3.4 SPINDLE AMPLIFIER MODULE

This section uses the following format for describing parameter numbers:

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6582	3082	4082	Setting of acceleration/deceleration time

The items of FS15*i* cover FS15. For a parameter number of FS15 different from FS15*i*, the item is described separately.
FS18*i*, 20*i*, 21*i*, PM*i*-D, 18, 20, and 21 are covered by the items of FS16*i*/16.

3.4.1 α Series and α (HV) Series Spindle Amplifier Module

If an alarm occurs in the spindle amplifier module, the ALM LED lights red in the STATUS display, and the two-digit 7-segment LEDs indicate the alarm code.

3.4.1.1 Alarm codes A, A0 to A4, and other Ax (x for representing an arbitrary number)

A, A0 : The SPM control program is not operating.
A1, A2, Ax : An error was detected in SPM control program processing.
A3 : An error was detected in the clock of the SPM control printed circuit board.
A4 : A parity error was detected in the SRAM on the SPM control printed circuit board.

(1) If an alarm is issued when the power to the PSM is turned on
  (a) The ROM is not installed correctly, no ROM is installed, or the ROM specification is incorrect
  If the ROM on the SPM control printed circuit board is once replaced, check the following:
  <1> Installation direction
  <2> Occurrence of a bent lead and so forth
  <3> Matching of the ROM series with the unit. Check Subsection 2.2.3 of Part I.
  (b) Printed circuit board failure
  Replace the SPM or SPM control printed circuit board.

(2) If an alarm is issued during motor activation
  (a) Influence of noise
  Referring to Chapter 5, "Installation," of "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the GND-related wiring. If the signal cable of the spindle sensor is bundled with the power line of the servo motor, separate them from each other.

3.4.1.2 Alarm code 01

The inside temperature of the motor is higher than the specified temperature.

(1) If this alarm is issued during cutting (the motor temperature is high)
  (a) Check the cooling state of the motor.
    <1> If the cooling fan of the spindle motor is stopped, check the power supply of the cooling fan. If the cooling fan is still inoperative, replace it with a new one.
    <2> When a liquid-cooled motor is used, check the cooling system.
    <3> When the ambient temperature of the spindle motor is higher than the specified temperature, lower the ambient temperature to satisfy the specification.
  (b) If this alarm is issued even when the load meter fluctuates in a limited range, check the short-period rating. If the specified value is exceeded, reduce the load.

(2) If this alarm is issued under a light load (the motor temperature is high)
  (a) When the frequency of acceleration/deceleration is too high
  Set such a use condition that the average including output at acceleration/deceleration does not exceed the continuous rating.
  (b) The parameters specific to the motor are not set correctly.
  Refer to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)."

(3) If this alarm is issued when the motor temperature is low
  (a) The spindle sensor feedback cable is faulty.
  Replace the cable.
  (b) The SPM control printed circuit board is faulty.
  Replace the SPM control printed circuit board or SPM.
  (c) The motor (internal thermostat) is faulty.
  Replace the motor.

3.4.1.3 Alarm code 02

The actual motor speed is largely deviated from the commanded speed.

(1) If this alarm is issued during motor acceleration

(a) The parameter setting of acceleration/deceleration time is incorrect.
In the following parameter, set the value equivalent to the spindle inertia plus some margin:

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6582	3082	4082	Setting of acceleration/deceleration time

(b) The parameter for the speed detector is not set correctly.
Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," set a correct value.

(2) If this alarm is issued during cutting

(a) The cutting load has exceeded the motor output power.
Check the load meter indication, and review the use condition.

(b) The parameters for output restriction are not set correctly.
Check that the settings of the following parameters satisfy the machine and motor specifications:

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6528	3028	4028	Output restriction pattern setting
6529	3029	4029	Output restriction value

(c) The parameters specific to the motor are not correctly.
Refer to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)."

3.4.1.4 Alarm code 03

The fuse of the DC link has blown. (The voltage at the DC link is insufficient.) This alarm is checked when emergency stop is cancelled.

(1) If this alarm is issued during spindle operation (rotation)
The fuse of the DC link inside the SPM has probably blown. So, replace the SPM. This alarm may be caused by the following:
<1> Power line short-circuited to ground
<2> Motor winding short-circuited to ground
<3> IGBT or IPM module failure

(2) If the PSM input magnetic contactor is once turned on and is turned off with this alarm when emergency stop is cancelled or the CNC is started (When two spindles are connected, the magnetic contactor may not be turned off.)
(a) The DC link wire is not connected.
Check the DC link (TB1) wiring for errors.
(b) A cable is faulty.
Pin 9 of the interface cable (JX1B-JX1A) between the PSM and SPM may be short-circuited to 0V. Replace the cable.
(c) The fuse of the DC link inside the SPM has blown.
Replace the SPM.

