High-Reliability and High-Performance
Compact Machining Center

FANUC

ROBODRILL DC series

D54CS/D74CS

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Compact Machining Center

FANUC ROBODRILL DC series

The new generation ROBODRILL that has further evolved to enhance productivity

ROBODRILL is the best-selling compact machining center with over 50 years of experience as a pioneer of the market.

The latest model DC series, which is the first full model change in 25 years, has achieved great progress by combining the experience cultivated in various production sites around the world and the passion of our development team with FANUC's latest technologies.

It has improved any performance, not just speeding up machine movement to reduce cycle time, but also improving machining stability and uptime to enhance customers' productivity.

FANUC ROBODRILL D54CS

Stroke : X 500 mm × Y 400 mm × Z 330/400 mm

FANUC ROBODRILL D74CS

Stroke : X 700 mm × Y 400 mm × Z 330/400 mm

Features of **ROBODRILL DC series**

Cycle time reduction

Further improving productivity by strengthening basic performance and eliminating wasting movements thoroughly

Level up in mechanism

Improving rapid traverse

Axis	Rapid traverse rate	Max. acceleration
X	54 m/min	2.1 G
Y	54 m/min	1.6 G
Z	60 m/min	2.2 G

Reduction of tool change time

Tool capacity	Drive type	Min. tool change time
14	Servo	0.6 s
	Spindle	0.9 s
21	Servo	0.6 s
	Spindle	1.1 s
28	Servo	0.7 s

New High-acceleration spindle ☞ P. 8

Maximum rotation speed of 12,000 min^{-1} with newly developed high-rigidity spindle unit improves cutting conditions to achieve shorter machining times.

High-output spindle motor further reduces acceleration and deceleration times.

Level up in control

Smart overlap 2

Overlapping of axis movement command blocks with improved control method further reduces non-cutting time.

Machining mode setting function ☞ P. 9

Each machining mode has been tuned with Smart overlap 2 to suit the characteristics of the new mechanism.

New G-codes ☞ P. 9

The new mode of G181 that applies new technology to reduce non-cutting time with smooth motion and new canned cycles have been added to achieve more efficient machining.

Table loading capacity setting

Automatic tuning function provides optimized parameter setting for actual fixture and workpiece weight easily.

Other technologies for cycle time reduction

Overlap of the ATC and table motion

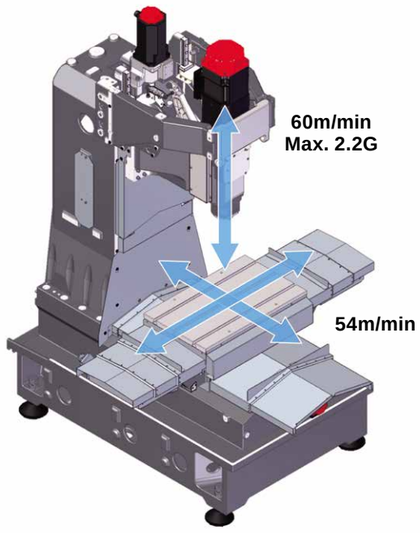
High-speed SKIP interface to reduce measurement time with touch probe or tool measurement switch

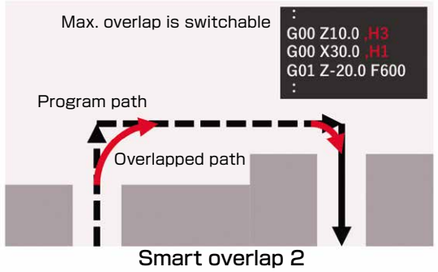
New mechanical structure

The main body mechanism has also been redesigned to handle the increased speed of the drive system.

Improved dynamic rigidity realizes higher cutting conditions or higher surface finishing quality.

The performance of the “Versatile BT30 machine" has been further enhanced.





Smart overlap 2

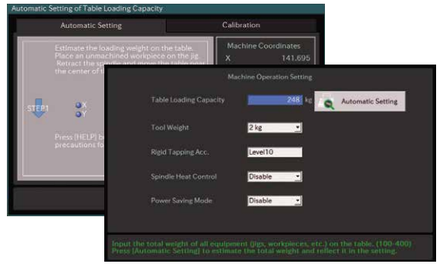
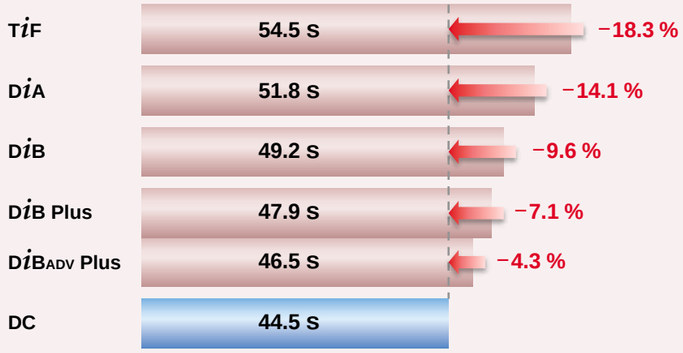


