Intelligent High Speed CNC Drill with Versatility

# FANUC ROBODRILL

α-T21*i*Es/T21*i*E/T21*i*EL

α-T14*i*Es/T14*i*E/T14*i*EL

α-T21*i*Ese/T21*i*Ee/T21*i*ELe

α-T14*i*Ese/T14*i*Ee/T14*i*ELe

## Intelligent High Speed CNC Drill with Versatility

# FANUC ROBODRILL α-*i*E series

**FANUC ROBODRILL α-*i*E series is a high speed versatile AI CNC drill with spindle taper size No. 30 for high precision and high efficiency production.**

## High speed, high precision, and ultimate efficiency

**Nano CNC System**
- Has a ultra-precision pulse coder for control with interpolation and feedback in nanometers

**High acceleration positioning**
- Acceleration over 1.5G

**Rigid structure of machine mechanism**
- High precision machining at high efficiency

**AI contour control I & HRV control**
- Greatly reduces profile errors caused by servo delays


## Intelligent Control

**AI contour control II**
- Implements very smooth machined surfaces

**AI tool life management**
- Tool life management based on frequency and time of use, and cutting load

**AI thermal displacement compensation**
- Compensation for thermal displacement that may occur when the spindle and feed axis operate

**Robot syst**
- From a robot st

**Standard**
- Program tr

**CIMP**
- Transfer
personal

**Cus**
- Eas
equ

## α-T21*i*Es/T21*i*Ese
## α-T14*i*Es/T14*i*Ese

980mm

**Space saver**

Stroke X300×Y300(+100)×Z330mm

## α-T21*i*E/T21*i*Ee
## α-T14*i*E/T14*i*Ee

1,550mm

**Best seller drill with No.30 Taper**

Stroke X500×Y400×Z330mm

## α-T21*i*EL/T21*i*ELe
## α-T14*i*EL/T14*i*ELe

2,100 mm

**Wide stroke**

Stroke X700×Y400×Z330mm

| Tool turret | X-axis travel(Longitudinal movement of table) | | | Control unit |
|---|---|---|---|---|
| | 300 | 500 | 700 | |
| 21Tools | α-T21*i*Es | α-T21*i*E | α-T21*i*EL | Series 31*i*-A5 |
| 14Tools | α-T14*i*Es | α-T14*i*E | α-T14*i*EL | |
| 21Tools | α-T21*i*Ese | α-T21*i*Ee | α-T21*i*ELe | Series 31*i*-A |
| 14Tools | α-T14*i*Ese | α-T14*i*Ee | α-T14*i*ELe | |

**Suitable for a wide range of parts machining and three-dimensional machining**

## Robotization, Networking, and System integration

**em**
ndard package to a large-scale production line

**Ethernet**
nsfer and network building

**LICITY® DRILL MONITOR *i***
machining programs and monitors the operating status from a computer

**tom PMC function**
creation of sequence programs suitable for your peripheral pment

### Operational Excellence

- MANUAL GUIDE *i*
- Quick editor
- Production control and tool counter
- Setup file

### Safety Excellence

- Conformance on the European safety standards
- Dual check safety function
- Front door with an electromagnetic lock

### Management Excellence

- ISO9001 certified
- ISO14001 certified

# Versatile Applications to Meet Wide-variety of Machining Needs

## Auto parts machining

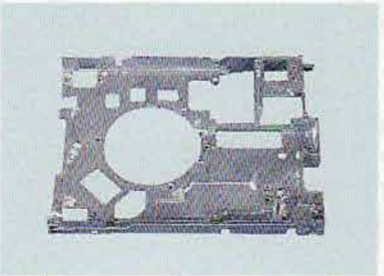
Highly rigid mechanism achieves heavy machining efficiently in milling, boring and side cutting. Multi-face machining and contouring makes auto parts machining easier.

Crank case

Exhaust manifold (FCD450)

## Electrical parts and small parts

High speed axis feed, high speed spindle operation and optimal acceleration and deceleration control provides efficiency of machining and reduced cycle time. This series is also suitable for machining of electrical and small parts, from high-speed cutting of light metal such as aluminum to cutting of stainless steel.

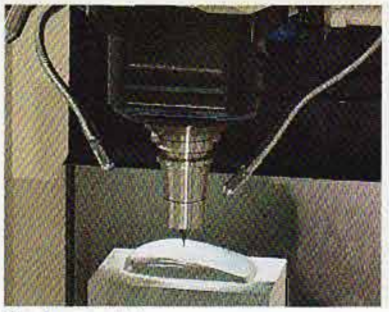


3.5″HDD frame

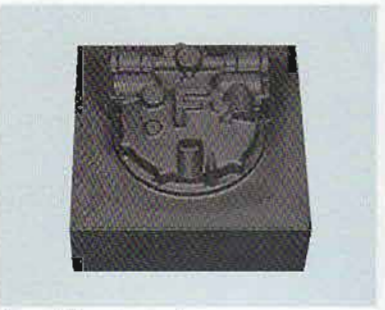
Stainless steel parts

## Three-dimensional machining

High-speed and High-precision machining for resin models, electrodes and precision parts, is possible with high speed processing. NURBS interpolation and super-minute line segment program provide smooth machined surfaces requiring little finishing, in a short time.



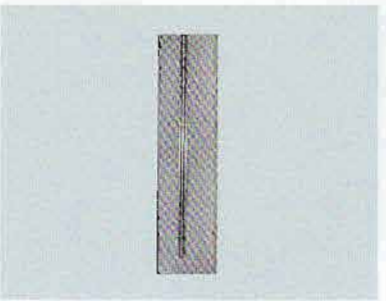
Resin model



Graphite electrode

## Deep and small hole drilling

Deep hole over 30 times deeper than the hole diameter and small hole about 0.1mm at its diameter can be drilled.

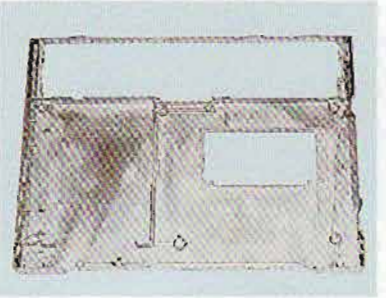


Deep hole (ϕ3.3×96mm) drilling (section) (SUS430)

ϕ16×150mm (SCM420)

## Deburring and chamfering

Precise high-speed contouring allows deburring and chamfering for sophisticated parts such as magnesium mold, die cast, forged or cast parts. This series is also available for machining the datum plane at the succeeding process.



