Mazak

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INTEGREX e-V, e-RAMTEC V SERIES SmoothX 17.02.0000 G 99J276116E 1Ⓦ

INTEGREX e-V SERIES, INTEGREX e-RAMTEC V SERIES

EE

SMOOTH TECHNOLOGY

INTEGREX e-V SERIES

INTEGREX e-RAMTEC V SERIES

1250V/8
1250V/8S
1600V/10
1600V/10S
1850V/12
1850V/25S
RAMTEC V/8
RAMTEC V/10
RAMTEC V/12

Mazak

Advanced features of the Mazak SmoothX CNC

Touch screen operation—
Operate similar to your smart phone / tablet

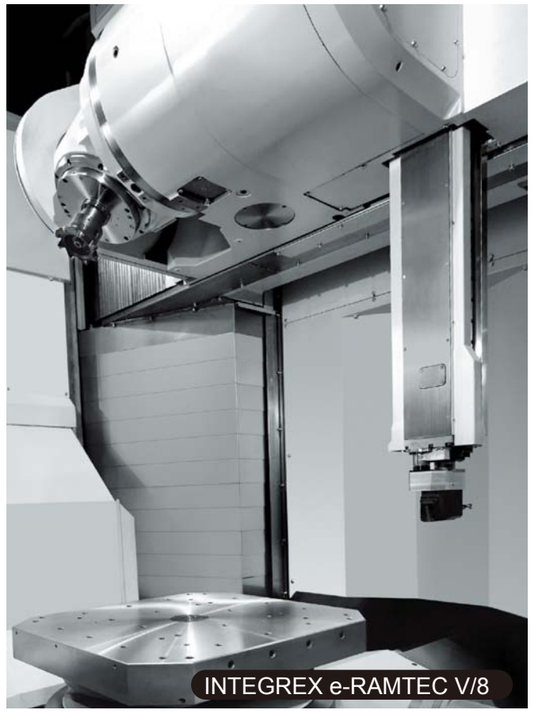
PC with Windows® embedded OS

Fastest CNC in the world—Latest hardware and software for unprecedented speed and precision

Smooth user graphical interface and support functions for unsurpassed ease of operation

MTConnect® ready—Convenient networking


INTEGREX e-1250V/8


INTEGREX e-RAMTEC V/8


Planetary gear box carrier


Jet engine casing

DONE IN ONE processing of large workpieces

- Integration of a 5-axis machining center and VTL
- High-rigidity design provides exceptional machining performance and high-accuracy
- High-accuracy milling by X and Y-axes at workpiece surface thanks to gate column construction
- High torque turning and high speed, high accuracy C-axis positioning
- Ram spindle on the e-RAMTEC V expands inner diameter machining capability and integrates multiple machining processes
- Ergonomic-focused design for outstanding ease of operation

Vertical multi-tasking machine

INTEGREX e-V SERIES
INTEGREX e-RAMTEC V SERIES

DONE IN ONE

The “DONE-IN-ONE” concept incorporates all machining processes from raw material input through final machining – in just one machine. It provides the ability to reduce production lead time, improve machining accuracy, reduce floor space and initial cost, lower operating expenses, reduce operator requirements and to improve the work environment. As a result, the concept not only streamlines production, it also improves overall management.

Number of processes: **50% reduction**
Considerably faster in process time

For a workpiece with high accuracy requirements, such as a machine tool table, a number of machining operations is required as well as several machine setups and workpiece handlings.

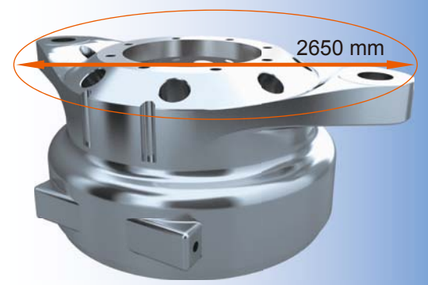
	Previous production process:	INTEGREX e-V, e-RAMTEC V:
Number of operators	Two	One
Number of machines	Two (VT/C, HMC)	One (INTEGREX e1250V/8)
Number of programs	Four	Two
Number of machine setups (Loading and positioning workpieces)	Four	Two
Number of tools	Two machines	One machine
Number of fixtures	One	None
In process inventory	Four times more	Minimum

Applications

Designed for processing large, heavy workpieces for a wide range of industries

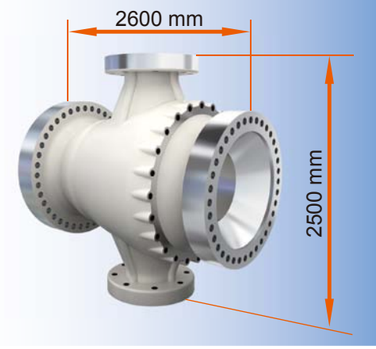
Energy industry

Reducer housing for wind generator



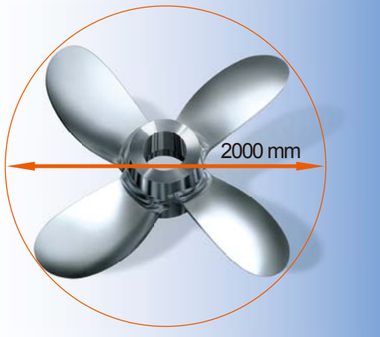
Oil industry

Valve case



Marine industry

Propellor



Higher Accuracy

High rigidity construction for high accuracy machining

Prevention of temperature change — milling spindle cooling

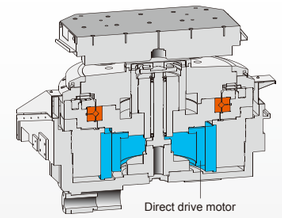
Temperature controlled cooling oil circulates through the milling spindle headstock to prevent heat displacement.

Roller gear cam utilized by B-axis

Elimination of backlash ensures high accuracy and high efficiency machining. (over the rotary positioning range of 150 degrees, positioning accuracy is two times better than the ISO standard)

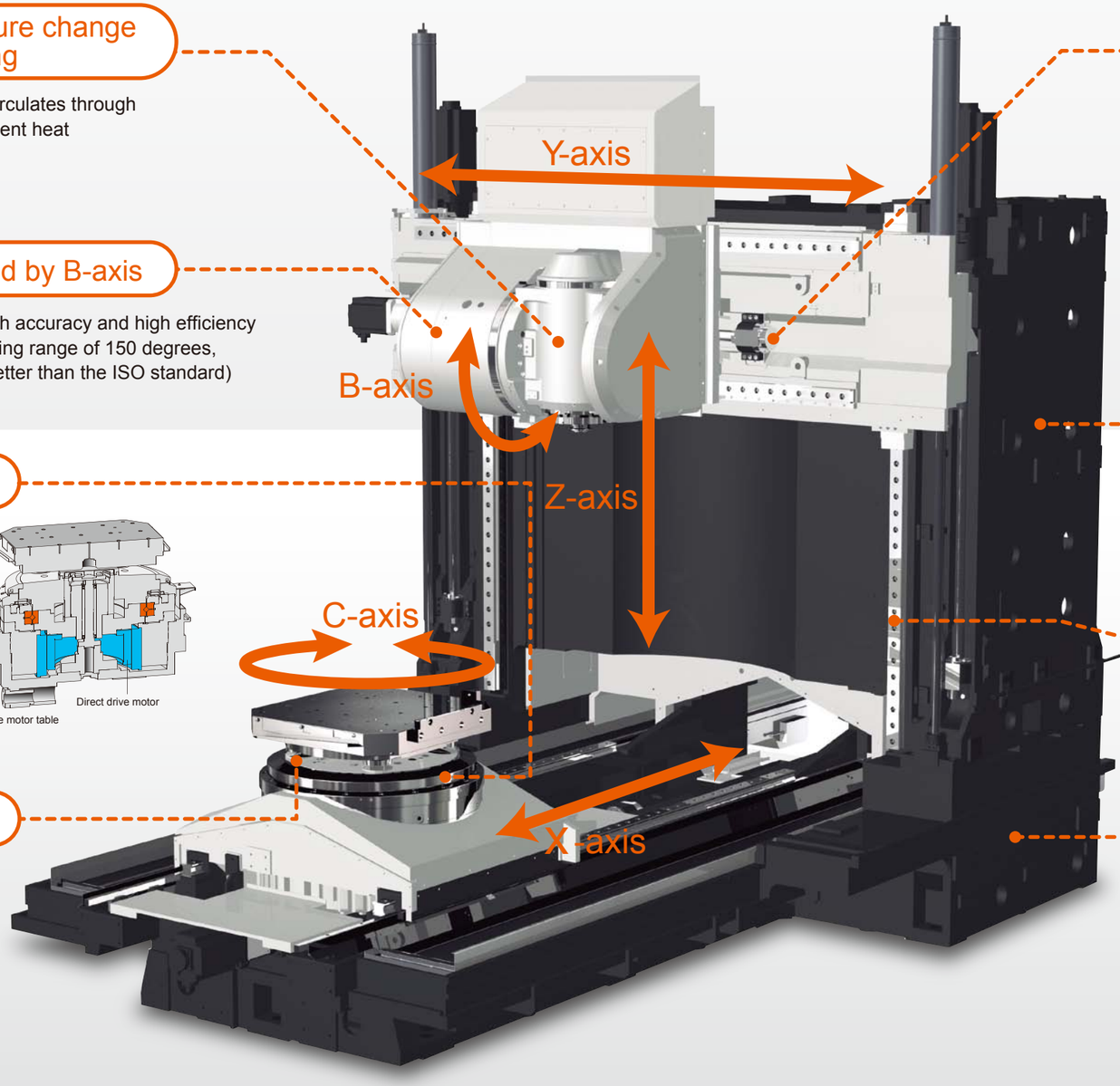
Direct drive motor

A direct drive motor is used for turning and C-axis operations. Since this eliminates a drive system made of belts and gears – there is no vibration, heat generation and backlash, high accuracy machining is realized. (e-1250V/8, e-1250V/8S, e-1600V/10 and e-1600V/10S only)



Taper cones

The pallet and table are connected by the taper cone clamping system. High rigidity and positioning accuracy of consecutive pallet changes are ensured.
(Single table e-1250V/8S and e-1600V/10S: tables are bolted to machine base)



Ball screw core cooling

Temperature controlled cooling oil circulates through the ball screw cores to ensure stable machining accuracy over extended periods of high speed operation.

Rigid, stable column

The column shape and weight distribution have been thoroughly analyzed so that the center of gravity is located to provide exceptional rigidity and stability. (e-1250V/8, e-1250V/8S, e-1600V10 and e-1600V/10S only)

Linear roller guides utilized on the X-, Y-, and Z-axes

Linear roller guides on the X-, Y-, and Z-axes are utilized by the INTEGREX e-V series and INTEGREX e-RAMTEC V series in order to provide high-accuracy and heavy duty machining.

High rigidity base

Rigidity is ensured thanks to the wide base with thick walls and optimized rib layout.

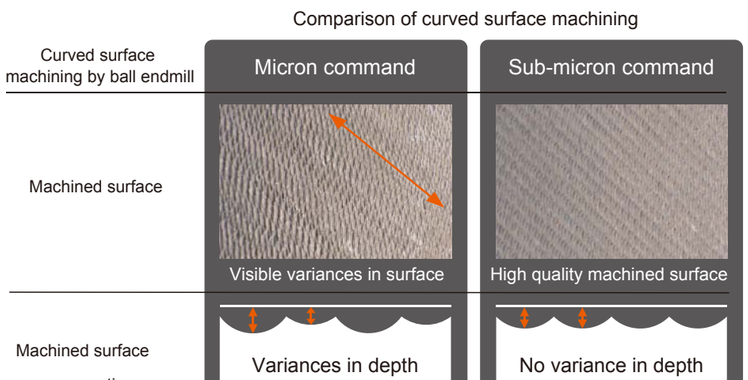
Higher Accuracy

The result of advanced machine construction and control technology

Sub-micron input

For high machining accuracy, contours can be defined in sub-micron units (0.0001 mm) for both MAZATROL and EIA/ISO format programs. The SmoothX CNC is equipped with the latest CPU which can perform calculations much faster than other systems. High accuracy and high speed machining is realized even when using sub-micron program commands.

Comparison of curved surface machining



Note : The above test was conducted with the same machine and same program
– one with micron program command and the other with sub-micron program command.

Positioning and Positioning Repeatability Accuracy

INTEGREX e-1250V/8				ISO	Mazak standard	Result
Linear axes Positioning accuracy Unit : μm	X-axis	Difference in positioning accuracy in both directions	M	20	10	1.14
		Positioning accuracy repeatability in one direction (+)	R↑	12	6	0.94
		Positioning accuracy repeatability in one direction (−)	R↓	12	6	0.99
	Y-axis	Difference in positioning accuracy in both directions	M	20	10	0.53
		Positioning accuracy repeatability in one direction (+)	R↑	10	5	1.78
		Positioning accuracy repeatability in one direction (−)	R↓	10	5	1.79
	Z-axis	Difference in positioning accuracy in both directions	M	20	10	0.99
		Positioning accuracy repeatability in one direction (+)	R↑	12	6	1.37
		Positioning accuracy repeatability in one direction (−)	R↓	12	6	1.28
Rotary axes Positioning accuracy Unit : sec	B-axis	Difference in positioning accuracy in both directions	A	28	14	2.43
		Positioning accuracy repeatability in one direction (+)	R↑	8	4	2.07
		Positioning accuracy repeatability in one direction (−)	R↓	8	4	1.66
	C-axis	Difference in positioning accuracy in both directions	A	28	14	2.19
		Positioning accuracy repeatability in one direction (+)	R↑	8	4	1.35
		Positioning accuracy repeatability in one direction (−)	R↓	8	4	1.51

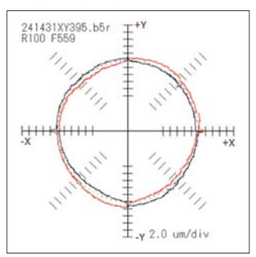
Note : The inspection is conducted according to ISO-230 on a recommended foundation with room temperature controlled to 22˚C±1˚C after machine has reached stable operation temperature

Circular interpolation (DBB)

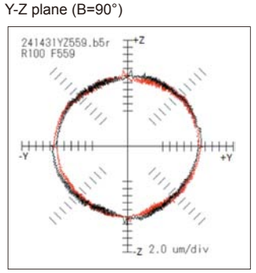
Stick-slip motion of the feed axes is minimized thanks to the synergy of Mazak's unique quadrant projection compensation and the new servo drive system. Projections during quadrant changes are minimized to ensure and high quality.

INTEGREX e-1250V/8

X-Y plane (B=0°)



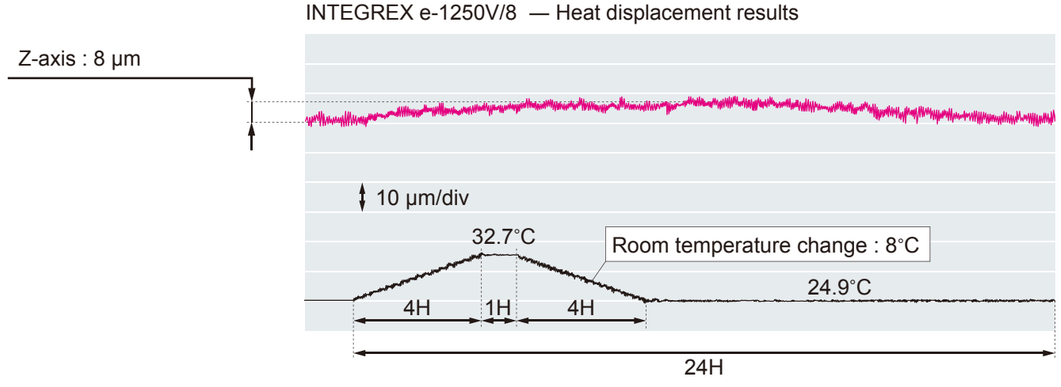
Y-Z plane (B=90°)



Circular motion accuracy (DBB) Feedrate : 559 (mm/min)			Mazak standard	Result
Roundness Unit : μm	X-Y plane（B=0°）	CW	5	3.4
	X-Y plane（B=0°）	CCW	5	3.8
	Y-Z plane（B=90°）	CW	5	4.1
	Y-Z plane（B=90°）	CCW	5	4.0

Note : The inspection is conducted according to ISO-230 on a recommended foundation with room temperature controlled to 22˚C±1˚Cafter machine has reached stable operation temperature

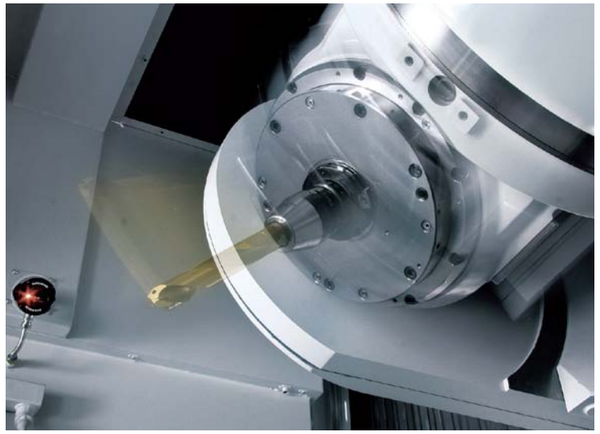
Z-axis heat displacement (during room temperature changes)



Higher Productivity

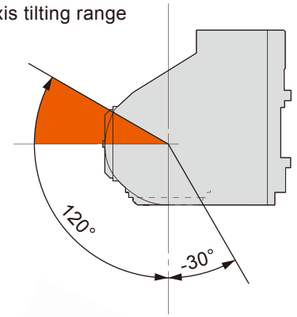
Enhanced machining performance for high productivity

B-axis tilting range 150°



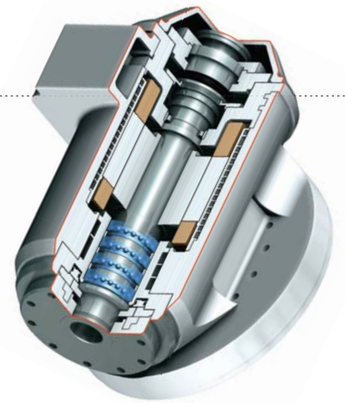
The B-axis tilting range 150°(-30°~120°) is driven by a roller gear cam without any backlash to ensure high accuracy.

B-axis tilting range



Powerful milling spindle for fast cycle times

The milling spindle features an integral spindle/motor in a compact headstock that provides high output. In addition to the standard 10000 rpm spindle that can machine a wide variety of materials, the high torque 5000 rpm spindle for the machining of difficult-to-machine materials and the high speed 15000 rpm spindle for the machining of nonferrous metals are optionally available.



