KEN

Focus High Speed & 5-axis

LiNMAX

LINEAR MOTOR SERIES

COMPACT Gantry Type High Speed 5-axis Machine Center

KEN ICHI MACHINE CO ., LTD


KEN

LINMAX

LINEAR MOTOR SERIES

COMPACT *Gantry Type High Speed 5-axis Machine Center*

Specialized design for

Plastic injection mold & High-speed five-axis machining

- Gantry Type
- Linear Motor Drive
- One-piece Structure Design
- Torque Motor Driven Milling Head

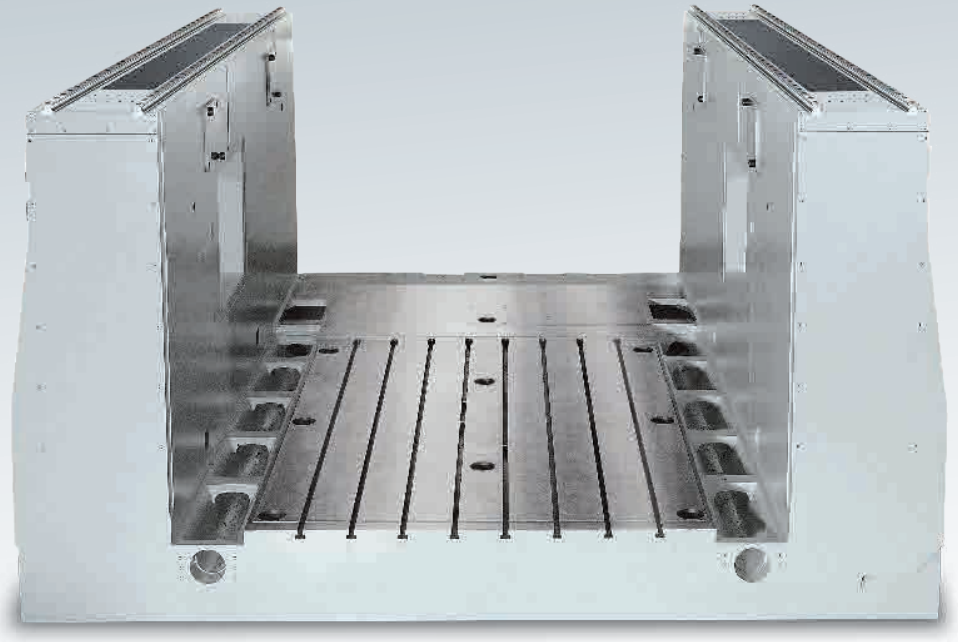
GANTRY TYPE
ONE PIECE STRUCTURE DESIGN

High-speed performance

- Gantry type design, all axial components (X / Y / Z / A / C axis) is movement on the top of the column. The work piece is fixed on the table so that the weight of the work piece does not affect the machine performance.
- European advanced FEM analysis and design optimization for higher rigidity and response.
- Optimal structural design for high-speed & high precision machining.

ONE PIECE STRUCTURE DESIGN

Improves the overall structural rigidity
Ensure the stability of precision and mechanical performance



LINMAX-1625
One piece structure design.

LINMAX-2232
Three main components linked into one-piece structure design.

LINEAR MOTOR DRIVE

The inevitable trend in the future

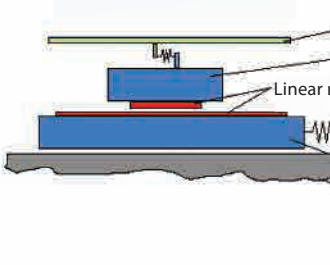
5-axis repeatability accuracy

Linear Motor Advantages

- Back lash free high positioning accuracy.
- Fewer parts. (reduce ball screw / nut, bearings couplings)
- Free of wear due to friction free drive concept.
- Simple structure / long-term accuracy / easy maintenance.

