues.)
- Compound 4 guide ways design for maximum structural support and to reduce work table over hang.
- Wide span symmetrical center-driven X-axis design with the ball screw placed in the center of the table to provide high precision axial feeding.
- Ball screw vibration absorbers reduce the vibration of long ball screws to increase machining accuracy.

High Flexibility 5-Face Machining Capability

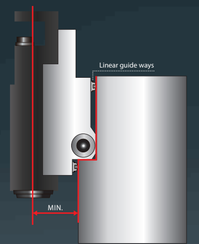
Automatic Head Changer And Vertical / Horizontal ATC system

- The LP series can be equipped with an automatic head changer and a vertical / horizontal ATC system to provide a maximum efficiency 5-face machining center.
- The optional automatic head storage magazine provides two cabinets with independent swing doors for each cabinet to avoid contamination during head changes. Linear guide ways enable quick head changes to reduce non-cutting time.
- The vertical / horizontal ATC system provides quick tool change with sensors and sequence scanning to ensure safety and reliability.
- The standard ATC magazine has a capacity of 32-tools. (60, 90, 120, or more capacity ATC magazines are optional) .

LP-7033F with 4-piece splash guard

LP-4025YZF fully enclosed splash guard with roof (Opt.)

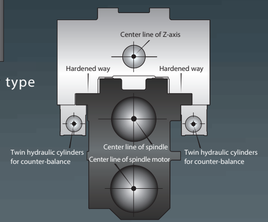
Optimum Spindle System



- Y-axis sectional roller type guide ways design

Powerful Cutting Capability

The embraced guide way design provides super rigidity and optimal load distribution. The Y-axis roller type linear guide ways offset increases structural rigidity and reduces the distance between spindle head and cross beam to minimize distortion and vibration issues, thereby enhancing the overall cutting performance.



- Centro-symmetric spindle head design

Centro-symmetric Spindle Head Design

The unique spindle head design, with the main spindle, spindle motor, and ball screw all aligned along the center of the spindle head and the hydraulic counter weight cylinders placed symmetrically, prevents thermal distortion and minimizing deflection thereby assuring high accuracy and heavy cutting capability.

977 Nm

Maximum Torque

High Torque Gear Spindle

- 2-speed super heavy-duty gear box.
- A floating type hydraulic tool release device eliminates pressure on the spindle bearing when releasing a tool.
- The 4,000 rpm high torque spindle is equipped with a powerful 26 kW motor that delivers a maximum torque output of 977 Nm at 254 rpm, ideal for heavy-duty cutting conditions.
- The 6,000 rpm high torque spindle is equipped with a powerful 26 kW motor that delivers a maximum torque output of 642 Nm at 387 rpm.

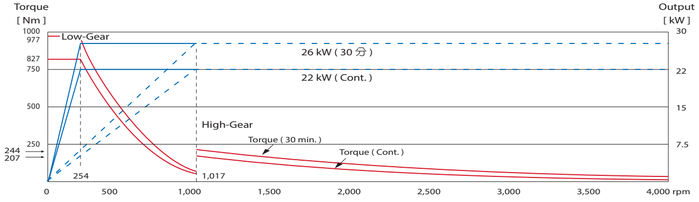
High Speed, High Torque Built-in Motorized Spindle

- The built-in motor design reduces centrifugal force effects and minimizes spindle vibrations, which increases the spindles life span and improves long-term machining accuracy.
- A floating type hydraulic tool release device eliminates pressure on the spindle bearing when releasing a tool.
- 6,000 rpm and 8,000 rpm spindles are available. Both provide a maximum torque of 600 Nm at 350 rpm to meet various working conditions.

