FANUC

α*i*-B series SERVO
β*i*-B series SERVO

High Speed, High Precision and High Efficiency Nano Control Servo

FANUC AC SERVO MOTOR αi-B/βi-B seri
FANUC AC SPINDLE MOTOR αi-B/βi-B se
FANUC SERVO AMPLIFIER αi-B/βi-B ser

αi-B and βi-B series SERVO are high speed, high precision and high efficiency intelligent servo system to make machine tools high performance, compact and energy saving.

Nano

Servo motor with ultra

Super high resolution 32,000,000/rev.

Servo amplifier with current detector

High speed and high SERVO HRV Control

High Speed, High Efficiency

Spindle motor enables high speed and high acceleration

High response and high efficiency with SPINDLE HRV Control

Full Line-up

Full line-up from small to large scale models

Full line-up with both 200V and 400V input

SERVO AMPLIFIER
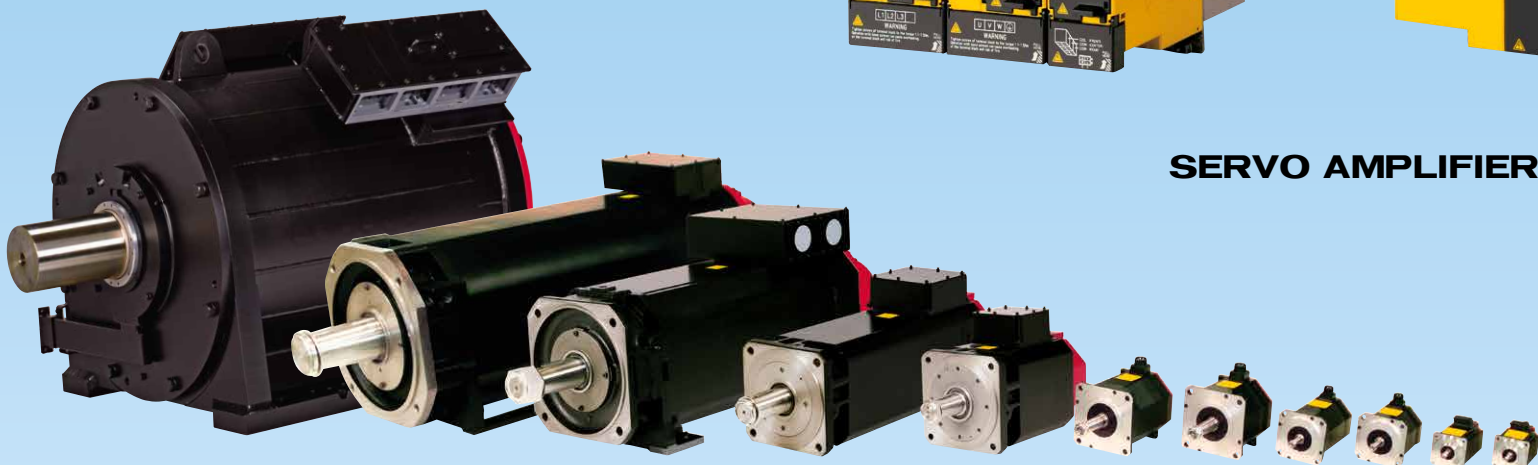
AC SERVO MOTOR αi-B/βi-B series

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rie s

ies

Control

smooth rotation

Pulsecoder with

high precision

precision with

Compact and Reduced Wiring

Servo and spindle motor with shorter length

Compact and space saving servo amplifier

Enhanced Maintainbability

Trouble prediction function enabling preventive maintenance

Simple maintenance structure and various diagnostic functions for quick recovery

α*i*-B/β*i*-B series

AC SPINDLE MOTOR α*i*-B/β*i*-B series

Compact, Reduced Wiring and Easy Maintenance

FANUC SERVO AMPLIFIER
α*i*-B series/β*i*-B series

FANUC AC SERVO MOTOR
α*i*-B series/β*i*-B series
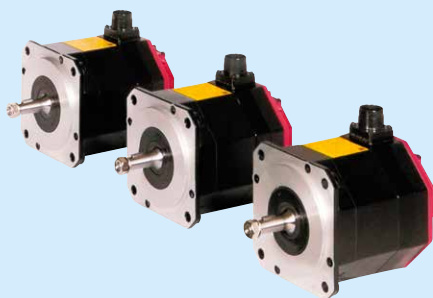
FANUC AC SPINDLE MOTOR
α*i*-B series/β*i*-B series
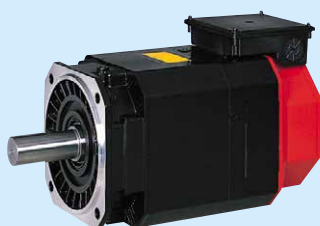
FANUC LINEAR MOTOR
L*i*S-B series