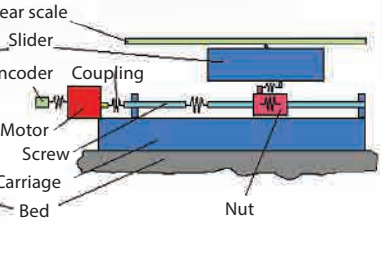
Linear motor VS. Ball screw

Linear motor drive



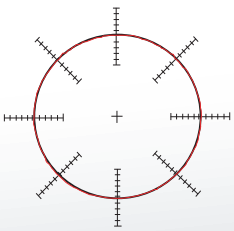
- Direct transmission
- System with higher KV value
- Path of high precision
- No backlash

Ball screw drive



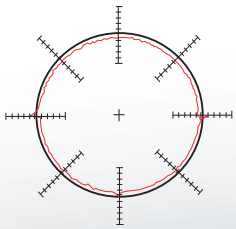
- Transmission chain length, the error is larger
- The path less accuracy
- Existence of backlash

Diameter : 300 mm
Feedrate : 4 m/min
Quality : ca. 1,2t



Linear motor drive

Error : 0.4 μ m



Ball screw drive

Error : 5 μ m

Source by : Siemens laboratory testing

EXCELLENT DESIGN FOR 5-AXIS HIGH SPEED MACHINE

Linear motor dry run

X-axis

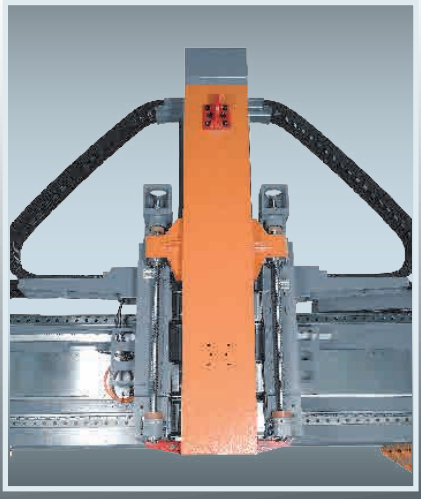
- X-axis is supported by a one-piece machine body structure, both sides of the column have two roller linear guideways on each side, each guideway has three high precision bearing blocks for increased rigidity.
- Both sides of the column have linear motor direct drive system to achieve high speed response.
- X-axis using two linear scale, each side having one set, can control dynamic accuracy. (Heidenhain resolution 0.1 μ)

Y-axis

- Y-axis using two roller linear guideways on the crossbeam for high speed movement. There are five high precision bearing blocks for increased rigidity. (Two on top rail / three on bottom rail)
- Linear motors, direct drive Y-axis movement, can achieve high-speed response.
- Y-axis using Heidenhain linear scale (resolution 0.1 μ) control accuracy, improve processing accuracy.

Z-axis

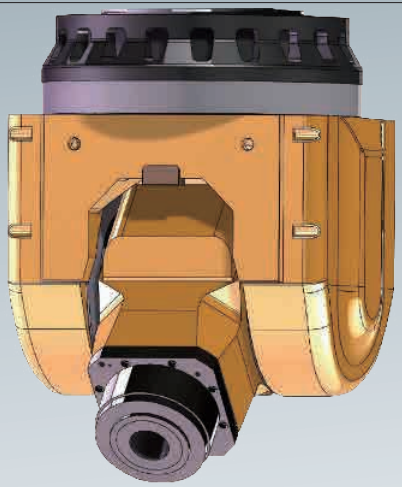
- Z-axis (head) moves by direct driven, dual ball screws using advanced servo motor technology. (Increased rigidity)
- There are two roller guideways, each with three high precision bearing blocks for high speed response and improved stability.
- Z-axis counterweight using hydraulic cylinder, hydraulic cylinders arranged in the center of both guideways, has the best high-speed milling stability.
- Z-axis using Heidenhain linear scale (resolution 0.1 μ) control accuracy, improve processing accuracy.



Specialized design for plastic injection mold
Three kinds of torque motor drive two axis milling head.

