

## M Series

Linear Way Vertical Machining Centers

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# M Series

## Vertical Machining Center

MICROCUT linear way VMC is designed and built to meet the ever-increasing demands for powerful and reliable machines with high efficiency, high accuracy machining performance.

MICROCUT M series uses four-low linear recirculating ball bearing guideways, a high-precision main spindle with thermal expansion stability and the robust and compact structure design with high rigid durability. Depending on machining needs, various travel lengths with great capacity satisfy all demands.



### M-760

900 x 410 mm Table  
XYZ: 760 x 440 x 460 mm  
Table load: 350 kg  
Spindle: 10000 rpm(std); 12000 rpm(opt)



### M-800

900 x 520 mm Table  
XYZ: 800 x 500 x 500 mm  
Table load: 450 kg  
Spindle: 10000 rpm(std);  
12000 rpm, 14000rpm(opt)



### M-1050

1200 x 600 mm Table  
XYZ: 1050 x 600 x 600 mm  
Table load: 800 kg  
Spindle: 10000 rpm(std);  
12000 rpm, 14000 rpm(opt)

### M-1200

1400 x 710 mm Table  
XYZ: 1200 x 730 x 650 mm  
Table load: 1000 kg  
Spindle: 10000 rpm(std);  
12000 rpm, 14000 rpm(opt)

### M-1400

1500 x 600 mm Table  
XYZ: 1400 x 800 x 800 mm  
Table load: 1000 kg  
Spindle: 10000 rpm(std);  
12000 rpm, 14000 rpm(opt)

### M-1600

1700 x 600 mm Table  
XYZ: 1600 x 850 x 850 mm  
Table load: 1200 kg  
Spindle: 10000 rpm(std);  
12000 rpm, 14000 rpm(opt)



High-performance solutions for demanding applications



Green Energy Industry



Die & Mold Industry



Automobile Industry



Mechanical Engineering

## Rigid Foundation



M1050

### Optimal Rigidity

The major structural component is made of Meehanite cast iron, which is heat treated to relieve stress, and to assure rigidity and accuracy

### Rib Enhancement

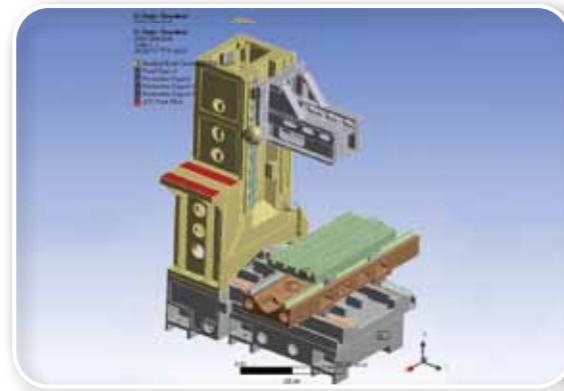
All casting is reinforced with heavy ribs to resist vibration. The base incorporates a durable ribbed box design for maximum structural loading.

### Structural Optimization

All structural components and whole machine frame of MM series are analyzed by ANSYS mechanical system and Finite Element Method (FEM) to ensure structural optimization.

### Triangular Support Base

The triangular wide-distance foundation provides solid support for operation.



## Motion Control



### Ballscrew

#### C3 Class Pretensioned Ballscrew

Class C3 ballscrews are pretensioned on each axis to reduce heat deformation for high accuracy and repeatability.

#### Direct-coupled Servo Ballscrew Motor

Direct-coupled servo motor can enhance positioning accuracy and provide better contouring and threading



### Guideway

#### High Precision Linear Guideways

Installed for all axes to ensure high load carrying capacity and rigidity with high running and positional accuracy as well as low friction.

#### Ball Type linear Guideway

##### M760

The recirculation ball guideways for each axis are preloaded to provide zero clearance between the moving surfaces. This increases rigidity in all directions while providing higher accuracy and reliability

#### Roller Type Linear Guideway

##### M800/ M1050/ M1200/ M1400/ M1600

High rigidity steel on roller guideway provides high durability. Roller guideway on the three axes enables a fast feed rate of 30 m/min, ensuring smooth movement and accuracy.



## Spindle

M series is built with innovative machine concepts by using a wide range of high-performance spindles to present consistent precision performance and dynamic machining for various application.

Extensive options of spindle types and motor configuration are provided to meet industrial demands. The higher horsepower motors are also available to optimize the strength of machine for ultimate machining performance.

