High-Reliability and High-Performance
Compact Machining Center

FANUC

ROBODRILL α-D*i*B series

High-Reliability and High-Performance Compact Machining Center

FANUC ROBODRILL α-D*i*B series

High Performance of Machining

- High speed, High precision, High power
- Stable machining
- Wide range of application

Applying the latest FANUC CNC & Servo motor technology

Good combination with FANUC Robot

*1

Minimizing Down Time

- High reliability
- Preventive maintenance function
- High maintainability

Ease of Use

- Excellent user-Interface
- High expandability
- Simple integration with FANUC Robot

High Performance of Machining

Achieving high productivity by high speed, high precision and high power

Achieving high yield of workpiece by stable machining

Utilization in various areas by wide range of application

Minimizing Down Time

Achieving long operation life by high reliability

Prevention of trouble by preventive maintenance function

Minimizing down time by high maintainability

Ease of Use

Easy utilization of high function by excellent user-Interface

Easy operation of peripheral equipment by high expandability

Realizing simple integration with FANUC Robot by automation support function

＊1

α-D21S*i*B
α-D14S*i*B

＊1

α-D21M*i*B
α-D14M*i*B

＊1
＊2

α-D21L*i*B
α-D14L*i*B

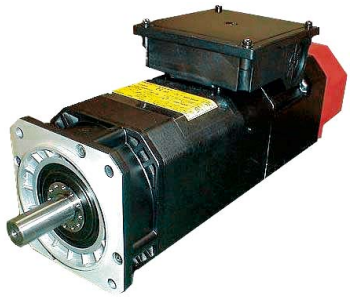
＊1 Photo when **DDR** mounted
＊2 Photo when 2 front doors option mounted

High Performance of Machining

Wide variety of high speed and high power spindle

● High speed and high power spindle
- High rigidity mechanism and outstanding rigidity of main spindle enabling excellent ability in milling in addition to drilling and tapping

● Optimum spindle selectable according to application
- Standard spindle : Applicable to wide range machining use
- High torque spindle : Applicable to heavy machining of steel parts
- High acceleration spindle : Applicable to high speed and high efficiency machining of aluminum parts
- High speed spindle : Applicable to smooth surface machining

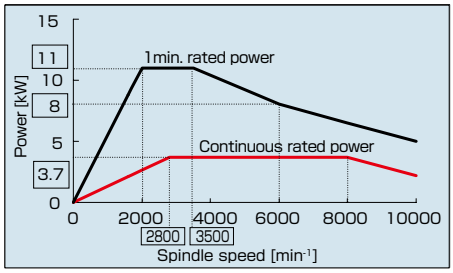


High power spindle motor

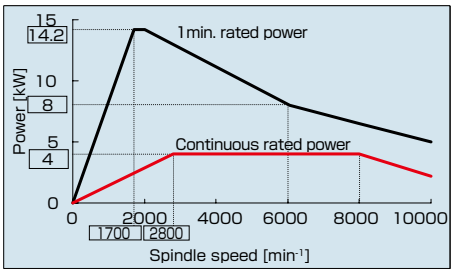
Spindle spec.	Max. speed	Tool taper spec.			
		BT (BT30)	BIG-PLUS (BBT30)	DIN (DIN69871-A30)	NC5 (NC5-46)
Standard	10000 min^{-1}	✓	✓	✓	✓
High torque					
High acceleration					
High speed	24000 min^{-1}	✓	✓	✓	

*Center through coolant option is available for all spindle spec.
Withstand pressure: 7MPa (NC5: 5MPa)

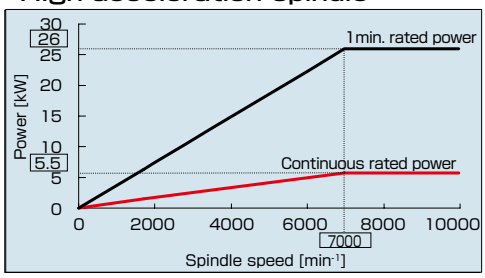
Standard spindle



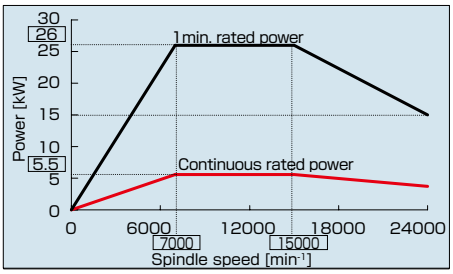
High torque spindle



High acceleration spindle



High speed spindle

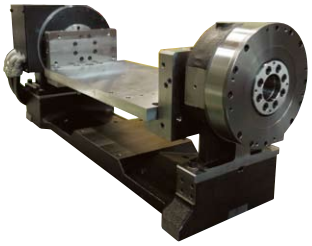


FANUC ROBODRILL DDR

● High-speed and high-precision additional 1-axis rotary table **DDR** (option)
- Synchronous built-in servo motor and αiCZ sensor provide non-backlash, high-speed and high-precision machining