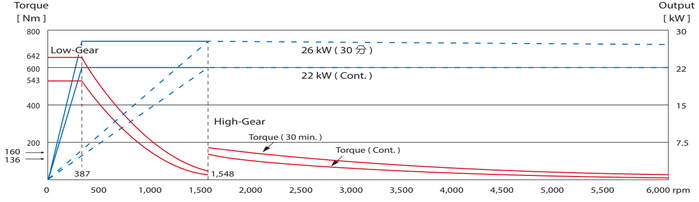
High Speed, High Power Direct-driven Spindle

- A direct-driven spindle is efficiently separated from the heat generated by the motor, which reduces deformation, thereby increasing machining accuracy.
- A floating type hydraulic tool release device eliminates pressure on the spindle bearing when releasing a tool.
- 8,000 rpm and 10,000 rpm spindles are available. Both provide a maximum torque of 165 Nm at 1,500 rpm to meet various high speed working conditions.

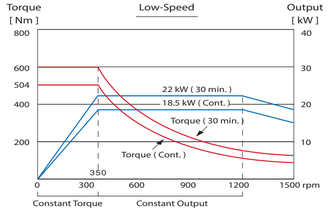
4,000 rpm Gear Spindle

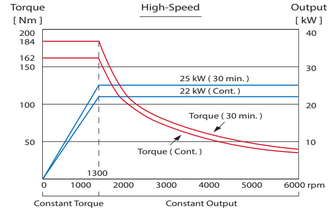


6,000 rpm Gear Spindle

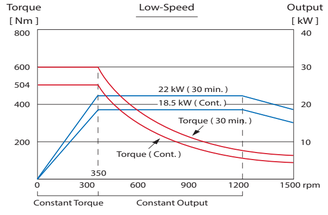


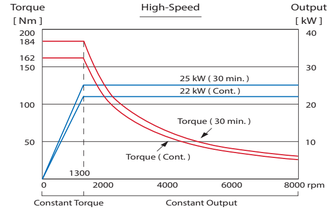
6,000 rpm Built-in Motorized Spindle



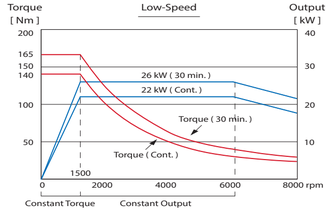


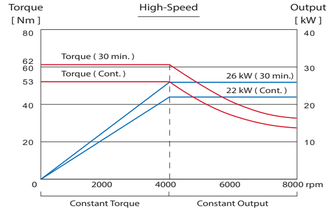
8,000 rpm Built-in Motorized Spindle



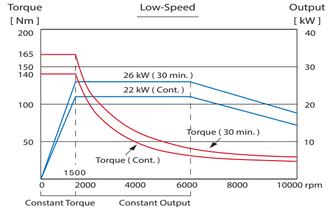


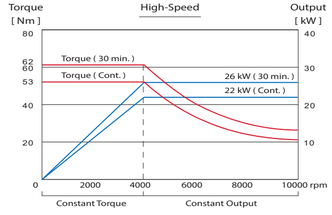
8,000 rpm Direct-driven Spindle





10,000 rpm Direct-driven Spindle

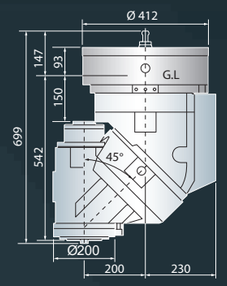




Milling Head Options

- All milling heads are self developed and assembled.
- The contact surface of all milling heads and covers are precisely hand scraped.

Automatic Universal Head (Oblique type)

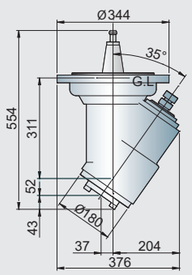


Super Rigidity

Automatic head clamp / tool clamp
A / C axes automatic 5° / 2.5°/ 1° indexing
Max. speed : 3,000 rpm / 4,500 rpm
Max. output : 22 kW (30 HP)
Optional CTS

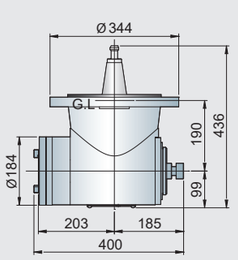
Optional Milling Head (Manual)

(Unit : mm)