- **Belt Drive spindle**

The standard 10,000 rpm belt drive spindle with ISO 40 taper.

- **In-line spindle (Opt)**

The powerful direct drive 12,000rpm spindle with ISO 40 taper ensures high drilling performances.

- **Built-in spindle (Opt)**

The powerful, 14,000rpm built-in spindle with HSK A63 taper allows for a wide range machining operations with better finish

### Spindle oil cooler (opt)



All machines are available to equip with spindle oil cooler to prevent thermal expansion effects and thermal deformation, allowing high accuracy machining, perfect finish and long lifetime of spindle as well.

### Spindle Dynamic Balancing

The online dynamic balancing instrument offers calibration for spindle displacement, speed and acceleration of full speed range

### High Capacity Cartridge Spindle

With preloaded angular-contact bearings throughout and with a large spacer between front bearings to improve radial thrust capacity. Cartridge spindle design makes maintenance easy.

### One-piece Design Headstock

Offering high stability and capacity for heavy duty cutting

### Various Spindle Speed Selections

Standard with belt-driven spindle, offering speed 10000 rpm ~ 14000 rpm to fulfill various need

## Tool Management



The fast, simple and long-life automatic tool changer provides stable and reliable tool change

### Arm type ATC

*Providing stable and quicker tool selection*

It is activated by electric motor and driven by cam mechanism. The bi-direction tool selection is controlled by PLC software for quicker tool selection to reduce non-cutting time.

#### Availability

24T (std.) / 30T (opt.)

24T Arm type ATC

## Coolant Through Spindle & High Pressure Pump (opt)

Coolant through spindle uses high pressure pump to supply coolant through tool, cooling the cutting edge directly. This clears chips during deep-hole and tapping, increases tool life and allows higher cutting speeds. Two systems are available, one provides individual CTS tank with 600L big capacity and 20 bar or 70 bar high pressure pump are available for selection. The other provides 20 bar high pressure pump built-in with machine major coolant tank which requires less floor space. Both systems include the auxiliary coolant filter



CTS system with high pressure 70bar pump



CTS system with high pressure 20bar pump



## Auxiliary Coolant Filter

Individual CTS tank is supplied with a re-usable 25-micron iron filter. Built-in system provides 25-micron filter. Both filters take away contamination and particles from the coolant before coolant is recycled through the coolant pump.

## Support for Rigid Tapping Function

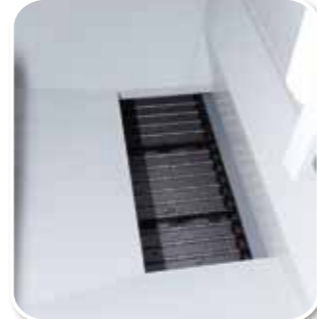
Rigid tapping provides high-speed precision tapping. The function enables the deceleration of the spindle and the Z axis is in synchronization with any situation, from full speed to operation stop. While machine is equipped with rigid tapping, operator can do one shot procedure to threading. The servo motor enables spindle to reach accurate spindle orientation position for rigid tapping and it's perfect especially for machining hard material like stainless steel.

## Chip Removal

- Efficient Free-flow enclosure guard design
- Efficient chip conveyor carries out chips to save operation time(opt)
- Drainage outlet design
- Multiple chip flush solution offers easy chip clean
  - Rear wash down with high pressure pumps(opt)
  - Spindle with coolant nozzle



Free-flow enclosure guard design



Drainage outlet & Chip conveyor



Chip drawer



Drainage outlet & Chip auger



Spindle with coolant nozzle



Coolant gun

## Control

### FANUC CONTROL



### FANUC 0iM CONTROL

- High reliable
- High-speed, high-precision and high-quality machining with AI contour control
- Machining condition selection function
- Enriched basic functions: rigid tapping, tool life management
- Advanced digital servo technology
- User friendly operation: Program editing, memory card, data server

### Excellent Operation

Integration operation & programming guidance with extremely simplified operations

#### FANUC MANUAL GUIDE 0i (std)

Integrated operation guidance for NC program

#### FANUC MANUAL GUIDE i (opt)

- Programming guidance
- With extremely simplified operations

### FAGOR CONTROL



### FAGOR 8055i / 8065 CONTROL

- High speed machining, large look-ahead buffer and a high speed block processing time
- Graphically assisted set up user interfaces
- Preparation help on tool management
- Various programming languages provide improved operator ease & efficiency:
  - Wide range of ICON conversational cycles
  - ISO code languages