Table loading capacity setting

Application example of cycle time reduction

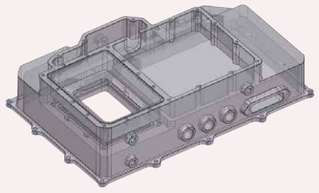
Comparison with the same machining program

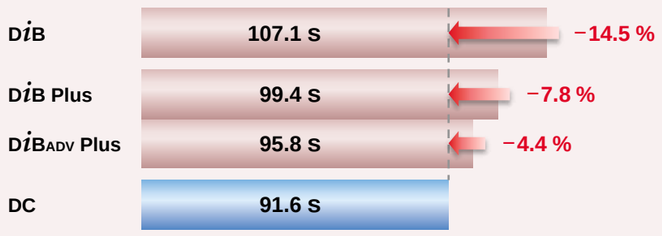

Crank case



Machine spec: X-stroke 500 mm, Tool storage capacity 21 tools, Standard/Basic spindle
Conditions: Fastest spec and setting of each model, same machining program

Comparison with the fastest machining program of each model


Inverter case



Machine spec: X-stroke 500 mm, Tool storage capacity 21 tools, High-acceleration spindle
Conditions: Fastest spec, setting and machining program of each model, same cutting conditions
Applied technology:
- DiB Plus: Machining mode setting function, New G-codes, Table loading capacity setting
- DiBADV Plus: The above + Servo turret
- DC: Level up in mechanism, New High-acceleration spindle, Smart overlap 2, New G-codes improvement

Features of **ROBODRILL DC series**

Machining stability

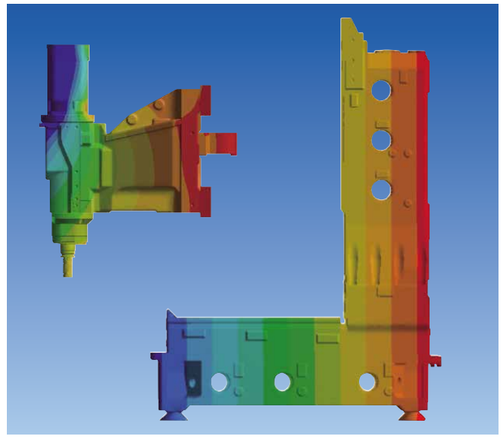
Improved mechanical structure and enhanced compensation functions enable stable machining without warm-up

Reduction of thermal displacement

The machine structure has been completely redesigned to reduce thermal displacement itself.

By optimizing the casting shape using heat transfer analysis the tilt of the spindle and column has also been reduced.

These improvements make it easier to compensate thermal displacement.



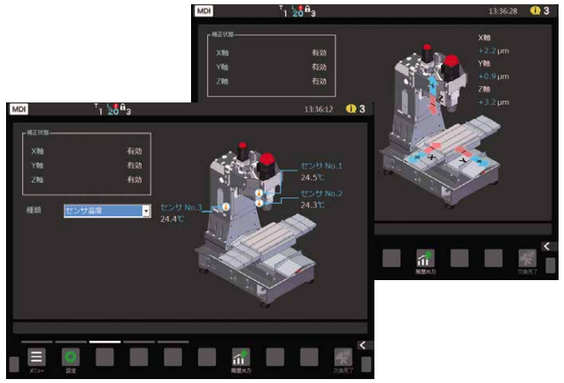
Extending straightly and easy to compensate

New thermal displacement compensation function

Thermal displacement in each axis direction is estimated from the operating status of the spindle and feed axis, and compensation is performed in real time.

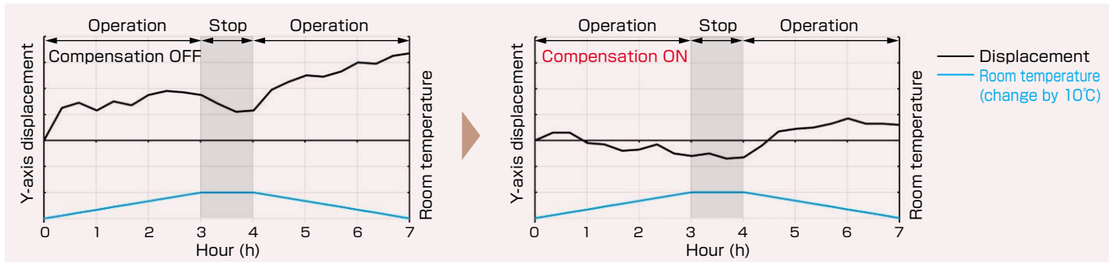
The calculation formula has been optimized to match the new mechanism with temperature sensors equipped as standard.

