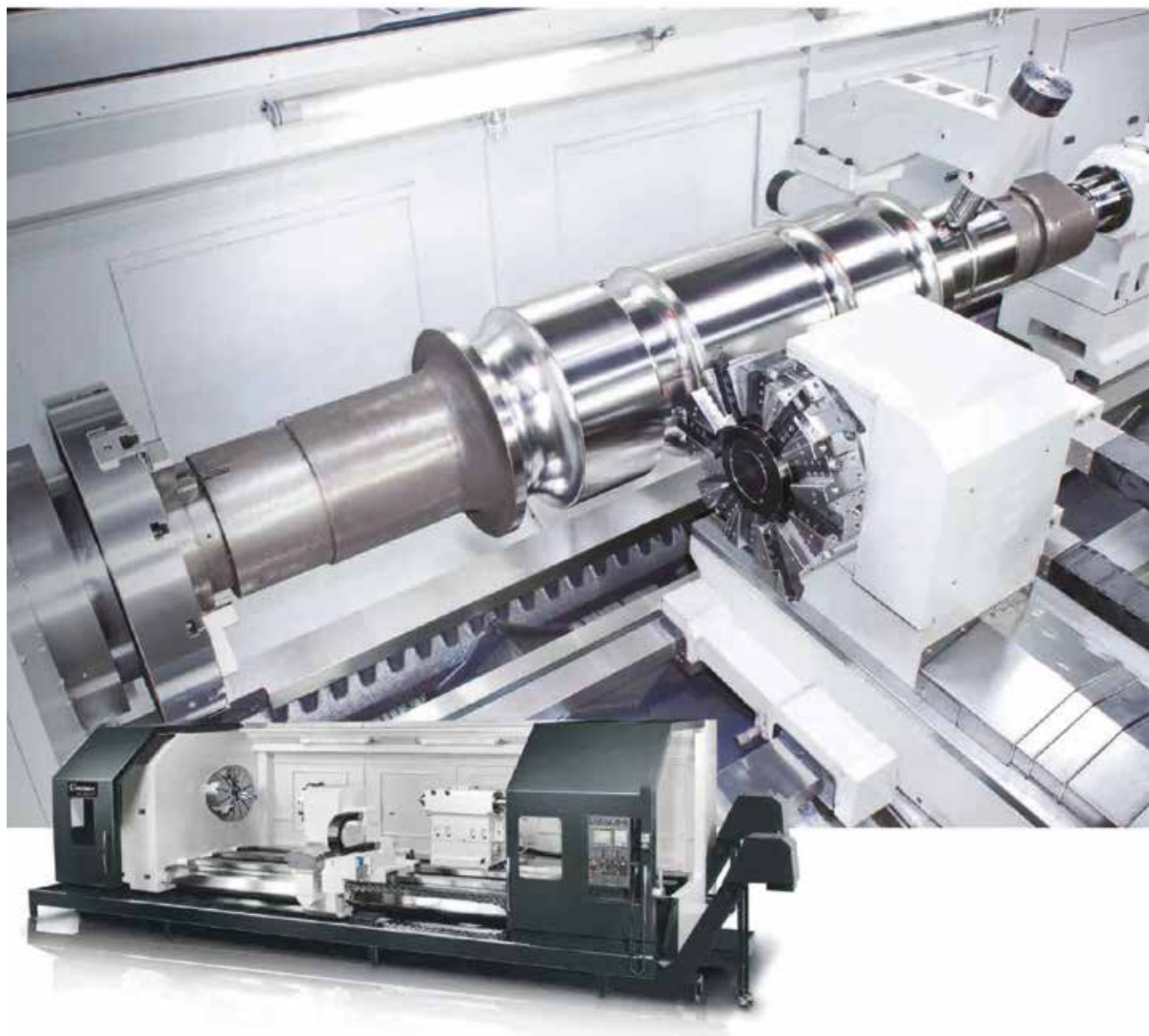


# HA SERIES FLAT-BED CNC TURNING CENTERS



LÍNEA DE MÁQUINAS PARA LA INDUSTRIA, DE CALIDAD SUPERVISADA CON LAS MAS ALTAS PRESTACIONES



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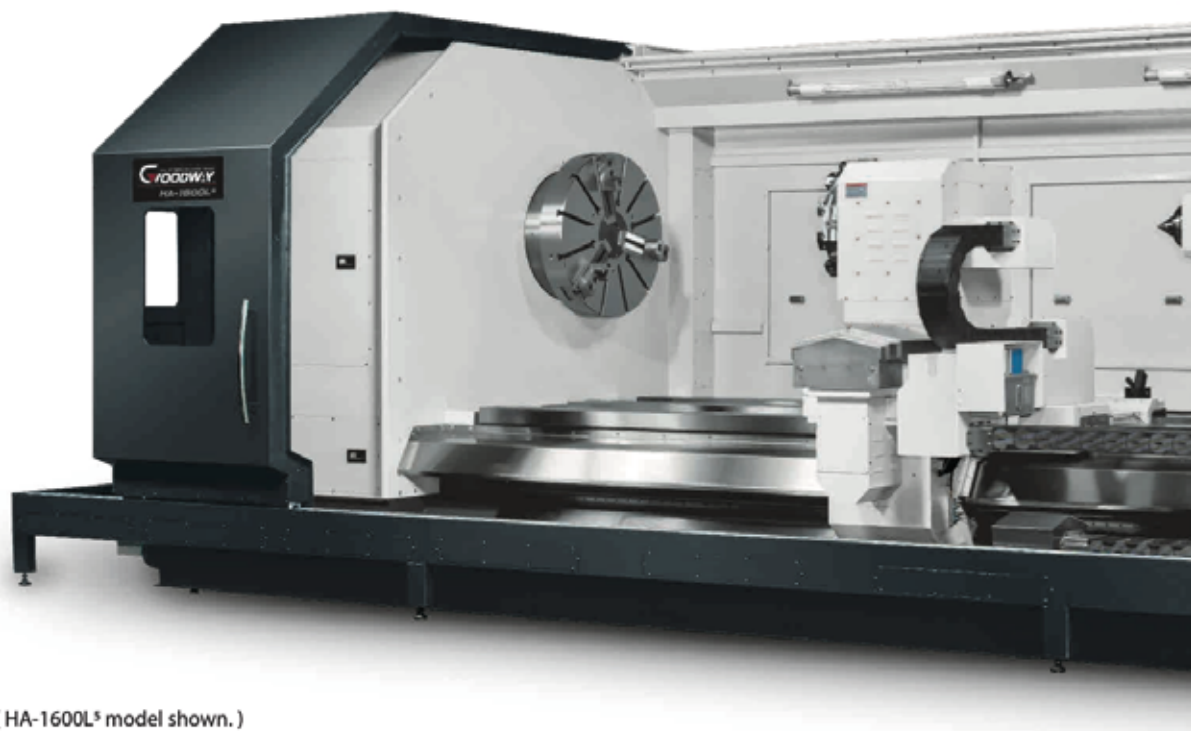
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## FLAT-BED CNC TURNING CENTER

Together with the latest technology and high quality components, the GOODWAY HA series utilizes high rigidity four box way bed with 3-step gear spindle and servo indexing turret to provide heavy-duty cutting capability for super large work-piece applications. It is suitable for energy, aerospace and shipbuilding industry. The optional four-way toolpost, boring bar, and steady rest provide a more efficient turning performance for large work-piece applications. Furthermore, the live tooling turret and C-axis is also available which allows the machine to perform more complicated tasks such as turning, milling, and drilling to fulfill your needs for today and tomorrow.