## Control

### HEIDENHAIN CONTROL



#### HEIDENHAIN TNC 620

- Minimize setup times
- Graphic support in any situation
- Straight forward function keys for complex contours
- Programming contours unconventionally
- Field-proven cycles for recurring operations
- Smar T.NC the alternative operating mode
- Program off line
- Fast data transfer
- The iTNC programming station
- Setup, presetting and measuring with touch trigger

### SIEMENS CONTROL

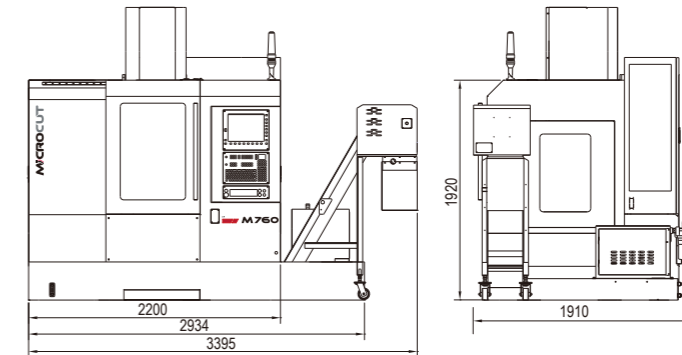


#### SIEMENS SINUMERIK 828D/828D BASIC CONTROL

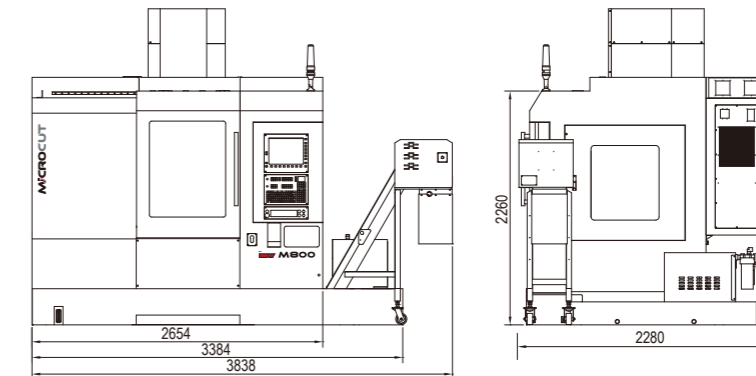
- Easy data exchange thanks to USB, CF and Ethernet interfaces on the panel
- ShopMill machining step programming
- SINUMERIK CNC programming language with high-level elements and program guide
- Online ISO dialect interpreter: maximum CNC program compatibility
- Advanced Surface: Innovative, high-performance CNC functions
- Animated Elements: Optimized operator guidance
- Easy input of pictographic languages directly via the CNC keyboard
- Easy Message: Integrated mobile radio modem for optimum process monitoring via mobile telephone.