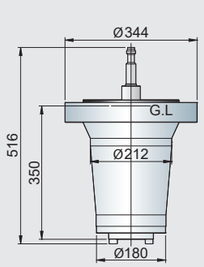
35° Head

Manual head clamp / tool clamp
Manual 45° indexing
Max. speed : 3,000 rpm
Max. output : 22 kW (30 HP)



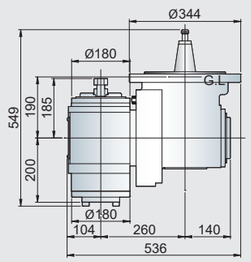
90° Head

Manual head clamp / tool clamp
Manual 45° indexing
Max. speed : 3,000 rpm
Max. output : 22 kW (30 HP)



Extension Head

Manual head clamp / automatic tool clamp
No index function
Max. speed : 3,000 rpm
Max. output : 22 kW (30 HP)

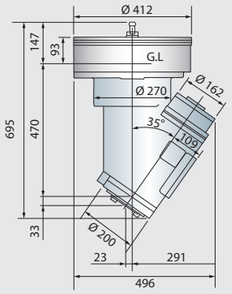


Universal Head

Manual head clamp / tool clamp
C-axis manual 45° indexing
A-axis manual 5° indexing
Max. speed : 3,000 rpm
Max. output : 22 kW (30 HP)

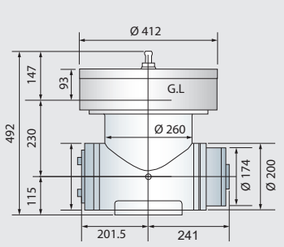
Optional Milling Head (Automatic)

(Unit : mm)



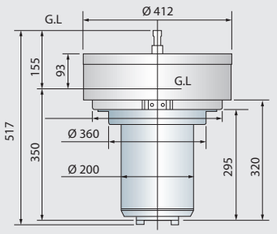
35° Head

Automatic head clamp / tool clamp
C-axis automatic 5° / 2.5° / 1° indexing
Max. speed : 3,000 rpm / 4,500 rpm
Max. output : 22 kW (30 HP)
Optional CTS



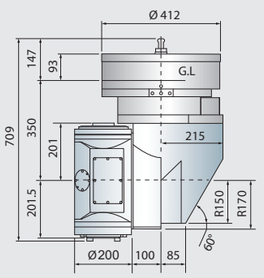
90° Head

Automatic head clamp / tool clamp
C-axis automatic 5° / 2.5° / 1° indexing
Max. speed : 3,000 rpm / 4,500 rpm
Max. output : 22 kW (30 HP)
Optional CTS



Extension Head (Z +350 mm / Z +600 mm)

Automatic head clamp / tool clamp
Max. speed : 3,000 rpm (Z +600 mm) / 6,000 rpm (Z +350 mm)
Max. output : 22 kW (30 HP)
Optional CTS



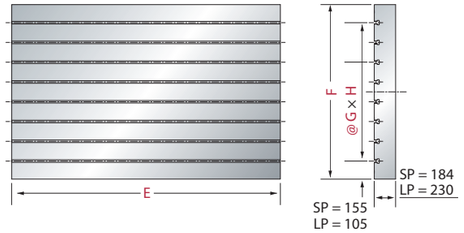
Universal Head (Orthogonal type)

Automatic head clamp / tool clamp
A / C axes automatic 5° / 2.5° / 1° indexing
Max. speed : 3,000 rpm / 4,500 rpm
Max. output : 22 kW (30 HP)
Optional CTS

Dimensions

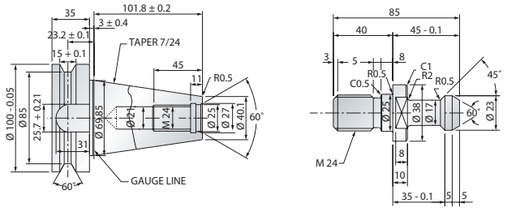
(Unit : mm)

Table Dimensions

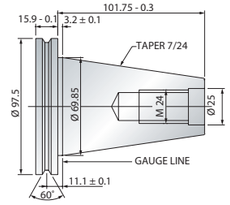


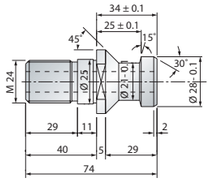
Tool Shank and Pull Stud Dimensions

BT50 (Std.)

