FANUC

FSSB setup Manual

1. FSSB setting with 16i, 18i, 21i control

After setting of all axis parameter and initialization of servo motor parameter there are 3 ways to set the following FSSB parameter:

- No. 1023
- No. 1905
- No. 1910-1919
- No. 1936, 1937

Automatic setting

By using FSSB screen input amplifier and axis configuration. After switch off/on CNC set parameter 1023, 1905, 1910-1919, 1936, 1937 automatically.

Manual setting 2

Set all FSSB parameter 1023, 1905, 1910-1919, 1936, 1937 by hand.

Manual setting 1

The arrangement of the axis (DSP's) is decided by setting of parameter 1023. Parameter 1905, 1910-1919, 1936, 1937 need not to be set. Because there are some restrictions in configuration the first 2 methods should be preferred.

Slave definition:

In i-series CNC with FSSB , the servo amplifier and pulse modules (M1,M2) are connected via an optical cable. In our description the amplifier and pulse modules we will call "slave".
Because each axis represent 1 slave, a 2-axis amplifier is consisting of 2 slaves and a 3-axis amplifier have 3 slaves. The slaves 1,2,3,… are in the range under consideration of the number of connection to the master (CNC).
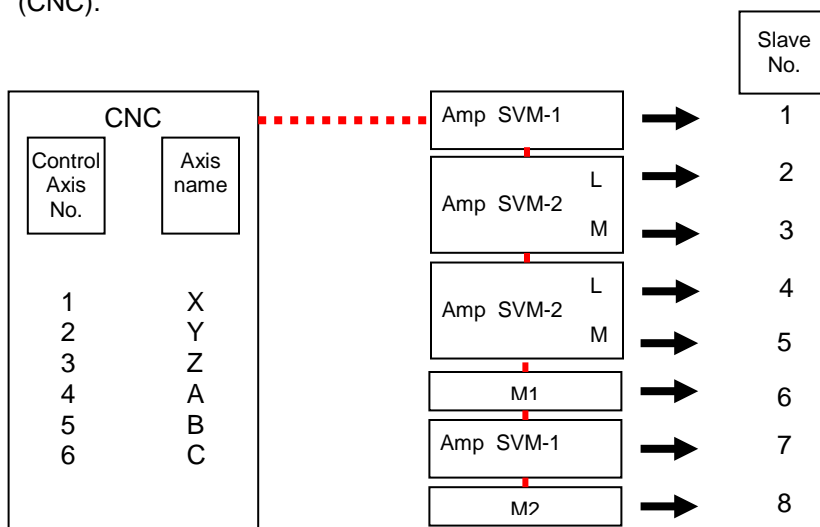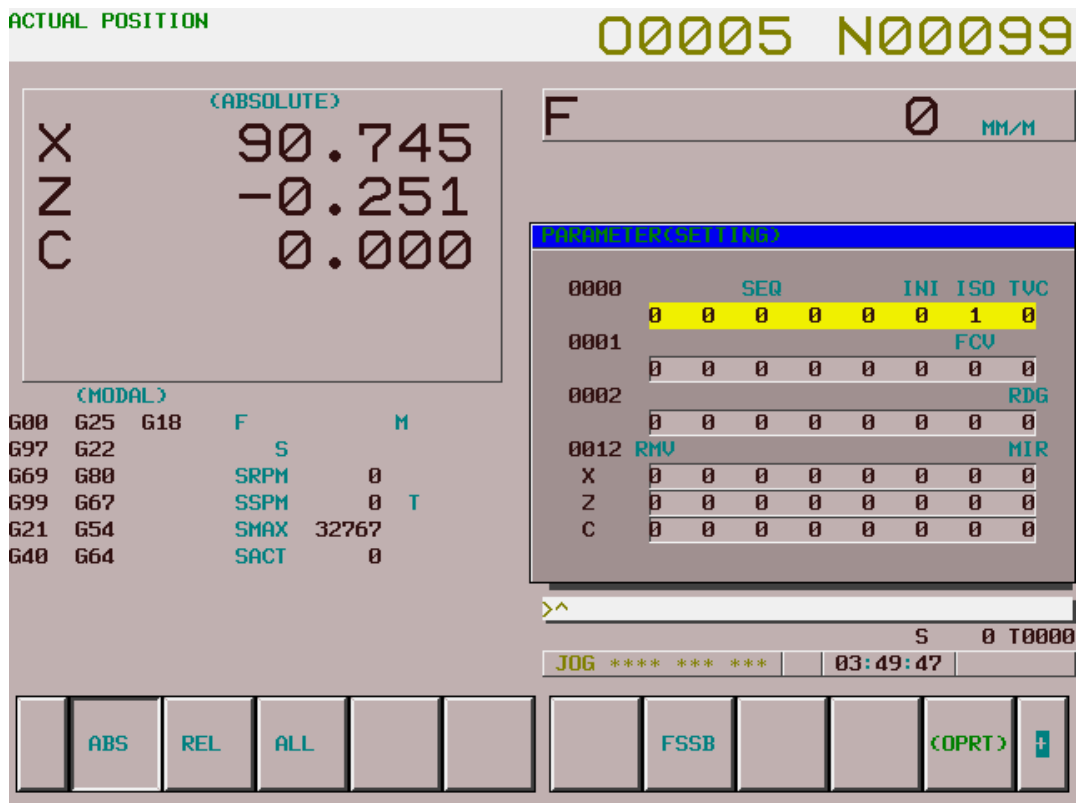
2.FSSB Setting