## Layout Dimension

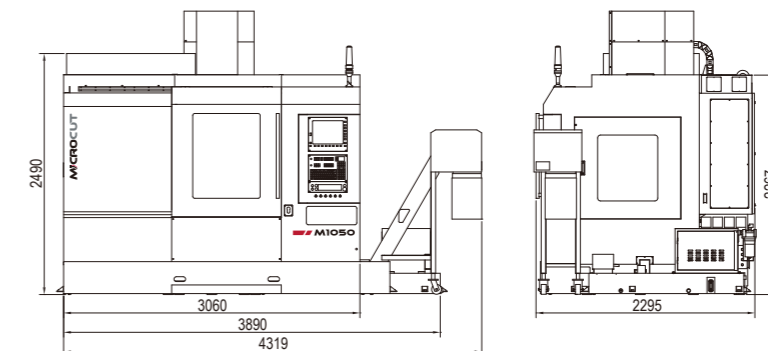
### M760



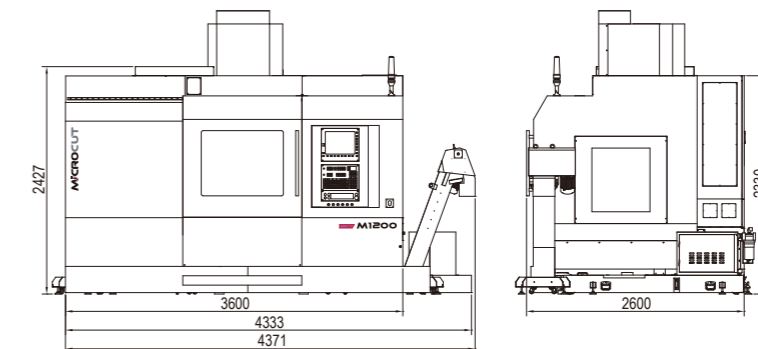
### M800



### M1050



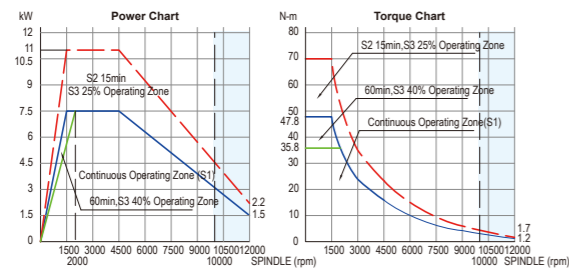
### M1200



# Power & Torque Chart

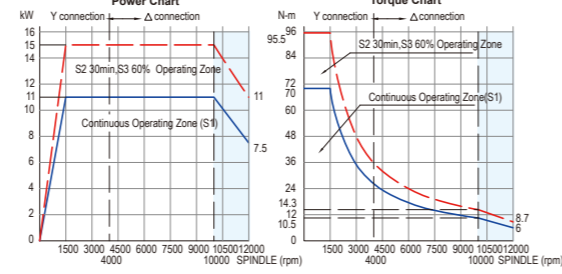
## Belt Drive Spindle M760 / M800

Fanuc  $\beta$ i18



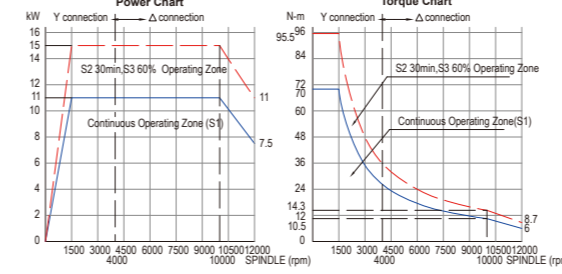
## Belt Drive Spindle M1050 / M1200 / M1400 / M1600

Fanuc  $\alpha$ i12



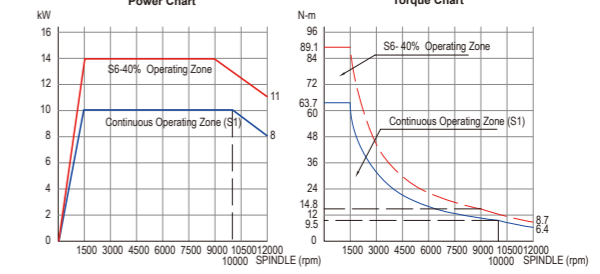
## In-line Spindle M1050 / M1200 / M1400 / M1600