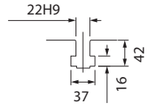


DIN69871-A (#50) (Opt.)

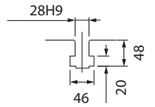




T-slot Dimensions

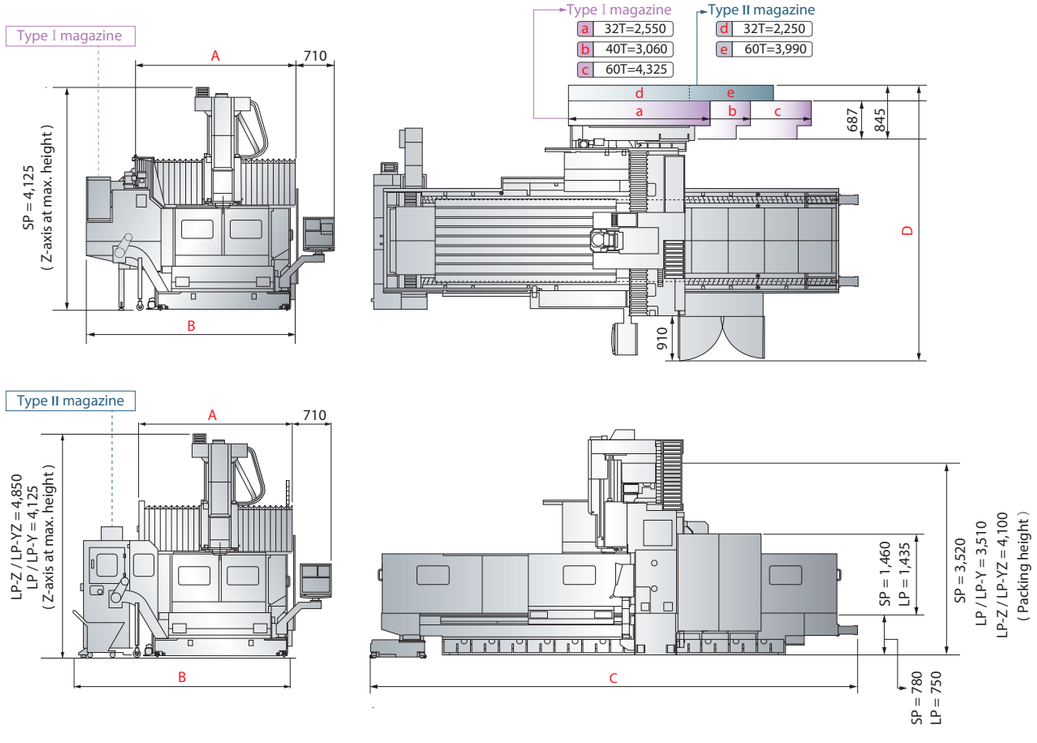


(SP Series)



(LP Series)

Machine Dimensions



(Unit : mm)

Models		A	B	C	D	E	F	G	H
SP	**2016**	2,970	3,860	6,750	4,680	2,310	1,500	170	7
	3016	2,970	3,860	8,760	4,680	3,260	1,500	170	7
	4016	2,970	3,860	10,760	4,680	4,200	1,500	170	7
LP	**3021**	3,650	4,550	8,580	5,375	3,020	2,010	200	9
	4021	3,650	4,550	10,580	5,375	4,020	2,010	200	9
	5021	3,650	4,550	12,680	5,375	5,020	2,010	200	9
	6021	3,650	4,550	14,680	5,375	6,020	2,010	200	9
	3025	4,050	4,950	8,580	5,775	3,020	2,400	200	11
	4025	4,050	4,950	10,580	5,775	4,020	2,400	200	11
	5025	4,050	4,950	12,680	5,775	5,020	2,400	200	11
	6025	4,050	4,950	14,680	5,775	6,020	2,400	200	11
	4033	4,850	5,750	10,580	6,575	4,020	2,400	200	11
	5033	4,850	5,750	12,680	6,575	5,020	2,400	200	11
	6033	4,850	5,750	14,680	6,575	6,020	2,400	200	11
	7033	4,850	5,750	16,630	6,575	7,020	2,400	200	11