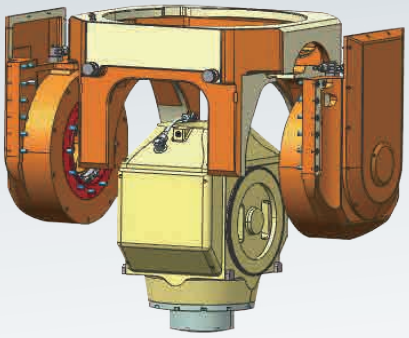
- *TCH-19 (A100)*
- *TCH-19 (A63)*
- *TCH-L13 (EVO)*

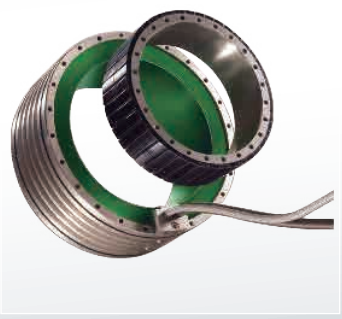
TCH-19

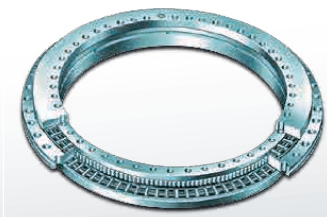


Modular design for two-axis milling heads
Torque motor direct drive

- Fork type modular design, easy maintenance, easy to disassemble.
- B、C-axis use torque motor direct drive with high-speed, high-torque.
- Remove the traditional wear parts, (worm and worm gears, belts ...) no backlash no wear and achieve long lasting accuracy.
- High rigidity roller bearing support achieving excellent rigidity and accuracy for B / C axis.
- Hydraulic disc brake system with tightly locked rotation axis can satisfy any position milling.
- Longer spindle extension 200 mm and 185 mm, suitable deep cavity milling and reduce interference range.
- Using Italian spindle, provide two kinds of spindle specifications best suited for plastic injection mold.
- Using high-resolution, high-precision encoder for B / C axis.





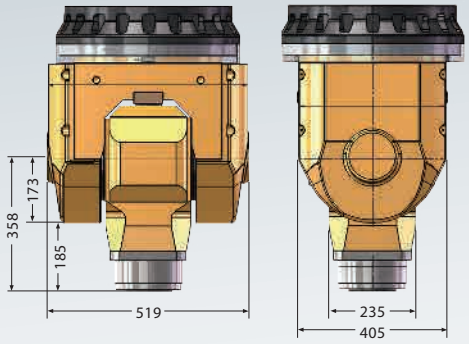


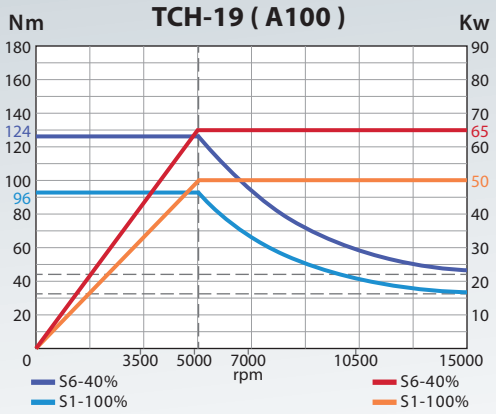
Torque motor direct drive

We reserve the right to change the above design without prior notification.

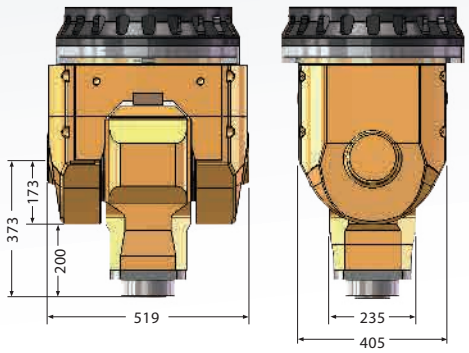
MILLING HEAD / SPINDLE SPECIFICATIONS AND LAYOUT

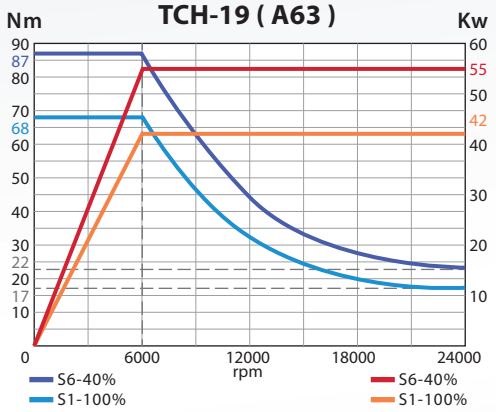
TCH-19 (A100)