2.1. Automatic setting

Set parameter 1902 as follows in order to perform automatic setting by using FSSB setting screen

> 1902#0 = 0
> 1902#1 = 0

Please perform the automatic setting using the following procedure:

- Set the servo axis No. in parameter 1023. The total number of axis in parameter 1023 have to be same as number of amplifier axis (except with "-" marked axis in 1023)

- Initialize servo parameter (motor ID, initialization bit)

- Turn off/on CNC power

- Push function key **SYSTEM**

- You can find the FSSB screen pushing [▶] several time

```
ACTUAL POSITION                          O0005  N00099

              (ABSOLUTE)          F                    0  MM/M
   X        90.745
   Z        -0.251
   C         0.000        PARAMETER(SETTING)

                          0000          SEQ      INI ISO TVC
                                  0  0   0   0   0   0   1   0
                          0001                      FCV
                                  0  0   0   0   0   0   0   0
       (MODAL)            0002                      RDG
 G00  G25  G18   F          M     0  0   0   0   0   0   0   0
 G97  G22        S                0012 RMV                MIR
 G69  G80   SRPM      0       X   0  0   0   0   0   0   0   0
 G99  G67   SSPM      0   T   Z   0  0   0   0   0   0   0   0
 G21  G54   SMAX  32767       C   0  0   0   0   0   0   0   0
 G40  G64   SACT      0

                          >^
                                                     S    0 T0000
                          JOG ****  ***  ***      03:49:47

   ABS   REL   ALL                     FSSB              (OPRT)  ▶
```

Pushing the softkey **FSSB** the amplifier setting screen appears

```
ACTUAL POSITION                      O0005  N00099

              (ABSOLUTE)        F                    0  MM/M
  X            90.745
  Z           -0.251      AMPLIFIER SETTING
  C            0.000      NO. AMP  SERIES UNIT CUR.  AXIS  NAME
                            1  A1-L    α     SVM  40A    1    X
                            2  A1-M    α     SVM  40A    2    Z
          (MODAL)
G00  G25  G18    F          M
G97  G22             S
G69  G80    SRPM       0
G99  G67    SSPM       0  T  NO. EXTRA TYPE PCB ID
G21  G54    SMAX   32767
G40  G64    SACT       0

                            >^
                                                   S    0 T0000
                            JOG **** *** ***   03:50:20

  [<] [ABS] [REL] [ALL] [  ] [  ]   [AMP] [AXIS] [MAINTE] [  ] [(OPRT)] [  ]
```

- Input the axis numbers which should be connected to each amplifier in amplifier setting screen. The information of slaves lines up one by one from top to the bottom.
  Therefore please set for control axis number to each amplifier neither to 0 nor to duplicate value.

- Press **(OPRT)** to switch to the setting screen

ACTUAL POSITION

O0005 N00000

(ABSOLUTE)

X   90.745
Z   -0.251
C   0.000

F   0   MM/M

AMPLIFIER SETTING
```
NO.  AMP    SERIES UNIT CUR.  AXIS  NAME
 1   A1-L     α     SVM  40A    1     X
 2   A1-M     α     SVM  40A    2     Z
```

NO. EXTRA TYPE PCB ID

(MODAL)
```
G00  G25  G18   F            M
G97  G22         S
G69  G80   SRPM        0
G99  G67   SSPM        0   T
G21  G54   SMAX    32767
G40  G64   SACT        0
```

>^

S   0 T0000

MDI **** *** ***   03:52:53

| < | ABS | REL | ALL | | | SETING | | CANCEL | | INPUT | |

- Push the soft key   **SETING**

- To find the axis setting screen push function key   **SYSTEM**   and   **⊡**   several times.

  Push   **FSSB**   and after that   **AXIS**

  The following screen will be displayed.

ACTUAL POSITION   O0005 N00000

AXIS	NAME	AMP	M1	M2	1-DSP	CS	TNDM
1	X	A1-L	0	0	0	0	1
2	Z	A1-M	0	0	0	0	2
3	C	----	0	0	0	1	0

- Set the following required information for each axes:

  ► External encoder is connected via pulse module M1 or M2 to the axes (full closed loop)
  Set connector number of pulse module regarding to axis name (set 1st connector =1 2nd connector =2 and so on)
  In case you are connecting basic unit and expansion unit via flat cable, this combination will be considered as one slave (connector No. 1…8)

