

Intelligent Machining Center

PBM Series Smartcenter

- Hartrol Premium controller
- 5-Year warranty on guideways
- Maximum cutting torque : 6494N-m(PBM-135)
- W-axis supported by two linear guideways
- B-axis repetitive positioning accuracy: $\pm 8''$



Hartrol Premium®
From tradition to intelligent



She Hong INDUSTRIAL CO. LTD.

No.3 Jingke N. Road, Taichung City, 408 Taiwan
www.hartford.com.tw Tel: 886-4-23501980 Fax: 886-4-23581793
CAT.No.: 20230925- E17

All Graphic and text on the catalog have been registered. Those who reprint will be held liable

Facebook



Website



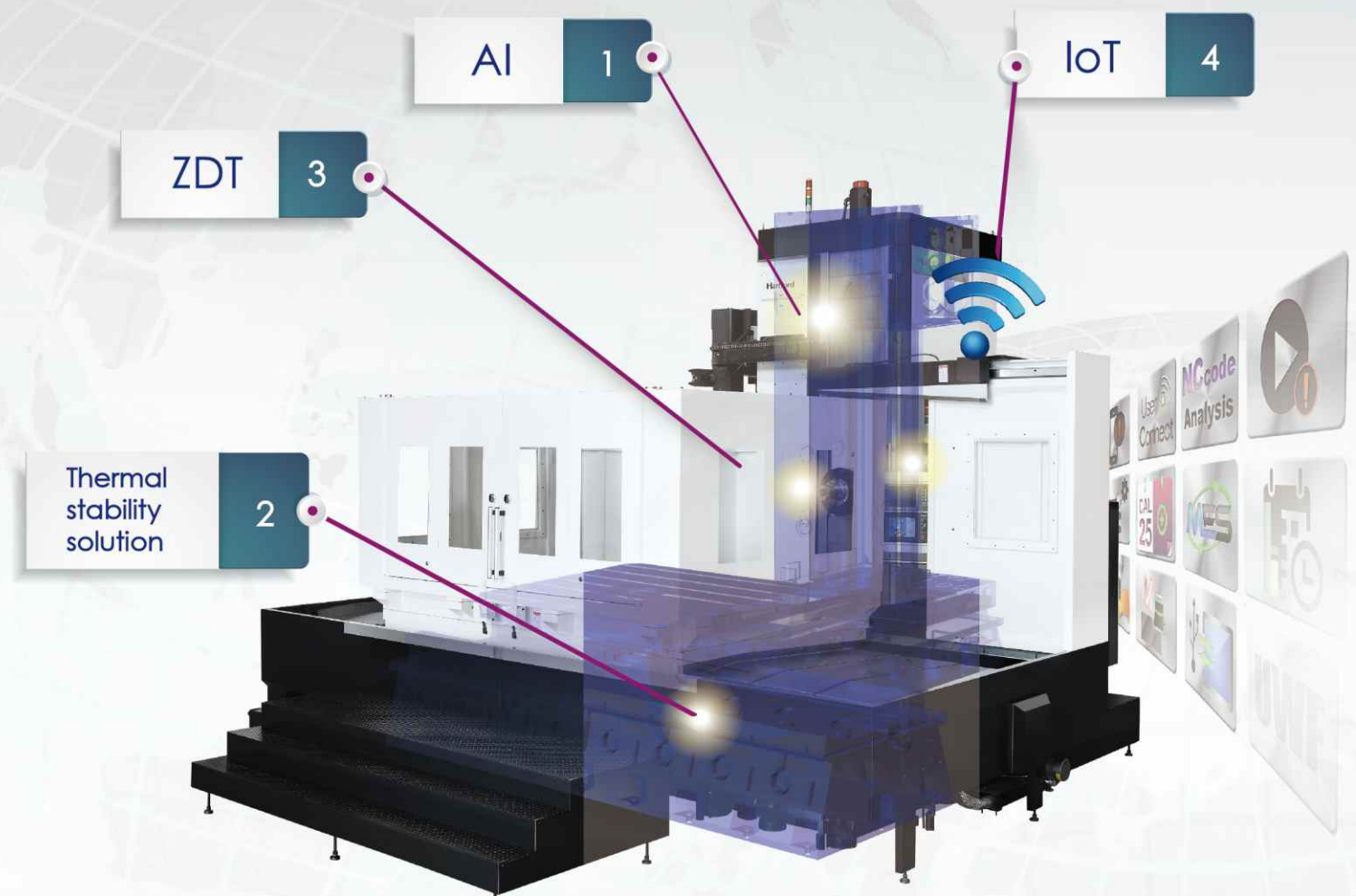
Imagine what future machines ought to be outlined.