TCH-19 (A63)





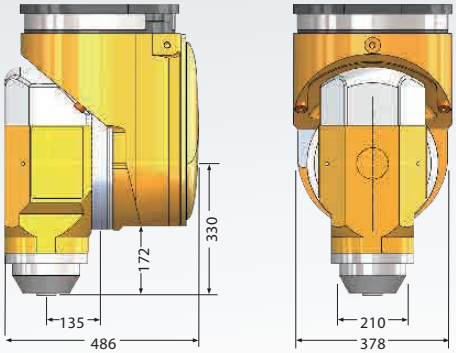
MILLING HEAD B&C-AXIS (Torque Motor Drive)		TCH-19 (A100)	TCH-19 (A63)
Rotation speed B/C	rpm (360° / s)	50 / 50	50 / 50
Max. acceleration B/C	rad / s²	30 / 30	30 / 30
Max. torque B/C	Nm	1,100 / 900	1,100 / 900
Clamping torque B/C	Nm	4,000 / 4,000	4,000 / 4,000
Positioning accuracy B/C	arc.sec	±3 / ±3	±3 / ±3
Rotation angle B/C	deg	±105° / ±270°	±105° / ±270°
SPINDLE			
Spindle power S1-100% (S6-40%)	kw	50 (65)	42 (55)
Spindle power S1-100% (S6-40%)	Nm	96 (124)	67 (87)
Max. speed	rpm	15,000	24,000
Tool shank	type	HSK-A100	HSK-A63

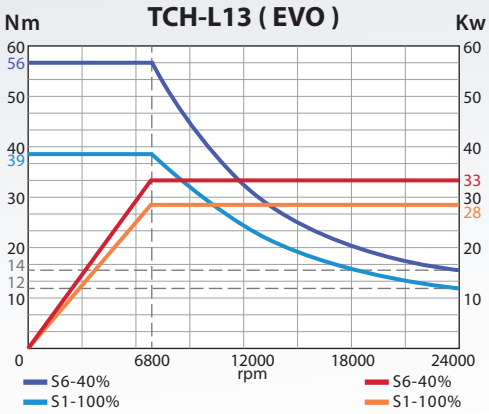
Specialized design for plastic injection mold.

TCH-L13 EVO

Small size, less interference range
Suitable for plastic injection mold applications

- A, C-axis use Torque motor direct drive with high-speed, high-torque.
- Remove the traditional wear parts, (worm and worm gears, belts ...) no backlash no wear and achieve long lasting accuracy.
- Longer spindle extension 172 mm, reduce interference range.
- Maximum spindle speed of 24,000 rpm optimizes the use of smaller cutting tools.





MILLING HEAD A&C-AXIS (Torque Motor Drive)		TCH-L13 (EVO)
Rotation speed A/C	rpm (360° / s)	50 / 50
Max. acceleration A/C	rad / s²	20 / 20
Max. torque A/C	Nm	312 / 447
Clamping torque A/C	Nm	2,000 / 2,000
Positioning accuracy A/C	arc.sec	±3 / ±3
Rotation angle A/C	deg	±105° / ±270°
SPINDLE		
Spindle power S1-100% (S6-40%)	kw	28 (33)
Spindle power S1-100% (S6-40%)	Nm	39 (56)
Max. speed	rpm	24,000
Tool shank	type	HSK-A63