Basic unit   Expansion unit
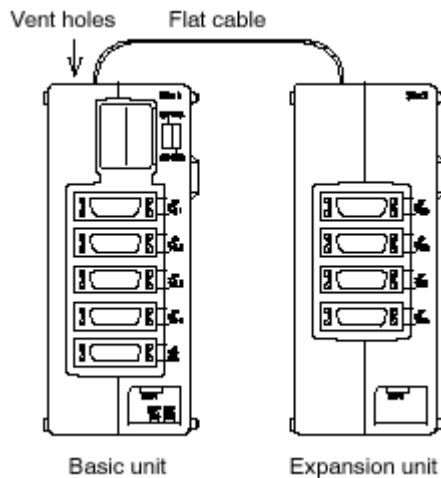
► Define the axis which are occupying 1 DSP (usually 1 DSP controls 2 axis except special functions like 125 μs current loop up to 9090 servo software and Learning Control)
Set the axis requiring 1 DSP to 1.

► Set Cs contouring axis to 1.

► Determine tandem control master and slave axis. Set 1. master to 1. The controlled slave axes is fixed with the next even number 2 in this case. Define additional axis pairs in the same way : master = odd number, slave = next even number.

```
ACTUAL POSITION                    O0005 N00000

         (ABSOLUTE)          F              0   MM/M
 X       89.542
 Z        3.447       AXIS SETTING
 C        0.000       AXIS  NAME AMP  M1 M2  1-DSP  CS TNDM

                        1    X   A1-L  0  0    0     0   1
      (MODAL)            2    Z   A1-M  0  0    0     0   2
 G00  G25  G18    F        M  3   C   ----  0  0    0     1   0
 G97  G22         S
 G69  G80      SRPM      0
 G99  G67      SSPM      0  T
 G21  G54      SMAX  32767
 G40  G64      SACT      0

                                              >^
                                                   S    0 T0000
                                     MDI  **** *** ***    06:22:33

  <  ABS  REL  ALL          SETING     CANCEL    INPUT
```

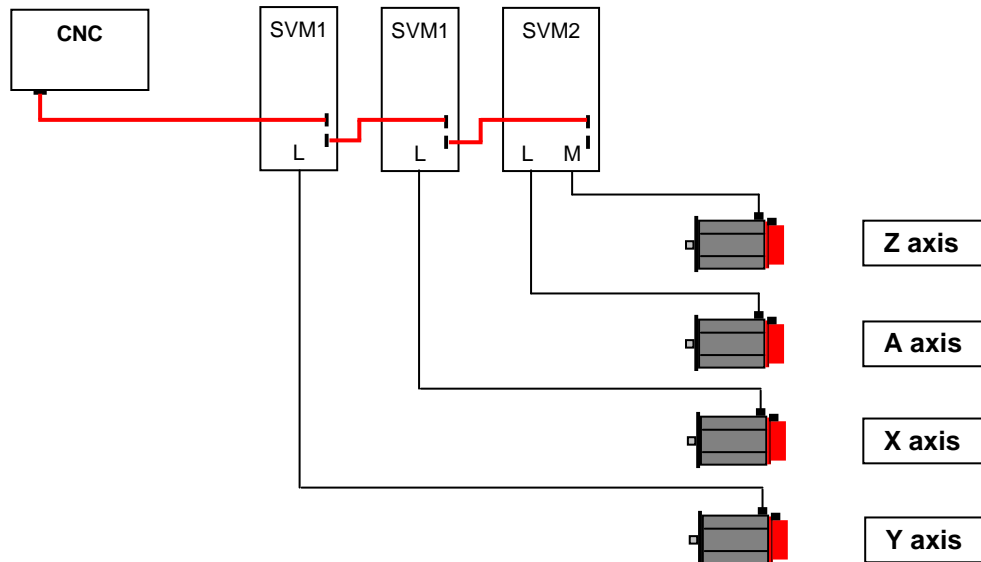- Push **SETING** in any case if you input setting data or not.

- Turn off/on CNC power

Following this procedure step by step parameter 1023, 1905, 1910-1919, 1936, 1937 will be set automatically. If Parameter No. 1902#1 is set to 1 by CNC automatically after power on the control indicates FSSB setting is completed.

Example 1: Semi closed loop

Please set parameter No. 1023

        X : 1   Z : 3
        Y : 2   A : 4

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A1-L	α	SVM	40A	2	Y
2	A2-L	α	SVM	40A	1	X
3	A3-L	α	SVM	40A	4	A
4	A3-M	α	SVM	80A	3	Z

NO. EXTRA TYPE PCB ID

Please push soft key `SETING`

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Push function key | SYSTEM | FSSB screen appears pushing ⊞ several times