The diagram illustrates six AI applications in manufacturing, each represented by an icon and a label:

- Facial Recognition system-Face ID:** An icon of a person's head with 'AI' and a face ID symbol.
- AI Environment Thermal Displacement Compensation:** An icon showing a thermometer, a color gradient bar, and a smartphone, with 'AI' and a temperature symbol.
- AI Efficient Lubrication Management:** An icon of a syringe dispensing liquid into a container, with 'AI' and a drop symbol.
- Broken Tool Detection System:** An icon of a drill bit with a red arrow pointing to a broken tool, with 'AI' and a broken tool symbol.
- Highlight on Intelligent Auger:** An icon of a drill bit with a red arrow pointing to it, with 'AI' and a drill bit symbol.
- AI Navi:** An icon of a drill bit with a red arrow pointing to it, with 'AI' and a navigation symbol.

Hartford
redefine the future




How to quickly implement automation?

Hartford Robot Production Cell

Easy to get started

Hartford Robocell provides you a professional robot training and rich automation experience, to let you quickly learn and easily operate your automation systems

Quality control monitoring

Automation systems have to pass all the strict Quality Control tests at every stage like design, assembly, testing, final inspection and shipment, complete quality control processes for all the products.

Professional analysis

Robocell Machining optimization service, to let you be on the top by using professional machining methods

What definition of Automation interface only :



- 1. Automatic Door
- 2. Automatic Interface
- 3. Pneumatic/ Hydraulic Interface
- 4. Other options

1. Automatic Door

- Pneumatic/Automatic Door System_Operating Door
- Pneumatic/ Servo Automatic Door System_Right Side Door

2. Automatic Interface

- I/O Preparation
- Profibus Link Preparation
- CC-Link Preparation
- EtherNet/IP Link Preparation

3. Pneumatic/ Hydraulic Interface

- 1/2/3 Cell Automatic Pneumatic/ Hydraulic Interface in the machine

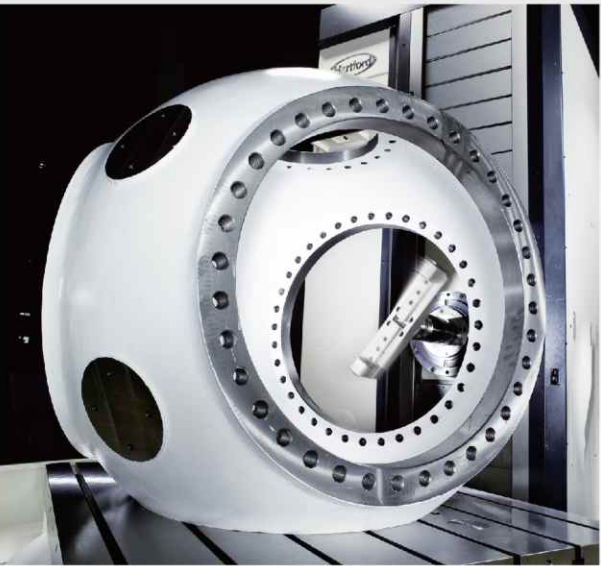
4. Other options

- High Pressure Spray Nozzle with Automatic Preparation
- HStainless Base
- High-volume chip-removal system comprising dual side augers

Optimized Cutting Efficiency

A perfect demonstration for machining accuracy and ability.

The optimized cutting efficiency and capability of Hartford Precision Boring is your best partner.



1. Component of wind power generation



2. Vertical machine head

Actual Cutting Test

Model: PBM-135

■ Spindle: 2,500 rpm Gear type, 26kW ■ Cutting material : S45C



Face milling

Tool diameter	Ø125mm
Feed rate	2,400 mm/min
Cutting depth	3 mm
Cutting width	100 mm
Spindle speed	500 rpm
Cutting volume	720 cc/min



Tapping

Tool diameter	M42 x P4.5mm
Feed rate	315 mm/min
Cutting depth	50 mm
Spindle speed	70 rpm



Drilling

Tool diameter	Ø76 mm
Feed rate	120mm/min
Cutting depth	30 mm
Spindle speed	300 rpm

All the results featured in this catalogue were produced under strict testing condition in a special zed testing environment. Under different testing conditions and in less than ideal testing environments. That the test results may vary form those shown in this catalogue.