Machining example (standard specification)

Material removal rate	**1092** cc/min
Material	S45C
Tool	Face mill Φ160 mm, 8 teeth

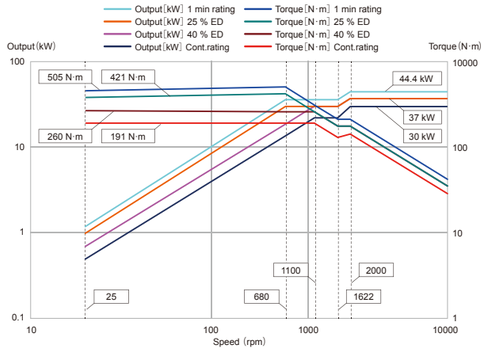
Cutting conditions

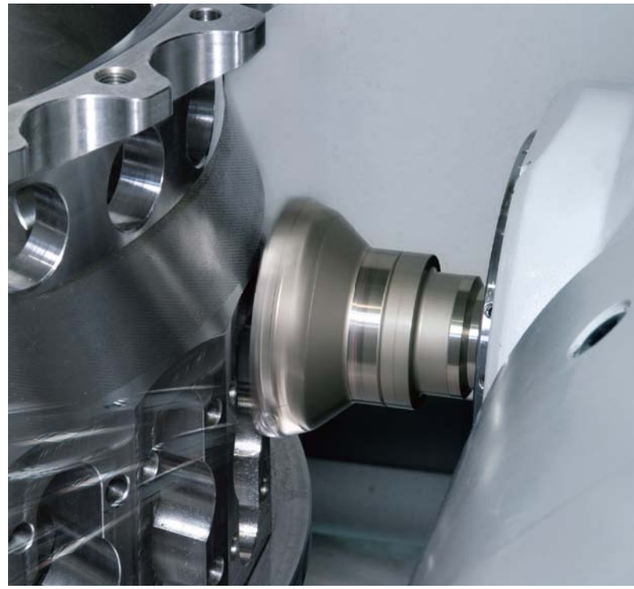
Spindle speed	500 rpm
Surface speed	250 m/min
Cut	4.2 mm
Feedrate (per tooth)	0.45 mm / blade

Standard 10000 rpm milling spindle

Max. speed	10000 rpm
Spindle bearing ID	Φ100 mm
Output	AC 37 kW (50 HP) [40% ED]
	AC 30 kW (40 HP) [Cont.rating]
Max. torque	191 N·m (19.3 kgf·m) [Cont.rating]

Standard 10000 rpm milling spindle output / torque diagram

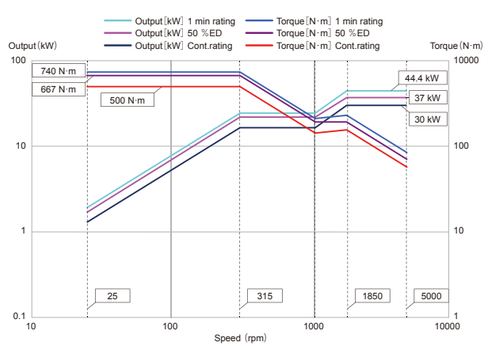




High torque 5000 rpm milling spindle OPTION

Max. speed	5000 rpm
Spindle bearing ID	Φ100 mm
Output	AC 37 kW (50 HP) [50% ED]
	AC 30 kW (40 HP) [Cont.rating]
Max. torque	500 N·m (50.9 kgf·m) [Cont.rating]

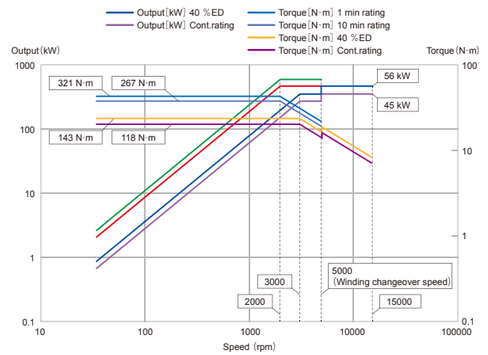
High torque 5000 rpm milling spindle output / torque diagram



High speed 15000 rpm milling spindle [BBT-50] OPTION

Max. speed	15000 rpm
Spindle bearing ID	Φ90 mm
Output	AC 56 kW (75 HP) [40% ED]
	AC 45 kW (60 HP) [Cont.rating]
Max. torque	118 N·m (12.0 kgf·m) [Cont.rating]

High speed 15000 rpm milling spindle output / torque diagram



Note : Distance between the gauge line and the center of B-axis rotation is 350 mm, 50 mm larger than the standard spindle. The machining area is reduced by a corresponding amount

Higher Productivity

e-RAMTEC V ram spindle for unsurpassed versatility

The ram spindle is mounted on the side of the milling spindle housing and has a vertical stroke of 900 mm. Is designed so that not only turning but also milling processes can be performed. In order to perform a wide variety of machining, the ram spindle has its own tool magazine with a capacity of 40 tools.

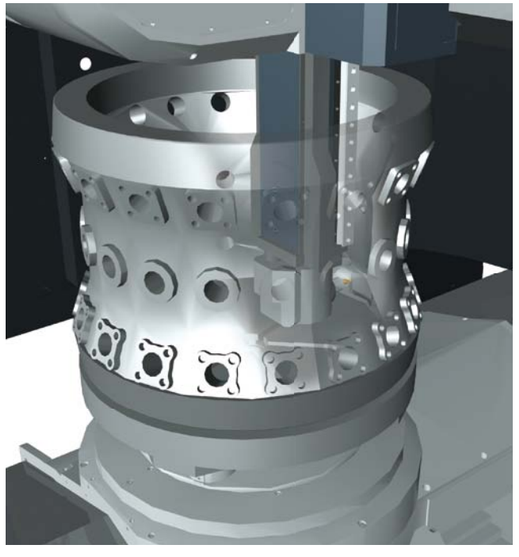
Available machine models	INTEGREX e-RAMTEC V/8 INTEGREX e-RAMTEC V/10 INTEGREX e-RAMTEC V/12

I.D. boring by ram spindle

A minimum I.D. bore of Φ300 mm to a maximum depth of 900 mm can be machined.

Milling by ram spindle

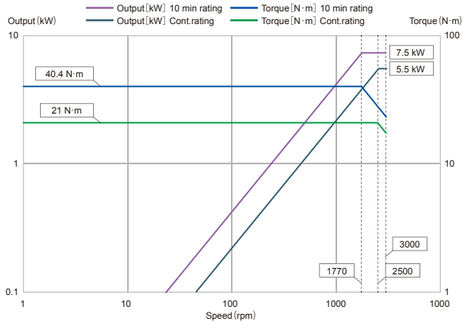
The ram spindle has a 7.5 kW (10HP) milling motor for I.D. milling with a milling holder. Thanks to the EY-32 collet chuck, a maximum tool shank diameter of Φ20 mm can be used.



Specification of ram spindle milling motor

Speed	3000 rpm
Output	AC 7.5 kW (10 HP) [10 min rating]
Max. torque	40.4 N·m (4.1 kgf·m) [10 min rating]

Ram spindle milling motor output

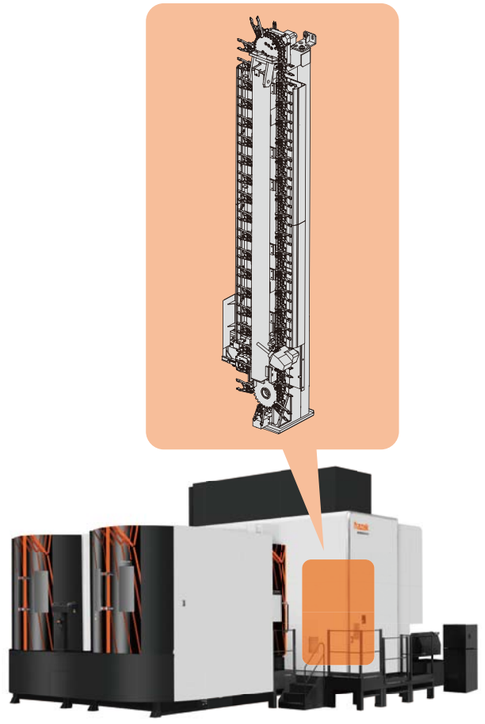


40-tool magazine for ram spindle

The tool magazine is located to the right of the CNC control. Tool changes can be done automatically to perform a variety of machining operations as well as store spare tools to make operation over extended periods possible.

Maximum tool specifications

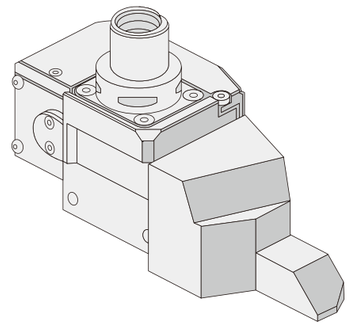
Machines	INTEGREX e-RAMTEC V/8 INTEGREX e-RAMTEC V/10 INTEGREX e-RAMTEC V/12
Max. diameter when using milling holder	50 mm
Tool length (from the center of CAPTO shank)	190 mm
Max. tool weight	10 kg



Tool holder for ram spindle

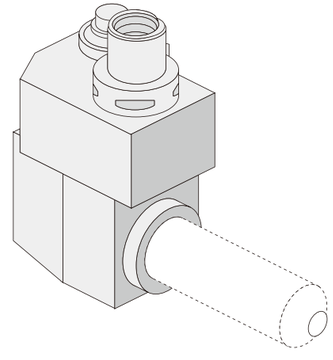
The ram spindle uses CAPTO-C6 tooling for accuracy and rigidity.

Turning holder for ram spindle



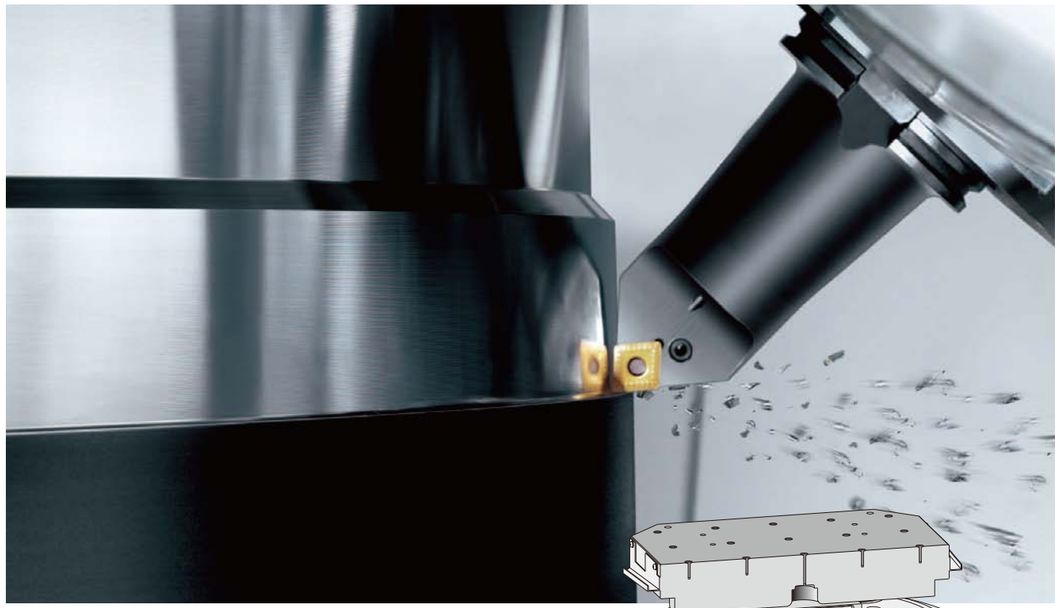
Too shank: 32 × 32 × 125 mm

Milling holder for ram spindle



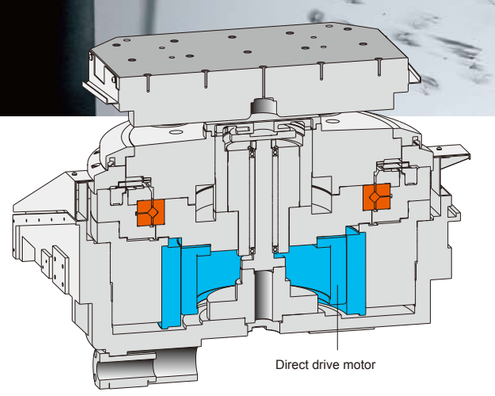
Higher Productivity

Powerful, high-torque table for turning and C-axis operations



The table, which is used for turning and C-axis operations, is driven by a powerful, high-torque direct drive motor

Machine models	INTEGREX e-1250V/8 INTEGREX e-1250V/8S INTEGREX e-1600V/10 INTEGREX e-1600V/10S



Direct drive motor/table cross section

Machining example (Standard table specification)

Material removal rate	**1573** cc/min
Material	S45C
Tool	45°turning holder (positive)

Cutting conditions

Spindle speed	112 rpm
Machining diameter	Φ426 mm
Surface speed	150 m/min
Depth of cut	12 mm
Feedrate	0.85 mm

INTEGREX e-1250V/8, INTEGREX e-1250V/8S

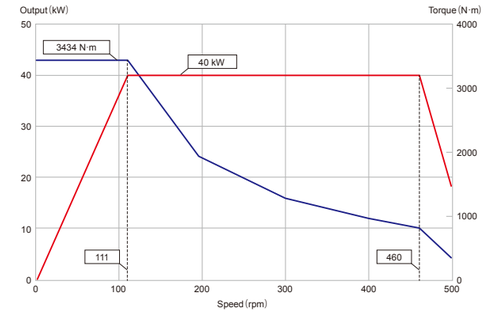
Standard 500 rpm table

Max. speed	500 rpm
Spindle output	AC 40 kW（53 HP）[Cont. rating]
Max. torque	3434 N·m（350 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	25 rpm
Load (uniform load)	e-1250V/8 : 2700 kg (Including pallet) e-1250V/8S : 4000 kg (Including pallet)

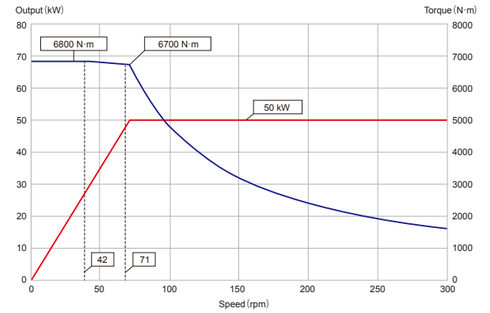
High torque 300 rpm table OPTION

Max. speed	300 rpm
Spindle output	AC 50 kW（66 HP）[Cont. rating]
Max. torque	6800 N·m（693 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	25 rpm
Load (uniform load)	e-1250V/8 : 2700 kg (Including pallet) e-1250V/8S : 4000 kg (Including pallet)

Standard 500 rpm table output / torque diagram



High torque 300 rpm table output / torque diagram



INTEGREX e-1600V/10, INTEGREX e-1600V/10S

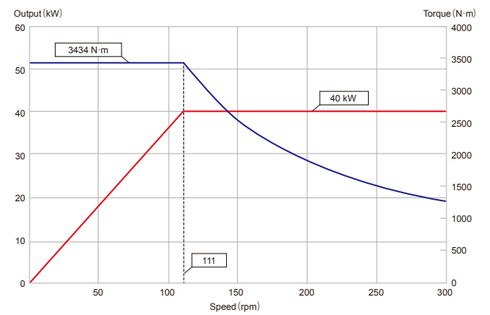
Standard 300 rpm table

Max. speed	300 rpm
Spindle output	AC 40 kW（53 HP）[Cont. rating]
Max. torque	3434 N·m（350 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	20 rpm
Load (uniform load)	e-1600V/10 : 5000 kg (Including pallet) e-1600V/10S : 7000 kg (Including pallet)

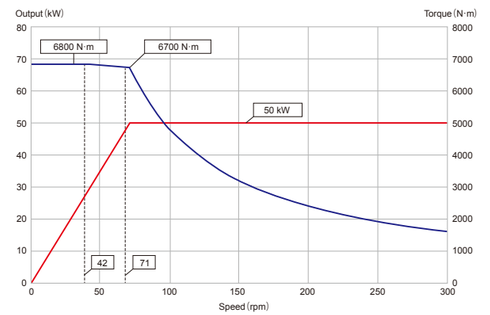
High torque 300 rpm table OPTION

Max. speed	300 rpm
Spindle output	AC 50 kW（66 HP）[Cont. rating]
Max. torque	6800 N·m（693 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	20 rpm
Load (uniform load)	e-1600V/10 : 5000 kg (Including pallet) e-1600V/10S : 7000 kg (Including pallet)

Standard 300 rpm table output / torque diagram



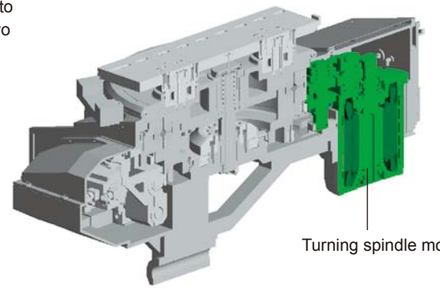
High torque 300 rpm table output / torque diagram



Higher Productivity

High efficiency turning from rough to finish machining

High efficiency turning from rough to finish machining is made possible thanks to the high output table motor for turning. The C-axis is driven by a separate servo motor and can be indexed in 0.0001° indexing increments.



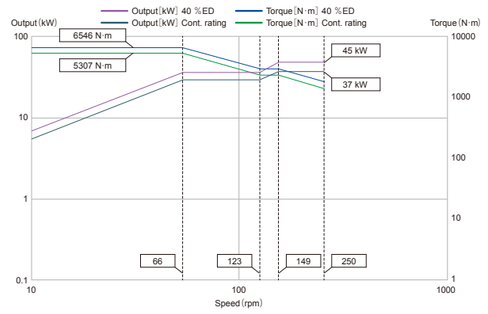
Machine models	
	INTEGREX e-1850V/12
	INTEGREX e-1850V/25S
	INTEGREX e-RAMTEC V/8
	INTEGREX e-RAMTEC V/10
	INTEGREX e-RAMTEC V/12

INTEGREX e-1850V/12, INTEGREX e-RAMTEC V/12

Standard 250 rpm table

Max. speed	250 rpm
Output	AC 37 kW（50 HP）[Cont. rating]
Max. torque	5307 N·m（541 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	6.7 rpm
Load (evenly distributed)	7000 kg（Including pallet）

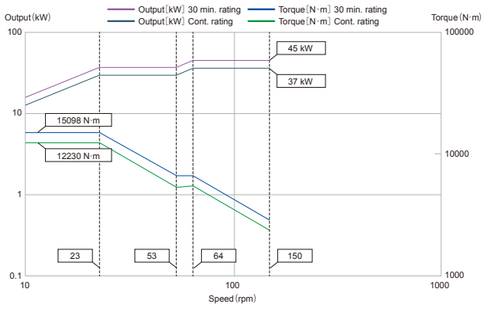
Standard 250 rpm table output / torque diagram



High torque 150 rpm table OPTION

Max. speed	150 rpm
Output	AC 37 kW（50 HP）[Cont. rating]
Max. torque	12230 N·m（541 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	6.7 rpm
Load (evenly distributed)	7000 kg（Including pallet）

High torque 150 rpm table output / torque diagram

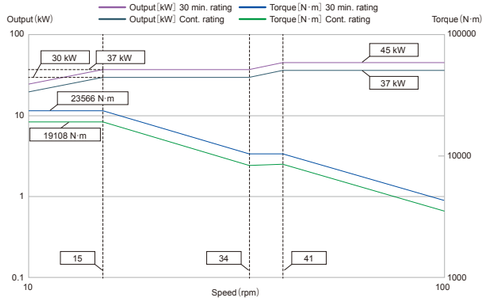


INTEGREX e-1850V/25S

Standard 100 rpm table

Max. speed	100 rpm
Output	AC 37 kW（50 HP）[Cont. rating]
Max. torque	19108 N·m（1948 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	3 rpm
Load (evenly distributed)	10000 kg（Including pallet）

Standard 100 rpm table output / torque diagram

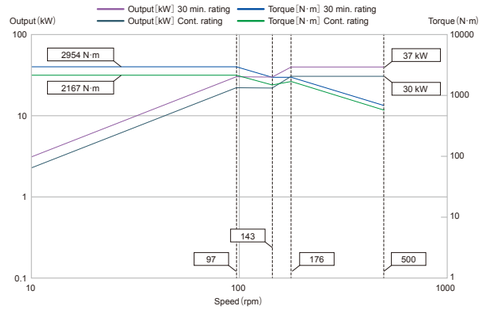


INTEGREX e-RAMTEC V/8

Standard 500 rpm table

Max. speed	500 rpm
Output	AC 30 kW（40 HP）[Cont. rating]
Max. torque	2167 N·m（220 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	17.9 rpm
Load (evenly distributed)	2700 kg（Including pallet）

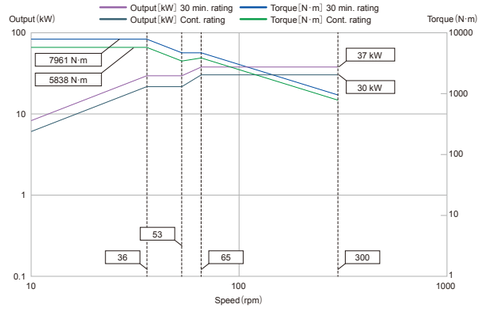
Standard 500 rpm table output / torque diagram



High torque 300 rpm table OPTION

Max. speed	300 rpm
Output	AC 30 kW（40 HP）[Cont. rating]
Max. torque	5838 N·m（595 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	17.9 rpm
Load (evenly distributed)	2700 kg（Including pallet）

High torque 300 rpm table output / torque diagram

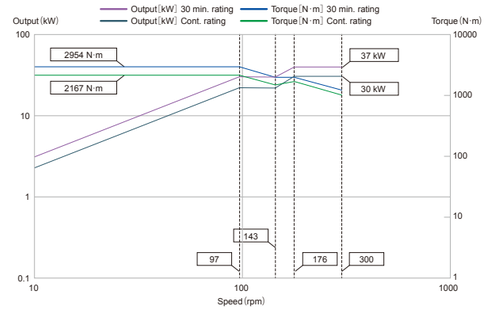


INTEGREX e-RAMTEC V/10

Standard 300 rpm table

Max. speed	300 rpm
Output	AC 30 kW（40 HP）[Cont. rating]
Max. torque	2167 N·m（220 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	8.9 rpm
Load (evenly distributed)	5000 kg（Including pallet）

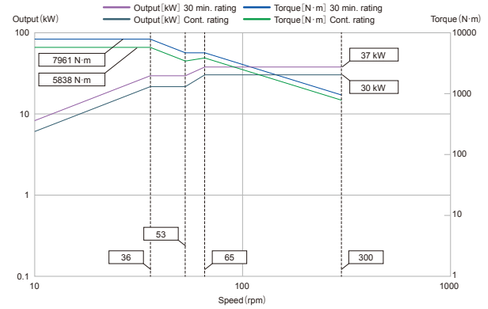
Standard 300 rpm table output / torque diagram



High torque 300 rpm table OPTION

Max. speed	300 rpm
Output	AC 30 kW（40 HP）[Cont. rating]
Max. torque	5838 N·m（595 kgf·m）[Cont. rating]
C-axis minimum indexing increment	0.0001°
C-axis rapid traverse rate	8.9 rpm
Load (evenly distributed)	5000 kg（Including pallet）

High torque 300 rpm table output / torque diagram



Higher Productivity

Tool magazine capacities available for any production requirement

High speed, high rigidity automatic tool changer

The automatic tool changer is designed for reliability and performs tool changes at high speed – including heavy tools as well.