Push FSSB ⇐ AXIS ⇐ (OPRT) ⇐ SETING
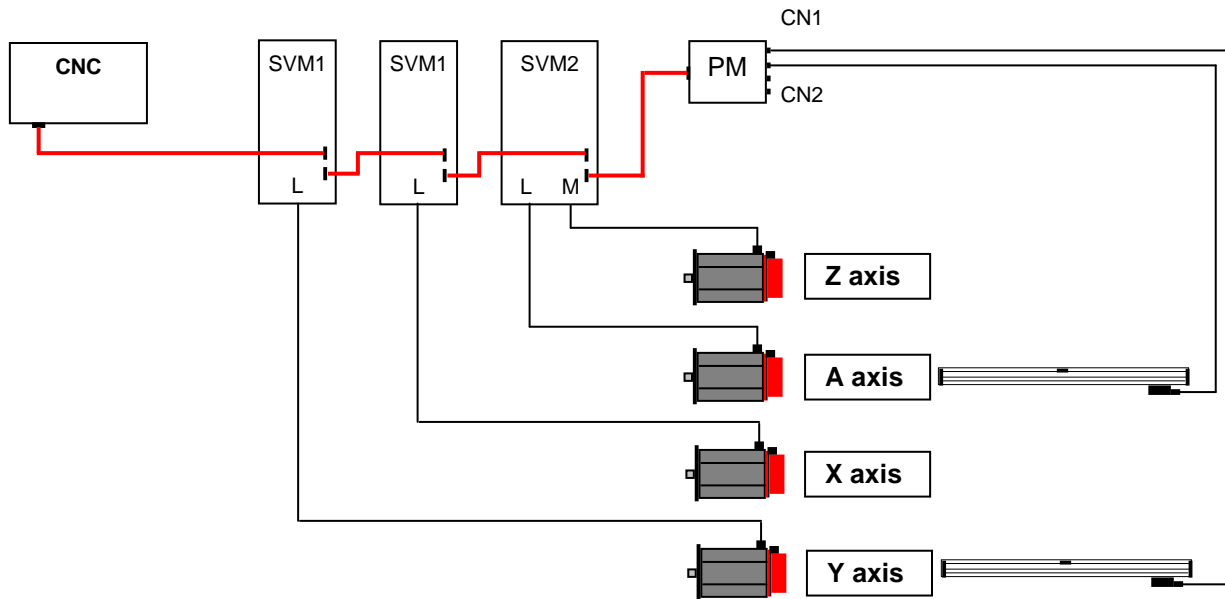
Setting is completed after turning Off/On of CNC.

Example 2: Full closed loop

Please set parameter No. 1023

        X : 1   Z : 3
        Y : 2   A : 4

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A1-L	α	SVM	40A	2	Y
2	A2-L	α	SVM	40A	1	X
3	A3-L	α	SVM	40A	4	A
4	A3-M	α	SVM	80A	3	Z

AMPLIFIER SETTING

NO.	EXTRA	TYPE	PCB	ID	
5	M1	A	0008	DETECTOR(4 AXES)	

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Please push soft key SETING

Push function key **SYSTEM** FSSB screen appears pushing [+] several times

Push FSSB ⇐ AXIS

AXIS SETTING

AXIS	NAME	AMP	M1	M2	1DSP	Cs	TNDM
1	X	A2-L	0	0	0	0	0
2	Y	A1-L	1	0	0	0	0
3	Z	A3-M	0	0	0	0	0
4	A	A3-L	2	0	0	0	0

>

Please push soft key SETING

Input parameter 1815#1=1 for Y axis and A axis.

Setting is completed after turning Off/On of CNC.

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Example 3: In case of Cs axis
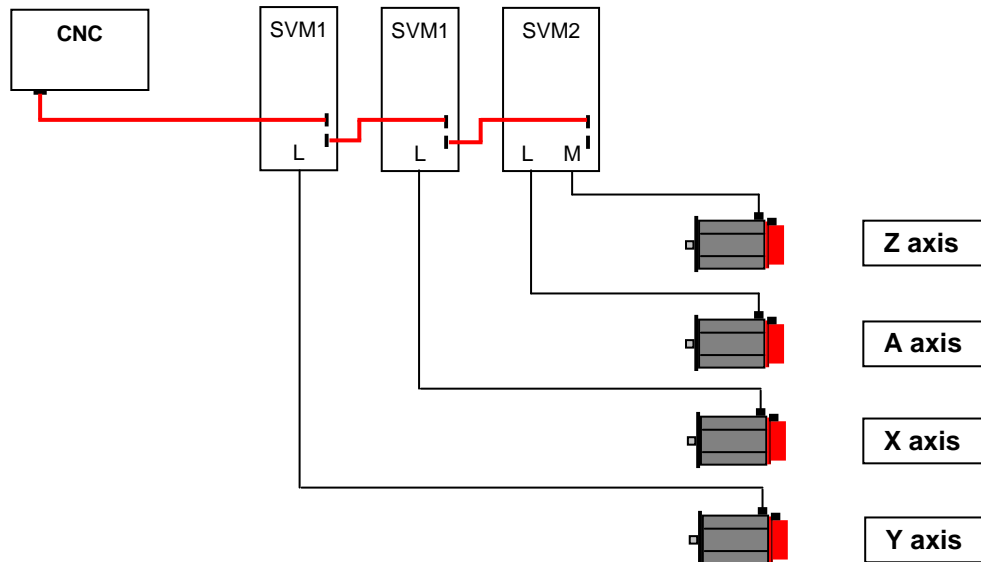
Please set parameter No. 1023