Personal computer case (magnesium)

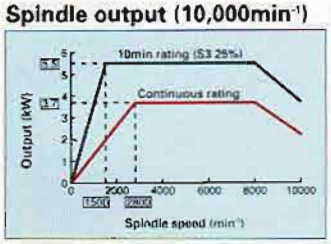
Gear (SCM420)

# High-precision indexing is made possible by using a closed loop

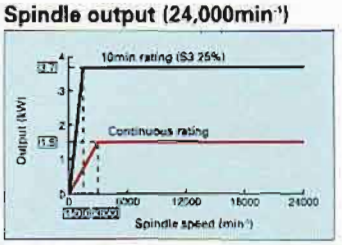
## High speed and high power spindle

- Spindle is directly coupled with its motor.
- Least maintenance due to grease sealed bearings.
- The high speed and high precision ball bearing is used for the high-speed spindle.
  (Some of touch switches may not be used according to the type of it.)

**Spindle output (10,000min⁻¹)**




**Spindle output (24,000min⁻¹)**




**Spindle organization**

| Spindle | Coolant | BT tooling | DIN tooling | NC5 tooling | BIG-PLUS tooling |
|---|---|---|---|---|---|
| 10,000min⁻¹ | External coolant | Possible (BT30) | Possible (DIN69871-A30) | Possible (NC5-46) | Possible (BBT30) |
| | Center through coolant | | | | |
| 24,000min⁻¹ | External coolant | Possible (BT30) | Possible (DIN69871-A30) | Impossible | Possible (BBT30) |
| | Center through coolant | | | | |

## Compact, very rigid basic structure and high-speed, fast-acceleration axis feed

- Rapid traverse speed :
  54m/min with FS31*i*-A5/ 48m/min with FS31*i*-A
- Max. Acceleration :
  over 1.5G with FS31*i*-A5/ over 1.3G with FS31*i*-A
- Z-axis travel : 330mm

| X-axis travel | Y-axis travel | Table working space | Table loading capacity |
|---|---|---|---|
| 300mm | 300+100(*)mm | 630×330mm | 150kg |
| 500mm | 400mm | 650×400mm | 250kg |
| 700mm | 400mm | 850×410mm | 250kg |

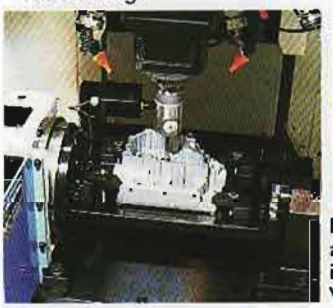
(*) The additional amount of 100 mm is provided for improving approach characteristics during work.

## High speed rigid tapping

- Max tapping up to 8,000min⁻¹ (at 24,000min⁻¹ spindle)/5,000min⁻¹ (at 10,000min⁻¹ spindle)
- Reduced tapping cycle time by quick extraction with override up to 20 times.

## Simultaneous 4-/5-axis machining

- Additional 1-/2-axis control can be added to enable simultaneous contour control of up to 4 or 5 axes.
- High-precision indexing is made possible by using a closed loop.
- With the FANUC Series 31*i*-A5, One or two additional axes can be added.
- With the FANUC Series 31*i*-A, One additional axes can be added.
- An index table can be used to enable multi-surface machining.



**Four-face machining using an additional axis and an index table**
Valve body cover (ADC12)

**Three-dimensional contouring using two additional axes and a tilting index table**
Impeller (Aluminum alloy)

## High speed and high reliable tool change

- Simple and reliable proprietary tool turret mechanism
- Tool changing time (cut to cut) : 1.8sec.
- Models for 21 tools and for 14 tools are available.

## Superior performance for machining

Versatile machining is possible including drilling, tapping, milling and profiling.

**A machining sample with 10,000min⁻¹ spindle (*1)**

| Workpiece | Medium carbon steel | Gray cast iron | Aluminium alloy die casting | Workpiece | Medium carbon steel | Gray cast iron | Aluminium alloy die casting |
|---|---|---|---|---|---|---|---|
| Drill diameter<br>Drill material | 25 dia.<br>HSS | 25 dia.<br>HSS | 30 dia.<br>HSS | Tap size<br>Tap pitch | M16<br>2 | M20<br>2.5 | M24<br>3 |
| Spindle Speed S | 318 | 382 | 637 | Spindle Speed S | 298 | 264 | 219 |
| Feedrate F (*2) | 48 | 115 | 255 | Feedrate F (*2) | 596 | 660 | 657 |
| Coolant | Water-immiscible cutting fluid | Emulsion type water-miscible cutting fluid | | Coolant | Water-immiscible cutting fluid | Emulsion type water-miscible cutting fluid | |
| Load meter % | 140 | 140 | 140 | Tolerance class | 6H | | |

Enhanced high speed and high acceleration spindle reduces machining cycle time significantly.

**A machining sample with 24,000min⁻¹ spindle (*1)**

| Workpiece | Medium carbon steel | Aluminium alloy die casting | Workpiece | Medium carbon steel | Aluminium alloy die casting |
|---|---|---|---|---|---|
| Drill diameter<br>Drill material | 20 dia.<br>HSS | 22 dia.<br>HSS | Tap size<br>Tap pitch | M16<br>2 | M24<br>3 |
| Spindle Speed S | 398 | 1012 | Spindle Speed S | 298 | 219 |
| Feedrate F (*2) | 40 | 253 | Feedrate F (*2) | 596 | 657 |
| Coolant | Water-immiscible cutting fluid | Emulsion type water-miscible cutting fluid | Coolant | Water-immiscible cutting fluid | Emulsion type water-miscible cutting fluid |
| Load meter % | 140 | 125 | Tolerance class | 6H | |

(*1) Sample data may vary on machining conditions
(*2) Unit : mm/min

# Intelligent Control

## High-speed control

Bell-shaped acceleration/deceleration, in-position width switching for rapid traverse/cutting feed, rapid traverse overlapping, and other control functions, as well as AI contour control I for reading 30 blocks in advance, optimize axis motion and reduce machining cycle time.