Compensation accuracy has been improved significantly and has become stable even when room temperature or coolant temperature changes.

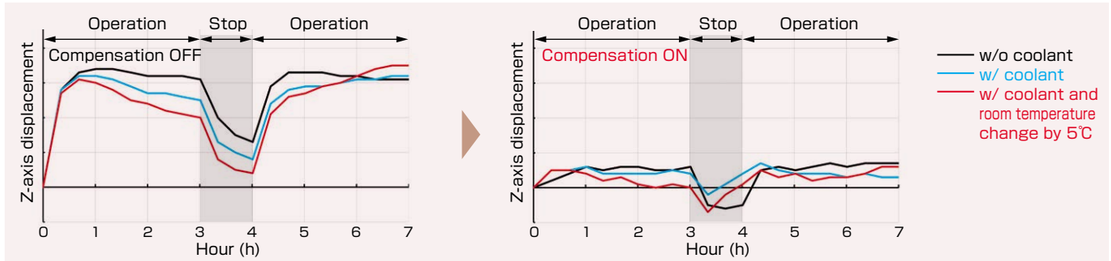


Thermal displacement compensation function

Compensation in Y-axis direction became stable by reducing tilt



Response to the changes of room temperature and coolant effects



* All graphs are actual measurement results with FANUC's specified machining program.

Measures against chips

Improving operation rates and reducing maintenance costs by solving the chip problems that bother machining sites

New design machine cover

Pursuing easy chip flow, the points where chips can accumulate have been reduced thoroughly.

Z-axis cover is made of highly durable single-piece sheet metal.

XY-axes covers use mountain-shaped telescopic covers that prevents chips and coolant from penetrating.

Machine cover

Improved coolant options

New chip flush system with diffusion-type coolant nozzles greatly improve chip removal performance.

The cutting coolant piping is housed inside the spindle head, eliminating interference and chip accumulation of piping .

Cyclone filter is used in the center through coolant unit, reducing maintenance and extending life.

Chip flush

FANUC's latest servo system

αi-D series servo, which has improved motor output and energy-saving performance, is applied.

Servo system losses have been reduced by an average of 10%.

Compact and integrated*1 amplifiers reduce the space occupied in the control cabinet, improving expandability at customization.

*1 except for High-speed spindle

αi-D series servo

Control cabinet

Machining performance

Spindle line up

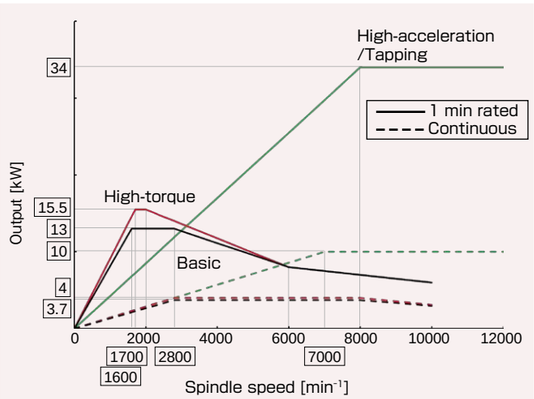
Optimum spindle can be selected according to application.

Spindle type	Max. speed	Max. rigid tapping speed	Continuous rated output	1 min rated output*1	Max. torque	Features
Basic	10,000 min^{-1}	6,000 min^{-1}	3.7 kW	13 kW	93 N·m	Performance enhanced with αi-D servo
High-torque	10,000 min^{-1}	6,000 min^{-1}	4.0 kW	15.5 kW	100 N·m	Focusing on torque in lower speed range, suitable for steel materials
High-acceleration	12,000 min^{-1}	8,000 min^{-1}	10 kW	34 kW	48 N·m	Excellent output in higher speed range, ideal for high-efficiency machining of aluminum parts
Tapping	12,000 min^{-1}	8,000 min^{-1}	10 kW	34 kW	48 N·m	Specialty in high cycle light machining with low inertia spindle unit
High-speed	24,000 min^{-1}	8,000 min^{-1}	4.5 kW	26 kW	42 N·m	Ideal for high-speed machining with small diameter tools

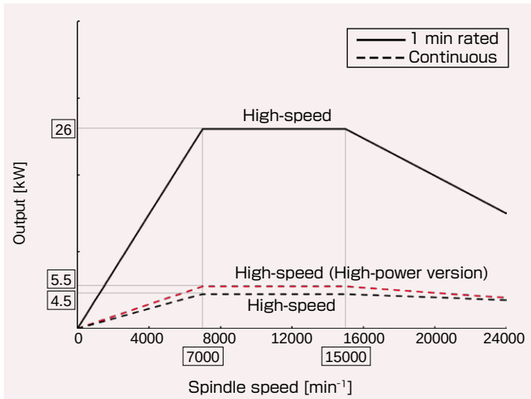
BBT30 (BIG-PLUS) tool taper and center through specification (withstand pressure 7MPa) are available for all spindle types.