FANUC DD MOTOR
D*i*S-B series

FANUC
BUILT-IN SPINDLE MOTOR
B*i*I-B series/B*i*S-B series

4

Servo Motor
for feed axis of machine tools and industrial machines

FANUC AC SERVO MOTOR
αiS-B series / αiF-B series

High performance AC SERVO MOTOR

・Machining Performance

Excellent torque characteristics achieves quick acceleration to high-speed range and make it possible to reduce the cycle time. 32,000,000/rev. or 4,000,000/rev. Pulsecoder and the special magnetic pole shape, which minimizes cogging torque, and the latest SERVO HRV$^+$ Control achieve extremely smooth motor rotation and enable high-precision and high-quality machining.

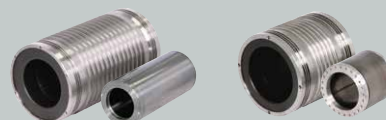Motor line-up with large torque up to 18,000Nm and large output up to 500kW and the technologies to drive a motor by multiple standard amplifiers and to drive an axis by multiple motors are suitable for large machine tools and large industrial machines such as electric press machines and injection molding machines.

・Minimizing Downtime

Unique seal structure provides excellent waterproofness.

Waterproof grade IP67 is available as option.

・Ease of Use

Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

Battery-less Pulsecoder that does not require a backup battery can be selected.

One-touch connector enables easy connecting and disconnecting of cables.

Backlash reduction brake is available as option.

FANUC AC SERVO MOTOR
βiS-B series / βiF-B series

Enough performance and value AC SERVO MOTOR

・Machining Performance

1,000,000/rev. Pulsecoder and the special magnetic pole shape, which minimizes cogging torque, and the latest SERVO HRV$^+$ Control achieve extremely smooth motor rotation and enable high-precision and high-quality machining.

・Minimizing Downtime

Unique seal structure provides excellent waterproofness.

Waterproof grade IP67 is available as option.

・Ease of Use

Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

Battery-less Pulsecoder that does not require a backup battery can be selected.

One-touch connector enables easy connecting and disconnecting of cables.

Backlash reduction brake is available as option.

Spindle Motor
for spindles of machine tools

High performance AC SPINDLE MOTOR

· Machining Performance

Optimum winding design and effective cooling structure enables quick acceleration up to high speed range.

The enhanced short-time rated output and torque enable higher performance of short-time heavy cutting and shorter acc/dcc time. S6 short-time rated output equal to S3 are available thanks to our unique spindle control.

As for the hollow-shaft model for center through coolant, air-cooled α*i*It-B series and liquid-cooled α*i*IL-B series are available.

Motor line-up with large output up to 200kW and large torque up to 2000Nm are suitable for large machine tools. The technologies to drive a motor by multiple standard amplifiers and to drive an axis by multiple motors extend further high-power applications.

For quick and frequent acc/dec, synchronous spindle motors are available. Also, spindle motors for lathe with increased allowable radial load are available.

· Minimizing Downtime

Models with oil-seal provide excellent waterproofness.

· Ease of Use

Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

Lower vibration of the spindle is possible by adjusting blance at rear end of the motor after the motor is coupled to the spindle.

FANUC AC SPINDLE MOTOR
β*i*I-B series/β*i*Ip-B series/β*i*It-B series

Enough performance and value AC SPINDLE MOTOR

· Machining Performance

Optimum winding design and effective cooling structure enables high power and large torque with compact size.

The enhanced short-time rated output and torque enable higher performance of short-time heavy cutting and shorter acc/dcc time. S6 short-time rated output equal to S3 are available thanks to our unique spindle control.