The very first step for fully intelligent machining.

Hartford APP Store?

What is Hartrol Premium ?

Hartrol premium is a brand new intelligent controller Hartrol , Hartnet and Hartford electrical function together which developed and made by Hartford.

- HMI and operation is user friendly, it can achieve :
- 1. Internet connection, collect and analyze data, monitoring by portable device
 - 2. Intelligent control: Auto revise human error and operating basis
 - 3. Real time update new APPs

The difference between Hartrol plus and others

Function	Hartrol Premium	Others
Screen Size	19"Multi-touch Panel	10.4" (OPT:15")
Look Ahead Block	2700(G5P20000)	400(1000 Max.)
Hard Drive	32GB SSD	NO
Smoothing Interpolation	SSS 4G	Option
Industry 4.0	Hartford UserConnect	NO



The main technologies of Hartford smartcenter include intelligent managing system, status monitoring, alarm predicting, machine status diagnosis, crash preventing, 3D program simulation, machining efficiency improving...etc. All the intelligent functions help you control the machine status and assure the job quality.



The Intelligent Controller You Should Have

With three major solutions, Hartrol Plus takes you machining to the next level.
Highly optimized and intelligent contorls bring even more capabilities and productivity to your metal cutting processes.
With ease use, advanced automation, and smart data collection, Hartrol plus is essential tool for enhancing performance on your production floor.



Hartford smartcenter APP



The fuctions mentioned above will need to option the Hartrol plus controller or Dual screen with Fanuc controller.

What Hartford APP can do for you?

The integrated intelligent functions of Hartrol plus could achieve your machining requirements.
For more Hartrol Plus functions, please contact our sales person.

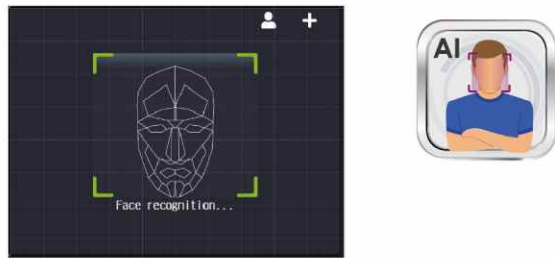
AI Environment Thermal Displacement Compensation(opt.)

Vertical machining center : **0.03mm**
Thermal displacement problem is improved up to **60%**
It can achieve good accuracy as in constant temperature room.



AI Facial recognition system(opt.)

Face ID log-in authority
Recognition time: **2 seconds**
Recognition accuracy: **100%**



Highlight on Intelligent Auger(opt.)

50% efficacy increases

- Intelligent auger automatically proceeds cleaning iron chips based on electrical current of spindle.
- Intelligent auger automatically performing reversal mode in case amount of iron chips outnumbers, preventing from machine stop. Auger is overly shielded



AI Efficient Lubrication Management(opt.)

50% lubrication saved.

- Auto-adjustment oil supply base on machining condition.
- 50% oil consumption saved



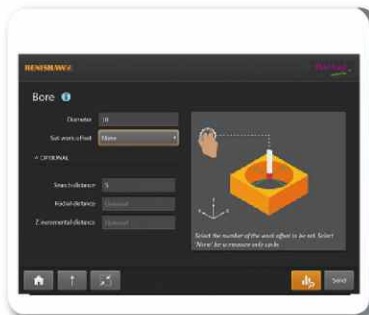
On line update

With online updating system similar to smart phone will make sure your operating system stays the latest version with Hartford.

- 24hr ➡ Live updating , no boundary no time zone difference.
- NEW ➡ Synchronize with Hartford for the latest information and functions.
- Easy ➡ One key updating, easy and fast !