*1 The maximum output that allows operation to continue for 1 minute after the motor has cooled down. (S2, 1 min)
Remaining operation time for the actual output can be confirmed on the Smart load meter screen.

Spindle output characteristics

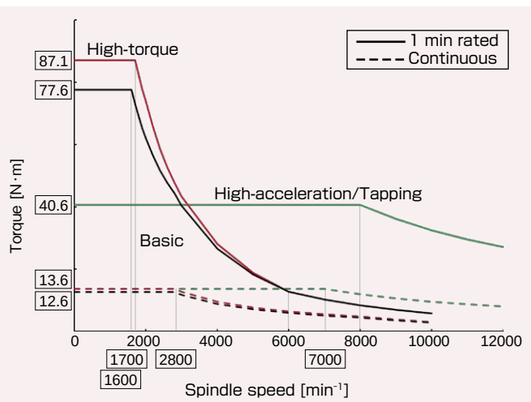


Basic/High-torque/High-acceleration/Tapping

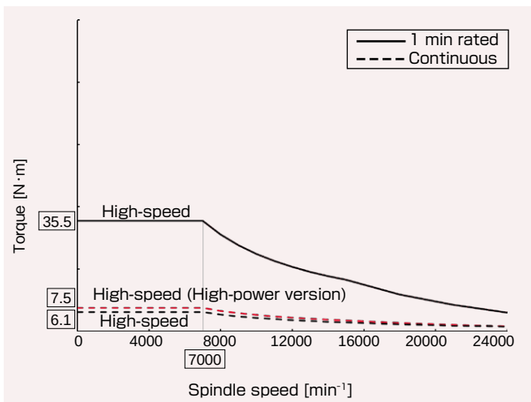


High-speed

Spindle torque characteristics



Basic/High-torque/High-acceleration/Tapping



High-speed

Functionalization of machining technique

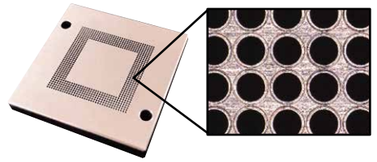
Providing easy-to-use functions to improve productivity from our know-how that have been accumulated through many years of machining technology support.

New G-codes

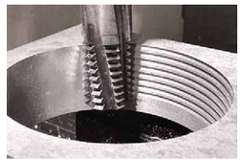
* Some features are option

Programming techniques for mastering ROBODRILL are compiled into G-codes, helping reduce cycle time and setup.

Fast and effective drilling:	G181 Drilling cycle, G183 Peck drilling cycle, G173 High-speed peck drilling cycle
Supporting various threading tools:	G184 Threading cycle
Contouring with one line command:	G102/G103 Circular machining cycle, G171 Contouring cycle
Fast and accurate deburring:	G104/G105 Deburring cycle, G182 Chamfering cycle
Effective tool change operation:	G100 Tool change cycle, G101 Tool escape cycle



High-speed peck drilling cycle
(Φ0.4mm×720 holes without breakage)



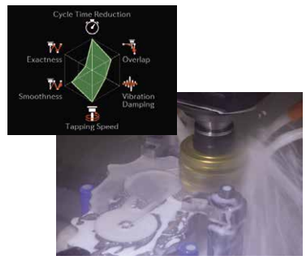
Threading cycle

Deburring cycle
(Deburring on cylindrical surface)

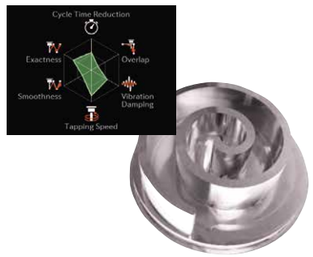
Machining mode setting function

New machining modes with advanced effect by incorporating the latest CNC functions are equipped.

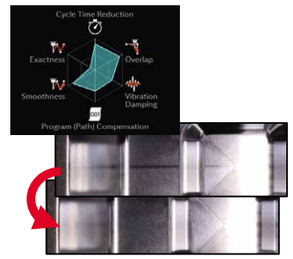
The new, intuitive and easy-to-use screen makes it easy to select and adjust the optimal parameters for each machining scene, such as reducing cycle time, high-precision machining, and high-quality machining.