3.4.1.5 Alarm code 04

It is detected that the 3-phase input to the main circuit of the PSM has an open phase.

(1) If the PSM indicates alarm code 6
Troubleshoot according to the description of alarm code 6 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.1.6 Alarm code 07

The motor rotates at a speed exceeding 115% (standard setting) of the maximum allowable speed.

(1) If this alarm is issued during spindle synchronization
If the activation (SFR, SRV) of the motor on one side is turned off then back on in the spindle synchronization mode, the spindle motor is accelerated to correct a position error built up during the period, thus causing this alarm. Modify the ladder so that SFR and SRV are not turned off in the spindle synchronization mode.

(2) If this alarm is issued while the motor is stopped
(a) The connection cable of the spindle sensor is faulty.
Check if the cable of the spindle sensor built into the motor (BZ sensor when a built-in motor is used) is disconnected, and replace the cable as required.
(b) The spindle sensor built into the motor is not adjusted correctly.
Adjust the sensor according to Subsection 4.3.4 of Part I.

3.4.1.7 Alarm code 09

The temperature of the heat sink of the SPM main circuit has risen to the set value. This alarm is issued for SPM-15 and up or SPM-15HV and later. With SPM-2.2 to SPM-11 and SPM-11HV, however, alarm code 12 is issued for the same cause.

(1) If this alarm is issued during cutting (the heat sink temperature is high)
(a) If this alarm is issued when the load meter reads a value below the continuous rating of the amplifier, check the cooling state of the heat sink.
<1> If the cooling fan is stopped, check the power supply (connector CX1A/B). If the cooling fan is still inoperative, replace the SPM with a new one.
<2> When the ambient temperature is higher than the specified temperature, lower the ambient temperature to satisfy the specification.
(b) When this alarm is issued because the load meter reads a value above the continuous rating of the amplifier, improve the use method.

(c) When the heat sink on the back of the amplifier is too dirty, clean the heat sink, for example, by blowing air. Consider the use of a structure that prevents the heat sink from being directly exposed to coolant.

(2) If this alarm is issued under a light load (the heat sink temperature is high)
   (a) When the frequency of acceleration/deceleration is too high
   Set such a use condition that the average including output at acceleration/deceleration does not exceed the continuous rating.
   (b) The parameters specific to the motor are not set correctly.
   Refer to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)."

(3) If this alarm is issued when the heat sink temperature is low
Replace the SPM.

3.4.1.8 Alarm code 11

The PSM detected that the DC link voltage was excessively high.

(1) If the PSM indicates alarm code 7
Troubleshoot according to the description of alarm code 7 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
   (a) A cable is faulty.
   The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
   (b) The SPM is faulty.
   Replace the SPM or SPM control printed circuit board.

3.4.1.9 Alarm code 12

An excessively large current flowed into the DC link of the main circuit.

With SPM-2.2 to SPM-11 and SPM-11HV, this alarm indicates that the power module (IPM) of the main circuit detected an error such as an excessive load, overcurrent, or low control supply voltage.

(1) If this alarm is issued on SPM-2.2 to SPM-11 and SPM-11HV
Check alarm code 09 as well.

(2) If this alarm is issued immediately after a spindle rotation command is specified
   (a) The motor power line is faulty.
   Check for a short circuit between motor power lines and short-circuit to ground, and replace the power line as required.
   (b) The motor winding has an insulation failure.
   If the motor is short-circuited to ground, replace the motor.
   (c) The parameters specific to the motor are not set correctly.
   Refer to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)."
   (d) The SPM is faulty.
   A power element (IGBT, IPM) may be destroyed. Replace the SPM.

(3) If this alarm is issued during spindle rotation
   (a) A power element is destroyed.
   A power element (IGBT, IPM) may be destroyed. Replace the SPM.
   If the amplifier setting condition is not satisfied, or cooling is insufficient because the heat sink is dirty, the power elements may be destroyed.
   When the heat sink on the back of the amplifier is too dirty, clean the heat sink, for example, by blowing air. Consider the use of a structure that prevents the heat sink from being directly exposed to coolant.
   For the setting condition, refer to "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)."
   (b) The parameters specific to the motor are not set correctly.
   Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameters specific to the motor.
   (c) Speed sensor signal error
   Check the spindle sensor signal waveform according to Subsection 4.3.4 of Part I. If an error is found, make an adjustment or replace the detector as required.