The Hartrol plus NC version must be A6 or above



Graphical user interfaces for part setting, inspection, tool setting

- Ease of use
- Increasing usability
- Eliminating manual set-up tasks
- Increasing efficiency



Hartford ZDT

Eliminate machine down time and increase efficiency.
ZDT —

1. Ease of use
2. Check parts status clearly
3. Eliminating unexpected down time
4. Instand notification to your machine and your portable device

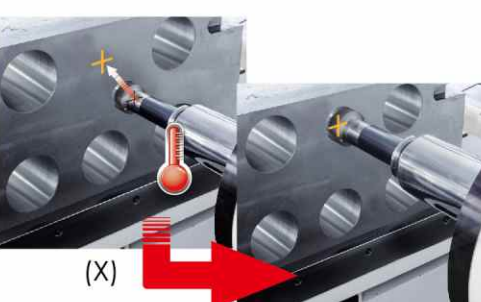
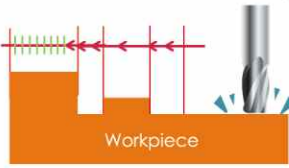


AFC(opt.)

Machining efficiency is increased by **21%**

Controls the feed rate depending on the machining situation

- Adjusting feed rate automatically
- Lengthen your tool life
- Reduce machining time



Thermal compensation on spindle(opt.)

No worries about HEAT!!

- Machine with compensation
#40 spindle thermal extension is within 0.03mm
#50 spindle thermal extension is within 0.02mm
- Machine without compensation
Spindle thermal extension is around 0.10mm
Notes: Above test is under room temperature



Tough, rugged and durable for MVP

With the extra rigid structure design, the Hartford PBM series precision boring milling machine features greater durability, stability and accuracy.



The picture shows PBM-115



The picture shows PBM-135



Full range of linear guideway five-year warranty:

Warranty coverage will not apply under following conditions

1. Improper operation (collision)
2. Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.



Oversized column design (PBM-135)

- For greater stability during cutting.
- Span between box guideways : **780mm**
- Box guideway thickness : **100mm**
- Box guideway surface width : **180mm**



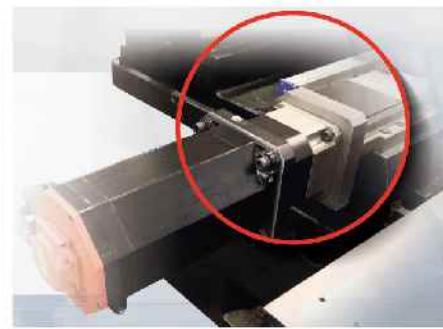
Specially design on front & rear base structure (PBM-135)

- Widen base design, span between box guideways **1080mm**, box guideway width : **200mm** (Front base)
- Increased machine structure rigidity.
- Span between box guideway **1140mm**
 - box guideway width : **250mm** (Rear base)



X / Y / Z direct-connected drive system

- X & Z axis are designed with planetary reducer enhance the overall axial drive torque.
- Y axis is direct-connect drive delivers high speed and less noise.



High Rigidity & High Accuracy Spindle

Heavy duty precision spindle

- The spindle supported by D4 class bearings guarantee superior dynamic running accuracy.
- Bearings & gear box are designed with cooling lubrication system so that spindle thermal problem can be reduced and prolong lifespan of parts.
- PBM-115 Spindle diameter : **Ø110mm**
- PBM-135 Spindle diameter : **Ø130mm**
- PBM-115 W-axis travel : **500mm**
- PBM-135 W-axis travel : **700mm**



W-axis supported by two linear guideways

- Increases the supported rigidity of W-axis.
- Increase the accuracy of W-axis.
- Delivers greater supporting capacity.



Gear-driven spindle

- The spindle is driven by gear box.
- Allowing for 4-step speed change delivers higher torque output and durability.
- Spindle torque is **6494N·(37kW)** (PBM-135)

High rigidity spindle stock

- The spindle stock is a high rigid box type construction.
- Ensures maximum stability during boring cutting.



A Variety of Accessories

Universal head

- Spindle taper: #50
- Max. tool diameter: Ø200
- Tool clamping : Manual
- Max. power : 55 kW
- Max. speed : 1000 rpm
- Indexing method : Manual



90 degree head

- Spindle taper: #50
- Max. tool diameter : Ø200
- Tool clamping : Manual
- Max. power : 55 kW
- Max. speed : 1000 rpm
- Indexing method : Manual



Quill support

- Spec.:
 - 300L (PBM-115)
 - 300L (PBM-135)
 - 500L (PBM-135)
- Max. speed : 1500 rpm



90 degree extension

- Spindle taper: #50
- Max tool diameter: Ø150
- Tool clamping : Manual
- Max. power : 38 kW
- Max. speed : 1000 rpm
- Indexing method : Manual