Models		A	B	C	D	E	F	G	H
LP	**3021Y**	4,050	4,950	8,580	5,375	3,020	2,010	200	9
	4021Y	4,050	4,950	10,580	5,375	4,020	2,010	200	9
	5021Y	4,050	4,950	12,680	5,375	5,020	2,010	200	9
	6021Y	4,050	4,950	14,680	5,375	6,020	2,010	200	9
	4025Y	4,850	5,750	10,580	5,775	4,020	2,400	200	11
	5025Y	4,850	5,750	12,680	5,775	5,020	2,400	200	11
	6025Y	4,850	5,750	14,680	5,775	6,020	2,400	200	11
	5033Y	5,490	5,750	12,680	6,575	5,020	2,400	200	11
	6033Y	5,490	5,750	14,680	6,575	6,020	2,400	200	11
	7033Y	5,490	5,750	16,630	6,575	7,020	2,400	200	11

Models		A	B	C	D	E	F	G	H
LP	**3021Z**	4,160	4,850	8,580	5,375	3,020	2,010	200	9
	4021Z	4,160	4,850	10,580	5,375	4,020	2,010	200	9
	5021Z	4,160	4,850	12,680	5,375	5,020	2,010	200	9
	3025Z	4,560	5,250	8,580	5,775	3,020	2,400	200	11
	4025Z	4,560	5,250	10,580	5,775	4,020	2,400	200	11
	5025Z	4,560	5,250	12,680	5,775	5,020	2,400	200	11
	6025Z	5,730	5,250	14,680	5,775	6,020	2,400	200	11
	4033Z	5,370	6,050	10,580	6,575	4,020	2,400	200	11
	5033Z	5,370	6,050	12,680	6,575	5,020	2,400	200	11
	6033Z	5,370	6,050	14,680	6,575	6,020	2,400	200	11
	7033Z	5,370	6,050	16,630	6,575	7,020	2,400	200	11

* This chart is based on 1,000 mm Z travel; please contact AWEA for 1,200 or 1,400 mm dimensions.

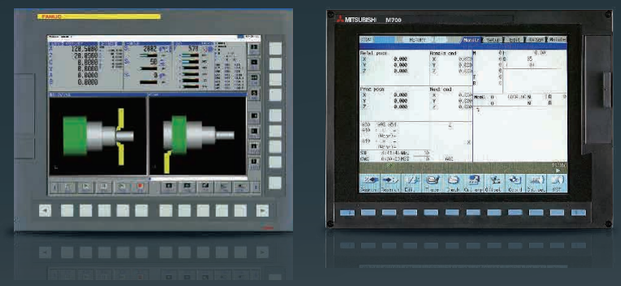
Models		A	B	C	D	E	F	G	H
LP	**3025YZ**	5,235	6,050	8,580	6,175	3,020	2,400	200	11
	4025YZ	5,235	6,050	10,580	6,175	4,020	2,400	200	11
	5025YZ	5,235	6,050	12,680	6,175	5,020	2,400	200	11
	6025YZ	5,235	6,050	14,680	6,175	6,020	2,400	200	11
	4033YZ	6,060	6,750	10,580	6,735	4,020	2,400	200	11
	5033YZ	6,060	6,750	12,680	6,735	5,020	2,400	200	11
	6033YZ	6,060	6,750	14,680	6,735	6,020	2,400	200	11
	7033YZ	6,060	6,750	16,630	6,735	7,020	3,010	200	14

* This chart is based on 1,000 mm Z travel ; please contact AWEA for 1,200 or 1,400 mm dimensions.