- ▶ One-piece 4 box way and flat bed casting provides a large platform with a heavy-duty structure, suitable for super large work-pieces of any cutting applications.
- ▶ 3-step gear spindle provides great torque output under low speed, to fulfill heavy cutting needs.
- ▶ Z-axis twin chip conveyor system with separated large coolant tank design provides high efficient chip disposal and stable turning accuracy.



( HA-1600L<sup>S</sup> model shown. )

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Max. swing diameter

**Ø 2,000 mm**

Max. turning diameter

**Ø 1,700 mm**

HA-2000 Series



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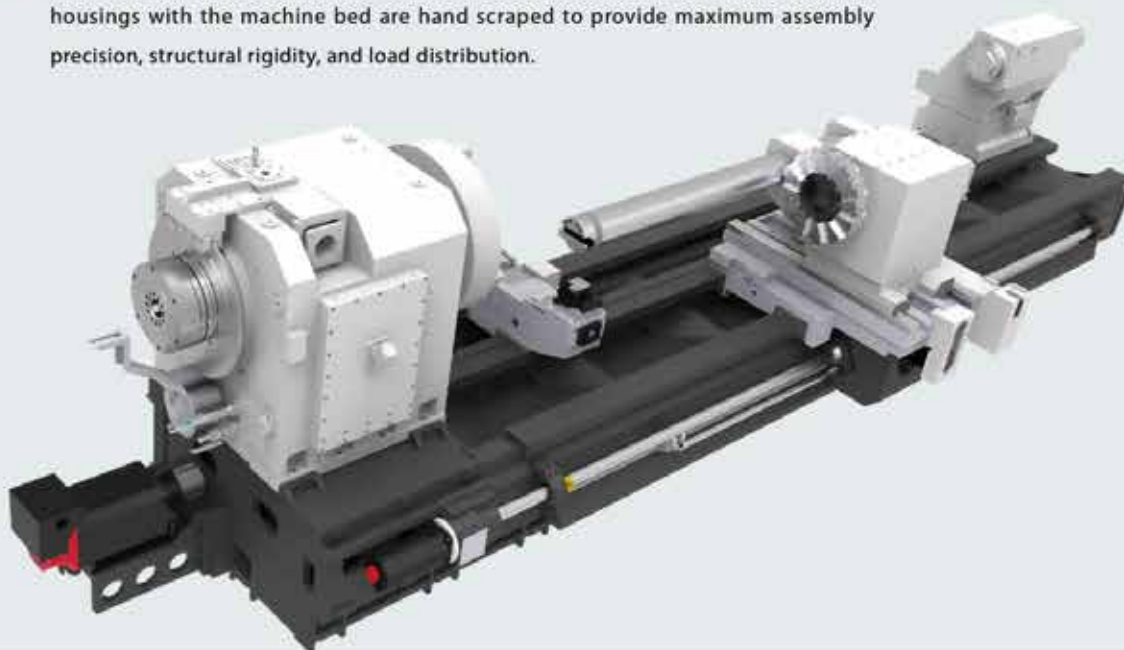
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## HEAVY-DUTY CONSTRUCTION

- The flat-bed is designed with a low center of gravity, which allows the work-piece weight to be evenly distributed throughout the flat-bed. This can greatly increase machine's overall structure and heavy-duty cutting capability.
- Built to endure years and years of rigorous high production turning, the heavily ribbed, one-piece thermally balanced bed and casting components are of FC35 MEEHANITE casting. FC35 grade cast iron is capable of withstanding much greater stress without deforming and provides maximum vibration damping, which result in a machine that will outlast and outperform the competition.
- By using Finite Element Analysis (FEA), optimal reinforce ribbings are directly cast into the one-piece bed structure. Mechanical rigidity has been increased by more than compared to conventional designs.
- Contact surfaces of all slides, headstock, turret, tailstock, and ball screw bearing housings with the machine bed are hand scraped to provide maximum assembly precision, structural rigidity, and load distribution.



- C3 class hardened and precision ground ball screws ensure the highest accuracy and durability possible. Plus, pretension on all axes minimizes thermal distortion.
- The Z-axis ball screw of the HA-L4 series and all other super-long models are equipped with supportive mechanism.



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- ▶ The one-piece casting components of the box way, bed, and saddle are designed with large span to reach maximum strength and accuracy.
- ▶ The X-axis saddle and tailstock travel are designed separately, which allows the tailstock to support the work-piece without crossing the saddle. This prevents the tailstock from overhanging which can influence the rigidity.

- ▶ The tailstock is equipped with Ø200 mm rotary tailstock spindle, combining the MT#6 dead center quill and sufficient thrust power, to provide stable and accurate support for the work-piece.
- ▶ The tailstock spindle control panel is directly integrated in the tailstock base, which allows the operator to easily control the tailstock positioning.
- ▶ X-axis carriage locks onto the tailstock base manually and moves it to the desired position with precision accuracy.
- ▶ The tailstock is designed with an auxiliary retention which gives a firm support to prevent the tailstock from sliding backwards when working on heavy work-pieces.



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( Twin chip conveying system )

- ▶ High performance twin chip conveying system allows the chip to be quickly disposed on both sides of the Z-axis travel through the chip conveyor. This ensures the working area to maintain its temperature while increasing turning stability and accuracy.
- ▶ 2,115 l ( L<sup>5</sup> Series ) super large coolant tank allows optimal air circulation for faster heat dispersion and coolant temperature, which will help extend coolant life.

- ▶ The control panel is integrated onto the splash guard. The operator can easily move it to the desired position without safety problems.



- ▶ The splash guard and saddle can be synchronized to move together manually during the working progress, which ensures safety for the operator.

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## ULTIMATE TURNING POWER

- The one-piece casting headstock has a net weight over 4,000 kg, which gives outstanding rigidity and also provides an ideal balance for super heavy work-pieces.
- The spindle is support by high rigidity bearings for maximum level of support and precision. Bearing configuration is designed for super heavy-duty cutting with ultra-smooth performance and long term durability with a higher level of accuracy.
- The spindle uses a high performance lubrication system to efficiently and evenly lubricate the spindle bearings. Also, with a special maze protection design, it can prevent the gear box from contamination thus extending the life of the bearings.