Milling head dry run

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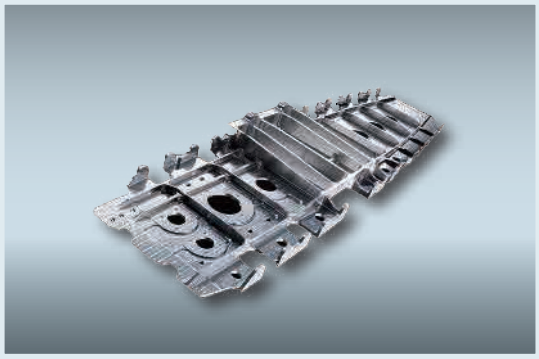
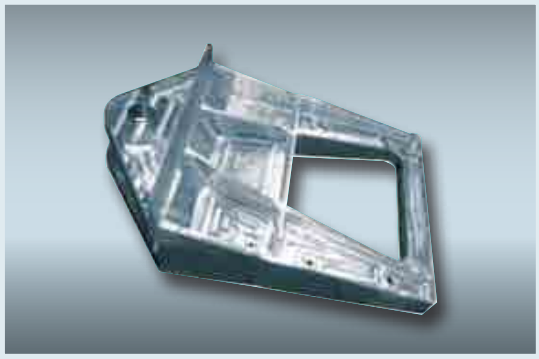
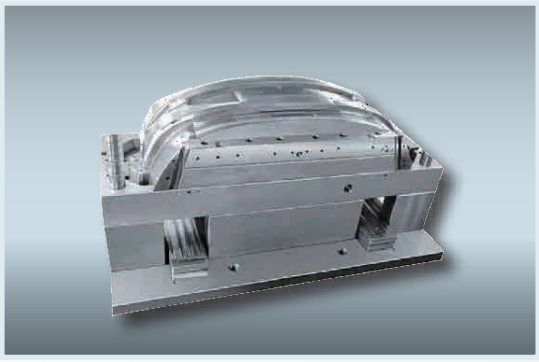
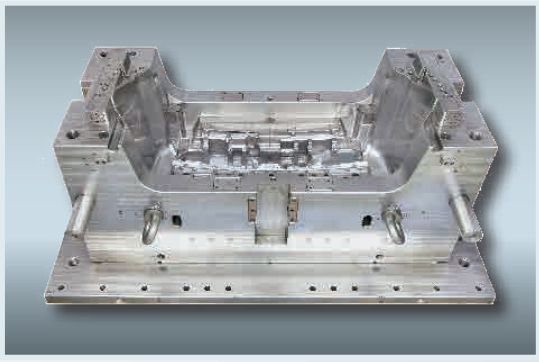
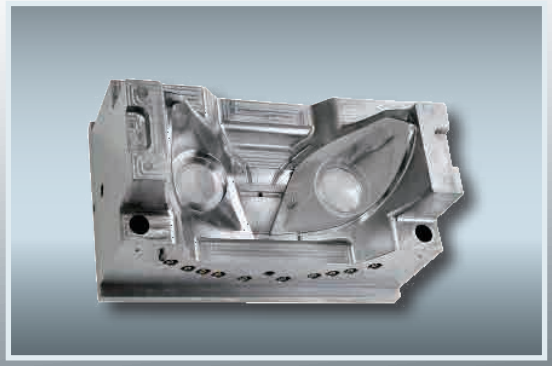
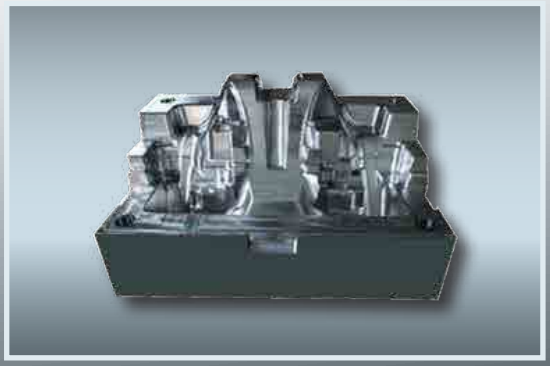
APPLICATIONS