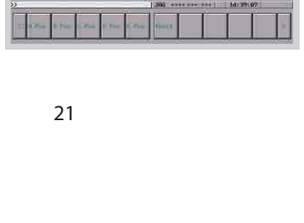
Specifications are subject to change without notice.

i Console

AWEA's self-developed *i* Console intelligent software enhancement system provides you with a user-friendly interface, real-time machine status information and diagnosis functions. It not only effectively reduces complex working processes but also enables intelligent machining abilities. Option



Multiple Functions Status Display

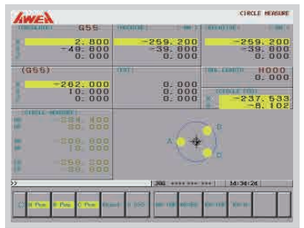


- Real time operation information
- Tool list
- Work piece measurement
- M code illustration
- PLC function
- Calculator
- CNC optimize parameter (Opt.)
- Spindle thermal compensation (Opt.)

Trouble Shooting

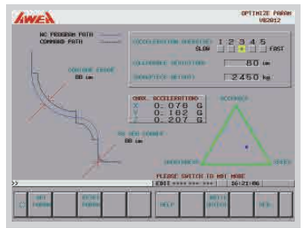
When an alarm appears, the program will display the cause for the alarm and a suitable troubleshooting procedure. Users can easily troubleshoot minor problems to avoid down time.

Circular Work Piece Measurement



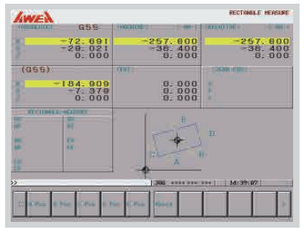
The circular work piece program can calculate the center coordinate of a work piece by measuring the point A, B and C coordinates.The calculated center coordinate can be transferred to the work piece coordinate system (G54 ~ G59).

CNC Optimized Parameter



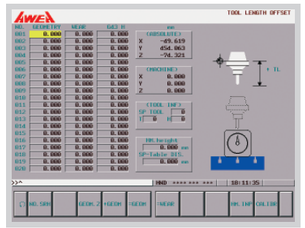
From rough cutting to fine machining, users can select different work modes, define the allowable tolerances and enter the weight of the work piece. Based on this input the *i* Console program will modify machining parameters to reduce machining time.

Rectangular Work Piece Measurement



The rectangular work piece program can calculate the center coordinate and the slant angle of a work piece by measuring the point A, B, C, D and E coordinates; the calculated center coordinate can be transferred to the work piece coordinate system (G54 ~ G59).

Manual Tool Length Measurement



After manually measuring the tool length, the controller will automatically calculate the tool tip position and input the data into the tool length offset table.

SP Series

		SP-2016	SP-3016	SP-4016
SPECIFICATIONS				
X-axis travel	mm	2,100	3,060	4,000
Y-axis travel	mm	1,600		
Z-axis travel	mm	760		
Distance from spindle nose to table top	mm	200 ~ 960		
Distance between columns	mm	1,700		
TABLE				
Table size (X direction)	mm	2,310	3,260	4,200
Table size (Y direction)	mm	1,500		
Table load capacity	kg	8,000	10,000	12,000
SPINDLE				
Spindle taper		BT50 / DIN50 (Opt.) / CAT50 (Opt.)		
Spindle motor (cont. / 30 min.)	kW (HP)	22 / 26 (30 / 35)		
Spindle speed	rpm	6,000		
FEED RATE				
X-axis rapid feed rate	mm/min.	20,000	20,000	15,000
Y / Z axes rapid feed rate	mm/min.	20,000 / 15,000		
Max. cutting feed rate	mm/min.	10,000		
TOOL MAGAZINE				
Tool magazine capacity	T	32 (24 / 40 / 60 Opt.)		
Max. tool diameter / adj. pocket empty	mm	Ø125 / Ø215		
Max. tool length (from gauge line)	mm	400		
Max. tool weight	kg	20		
ACCURACY				
Positioning accuracy (JIS B 6338)	mm	± 0.015 / Full Travel		
Positioning accuracy (VDI 3441)	mm	P ≤ 0.020 / Full Travel	P ≤ 0.025 / Full Travel	P ≤ 0.030 / Full Travel
Repeatability (JIS B 6338)	mm	± 0.003		
Repeatability (VDI 3441)	mm	Ps ≤ 0.020	Ps ≤ 0.020	Ps ≤ 0.025
GENERAL				
Power requirement	V	220 ± 10 %		
Pneumatic pressure requirement	kg/cm^2	5 - 8		
Hydraulic tank capacity	liter	120		
Lubrication oil tank capacity	liter	6		
Coolant tank capacity (pump)	liter	420 (2 HP)		
Machine weight	kg	19,000	23,000	28,000