Cycle time reduction
(General Parts – High speed)



Scroll machining
(General Parts - Contouring)

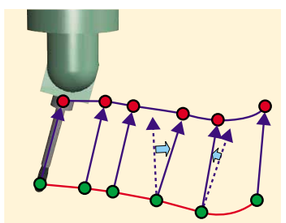


Reducing creases caused by program
(Model/Mold – High Speed Finishing)

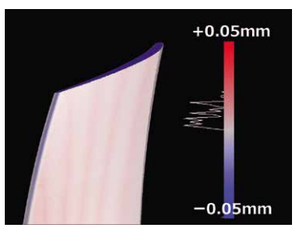
Simultaneous 5-axis machining (option)

ROBODRILL is also capable of simultaneous 5-axis machining by installing an additional 2-axis rotary table.

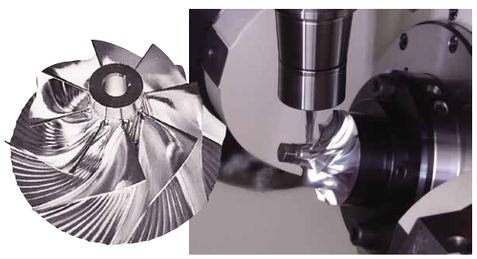
FANUC's advanced servo technology and extensive 5-axis control functions enable high-speed, high-precision, high-quality 5-axis machining.



High-speed smooth TCP
smooths tool path
and posture changes



Machining surface estimation
indicates machining result
before cutting. (PC software)



High-speed machining of impellers
using a 2-axis DD motor rotary table

Ease of Use

Control unit

FANUC Series 31*i*-B5 Plus, the high-end CNC with improved basic performance by high-speed CPU

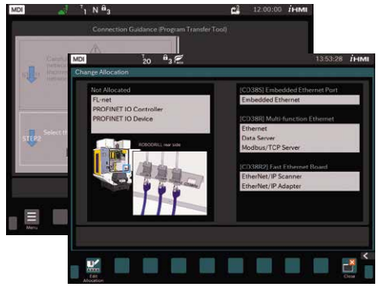
10.4" color LCD display PANEL *i*H compatible with *i*HMI is equipped. Well designed operation screens allow intuitive operation.

The interactive programming support function *i*HMI machining cycle makes it easy to create programs that include complex machining cycles.

Multi-function Ethernet compatible with various communication standards is standard. Guidance screen to assist with network connection are also available.

Standard: Modbus/TCP, FL-net, EtherNet/IP, PROFINET
Options: DeviceNet, PROFIBUS-DP, CC-Link

*i*HMI machining cycle



Network setting guidance

Energy saving technology

ROBODRILL achieves energy savings for the entire system including peripheral devices.

There is a limit to reduce the power consumption of the machine itself. It is important to save energies of peripheral equipment such as coolant system and mist collector, which account for more than half*1 of the power consumption in machining equipment.

ROBODRILL reduces power consumption of peripheral equipment by not only reducing operating time by shortening cycle time, but also saving unnecessary power consumption while machine is stopped with various functions.

Energy saving for peripherals

Energy-saving control signals can also be used for peripheral equipment.

Operation data of peripheral equipment can be displayed on the power consumption monitor.

Control unit for mist collector, which accounts for approx. 1/3 *1 of the power consumption, is available. (Option)

Sleep function

During standby, power to the motors, pumps, illumination, peripheral equipment, etc. is shut off.

This function is even more effective on DC Series, that does not require machine warm-up.

Sleep mode on

Other functions

Power regeneration, which reuses regenerative energy, has been standard since 1994.

Power consumption monitor, that displays power consumption and CO_2 emissions in real time and historically

Energy saving settings for the main unit and optional equipment

*1 Actual measurement results based on ISO14955-3 with FANUC's specified machining program

Customization functions

A wide variety of interfaces to enhance the expandability of ROBODRILL.

External interface: Basic I/O signals to control peripheral devices are provided as standard.
Custom operator' s panel: Switches and lamps can be created on the screen to operate peripheral devices etc.
Custom screen: Apps created with FANUC PICTURE (PC software) can be registered. Various exclusive apps for peripheral devices are provided by their manufacturers.
Custom PMC function: Ladder program to control peripheral devices can be created without preparing external PLC.
Custom safety PMC: Duplicated safety I/O signals enable to create software safety circuits for user's system.

External interface

Custom operator's panel

Examples of Custom screen

Robotization support (option)

Automation in combination with FANUC robots is also easy with ROBODRILL.

Automatic side/front door: Safety circuit is included. Pneumatic or servo drive is selectable.
Robot interface 2: Dedicated screen that allows robot operation and system start/stop, etc. All the functions necessary for communication between ROBODRILL and robot are covered. Signal connection with robot is via a single Ethernet cable and it complies with safety standards.
ROBODRILL Robot package: Package of basic elements necessary for startup of robot system.