As for the hollow-shaft model for center through coolant, air-cooled β*i*It-B series is available. Thanks to high mechanical accuracy and low vibration, it is suitable for direct connection to the spindle.

· Minimizing Downtime

Models with oil-seal provide excellent waterproofness.

· Ease of Use

Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

Lower vibration of the spindle is possible by adjusting blance at rear end of the motor after the motor is coupled to the spindle.

Servo Amplifier
Amplifier to Drive Servo Motor and Spindle Motor

FANUC SERVO AMPLIFIER αiSV-B series/αiSP-B series/αiPS-B series

Highly functional SERVO AMPLIFIER with wide variety lineup from small to large capacity

· Machining Performance
Shorter cycle time and high-precision and high-quality machining can be achieved thanks to high-power and high-precision current control.

· Minimizing Downtime
Insulation deterioration of motors under harsh coolant environments can be detected for preventive maintenance.
Fan motor can be easily replaced from the front side.
Troubleshooting functions make it easier to identify the defective part.

· Ease of Use
Wide lineup of amplifiers from small to large capacity matches various machines.
External magnetic contactor for cutting power can be reduced by using the Safe Torque Off (STO) function.
The latest low-loss power devices contribute to further energy saving.
Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

FANUC SERVO AMPLIFIER βiSVSP-B series

Cost-effective all-in-one SERVO AMPLIFIER

· Machining Performance
Shorter cycle time and high-precision and high-quality machining can be achieved thanks to high-power and high-precision current control.

· Minimizing Downtime
Fan motor can be easily replaced from the front side.
Troubleshooting functions make it easier to identify the defective part.

· Ease of Use
Simple wiring is achieved thanks to the integrated all-in-one structure.
External magnetic contactor for cutting power can be reduced by using the STO function.
The latest low-loss power devices contribute to further energy saving.
Both models for 200V and 400V input are available. Flexible selection is possible depending on the power supply voltage where the machines are delivered.

Power Failure Backup Module MODEL B

Machine Protection at Power Failure
Damage of machines and workpieces at power failure is prevented where a power supply is unstable or in lightning-prone areas.

· Gravity-axis drop prevention
The holding brake of gravity axis can be quickly activated by detecting power failure in the circuit incorporated into the amplifier.

· Stop distance reduction [1]
Feed axes can be quickly stopped in order to prevent them from crashing in high-speed machine tools.

· Retraction [2]
The tool can be retracted from the workpiece while keeping synchronization in gear cutting machines and others.

| PFB-24 | PFB-R | PFB-C + Capacitor Module |

Power Failure Backup Module MODEL B
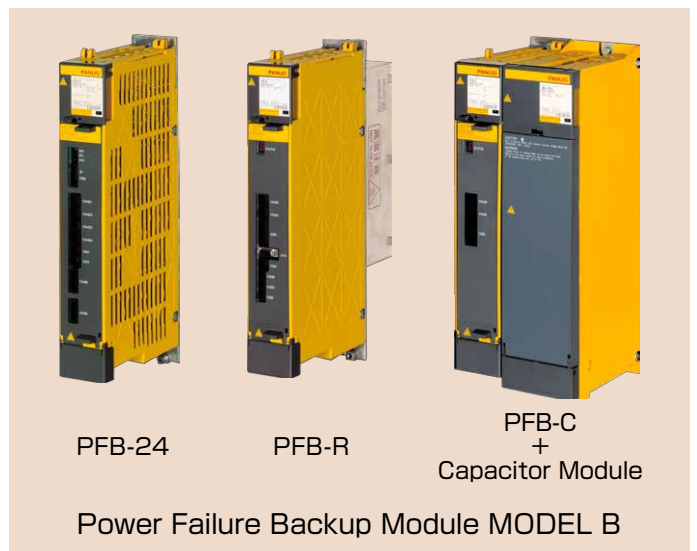
[1], [2] "Power Failure Backup Module (Hardware)" or "Power Failure Backup Function (Software)" shall be applied.

Machining Performance

Smart Servo Control

Optimizing control in real time

Smart Servo Control is a group of functions to optimize control in real time according to the change of machine conditions such as load, temperature and position. High-speed, high-precision and high-quality machining can be achieved by using these functions.