Standard Accessories

- Spindle cooling system
- Centralized automatic lubricating system
- Fully enclosed splash guard w/o roof
- Coolant system with pump and tank
- Coil type chip augers
- Caterpillar type chip conveyor and bucket
- Foundation bolt kit
- Tool box
- Alarm light
- Water gun
- Automatic power-off system
- Tool magazine : 32 T

Optional Accessories

- Spindle:
  4,000 rpm gear spindle
  8,000 / 10,000 rpm direct-driven spindle
  6,000 / 8,000 / 12,000 rpm built-in motorized spindle
- Z travel extension : 1,000 mm
- Column raiser : 200 / 300 / 400 / 500 mm
- Attachment head (Manual) :
  35° / 90° / Extension / Universal Head
- Attachment head (Automatic) :
  35° / 90° / Extension / Universal Head
- Tool magazine : 40 / 60 / 90 / 120 T
- X / Y / Z axes optical linear scale (HEIDENHAIN)
- Spindle thermal compensation
- Coolant through the tool adapter
- Coolant through the spindle (Form A)
- Automatic tool length measurement
- Automatic work piece measurement
- CNC rotary table
- Oil skimmer
- Oil mist cooling system

LP Series

		LP-3021	LP-4021	LP-5021	LP-6021	LP-3025	LP-4025	LP-5025	LP-6025	LP-4033	LP-5033	LP-6033	LP-7033
SPECIFICATIONS													
X-axis travel	mm	3,000	4,000	5,000	6,000	3,000	4,000	5,000	6,000	4,000	5,000	6,000	7,000
Y-axis travel	mm	2,100 (2,800 Opt.)				2,500 (3,200 Opt.)				3,300 (4,000 Opt.)			
Z-axis travel	mm	760 (1,000 / 1,200 / 1,400 Opt.)											
Distance from spindle nose to table top	mm	200 ~ 960 (200 ~ 1,200 / 200 ~ 1,400 / 200 ~ 1,600 Opt.)											
Distance between columns	mm	2,300				2,700				3,500			
TABLE													
Table size (X direction)	mm	3,020	4,020	5,020	6,020	3,020	4,020	5,020	6,020	4,020	5,020	6,020	7,020
Table size (Y direction)	mm	2,010				2,400				2,400 (3,010 Opt.)			
Table load capacity	kg	10,000	12,000	15,000	18,000	12,000	15,000	18,000	20,000	15,000	18,000	20,000	20,000
SPINDLE													
Spindle taper		BT50 / DIN50 (Opt.) / CAT50 (Opt.)											
Spindle motor (cont. / 30 min.)	kW	22 / 26 (30 / 35 HP)											
Spindle speed	rpm	Z-axis : 1,000 / 1,200 / 1,400 mm ; 4,000 / 5,000 / 6,000 Gear Spindle (Opt.) ; 6,000 (Std.) 6,000 / 8,000 / 12,000 Built-in Spindle (Opt.) ; 8,000 / 10,000 Direct-driven Spindle (Opt.)											
FEED RATE													
X-axis rapid feed rate	mm/min.	20,000	15,000	10,000	10,000	20,000	15,000	10,000	10,000	15,000	10,000	10,000	7,500
Y / Z axes rapid feed rate	mm/min.	15,000 (Std.) Y : 10,000 (Y-axis : 4,000mm Opt.) *1 Z : 10,000 (Z-axis : 1,000 / 1,200 / 1,400mm Opt.) *1											
Max. cutting feed rate	mm/min.	10,000	10,000	8,000	5,000	10,000	10,000	8,000	5,000	10,000	8,000	5,000	5,000