X : 1	Z : 3	C: -1
Y : 2	A : 4	

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

AMPLIFIER SETTING						
NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A1-L	α	SVM	40A	2	Y
2	A2-L	α	SVM	40A	1	X
3	A3-L	α	SVM	40A	4	A
4	A3-M	α	SVM	80A	3	Z

NO. EXTRA TYPE PCB ID

Please push soft key   `SETING`

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Push function key | **SYSTEM** | FSSB screen appears pushing | several times

Push | FSSB | ⇐ | AXIS

```
AXIS SETTING
  AXIS  NAME  AMP    M1    M2    1DSP   Cs    TNDM

    1     X    A2-L    0     0      0     0      0
    2     Y    A1-L    0     0      0     0      0
    3     Z    A3-M    0     0      0     0      0
    4     A    A3-L    0     0      0     0      0
    5     C    -- --   0     0      0     1      0




  >

```
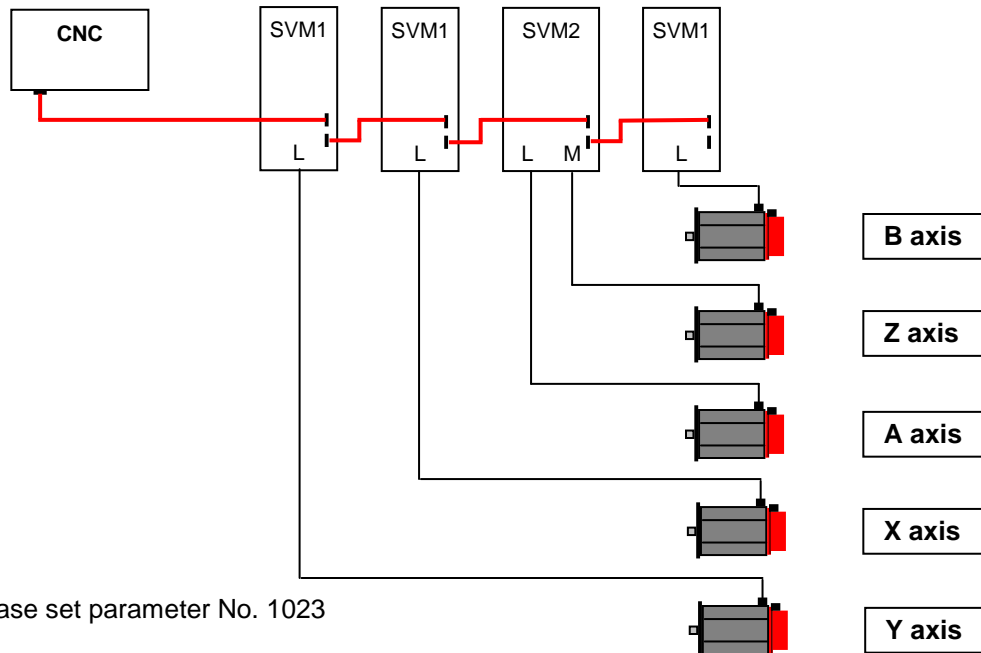
Please push soft key | SETING

.

Setting is completed after turning Off/On of CNC.

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Example 4: In case of Tandem axis
1st Tandem axes (X-Master axis, A-Slave axis)   2nd Tandem axes (Y-Master axis, B-Slave axis)

Please set parameter No. 1023

X : 1	Z : 5	B: 4
Y : 3	A : 2	

Parameter 9900=5
Parameter 1010=3
Option Parameter: Tandem Operation

Parameter 1817#6=1 (for X axis, A axis, Y axis, B axis)

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

AMPLIFIER SETTING						
NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A1-L	α	SVM	40A	3	Y
2	A2-L	α	SVM	40A	1	X
3	A3-L	α	SVM	40A	2	A
4	A3-M	α	SVM	80A	5	Z
5	A4-L	α	SVM	40A	4	B

NO. EXTRA TYPE PCB ID

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Please push soft key **SETING**