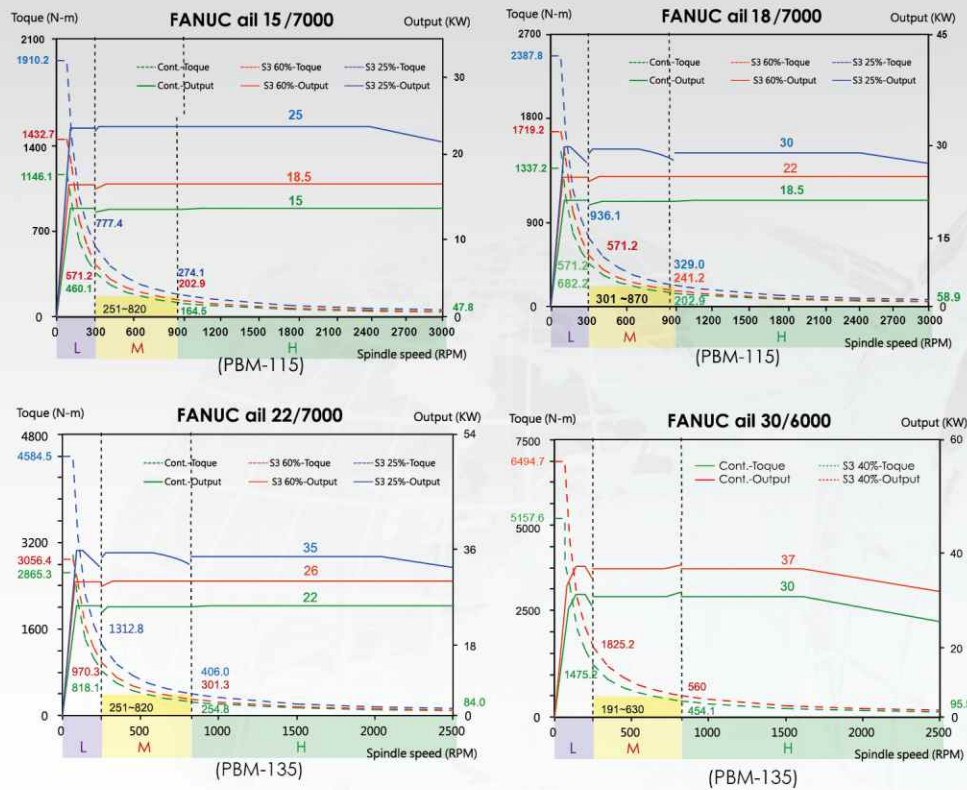
Spindle Torques

Spindle torques diagram

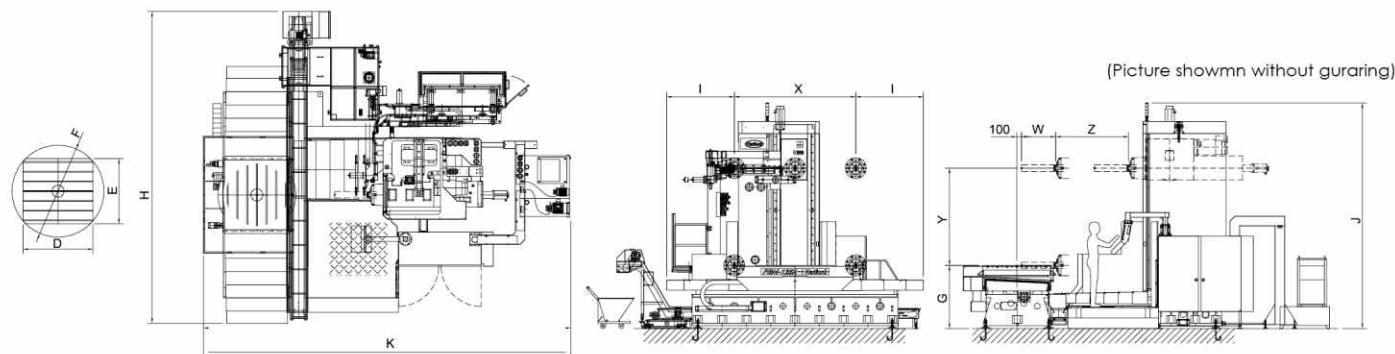
#50 gear type spindle 2500 rpm
(PBM-135)

#50 gear type spindle 3000 rpm
(PBM-115)