● High-rigidity trunnion unit with **DDR** **DDR-T** (option)
- Easy to develop indexing fixture making the best use of ROBODRILL's working space

DDR



DDR-T

DDR specifications

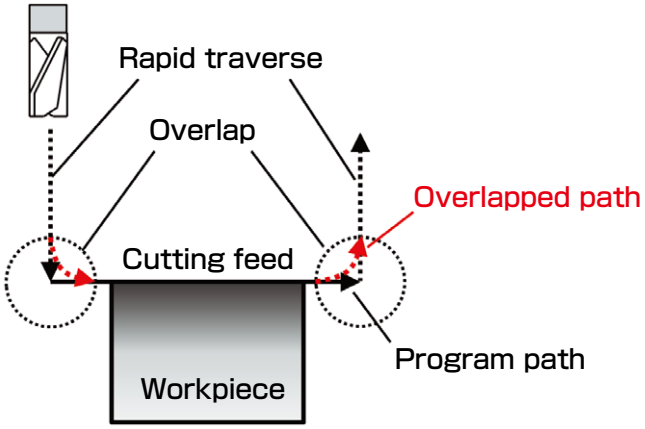
Items	Specifications
Drive system	Direct drive
Maximum torque	260 N·m
Maximum speed	200 min^{-1} (300 min^{-1}*)
Feedrate	1°/min to 30000°/min
Least input increment	0.001° (IS-C: 0.0001°)
Index accuracy	±0.0028° (±10″)
Clamp system	Pneumatic cylinder and spring
Clamp torque	500 N·m (at 0.5 MPa)
Max. loading capacity	100 kg
Allowable moment load	Projecting distance x Load = 600 N·m
Center height	150 mm
Machine weight	66 kg

*When loading capacity less than 25kg and loading inertia less than 0.25 kg·m^2

High speed machining

● Smart overlap function
- Achieving cycle time reduction by overlapping on the transition between rapid traverse and cutting feed
- Easy setting by selecting ON/OFF on the screen

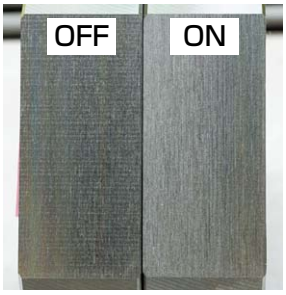
● Overlap of the ATC and table motion
- Achieving cycle time reduction by overlapping Z-axis ascent/descent and other axes motion during tool change



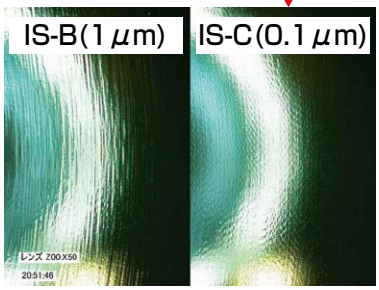
Higher axis feed accuracy

● Higher axis feed accuracy by the latest CNC and Servo functions
- SERVO HRV+ control
  Achieving high responsiveness by optimized electrical control
- Latest AC Servo Motor
  Applying the latest AC Servo Motor which provides more smoother feed
- Least input increment 0.1 μm (IS-C)
  Addition of setting for least unit 0.1 μm for program command

Achieving high quality machining (e.g. higher surface quality and improved circularity) by applying each function



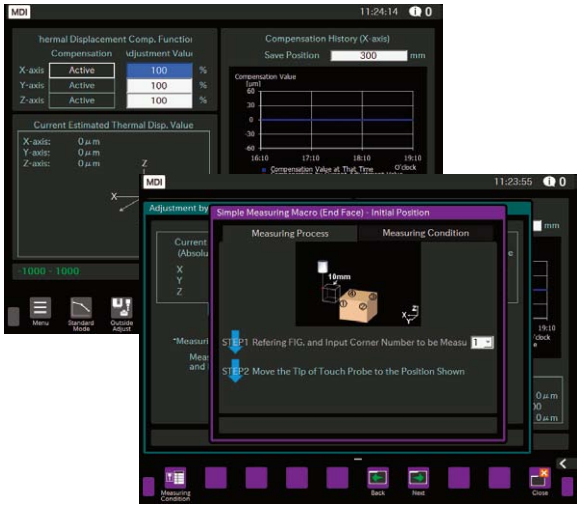
SERVO HRV+ control



Least input increment
(Machining example by program command 0.1 μm)