Rack type tool magazine

Tools are stored vertically in racks resulting in a small space requirement for any tool storage capacity rack magazine. High speed and smooth tool loader movement reduces tool waiting time and vibration preventing any effect on machined surfaces. The 84 tool and 126 tool rack magazines can be expanded after the initial installation.

Standard 42 tool rack magazine

e-1250V/8, e-1250V/8S, e-1600V/10, e-1600V/10S

Tool storage	42 tools* (standard)	84 tools (option)	120 tools (option)	162 tools (option)
Tool selection method	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number
Available tool capacity expansion	—	120 tools / 162 tools	162 tools	—

* : 650 mm long tools can be stored on the bottom rack. The top and middle racks can store tools up 500 mm long.

Maximum tool specifications

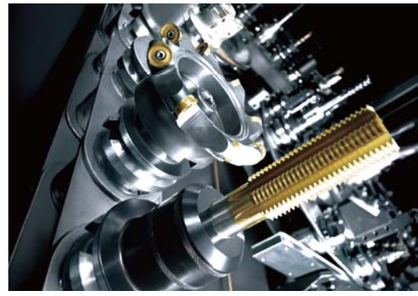
Machine models	INTEGREX e-1250V/8 INTEGREX e-1250V/8S INTEGREX e-1600V/10 INTEGREX e-1600V/10S	INTEGREX e-1850V/12 INTEGREX e-1850V/25S	INTEGREX e-RAMTEC V/8 INTEGREX e-RAMTEC V/10 INTEGREX e-RAMTEC V/12
Max. tool diameter (with / without adjacent tool)	135 mm / 260 mm	135 mm / 260 mm	135 mm / 260 mm
Tool length (from gauge line)	650 mm	650 mm	650 mm
Max. tool weight	30 kg	30 kg	30 kg
Max. tool momentum	49 N·m	29.4 N·m	29.4 N·m

Tool chain magazine

Tool chain magazines are available with tool storage capacities up to 160 tools. This makes it possible to perform high-mix, low volume production as well as store back up tools when unmanned operation over extended periods is carried out.

Machine models: e-1850V/12, e-1850V/25S,
e-RAMTEC V/8, e-RAMTEC V/10, e-RAMTEC V/12

Tool capacity	40 tools (standard)	80 tools (option)	120 tools (option)	160 tools (option)
Tool selection method	Magazine pocket Fixed pocket number Random selection, shortest path	Magazine pocket Fixed pocket number Random selection, shortest path	Magazine pocket Fixed pocket number Random selection, shortest path	Magazine pocket Fixed pocket number Random selection, shortest path



Tool chain magazine

TOOL HIVE OPTION

The TOOL HIVE can store more than 180 tools in a small space. Operation and tool data editing can be performed on the TOOL HIVE TERMINAL control panel to reduce the time required for tool setup. The TOOl HIVE tool storage capacity can be expanded after the initial installation.

TOOL HIVE TERMINAL

240 tool TOOL HIVE magazine

e-1250V/8, e-1250V/8S, e-1600V/10, e-1600V/10S TOOL HIVE

Tool storage	180 tools	216 tools	252 tools	288 tools	324 tools	360 tools
Magazine	Rack type	Rack type	Rack type	Rack type	Rack type	Rack type
Tool selection method	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number

e-1850V/12, e-1850V/25S, e-RAMTEC V/8, e-RAMTEC V/10, e-RAMTEC V/12 TOOL HIVE

Tool storage	180 tools	204 tools	240 tools	288 tools	312 tools	348 tools
Magazine	Rack type	Rack type	Rack type	Rack type	Rack type	Rack type
Tool selection method	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number	Fixed pocket number

Higher Productivity

2 pallet changer for reduced setup time

Automatically changes pallet loaded with heavy workpieces. The next workpiece can be setup during the machining of the current one for higher productivity. To provide good access for setup, the pallet can be indexed every 90°.

Workpiece centering equipment OPTION

Convenient workpiece centering of turning workpieces thanks to the indicator stand and pallet power rotation at the setup station.

Indicator stand

Power rotation at setup station

2 pallet changer

Machine	INTEGREX e-1250V/8	INTEGREX e-1600V/10	INTEGREX e-1850V/12
Pallet change time	14.3 sec	25 sec	50 sec
Max. workpiece size	Φ1450 mm × 1600 mm	Φ2050 mm × 1600 mm	Φ2350 mm × 1800 mm
Max. weight capacity (including pallet)	2700 kg	5000 kg	7000 kg

Machine	INTEGREX e-RAMTEC V/8	INTEGREX e-RAMTEC V/10	INTEGREX e-RAMTEC V/12
Pallet change time	13 sec	25 sec	50 sec
Max. workpiece size	Φ1250 mm × 1250 mm	Φ2000 mm × 1400 mm	Φ2350 mm × 1800 mm
Max. weight capacity (including pallet)	2700 kg	5000 kg	7000 kg

Factory Automation

Convenient system expansion to meet changes in production requirements

The PALLETECH SYSTEM is designed with the flexibility required for shorter product life cycles, reduced in-process inventory, just-in-time production and other demands of today's manufacturing environment. The pallet stocker modules are available in the PALLETECH MANUFACTURING CELL (single level) and PALLETECH HIGH-RISE SYSTEM (two levels and three levels)

PALLETECH SYSTEM composed of single level stocker with 6 pallets, one loading station, and one INTEGREX

		Minimum	Maximum
Machine(s)		1	16
Number of pallets	1 level	6	240
	2 level	12	240
	3 level	18	240
Loading station(s)		1	8
Loading robot		1	1

Machine model	Pallet stocker		
	1 level	2 level	3 level
INTEGREX e-1250V/8	○	○	—
INTEGREX e-1600V/10	○	—	—
INTEGREX e-1850V/12	○	—	—
INTEGREX e-RAMTEC V/8	○	○	—
INTEGREX e-RAMTEC V/10	○	—	—
INTEGREX e-RAMTEC V/12	○	—	—

○ : available — : not available

Factory Automation

Enhanced versatility

4 point clamping attachment for further process integration (e-1600V/10, e-1600V/10S) OPTION

Process integration thanks to special tools for improved accuracy and productivity

- High machining capability thanks to rigid construction of 4 point clamping attachment
- Up to 4 of the 4 point clamping attachments can be stored in the attachment stocker for automatic attachment loading/unloading on the spindle

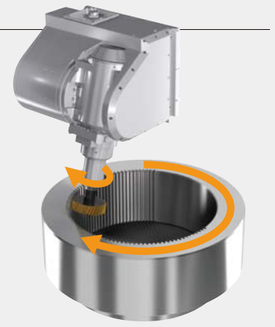
Snout head

Example attachments

Snout head

Gear skiving

Thanks to the high rigidity construction of the snout attachment, gear cutting on large workpieces can be performed.



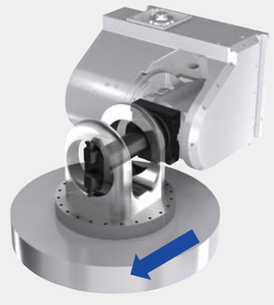
Very long tool machining

A long tool is not required with the high rigidity snout attachment. Tools can be automatically changed.

Boring head

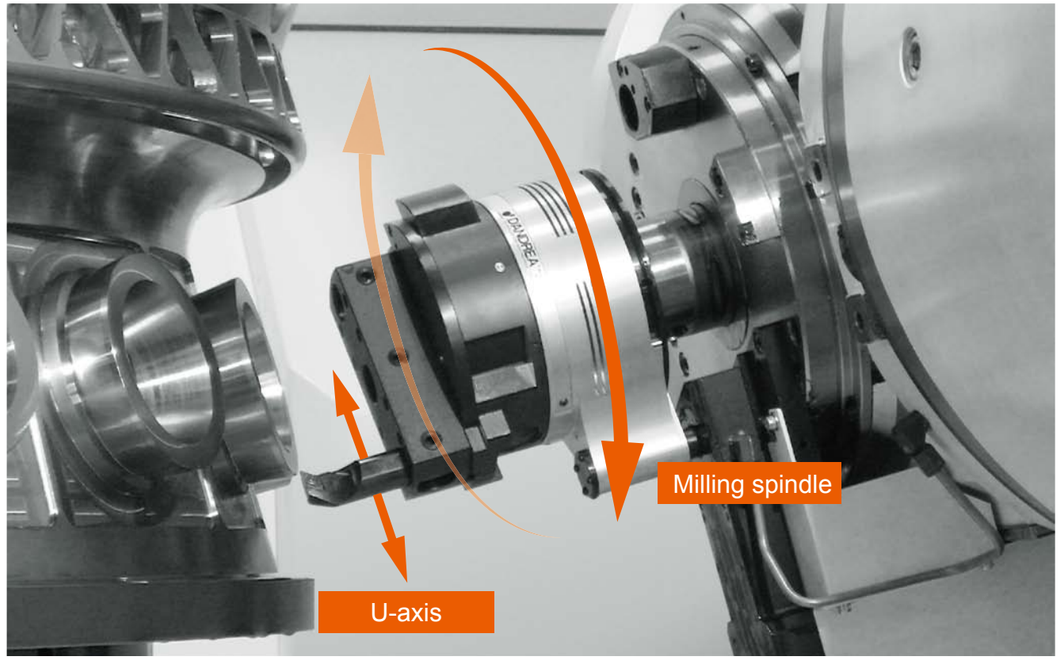
Deep finish boring performed from one side of the workpiece

Since the workpiece is not indexed 180˚ to complete the boring from 2 sides, the bore is machined with high accuracy and concentricity.

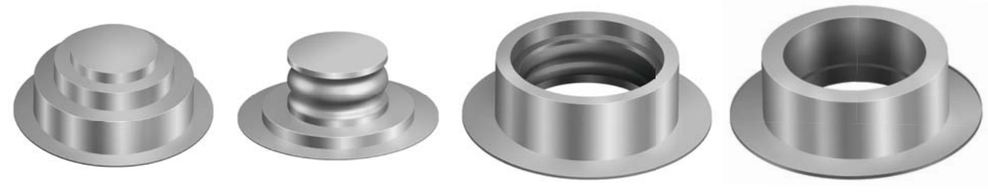


Facing head and U-axis OPTION

Position of tool controlled by U-axis during milling operation.



By controlling the machining diameter with the U-axis, features such as stepped diameters, curved contours, phonograph seal surfaces and taper bores that normally are done by turning centers can be performed by milling.



Ergonomics

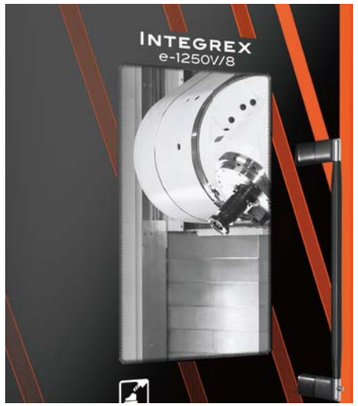
Design focus on ergonomics provides unsurpassed ease of operation

ergonomics

Large window

Large windows are located on the operator door and safety cover door for convenient monitoring of machine operation.

Large window on operator door



Large window on safety cover door

Smooth loading and unloading of workpieces

The wide opening of the cylindrical door of 2 the pallet changer provides excellent accessibility for an overhead crane during setup and loading/unloading.

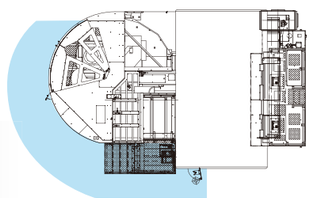
Convenient location of tool magazine

The tool magazine is located next to the CNC operation panel to significantly reduce the distance the operator must cover for machine setup.

2 pallet changer

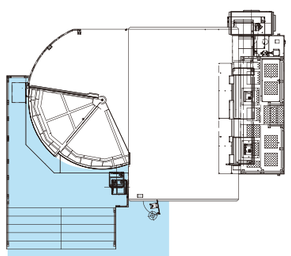
: Operation area

e-1250V/8,
e-1600V/10



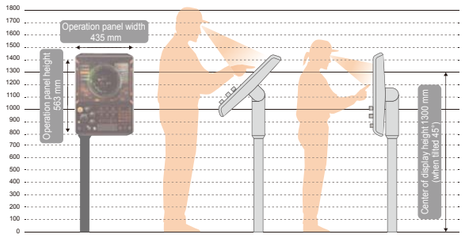
Single table

e-1250V/8S,
e-1600V/10S



Adjustable CNC Operation Panel

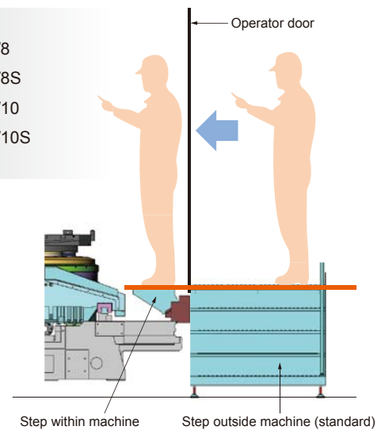
The operation panel can be tilted to the optimum position for any operator' s height to ensure ease of operation.



Convenient access to machining area

Steps outside the machine and inside the machine are standard equipment to provide convenient access to the operator.

e-1250V/8
e-1250V/8S
e-1600V/10
e-1600V/10S



Tool magazine operation panel

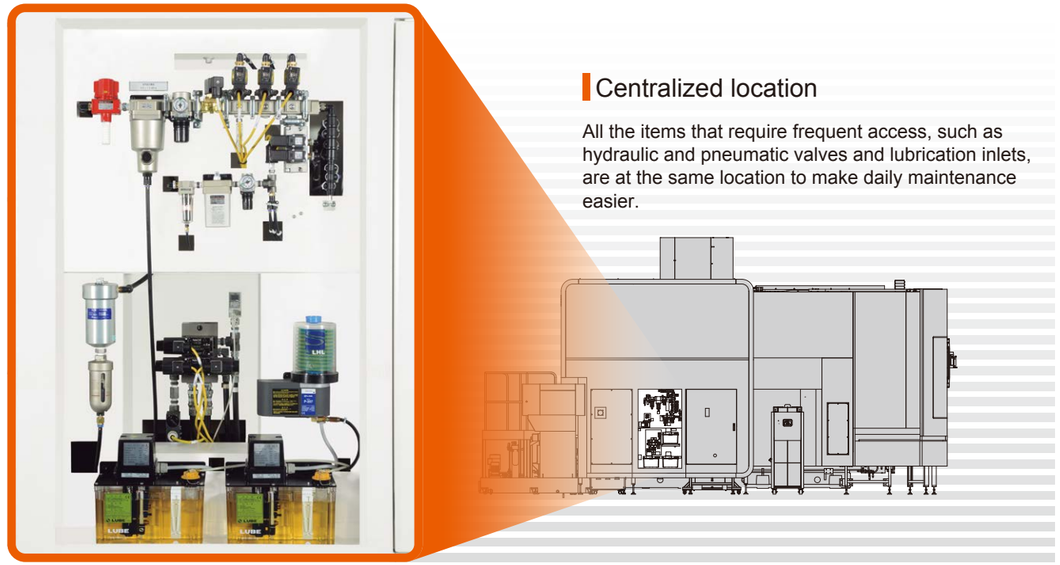
The tool magazine operation panel is designed for increased ease of operation. Instead of having just a forward / reverse button for indexing the tool magazine and manually positioning the desired tool pocket, the pocket number or tool number can be input into the operation panel numeric keyboard and the desired pocket will be automatically brought into position. This is standard equipment for the different capacity tool magazines.

Remote manual pulse generator

The remote manual pulse generator provides convenient operation when the operator is not close to the CNC operation panel. Its display shows the position display and the machine coordinate values. 4 different positions can be registered in memory by the remote manual pulse generator.

Ease of Maintenance

Convenient maintenance



Centralized location

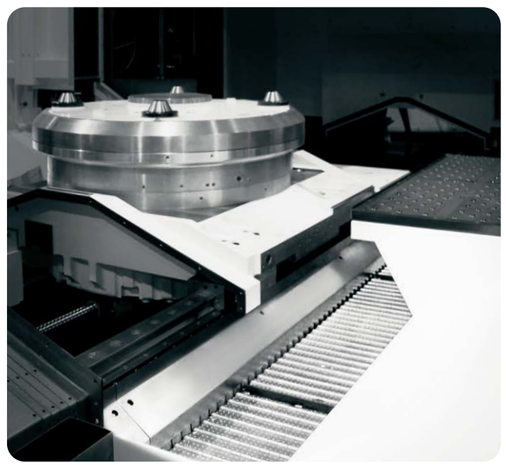
All the items that require frequent access, such as hydraulic and pneumatic valves and lubrication inlets, are at the same location to make daily maintenance easier.

Chip accumulation prevention

The top surface of the slideway covers are angled so that machined chips and coolant will be smoothly discharged to prevent any accumulation.

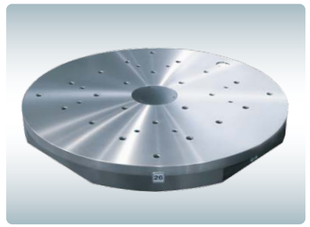
Chip conveyor inside machine

The standard equipment hinge-type chip conveyor at the front and back of the table smoothly removes machined chips.



Option

A variety of pallets / chucks is available to meet any machining requirement OPTION



Tapped round pallet with location bore

Used for machining irregularly shaped workpieces including turning. A fixture plate that mounts the workpiece is placed on this pallet for turning operations.

Machines	Pallet size
e-1250V/8	Φ1000 mm
e-1600V/10	Φ1400 mm
e-1850V/12	Φ1650 mm , Φ1850 mm
e-1250V/8S	Φ1250 mm
e-1850V/25S	Φ2500 mm
e-RAMTEC V/8	Φ1000 mm
e-RAMTEC V/10	Φ1250 mm , Φ1400 mm
e-RAMTEC V/12	Φ1650 mm , Φ1850 mm

Face plate with jaws

Used for cylindrical and square workpieces. Jaws can be moved separately to accurately center a workpiece as well as be adjusted for different workpiece diameters.