Push function key **SYSTEM**   FSSB screen appears pushing **+**   several times

Push **FSSB** ⇐ **AXIS**

```
AXIS SETTING
 AXIS  NAME  AMP    M1    M2    1DSP   Cs    TNDM

   1     X    A2-L    0     0      0     0      1
   2     Y    A1-L    0     0      0     0      3
   3     Z    A3-M    0     0      0     0      0
   4     A    A3-L    0     0      0     0      2
   5     B    A4-L    0     0      0     0      4



 >
```
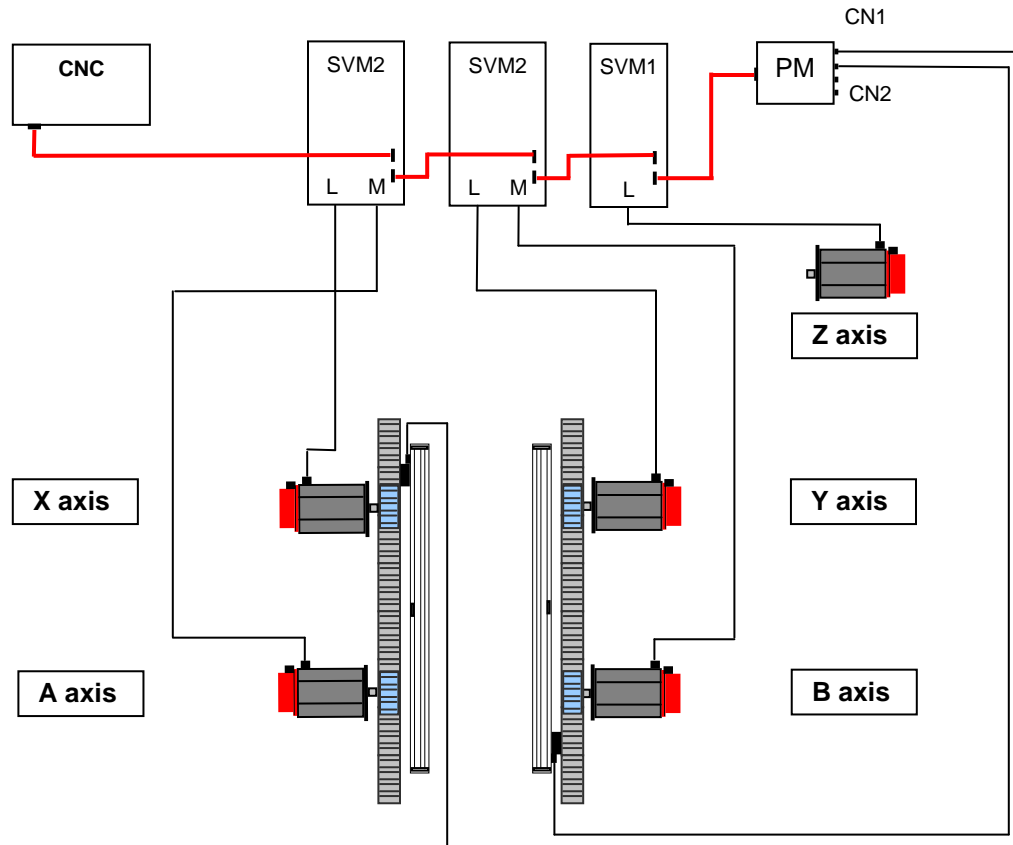
Please push soft key **SETING**

Setting is completed after turning Off/On of CNC.

Example 5: In case of Tandem compounded with simple synchronous control
1st Tandem axes (X-Master axis, A-Slave axis)   2nd Tandem axes (Y-Master axis, B-Slave axis)
Simple synchronous Master – X-axis, Simple synchronous Slave – Y-axis

Please set parameter No. 1023

> X : 1
> Y : 3
> Z : 5
> A : 2
> B : 4

Parameter 9900=5
Parameter 1010=3
Option Parameter: Tandem Operation, Simple Synchronous Control
Parameter 1817#6=1 (for X axis, A axis, Y axis, B axis)
Parameter 1815#1=1 (for X axis, Y axis)
Parameter 8311=1 (for Y axis)

Please set servo initial setting for each axis.

Turn Off/On CNC power

FANUC

Input AXIS NO. in Amplifier setting screen

```
 AMPLIFIER SETTING
  NO.   AMP    SERIES      UNIT   CUR   AXIS   NAME

  1     A1-L    α          SVM    40A    1      X
  2     A1-M    α          SVM    40A    2      A
  3     A2-L    α          SVM    40A    3      Y
  4     A2-M    α          SVM    40A    4      B
  5     A1-L    α          SVM    80A    5      Z




  NO. EXTRA TYPE PCB  ID
   6    M1    A    0008  DETECTOR(4 AXES)
```

Please push soft key   **SETING**

Push function key   **SYSTEM**   FSSB screen appears pushing   **⊞**   several times