Stable machining

● AI thermal displacement compensation function
- Real time compensation by estimating the thermal displacement along each axis based on the operation status of the spindle and feed axes
- By using touch probe (option), compensation effect adjustment can be performed automatically from the measurement result

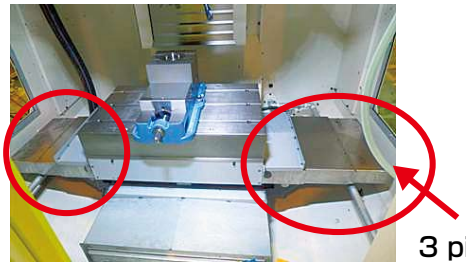


AI thermal displacement compensation

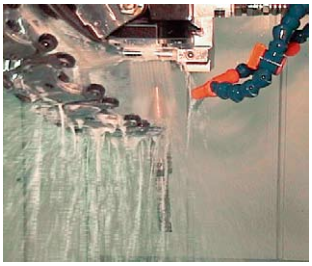
Minimizing Down Time

Excellent chip countermeasure

● X-axis telescopic cover with 3 pieces (option)
- Enhanced covering against chips and coolant by improved shape of telescopic cover
- Reduction of the impact against telescopic cover by 3 pieces structure enhances durability of cover and cushion rubber



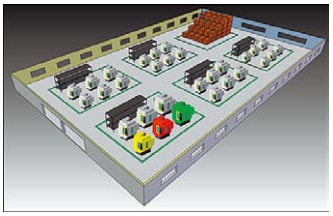
● Cleaning unit for tool taper shank (option)
- Flushing the tool taper shank by coolant during tool change to prevent catching chips on the spindle taper
- Stable machining accuracy can be maintained



Cleaning tool taper shank

Complete operation management

● **ROBODRILL-LINK*i*** (PC software)
- Real time display of the entire production area helps to understand the condition of each machine at once
- Supporting improvement of machine utilization by collecting and visualizing each machine's information
- Collecting operation achievement data for each machine and show in the graph
- Contents of alarm and conditions such as program number at alarm can be referred
- The system can be built with common PC and no server PC is required
- Collective parameter setting function supports to input necessary information to setup the system

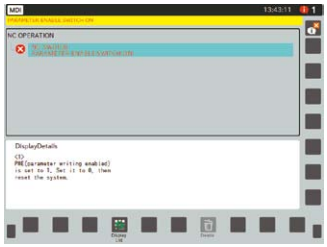


Condition overlook screen

Individual machine operation achievement

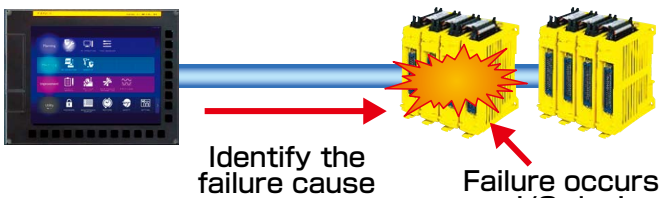
High maintainability

● Information center
- Alarm messages and their detailed information are displayed
- Cause of alarm can be identified from the detailed information



Information center

● Improvement of maintainability for I/O device
- Cause and point of the failure of I/O devices (disconnection, earth fault etc.) are identified
- The facility availability ratio is improved due to the reduction of down time



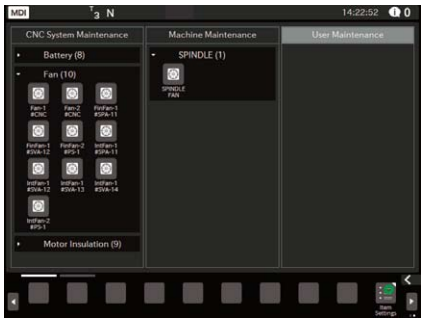
High reliability

- Abundant track records at FANUC in-house factory
  - Using ROBODRILLs for both steel and aluminum parts machining at FANUC in-house factory
- Applying maintenance data of FANUC in-house factory
  - Accumulating maintenance data of ROBODRILL obtained at FANUC in-house factory
  - Achieving high reliability by returning the maintenance data to ROBODRILL design