## Optimal acceleration/deceleration

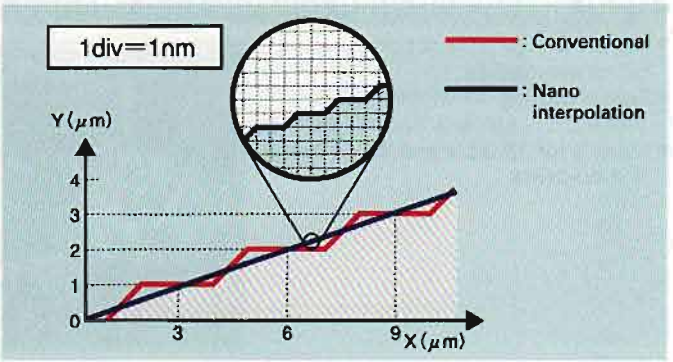
During positioning, acceleration/deceleration is optimally controlled according to the torque and speed characteristics of the motor.
Making full use of the motor characteristics at a low speed reduces positioning (rapid traverse) time, resulting in reduction in machining cycle time.

## HRV control

The latest and quick response servo motor $\alpha is$ series with an ultra-precision pulse coder of 16,000,000pulse/rev resolution is adopted. And a combination of HRV control, which are leading-edge digital servo/spindle control technologies, reduces possible servo delay and allows the least tracking error on high-speed machining.

## Nano interpolation

Nano-interpolation is ultra-precision interpolation which calculates a position command to be transmitted to the digital servo in nanometers (nm) even when the unit used for the command in the program is $\mu$m. Together with nano-feedback by the ultra-precision pulse coder with a resolution of 16,000,000 pulses/rev., nano-interpolation implements very smooth movement to improve the precision of machined surfaces.

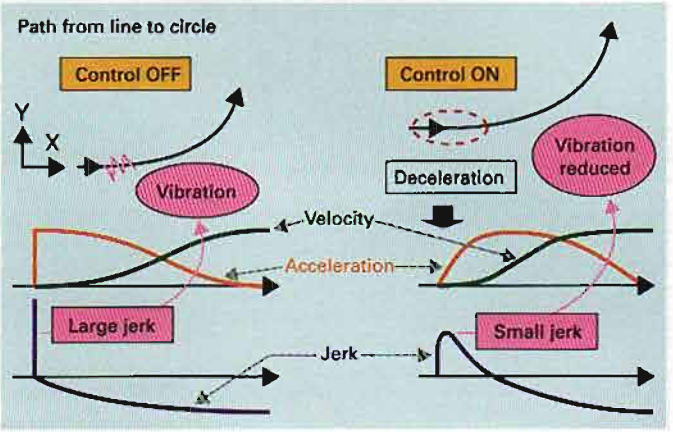



## AI contour control Ⅱ (option)

AI contour control Ⅱ implements high-speed, high-precision machining by reading 200 blocks in advance for acceleration/deceleration control.
The number of blocks to be read in advance can be increased, thereby enabling up to 1,000 blocks to be read in advance for acceleration/deceleration control. This enables high-speed, high-precision machining without feedrate variations even for a program consisting of super-minute line segments. Nano-interpolation can be used to obtain smooth machined surfaces requiring little finishing.

## Jerk Control (option)

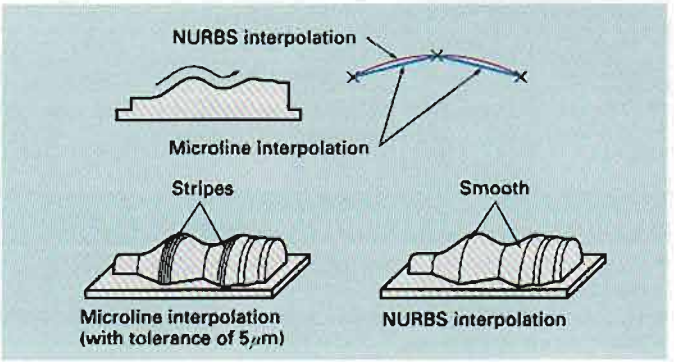
Mechanical shock during machining is reduced more than ever before by performing acceleration/deceleration control (smooth bell-shaped acceleration/deceleration before interpolation) that keeps a low level of jerk, which is the rate of change of acceleration with respect to time. In a machining program, a portion in which a specified profile is smooth but significant change in acceleration causes mechanical shock is automatically determined, and controlled so that a suitable speed is achieved.




## NURBS interpolation (option)

NURBS curves, which have become widespread as a method of representing free curves, can be specified in a program. High-precision interpolation is performed on each NURBS curve so that a smooth machined surface very close to the designed profile can be obtained. The size of a program can also be reduced as compared with that of a program consisting of minute straight line commands.

Note) CAM system for programming is required to support the NURBS interpolation




## Nano-smoothing (option)

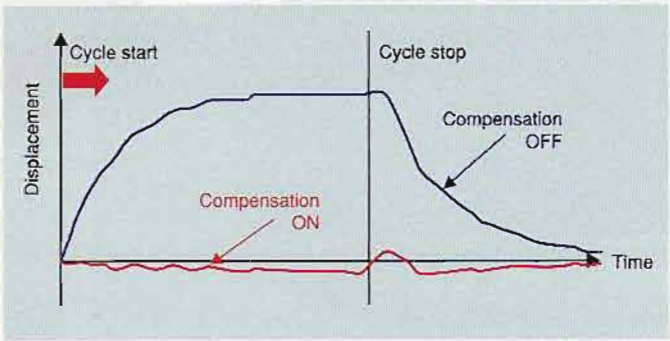
From a program consisting of minute line segments created with a CAD/CAM system, the original curved surface is estimated as NURBS curves. The generated NURBS curves are interpolated in nanometers, so that a smooth machined surface close to the designed profile can be obtained, thereby reducing the number of hand finishing process steps.