Aerospace



Automotive mold

MACHINE SPECFICATION

Specifications / Model	Unit	Linmax-1625	Linmax-2232
Travel			
X-axis travel	mm (in)	2,500 (98.4)	3,200 (125.9)
Y-axis travel	mm (in)	1,600 (63)	2,200 (86.6)
Z-axis travel	mm (in)	1,000 (39.4)	1,000 (39.4)
Table			
Table length	mm (in)	2,500 (98.4)	3,200 (125.9)
Table width	mm (in)	1,600 (62.9)	2,200 (86.6)
T-slot size (width)	mm (in)	22 (0.9)	22 (0.9)
Table load	Kg/m^2	4,000	6,000
Distance between spindle nose to table surface (TCH13 EVO)	mm (in)	200-1,200 (7.8 ~ 47.2)	300-1,300 (11.8 ~ 51.1)
Distance between columns	mm (in)	2,350 (92.5)	2,950 (116.1)
Feedrate			
X / Y / Z-axis rapid feedrate	m/min	60	60
X / Y / Z-axis acceleration	m/sec^2	5	5
Other			
Power request	KVA	110	
Air request	Kg/cm^2	6~8	

Milling Head Type	Unit	TCH-L13 (EVO)	TCH-19 (A63)	TCH-19 (A100)
Auto tool changer				
Tool shank	type	HSK-A63		HSK-A100
Tool magazine capacity	pcs	20		20
Max. tool weight	Kgs	8		15
Max. tool length	mm	350		350
Max. tool dimensions	mm	Ø 63		Ø 100

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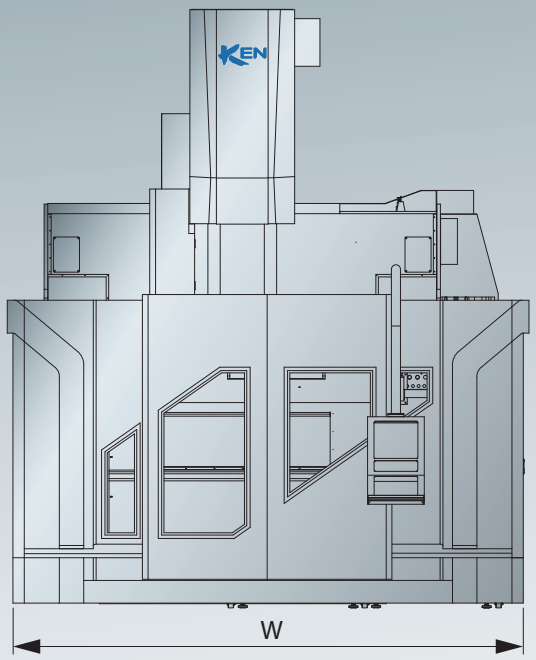
STANDARD ACCESSORIES