Note: Spindle max. speed is unavailable for
long-term running



Machine Dimensions



Model	X	Y	Z	W	D	E
	X-axis travel	Y-axis travel	Z-axis travel	W-axis travel	Length of table	Length of table
PBM-115A	2000	1600	1500	500	1600	1400
PBM-135A, X=2.5M	2500	2000 (2500 opt.)	1500 (2000 opt.)	700	1600	1400
PBM-135B, X=2.5M	2500	2000 (2500 opt.)	1500 (2000 opt.)	700	1800	1600
PBM-135A, X=3M	3000	2000 (2500 opt.)	1500 (2000 opt.)	700	1600	1400
PBM-135B, X=3M	3000	2000 (2500 opt.)	1500 (2000 opt.)	700	1800	1600
PBM-135A, X=4M	4000	2000 (2500 opt.)	1500 (2000 opt.)	700	1600	1400
PBM-135B, X=4M	4000	2000 (2500 opt.)	1500 (2000 opt.)	700	1800	1600

Model	F	G	H	I	J	K
	Max. table size	Distance from floor to table	Width of machine (including frame)	Distance from spindle to frame	Height of machine	Height of machine
PBM-115A	ø2400 x 1600H	1300	5867	1493	4188	7256
PBM-135A, X=2.5M	ø2400 x 2000H	1400	6837	1493	4744(5244 opt.)	7785(8285 opt.)
PBM-135B, X=2.5M	ø2400 x 2000H	1400	6837	1493	4744(5244 opt.)	7785(8285 opt.)
PBM-135A, X=3M	ø3000 x 2000H	1400	7818	1743	4744(5244 opt.)	7785(8285 opt.)
PBM-135B, X=3M	ø3000 x 2000H	1400	7818	1743	4744(5244 opt.)	7785(8285 opt.)
PBM-135A, X=4M	ø3000 x 2000H	1400	8920	1846	4744(5244 opt.)	7785(8285 opt.)
PBM-135B, X=4M	ø3000 x 2000H	1400	8920	1846	4744(5244 opt.)	7785(8285 opt.)

UNIT : mm

Inspection Results

Straightness of table (X-axis) moves in R&L direction

Inspection item	Hartford PBM
R&L direction(vertical surface)	0.03 / 1000 mm
Forward & backward direction (vertical surface)	0.03 / 1000 mm

Spindle hole runout

Inspection item	Hartford PBM
Fixed side(20mm)	0.015 / 20 mm
At 300mm of testbar	0.025 / 300 mm

Boring accuracy report : 0°-180° boring
(PBM-135A)

Inspection item	JIS standard	Measured value
X-axis deviation	0.06 / 1000 mm	0.03
Z-axis deviation	0.06 / 1000 mm	0.03

Positioning & repetitive accuracy of line movement
(PBM-135A)

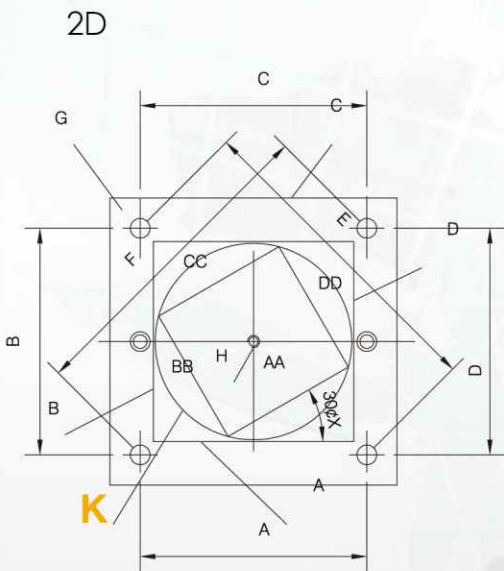
Inspection item	Positioning accuracy	Repetitive accuracy
X / Y / Z-axis	±0.010 / Full travel	±0.006 / Full travel
W-axis	±0.010 / Full travel	±0.005 / Full travel

Positioning & repetitive accuracy of linear movement
(PBM-135A)

Inspection item	Positioning accuracy	Repetitive accuracy
X / Y / Z-axis	±0.010 / Full travel	±0.006 / Full travel
W-axis	±0.010 / Full travel	±0.005 / Full travel

Positioning & repetitive accuracy of linear movement
with linear scale (PBM-135A)