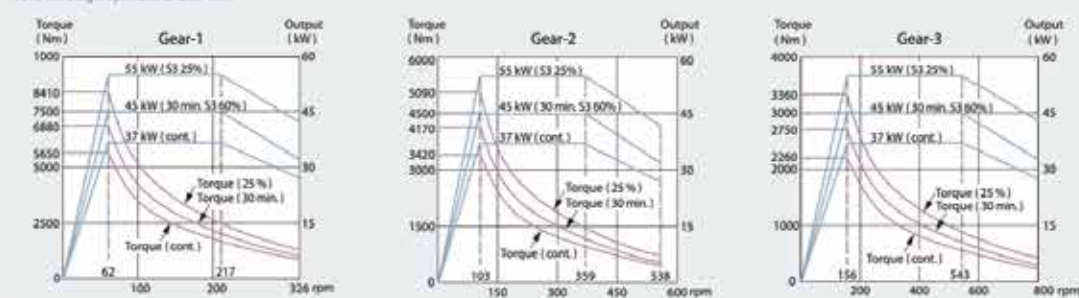


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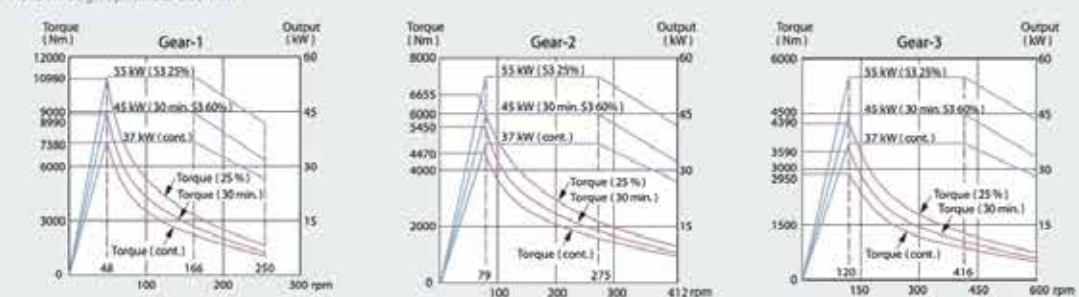
6

### Spindle Output

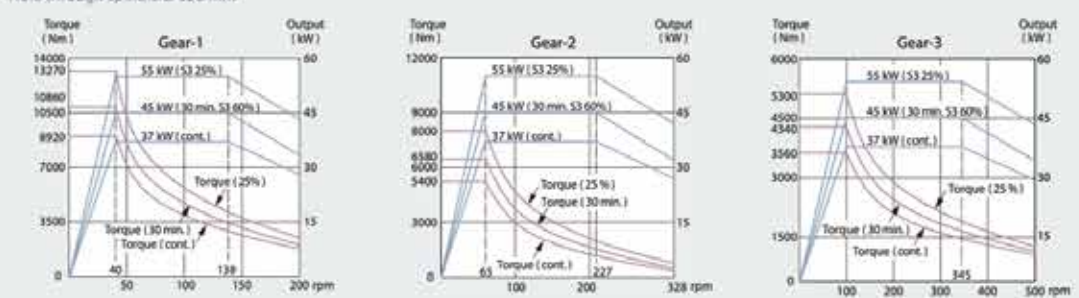
Hole through spindle Ø 205 mm



Hole through spindle Ø 260 mm



Hole through spindle Ø 320 mm



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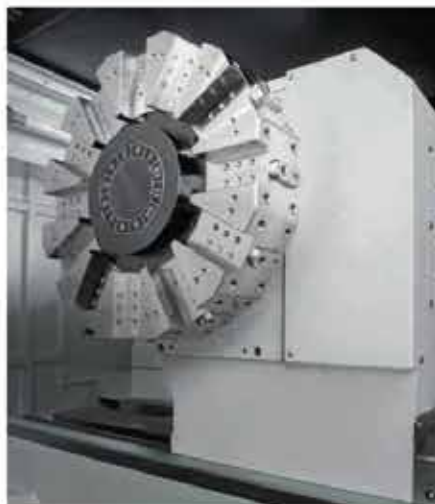
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## ADVANCED TURRET TECHNOLOGY

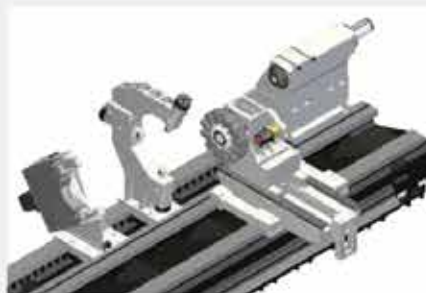
- ▶ Ø 320 mm diameter 2-piece CURVIC couplings accurately position the turret disk and 10,000 Kg of clamping force ensures abundant turret rigidity for all cutting conditions.
- ▶ The 12-station servo indexing turret achieves 0.3 second indexing times for adjacent stations and 0.8 second times for stations at the opposite end of the disk turret.

- ▶ Optional 4-way toolpost for super heavy cutting.



## HEAVY-DUTY STEADY REST

- ▶ The available heavy-duty steady rest can prevent the long work-pieces from deflection during high speed rotation while ensuring precise concentricity of the work-piece.
- ▶ When the work-piece diameter is not more than Ø600 mm, the saddle and steady rest will not interfere each other during the progress. Thus the operator does not need to stop the machine to remove the steady rest, which greatly increases working efficiency.



( Hydraulic ) Ø125 – 460 mm\*1

( Manual ) Ø300 – 600 mm\*1

( Manual ) Ø500 – 800 mm

( Manual ) Ø800 – 1,000 mm

\*1 The steady rest does not need to be removed during the working progress.

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## LIVE TOOLING TURRET

- ▶ Live tooling and C-axis control capabilities on the HA series allows the machine to perform multiple tasks on a work-piece, such as turning, milling, drilling and tapping. It eliminates manpower and cycle time, while reducing accuracy lost, which will occur if the part is moved from machine to machine.
- ▶ The 12-station GOODWAY live tooling turret offers 12 stations available for live tooling, live tools rotate in working position only to reduce power loss and heat.