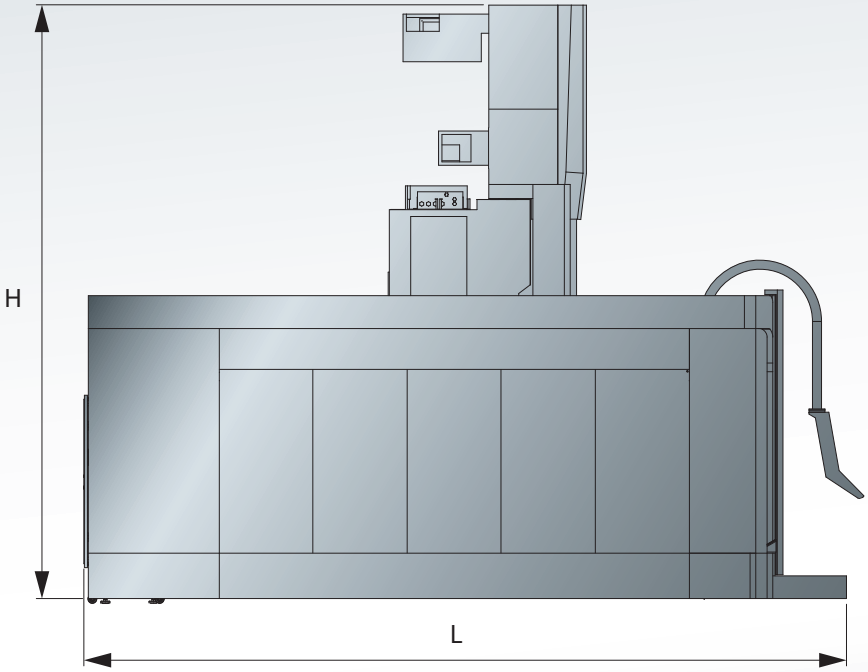
- HEIDENHAIN ITNC-530 controllers. (X, Y, Z, A, C-five-axis continuous)
- HEIDENHAIN Handwheel - HR520.
- Europe imported 2-axis milling head - TCH-L13. (EVO)
- European system of vertical spindle HSK A-63 24,000 RPM.
- HSK A-63 20 tools magazine.
- X / Y axis linear motor direct drive.
- 8 roller linear guideways. (4 sets for X-axis, 4 sets for Y / Z-axis)
- 4 HEIDENHAIN linear scale. (2 sets for X-axis, 2 sets for Y / Z-axis)
- Electrical cabinet temperature control device.
- X / Y axis Linear motor coolant system.
- The spindle and milling head coolant system.
- Spindle oil mist lubrication system.
- Cutting oil mist device.
- Dual spiral-type chip conveyors with front lift out conveyor.
- Front and rear working door safety interlock. (each type)
- Waterproof work light.
- Protection devices complete and reliable, work area safety, according to ISO 12100-1 & -2 1992.
- Electrical cabinet with air-conditioning systems, filtration and ventilation installations and variety of electrical protection.
- Machine standard color.

OPTION ACCESSORIES

- TCH-19 (A63) Modular 2-axis Milling Head + 24,000 rpm spindle
- TCH-19 (A100) Modular 2-axis Milling Head + 15,000 rpm spindle
- Siemens-840D CNC controllers
- Laser tool measuring system
- Touch probe for work piece measuring
- Coolant through spindle
- Transformer
- Voltage stabilizer

LAYOUT





Unit : mm (in)	Model	
	Linmax-1625	Linmax-2232
L (Length)	5,419 (213.3)	6,545 (257.6)
W (Width)	5,265 (207.2)	5,865 (230.9)
H (Height)	5,250 (206.7)	5,250 (206.7)