Smart Spindle-load Control
Feed rate
Overheat level
Load
Temperature
Time

Smart Rigid Tapping

Smart Thermal Control
Temperature
OH alarm temperature
OFF
ON
Time

Smart Feed-axis Acc/Dec
Servo
Large inertia
Small inertia
Speed
Torque
Time constant
Time constant

Spindle

Smart Spindle Acc/Dec

Smart Load Meter
0   223   189%
DURATION TIME 9 s

Smart Overlap
Overlap
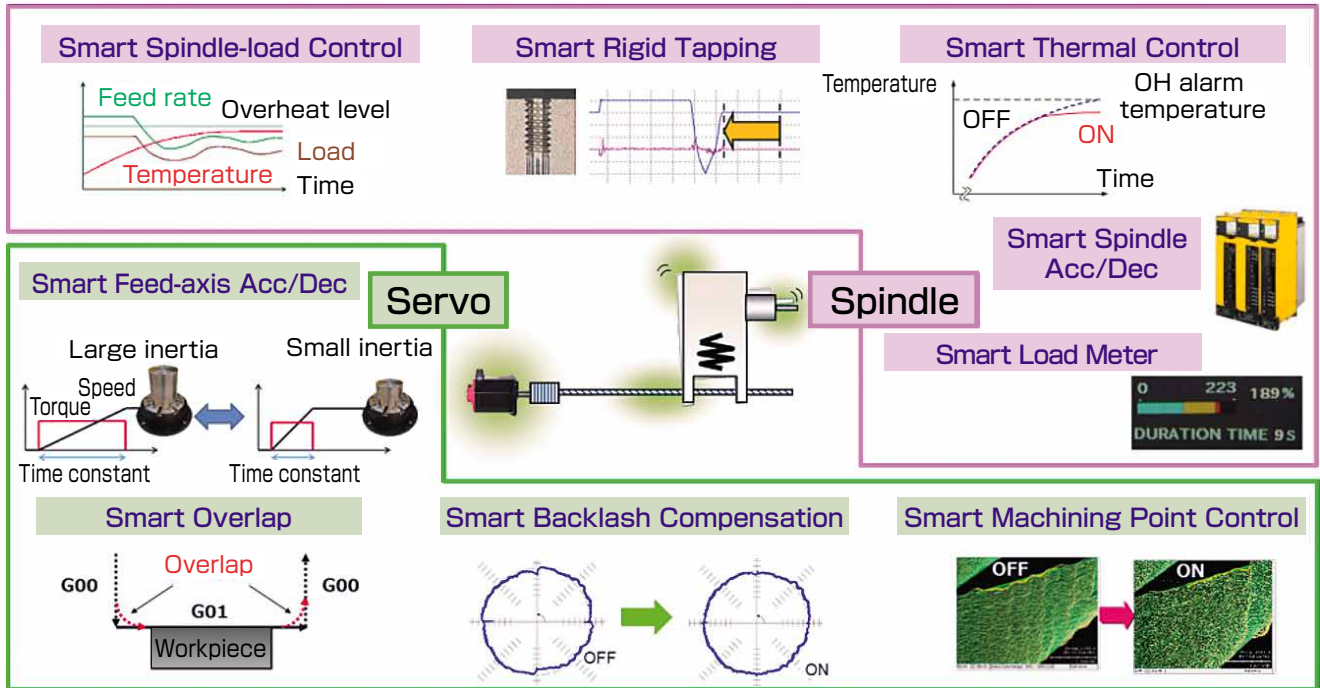G00
G01
G00
Workpiece

Smart Backlash Compensation
OFF
ON

Smart Machining Point Control
OFF
ON

SERVO HRV Control

High-speed and high-precision servo control

High-speed and high-precision machining at nanometer level can be achieved thanks to combination of the hardware technology such as the smoothly rotating motor, the highly accurate current detection and the high-responce and high-resolution Pulsecoder and the software technology such as the latest SERVO HRV+ Control.
The automatic-following HRV filter can suppress mechanical resonance even when its frequency changes.