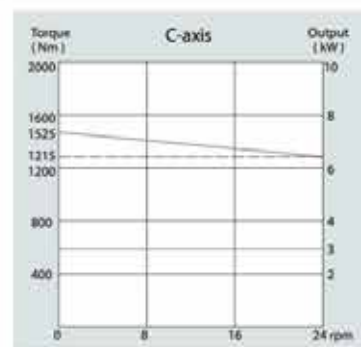
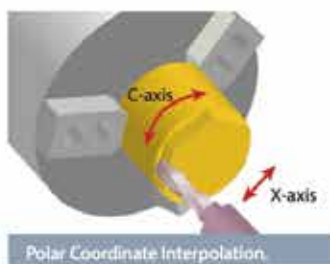
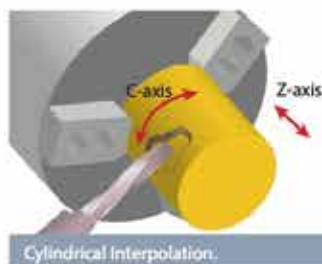
▶ Optional super rigidity boring bar



7  
8

## ULTIMATE C-AXIS SPINDLE

- ▶ The Cf-axis and disk brake system available on the HA series provide the most rigid and powerful type of C-axis on the market today. In Cf-axis mode, a servo motor is engaged and drives the rotation of the spindle; engagement time is approximately 1 second.
- ▶ Working with the live tooling turret, the Cf-axis and disk brake system enables the machine to perform multiple tasks, such as drilling, tapping, and milling operations, including cylindrical and polar coordinate interpolations, resembling a 4<sup>th</sup>-axis rotary table on a machining center.
- ▶ With the FANUC servo motor generating an ultra high resolution of 1,000,000 pulses per spindle rotation and 1,500 Nm of spindle torque (Cont. ). Plus, dynamic accuracy is within  $\pm 0.02^\circ$  even under heavy cutting loads.



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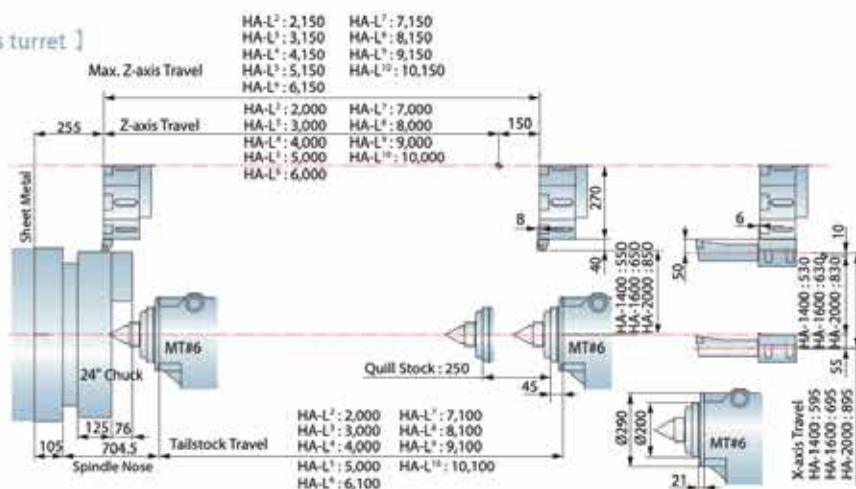
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## GENERAL DIMENSION

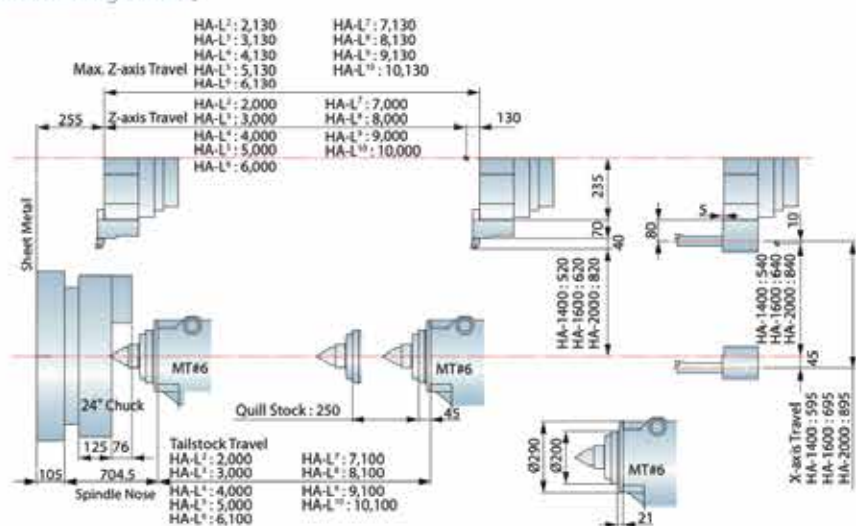
### Work Range

[ Standard 12-stations turret ]

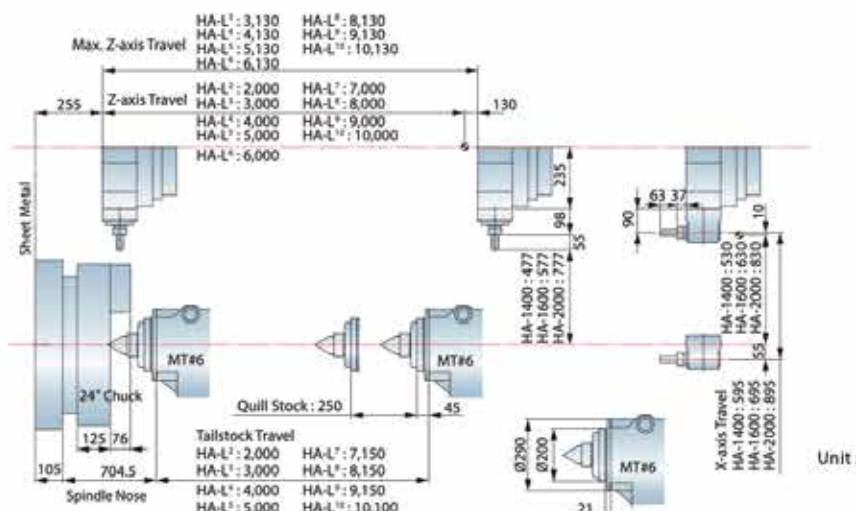


[ Optional 12-stations live tooling turret ]

MT#6  
Dead Center  
(I.D. / O.D. Tools)



MT#6  
Live Center  
(Live Tooling)