3.4.1.10 Alarm code 13

The memory inside the CPU is faulty. A check is made when the power is turned on.

If this alarm is issued, replace the SPM or SPM control printed circuit board.

3.4.1.11 Alarm code 15

In output switching control or spindle switching control, the switching operation sequence was not executed correctly.
This alarm is issued if one second or more elapses from the transition of a switch request signal (SPSL or RSL) until a power line state check signal (MCFN, MFNHG, RCH, or RCHHG) makes a transition.

Troubleshooting when this alarm is issued

(a) The magnetic contactor (switch unit) for power line switching is faulty.
If the contact is inoperative, check the power supply of the magnetic contactor. If the magnetic contactor is still inoperative, replace the magnetic contactor.

(b) The I/O unit or wiring for checking the contact of the magnetic contactor is faulty.
If a defect is found in the I/O unit or wiring, replace the I/O unit or wiring.

(c) The sequence (ladder) is incorrect.
Modify the sequence so that switching is completed within 1 second. For details of the signals, refer to Chapter 10, "Interface Signals," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)."

3.4.1.12 Alarm code 16

The memory (RAM) is faulty. A check is made when the power is turned on.

If this alarm is issued, replace the SPM or SPM control printed circuit board.

3.4.1.13 Alarm codes 19 and 20

The offset voltage of the phase U (alarm code 19) or phase V (alarm code 20) current detection circuit is excessively high. A check is made when the power is turned on.

If this alarm is issued, replace the SPM. If this alarm is issued immediately after the SPM control printed circuit board is replaced, check the plugging of the connectors (CN1, CN3, and CN4) between the power unit and SPM control printed circuit board.

3.4.1.14 Alarm code 24

The power to the CNC is turned off. (This symptom does not represent an error.) Serial communication data transferred between the CNC and spindle amplifier module contains an error.

Troubleshooting when this alarm is issued

(a) Noise occurring between the CNC and spindle amplifier module (connected via an electric cable) caused an error in communication data.
Check the condition for maximum wiring length.
Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the condition of electric cable connection.

(b) Noise exercises an influence because a communication cable is bundled with the power line.
If a communication cable is bundled with the power line for the motor, separate them from each other.

(c) A cable is faulty.
Replace the cable.
If an optical I/O link adapter is used, the optical link adapter or optical cable may be faulty.

(d) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

(e) The CNC is faulty.
Replace the board or module related to the serial spindle.

3.4.1.15 Alarm code 25

Serial communication between the CNC and spindle amplifier module stopped.

Troubleshoot as in the case of alarm code 24.

3.4.1.16 Alarm code 26

The sensor signal (for speed control) for Cs contour control has an error.

<1> When a high-resolution magnetic pulse coder is used with SPM TYPE2 (using both of the JY2 and JY5 connectors), the amplitude of the sensor signal on the high-resolution side (1000 λ) of the high-resolution magnetic pulse coder built into the motor on the JY2 side is excessively small.

<2> When a built-in motor is used with SPM TYPE2 (using only the JY5 connector), the amplitude of the sensor signal on the high-resolution side (1000 to 3000 λ) of the high-resolution magnetic pulse coder is excessively small.

<3> When SPM TYPE4 is used, the amplitude of the spindle sensor (MZ sensor) built into the motor connected to JY2 is excessively small.

(1) If this alarm is issued when the motor is deactivated

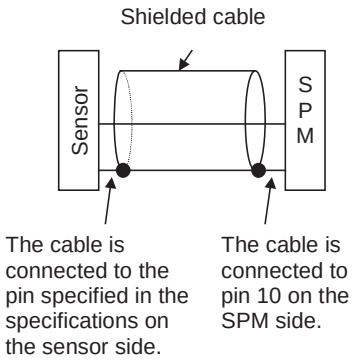
(a) The setting of a parameter is incorrect.
Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.

(b) The sensor is not adjusted correctly, or the cable is disconnected.
Adjust the sensor signal according to Subsection 4.3.4 of Part I of this manual. If the signal is not observed, replace the cable and sensor.