Robot package

Robot interface 2

ROBODRILL Robot package

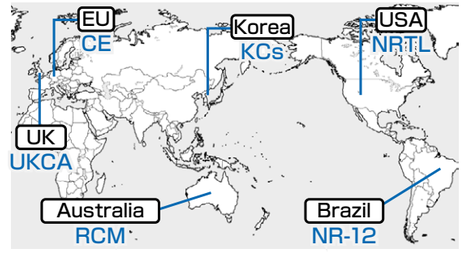
Application example

Conformity of safety standards

Dual check safety function is applied as standard.

By duplicating safety signals such as emergency stop and door lock switches, functional safety level that complies with ISO13849-1:2006 Category 3 is provided.

ROBODRILL is also able to comply with major safety standards around the world. (Optional)



Reliability

High-reliability design

As FANUC's products are production goods used at our customers' manufacturing sites, we have thoroughly developed them to be "Reliable, Predictable, and Easy to Repair", in order to maximize uptime.

Reliable

During the development, product reliability is evaluated using unique reliability development methods such as accelerated life testing. In addition, maintenance information from over 200 ROBODRILLs at our in-house factories is fed back to development.

A full range of functions to protect the machine from breakdowns by detecting excessive loads on the mechanical parts and safely slowing down and stopping the machine are available, including various abnormality detection functions, spindle heat control, smart spindle load control, and so on.

By automating the production line and introducing IoT, we are improving manufacturing quality while strengthening traceability.

Achieved the failure rate of 0.01 per unit per month*1 (less than one failure per year when 8 units are in operation)

*1 Results of service calls regarding faults excluding user-responsible cases for ROBODRILLs in operation for less than 5 years.
Collection period: January 2022 to December 2024

Reliability evaluation building

FANUC in-house factory

Automatic assembly line of ATC unit

Predictable

A full range of preventive maintenance functions are available, including Periodical maintenance screen, Leakage detection, Fan monitor, and Z-axis brake check.

By connecting to FIELD system Basic Package, FANUC's operation monitoring system, machine's operating status can be checked.

Periodical maintenance screen

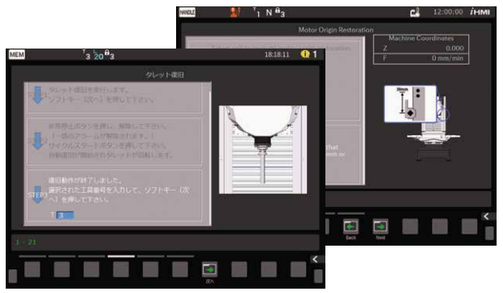
FIELD system Basic Package

Easy to Repair

Functions to identify the cause of error and to support recovery with guidance when abnormality occurs are available.

Well considered machine structure that allows easy parts replacement will reduce downtime.

FANUC Service's maintenance system ensures swift recovery in case of breakdown, and lifetime maintenance allows you to use our products for a long period without worry.



Turret restoration screen/
Motor origin restoration screen

Service & Support

Excellent maintenance services

FANUC service team delivers customer trust and confidence based on direction of service "Maximizing Uptime", "Global Service" and "Lifetime maintenance".

Service First

Conforming to the spirit of "Service First", FANUC provides lifetime maintenance to its products for as long as they are used by customers, through more than 270 service locations supporting more than 100 countries and regions throughout the world.

Lifetime maintenance

FANUC offers lifetime maintenance, where FANUC's products will be serviced as long as they are used by customers.

The motors, PCBs or any units of even over 30 years old can be repaired and recovered.

To perform lifetime maintenance, FANUC stocks enough amount of discontinued spare parts and even redesigns units when spare parts have run out.

ROBODRILL α-T10A
(1992)

Even old motors can be repaired

Repair factory

FANUC ACADEMY

A variety of short-term intensive courses that focus on practical training are held.

One training machine is provided for each participant, and participants can learn from the basics of operation and programming to complex machining using additional axis tables, through a wide variety of examples in a short period of time .

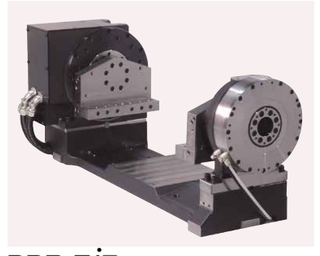
Live seminars that can be taken in web format and on-demand seminars that allow self-study online are also available. (ROBODRILL Basic Course only)

ACADEMY

Options

DDR*i*B

Dedicated additional 1-axis rotary table that enables high-speed and high-precision, non-backlash positioning with direct drive motor. Max. rotation speed: 300min^{-1}



DDR-T*i*B

The trunnion unit that allows easy creation of machining fixture making the most of the ROBODRILL's machining stroke. Clamping torque: 1100N･m

Horizontal axis installation　C-axis installation

DDR-HS*i*B

High-speed rotation type unit capable of turning, in addition to high-speed and high-precision positioning. The installation direction can be selected according to the application. Max. rotation speed: 1,500min^{-1}

DDR series

Coolant unit (tank)

Selectable between 260L type (photo) on which center-through pump unit can be equipped, and the compact 120L type.