+2.0um
−2.0um
2μm/div
R26mm
F2m/min
Circularity
1μm

1μm/div
Feed smoothness 0.2μm
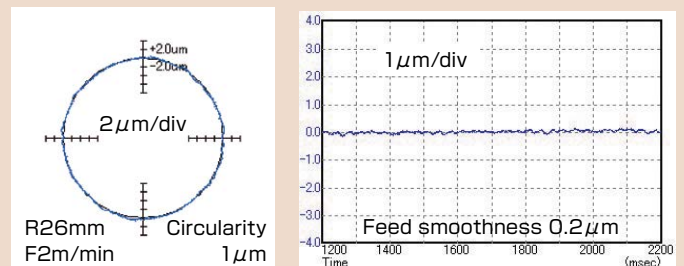
Application example of SERVO HRV+

SPINDLE HRV Control

High response and high efficiency spindle control

- High-speed current control achieves the high-gain control and the low heat generation of motors at high-speed rotation.
- Optimum Orientation function enables the optimum deceleration according to the inertia of workpieces or tools, and cycle time can be reduced.
- Nano Interpolation in position control enables Nano CNC system for spindle axis as well as feed axis.

Optimum deceleration according to inertia
3000min⁻¹
Spindle speed
1180ms
0min⁻¹

540ms
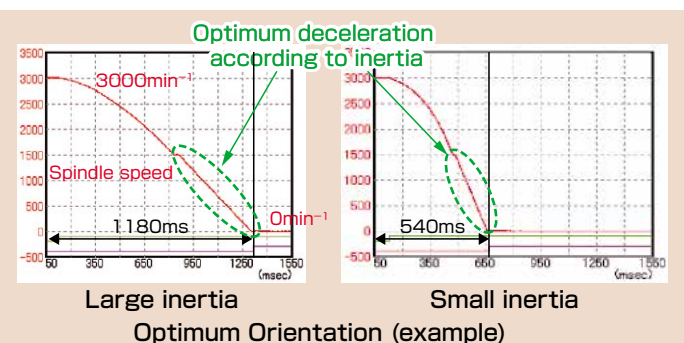
Large inertia
Small inertia
Optimum Orientation (example)

Servo Learning Oscillation

Prevent trouble caused by entangled chips in turning

Servo Learning Oscillation is a function to shred chips by oscillating tool in the feed direction. This function achieves sure chip shredding with accurate following even high frequency oscillations by applying our own Servo Learning Control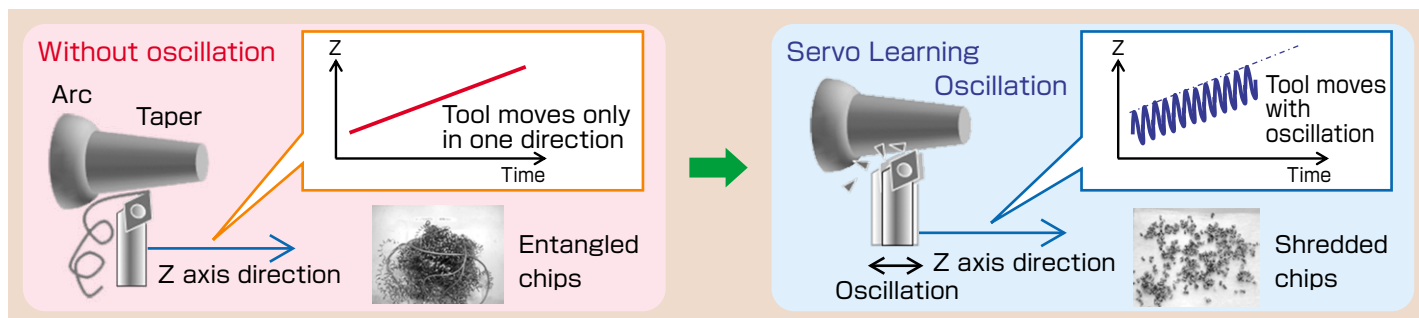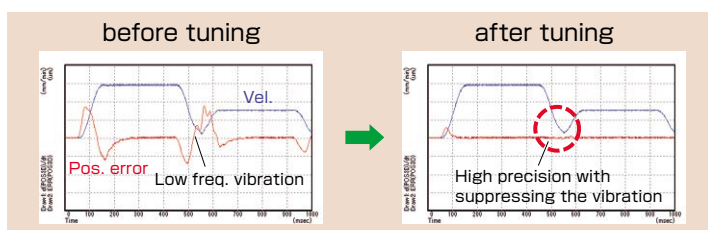. As the result this function contributes to the unattended operation in lathe and makes chips disposal easier with the significant reduction of chip volume.