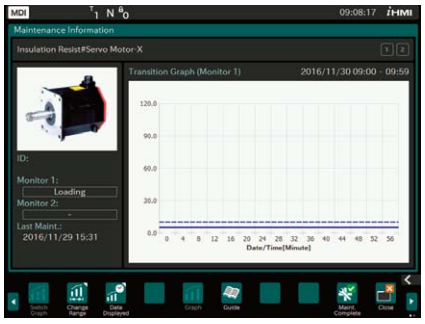
FANUC in-house factory

Complete preventive maintenance

- Maintenance information management
  - Monitoring the condition of maintenance items and announcing the abnormality or maintenance timing to support effective periodical maintenance
  - Possible to set customized maintenance items (Max. to 10)
- Leakage Detection Function
  - Early detection of insulation resistance drop of each motor and motor power cable
  - Enable preventive maintenance before breakdown
- Fan Monitor Function
  - Monitoring cooling fans of CNC, Servo Amplifiers, Spindle Amplifier and Power Supply
  - Announcing before failure when the rotation speed of the cooling fans is dropping
  - Easy to detect the abnormal fan

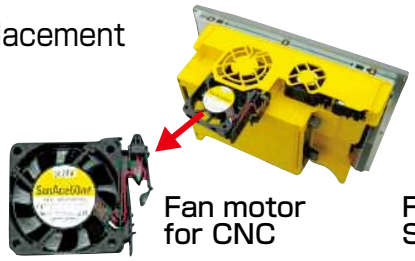


Maintenance Information Management

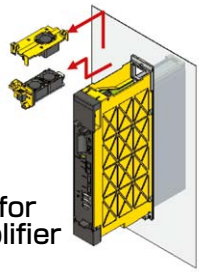


Leakage Detection Function

- Machine configuration to improve parts replacement
  - New fan motor units are applied for easy parts replacement
  - The facility availability ratio is improved due to the reduction of maintenance time



Fan motor for CNC



Fan motor for Servo Amplifier

- RECHARGEABLE BATTERY UNIT (option)
  - Supplying backup power both CNC and PULSECODER instead of disposable battery
  - Automatically recharged while ROBODRILL power ON
  - Battery maintenance free

RECHARGEABLE BATTERY UNIT

Ease of Use

The latest CNC of FANUC

● 10.4” Color LCD with *i*HMI
- Intuitive and operable interface by *i*HMI
- Easy operation on programming, setup and machining
- Seamless flat display unit achieves tolerance to coolant oil resistant and designability

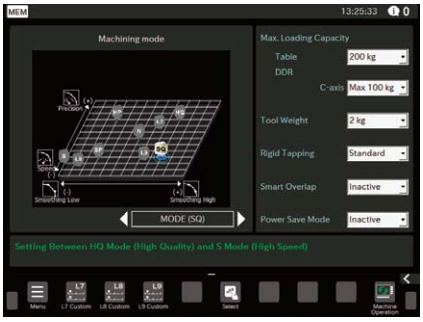
● Operator’s panel
- Improving operability and visibility by renewing key layout and indicators
- Unity design with CNC display unit

High usability

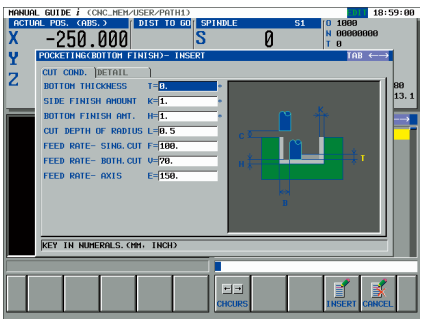
● Easy to use screens from programming to maintenance
- CNC operation screen
  Operable screen structure arranged by operation steps of “programming”, “setup” and “machining”
  Graphical display enhances visibility
- Machine operation setting screen
  Parameters related with work load, machining mode and energy saving can be switched easily according to applications
- Restoration screen
  Particular maintenance of ROBODRILL such as turret restoration or motor reference position recovery can be performed easily

● Integrated operation, programming guidance (MANUAL GUIDE *i*)
- Easy to program and operate machining on one screen
- Easy to program with G code through graphic guide
- Simple machining simulation of solid model

CNC operation



Machine operation setting

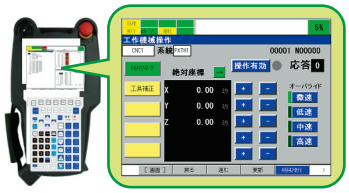


Machining cycle input

Automation application

- Quick & Simple Startup Package (QSSP) (option)
  - Useful package of robot, robot base, auto side door, connecting cables, sample programs, easy setting function etc.
  - Easy to introduce robot system
- Robot interface 2 (option)
  - Reducing cables and keeping safety by FL-net function
  - Robot manual operation is available on the ROBODRILL screen
  - ROBODRILL manual operation is available on the Robot teach pendant