Coolant unit (nozzle)

Coolant is surely delivered to the cutting point by 4 nozzles even tool lengths are different. Interference is reduced by running the piping inside the spindle.

Chip flush function

Chips that scatter inside the machine are washed away. The new piping design has significantly improved cleaning efficiency.

Taper cleaning function

Tool taper and spindle taper are washed with coolant during tool change to reduce chips getting caught.

Top cover (basic)

It prevents chips and coolant from scattering from the top of the machine. Full cover unit for the top of the spindle head is also available.

Signal lamp (3 colors)

LED type lamp of long-life and energy-efficient. It can be tilted in any direction to suit the machine layout.

Illumination (LED type)

High-brightness LED is applied and installed on the back of the operation panel.

Portable manual pulse generator

When working away from the operator' s panel such as setting up jigs, it makes easier to operate each axis. Comes with a magnet on the back.

Tool length measurement switch

Highly reliable type with overtravel detection. Multi-function measurement macro program is also included as standard.

Touch probe

Can be used for workpiece centering and thermal displacement compensation. Infrared communication type and radio communication type are available.

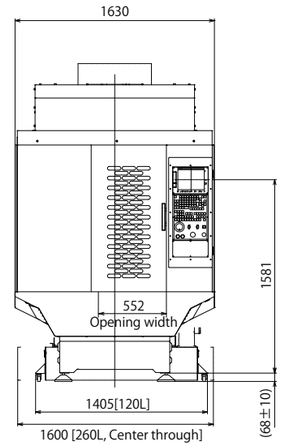
Oil type　Grease type

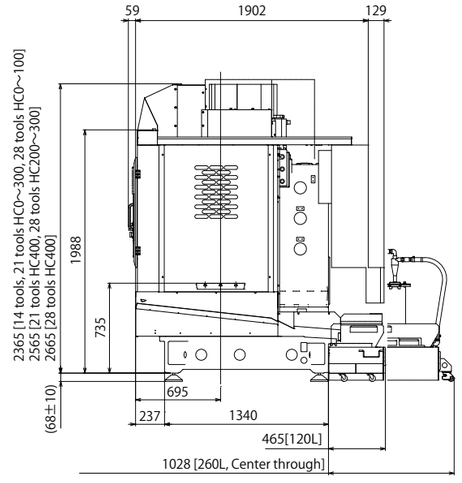
Automatic lubrication system

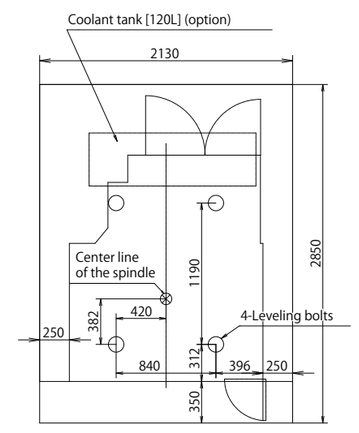
Lubricant is automatically supplied to the XYZ axis guides and ball screws. Energy saving control is also supported. The grease type consumes less and has excellent running costs.

Dimensions

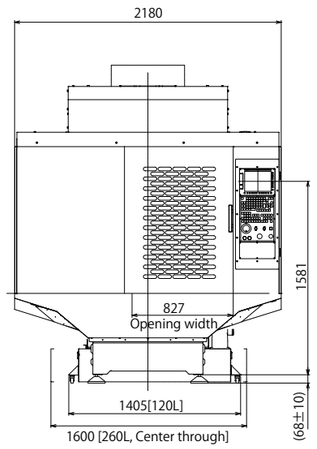
D54CS

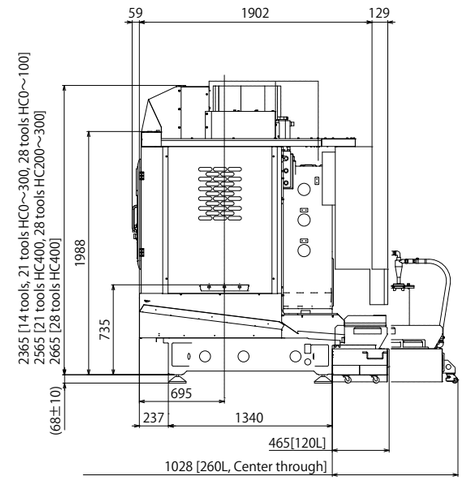


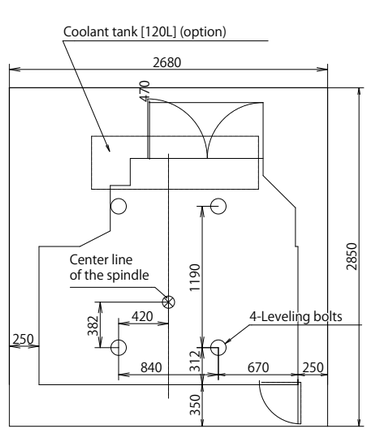




D74CS







* Dimensions may vary depending on optional configurations. (Please contact us for details.)