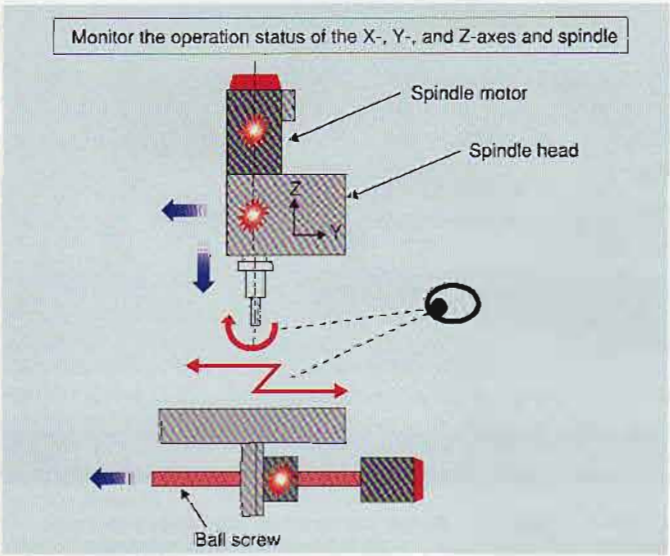
## Fast data server (option)

A huge program for three-dimensional machining that contains continuous settings for small amounts of travel can be stored on the ATA flash card built into the fast data server, and can be used for high-speed machining. DNC operation can also be performed from a personal computer.
Memory-based operation can be performed using macro statements and subprogram calls from the ATA flash card.
Programs stored on the ATA flash card can be edited.

## AI thermal displacement compensation

Compensation for thermal displacement is carried out at real time by monitoring the operation status of the spindle and feed axis and estimating an elongation along the each axes. (The precision of compensation varies with the operating conditions.)

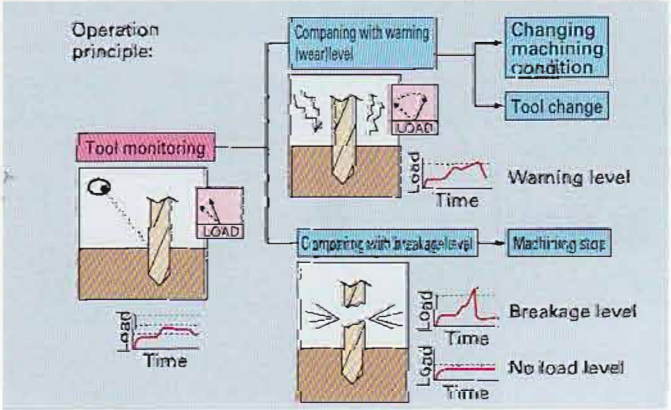



## AI tool life management / AI tool monitoring (option)

The tool life management traces tool status such as frequency or time of use and replaces a tool when its usage exceeds the preset value. This prevents any trouble on cutting tools such as broken drill.

The built-in AI tool monitor watches actual load on drilling by detecting directly external disturbance load of the spindle motor.This provides superior tool management. (For usable ranges, contact FANUC.)



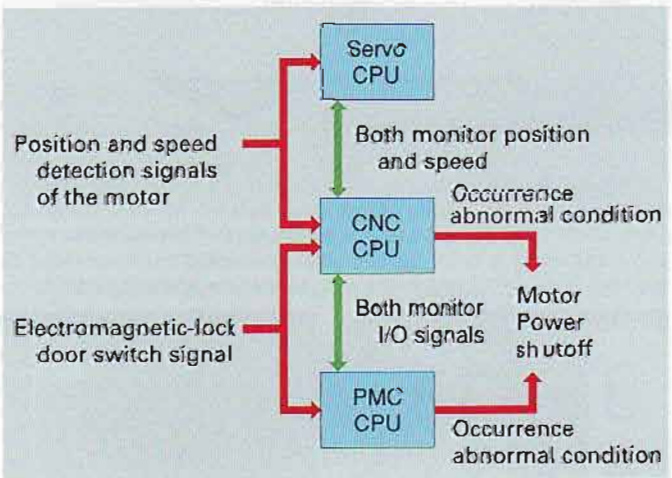

## MANUAL GUIDE *i*

MANUAL GUIDE *i* can be used to perform all operations from creation of a program to machining on one screen simply.

A conventional program using G codes can be created simply using a graphical menu guide. Hole position specification and pocketing can be entered simply without calculations. High-speed real animated simulation with a solid model allows simple machining simulation.

## Safety

A dual check safety function is installed, which doubly monitors feedrate, position, and safety signals using two CPUs. Neither special operation nor waiting time for safety check is required. Together with the electromagnetic lock mechanism on each door, this function ensures the safety of the operators without reducing efficiency. The category-3 safety level defined in EN 954-1 is ensured.




## CE Mark ( for EU countries) (option)

Changes (such as adding power noise filters) made in addition to the improved safety mentioned above had the product certified by third-party certification institutes.

# Robotization, Networking and System Integration

## Robot standard package

A robot standard package with a versatile mini-robot FANUC Robot LR Mate 100*i*B/200*i*B installed can easily implement a compact machining cell with low-price that enables processes such as loading/unloading and deburring of workpieces.

- The package of two ROBODRILLs and one robot is also available.
- With the robot operation screen of the ROBODRILL, you can operate a robot, open and close a robot hand, open and close an automatic side door and view the system status.
- Interlocking with safety consideration is incorporated in ROBODRILL.

Thanks to the multiple robots, machining system without any peripheral devices is also available.

Robot operation screen

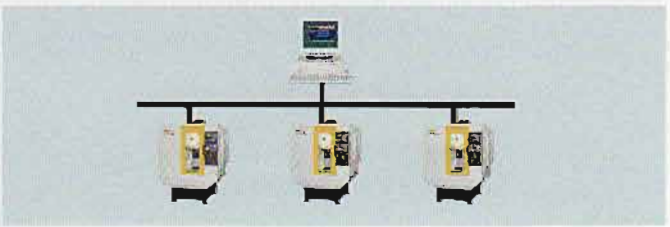
Example of robot hand

Robot standard package with LR Mate 100*i*B

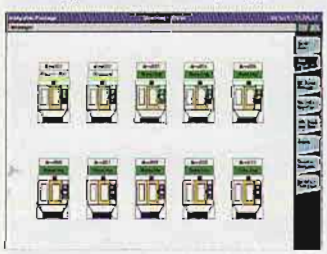
Machining robot system

## Network

*The Ethernet function is available* as standard communication for network.



Centralized management package **CIMPLICITY® DRILL MONITOR *i*** can be used on a personal computer connected to the network to manage ROBODRILL programs and monitor the operating status.