Fanuc  $\alpha$ iT12

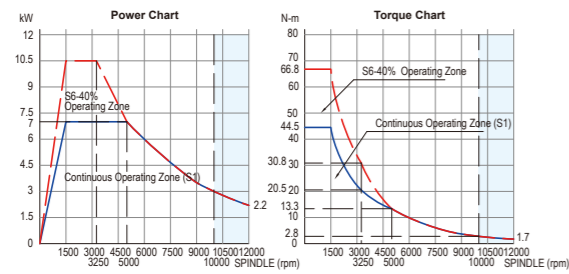


## In-line Spindle M800 / M1050 / M1200

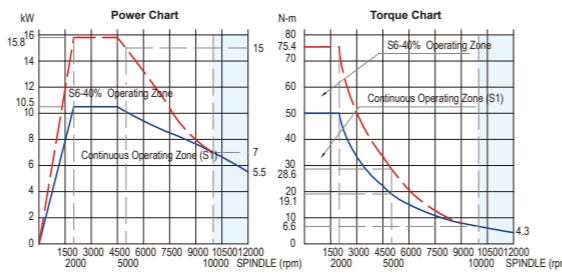
Heidenhain QAN-200UH



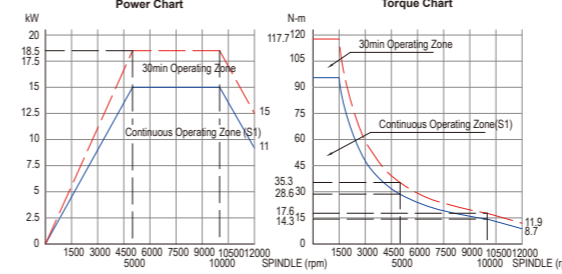
## SEIMENS 1PH8105-1SF02-3LA1



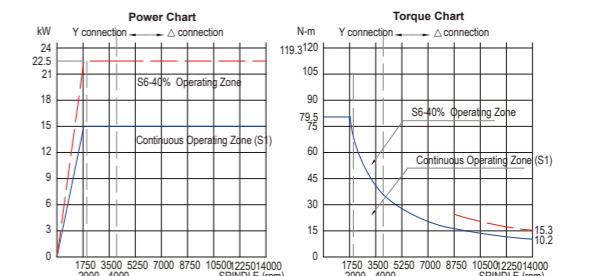
## SEIMENS 1PH8107-1SG02-3LA1



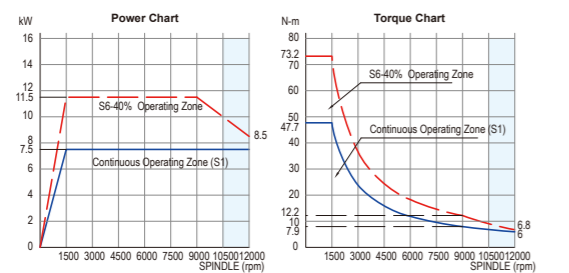
Fanuc  $\alpha$ iT15



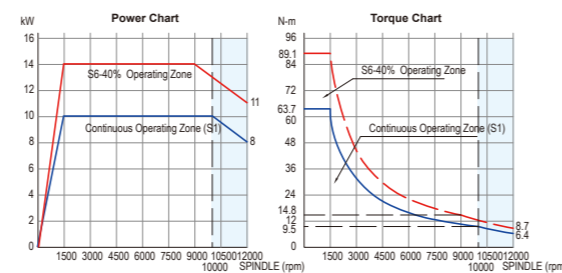
## Built-in Spindle M800/1050 / M1200 / M1400 / M1600