Without oscillation
Arc
Taper
Z
Tool moves only in one direction
Time
Z axis direction
Entangled chips

Servo Learning Oscillation
Z
Tool moves with oscillation
Time
Oscillation
Z axis direction
Shredded chips

AI Servo Tuning

AI Feedforward achieves high response of servo control and suppresses low frequency vibration

AI Feedforward is the high-dimensional feedforward control which can describe the machine characteristics precisely. Application of machine learning to the parameter decision process leads to the advanced feedforward control easily. This function suppresses the low frequency vibration during acc/dec and contributes to the fine surface machining.
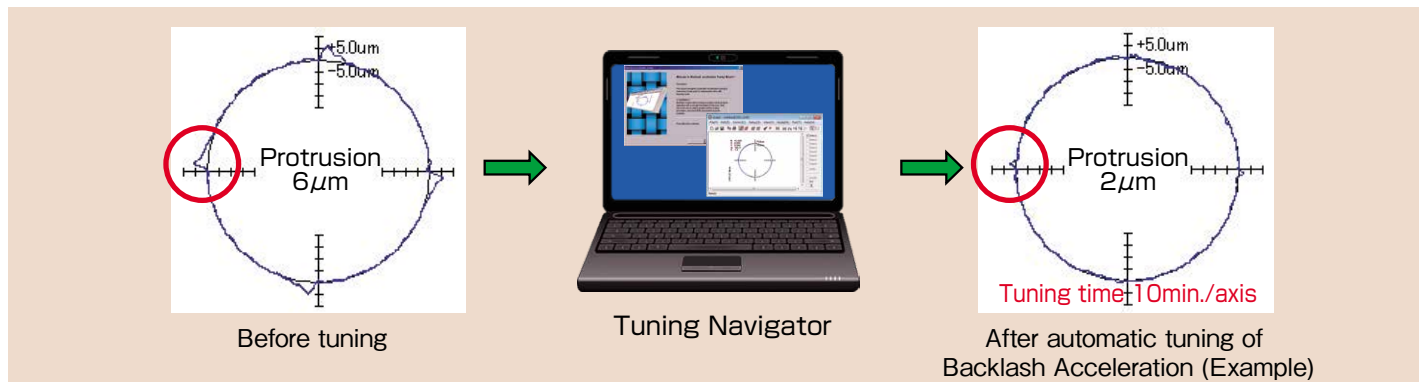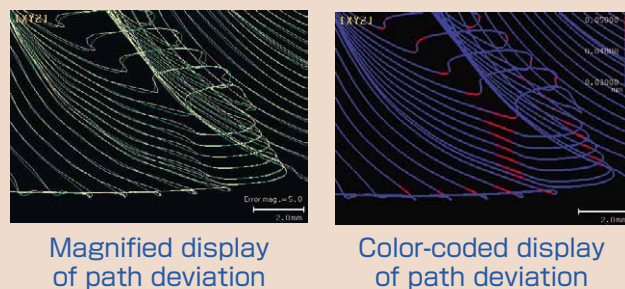

before tuning
Vel.
Pos. error   Low freq. vibration

after tuning
High precision with suppressing the vibration

Ease of Use

Servo Tuning Tool FANUC SERVO GUIDE

Integrated tuning tool for Servo and Spindle

SERVO GUIDE supports servo and spindle tuning process in an integrated manner, including test program preparation, parameter setting and data measurement. It can be used easily by connecting a PC to a CNC directly. The 3-D View Function displays the tool path in 5-axis machining. This function supports the magnified display and the color-coded display of tool path deviation and supports efficient parameter tuning.

Tuning Navigator offers automatic process for tuning gain, filter and others and make it possible to perform the advanced servo tuning in a short time. The automatic tuning function for the quadrant protrusion compensation significantly shortens the time of tuining for high speed and high precision.