Unit : mm

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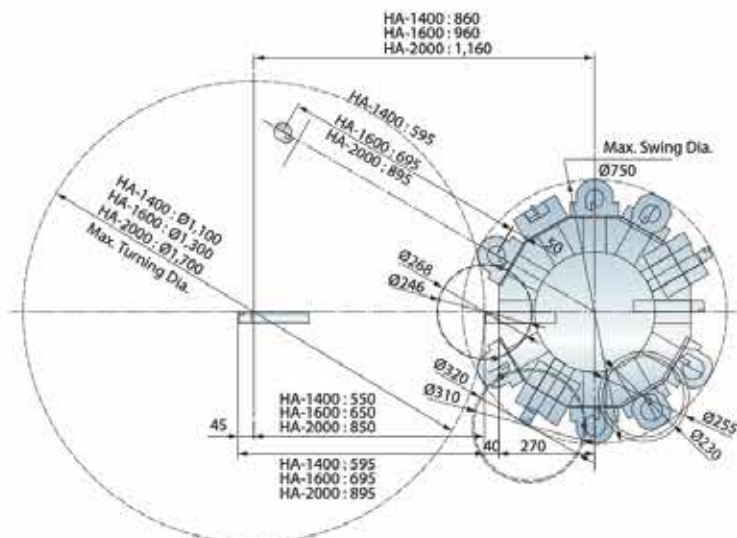
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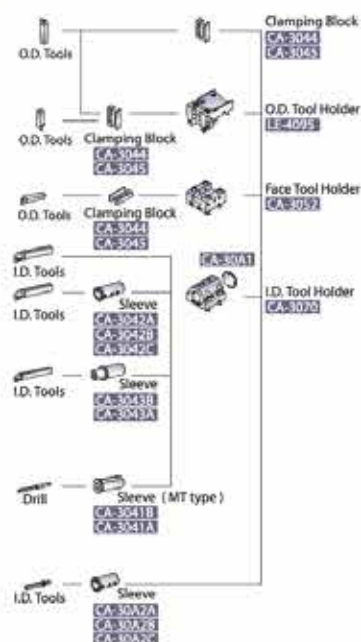


## Interference Diagram

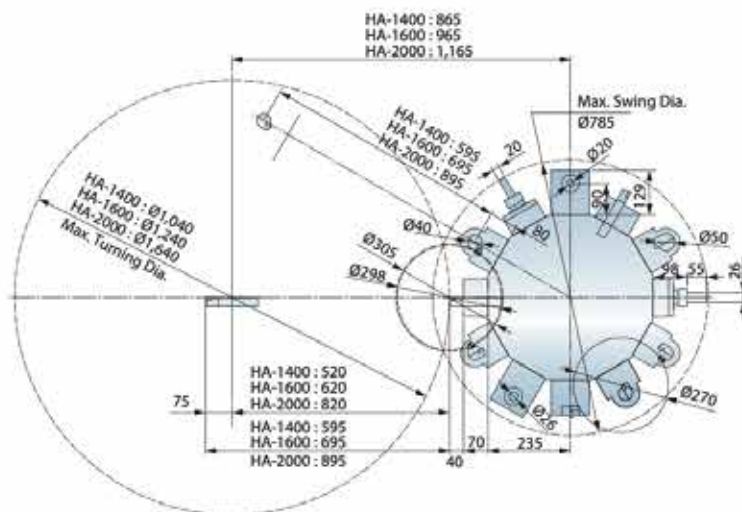
[ Standard 12-stations turret ]



## Tooling System

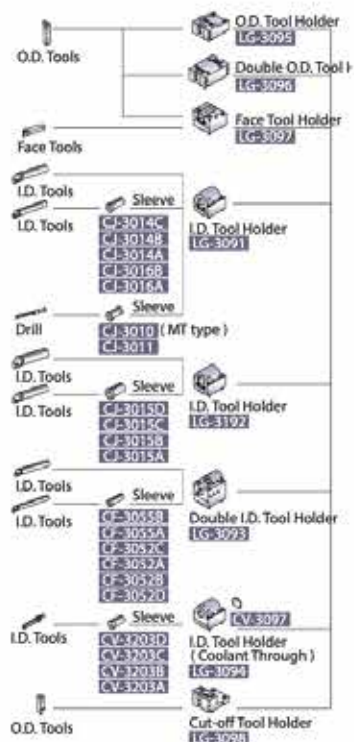


[ Optional 12-stations live tooling turret ]



Unit : mm

Please contact sales representative for 8-stations turret



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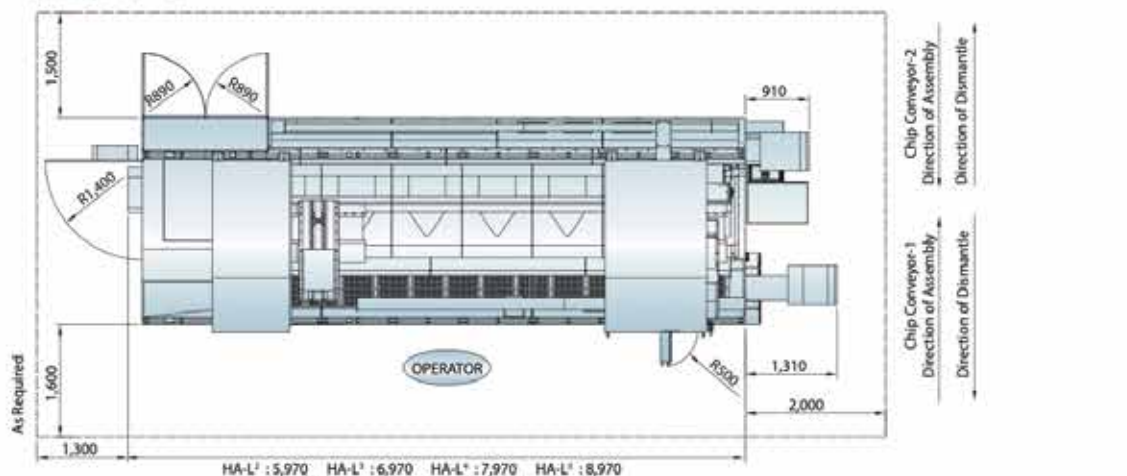
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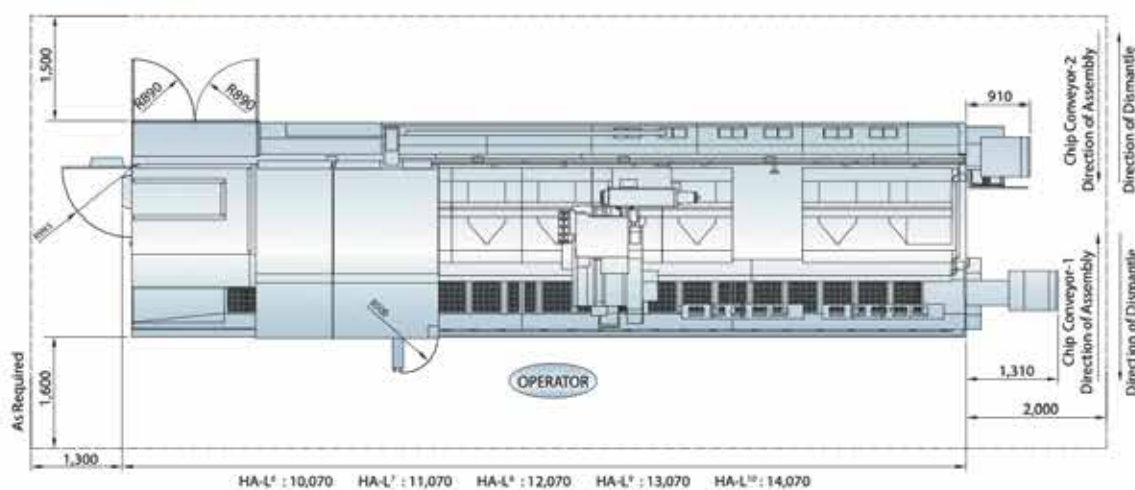
## GENERAL DIMENSION