Inspection item	Positioning accuracy	Repetitive accuracy
X / Y / Z-axis	±0.007 / Full travel	±0.003 / Full travel
W-axis	±0.010 / Full travel	±0.005 / Full travel



Boring
positioning
accuracy

Circular cutting

Side milling
accuracy

Linear
interpolation
end milling
accuracy

Inspection item	Tolerance	Test result	Remarks
Positioning accuracy A (300mm)	0.025	0.0078	(⊕)
Positioning accuracy B (300mm)	0.025	0.0062	(⊕)
Positioning accuracy C (300mm)	0.025	0.0076	(⊕)
Positioning accuracy D (300mm)	0.025	0.0056	(⊕)
Positioning accuracy E (300mm)	0.035	0.0057	(⊕)
Positioning accuracy F	0.035	0.0134	(⊕)
Roundness K	0.04	0.0096	(○)
Straightness A	0.015	0.0047	(—)
Straightness B	0.015	0.0052	(—)
Straightness C	0.015	0.0055	(—)
Straightness D	0.015	0.0046	(—)
Squareness A&B	0.03	0.0140	(⊥)
Squareness B&C	0.03	0.0146	(⊥)
Squareness C&D	0.03	0.0148	(⊥)
Squareness D&A	0.03	0.0141	(⊥)
Parallelism A&C	0.03	0.0122	(//)
Parallelism B&D	0.03	0.0112	(//)
Straightness AA	0.02	0.0020	(—)
Straightness BB	0.02	0.0044	(—)
Straightness CC	0.02	0.0027	(—)
Straightness DD	0.02	0.0021	(—)
Squareness AA&BB	0.04	0.0028	(⊥)
Squareness BB&CC	0.04	0.0048	(⊥)
Squareness CC&DD	0.04	0.0056	(⊥)
Squareness DD&AA	0.04	0.0058	(⊥)
Parallelism AA&CC	0.04	0.0050	(//)
Parallelism BB&DD	0.004	0.0060	(//)

Machine Specifications

item	Model Unit	PBM-115A	PBM-135A / B	PBM-135C
Table	Working surface	mm1400 x1600	1400 x1600(A) / 1600 x1800(B)	1800 x 2000
	T-slot Width X pitch(number)	mm22 x 200(7)	A : 22 x 200(7) B:22 x 225(7)	22 x 225(7)
	Max. load (Average)	kg8000	A : 8000 / B:12000	15000
	Resolution	deg.0.001	0.001	0.001
	Max. rpm	rpm2	2	2
Travel	Max. rotating range	mm360	360	360
	X-axis travel	mm2000	2500 opt. 3000/4000	3000 opt. 4000
	Y -axis travel	mm1600	2000 opt. 2500	2000 opt. 2500
	Z -axis travel	mm1500	1500 opt.2000	1500 opt. 2000
	W-axis travel	mm500	700	700
Spindle	Spindle nose taper	#50	#50	#50
	Spindle speed(Gear)	rpm5~3000 ; 5~4000	5~2500	5~2500
	Spindle diameter	mm110	130	130
	Spindle sleeve	225	245	245
Feed	Cutting feedrate(X/Y/Z)	m/min5/5/5	5/5/5	5/5/5
	Rapid traverse rate(X/Y/Z)	m/min10/10/10	10/10/10	10/10/10
	Rapid traverse rate(W)	m/min6	6	6
ATC	Capacity	pcs32(40/60)	32(40/60)	32(40/60)
	Max. tool weight	kg25	25	25
	Max. tool size (dia.x length)	mmØ125 x 400L	Ø125 x 400L	Ø125 x 400L
	Pull stub bolt	BT-50(CAT50/DIN/BBT50)	BT-50(CAT50/DIN/BBT50)	BT-50(CAT50/DIN/BBT50)
	Tool shank	P50T-1 (CAT-50/DIN 69872)	P50T-1 (CAT-50/DIN 69872)	P50T-1 (CAT-50/DIN 69872)
MotorSpindle drive motor (cont./30 min)		kw15/18.5 opt. 18.5/22	22/26 opt.30/37	22/26 opt.30/37
Positioning Accuracy	3-axis laser positioning accuracy(JIS B6330), with linear scale			
	Positioning accuracy	mm±0.008	X(2500): ±0.008 ; X(3000/4000): ±0.010	±0.010
	Repeatability	mm±0.003	±0.003	±0.003
	3-axis laser positioning accuracy(VDI3441)repeat 5 time			
	Positioning accuracy	mm0.015	0.015	0.015
	Repeatability	mm0.012	X(2500/3000) : 0.012 ; X(4000) : 0.013	X(3000): 0.012 ; X(4000): 0.013
other	Required air pressure	kg/cm²6.5	6.5	6.5
	Electric power requirement	kVA40-50	50-65	50-65
	Machine weight	kg25000	A:X:2500 / Y : 2000/ Z(1500): 30000 B:X:2500 / Y : 2000/ Z(1500): 32000	X : 3000 / Y : 2000 / Z(1500): 35000
	Floor space	mmST: 6800 x 8250 CTS: 7000 x 10000	X : 2500 / Y : 2000 / Z : 1500 ST: 7370x8550 ; CTS: 7370x10050	X : 3000 / Y : 2000 / Z : 1500 ST : 8370 x 8550 ; CTS: 8770 x 10050
	Machine dimension (L x W x H)	mmST: 5867 x 7256 x 4188 CTS: 6300 x 9080 x 4556	X : 2500 / Y : 2000 / Z :1500 (A) ST: 5867 x 7256 x 4188 CTS: 6300 x 9080 x 4556 (B) ST: 6837 x 7785 x 4744 CTS: 7000 x 9335 x 4910	X : 3000 / Y : 2000 / Z :1500 ST : 7818 x 7885 x 4744 CTS : 8196 x 9635 x 4910