(c) The printed circuit board is faulty.
Replace the SPM or SPM control printed circuit board.

(2) If this alarm is issued when the cable is moved (as in the case where the spindle moves)

(a) The connector has a bad contact, or the cable is disconnected.
The conductor may be broken. Replace the cable. If coolant has penetrated into the connector, clean the connector.



(3) If this alarm is issued when the motor rotates

(a) The shielding of the cable between the preamplifier or MZ sensor (for TYPE4) and the SPM is faulty.
Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the shielding of the cable.

(b) The signal cable is bundled with the servo motor power line.
If the cable between the preamplifier or MZ sensor (for TYPE4) and the SPM is bundled with the servo motor power line, separate them from each other.

(c) Improve the cable routing between the motor and preamplifier.
If the cables (including those within a terminal box) extending from the motor to the preamplifier are close to the power line, separate the cables from the power line.

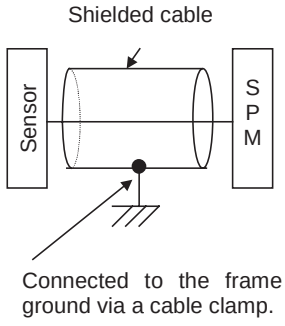
3.4.1.17 Alarm code 27

The sensor signal (position coder signal) for position control is abnormal.

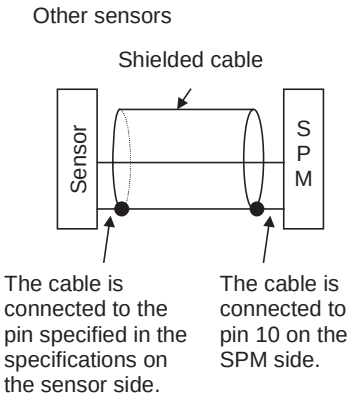
<1> The signal of the α position coder is disconnected (for all types).
<2> When an MZ or BZ sensor is used with SPM TYPE1 (using the JY2 connector), the amplitude of the sensor signal is excessively small.
<3> When a separate built-in sensor is used with SPM TYPE2 (using the JY2 and JY5 connectors), the amplitude of the spindle sensor signal on the JY2 side is excessively small.
<4> When a high-resolution magnetic pulse coder is used with SPM TYPE2 (using the JY2 and JY5 connectors), the amplitude of the sensor signal on the low-resolution side (128 to 384 λ) on the JY5 side is excessively small.
<5> When SPM TYPE4 is used, the amplitude of the spindle sensor signal connected to JY5 is excessively small.

(1) If this alarm is issued when the motor is deactivated
  (a) The setting of a parameter is incorrect.
  Referring to Chapter 2 of "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
  (b) The cable connected to JY4 is disconnected. (α position coder)
  When the α position coder is used, adjustment is impossible. Replace the cable.
  (c) The sensor is not adjusted correctly.
  Adjust the sensor signal according to Subsection 4.3.4 of Part I of this manual. If the sensor signal cannot be adjusted correctly, or the sensor signal is not observed, replace the connection cable and sensor.
  (d) The SPM is faulty.
  Replace the SPM or SPM control printed circuit board.

α position coder



(2) If this alarm is issued when the cable is moved (as in the case where the spindle moves)
  (a) The connector has a bad contact, or the cable is disconnected.
  The conductor may be broken. Replace the cable. If coolant has penetrated into the connector, clean the connector.



(3) If this alarm is issued when the motor rotates
   (a) The shielding of the cable between the sensor and the SPM is faulty.
   Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the shielding of the cable.
   (b) The signal cable is bundled with the servo motor power line. If the cable between the sensor and the SPM is bundled with the servo motor power line, separate them from each other.

3.4.1.18 Alarm code 28

The sensor signal (for position control) for Cs contour control is abnormal.

<1> When a high-resolution magnetic pulse coder is used with SPM TYPE2 (using both of the JY2 and JY5 connectors), the amplitude of the sensor signal on the high-resolution side (1000 to 3000 λ) of the high-resolution magnetic pulse coder on the JY5 side is excessively small.

<2> When SPM TYPE4 is used, the amplitude of the spindle sensor (MZ sensor) built into the motor connected to JY5 is excessively small.

Troubleshoot as in the case of alarm code 26.

3.4.1.19 Alarm code 29

An excessive load (standard setting: load meter reading of 9 V) has been applied continuously for a certain period (standard setting: 30 seconds).