Machines	Pallet size
e-1250V/8	Φ1000 mm
e-1600V/10	Φ1400 mm
e-1850V/12	Φ1650 mm , Φ1850 mm
e-1250V/8S	Φ800 mm, Φ1000 mm , Φ1250 mm
e-1600V/10S	Φ1250 mm, Φ1400 mm, Φ1500 mm, Φ1650 mm
e-1850V/25S	Φ2500 mm , Φ3000 mm
e-RAMTEC V/8	Φ1000 mm
e-RAMTEC V/10	Φ1250 mm , Φ1400 mm
e-RAMTEC V/12	Φ1650 mm , Φ1850 mm

Scroll chuck with 3 jaws

Used for machining of cylindrical workpieces. By turning a wrench, all 3 jaws move towards the chuck center to easily center a workpiece.

Machines	Pallet size
e-1250V/8	Φ1000 mm
e-1600V/10	Φ1400 mm
e-1850V/12	Φ1650 mm , Φ1850 mm
e-1250V/8S	Φ1000 mm
e-RAMTEC V/8	Φ1000 mm
e-RAMTEC V/10	Φ1250 mm , Φ1400 mm
e-RAMTEC V/12	Φ1650 mm , Φ1850 mm

4 jaw independent chuck

Used for cylindrical and square workpieces. Jaws can be moved separately to accurately center a workpiece.

Machines	Pallet size
e-1250V/8	Φ1000 mm
e-1600V/10	Φ1400 mm
e-1850V/12	Φ1650 mm , Φ1850 mm
e-1250V/8S	Φ1000 mm
e-RAMTEC V/8	Φ1000 mm
e-RAMTEC V/10	Φ1250 mm , Φ1400 mm
e-RAMTEC V/12	Φ1650 mm , Φ1850 mm

Tapped square pallet with location bore*

Used for the machining of irregularly shaped workpieces without turning operations. A workpiece fixture can be mounted on the pallet.

Machines	Pallet size
e-1250V/8	□800 mm , □1000 mm
e-1600V/10	□1000 mm
e-1850V/12	□1250 mm , 1250 mm×1600 mm
e-RAMTEC V/8	□800 mm , □1000 mm
e-RAMTEC V/10	□1000 mm
e-RAMTEC V/12	□1250 mm , 1250 mm×1600 mm

Note) turning spindle maximum speed is limited according to specifications of circular pallets and chucks
*) Turning spindle max. speed when using square pallets is 50 rpm

Intelligent Machine

A variety of Intelligent Functions provides incomparable operator support for exceptional ease of operation and the optimum machine efficiency

Yamazaki Mazak has developed a variety of functions for the improvement of productivity, high accuracy machining and operator support. A variety of unique technologies has been developed that incorporates the expertise of experienced machine operators that realizes unsurpassed productivity and higher accuracy machining.

INTELLIGENT MACHINE®

Advanced Intelligent Functions

A variety of Intelligent+ Functions provides incomparable operator support for exceptional ease of operation and the optimum machine efficiency.

Machining

SMC+
Convenient Parameter Setting and Fine Tuning Function
SMOOTH MACHINING CONFIGURATION
Machining time, finished surface smoothness and machining shape can be adjusted for improved productivity

VAC
Variable Acceleration Control Function
VARIABLE ACCELERATION CONTROL
Variable acceleration control is a new function which permits the faster acceleration capability of linear axes to be used whenever possible. The slower acceleration of the rotary axes is not used for all program commands, resulting in faster machining cycle times.

SCC
Seamless Corner Control
SMOOTH CORNER CONTROL
Improved finished surfaces and reduced cycle times by optimized acceleration/deceleration when machining corners

AVC
Minimized Vibration
ACTIVE VIBRATION CONTROL
Minimized vibration function for high-speed, high-accuracy machining and longer tool life

ITS+
Heat Displacement Control
INTELLIGENT THERMAL SHIELD
Unique Mazak heat displacement compensation system

Set up

ISS+
Machine Interference Prevention
INTELLIGENT SAFETY SHIELD
For safe operation

IBA+
Unbalanced Table Detection and Analysis
INTELLIGENT BALANCE ANALYZER
Shows required weight and locations to eliminate unbalanced condition

MVA+
Verbal Message System
MAZAK VOICE ADVISER
Verbal support for machine setup and safe conditions confirmation

Maintenance

IMC+
High-Accuracy 5-Axis Calibration
INTELLIGENT MAZA-CHECK
Position misalignment and incline of the rotary axes can automatically be measured and compensated to realize high-accuracy 5-axis machining

IMS+
Comprehensive Maintenance Monitor
INTELLIGENT MAINTENANCE SUPPORT
Useful information for improved preventative maintenance to prevent unexpected machine downtime

IPS+
Comprehensive Spindle Monitoring
INTELLIGENT PERFORMANCE SPINDLE
Monitoring milling spindle status —designed to minimize downtime and improve preventative maintenance

Intelligent Machine

SMC+

Convenient Parameter Setting and Fine Tuning Function

SMOOTH MACHINING CONFIGURATION

INTELLIGENT MACHINE®

Machining features including cycle time, finished surface and machining shape can be adjusted by slider switches on the display according to material requirements and machining methods. This is especially effective for complex workpiece contours defined in small program increments. Once the desired results are obtained, the settings can be stored in memory so that they can be easily used again in the future.

Machining time for an aluminum impeller was reduced approximately 10-20% by using this function

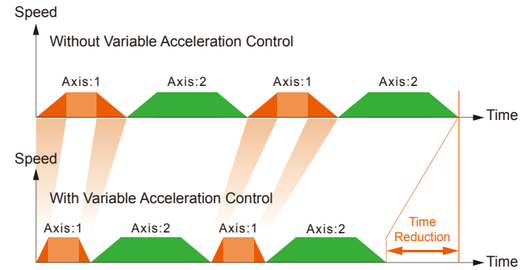
(test results for reference only)

VAC

Variable Acceleration Control Function

VARIABLE ACCELERATION CONTROL

Variable acceleration control is a new function which permits the faster acceleration capability of linear axes to be used whenever possible. The slower acceleration of the rotary axes is not used for all program commands, resulting in faster machining cycle times.



SCC

Seamless Corner Control

SMOOTH CORNER CONTROL

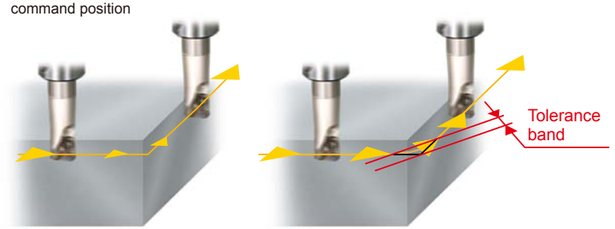
Improved finished surfaces and reduced cycle times by optimized acceleration/deceleration when machining corners

Other systems

Move to next command position after reaching current command position

SMOOTH CORNER CONTROL

Move to next command position within tolerance band



AVC

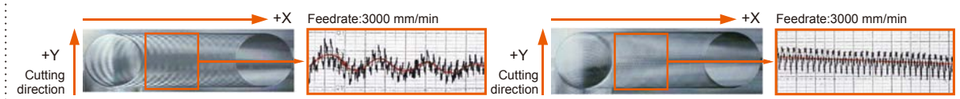
Minimized Vibration

ACTIVE VIBRATION CONTROL

Minimized vibration function for high-speed, high-accuracy machining and longer tool life

Other Systems

ACTIVE VIBRATION CONTROL



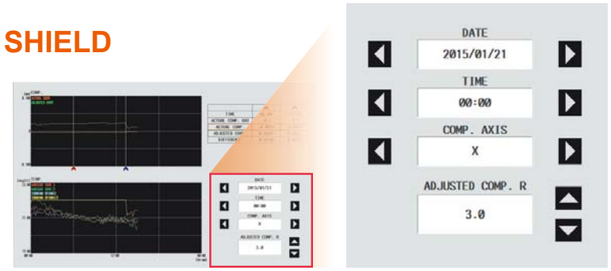
Intelligent Machine

ITS+

Heat Displacement Control

INTELLIGENT THERMAL SHIELD

The INTELLIGENT THERMAL SHIELD is an automatic compensation for room temperature changes, which realizes enhanced continuous machining accuracy. MAZAK has performed extensive testing in a variety of environments in a temperature controlled room and has used the results to develop a control system that automatically compensates for temperature changes in the machining area. Changes in the room temperature and compensation data are shown visually.



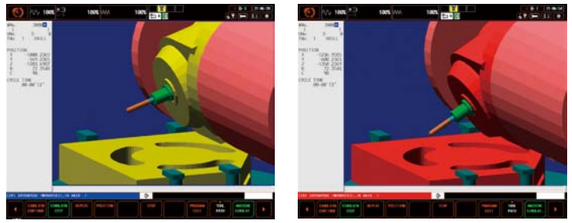
Temperature and compensation is displayed on screen. Operator can adjust compensation by looking at the data.

ISS+

Machine Interference Prevention

INTELLIGENT SAFETY SHIELD

When an operator manually moves the machine axes for setup, tool measurement or changing inserts, the CNC shows a synchronized 3D model on the display for checking machine interference. If any machine interference occurs, the machine motion automatically stops. For machines equipped with the MAZATROL SmoothX, this function is also effective during automatic operation.

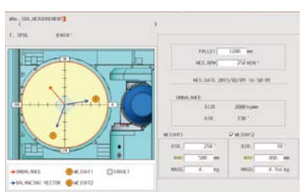


IBA+

Unbalanced Table Detection and Analysis

INTELLIGENT BALANCE ANALYZER

Shows required weight and locations to eliminate unbalanced condition



MVA+

Verbal Message System

MAZAK VOICE ADVISER

Verbal support for machine setup and safe conditions confirmation

IMC+

High-Accuracy 5-Axis Calibration

INTELLIGENT MAZA-CHECK

Position misalignment and incline of the rotary axes can automatically be measured and compensated to realize high-accuracy 5-axis machining. The centers of rotation of both the C and B axes can be automatically measured and compensated.

■ Measurement item selection

■ Measurement information setting

■ Automatic measurement program generation

IMS+

Comprehensive Maintenance Monitor

INTELLIGENT MAINTENANCE SUPPORT

Useful information for improved preventative maintenance to prevent unexpected machine downtime.

IPS+

Comprehensive Spindle Monitoring

INTELLIGENT PERFORMANCE SPINDLE

The INTELLIGENT PERFORMANCE SPINDLE monitors a variety of properties with sensors housed in the spindle — including temperature,vibration and displacement — and provides useful information to the operator. Thanks to this monitoring, production loss due to machine down time can be minimized.

■ Condition check

Temperature and vibration of the spindle, as well as the motor load can be displayed.

■ Running recorder

Operation status of milling spindle (rpm, % motor load and temperature) can be recorded up to one year

New MAZATROL CNC System

The seventh generation MAZATROL CNC system
— the core of Smooth Technology

MAZATROL SMOOTHX

From setup to machining
— designed for unsurpassed ease of operation

Three color status indicator

Machining status is indicated by three colors.
Green: automatic operation mode
Yellow: Machining completion
Red: Alarm

19" touch panel

Touch panel operation
— similar to your smartphone or tablet

USB port

Interface for peripheral equipment of USB-1.0+2.0 standard

SD card slot

Transfer program and tool data

Operation switches

Large switches
— color changes from orange to green when turned on

Dials

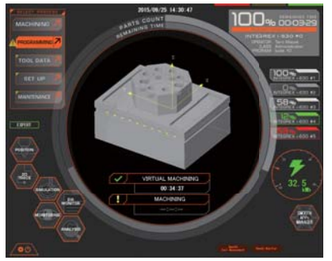
For frequently-used axes selection and feedrate changes

New interface with touch operation ensures convenient data processing
— programming, confirmation, editing, and tool data registration

Process home screens

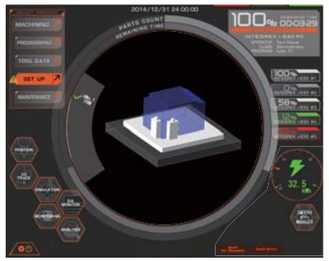
Five different home process screens — each home screen displays the appropriate data in an easy-to-understand manner. Icons can be touched in each process display for additional screen displays.

Programming

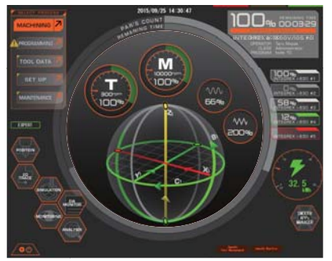


Tool data

Setup



Machining

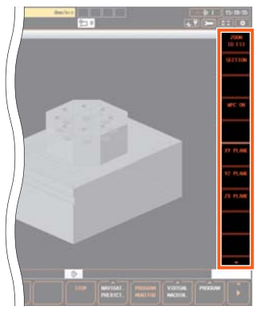


Maintenance

Pop-up windows

Values and items can easily be input/selected on pop-up windows.

Side menu



List menu

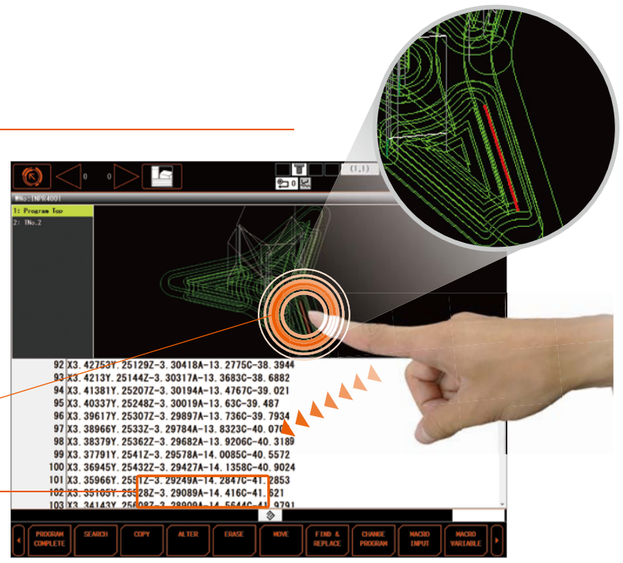
Screen key board

Ease of Programming

Visible programming screen

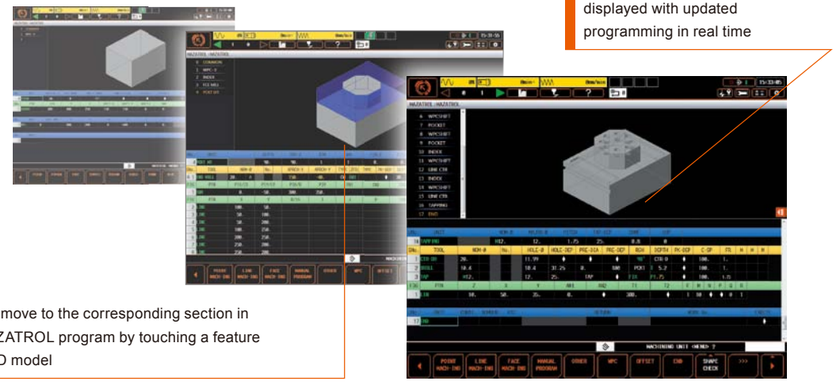
QUICK EIA

Program, process list and 3D tool path display are linked to each other. Visible search on touch screen can reduce the time for program checking.



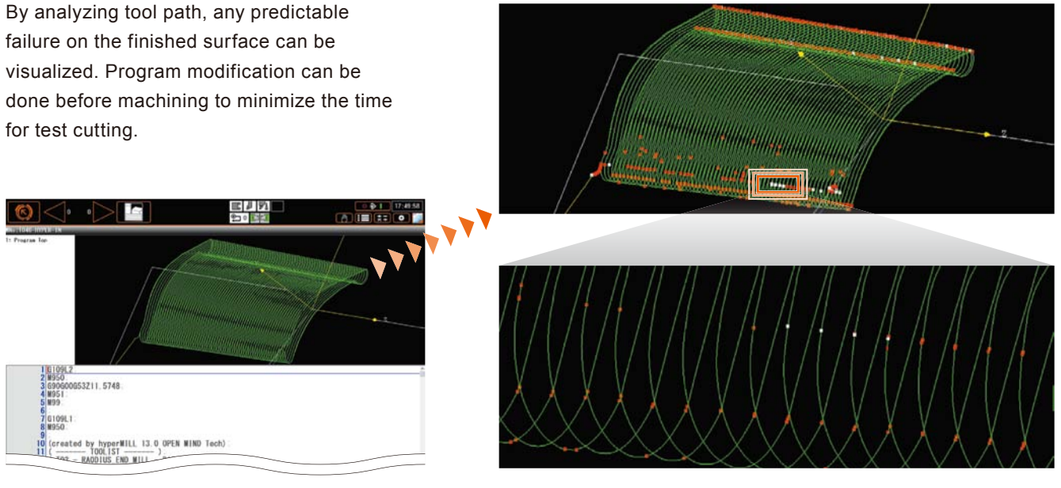
QUICK MAZATROL

MAZATROL program, unit list and 3D workpiece shape are linked to each other. After defining a machining unit in a MAZATROL program, the 3D shape is immediately displayed to easily and quickly check for any programming error.



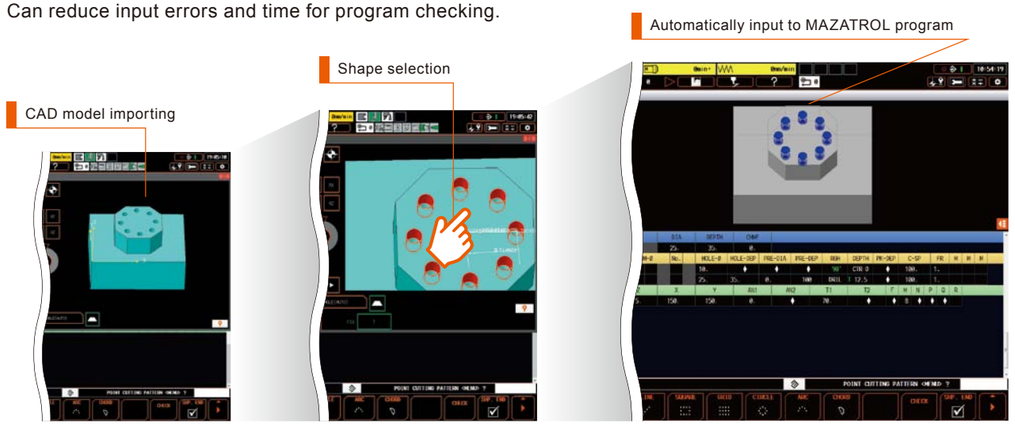
VIEW SURF

By analyzing tool path, any predictable failure on the finished surface can be visualized. Program modification can be done before machining to minimize the time for test cutting.



3D ASSIST

Workpiece and coordinates data can be imported from 3D CAD data to a MAZATROL program. No coordinate value inputs are required. Can reduce input errors and time for program checking.



Interoperation

Network integration
— convenient connection to automation equipment

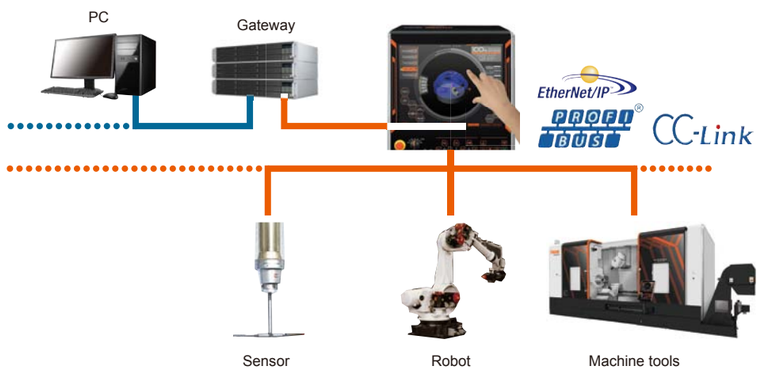
Smooth Process Support Software for efficient factory management OPTION

SMOOTH PROCESS SUPPORT SOFTWARE

Data sharing between SmoothX CNC and office PCs for improved production efficiency.

Networking to peripheral equipment OPTION

Convenient network connection to peripheral equipment thanks to industrial network standards.



EtherNet/IP is a trademark of ODVA (Open Device Net Vendor Association).
PROFIBUS is a trademark of PROFIBUS User Organization.
MTConnect is a registered trademark of AMT (Association for Manufacturing Technology).

Environmentally Friendly

Designed with environmental considerations eco-friendly

The environment and our impact on natural surroundings have always been important concerns of Yamazaki Mazak. This is shown by the fact that all factories in Japan where Mazak machine tools are produced are ISO 14001 certified, an international standard confirming that the operation of our production facilities does not adversely affect air, water, or land.