Push   **FSSB**   ⇐   **AXIS**


```
 AXIS SETTING
  AXIS NAME AMP    M1    M2    1DSP   Cs    TNDM

   1    X    A1-L   1     0     0      0     1
   2    Y    A2-L   2     0     0      0     3
   3    Z    A3-L   0     0     0      0     0
   4    A    A1-M   0     0     0      0     2
   5    B    A2-M   0     0     0      0     4




   >
```
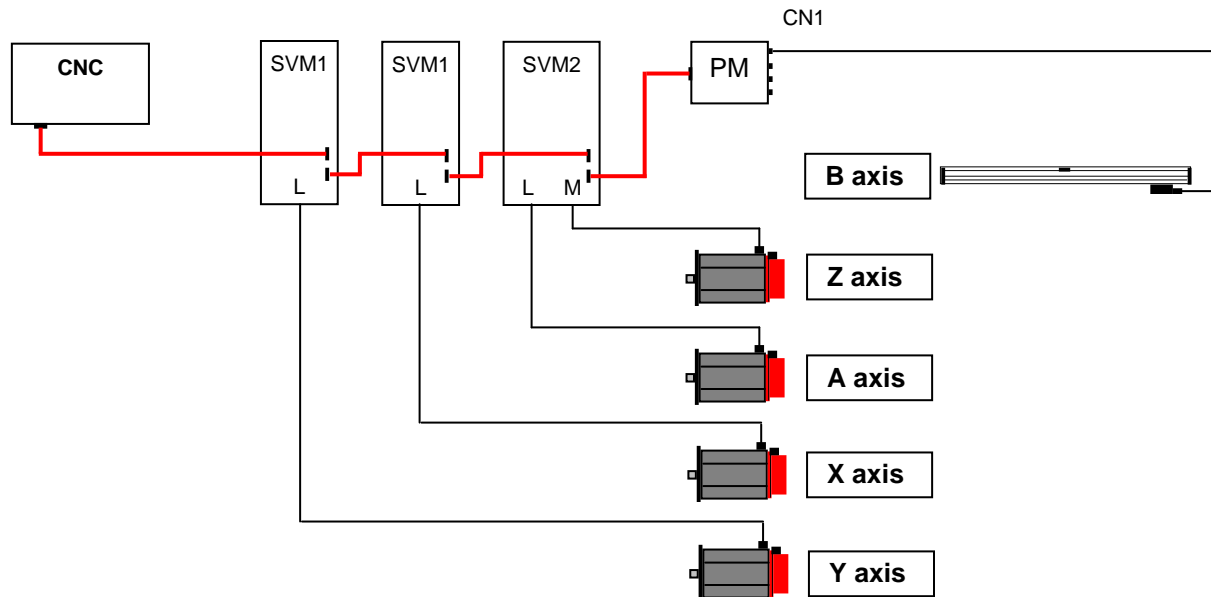
Please push soft key

SETING

Setting is completed after turning Off/On of CNC.

Example 6: In case of Electrical Gear Box function
EGB work axis: A axis EGB dummy axis: B axis (parameter No.7771=5)

Please set parameter No. 1023

X : 1	Z : 5	B : 4
Y : 2	A : 3	

Option Parameter: Electronic Gear Box
Parameter 7771=5
Parameter 7771,7773
Parameter 2011#0=1 (for A axis, B axis)

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

```
AMPLIFIER SETTING
 NO.   AMP   SERIES      UNIT  CUR   AXIS   NAME

 1     A1-L    α         SVM   40A    2      Y
 2     A2-L    α         SVM   40A    1      X
 3     A3-L    α         SVM   40A    3      A
 4     A3-M    α         SVM   80A    5      Z




 NO.  EXTRA TYPE  PCB  ID
 5     M1     A    0008  DETECTOR(4 AXES)
```

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Please push soft key   `SETING`

Push function key   **SYSTEM**   FSSB screen appears pushing   ⬛   several times

Push   `FSSB`   ⇐   `AXIS`

```
AXIS SETTING
  AXIS NAME  AMP    M1    M2    1DSP   Cs    TNDM

    1    X    A2-L   0     0      0     0     0
    2    Y    A1-L   0     0      0     0     0
    3    Z    A3-M   0     0      0     0     0
    4    A    A3-L   0     0      0     0     0
    5    B    -- --  1     0      0     0     0




  >
```
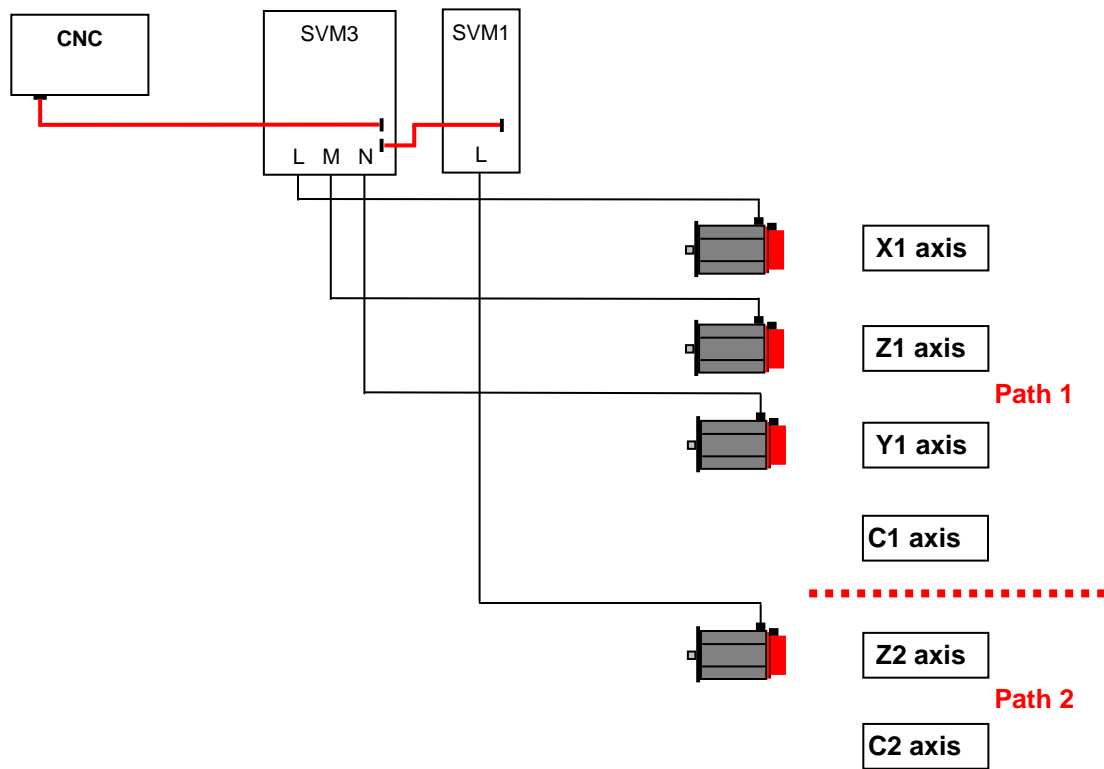
Please push soft key   `SETING`