(1) If this alarm is issued during cutting
Check the load meter, and review the cutting condition.

(2) If this alarm is issued during a stop
  (a) The spindle is locked.
  Check the sequence to see if the spindle is locked when a command for very slow movement is specified or orientation is specified for the spindle.

(3) If the spindle does not rotate as specified (the spindle rotates at a very low speed) and this alarm is issued
  (a) The setting of a parameter is incorrect.
  Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
  (b) The phase sequence of the motor power line is incorrect.
  (c) The feedback cable of the motor has a problem.
  Check if the phase A/B signals are connected correctly.
  (d) The feedback cable of the motor is faulty.
  Rotate the motor manually to see if a speed is indicated in the item of motor speed on the CNC diagnosis screen or on the spindle check board. If no speed indication is provided, replace the cable or spindle sensor (or motor).

(4) If the spindle does not rotate as specified (the spindle does not rotate at all) and this alarm is issued
  (a) The power line is abnormal.
  Check if the motor power line is connected normally. If spindle switching or output switching is performed, check if the magnetic contactor is on.
  (b) The SPM is faulty.
  Replace the SPM.

3.4.1.20 Alarm code 30

An excessively large current is detected at the input of the 3-phase main circuit of the PSM.

(1) If the PSM indicates alarm code 1
Troubleshoot according to the description of alarm code 1 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.1.21 Alarm code 31

The motor failed to rotate as specified, and has stopped or is rotating at a very low speed.

(1) If the motor rotates at a very low speed and this alarm is issued
(a) The setting of a parameter is incorrect.
Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
(b) The motor phase sequence is incorrect.
Check if the motor phase sequence is correct.
(c) The feedback cable of the motor has a problem.
Check if the phase A/B signals are connected correctly.
(d) The feedback cable of the motor is faulty.
Rotate the motor manually to see if a speed is indicated in the item of motor speed on the CNC diagnosis screen or on the spindle check board. If no speed indication is provided, replace the cable or spindle sensor (or motor).

(2) If the motor does not rotate at all and this alarm is issued
(a) The sequence for locking the spindle is incorrect.
Check the sequence to see if the spindle is locked.
(b) The power line is faulty.
Check if the power line is connected to the motor correctly. If spindle switching or winding switching is performed, check if the magnetic contactor is on.
(c) The SPM is faulty.
Replace the SPM.

3.4.1.22 Alarm code 32

LSI memory for serial communication is abnormal. A check is made when the power is turned on.

If this alarm is issued, replace the SPM or SPM control printed circuit board.

3.4.1.23 Alarm code 33

The PSM could not be charged within a specified time.
PSM input has an open phase.

(1) If the PSM indicates alarm code 5
Troubleshoot according to the description of alarm code 5 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.1.24 Alarm code 34

Parameter data outside the specifiable range was set.

Troubleshooting when this alarm is issued
Connect the spindle check board.
The spindle check board displays "AL-34" and "F-xxx" alternately. "F-xxx" indicates a parameter number outside the specifiable range. For the correspondence between the CNC parameter numbers and "F-xxx," refer to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)."

3.4.1.25 Alarm code 35

The gear ratio set in a parameter exceeds the value range allowable for internal processing. This alarm is issued with a parameter related to orientation of magnetic sensor type.

Troubleshooting when this alarm is issued

(a) The gear ratio set in a parameter is incorrect.
Check if an excessively large gear ratio is set.

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6556 to 6559	3056 to 3059	4056 to 4059	Gear ratio between the spindle and motor
6560 to 6563	3060 to 3063	4060 to 4063	Position gain at orientation

3.4.1.26 Alarm code 36

The error counter overflowed.

(1) The setting of a parameter is incorrect.
(a) The gear ratio set in a parameter is incorrect.
Check if an excessively large gear ratio is set.
(b) The setting of a position gain is incorrect.
If the gear ratio data is correct, increase the position gain.
(c) The setting of a position detector mounting direction or the setting of spindle and motor rotation directions is incorrect.

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6556 to 6559	3056 to 3059	4056 to 4059	Gear ratio between the spindle and motor
6565 to 6568	3065 to 3068	4065 to 4068	Position gain in the servo mode/spindle synchronization
6569 to 6572	3069 to 3072	4069 to 4072	Position gain in Cs contour control

(2) Sequence error
(a) Check if the motor is deactivated (by turning off SFR/SRV) in a position control mode (rigid tapping, Cs contour control, or spindle synchronization).