INTEGREX e-V SERIES
INTEGREX e-RAMTEC V SERIES

Reduction of lubrication consumption

The automatic tool changer and tool magazine gear box are lubricated by an oil-return system with lower consumption than other systems. The spindle oil-air lubrication system automatically stops when the spindle is not operating. The linear roller guides on the X, Y, and Z axes are lubricated by grease which eliminates tramp oil in the coolant resulting in a much longer service life for the coolant.

Reduced electrical power consumption

The automatic tool changer, tool shifter and tool magazine are all powered by servo motors. As a result, a smaller capacity hydraulic system is used with a corresponding reduction in the electrical power consumption.

Auto-power off

When the machine is not operated for a pre-registered period of time, the machine worklights and the NC backlight are turned off automatically. They are automatically turned on when the motion sensor detects the return of the operator.

Extensive Series Range

A variety of e-V and e-RAMTEC V machines are available to meet the machining requirements of a wide range of large workpieces.

INTEGREX e-V

Fusion of machining centers and turning centers

Single table

INTEGREX	e-1250V/8S	e-1600V/10S	e-1850V/25S
Max. workpiece size	Φ1500 ×1600 mm (Φ1250 mm faceplate*)	Φ2300 ×1669 mm (Φ1400 mm faceplate*)	Φ3500 ×1800 mm (Φ2500 mm tapped pallet*)
Max. load (including table /chuck weight)	4000 kg	7000 kg	15000 kg (Simultaneous 5 axis: 10000 kg)
X-axis (stroke past table center)/ Y-axis / Z-axis stroke	1875 mm [540 mm] / 1250 mm / 1345 mm	2165 mm [390 mm] / 1600 mm / 1345 mm	3055 mm [855 mm] / 1850 mm / 1800 mm
B-axis / C-axis stroke	150° / 360°	150° / 360°	150° / 360°

*Option

2 pallet changer

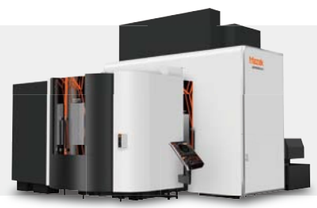
INTEGREX	e-1250V/8	e-1600V/10	e-1850V/12
Max. workpiece size	Φ1450 ×1600 mm (800 mm ×800 mm tapped pallet*)	Φ2050 ×1600 mm (1000 × 1000 tapped pallet*)	Φ2350 ×1800 mm (1250 mm ×1250 mm tapped pallet*)
Max. load (including pallet weight)	2700 kg	5000 kg	7000 kg
X-axis (stroke past table center)/ Y-axis / Z-axis stroke	1875 mm [540 mm] / 1250 mm / 1345 mm	2315 mm [540 mm] / 1600 mm / 1345 mm	3055 mm [925 mm] / 1850 mm / 1800 mm
B-axis / C-axis stroke	150° / 360°	150° / 360°	150° / 360°

*Option

INTEGREX e-RAMTEC V

Ram spindle for turning and milling of deep bores

2 pallet changer



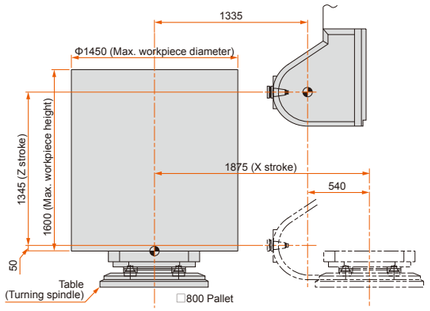
INTEGREX	e-RAMTEC V/8	e-RAMTEC V/10	e-RAMTEC V/12
Max. workpiece size	Φ1250 ×1250 mm (800 mm ×800 mm tapped pallet*)	Φ2000 ×1440 mm (1000 × 1000 tapped pallet*)	Φ2350 ×1800 mm (1250 mm ×1250 mm tapped pallet*)
Max. load (including pallet weight)	2700 kg	5000 kg	7000 kg
X-axis (stroke past table center)/ Y-axis / Z-axis stroke	1875 mm [540 mm] / 1060 mm / 1595 mm	1725 mm [75 mm] / 1060 mm / 1450 mm	3055 mm [925 mm] / 1700 mm / 1800 mm
W-axis (ram spindle) stroke	900 mm	900 mm	900 mm
B-axis / C-axis stroke	150° / 360°	150° / 360°	150° / 360°

*Option

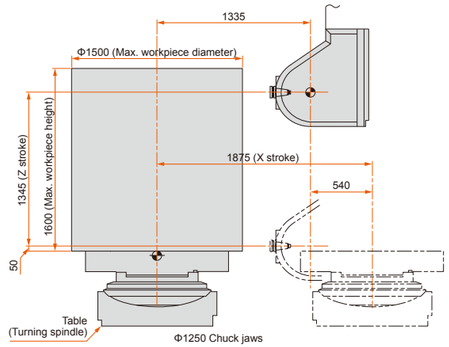
INTEGREX e-1250V/8, e-1250V/8 Stroke Diagram

Unit:mm

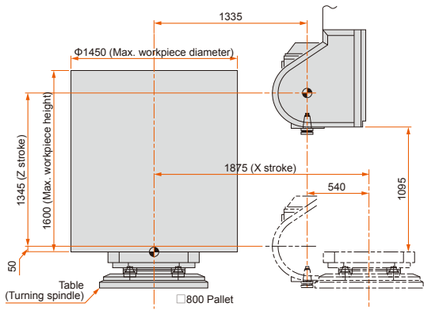
INTEGREX e-1250V/8 H［B-axis : 90°］



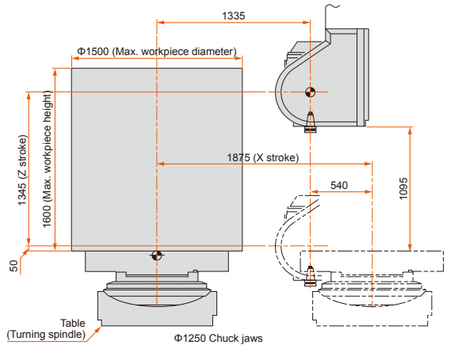
INTEGREX e-1250V/8S H［B-axis : 90°］



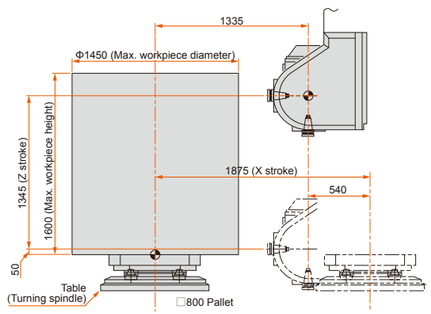
INTEGREX e-1250V/8 V［B-axis : 0°］



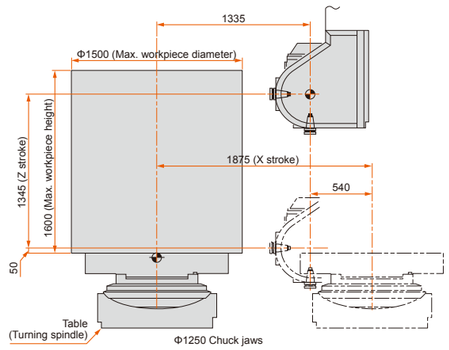
INTEGREX e-1250V/8S V［B-axis : 0°］



INTEGREX e-1250V/8 Turning



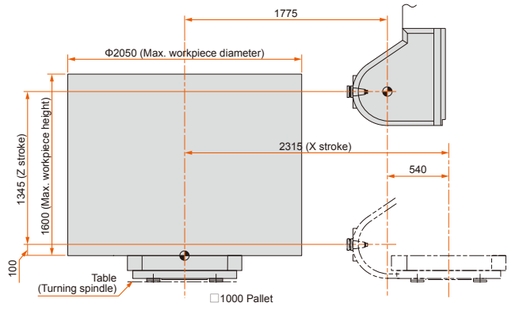
INTEGREX e-1250V/8S Turning



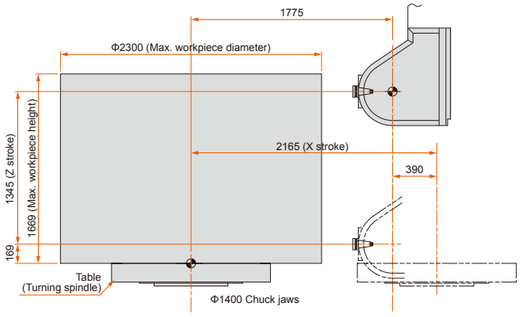
INTEGREX e-1600V/10, e-1600V/10S Stroke Diagram

Unit:mm

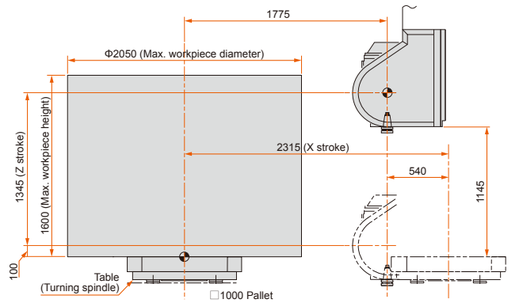
INTEGREX e-1600V/10 H [B-axis : 90°]



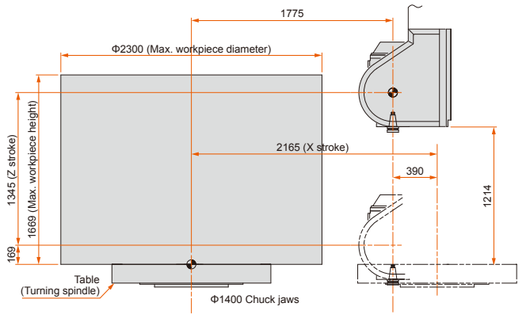
INTEGREX e-1600V/10S H [B-axis : 90°]



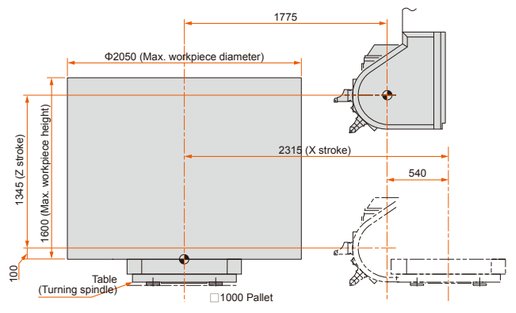
INTEGREX e-1600V/10 V [B-axis : 0°]



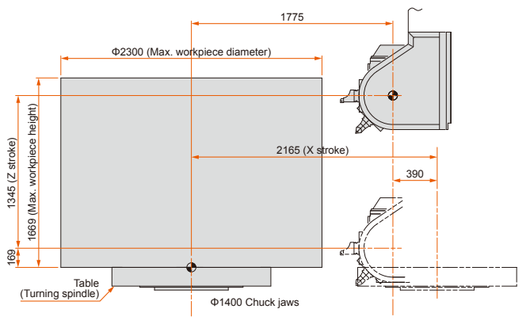
INTEGREX e-1600V/10S V [B-axis : 0°]



INTEGREX e-1600V/10 Turning



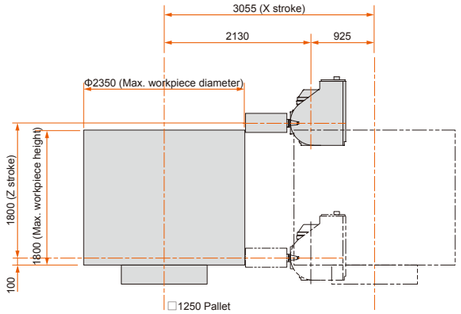
INTEGREX e-1600V/10S Turning



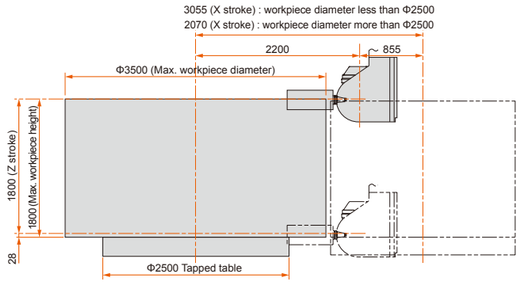
INTEGREX e-1850V/12, e-1850V/25S Stroke Diagram

Unit : mm

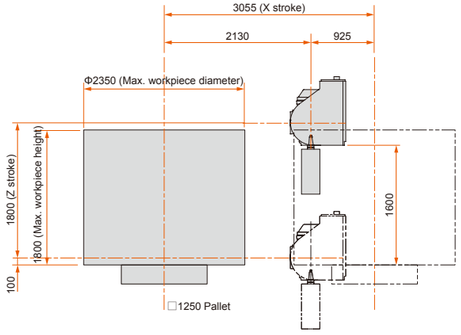
INTEGREX e-1850V/12 H［B-axis : 90°］



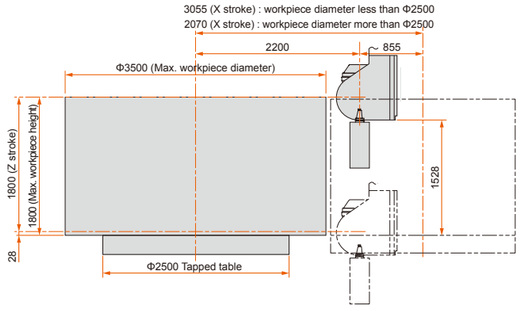
INTEGREX e-1850V/25S H［B-axis : 90°］



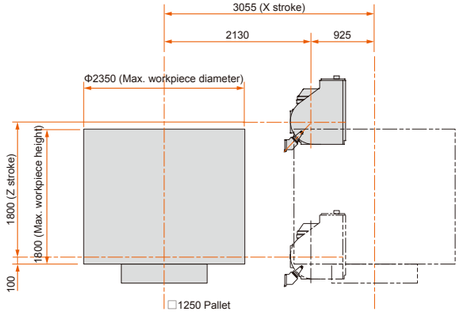
INTEGREX e-1850V/12 V［B-axis : 0°］



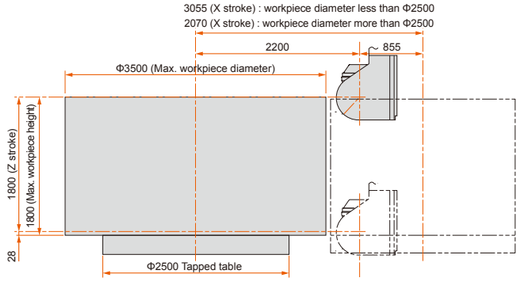
INTEGREX e-1850V/25S V［B-axis : 0°］



INTEGREX e-1850V/12 Turning



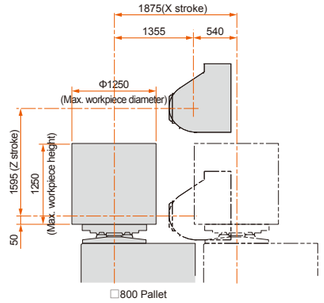
INTEGREX e-1850V/25S Turning



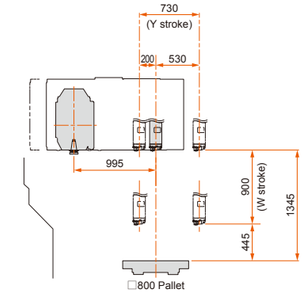
INTEGREX e-RAMTEC V/8 Stroke Diagram

Unit : mm

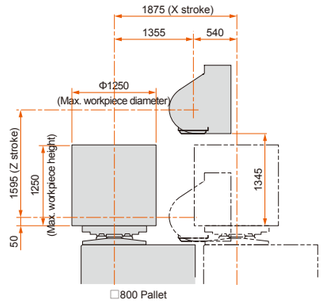
INTEGREX e-RAMTEC V/8 H [B-axis : 90°]

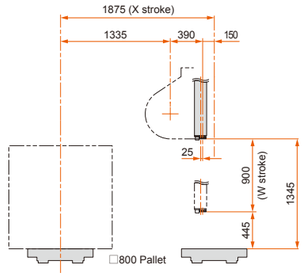


INTEGREX e-RAMTEC V/8 Ram spindle

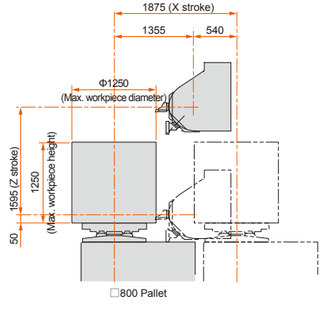


INTEGREX e-RAMTEC V/8 V [B-axis : 0°]