Robot manual operation screen

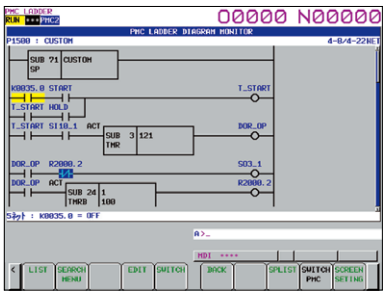


Machine operation screen

High expandability

- External interface function
  - General I/O signals such as external start are ready to use only by selecting settings
  - Lighting conditions of signal lamps can be set on the screen
- Custom control panel
  - On screen switches (ON/OFF or pulse) and indication lamps can be created
  - Peripheral devices are operated without integrating control panel hardware
  - Flexible and cost saving solution for simple system integration
- Custom PMC function
  - LADDER program to control peripheral devices can be created and monitored on screen
  - Number of I/O signals can be expanded
    Standard: Input 16 / Output 16
    Max: Input 1024 / Output 1024 (option)

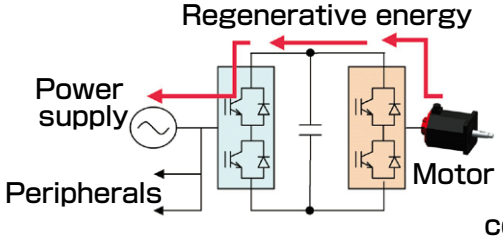
External interface function



PMC ladder screen

Technology for power saving

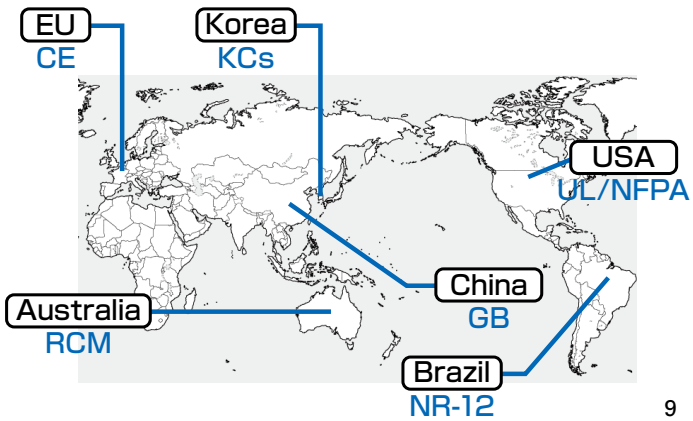
- Proven power regeneration function
  - The power regeneration function that use regenerating energy occurred on deceleration of motors has been adopted since 1994.



Electric power consumption monitor

Conformity of safety standards

- Conformity of each country's safety standard (option)



Machining Capability

Machining sample (These data may change by machining conditions)

Spindle spec.	Standard spindle		High torque spindle		High acceleration spindle High speed spindle	
Machining / Material	Drilling Tool dia.(mm) x Feed(mm/rev)	Tapping Tap size x Tap pitch(mm)	Drilling Tool dia.(mm) x Feed(mm/rev)	Tapping Tap size x Tap pitch(mm)	Drilling Tool dia.(mm) x Feed(mm/rev)	Tapping Tap size x Tap pitch(mm)
Carbon Steel C45	ϕ30 x 0.10	M20 x 2.5	ϕ30 x 0.15	M20 x 2.5	ϕ20 x 0.10	M16 x 2.0
Grey Cast Iron	ϕ30 x 0.25	M27 x 3.0	ϕ30 x 0.30	M27 x 3.0		
Aluminum Alloy Die Casting	ϕ32 x 0.35	M30 x 3.5	ϕ32 x 0.40	M30 x 3.5	ϕ22 x 0.25	M24 x 3.0

Available Options

Top cover

Coolant unit (tank)

Tool length switch for automatic measurement

Touch probe

LED Illumination

Coolant unit with chip flush (spot gun provided)

Automatic Grease Lubricating System (LHL Liquid Grease)