## Equipment for system configuration

Centering system

Probe

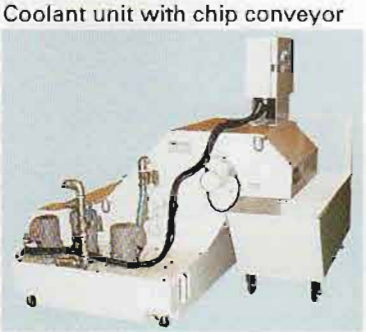


Receiver

Broken tool detection unit

Mist separator

Coolant unit with chip conveyor

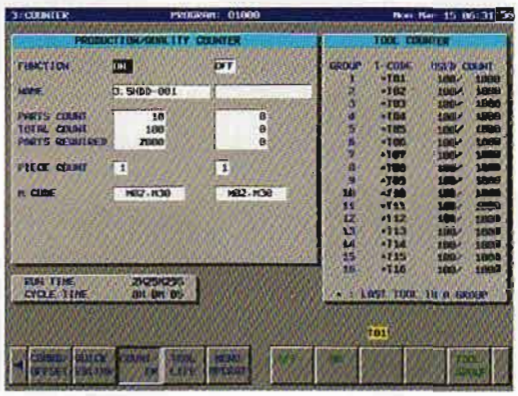


2-pallet type pallet changer installed at side

# Easy Operation

## Production control and tool counter

Two production monitoring counters and two accumulation counters are applicable for recognition of scheduled parts production, status display, termination of machining and so on. These counters are indispensable for production. The use status of tools with the tool life management function can also be checked using the tool counter on the same screen.



## Setup file

Initial setting information can be stored such as parts coordinate system, offsets values, program identification and so on. Automated initialization for operation is available simply by calling a set of information for ease of use.

## Quick editor

Quick Editor used to create or edit a program is an easy-to-use full-screen editor, which can perform copy, move, search, cursor jump, and other operations like an editor for PCs. The guidance input function for G codes or M codes allows you to edit a program efficiently. Effective edit of programming is also possible through on- screen selection of G and M codes with guidance.

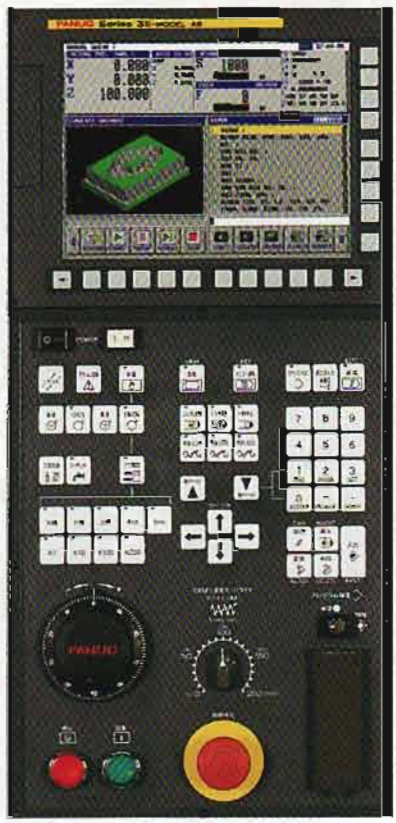
## Program management

Large-sized program memory can be easily managed based on program folders and file names (each having up to 32 characters).

## Compact operator's panel and 10.4"color LCD

Standard display with 10.4" color LCD integrated with the operator panel features ease of use with least key stroke operations. The soft keys vertically provided to the right of the display unit can be used as machine operation menu keys.

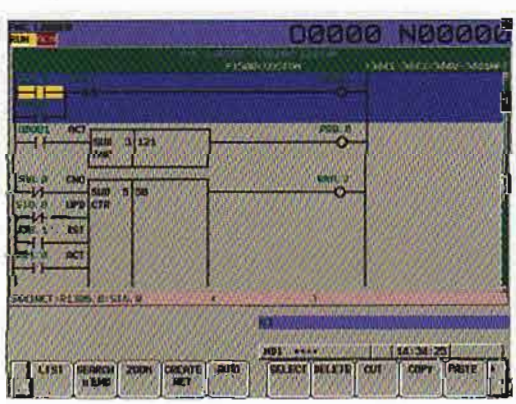
In a memory card slot located at the side of the display unit, a compact flash card can be inserted to perform DNC operation or to enable the card to be used as a large-sized program memory device.



* The above photo is that for $\alpha$-T21iE and $\alpha$-T14iE

## Custom PMC

The custom PMC function which allows simple control of peripheral devices is installed as standard. A sequence program can be created and edited easily on a screen with symbols. This function provides 16 input and 16 output signals as basic features and also available up to 352 input and 256 output signals in total as optional features.



## Accessory (option)

Wide opening door :
730mm for $\alpha$-T14*i*E

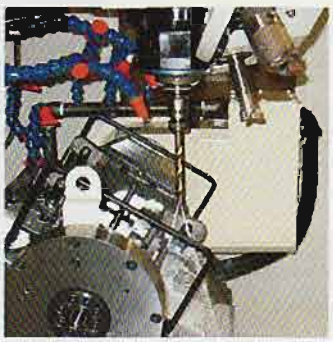
Air blow for chips

Top cover

Signal lamp

Tool length switch for
automatic measurement

Coolant unit (tank)



Center through coolant

Automatic fire extinguisher
(Note)

Operation panel with
alphabetical key

Coolant unit with chip flush
(spot gun provided)

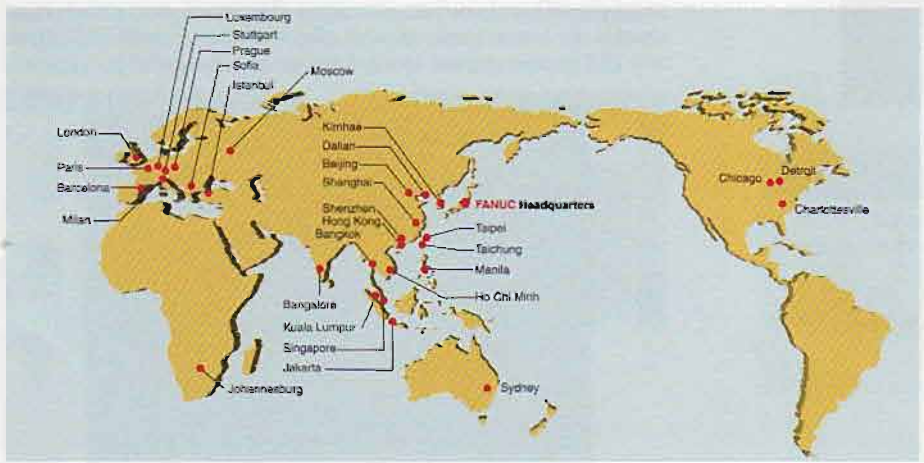
Illumination

Intermittent central
lubrication

(NOTE) When machining a flammable material such as resin, select the automatic fire control equipment against fire hazards. For the materials covered by the automatic fire control equipment, contact the ROBODRILL sales personnel.