VDI 3441 accuracy available upon order request.

Specifcations & dimensions are subject to change without notice (for actual weight, shipped product shall prevail.)

Accessories

Standard : ● Optional : ★

Item	modle	PBM-115A	PBM-135A/B
1.Semi-enclosed Splash Guard		●	●
2.Full-enclosed Splash Guard		★	★
3.Full-enclosed Splash Guard For CTS		★	★
4.2500RPMGear Head		-	●
5.3000RPMGear Head		●	-
6.Coolant Through Spindle		★	★
7.Centralized Automatic Lubrication System		●	●
8.Air Blast Through Spindle		●	●
9.Spindle Oil Cooler		●	●
10.Extend Head (G.Y.)		★	★
11.Table Side Air Blast (1 Tube)		●	●
12.Cooling System(With Coolant Tank)		★	★
13.Screw Type Chip Conveyor		●	●
14.Link Type Chip Conveyor and Portable Chip Bucket		★	★
15.Double Screw and Link Type Chip Conveyor and Portable Chip Bucket		★	★
16.Oil Fluid Separator		★	★
17.Oil Skimmer		★	★
18.X/Y/X AXIS Closed Loop Linear Scale Positioning System for FAGOR		●	●
19.ARM Type ATC(32pcs)		●	●
20.ARM Type ATC(40pcs)		★	★
21.ARM Type ATC(60pcs)		★	★
22.Without Tool Magazine		★	★
23.Foot Switch For Spindle Clamp / Unclamp		★	★
24.Work Light		●	●
25.Fluorescent Light		★	★
26.Air gun		★	★
27.Coolant Gun(With Coolant Tank)		★	★
28.Leveling Bolts And Blocks		●	●
29.Adjusting Bolt And Blocks		●	●
30.Adjusting Tools And Box		●	●
31.Hoist Seat		★	★
32.Shaft Support Block300L		★	★
33.Shaft Support Block500L		-	★
34.Extend Head (G.Y.)		★	★
35.Mutiangular Milling Head (G.Y.)		★	★
36.Operation Manual & Electric Drawing Equipment		●	●
37.Convection Heat Exchanger in Control Box		●	●
38.Auto Power Off		●	●
39.Tri-color Light		●	●
40.Remote Manual Pulse Generator		●	●
41.RS-232 Interface		●	●
42.Auto Tool Length Measurement(RENISHAW)		-	★
43.CE Mark		★	★
44. DNC Software		★	★
45.B-AXIS Closed Loop Linear Scale Positioning System for HEIDENHAIN		★	★

Electrical

Hartrol / Standard

- Workpiece calibration by MPG directly
- Parameter package
- Tool magazine display(0i&31i only)
- Tool status display
- Utilization rate of machining
- Machining time countdown
- B-axis workpiece calibration (manually)

Hartnet / Optional

- Management system of utilization
- Machining time countdown
- Convenient file transfer

Electrical / Optional

- Lifting function against gravity
- Retraction for rigid tapping
- Intelligent MPG