3-D View Function (Example)

Magnified display of path deviation

Color-coded display of path deviation

+5.0um
−5.0um
Protrusion 6μm
Before tuning

Tuning Navigator

+5.0um
−5.0um
Protrusion 2μm
Tuning time 10min./axis
After automatic tuning of Backlash Acceleration (Example)

Minimizing Downtime

Reliable

Molded Fan Motor

High durability against coolant

Molded fan motors were adopted, in which the coils and printed circuit board are molded with resin.
Molded fan motor has high durability against coolant, and prevents the failure of fan motor by itself due to coolant.

Rechargeable Battery Unit

Prevention of data loss

Rechargeable Battery Unit eliminates the need for battery replacement in both Pulsecoder and CNC and prevents the loss of parameter or reference point data.

Maintenance cost saving

Eliminating battery replacement will reduce maintenance costs.

Environmentally-friendly

Used battery disposal is not necessary.

Predictable

Trouble Prediction Function

Enable preventive maintenance

By detecting the abnormal sign of the motor, amplifier, fan motor, unexpected machine stop is prevented and preventive maintenance becomes availabel.

Leakage Detection Function

Leakage detection function measures the insulation resistance of the motor, and detects insulation deterioration.

Capacitor Check Function

Capacitor check function measures the capacitance for main circuit in servo amplifier, and detects the drop of capacitance.

Fan motor speed detection function

Fan motor speed detection function measures the speed of the fan motor in servo amplifier, and detects the drop of fan motor speed.

Brake check function

The brake check function measures the brake condition and detects a failure of the brake.

Drop of Fan motor speed

Insulation deterioration

·Insulation resistance
·Fan motor speed
·Capacitance

Drop of capacitance

Brake condition
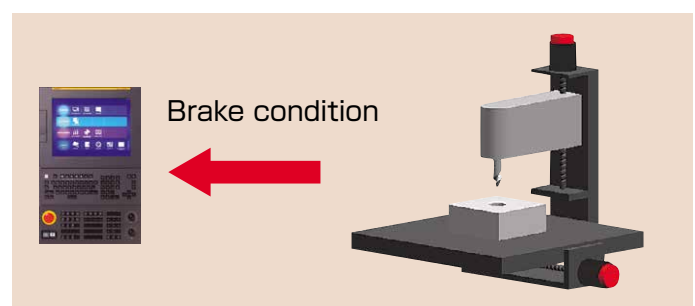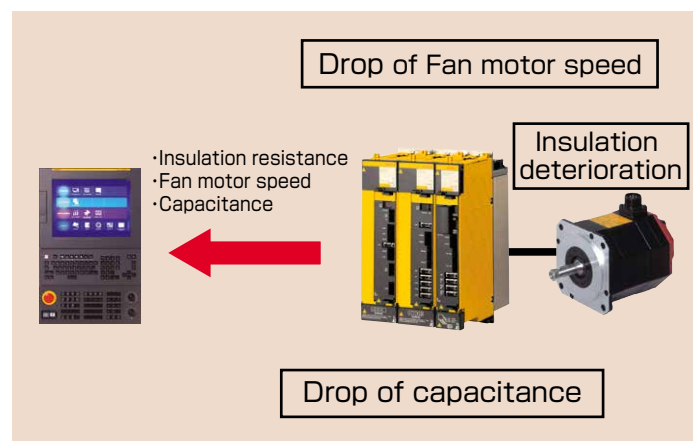
Easy to repair

Quick Replacement of Fan motor

Reducing maintenance time

Fan motor can be easily replaced from the front side without removing amplifiers from control cabinet.
Maintenance time of fan motors can be reduced significantly.