## Worldwide customer service and support

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.



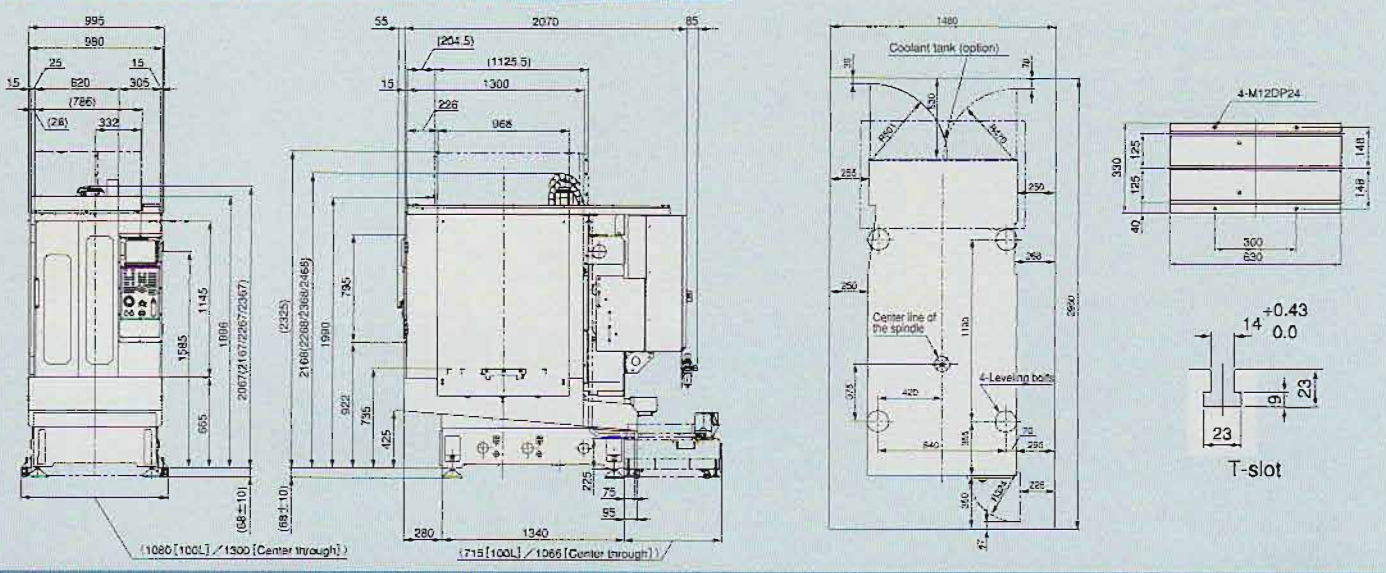

## FANUC training center

FANUC Training Center operates training programs on FANUC ROBODRILL *i* series throughout the year, which focus on practical operations and programming with machining know how and maintenance.

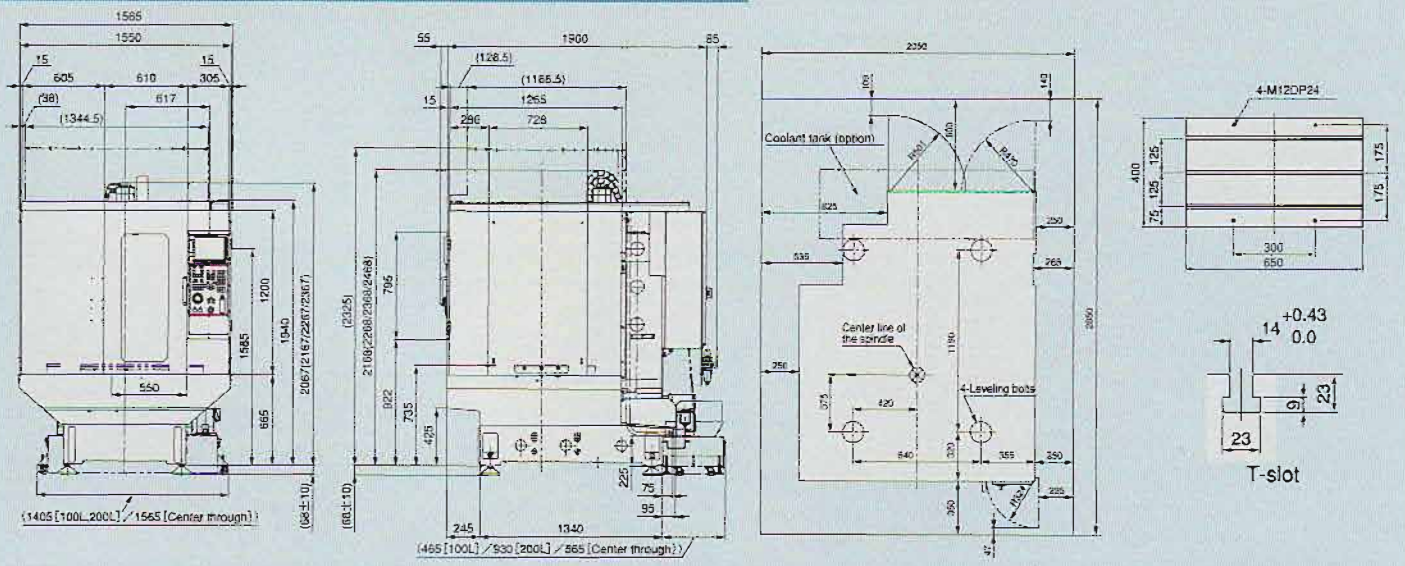
Inquiries : Yamanakako-mura,
Yamanashi, Japan 401-0501
Phone : 81-555-84-6030 Fax : 81-555-84-5540