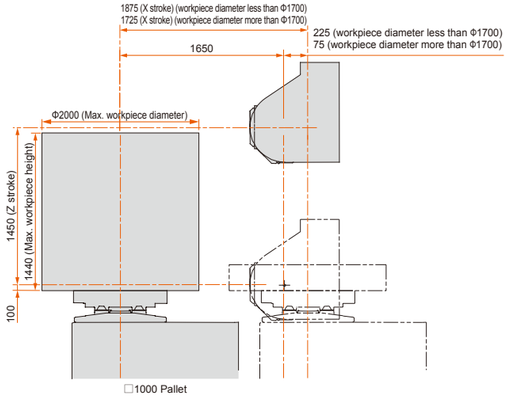
INTEGREX e-RAMTEC V/8 Turning



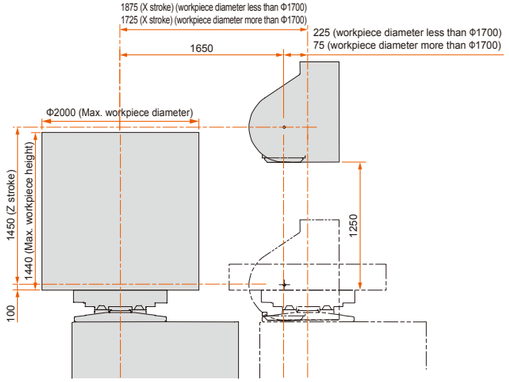
INTEGREX e-RAMTEC V/10 Stroke Diagram

Unit : mm

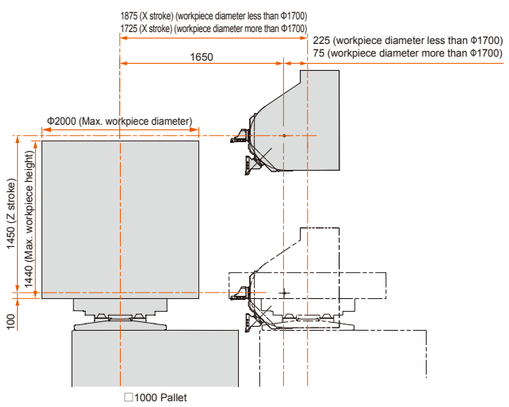
INTEGREX e-RAMTEC V/10 H［B-axis : 90°］



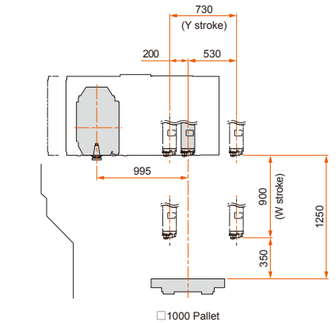
INTEGREX e-RAMTEC V/10 V［B-axis : 0°］

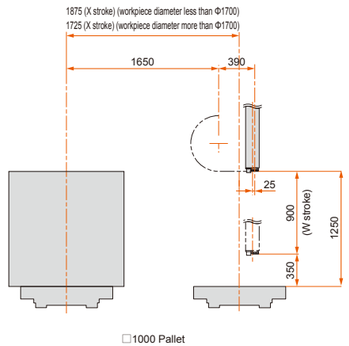


INTEGREX e-RAMTEC V/10 Turning



INTEGREX e-RAMTEC V/10 Ram spindle

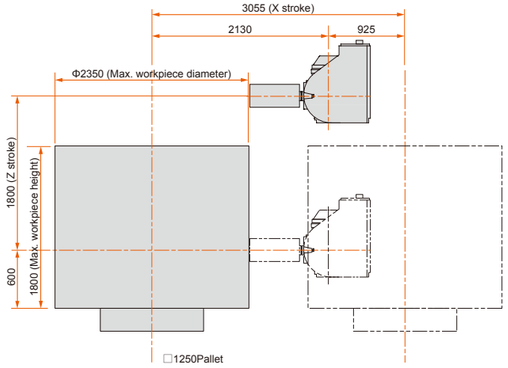




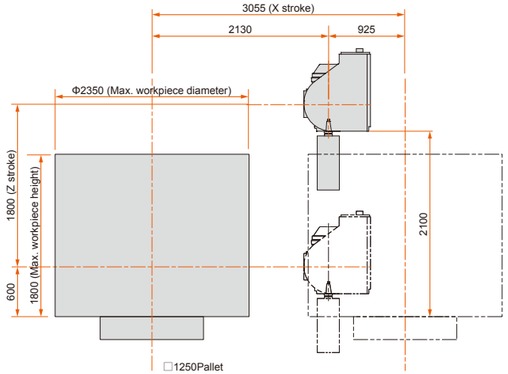
INTEGREX e-RAMTEC V/12 Stroke Diagram

Unit : mm

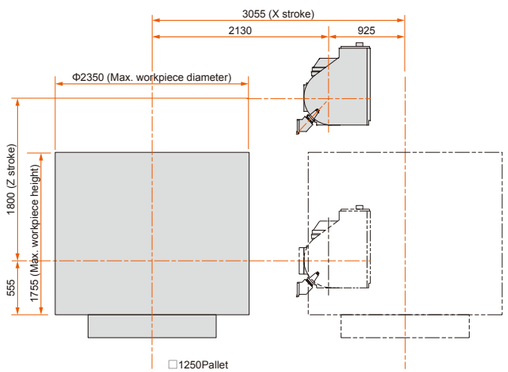
INTEGREX e-RAMTEC V/12 H［B-axis : 90°］



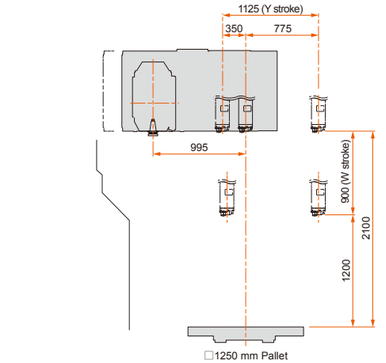
INTEGREX e-RAMTEC V/12 V［B-axis : 0°］

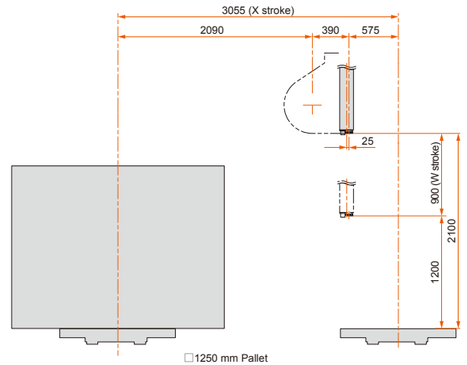


INTEGREX e-RAMTEC V/12 Turning



INTEGREX e-RAMTEC V/12 Ram spindle

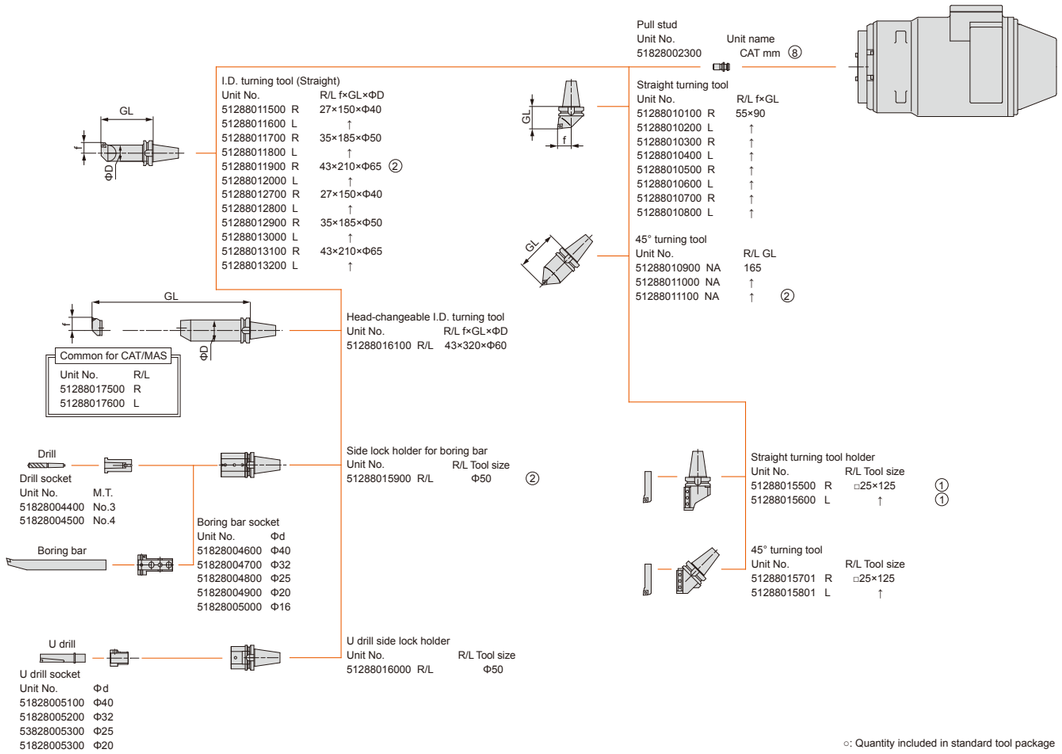




Tooling System

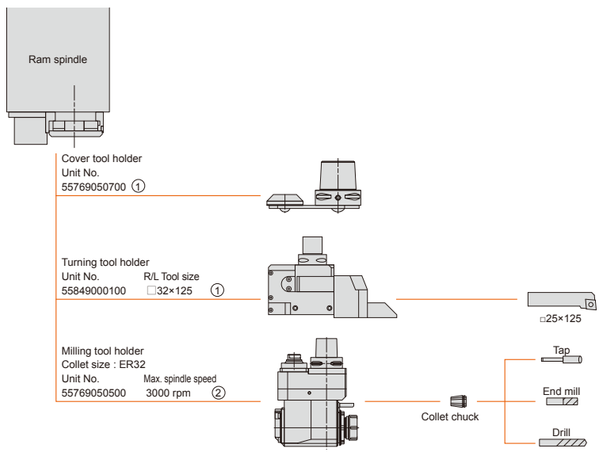
Unit : mm

Milling spindle tooling system



○: Quantity included in standard tool package

e-RAMTEC V ram spindle tooling system

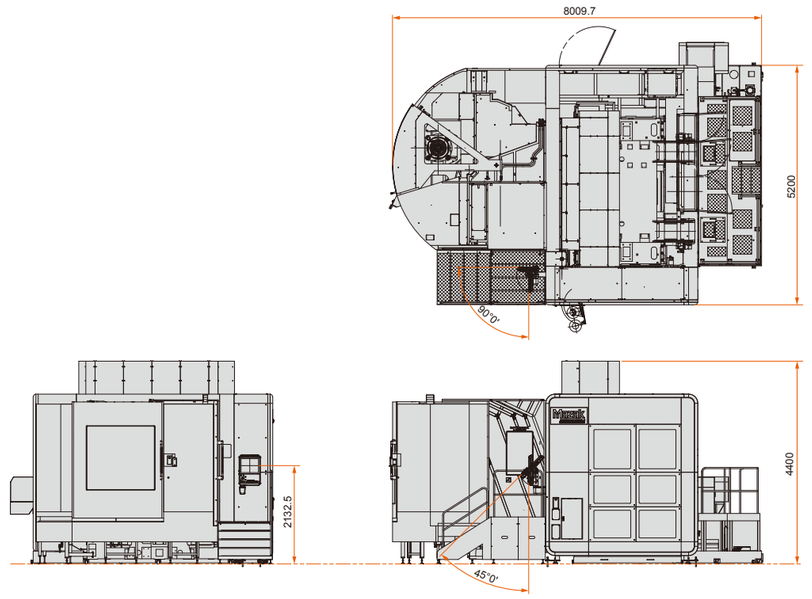


○: Quantity included in standard tool package

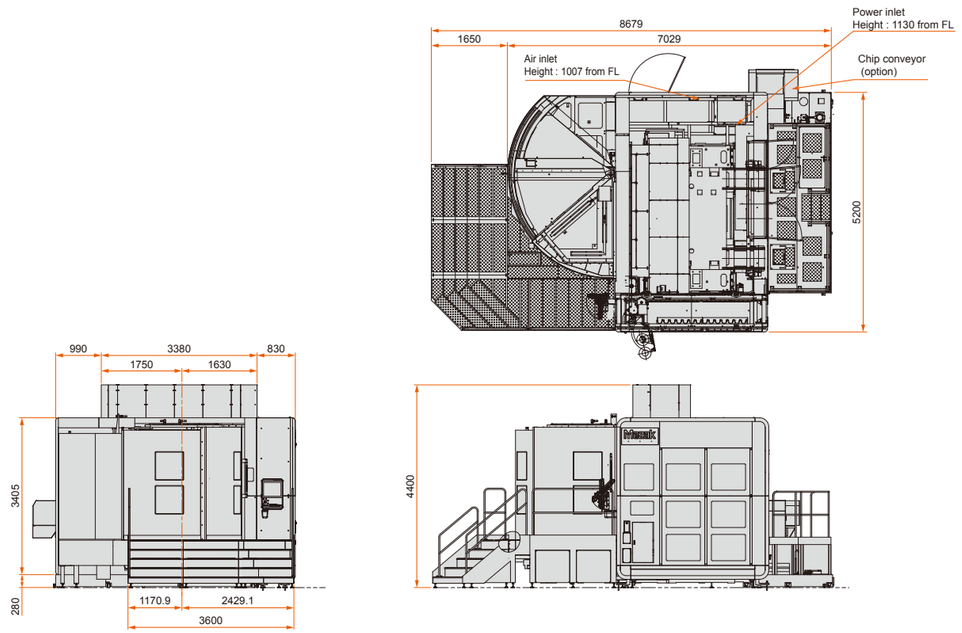
Machine Dimensions

Unit : mm

INTEGREX e-1250V/8



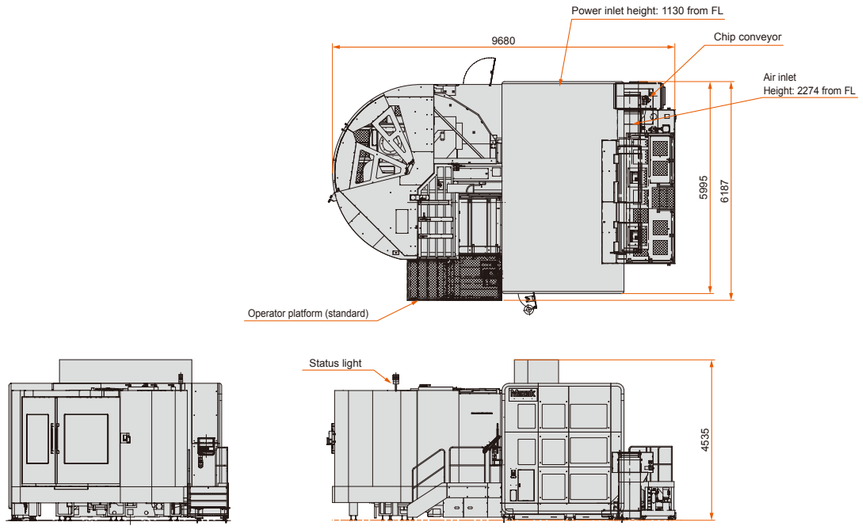
INTEGREX e-1250V/8S



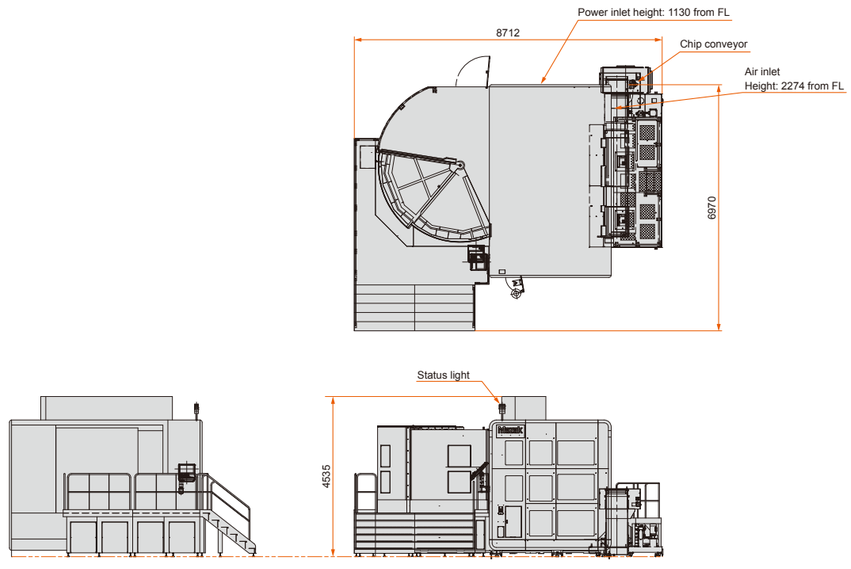
Machine Dimensions

Unit : mm

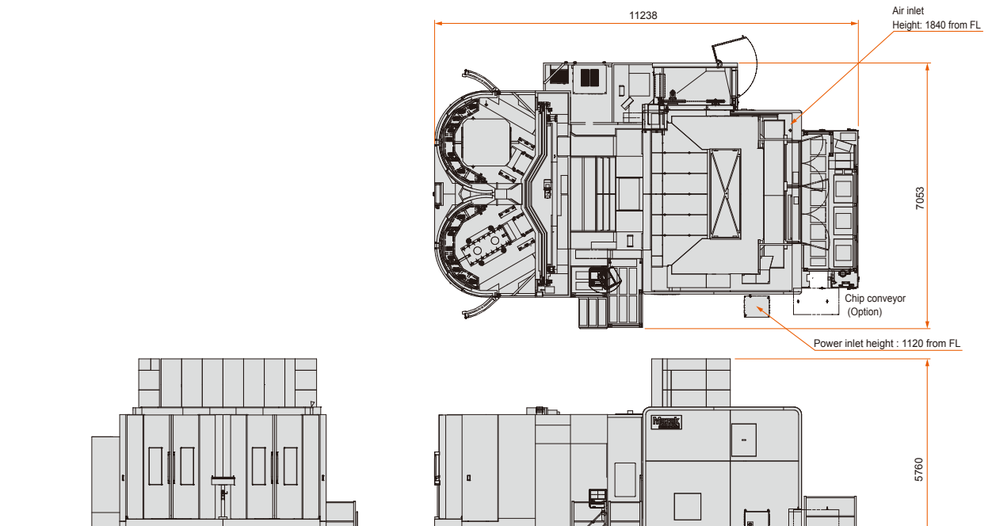
INTEGREX e-1600V/10



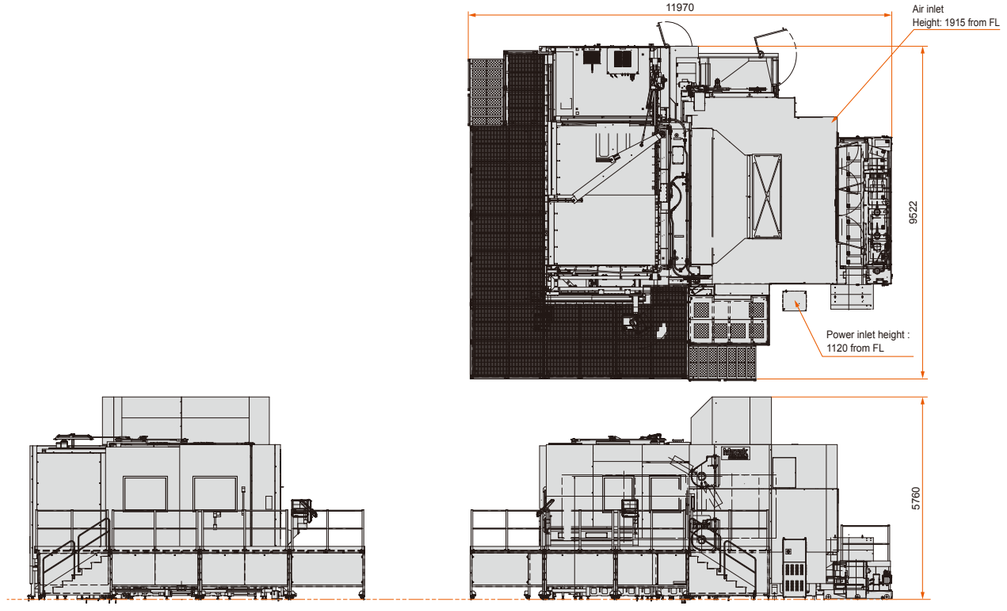
INTEGREX e-1600V/10S



INTEGREX e-1850V/12



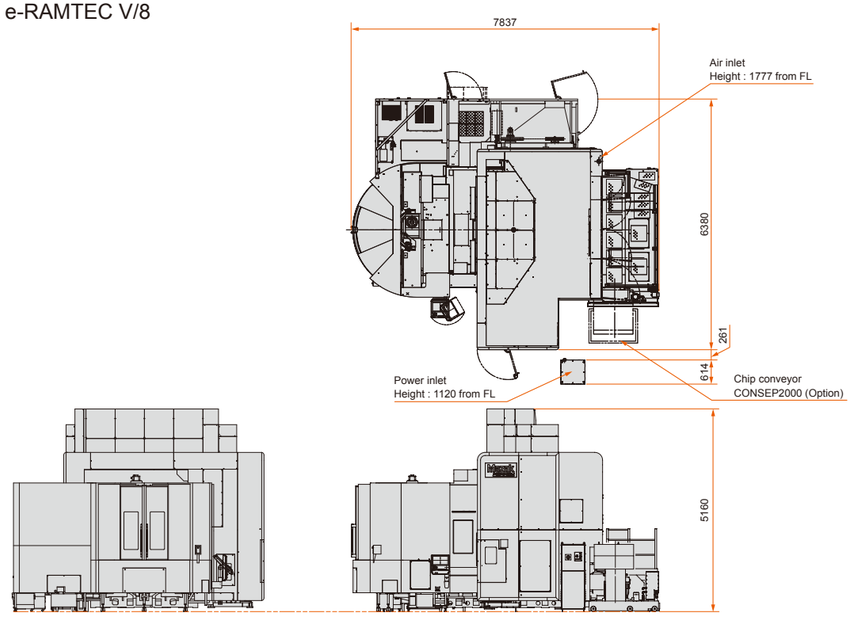
INTEGREX e-1850V/25S



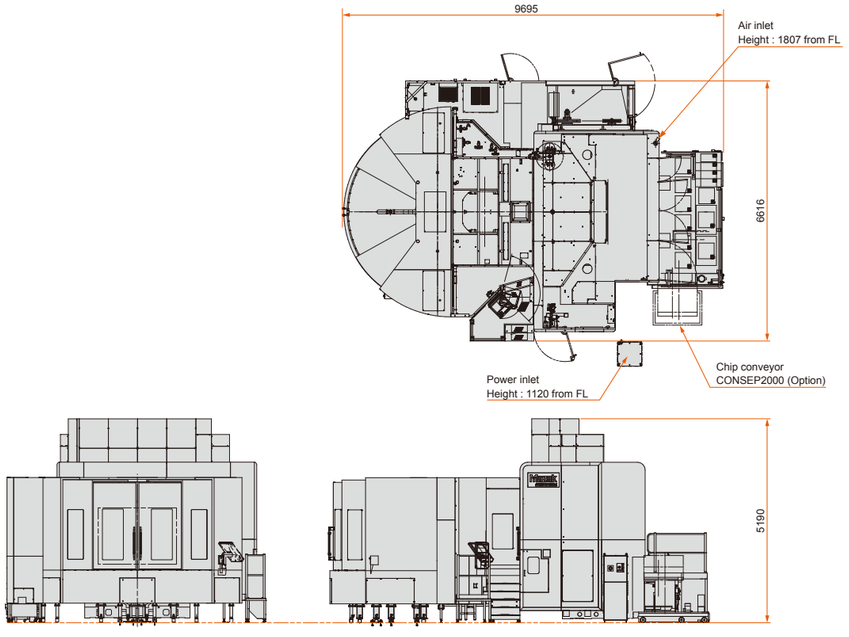
Machine Dimensions

Unit : mm

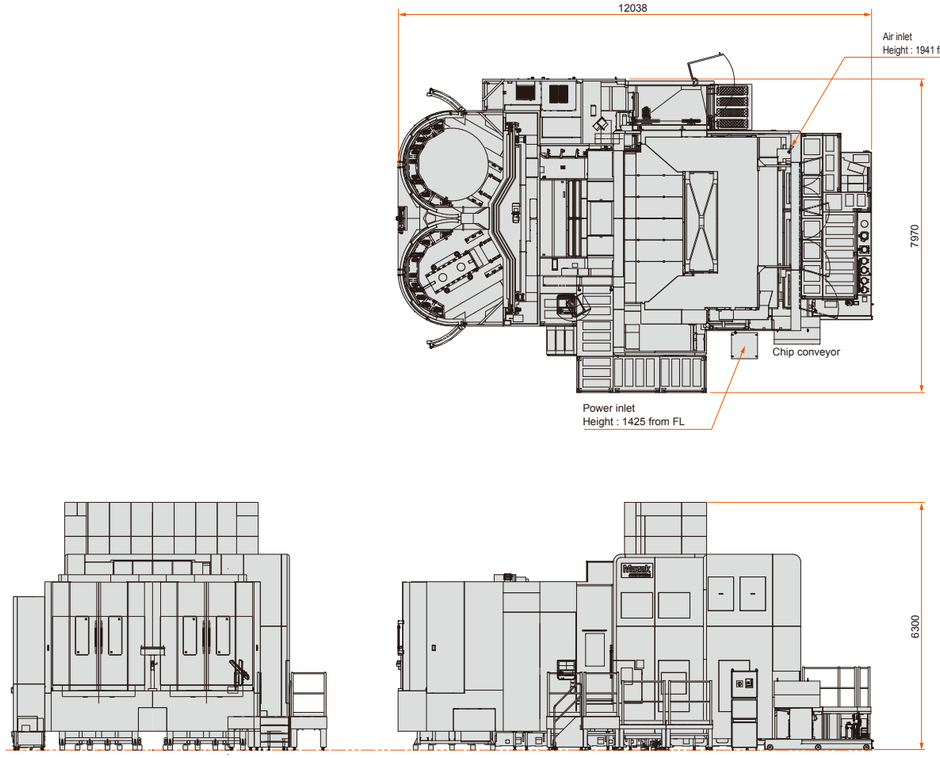
INTEGREX e-RAMTEC V/8



INTEGREX e-RAMTEC V/10



INTEGREX e-RAMTEC V/12



INTEGREX e-1250V/8, e-1250V/8S Standard Machine Specifications

		e-1250V/8	e-1250V/8S
Travel	X-axis (table forward / backward)	1875 mm	
	Y-axis (spindle head travel right / left)	1250 mm	
	Z-axis (spindle head travel up / down)	1345 mm	
	B-axis (spindle head tilt)	150°(−30° ~ +120°)	
	C-axis (table rotation)	360°(Cont.)	
	Distance between B-axis rotation center and pallet center (X-axis at home)	1335 mm	
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	−540 mm	
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1035 mm	
	Distance between B-axis rotation center and pallet top face*1	50 mm ~ 1395 mm	
	Distance between spindle nose and pallet top face (B-axis=0°)*1	−250 mm ~ 1095 mm	
Capacity	Max. machining diameter	Φ1450 mm	Φ1500 mm
	Max. workpiece size*1	Φ1450 × 1600 mm	Φ1500 × 1600 mm
	Table load capacity (evenly distributed)	2700 kg (Including pallet weight)	4000 kg (Including pallet weight)
Table	Max. speed*2	500 rpm	
	Rapid traverse rate (C-axis)	25 rpm	
	Min. indexing angle increment (C-axis)	0.0001°	
	Indexing time (C-axis)	1.1 sec. / 90°	
Milling spindle	Max. speed	10000 rpm	
	Spindle taper	No.50	
	Spindle bearing ID	Φ100 mm	
	Spindle acceleration	3.1sec. (0 ~ 10000 rpm)	
	Rapid traverse rate (B-axis)	30 rpm	
	Min. indexing angle increment (B-axis)	0.0001°	
	Indexing time	0.7 sec. / 90°	
Feedrate*3	Rapid traverse rate (X, Y, Z-axes)	42000 mm/min	
	Max. cutting feedrate (X, Y, Z-axes)	42000 mm/min	
Automatic tool changer	Tool shank	CAT-50	
	Pull stud	ANSI	
	Tool magazine capacity	42	
	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 49 N·m	
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm	
Automatic pallet changer	Number of pallets	2	—
	Pallet change time	15 sec.	—
	Pallet changer type	Rotary type	—
Motors	Table motor (cont. rating)	AC 40 kW (53.3 HP)	
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)	
	Coolant pump motor (50 Hz / 60 Hz)	0.73 / 1.21 kW	
Power requirement	Electrical power supply (40% ED / cont. rating)	135.6 kVA / 124.5 kVA	
	Air supply	1000 L/min (ANR)	
Tank capacity	Coolant tank capacity	1100 L	
Machine size	Machine height (from floor)	4400 mm	
	Floor space requirement	5200 × 8009 mm	5200 × 7029 mm
	Machine weight	49500 kg	45000 kg
CNC		MAZATROL SmoothX	
Sounds		Less than 80 db (A)	

*1 With e-1250V/8 : □800 mm tapped pallet, e-1250V/8S : φ1250 mm faceplate with jaws
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement

INTEGREX e-1600V/10, e-1600V/10S Standard Machine Specifications

		e-1600V/10	e-1600V/10S
Travel	X-axis (table forward / backward)	2315 mm	2165 mm
	Y-axis (spindle head travel right / left)	1600 mm	
	Z-axis (spindle head travel up / down)	1345 mm	
	B-axis (spindle head tilt)	150°(−30° ~ +120°)	
	C-axis (table rotation)	360°(Cont.)	
	Distance between B-axis rotation center and pallet center (X-axis at home)	1775 mm	
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	−540 mm	−390 mm
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1475 mm	
	Distance between B-axis rotation center and pallet top face*1	100 mm ~ 1445 mm	169 mm ~ 1514 mm
	Distance between spindle nose and pallet top face (B-axis=0°)*1	−200 mm ~ 1145 mm	−131 mm ~ 1214 mm
Capacity	Max. machining diameter	Φ2050 mm	Φ2300 mm
	Max. workpiece size*1	Φ2050 × 1600 mm	Φ2300 × 1669 mm
	Table load capacity (evenly distributed)	5000 kg (Including pallet weight)	7000 kg (Including pallet weight)
Table	Max. speed*2	300 rpm	
	Rapid traverse rate (C-axis)	20 rpm	
	Min. indexing angle increment (C-axis)	0.0001°	
	Indexing time (C-axis)	1.4 sec. / 90°	
Milling spindle	Max. speed	10000 rpm	
	Spindle taper	No.50	
	Spindle bearing ID	Φ100 mm	
	Spindle acceleration	3.1sec. (0 ~ 10000 rpm)	
	Rapid traverse rate (B-axis)	30 rpm	
	Min. indexing angle increment (B-axis)	0.0001°	
	Indexing time	0.7 sec. (90°)	
Feedrate*3	Rapid traverse rate (X, Y, Z-axes)	42000 mm/min	
	Max. cutting feedrate (X, Y, Z-axes)	42000 mm/min	
Automatic tool changer	Tool shank	CAT-50	
	Pull stud	ANSI	
	Tool magazine capacity	42	
	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 49 N·m	
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm	
Automatic pallet changer	Number of pallets	2	—
	Pallet change time	25 sec.	—
	Pallet changer type	Rotary type	—
Motors	Table motor (cont. rating)	AC 40 kW (53.3 HP)	
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)	
	Coolant pump motor (50 Hz / 60 Hz)	2.2 / 3.0 kW (3.0 / 4.0 HP)	
Power requirement	Electrical power supply (40% ED / cont. rating)	133.0 / 121.9 kVA	
	Air supply	1100 L/min (ANR)	
Tank capacity	Coolant tank capacity	1100 L	
Machine size	Machine height (from floor)	4535 mm	
	Floor space requirement	9680 × 6187 mm	8712 × 6970 mm
	Machine weight	58000 kg	46700 kg
CNC		MAZATROL SmoothX	
Sounds		Less than 80 db (A)	

*1 With e-1600V/10 : □1000 mm tapped pallet (option), e-1600V/10S : φ14000 mm faceplate with jaws (option)
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement

INTEGREX e-1850V/12, e-1850V/25S Standard Machine Specifications

		e-1850V/12	e-1850V/25S
Travel	X-axis (table forward / backward)	3055 mm	
	Y-axis (spindle head travel right / left)	1850 mm	
	Z-axis (spindle head travel up / down)	1800 mm	
	B-axis (spindle head tilt)	150°(−30°~ +120°)	
	C-axis (table rotation)	360°(Cont.)	
	Distance between B-axis rotation center and pallet center (X-axis at home)	2130 mm	2200 mm
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	−925 mm	−855 mm
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1830 mm	1900 mm
	Distance between B-axis rotation center and pallet top face*1	100 mm ~ 1900 mm	28 mm ~ 1828 mm
	Distance between spindle nose and pallet top face (B-axis=0°)*1	−200 mm ~ 1600 mm	−272 mm ~ 1528 mm
Capacity	Max. machining diameter	Φ2350 mm	Φ3500 mm
	Max. workpiece size*1	Φ2350 × 1800 mm	Φ3500 × 1800 mm
	Table load capacity (evenly distributed)	7000 kg (Including pallet weight)	15000 kg*4 (Including table weight)
Table	Max. speed*2	250 rpm	75 rpm*5