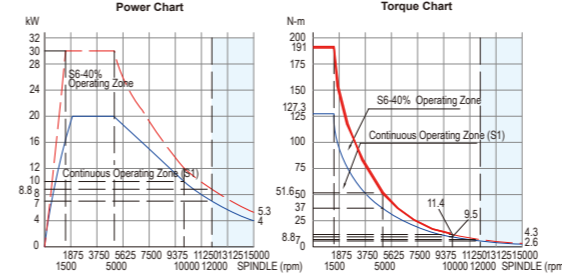
Heidenhain QAN-200L



HEIDENHAIN QAN-200U

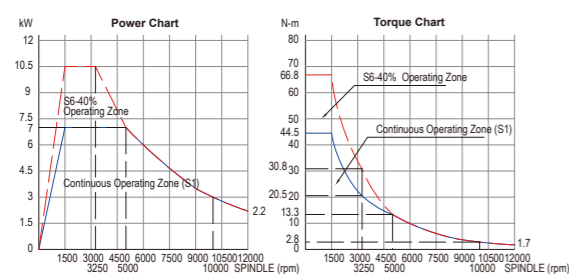


SEIMENS 1PH8133-1LG02-3MA1



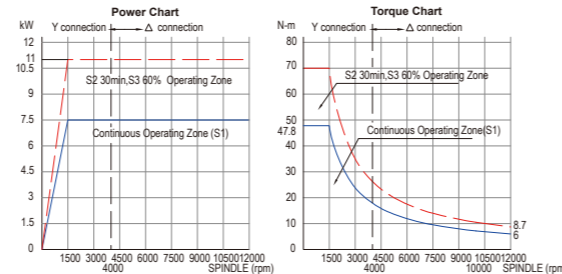
## In-line Spindle M760 / M800

SEIMENS 1PH8105-1SF02-3LA1

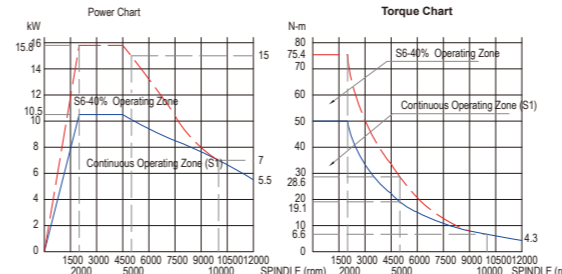


## In-line Spindle M800

Fanuc  $\alpha$ iT8



SEIMENS 1PH8107-1SG02-3LA1



# Technical data

Table	Unit	M760	M800	M1050	M1200	M1400	M1600
Table size	mm	900 x 410	900 x 520	1200 x 600	1400 x 710	1500 x 600	1700 x 600
Table loading	kg	350	450	800	1000	1000	1200
<b>Travel</b>							
X axis	mm	760	800	1050	1200	1400	1600
Y axis	mm	440	500	600	730	800	850
Z axis	mm	460	500	600	650	800	850
<b>Belt-driven Spindle (Std)</b>							
Spindle taper		ISO40	ISO40	ISO40	ISO40	ISO40	ISO40
Spindle speed	rpm	10000	10000	10000	10000	10000	10000
Spindle motor output	kW	Heidenhain-7.5/11.5 Siemens-7/10.5 Fanuc-7.5/11			Heidenhain-10/14 Siemens-10.5/15.8 Fanuc-11/15		
<b>In-line Spindle (Opt)</b>							
Spindle taper		ISO40	ISO40	ISO40	ISO40	ISO40	ISO40
Spindle speed	rpm	12000	12000	12000	12000	12000	12000
Spindle motor output	kW	Heidenhain-7/10.5 Siemens-7/10.5 Fanuc-7.5/11			Heidenhain-10/14 Siemens-10.5/15.8 Fanuc-11/15		
<b>Built-in Spindle (Opt)</b>							
Spindle taper		-	HSK A63	HSK A63	HSK A63	HSK A63	HSK A63
Spindle speed	rpm	-	14000	14000	14000	14000	14000
Spindle motor output	kW	-	15	15	15	15	15
<b>Axes feed rate</b>							
X/Y/Z rapid feed	m/min	30/30/30	30/30/30	30/30/30	30/30/30	30/30/30	30/30/30
<b>Guideway</b>							
X/Y/Z guideway type	mm	Linear / 35 (Ball)	Linear / 35(Roller)	Linear / 45 (Roller)	Linear / 45(Roller)	Linear / 45(Roller)	Linear / 45(Roller)
<b>Accuracy</b>							
Positioning accuracy	mm	0.01/300	0.01/300	0.01/300	0.01/300	0.01/300	0.01/300
Repeatability	mm	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01
<b>Automatic Tool Changer</b>							
ATC type		Arm	Arm	Arm	Arm	Arm	Arm
No. of tools		24 (std) / 30 (opt)	24 (std) / 30 (opt)	24 (std) / 30 (opt)	24 (std) / 30 (opt)	24 (std) / 30 (opt)	24 (std) / 30 (opt)
Tool taper		BT / CAT / DIN 40	BT / CAT / DIN 40	BT / CAT / DIN 40	BT / CAT / DIN 40	BT / CAT / DIN 40	BT / CAT / DIN 40
Tool changing time (T-T)	sec	1.94(50Hz) / 1.64(60Hz)	1.94(50Hz) / 1.64(60Hz)	1.94(50Hz) / 1.64(60Hz)	1.94(50Hz) / 1.64(60Hz)	1.94(50Hz) / 1.64(60Hz)	1.94(50Hz) / 1.64(60Hz)
Max. tool dia.	mm	ø75	ø75	ø75	ø75	ø75	ø75
Max. tool dia. with next tool empty	mm	ø125	ø125	ø125	ø125	ø125	ø125
Max. tool length	mm	300	300	300	300	300	300
Max. tool weight	kg	8	8	8	8	8	8
<b>Machine size</b>							
Weight	kg	4350	6250	7000	8850	-	-
Floor space (With chip conveyor)	mm	3400 x 2000	3838 x 2300	4320 x 2300	4250 x 2600	5200 x 2700	5200x2700

Specification are subject to change without notice.

## Standard Accessories

- Belt drive spindle 10000 rpm
- Large fully ground work table with 4 T-slots
- C3 class precision ground ballscrew
- Linear guideway
- Fully ground way mating surfaces
- Automatic lubrication with low lubrication fault
- Coolant system
- Telescopic way covers
- Low voltage circuit system
- chip conveyor
- 4 bar wash down device
- 4th axis preparation
- CE standard electrical control system
- Fully enclosure with removable slide door
- Rigid tapping function
- AICC (40 block) for FANUC 0iM
- EMC and Safety module
- CE-marking declaration
- Heat exchanger

## Optional Accessories

- In-line spindle 12000 rpm
- Built-in spindle 14000 rpm
- Spindle oil cooler
- CTS system with high pressure 20/70 bar pump
- Chip auger
- Air conditioner
- Coolant gun
- Oil skimmer
- 4th axis
- Tool setting probe
- Workpiece probe
- Three axes with linear scales
- Arm-type ATC with 30T tool capacity