# Outer dimensions

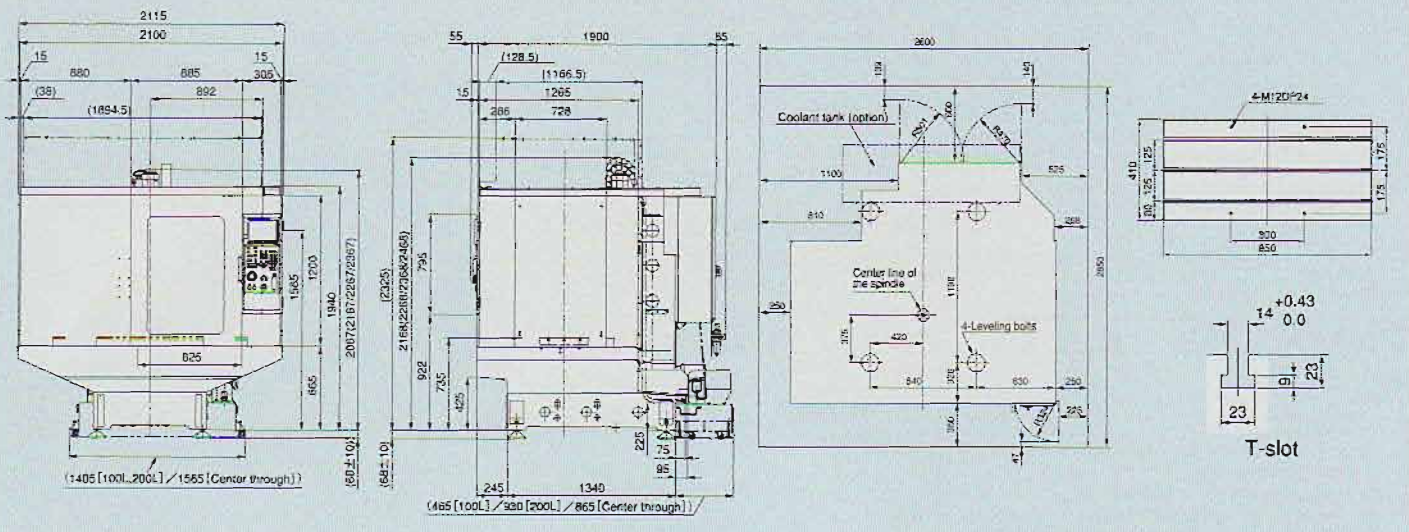
## α-T21*i*Es/T14*i*Es/T21*i*Es*e*/T14*i*Es*e*




## α-T21*i*E/T14*i*E/T21*i*E*e*/T14*i*E*e*




## α-T21*i*EL/T14*i*EL/T21*i*EL*e*/T14*i*EL*e*



# FANUC ROBODRILL α-*i*E series

| Item | | α-T21*i*Es/T21*i*Ese<br>α-T14*i*Es/T14*i*Ese | α-T21*i*E/T21*i*Ee<br>α-T14*i*E/T14*i*Ee | α-T21*i*EL/T21*i*ELe<br>α-T14*i*EL/T14*i*ELe |
|---|---|---|---|---|
| **Machine (Standard)** | | | | |
| Capacity | X-axis travel (Longitudinal movement of table) | 300mm | 500mm | 700mm |
| | Y-axis travel (Cross movement of saddle) | 300mm + 100mm | 400mm | |
| | Z-axis travel (Vertical movement of spindle head) | 330mm | | |
| | Distance from table surface to spindle gage plane | 150 to 480mm (When no high column is specified) | | |
| Table | Working space (X-axis × Y-axis) | 630 × 330mm | 650 × 400mm | 850 × 410mm |
| | Capacity of workpiece mass | 150kg (uniform load) | 250kg (uniform load) | |
| | Working surface configration | 3T-slots, size 14mm pitch 125mm | | |
| Spindle | Speed range | 100～10,000min$^{-1}$ | | |
| | Spindle gage (Call number) | 7/24 taper No.30 (with air blow) | | |
| Feedrate | Rapid traverse rate | 54m/min (X,Y,Z) : α-T21*i*Es/T21*i*E/T21*i*EL/T14*i*Es/T14*i*E/T14*i*EL<br>48m/min (X,Y,Z) : α-T21*i*Ese/T21*i*Ee/T21*i*ELe/T14*i*Ese/T14*i*Ee/T14*i*ELe | | |
| | Feedrate | 1 to 30,000mm/min | | |
| Turret | Tool change system | Turret type | | |
| | Type of tooling | JIS B 6339-1998 BT30, MAS 403-1982 P30T-1 (45°) | | |
| | Tool storage capacity | 21tools : α-T21*i*Es/T21*i*E/T21*i*EL/T21*i*Ese/T21*i*Ee/T21*i*ELe<br>14tools : α-T14*i*Es/T14*i*E/T14*i*EL/T14*i*Ese/T14*i*Ee/T14*i*ELe | | |
| | Maximum tool diameter | 80mm | | |
| | Maximum tool length | 200mm : α-T14*i*Es/T14*i*Ese<br>190mm (Changed by specifications)<br>: α-T21*i*Es/T21*i*Ese | 250mm (Changed by specifications) | |
| | Method of tool selection | Random shortest path | | |
| | Maximum tool mass | 2kg/tool (total mass : 22kg) / 3kg/tool (total mass : 33kg) : α-T21*i*Es/T21*i*E/T21*i*EL/T21*i*Ese/T21*i*Ee/T21*i*ELe<br>2kg/tool (total mass : 15kg) / 3kg/tool (total mass : 22kg) : α-T14*i*Es/T14*i*E/T14*i*EL/T14*i*Ese/T14*i*Ee/T14*i*ELe | | |
| | Tool changing time (Cut To Cut) | 1.8 sec. (When 2kg/tool is specified) | | |
| Motors | Spindle drive motor | 5.5kW (10min rating) / 3.7kW (continuous rating) | | |
| Accuracy | Single direction positioning accuracy(*1) | 0.006/300mm : α-T21*i*Es/T21*i*E/T21*i*EL/T14*i*Es/T14*i*E/T14*i*EL<br>0.010/300mm : α-T21*i*Ese/T21*i*Ee/T21*i*ELe/T14*i*Ese/T14*i*Ee/T14*i*ELe | | |
| | Positioning repeatability (*2) | ±0.002mm | | |