Specification

Item		D54CS	D74CS
Machine specification			
Capacity	X-axis travel (longitudinal movement of table)	500 mm	700 mm
	Y-axis travel (cross movement of saddle)	400 mm	400 mm
	Z-axis travel (vertical movement of spindle head)	330 mm / 400 mm (selectable)	
	Distance from table surface to spindle gage plane	150 to 480 mm / 80 to 480 mm (selectable, when no high column is specified)	
Table	Working space (X-axis×Y-axis)	650 mm×400 mm	850 mm×400 mm
	Capacity of workpiece mass	300 kg / 400 kg (selectable)	
Spindle	Speed range [Continuous rating output/ 1 min rating output]	Basic: 100 to 10000 min^{-1} [3.7 kW / 13.0 kW] High-torque: 100 to 10000 min^{-1} [4.0 kW / 15.5 kW] High-acceleration: 100 to 12000 min^{-1} [10.0 kW / 34.0 kW] Tapping: 100 to 12000 min^{-1} [10.0 kW / 34.0 kW] High-speed: 240 to 24000 min^{-1} [4.5 kW / 26.0 kW]	
	Maximum rigid tap speed	6000 min^{-1} / 8000 min^{-1} (changes by spindle specification)	
	Spindle gauge (Call number) *1	7/24 taper No.30 (with air blow)	
Feedrate	Rapid traverse rate	54 m/min (X,Y) / 60 m/min (Z)	
	Cutting feedrate	1 mm/min to 30000 mm/min	
Turret	Type of tooling / Type of pull stud bolt *2	JIS B 6339-2 No.30、MAS 403-1982 P30T-1（45° ）	
	Tool storage capacity	14 tools / 21 tools / 28 tools (selectable)	
	Maximum tool diameter	80 mm	
	Maximum tool length	250 mm	
	Maximum tool mass [Total mass]	14 tools: 4 kg [30 kg] / 3 kg [22 kg] (when spindle-driven turret is specified) 21 tools: 4 kg [46 kg] / 3 kg [33 kg] (when spindle-driven turret is specified) 28 tools: 4 kg [46 kg]	
	Tool changing time (Tool to Tool) (at fastest setting)	14 tools: 0.6 s / 0.9 s (when spindle-driven turret is specified) 21 tools: 0.6 s / 1.1 s (when spindle-driven turret is specified) 28 tools: 0.7 s	
Accuracy *3	Bidirectional accuracy of positioning of an axis	Less than 0.006 mm (ISO230-2:1988)	
	Bidirectional repeatability of positioning of an axis	Less than 0.004 mm (ISO230-2:1997,2006)	
Control unit		FANUC Series 31*i*-B5 Plus (Simultaneously controlled axes: Max.5 axes)	
Installations	(note) Please make sure to comply with installation conditions specified by FANUC when installing ROBODRILL *4		
Power source	Power supply *5	200V AC to 220V AC, -15 % to +10 %, 3-phase, 50 Hz±1 Hz or 60 Hz±1 Hz Basic/High-torque/High-speed: 10kVA, High-speed (High-power version): 12kVA, High-acceleration/Tapping: 18kVA	
	Compressed air supply *6	0.35 MPa to 0.55 MPa (0.5 MPa is recommend) (gage pressure), 0.16 m^3 /min (at atmospheric pressure)	
Machine size	Machine height	2433 mm±10 mm (when no high column is specified)	
	Floor space	1630 mm×2090 mm	2180 mm×2090 mm
	Mass of machine	Approx. 2050 kg	Approx. 2150 kg

*1 Spindle gauge does not conform to JIS B 6340:1992, JIS B 6340-1:2019 or JIS B 6340-2:2019.
*2 In case of using center through coolant, please apply suitable pull stud bolt for Robodrill of each tooling supplier.
*3 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.
*4 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.
*5 When peripherals such as coolant unit or rotary table are added, additional power is required. Please contact FANUC for detail. A cable with 10 mm^2 to 14 mm^2 should be used at primary power connection.
*6 In case of side automatic door, 0.4 MPa compressed air supply or more is required. 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.

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ROBODRILL product brochure

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