3.4.1.27 Alarm code 37

After emergency stop signal input, the motor is accelerated without being decelerated. This alarm is issued also when the motor is not deactivated (the motor is not decelerated completely) when the acceleration/deceleration time (initial parameter setting: 10 seconds) has elapsed after emergency stop signal input.

Troubleshooting when this alarm is issued

(a) The parameter setting of the speed detector is incorrect.
Referring to Chapter 1 in "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," set a correct time.

(b) The parameter setting of an acceleration/deceleration time is not proper.
Check the parameter-set value and actual acceleration/ deceleration time, then set an actual acceleration/ deceleration time plus some margin.

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6582	3082	4082	Acceleration/deceleration time setting

3.4.2 Alarm Code 39

The position where the one-rotation signal for Cs contour control is generated is incorrect. This alarm is not issued when the parameter indicated below is not set.

<1> When SPM TYPE2 is used, phase A/B/Z on the high-resolution (1000 to 3000 λ) side of the high-resolution magnetic pulse coder on the spindle side has a problem.

<2> When SPM TYPE4 is used, the spindle sensor connected to JY5 is faulty.
Troubleshoot as in the case of alarm code 41.

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6516#5	3016#5	4016#5	Whether the function for detecting the one-rotation signal of the detector for Cs contour control is provided 1: The function is provided.

Troubleshooting when this alarm is issued (at the time of reference position return on the Cs axis)

(a) The setting of a parameter is incorrect.
Referring to Chapter 2 in "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.

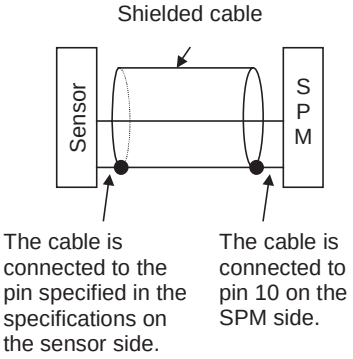
(b) The sensor is not adjusted correctly.
Adjust the sensor according to Subsection 4.3.4 of Part I of this manual. If the signal is not observed, replace the sensor.

(c) The shielding of the cable between the preamplifier and SPM is faulty.
Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the shielding of the cable.

(d) The signal cable is bundled with the servo motor power line.
If the cable between the preamplifier and SPM is bundled with the servo motor power line, separate them from each other.

(e) Improve the cable routing between the motor and preamplifier.
If the cables (including those within a terminal box) extending from the motor to the preamplifier are close to the power line, separate the cables from the power line.

(f) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.



3.4.2.1 Alarm code 40

The one-rotation signal for Cs contour control is not generated.

<1> When SPM TYPE2 is used, phase A/B/Z on the high-resolution (1000 to 3000 λ) side of the high-resolution magnetic pulse coder on the spindle side has a problem.

<2> When SPM TYPE4 is used, the spindle sensor connected to JY5 is faulty.
Troubleshoot as in the case of alarm code 42.

Troubleshooting when this alarm is issued (at the time of reference position return on the Cs axis)

(a) The setting of a parameter is incorrect.
Referring to Chapter 2 in "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.

(b) The sensor is not adjusted correctly.
Adjust the sensor according to Subsection 4.3.4 of Part I of this manual. If the signal is not observed, replace the sensor.

(c) The cable is disconnected.
Check the check pin PSD on the check board. If the signal is not observed per sensor rotation, replace the cable.

(d) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

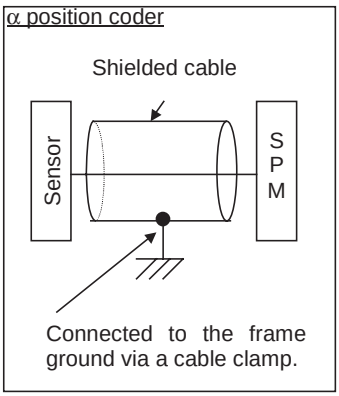
3.4.2.2 Alarm code 41

<1> The position where the one-rotation signal of the α position coder is generated is incorrect.
<2> The position where the one-rotation signal of the MZ sensor or BZ sensor is generated is incorrect.
<3> The position where the one-rotation signal of α position coder S is generated is incorrect.