**Numerical control (Standard)** (Note) ☆: α-T21*i*Es/T21*i*E/T21*i*EL/T14*i*Es/T14*i*E/T14*i*EL ※ : α-T21*i*Ese/T21*i*Ee/T21*i*ELe/T14*i*Ese/T14*i*Ee/T14*i*ELe

- Control unit FANUC Series 31*i*-A5 (☆)
- Control unit FANUC Series 31*i*-A (※)
- Basic controlled axes 3 axes (X,Y,Z)
- Simultaneously controlled axes (3 axes)
- HRV control
- Rapid traverse bell-shaped acceleration/deceleration
- Rigid tapping (M29)
- Manual handle feed
- Part program storage size (512Kbyte)
- Number of registerable programs (1000)
- Optimum torque acceleration/deceleration
- Back ground editing (Multi part program editing)
- Extended part program editing
- Quick editor
- Control unit incorporated type display unit with 10.4"color LCD(*3)
- Directory display of floppy cassette
- Reader/puncher interface
- Ethernet interface
- Coordinate system selection (G92)
- Workpiece coordinate system (G52～G59)
- Addition of workpiece coordinate system 48 pairs (G54.1)
- Return to reference point (G28)
- Helical interpolation
- Dual check safety
- Sub program call (M98(M198)/M99)
- Custom macro B (G65,G66/G67)
- Canned cycles for drilling (G73,G74,G76,G81～G89/G80)
- Coordinate system rotation (G68,G69)
- Circular interpolation by R programming
- Setup file
- MANUAL GUIDE *i* (Included Measurement Cycle)
- Dynamic graphic display
- Playback
- Retraction for rigid tapping
- Compensation of thermal displacement (XYZ axes)
- Skip function (G31)
- Multi-step skip (G31 P1～4)
- Tool compensation memory C D/H code, Tool geometry/wear
- Production control counter
- AI contour control I
- Stroke limit check before move
- Stored stroke check 1
- Stored stroke check 2 (G22/G23)
- Custom PMC

**Option** (Note) Some options applicable only to certain machine model and configurations. ☆ : α-T21*i*Es/T21*i*E/T21*i*EL/T14*i*Es/T14*i*E/T14*i*EL

- High column 100/200/300mm
- High speed spindle 24,000min$^{-1}$
- Center through coolant
- Double contact tooling (NC5-46/BBT30)
- DIN Tooling (DIN 69871-A30)
- Illumination
- Signal lamp (3 lamps)
- Tool length switch
- Automatic oil lubricating
- Centralized system of grease
- Splashguard wide opening door : 730mm (α-T21*i*E/T14*i*E/T21*i*Ee/T14*i*Ee)
- Splashguard wide opening door : 1100mm (α-T21*i*EL/T14*i*EL/T21*i*ELe/T14*i*ELe)
- Automatic front door opening/closing of splashguard
- Automatic side door of splashguard
- Side window of splashguard
- Basic top cover of splashguard
- Full-closed cover of splashguard
- Tool pot covar
- Coolant unit (Tank capacity : 100 (140)*7, 200L)
- Coolant unit with chip flush (Tank capacity : 100 (140)*7, 200L)
- Cleaning unit for tool taper shank
- Air blow for chips
- Automatic fire extinguisher
- Additional controlled 1axis (Simultaneously controlled 4 axes)
- Additional controlled 2axes (Simultaneously controlled 5 axes) (☆)
- Single direction positioning (G60)
- Cylindrical interpolation (G07.1)
- Conical/spiral interpolation
- NURBS interpolation (G06.2)
- Jerk control
- Tool center point control for 5-axis machining☆
- Tool radius compensation for 5-axis machining☆
- 1-digit F code feed
- Inverse time feed (G93)
- Part program storage size (2Mbyte)
- Number of registerable programs 4000
- Operation panel with alphabet key
- Multi-language display
- Fast data server (with ATA Flash Memory 160MB)
- Memory card
- ROBODRILL PROGRAM MANAGER2 (for personal computer)
- Fast Ethernet board
- CIMPLICITY® DRILL MONITOR *i* (for personal computer)
- AI tool monitor
- Tool position offset (G45～G48)
- Addition of workpiece coordinate system 300 pairs (G54.1)
- Scaling (G51/G50)
- Figure copy (G72.1,G72.2)
- Interruption type costom macro (M96/M97)
- Peck drilling cycle for small deep holes
- Programmable mirror image (G51.1/G50.1)
- 3-dimensional coordinate conversion (G68/G69)
- Polar coordinate command (G16/G15)
- AI contour control II
- Look-ahead blocks expansion
- Nano Smoothing
- Tool lengh automatic measurement (G37)
- High-speed skip
- Backup function for power failure
- External transfer
- Additional I/O unit
- FANUC LADDER-III (for personal computer)
- CE Mark version
- Robot standard package

**Installations**

| | | | | |
|---|---|---|---|---|
| Power source | Power supply | 200 to 220 VAC+10 to -15% 3-phase, 50/60Hz±1Hz 10kVA *4 | | |
| | Compressed air supply | 0.35 to 0.5MPa(0.5MPa is recommend)(gage pressure) 0.13m$^3$/min(at atmospheric pressure) *5 | | |
| Machine size | Machine height | 2,236±10mm (When no high column is specified) | | |
| | Floor space | 995mm×2,210mm | 1,565mm×2,040mm | 2,115mm×2,040mm |
| | Mass of machine | Approx. 1,950kg | Approx. 2,000kg | Approx. 2,100kg |

*1 and *2 are measured in compliance with JIS B6201-1987.
*3 The color LCD has been developed with high-precision technologies and thus features high visibility and image quality. Note, however, that the screen may have a few missing or constantly lit pixels.
*4 In case of center through coolant and cleaning unit for tool taper shank, additional + 1kVA is required respectively. In case of additional 1 axis, additional maximum + 1kVA is required.
In case of additional 2 axes, additional maximum + 2kVA is required. A cable with 8mm$^2$ or more should be used at primary power connection.
*5 In case of center through coolant, additional + 0.05m$^3$/min is required. In case of high speed spindle, additional + 0.03m$^3$/min is required.
In case of side automatic door, 0.4 MPa compressed air supply or more is required.
*6 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.
*7 In case of α-T21*i*Es/T14*i*Es/T21*i*Ese/T14*i*Ese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