Internal cooling fan

Radiator cooling fan

Radiator cooling fan
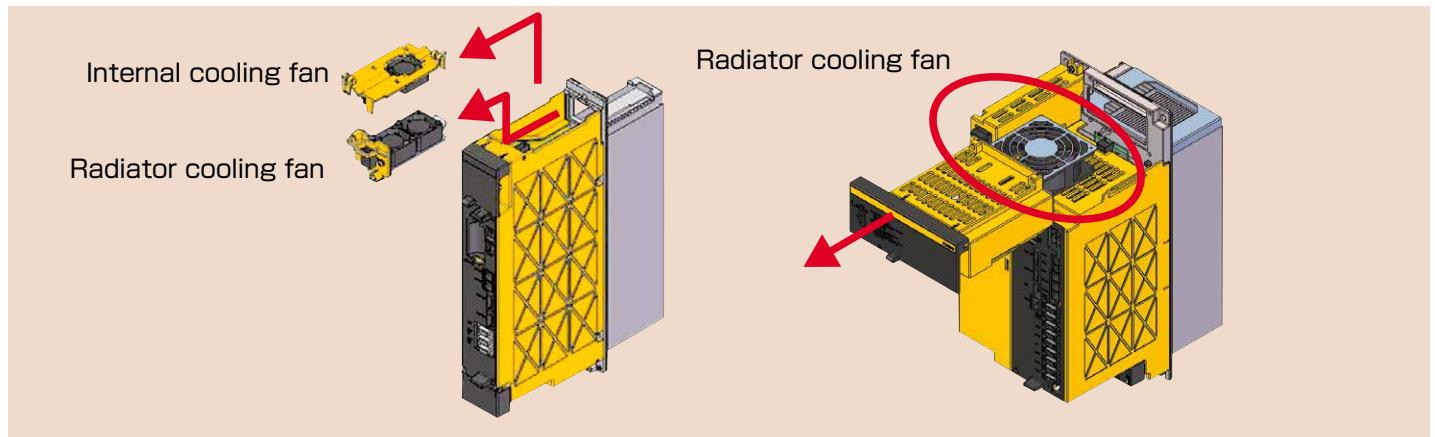
One-touch connector

The power and signal connector of the servomotor can be installed and removed with one touch. It reduces work time during motor maintenance and contributes to improvement of reliability during replacement work.
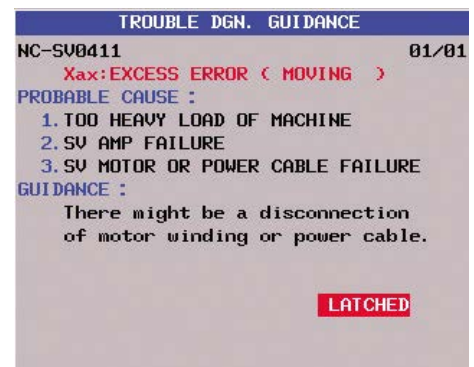

Trouble Diagnosis Function

Quick identify cause of alarms

The trouble diagnosis function is prepared in combination with the Series 30*i*-MODEL B CNC and the Series 0*i*-MODEL F CNC.
The diagnostic information which is useful for trouble shooting at the time of alarm occurrence can be seen on a CNC screen.

The features of Trouble Diagnosis Function are as follows:
· "Trouble diagnosis guidance" screen for figuring out alarm causes according to the trouble diagnosis flow
· "Trouble diagnosis monitor" screen for monitoring the status of servo and spindle amplifier during normal operation and enabling data latch at alarm occurrence
· "Trouble diagnosis graphic" screen for display waveforms observed at the occurrence of the servo or spindle alarm.


```
          TROUBLE DGN. GUIDANCE
NC-SV0411                        01/01
   Xax:EXCESS ERROR ( MOVING  )
PROBABLE CAUSE :
  1.TOO HEAVY LOAD OF MACHINE
  2.SV AMP FAILURE
  3.SV MOTOR OR POWER CABLE FAILURE
GUIDANCE :
   There might be a disconnection
   of motor winding or power cable.


                              LATCHED
```

Encoder Communication Check Circuit

Quick identification of defective part

As there are three possible sources at communication alarm of the encoder, which include encoder, feedback cable and servo amplifier, it can take a longer time to identify the source, thereby extending down time. The Encoder Communication Check Circuit outputs compatible signals of the encoder in order to identify the source of the defect quickly.

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 260 service locations supporting more than 100 countries and regions throughout the world.

Maximizing Uptime

Global Service

Lifetime Maintenance

FANUC ACADEMY

FANUC ACADEMY operates versatile training courses to develop skilled engineers effectively in several days.

Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
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Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
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Иркутск (395)279-98-46
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Кемерово (3842)65-04-62
Киров (8332)68-02-04
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Кострома (4942)77-07-48
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Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35

Тольятти (8482)63-91-07
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