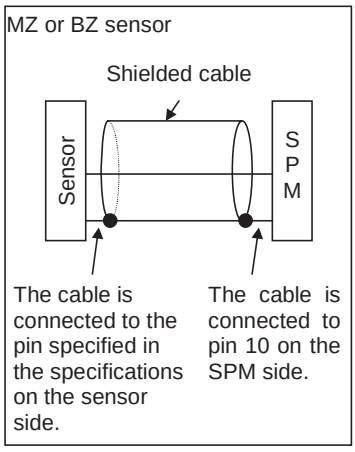
(1) If orientation based on the external one-rotation method is used
(a) The settings of parameters are incorrect.
Check that the gear ratio data matches the specification of the machine.

FS0	FS15	FS15*i*	FS16*i*/16, PM-D/F	Description
6935 6937	3315 3317	3171 3173	4171 4173	Number of teeth on the spindle side
6936 6938	3316 3318	3172 3174	4172 4174	Number of teeth on the position detector side

(b) Slippage between the spindle and motor
Check that there is no slippage between the spindle and motor. Orientation based on the external one-rotation method is not applicable to V-belt connection.



(2) Troubleshooting in other cases
(a) The setting of a parameter is incorrect.
Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
(b) A sensor (MZ sensor or BZ sensor) is not adjusted correctly.
Adjust the sensor according to Subsection 4.3.4 of Part I of this manual. If the signal is not observed, replace the sensor.
(c) The α position coder is faulty.
Check the check pin PSD on the spindle check board. If the signal is not generated per rotation, replace the position coder.
(d) The shielding of the cable between the sensor and SPM is faulty.
Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the shielding of the cable.
(e) The signal cable is bundled with the servo motor power line.
If the cable between the sensor and SPM is bundled with the servo motor power line, separate them from each other.
(f) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.



3.4.2.3 Alarm code 42

<1> The one-rotation signal of the α position coder is not generated.
<2> The one-rotation signal of the MZ sensor or BZ sensor is not generated.
<3> The one-rotation signal of α position coder S is not generated.

Troubleshooting when this alarm is issued

(a) The setting of a parameter is incorrect.
Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
(b) The MZ sensor or BZ sensor is not adjusted correctly.
Adjust the sensor according to Subsection 4.3.4 of Part I of this manual. If the sensor cannot be adjusted or the signal is not observed, replace the connection cable and sensor.
(c) The α position coder is faulty.
Check the check pin PSD on the spindle check board. If the signal is not generated per rotation, replace the connection cable and position coder.
(d) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.2.4 Alarm code 43

The position coder signal of the spindle on the mater side used in the differential speed mode is disconnected.

Troubleshoot as in the case of alarm code 27.

3.4.2.5 Alarm code 44

An error occurred in the A/D converter.

When this alarm is issued, replace the SPM or SPM control printed circuit board.

3.4.2.6 Alarm code 46

The one-rotation signal of the position coder cannot be detected normally during thread cutting.

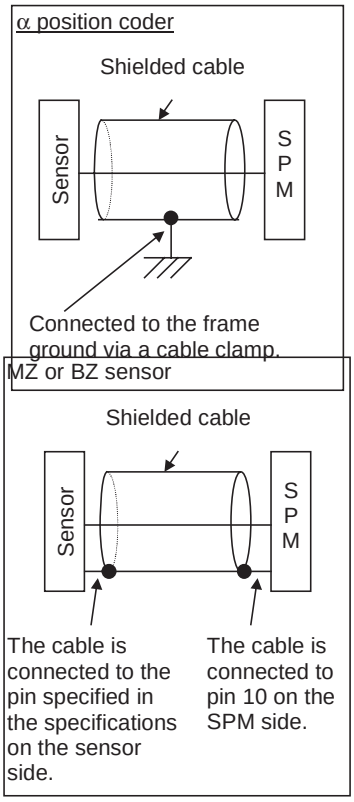
Troubleshoot as in the case of alarm code 41.

3.4.2.7 Alarm code 47

<1> The count value of α position coder signal pulses is abnormal.
<2> The pulse count value of the MZ sensor or BZ sensor is abnormal.

Phases A and B for the position coder have a feedback pulse count of 4096 p/rev per spindle rotation. The SPM checks the pulse counts of phases A and B equivalent to the position coder each time a one-rotation signal is generated. The alarm is issued when a pulse count beyond the specified range is detected.

(1) If this alarm is issued when the cable is moved (as in the case where the spindle moves)
   (a) The connector has a bad contact, or the cable is disconnected.
   The conductor may be broken. Replace the cable. If coolant has penetrated into the connector, clean the connector.