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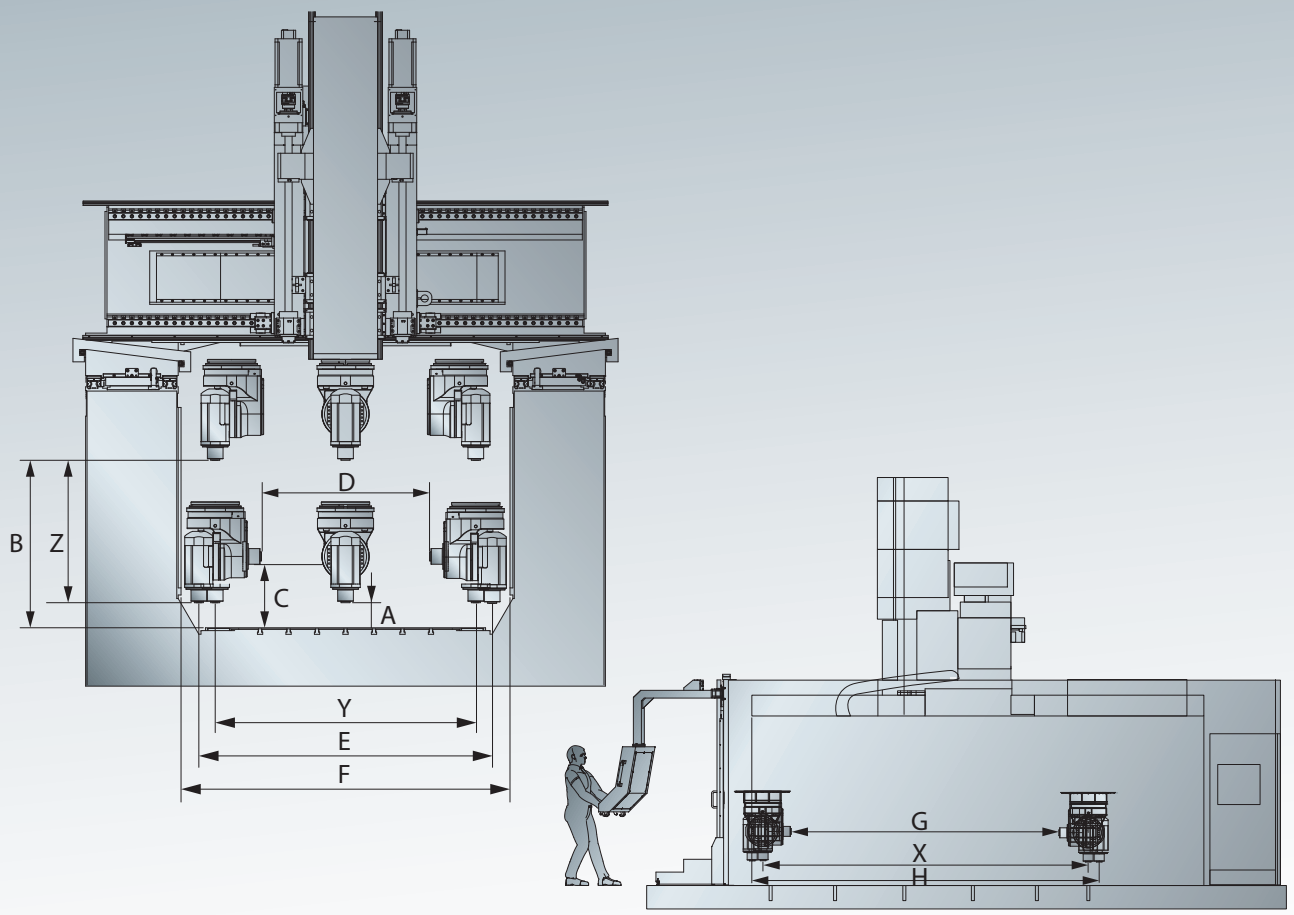
WORKING AREA



Regional : mm (in)	Milling Head	Linmax-1625	Linmax-2232
Z (Z-axis travel)		1,000 (39.4)	
A (Distance between spindle nose to table surface)	TCH-L13 (EVO)	200 (7.8)	300 (11.8)
	TCH-19 (A63)	200 (7.8)	300 (11.8)
	TCH-19 (A100)	215 (8.4)	315 (12.4)
B (Z-axis opening height)	TCH-L13 (EVO)	1,200 (47.2)	1,300 (51.1)
	TCH-19 (A63)	1,200 (47.2)	1,300 (51.1)
	TCH-19 (A100)	1,215 (47.8)	1,315 (51.7)
C (Swing axis 90°) Z-direction	TCH-L13 (EVO)	530 (20.8)	630 (24.8)
	TCH-19 (A63)	573 (22.5)	673 (26.5)
	TCH-19 (A100)	558 (21.9)	658 (25.9)
D (Swing axis 90°) Y-direction	TCH-L13 (EVO)	940 (37)	1,540 (60.6)
	TCH-19 (A63)	854 (33.6)	1,454 (57.2)
	TCH-19 (A100)	884 (34.8)	1,484 (58.4)
Y (Y-axis travel)		1,600 (62.9)	2,200 (86.6)
E (Rotation axis 90°)	TCH-L13 (EVO)	1,870 (73.6)	2,470 (97.2)
F (Distance between columns)		2,350 (92.5)	2,950 (116.1)
X (X-axis travel)		2,500 (98.4)	3,200 (125.9)
G (Swing axis 90°) X-direction	TCH-L13 (EVO)	1,840 (72.4)	2,540 (100)
	TCH-19 (A63)	1,754 (69)	2,454 (96.6)
	TCH-19 (A100)	1,784 (70.2)	2,484 (97.7)
H (Rotation axis 0°) X-direction	TCH-L13 (EVO)	2,770 (109)	3,470 (136.6)

Focus High Speed & 5-axis

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