### Foot - Print

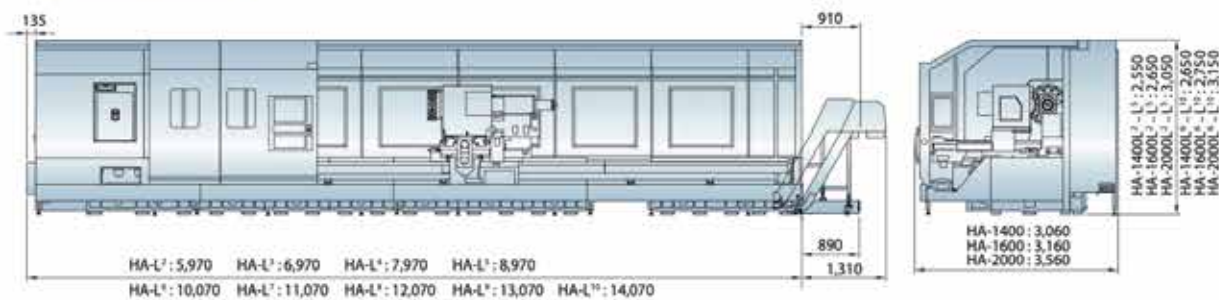
HA series L<sup>2</sup> ~ L<sup>3</sup>



HA series L<sup>6</sup> ~ L<sup>10</sup>



### Machine Layout



Unit : mm

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## STANDARD & OPTIONAL FEATURES

S : Standard O : Option  
- : Not available C : Contact YAMA SEIKI

|                                                |                      | HA-1400 | HA-1600 | HA-2000 |
|------------------------------------------------|----------------------|---------|---------|---------|
| <b>SPINDLE</b>                                 |                      |         |         |         |
| Main spindle configuration                     | 3-Speed Gear         | S       | S       | S       |
| Rigid tapping & spindle orientation            |                      | S       | S       | S       |
| Main spindle disk brake                        |                      | O       | O       | O       |
| <b>WORK HOLDING</b>                            |                      |         |         |         |
| Hollow 3-jaws chuck & 1 set soft jaws          | 24"                  | O       | O       | O       |
|                                                | 32"                  | O       | O       | O       |
|                                                | 40"                  | O       | O       | O       |
|                                                | 50"                  | -       | O       | O       |
|                                                | 63"                  | -       | -       | O       |
| Foot switch for chuck operation                |                      | S       | S       | S       |
| Quill hydraulic tailstock                      |                      | S       | S       | S       |
| MT#6 dead center quill                         |                      | S       | S       | S       |
| Manual steady rest                             |                      | O       | O       | O       |
| Self-centering hydraulic steady rest           |                      | O       | O       | O       |
| Foot switch for steady rest operation          |                      | O       | O       | O       |
| <b>TURRET</b>                                  |                      |         |         |         |
| 12-station turret                              |                      | S       | S       | S       |
| 12-station live tooling turret                 |                      | O       | O       | O       |
| Hydraulic 4-way Toolpost                       |                      | O       | O       | O       |
| Tool holder & sleeve package                   |                      | S       | S       | S       |
| Live tooling tool holders ( 0° x 2 , 90° x 2 ) |                      | O       | O       | O       |
| <b>COOLANT</b>                                 |                      |         |         |         |
| Coolant pump                                   | 3 Kg/cm²             | S       | S       | S       |
|                                                | 5 Kg/cm²             | O       | O       | O       |
| High-pressure coolant system                   | 20 Kg/cm²            | C       | C       | C       |
| Roll-out coolant tank                          |                      | S       | S       | S       |
| Oil skimmer                                    |                      | O       | O       | O       |
| Coolant flow switch                            |                      | O       | O       | O       |
| Coolant level switch                           |                      | O       | O       | O       |
| Coolant intercooler system                     |                      | O       | O       | O       |
| <b>CHIP DISPOSAL</b>                           |                      |         |         |         |
| Twin chip conveyor                             | Right discharge      | S       | S       | S       |
| Chip cart with coolant drain                   |                      | O       | O       | O       |
| <b>SAFETY</b>                                  |                      |         |         |         |
| Fully enclosed guarding                        |                      | O       | O       | O       |
| Impact resistant viewing window                |                      | S       | S       | S       |
| Tailstock stroke out-end check                 |                      | S       | S       | S       |
| Chuck cylinder stroke out-end check            |                      | S       | S       | S       |
| Low hydraulic pressure detection switch        |                      | S       | S       | S       |
| Load monitoring function                       |                      | O       | O       | O       |
| <b>OTHERS</b>                                  |                      |         |         |         |
| Tri-color machine status light tower           |                      | S       | S       | S       |
| External work light                            |                      | S       | S       | S       |
| Electrical cabinet                             | Heat exchanger       | S       | S       | S       |
|                                                | A / C cooling system | O       | O       | O       |
| Complete hydraulic system                      |                      | S       | S       | S       |
| Advanced auto lubrication system               |                      | S       | S       | S       |
| Tailstock manual lubrication system            |                      | S       | S       | S       |
| Foundation leveling & maintenance tool kit     |                      | S       | S       | S       |
| Emergency maintenance electrical part package  |                      | S       | S       | S       |
| Operation & maintenance manuals                |                      | S       | S       | S       |

Specifications are subject to change without notice.