Automatic Oil Lubricating System

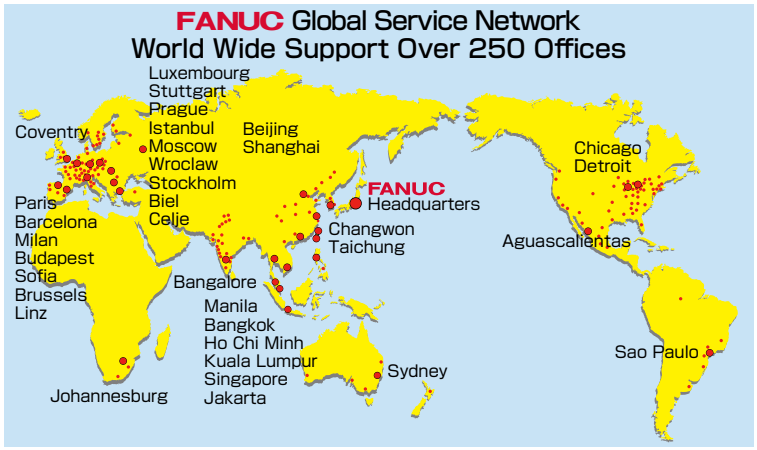
Automatic fire extinguisher (Note)

(Note)
- If machining "combustible materials" such as resin and magnesium or using a water-immiscible cutting fluid, select an automatic fire extinguishing system because of fire hazards. For information on the objects that can be extinguished by an automatic fire extinguishing system, contact your ROBODRILL sales representative.
- The machine life may be shortened depending on the workpiece, tool, coolant, or lubricant to be used.

Maintenance and Customer Support

Worldwide Customer Support and Service

FANUC operates customer service and support system anywhere in the world through subsidiaries, affiliates and distributor partners. FANUC provides the highest quality service with the quickest response at the location nearest you.



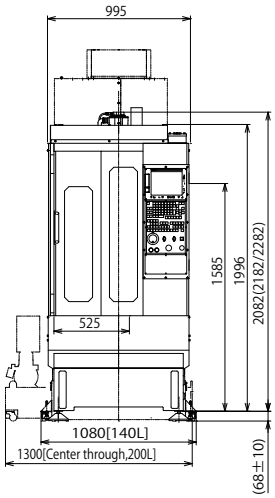
FANUC Training Center

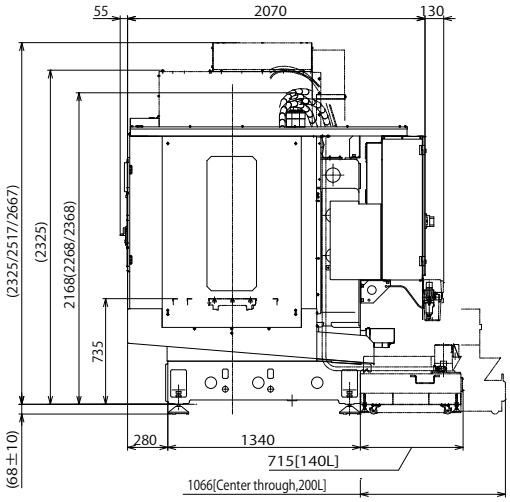
FANUC Training Center operates training programs on FANUC ROBODRILL which focus on practical operations and programming with machining know how and maintenance.

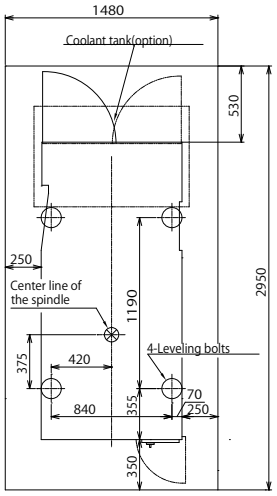
Inquiries : Yamanakako-mura,
Yamanashi, Japan 401-0501
Phone : 81-555-84-6030 Fax : 81-555-84-5540