TOOL MAGAZINE													
Tool magazine capacity	T	32 (40 / 60 / 90 / 120 Opt.)											
Max. tool diameter / adj. pocket empty	mm	Ø127 / Ø215											
Max. tool length (from gauge line)	mm	350 (400 Opt.)											
Max. tool weight	kg	20											
ACCURACY													
Positioning accuracy (JIS B 6338)	mm	± 0.015 / Full Travel											± 0.010 / Full Travel
Positioning accuracy (VDI 3441)	mm	P ≤ 0.025 / Full Travel	P ≤ 0.030 / Full Travel	P ≤ 0.040 / Full Travel	P ≤ 0.050 / Full Travel	P ≤ 0.025 / Full Travel	P ≤ 0.030 / Full Travel	P ≤ 0.040 / Full Travel	P ≤ 0.050 / Full Travel	P ≤ 0.030 / Full Travel	P ≤ 0.040 / Full Travel	P ≤ 0.050 / Full Travel	P = 0.040 / Full Travel
Repeatability (JIS B 6338)	mm	± 0.003											
Repeatability (VDI 3441)	mm	Ps ≤ 0.020	Ps ≤ 0.025	Ps ≤ 0.030	Ps ≤ 0.035	Ps ≤ 0.020	Ps ≤ 0.025	Ps ≤ 0.030	Ps ≤ 0.035	Ps ≤ 0.025	Ps ≤ 0.030	Ps ≤ 0.035	Ps = 0.030
GENERAL													
Power requirement	V	220 ± 10 %											
Pneumatic pressure requirement	kg/cm^2	5 - 8											
Hydraulic tank capacity	liter	120											
Lubrication oil tank capacity	liter	6											
Coolant tank capacity (pump)	liter	650 (2 HP)				750 (2 HP)				1,000 (2 HP)			
Machine weight	kg	33,000	37,000	41,000	45,000	36,000	40,000	44,000	48,000	42,000	46,000	50,000	75,000

*1 Please check with our sales representative the possibility for machine sizes other than listed in this catalog,as well as additional options.

Specifications are subject to change without notice.

Standard Accessories

- Spindle cooling system
- Centralized automatic lubricating system
- 4 pcs splash guard
- Tool magazine : 32 T
- Coolant system with pump and tank
- Coil type chip augers
- Caterpillar type chip conveyor and bucket
- Foundation bolt kit
- Tool box
- Alarm light
- Air gun
- Automatic power-off system

Optional Accessories

- Spindle :
  4,000 / 5,000 / 6,000 rpm gear spindle
  8,000 / 10,000 rpm direct-driven spindle
  6,000 / 8,000 / 12,000 rpm built-in motorized spindle
- Spindle taper : DIN50 / CAT50
- Y travel extension : 2,800 / 3,200 / 4,000 mm
- Z travel extension : 1,000 / 1,200 / 1,400 mm
- Column raiser : 200 / 300 / 400 / 500 mm
- Attachment head (Manual) :
  35° / 90° / Extension / Universal Head
- Attachment head (Automatic) :
  35° / 90° / Extension / Universal Head
- Tool magazine : 40 / 60 / 90 / 120 T
- X / Y / Z axes optical linear scale (HEIDENHAIN)
- Spindle thermal compensation
- Coolant through the tool adapter
- Coolant through the spindle (Form A)
- Automatic tool length measurement
- Automatic work piece measurement
- CNC rotary table
- Oil skimmer
- Oil mist cooling system