|                                                  |                       | Oi-TF | 31i |
|--------------------------------------------------|-----------------------|-------|-----|
| <b>FANUC CONTROL FUNCTIONS</b>                   |                       |       |     |
| Display                                          | 8.4" color LCD        | S     | -   |
|                                                  | 10.4" color LCD       | -     | S   |
| Graphic function                                 | Standard              | S     | -   |
|                                                  | Dynamic <sup>*2</sup> | O     | S   |
| Part program storage size                        | 512K bytes            | S     | -   |
|                                                  | 1M bytes              | -     | S   |
|                                                  | 2M bytes              | O     | O   |
|                                                  | 4M bytes              | -     | O   |
|                                                  | 8M bytes              | -     | O   |
| Oi-TF : each path                                | 400                   | S     | -   |
|                                                  | 1,000                 | O     | S   |
| 31i : total                                      | 4,000                 | -     | O   |
|                                                  | 99                    | -     | S   |
| Tool offset pairs                                | 128                   | S     | -   |
|                                                  | 200                   | O     | O   |
| Oi-TF : each path                                | 400                   | -     | O   |
|                                                  | 499                   | -     | O   |
| 31i : total                                      | 999                   | -     | O   |
|                                                  | 2000                  | -     | O   |
| Servo HRV control                                | HRV 3                 | S     | S   |
| Automatic data backup                            |                       | S     | S   |
| Synchronous / Composite control                  |                       | O     | O   |
| Inch / metric conversion                         |                       | S     | S   |
| Polar coordinate interpolation                   |                       | S     | S   |
| Cylindrical interpolation                        |                       | S     | S   |
| Multiple repetitive cycle                        |                       | S     | S   |
| Rigid tapping                                    |                       | S     | S   |
| Unexpected disturbance torque detection function |                       | S     | S   |
| Spindle orientation                              |                       | S     | S   |
| Spindle speed fluctuation detection              |                       | S     | S   |
| Embedded macro                                   |                       | O     | O   |
| Spindle synchronous control                      |                       | S     | S   |
| Run hour and parts count display                 |                       | S     | S   |
| Tool radius / Tool nose radius compensation      |                       | S     | S   |
| Polygon turning                                  |                       | S     | S   |
| Helical interpolation                            |                       | O     | O   |
| Direct drawing dimension programming             |                       | S     | S   |
| Thread cutting retract                           |                       | S     | S   |
| Variable lead threading                          |                       | S     | S   |
| Multiple repetitive cycle II                     |                       | S     | S   |
| Canned cycles for drilling                       |                       | S     | S   |
| Tool nose radius compensation                    |                       | S     | S   |
| Chamfering / Corner R                            |                       | S     | S   |
| AI contour control I                             |                       | O     | S   |
| Multi part program editing <sup>*3</sup>         |                       | S     | S   |
| Manual handle retrace                            |                       | O     | O   |
| Manual intervention and return                   |                       | S     | O   |
| External data input                              |                       | S     | S   |
| Addition of custom macro                         |                       | S     | S   |
| Increment system C                               |                       | S     | S   |
| Run hour & parts counter                         |                       | S     | S   |
| Auto power-off function                          |                       | S     | S   |
| RS-232 port                                      |                       | S     | S   |
| Memory card input / output ( CF + USB )          |                       | S     | S   |
| Ethernet                                         |                       | S     | S   |

\*2 Dynamic graphic display conflict to MANUAL GUIDE i, only can choose one to have.

MANUAL GUIDE i is standard on 31i controller.

\*3 10.4" LCD option needed

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## MACHINE SPECIFICATIONS

| CAPACITY                              | HA-1400L <sup>2</sup> ~ L <sup>10</sup>                                                                                                                                                 | HA-1600L <sup>2</sup> ~ L <sup>10</sup> | HA-2000L <sup>2</sup> ~ L <sup>10</sup> |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| Max. swing diameter                   | Ø 1,400 mm 55.11"                                                                                                                                                                       | Ø 1,600 mm 62.99"                       | Ø 2,000 mm 78.74"                       |
| Swing over saddle                     | Ø 1,000 mm 39.37"                                                                                                                                                                       | Ø 1,100 mm 43.3"                        | Ø 1,500 mm 59.05"                       |
| Max. turning diameter                 | Ø 1,100 mm 43.3"                                                                                                                                                                        | Ø 1,300 mm 51.18"                       | Ø 1,700 mm 66.92"                       |
| Max. turning length                   | 2,000 / 3,000 / 4,000 / 5,000 / 6,000 / 7,000 / 8,000 / 9,000 / 10,000* <sup>1</sup> mm<br>78.74" / 118.1" / 157.4" / 196.8" / 236.2" / 275.5" / 314.9" / 354.3" / 393.7" <sup>1</sup>  |                                         |                                         |
| Max. table load                       | 10,000 ~ 15,000 Kg 22,046 ~ 33,069 lb<br>( Need to be supported by steady rest )                                                                                                        |                                         |                                         |
| Spindle center height ( from ground ) | 1,525 mm 60.03"                                                                                                                                                                         | 1,625 mm 63.97"                         | 1,825 mm 71.85"                         |
| FLAT BED                              |                                                                                                                                                                                         |                                         |                                         |
| Flat bed width                        | 1,350 mm 53.14"                                                                                                                                                                         |                                         |                                         |
| Flat bed height                       | 815 mm 32.08"                                                                                                                                                                           |                                         |                                         |
| Slide way type                        | Four Box Ways                                                                                                                                                                           |                                         |                                         |
| SPINDLE                               |                                                                                                                                                                                         |                                         |                                         |
| Spindle drive system                  | 3-Step Gear box                                                                                                                                                                         |                                         |                                         |
| Spindle nose                          | A A2-15 B A2-15 C A2-20 D A2-28* <sup>2</sup> E A2-28* <sup>2</sup>                                                                                                                     |                                         |                                         |
| Hole through spindle                  | A 205 mm B 260 mm C 320 mm D 420* <sup>2</sup> mm E 520* <sup>1</sup> * <sup>2</sup> mm<br>A 8" B 10.2" C 12.5" D 16.5" <sup>1</sup> * <sup>2</sup> E 20.4" <sup>1</sup> * <sup>2</sup> |                                         |                                         |
| Spindle bearing diameter              | A 260 mm B 340 mm C 400 mm D 500* <sup>2</sup> mm E 600* <sup>2</sup> mm<br>A 10.2" B 13.3" C 15.7" D 19.6" <sup>2</sup> E 23.6" <sup>2</sup>                                           |                                         |                                         |
| Spindle motor type                    | α 40 / 6000i                                                                                                                                                                            |                                         |                                         |
| Motor output ( Cont. / 30 min. )      | 37 / 45 kW 50 / 60 HP                                                                                                                                                                   |                                         |                                         |
| Spindle speed range                   | A 800 B 600 C 500 D 300* <sup>2</sup> E 250* <sup>2</sup> rpm                                                                                                                           |                                         |                                         |
| Cf-AXIS SPINDLE ( OPTIONAL )          |                                                                                                                                                                                         |                                         |                                         |
| Cf-axis drive motor                   | AC 3.0 kW 4 HP                                                                                                                                                                          |                                         |                                         |
| Cf-axis rapid                         | 24 rpm                                                                                                                                                                                  |                                         |                                         |
| Cf-axis torque output ( Cont. )       | 1,524 Nm 1,124 lb-ft                                                                                                                                                                    |                                         |                                         |
| X & Z AXES                            |                                                                                                                                                                                         |                                         |                                         |
| Max. X-axis travel                    | 595 mm 23.42"                                                                                                                                                                           | 695 mm 27.36"                           | 895 mm 32.23"                           |
| Max. Z-axis travel                    | 2,150 / 3,150 / 4,150 / 5,150 / 6,150 / 7,150 / 8,150 / 9,150 / 10,150 mm<br>84.64" / 124" / 163.3" / 202.7" / 242.1" / 281.4" / 320.8" / 360.2" / 399.6"                               |                                         |                                         |
| X / Z axes rapids                     | 10 / 8 m/min. 394 / 315 IPM                                                                                                                                                             |                                         |                                         |
| Slide way type                        | Box Way                                                                                                                                                                                 |                                         |                                         |
| Feed rates                            | 1 ~ 2,000 mm/min 0.04 ~ 78.7 IPM                                                                                                                                                        |                                         |                                         |
| X-axis servo motor                    | 4 kW 5.4 HP                                                                                                                                                                             |                                         |                                         |
| Z-axis servo motor                    | 9 kW 12 HP                                                                                                                                                                              |                                         |                                         |
| X-axis ball screw Ø / pitch           | Ø 50 / pitch 10 mm Ø 1.96" / pitch 0.3"                                                                                                                                                 |                                         |                                         |
| Z-axis ball screw Ø / pitch           | Ø 80 / pitch 10 mm Ø 3.14" / pitch 0.3"                                                                                                                                                 |                                         |                                         |
| X / Z axes thrust ( Cont. )           | 1,407 / 3,400 Kgf 3,101 / 7,495 lbf                                                                                                                                                     |                                         |                                         |