Outer Dimensions and Floor Plan

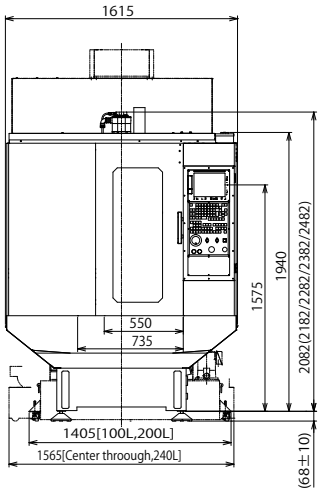
α-D21SiB/D14SiB *1

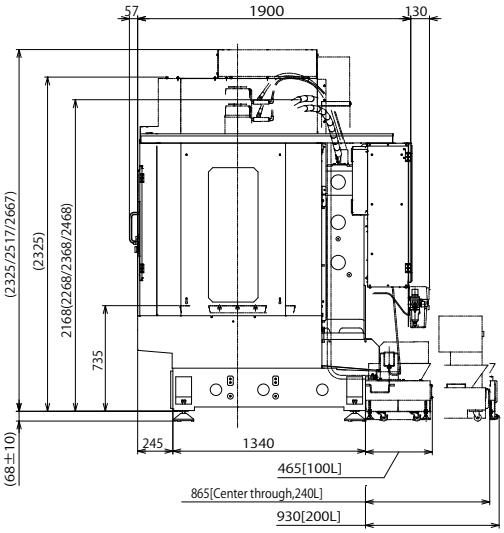


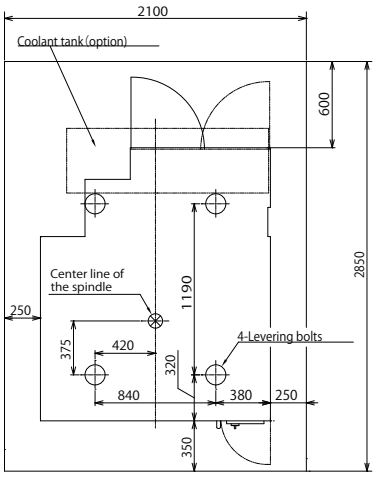




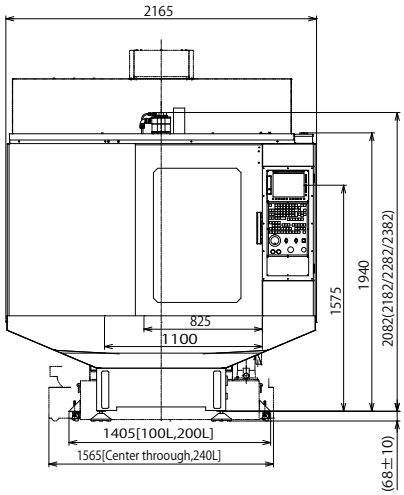
α-D21MiB/D14MiB *1

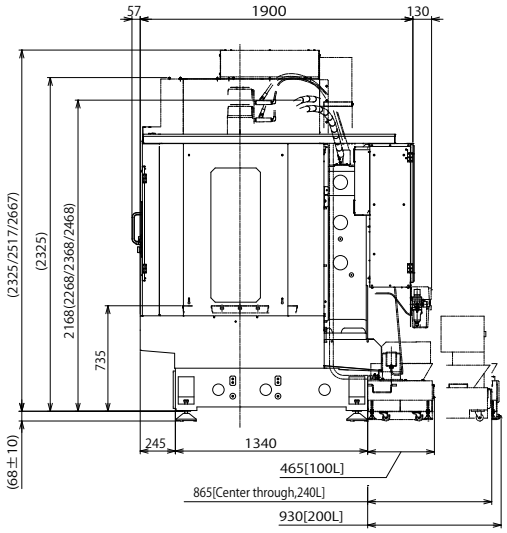


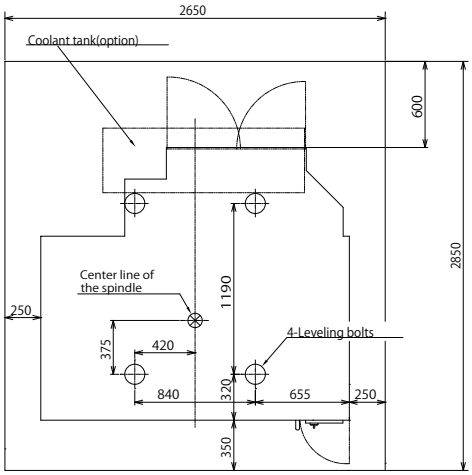




α-D21LiB/D14LiB *1







*1 These dimensions may vary on some options. (For further details, please contact FANUC.)