	Rapid traverse rate (C-axis)	6.7 rpm	1.0 rpm*6
	Min. indexing angle increment (C-axis)	0.0001°	0.0001° *7 (no contouring)
	Indexing time (C-axis)	3.4 sec. / 90°	5.4 sec. / 90°
Milling spindle	Max. speed	10000 rpm	
	Spindle taper	No.50	
	Spindle bearing ID	Φ100 mm	
	Spindle acceleration	3.1 sec. (0 ~ 10000 rpm)	
	Rapid traverse rate (B-axis)	30 rpm	
	Min. indexing angle increment (B-axis)	0.0001°	
	Indexing time	0.7 sec. / 90°	
Feedrate*3	Rapid traverse rate	X, Y, Z-axes：40000 mm/min	X-axes：20000 mm/min / Y, Z-axes：40000 mm/min
	Max. cutting feedrate	X, Y, Z-axes：40000 mm/min	X-axes：20000 mm/min / Y, Z-axes：40000 mm/min
Automatic tool changer	Tool shank	CAT-50	
	Pull stud	ANSI	
	Tool magazine capacity	40	
	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 29.4 N·m	
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm	
	Tool selection method	Fixed pocket number, random selection / shortest path	
Automatic pallet changer	Number of pallets	2	—
	Pallet change time	50 sec.	—
	Change system	Shuttle type	—
Motors	Table motor (40% ED / cont. rating)	AC 45 / 37 kW (60 / 50 HP)	
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)	
	Coolant pump motor (50 Hz / 60 Hz)	0.73 / 1.21 kW	
Power requirement	Electrical power supply (40% ED / cont. rating)	127.5 kVA / 116.3 kVA	
	Air supply	700 L/min (ANR)	
Tank capacity	Coolant tank capacity	1300 L	
Machine size	Machine height (from floor)	5760 mm	
	Floor space requirement	7053 × 11238 mm	9522 × 11970 mm
	Machine weight	60000 kg	75000 kg
CNC		MAZATROL SmoothX	
Sounds		Less than 80 db (A)	

*1 With V/12 : tapped pallet, V/25S : Φ2500 mm tapped table
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement
*4 Specification for simultaneous 5-axis control : 10000 kg (including table)
*5 Specification for simultaneous 5-axis control : 100 rpm
*6 Specification for simultaneous 5-axis control : 3.0 rpm
*7 Specification for simultaneous 5-axis control : 0.0001°

INTEGREX e-RAMTEC V/8 Standard Machine Specifications

		INTEGREX e-RAMTEC V/8
Travel	X-axis (table forward / backward)	1875 mm
	Y-axis (spindle head travel right / left)	1060 mm
	Z-axis (spindle head travel up / down)	1595 mm
	W-axis (ram spindle head travel up / down)	900 mm
	B-axis (spindle head tilt)	150°(−30°~ +120°)
	C-axis (table rotation)	360°(Cont.)
	Distance between B-axis rotation center and pallet center (X-axis at home)	1335 mm
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	−540 mm
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1035 mm
	Distance between B-axis rotation center and pallet top face*1	50mm ~ 1645 mm
	Distance between spindle nose and pallet top face (B-axis=0°)*1	−250mm ~ 1345 mm
Capacity	Max. machining diameter	Φ1250 mm
	Min. machining diameter by ram spindle	Φ300 mm
	Max. workpiece size*1	Φ1250 × 1250 mm
	Table load capacity (evenly distributed)	2700 kg (Including pallet weight)
Table	Max. speed*2	500 rpm
	Rapid traverse rate (C-axis)	18 rpm
	Min. indexing angle increment (C-axis)	0.0001°
	Indexing time (C-axis)	2.6 sec. / 90°
Milling spindle	Max. speed	10000 rpm
	Spindle taper	No.50
	Spindle bearing ID	Φ100 mm
	Spindle acceleration	3.1sec. (0 ~ 10000 rpm)
	Rapid traverse rate (B-axis)	30 rpm
	Min. indexing angle increment (B-axis)	0.0001°
	Indexing time (B-axis)	0.7 sec. / 90°
Ram spindle	Max. speed	3000 rpm
	Spindle taper	CAPTO C6
	Rapid traverse rate (W-axis)	30000 mm/min
Feedrate*3	Rapid traverse rate (X, Y, Z-axes)	42000 mm/min
	Max. cutting feedrate (X, Y, Z-axes)	42000 mm/min
Milling spindle automatic tool changer	Tool shank	CAT-50
	Pull stud	ANSI
	Tool magazine capacity	40
	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 29.4 N·m
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm
	Tool selection method	Fixed pocket number, random selection / shortest path
Ram spindle automatic tool changer	Tool shank	CAPTO C6
	Tool magazine capacity	40
	Max. tool weight	10 kg
	Max. tool diameter on milling tool holder / length (from taper center)	Φ50 mm / 190 mm
Automatic pallet changer	Number of pallets	2
	Pallet change time	13 sec.
	Change system	Rotary type
Motors	Table motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)
	Ram spindle motor (10 min / cont. rating)	AC 7.5 / 5.5 kW (10 / 7.3 HP)
	Coolant pump motor (50 Hz / 60 Hz)	730 / 1210 W
Power requirement	Electrical power supply (40% ED / cont. rating)	110.24 kVA / 100.44 kVA
	Air supply	0.5 MPa (5 kgf/cm^3) / 780 L/min
Tank capacity	Coolant tank capacity	900 L
Machine size	Machine height (from floor)	5160 mm
	Floor space requirement	7837 × 6380 mm
	Machine weight	46000 kg
CNC		MAZATROL SmoothX
Sounds		Less than 80 db (A)

*1 With □800 mm tapped pallet
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement

INTEGREX e-RAMTEC V/10 Standard Machine Specifications

		INTEGREX e-RAMTEC V/10
Travel	X-axis (table forward / backward)	1875 mm (workpiece diameter less than Φ1700mm), 1725mm (workpiece diameter more than Φ1700mm)
	Y-axis (spindle head travel right / left)	1060 mm
	Z-axis (spindle head travel up / down)	1450 mm
	W-axis (ram spindle head travel up / down)	900 mm
	B-axis (spindle head tilt)	150°(−30°~ +120°)
	C-axis (table rotation)	360°(Cont. rating)
	Distance between B-axis rotation center and pallet center (X-axis at home)	1650 mm
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	-225 mm (workpiece diameter less than Φ1700mm), -75mm (workpiece diameter more than Φ1700mm)
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1350 mm
	Distance between B-axis rotation center and pallet top face*1	100 mm ~ 1550 mm
	Distance between spindle nose and pallet top face (B-axis=0°)*1	−200 mm ~ 1250 mm
Capacity	Max. machining diameter	Φ2000 mm
	Min. machining diameter by ram spindle	Φ500 mm (workpiece diameter less than Φ1700mm), Φ800mm (workpiece diameter more than Φ1700mm)
	Max. workpiece size*1	Φ2000 × 1440 mm
	Table load capacity (evenly distributed)	5000 kg (Including pallet weight)
Table	Max. speed*2	300 rpm
	Rapid traverse rate (C-axis)	8.9 rpm
	Min. indexing angle increment (C-axis)	0.0001°
	Indexing time (C-axis)	2.7 sec. / 90°
Milling	Max. speed	10000 rpm
spindle	Spindle taper	No.50
	Spindle bearing ID	Φ100 mm
	Spindle acceleration	3.1 sec. (0 ~ 10000 rpm)
	Rapid traverse rate (B-axis)	30 rpm
	Min. indexing angle increment (B-axis)	0.0001°
	Indexing time (B-axis)	0.7 sec. / 90°
Ram spindle	Max. speed	3000 rpm
	Spindle taper	CAPTO C6
	Rapid traverse rate (W-axis)	30000 mm/min
Feedrate*3	Rapid traverse rate (X, Y, Z-axes)	42000 mm/min
	Max. cutting feedrate (X, Y, Z-axes)	42000 mm/min
Milling	Tool shank	CAT-50
spindle	Pull stud	ANSI
automatic	Tool magazine capacity	40
tool changer	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 29.4 N·m
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm
	Tool selection method	Fixed pocket number, random selection / shortest path
Ram spindle	Tool shank	CAPTO C6
automatic	Tool magazine capacity	40
tool changer	Max. tool weight	10 kg
	Max. tool diameter on milling tool holder / length (from taper center)	Φ50 mm / 190 mm
Automatic	Number of pallets	2
pallet changer	Pallet change time	25 sec.
	Change system	Rotary type
Motors	Table motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)
	Ram spindle motor (10 min / cont. rating)	AC 7.5 / 5.5 kW (10 / 7 HP)
	Coolant pump motor (50 Hz / 60 Hz)	730 / 1210 kW
Power	Electrical power supply (40% ED / cont. rating)	118.1 kVA / 108.3 kVA
requirement	Air supply	0.5 MPa (5 kgf/cm^3) / 780 L/min
Tank capacity	Coolant tank capacity	900 L
Machine size	Machine height (from floor)	5190 mm
	Floor space requirement	6616 × 9695 mm
	Machine weight	53000 kg
CNC		MAZATROL SmoothX
Sounds		Less than 80 db (A)

*1 With □1000 mm tapped pallet
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement

INTEGREX e-RAMTEC V/12 Standard Machine Specifications

		INTEGREX e-RAMTEC V/12
Travel	X-axis (table forward / backward)	3055 mm
	Y-axis (spindle head travel right / left)	1700 mm
	Z-axis (spindle head travel up / down)	1800 mm
	W-axis (ram spindle head travel up / down)	900 mm
	B-axis (spindle head tilt)	150°(−30°~ +120°)
	C-axis (table rotation)	360°(Cont. rating)
	Distance between B-axis rotation center and pallet center (X-axis at home)	2130 mm
	Distance between B-axis rotation center and pallet center (X-axis at stroke end)	−925 mm
	Distance between spindle nose and pallet center (B-axis = +90°) (X-axis at home)	1830 mm
	Distance between B-axis rotation center and pallet top face*1	600 mm ~ 2400 mm
	Distance between spindle nose and pallet top face (B-axis=0°)*1	300 mm ~ 2100 mm
Capacity	Max. machining diameter	Φ2350 mm
	Min. machining diameter by ram spindle	Φ300 mm
	Max. workpiece size*1	Φ2350 × 1800 mm
	Table load capacity (evenly distributed)	7000 kg (Including pallet weight)
Table	Max. speed*2	250 rpm
	Rapid traverse rate (C-axis)	6.7 rpm
	Min. indexing angle increment (C-axis)	0.0001°
	Indexing time (C-axis)	3.4 sec. / 90°
Milling	Max. speed	10000 rpm
spindle	Spindle taper	No.50
	Spindle bearing ID	Φ100 mm
	Spindle acceleration	3.1 sec. (0 ~ 10000 rpm)
	Rapid traverse rate (B-axis)	30 rpm
	Min. indexing angle increment (B-axis)	0.0001°
	Indexing time (B-axis)	2.2 sec / 90°
Ram spindle	Max. speed	3000 rpm
	Spindle taper	CAPTO C6
	Rapid traverse rate (W-axis)	30000 mm/min
Feedrate*3	Rapid traverse rate (X, Y, Z-axes)	40000 mm/min
	Max. cutting feedrate (X, Y, Z-axes)	40000 mm/min
Milling	Tool shank	CAT-50
spindle	Pull stud	ANSI
automatic	Tool magazine capacity	40
tool changer	Max. tool diameter / length (from gauge line) / max. weight / momentum	Φ135 mm / 650 mm / 30 kg / 29.4 N·m
	Max. tool diameter with adjacent tool pockets empty	Φ260 mm
	Tool selection method	Fixed pocket number, random selection / shortest path
Ram spindle	Tool shank	CAPTO C6
automatic	Tool magazine capacity	40
tool changer	Max. tool weight	10 kg
	Max. tool diameter on milling tool holder / length (from taper center)	Φ50 mm / 190 mm
Automatic	Number of pallets	2
pallet changer	Pallet change time	50 sec.
	Change system	Shuttle type
Motors	Table motor (40% ED / cont. rating)	AC 45 / 37 kW (60 / 50 HP)
	Milling spindle motor (40% ED / cont. rating)	AC 37 / 30 kW (50 / 40 HP)
	Ram spindle motor (10 min / cont. rating)	AC 7.5 / 5.5 kW (10 / 7.4 HP)
	Coolant pump motor (50 Hz / 60 Hz)	0.73 / 1.21 kW
Power	Electrical power supply (40% ED / cont. rating)	137 kVA / 126 kVA
requirement	Air supply	0.5 MPa (5 kgf/cm^3) / 780 L/min
Tank capacity	Coolant tank capacity	2500 L
Machine size	Machine height (from floor)	6300 mm
	Floor space requirement	7970 × 12038 mm
	Machine weight	87200 kg
CNC		MAZATROL SmoothX
Sounds		Less than 80 db (A)

*1 With □1250 mm tapped pallet
*2 Depends on chuck / pallet specifications. 50 rpm for square pallet
*3 Limited feedrate with continuous movement

INTEGREX e-1250V/8, e-1250V/8S, e-1600V/10, e-1600V/10S Standard and Optional Equipment

● : Standard ○ : Option — : N/A

		e-1250V/8	e-1250V/8S	e-1600V/10	e-1600V/10S
Milling spindle	Standard specification 10000 rpm	●	●	●	●
	High torque specification 5000 rpm 500 N·m (cont. rating)	○	○	○	○
	High speed specification 15000 rpm 45 kW (cont. rating)	○	○	○	○
Table (turning spindle)	Standard specification 500 rpm 3434 N·m (cont. rating)	●	●	—	—
	High torque specification 300 rpm 6800 N·m (cont.rating)	○	○	—	—
	Standard specification 300 rpm 3434 N·m (cont. rating)	—	—	●	●
	High torque specification 300 rpm 6800 N·m (cont.rating)	—	—	○	○
Tool magazine	42 tools-rack type tool magazine	●	●	●	●
	84 tools-rack type tool magazine	○	○	○	○
	120 tools-rack type tool magazine	○	○	○	○
	162 tools-rack type tool magazine	○	○	○	○
	180 tools-tool hive	○	○	○	○
	216 tools-tool hive	○	○	○	○
	252 tools-tool hive	○	○	○	○
	288 tools-tool hive	○	○	○	○
	324 tools-ool hive	○	○	○	○
	360 tools-tool hive	○	○	○	○
	HSK	○	○	○	○
	CAPTO	○	○	○	○
Pallet changer	Manual pallet rotation at 2PC loading station	●	—	—	—
	Power pallet rotation at 2PC loading station	○	—	●	—
	Workpiece centering equipment at setup station with power pallet rotation	○	—	○	—
	FMS preparation for 2PC (Pallet can rotate at loading station)	○	—	○	—
	2PC for FMS (Pallet cannot rotate at loading station)	○	—	○	—
Setup	Absolute position detection (Linear axes)	●	●	●	●
	Separate manual pulse handle	●	●	●	●
	Automatic tool eye	○	○	○	○
	Laser milling tool measurement system (NC4 / air blast)	○	○	○	○
	Laser milling tool measurement system (NC4 / software not included)	○	○	○	○
	Tool breakage detection	○	○	○	○

● : Standard ○ : Option — : N/A

		e-1250V/8	e-1250V/8S	e-1600V/10	e -1600V/10S
Setup	Preparation for Mazak monitoring system B (RMP-600)	●	●	●	●
	Wireless touch probe (RMP-600)	○	○	○	○
	Visual tool ID / preparation for data management	○	○	○	○
	Pull stud with tool ID (#50 Euchner)	○	○	○	○
Automation	Preparation for flash tool	○	○	○	○
	Z-axis high column (250 mm)	○	○	—	—
	Z-axis high column (300 mm)	—	—	○	○
	Auto power off	●	●	●	●
	Calendar type automatic power on / off and warm-up operation	●	●	●	●
High accuracy	Chiller unit (milling spindle, turning spindle [table], ball screw core cooling)	●	●	●	●
	Ball screw core cooling (X, Y, Z-axes)	●	●	●	●
	Scale feedback (Z-axis)	●	●	●	●
	Scale feedback (X, Y-axes)	○	○	○	○
	Scale feedback (C-axis)	●	●	●	●
	Hydraulic unit temperature control	○	○	○	○
	Coolant temperature control	○	○	○	○
Coolant / chip disposal	Air through milling spindle	●	●	●	●
	Flood coolant and coolant through spindle 1.5 MPa	●	●	●	●
	Niagara coolant	○	○	○	○
	Oil skimmer (RB-200)	○	○	○	○
	Coolant tank magnetic plate	○	○	○	○
	Magnetic separator for cast iron	○	○	○	○
	Mist collector (G3000)	○	○	○	○
	Preparation for mist collector (without power supply)	○	○	○	○
	Hand held coolant nozzle	○	○	○	○
	Hand held coolant nozzle for pallet changer	○	—	○	—
	Pressure switch for coolant through spindle	○	○	○	○
	Secondary filter for coolant (for aluminum)	○	○	○	○
	Chip conveyor (side discharge, CONSEP)	○	○	○	○
Safety equipment	Operator's door interlock	●	●	●	●
	Overload error detection	○	○	○	○
	Hydraulic pressure interlock	○	○	○	○

INTEGREX e-1850V/12, e-1850V/25S Standard and Optional Equipment

● : Standard ○ : Option — : N/A

		e-1850V/12	e-1850V/25S
Milling spindle	Standard specification 10000 rpm	●	●
	High torque specification 5000 rpm 500N·m (cont. rating)	○	○
	High speed specification 15000 rpm 45 kW (cont. rating)	○	○
Table (turning spindle)	Standard specification 250 rpm	●	—
	High torque specification 150 rpm 12230 N·m (cont.rating)	○	—
	Table load 10 ton (including pallet)	○	—
	Standard specification 75 rpm	—	●
	Simultaneous 5-axis specification 100 rpm (contouring)	—	○
Tool magazine	40 tools-chain type tool magazine	●	●
	80 tools-chain type tool magazine	○	○
	120 tools-chain type tool magazine	○	○
	160 tools-chain type tool magazine	○	○
	180 tools-tool hive	○	○
	204 tools-tool hive	○	○
	240 tools-tool hive	○	○
	288 tools-tool hive	○	○
	312 tools-tool hive	○	○
	348 tools-tool hive	○	○
	HSK	○	○
	CAPTO	○	○
Pallet changer	Power pallet rotation of 2PC loading station	●	—
	Workpiece centering equipment at 2PC with power pallet rotation	○	—
	FMS preparation for 2PC (Pallet can rotate at loading station)	○	—
	2PC for FMS (Pallet cannot rotate at loading station)	○	—
Setup	Absolute position detection (Linear axes)	●	●
	Separate manual pulse handle	●	●
	Automatic tool eye	○	○
	Laser milling tool measurement system (NC4 / air blast)	○	○
	Laser milling tool measurement system (NC4 / software not included)	○	○
	Tool breakage detection	○	○

● : Standard ○ : Option — : N/A

		e-1850V/12	e-1850V/25S
Setup	Preparation for Mazak monitoring system B (RMP-600)	●	●
	Wireless touch probe (RMP-600)	○	○
	Visual tool ID / preparation for data management	○	○
	Pull stud with tool ID (#50 Euchner)	○	○
Automation	Preparation for flash tool	○	○
	Auto power off	●	●
	Calendar type automatic power on / off and warm-up operation	●	●
High accuracy	Chiller unit	●	●
	Ball screw core cooling (X, Y, Z-axes)	●	●
	Scale feedback (Z-axis)	●	●
	Scale feedback (X, Y-axes)	○	○
	Hydraulic unit temperature control	○	○
	Coolant temperature control	○	○
Coolant / chip disposal	Air through milling spindle	●	●
	Flood coolant and coolant through spindle 1.5 MPa	●	●
	Niagara coolant	○	○
	Oil skimmer	○	○
	Coolant tank magnetic plate	○	○
	Magnetic separator for cast iron	○	○
	Mist collector	○	○
	Preparation for mist collector (no power supply)	○	○
	Hand held coolant nozzle	○	○
	Hand held coolant nozzle for pallet changer	○	—
	Pressure switch for coolant through spindle	○	○
	Secondary filter for coolant (for aluminum)	○	○
	Chip conveyor (side discharge, CONSEP)	○	○
Safety equipment	Operator's door interlock	●	●
	Overload error detection	○	○
	Hydraulic pressure interlock	○	○

INTEGREX e-RAMTEC V/8, e-RAMTEC V/10, e-RAMTEC V/12 Standard and Optional Equipment

● : Standard ○ : Option — : N/A

		e -RAMTEC V/8	e -RAMTEC V/10	e -RAMTEC V/12
Milling spindle	Standard specification 10000 rpm	●	●	●
	High torque specification 5000 rpm 500 N·m (cont. rating)	○	○	○
	High speed specification 15000 rpm 45 kW (cont. rating)	○	○	○
Table (turning spindle)	Standard specification 500 rpm	●	—	—
	High torque specification 300 rpm 5835 N·m (cont.rating)	○	—	—
	Standard specification 300 rpm	—	●	—
	Standard specification 250 rpm	—	—	●
	High torque specification 150 rpm 12230 N·m	—	—	○
	Table load 10 ton (including pallet)	—	—	○
Tool magazine	40 tools-chain type tool magazine	●	●	●
	80 tools-chain type tool magazine	○	○	○
	120 tools-chain type tool magazine	○	○	○
	160 tools-chain type tool magazine	○	○	○
	180 tools-tool hive	○	○	○
	204 tools-tool hive	○	○	○
	240 tools-tool hive	○	○	○
	288 tools-tool hive	○	○	○
	312 tools-tool hive	○	○	○
	348 tools-tool hive	○	○	○
	HSK	○	○	○
	CAPTO	○	○	○
Pallet changer	Manual pallet rotation at 2PC loading station	●	—	—
	Power pallet rotation at 2PC loading station	○	●	●
	Workpiece centering equipment at loading station with power pallet rotation	○	○	○
	FMS preparation for 2PC (Pallet can rotate at loading station)	○	○	○
	2PC for FMS (Pallet cannot rotate at loading station)	○	○	○
Setup	Absolute position detection (Linear axes)	●	●	●
	Separate manual pulse handle	●	●	●
	Automatic tool eye	○	○	○
	Laser milling tool measurement system (NC4 / air blast)	○	○	○
	Laser milling tool measurement system (NC4 / full function, software not included)	○	○	○
	Tool breakage detection	○	○	○

● : Standard ○ : Option — : N/A

		e -RAMTEC V/8	e -RAMTEC V/10	e -RAMTEC V/12
Setup	Preparation for Mazak monitoring system B (RMP-600)	●	●	●
	Wireless touch probe (RMP-600)	○	○	○
	Visual tool ID / preparation for data management	○	○	○
	Pull stud with tool ID (#50 Euchner)	○	○	○
Automation	Preparation for flash tool	○	○	○
	Auto power off	●	●	●
	Calendar type automatic power on / off and warm-up operation	●	●	●
High accuracy	Chiller unit (milling spindle, turning spindle [table], ball screw core cooling)	●	●	●
	Ball screw core cooling (X, Y, Z-axes)	●	●	●
	Scale feedback (Z-axis)	●	●	●
	Scale feedback (X, Y-axes)	○	○	○
	Hydraulic unit temperature control	○	○	○
	Coolant temperature control	○	○	○
Coolant / chip disposal	Air through milling spindle	●	●	●
	Flood coolant and coolant through spindle 1.5 MPa	●	●	●
	Niagara coolant	○	○	○
	Oil skimmer	○	○	○
	Coolant tank magnetic plate	○	○	○
	Magnetic separator for cast iron	○	○	○
	Mist collector	○	○	○
	Preparation for mist collector (no power supply)	○	○	○
	Hand held coolant nozzle	○	○	○
	Hand held coolant nozzle for pallet changer	○	○	○
	Pressure switch for coolant through spindle	○	○	○
	Secondary filter for coolant (for aluminum)	○	○	○
	Chip conveyor (side discharge , CONSEP)	○	○	○
Safety equipment	Operator’s door interlock	●	●	●
	Overload error detection	○	○	○
	Hydraulic pressure interlock	○	○	○

MAZATROL SmoothX Specifications

● : Standard ○ : Option — : N/A

		MAZATROL	EIA
Number of controlled axes	Simultaneous 2 ~ 4 axes	●	●
	Simultaneous 5 axes	—	○
	Least input increment : 0.0001 mm, 0.00001", 0.0001°	●	●
	Max. programmable value : ±99999.9999 mm, ±9999.99999", ±99999.9999°	●	●
High-speed, high precision control	Shape error designation	●	●
	Smooth corner control	●	●
	Rapid traverse override	●	●
	Rotational-shape correction	●	●
	High-speed machining mode	—	●
	High-speed smoothing control function	—	●
	5-axis spline	—	○
Interpolation	Positioning (Linear interpolation)	●	●
	Positioning (Independent interpolation)	●	●
	Linear interpolation	●	●
	Circular interpolation	●	●
	Cylindrical coordinate interpolation	●	○
	Spiral interpolation	—	●
	Virtual axis interpolation	—	●
	Helical interpolation	—	○
	Fine spline interpolation	—	○
	NURBS interpolation	—	○
	Polar coordinate interpolation	●	○
	Equal pitch threading	●	●
	Variable pitch threading	—	●
	Threading (C-axis interpolation type)	—	●
	Re-threading	○	○
	Override threading	○	○
	Override variable threading	○	○
	Synchronized milling spindle tapping	○	○
Feedrate	Rapid traverse	●	●
	Cutting feed	●	●
	Cutting feed (per minute)	●	●
	Cutting feed (per revolution)	●	●
	Inverse time feed	—	●
	Dwell (specified time, specified number of rotation)	●	●
	Rapid traverse override	●	●
	Cutting feed override	●	●
	2nd cutting feed override	●	●
	G0 speed variable control	●	●
	Feedrate clamp	●	●
	Acceleration / decelation feedrate after interpolation	●	●
	Acceleration / deceleration feedrate before interpolation	●	●
	Time constant changing for G1	—	●
	Constant control for G0 tilting	○	○
	Variable acceleration / deceleration control	●	●
Program registration	Max.number of programs : 960	●	●
	Program storage : 2 MB	●	●
	Program storage expansion : 8 MB	○	○
Control display	Display : 19" touch panel	●	●
	Resolution : SXGA	●	●

		MAZATROL	EIA
Spindle function	S code output	●	●
	Spindle speed clamp	●	●
	Spindle speed override	●	●
	Spindle speed reaching detection	●	●
	Spindle speed display	●	●
	1 position orient	●	●
	Multiple position orient	●	●
	Constant surface speed	●	●
	Spindle speed command with decimal digits	●	●
	C-axis control for main spindle	●	●
	Spindle Z pulse detection	●	●
	Spindle positioning control	●	●
	Max. speed control for spindle	●	●
Tool functions	Number of registered tools : Max. 4000	●	●
	Tool offset pairs : 4000	●	●
	T code output for tool number	●	●
	T code output for group number	—	●
	Tool life monitoring (time)	●	●
	Tool life monitoring (number of machined workpieces)	●	●
	Tool life monitoring (wear) (only for turning tools)	●	—
Miscellaneous functions	M code output	●	●
	Simultaneous output of multiple M codes	●	●
	Lock function for miscellaneous functions	●	●
Tool offset function	Tool position offset	●	●
	Tool length offset	●	●
	Tool diameter / Tool nose R offset	●	●
	3D tool offset	—	●
	Tool nose shape offset	●	●
	Tool wear offset	●	●
	Fixed amount offset (only for turning tools)	●	●
	Simple wear offset (only for turning tools)	●	●
Coordinate system	Machine coordinate system	●	●
	Work coordinate system	●	●
	Local coordinate system	●	●
	MAZATROL coordinate system	●	●
	External workpiece coordinate shift	●	●
	Machine coordinate system shift	●	●
	Additional work coordinates (300 set)	●	●
Machine structure functions	Turret B-axis control	●	●
	Polygon cutting	—	○
	Hobbing	—	○
	Shaping	—	○
	Tool tip control	—	○
	Tool diameter compensation for 5-axis machining	—	○
	Angled surface machining	—	●
	Workpiece positioning error compensation	—	○
	Tool axis direction, tool length compensation	—	○

		MAZATROL	EIA
Machine compensation	G0 / G1indipendent backlash compensation	●	●
	Pitch error compensation	●	●
	Volumetric compensation	●	●
Protection functions	Emergency stop	●	●
	Interlock	●	●
	Stroke check before travelling	●	●
	Barrier	●	●
	Retraction function for the vertical axis	●	●
	INTELLIGENT SAFETY SHIELD	●	●
	MAZAK VOICE ADVISER	●	●
Automatic operation mode	Memory operation	●	●
	Tape operation	—	●
	MDI operation	—	●
	Ethernet operation	—	○
Automatic operation control	Cycle start	●	●
	Single block	●	●
	Feed hold	●	●
	NC reset	●	●
	Optional block skip	—	●
	Optional stop	●	●
	Program end	●	●
	Dry run	●	●
	Manual control	●	●
	Manual handle control	●	●
	MDI control	●	●
	TPS	●	●
	Restart	●	●
	Restart 2	—	●
	Restart 2 (During automatic operation)	—	●
	Collation stop	—	●
	Single process	●	—
	Machine lock	●	●
	Threading retract	●	●
Manual operation mode	Rapid traverse	●	●
	JOG·Manual handle feed	●	●
	PLC control axis handle feed	●	●
	Home return	●	●
	Handle feed	●	●
	JOG feed	●	●
	Rapid traverse	●	●
	Tap retract	○	○
	Handle feed for 5-axis machining	●	●
	External deceleration	●	●
	Feed to an arbitrary point	●	●
Manual spindle control	Start	●	●
	Stop	●	●
	Backward rotation	●	●
	Gear shift	●	●

● : Standard ○ : Option — : N/A

		MAZATROL	EIA
Manual measuring function	Tool length and tip teach	●	●
	Tool offset teach	—	●
	Touch sensor coordinates measurement	●	●
	Workpiece offset measurement	●	●
	WPC coordinate measurement	●	—
	Measurement on machine	●	●
	Tool eye measurement	●	●
Automatic measuring function	WPC coordinate measurement	●	—
	Automatic tool length measurement	●	●
	Laser tool length/diameter measurement	●	●
	Workpiece measurement	●	●
	Sensor calibration	●	●
	Tool eye auto tool measurement	●	●
	Tool breakage detection	●	●
	External tool breakage detection	●	●
MDI measurement	Coordinates measurement	●	●
	Laser measurement	●	●
Communication interface	Ethernet	●	●
	USB	●	●
	PROFIBUS-DP	○	○
	EtherNet I / P	○	○
	CC- Link	○	○
Protocol	MAZAK protocol	●	●
	Protocol B	—	○
Data input / output	SD card interface	●	●