Specifications are subject to change without notice.

\*1 Please contact GOODWAY for larger size requirements.

\*2 Please contact GOODWAY for further details.

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13

14

■ : Metric ■ : Inch

| TURRET                           | HA-1400L <sup>2</sup> ~ L <sup>10</sup>                                                                                                                                               | HA-1600L <sup>2</sup> ~ L <sup>10</sup> | HA-2000L <sup>2</sup> ~ L <sup>10</sup> |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| Stations                         | 12 ( 8 / 4 Opt. )                                                                                                                                                                     |                                         |                                         |
| Indexing drive                   | FANUC AC Servo motor                                                                                                                                                                  |                                         |                                         |
| Indexing speed                   | 0.3 sec. ( Adjacent ) / 0.8 sec. ( 180° Single step )                                                                                                                                 |                                         |                                         |
| O.D. tool shank size             | <input type="checkbox"/> 32 mm <input type="checkbox"/> 40 / 50 mm Opt.<br><input type="checkbox"/> 1-1/4" <input type="checkbox"/> 1-1/2" / 2" Opt.                                  |                                         |                                         |
| I.D. tool shank size             | Ø 60 mm   2-1/2"                                                                                                                                                                      |                                         |                                         |
| LIVE TOOLING TURRET ( OPTIONAL ) |                                                                                                                                                                                       |                                         |                                         |
| Live tooling stations            | 12 ( 8 Opt. )                                                                                                                                                                         |                                         |                                         |
| Indexing drive type              | Spindle motor                                                                                                                                                                         |                                         |                                         |
| Index speed                      | 0.3 sec. ( Adjacent ) / 0.8 sec. ( 180° Single step )                                                                                                                                 |                                         |                                         |
| O.D. tool shank size             | <input type="checkbox"/> 25 mm   1"                                                                                                                                                   |                                         |                                         |
| I.D. tool shank size             | Ø 50 mm   2"                                                                                                                                                                          |                                         |                                         |
| Live tooling shank size          | ER 40 collets ( ER 50 collets Opt. )                                                                                                                                                  |                                         |                                         |
| Live tooling RPM range           | 4,000 rpm                                                                                                                                                                             |                                         |                                         |
| TAILSTOCK ( OPTIONAL )           |                                                                                                                                                                                       |                                         |                                         |
| Quill center taper               | MT#6 Dead center                                                                                                                                                                      |                                         |                                         |
| Quill diameter                   | Ø 200 mm Rotary type ( Ø 250 mm Opt. )<br>Ø 7.87" Rotary type ( Ø 9.84" Opt. )                                                                                                        |                                         |                                         |
| Quill travel                     | 250 mm ( 9.84" )                                                                                                                                                                      |                                         |                                         |
| Tail stock base travel           | 2,000 / 3,000 / 4,000 / 5,000 / 6,100 / 7,100 / 8,100 / 9,100 / 10,100 <sup>1</sup> mm<br>78.74" / 118.1" / 157.4" / 196.8" / 240.1" / 279.5" / 318.8" / 358.2" / 397.6" <sup>1</sup> |                                         |                                         |
| Programmable quill               | Yes                                                                                                                                                                                   |                                         |                                         |
| GENERAL                          |                                                                                                                                                                                       |                                         |                                         |
| NC controller                    | FANUC Oi-TF                                                                                                                                                                           |                                         |                                         |
| Voltage / Power requirement      | AC 220 V / 65 kVA                                                                                                                                                                     |                                         |                                         |
| Hydraulic tank capacity          | 100 L   26 gal                                                                                                                                                                        |                                         |                                         |
| Coolant tank capacity            | 2,115 L ( L <sup>5</sup> )   558 gal                                                                                                                                                  |                                         |                                         |
| Coolant pump                     | 0.7 kW rated at 3 bar ( 40 PSI )                                                                                                                                                      |                                         |                                         |

Specifications are subject to change without notice.

#### MACHINE WEIGHT

|         | L <sup>2</sup> | L <sup>3</sup> | L <sup>4</sup> | L <sup>5</sup> | L <sup>6</sup> | L <sup>7</sup> | L <sup>8</sup> | L <sup>9</sup> | L <sup>10</sup> |
|---------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| HA-1400 | 26,200         | 28,600         | 31,000         | 33,400         | 40,500         | 43,400         | 46,300         | 49,200         | 52,100          |
|         | 57,800         | 63,100         | 68,400         | 73,700         | 89,300         | 95,700         | 102,100        | 108,500        | 114,900         |
| HA-1600 | 26,800         | 29,200         | 31,600         | 34,000         | 41,100         | 44,000         | 46,900         | 49,800         | 52,700          |
|         | 59,100         | 64,400         | 69,700         | 75,000         | 90,700         | 97,100         | 103,400        | 109,800        | 116,200         |
| HA-2000 | 28,100         | 30,500         | 32,900         | 35,300         | 42,300         | 45,200         | 48,100         | 51,000         | 53,900          |
|         | 62,000         | 67,300         | 72,600         | 77,900         | 93,300         | 99,700         | 106,100        | 112,500        | 118,900         |

Specifications are subject to change without notice.

Unit : kg ( lb )

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