Specification

Item		α-D21S*i*B α-D14S*i*B	α-D21M*i*B α-D14M*i*B	α-D21L*i*B α-D14L*i*B
Machine (Standard)				
Capacity	X-axis-travel (longitudinal movement of table)	300 mm	500 mm	700 mm
	Y-axis travel (cross movement of saddle)	300 mm + 100 mm	400 mm	
	Z-axis travel (vertical movement of spindle head)	330 mm		
	Distance from table surface to spindle gage plane	150 mm to 480 mm (when no high column is specified)		
Table	Working space (X-axis×Y-axis)	630 mm×330 mm	650 mm×400 mm	850 mm×410 mm
	Capacity of workpiece mass	200 kg (uniform load)	300 kg (uniform load)	
	Working surface configuration	3×T-slots size 14 mm pitch 125 mm		
Spindle	Speed range	100 min^{-1} to 10000 min^{-1}/ 240 min^{-1} to 24000 min^{-1} (option)		
	Spindle gage (call number)	7/24 taper No.30 (with air blow)		
Feedrate	Rapid traverse rate	48 m/min (X,Y,Z)		
	Feedrate	1 mm/min to 30000 mm/min		
Turret	Tool change system	Turret type		
	Type of tooling	JIS B 6339-2011 BT30, MAS 403-1982 P30T-1 (45°)		
	Tool storage capacity	21 tools : α-D21S*i*B/D21M*i*B/D21L*i*B 14 tools : α-D14S*i*B/D14M*i*B/D14L*i*B		
	Maximum tool diameter	80 mm		
	Maximum tool length	200 mm : α-D14S*i*B 190 mm (changed by specifications) : α-D21S*i*B	250 mm (changed by specifications)	
	Method of tool selection	Random shortest path		
	Maximum tool mass	2 kg/tool (total mass 23 kg)/3 kg/tool (total mass 33 kg) : α-D21S*i*B/D21M*i*B/D21L*i*B 2 kg/tool (total mass 15 kg)/3 kg/tool (total mass 22 kg) : α-D14S*i*B/D14M*i*B/D14L*i*B		
	Tool changing time (Cut to Cut)	1.4 s : α-D14S*i*B/D14M*i*B/D14L*i*B (when 2 kg/tool is specified) 1.6 s : α-D21S*i*B/D21M*i*B/D21L*i*B (when 2 kg/tool is specified)		
Motors	Spindle drive motor	11.0 kW (1minute rating)/3.7 kW(continuous rating) (changed by specifications)		
Accuracy *1	Bidirectional accuracy of positioning of an axis (ISO230-2:1988)	0.006 mm to 0.020 mm		
	Bidirectional repeatability of positioning of an axis (ISO230-2:1997, 2006)	Less than 0.004 mm		
Sound pressure level		Less than 70 dB *2		
Control unit	Model	**FANUC Series 31*i*-B**		
	Simultaneously controlled axes	Max.4 axes		
Installations (note)Please make sure to comply with installation conditions specified by FANUC when installing ROBODRILL *3				
Power source	Power supply	200 Va.c. to 220 Va.c., -15 % to +10 %, 3-phase, 50 Hz±1 Hz or 60 Hz±1 Hz 10 kVA *4		
	Compressed air supply	0.35 MPa to 0.55 MPa (0.5 MPa is recommend) (gage pressure) , 0.15 m^3/min (at atmospheric pressure) *5		
Machine size	Machine height	2236 mm ±10 mm (when no high column is specified)		
	Floor space	995 mm×2210 mm	1615 mm×2040 mm	2165 mm×2040 mm
	Mass of machine	Approx. 1950 kg	Approx. 2000 kg	Approx. 2100 kg

*1 Positioning accuracy is the adjusted and measured value in compliance with applicable standard at FANUC's factory. Depending on an influence of JIG & workpiece mass on table, the use conditions and installation environment, there may be a case where the accuracy shown in this catalog can not be achieved.

*2 Sound pressure level is measured in compliance with FANUC's own regulation. Depending on the use conditions and installation environment, there may be a case where the sound pressure level shown in this catalog can not be achieved.

*3 Fastening the machine to the floor (mounting anchors) may be required depending on the use conditions and installation environment, or to prevent the machine from toppling over due to an earthquake.

*4 In case of center through coolant and cleaning unit for tool taper shank, additional + 1 kVA is required respectively. In case of additional 1 axis, additional maximum + 1.5 kVA is required. A cable with 10 mm^2 or more should be used at primary power connection.

*5 In case of center through coolant, additional + 0.05 m^3/min is required. In case of air blow for chips, additional + 0.2 m^3/min is required. In case of side automatic door, 0.4 MPa compressed air supply or more is required.

FANUC CORPORATION

Oshino-mura, Yamanashi 401-0597, Japan Phone: 81-555-84-5555 Fax: 81-555-84-5512 http://www.fanuc.co.jp

- All specifications are subject to change without notice.
- No part of this catalog may be reproduced in any form.
- The photo includes options.
- The products in this catalog are controlled based on Japan's "Foreign Exchange and Foreign Trade Law". The export of these products from Japan is subject to an export License by the government of Japan.
  Further, re-export to another country may be subject to the license of the government of the country from where the product is re-exported.
  Furthermore, the product may also be controlled by re-export regulations of the United States government.
- Should you wish to export or re-export these products, please contact FANUC for advice.

©FANUC CORPORATION, 2016

RDRILLA-D*i*B(E)-02, 2017.5, Printed in Japan