(2) Troubleshooting in other cases
   (a) The setting of a parameter is incorrect.
   Referring to "FANUC AC SPINDLE MOTOR α series Parameter Manual (B-65160E)," check the parameter for sensor setting.
   (b) A sensor (MZ sensor or BZ sensor) is not adjusted correctly.
   Adjust the sensor according to Subsection 4.3.4 of Part I of this manual.
   (c) The shielding of the cable between the sensor and SPM is faulty.
   Referring to Chapter 9, "Connection," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)," check the shielding of the cable.
   (d) The signal cable is bundled with the servo motor power line.
   If the cable between the sensor and SPM is bundled with the servo motor power line, separate them from each other.
   (e) The SPM is faulty.
   Replace the SPM or SPM control printed circuit board.

3.4.2.8 Alarm code 49

In the differential speed mode, the spindle speed on the master side (remote) converted to a motor speed on the slave side (local) exceeded the maximum allowable speed of the motor.

Troubleshooting when this alarm is issued

A differential speed is calculated by multiplying the speed on the target speed by a gear ratio.
Ensure that the maximum allowable speed of the motor is not exceeded.

3.4.2.9 Alarm code 50

A value obtained by internal calculation in spindle synchronization exceeded the allowable range.

Troubleshooting when this alarm is issued

(a) The setting of parameters for gear ratio setting is incorrect.
Check if an excessively large gear ratio is set.

(b) Position gain setting limit
If correct gear ratio data is set, increase the position gain value in spindle synchronization.

FS0	FS15*i*	FS16*i*/16, PM-D/F	Description
6556 to 6559	3056 to 3059	4056 to 4059	Gear ratio between the spindle and motor
6565 to 6568	3065 to 3068	4065 to 4068	Position gain in the servo mode/spindle synchronization

3.4.2.10 Alarm code 51

The PSM detected that the DC link voltage was excessively low.

(1) If the PSM indicates alarm code 4
Troubleshoot according to the description of alarm code 4 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm

(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.

(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.2.11 Alarm codes 52 and 53

The synchronization signal (ITP) in communication data transferred to and from the CNC stopped.

Troubleshooting when this alarm is issued

(a) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.
(b) The CNC is faulty.
Replace the board or module related to the serial spindle.

3.4.2.12 Alarm code 54

A large current flowing in the motor for a long time was detected.

Troubleshoot as in the case of alarm code 29.

3.4.2.13 Alarm code 55

In spindle switching control or output switching control, a mismatch between the switching request signal (SPSL or RSL) and the power line state check signal (MCFN, MFNHG, RCH, or RCHHG) continues during motor activation.

Troubleshooting when this alarm is issued

(a) The magnetic contactor (switch unit) for power line switching is faulty.
If the contact is inoperative, check the power supply of the magnetic contactor. If the magnetic contactor is still inoperative, replace the magnetic contactor.
(b) The I/O unit or wiring for checking the contact of the magnetic contactor is faulty.
If a defect is found in the I/O unit or wiring, replace the I/O unit or wiring.
(c) The sequence (ladder) is incorrect.
Modify the sequence so that switching is not performed during activation. For details of the signals, refer to Chapter 10, "Interface Signals," in "FANUC SERVO AMPLIFIER α series Descriptions (B-65162E)."

3.4.2.14 Alarm code 56

The cooling fan of the control circuit stopped.

When this alarm is issued, replace the SPM or the internal cooling fan of the SPM. When replacing the internal cooling fan, see Chapter 4.

3.4.2.15 Alarm code 57

The temperature of the regenerative resistance of the PSM (resistance regenerative type) is excessively high. The PSM is faulty.

(1) If the PSM indicates alarm code 8 or above
Troubleshoot according to the description of alarm code 8 (or the pertinent code) provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.2.16 Alarm code 58

The temperature of the main circuit-cooling fan of the PSM is abnormally high.

(1) If the PSM indicates alarm code 3
Troubleshoot according to the description of alarm code 3 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.

3.4.2.17 Alarm code 59

The internal cooling fan of the PSM stopped.

(1) If the PSM indicates alarm code 2
Troubleshoot according to the description of alarm code 2 provided in Section 3.1 of Part II.

(2) If the PSM indicates no alarm
(a) A cable is faulty.
The connection cable between the PSM (JX1B) and SPM (JX1A) is faulty. Replace the cable.
(b) The SPM is faulty.
Replace the SPM or SPM control printed circuit board.