Setting is completed after turning Off/On of CNC.

Example 7: In case of 1CPU dual path and Cs axis

CNC	SVM3 SVM1

L M N   L

X1 axis

Z1 axis

Path 1

Y1 axis

C1 axis

Z2 axis

Path 2

C2 axis

Automatic setting procedure is not available for CNC with 1 CPU dual path.
It's necessary to use manual setting 2. (see example in chapter 3)

Example 8: In case of 2CPU dual path and Cs axis (possible from BEF1-04, BOF1-04)
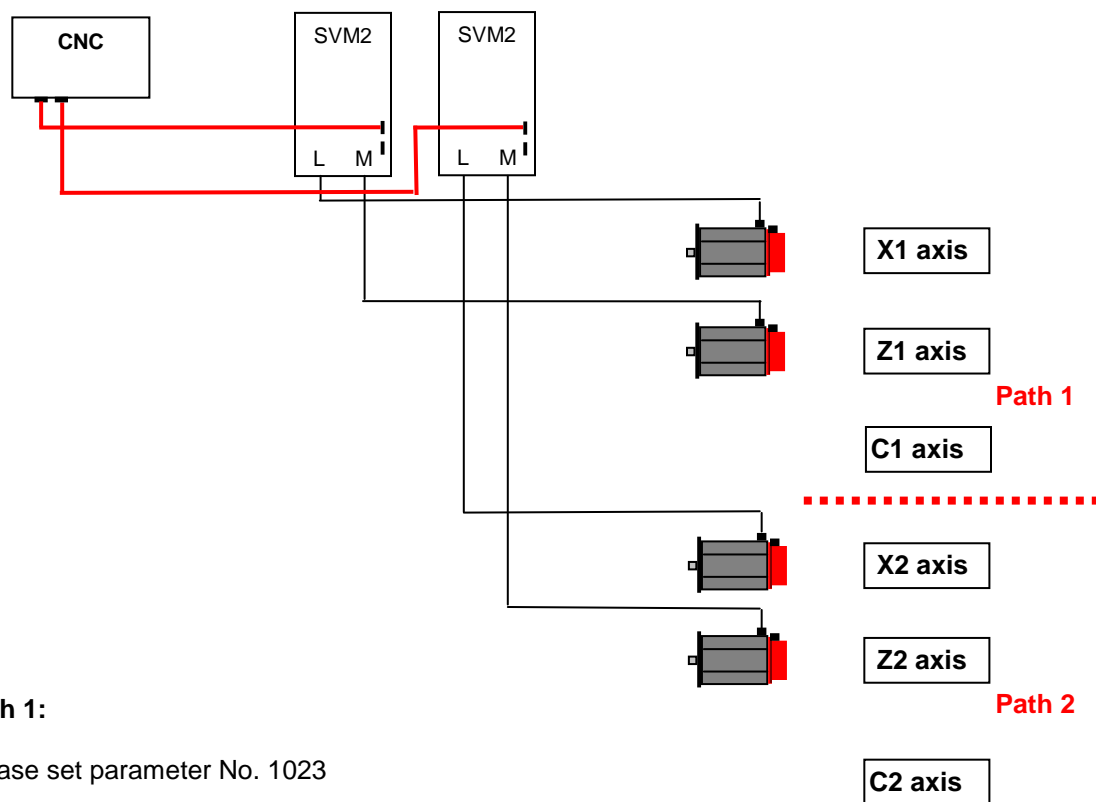
Path 1:

Please set parameter No. 1023

        X1 : 1   C: -1
        Z 1: 2

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

AMPLIFIER SETTING						
NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A1-L	α	SVM	40A	1	X1
2	A1-M	α	SVM	40A	2	Z1

NO. EXTRA TYPE PCB ID

FANUC

Please push soft key **SETING**

Push function key **SYSTEM**   FSSB screen appears pushing ⊕ several times

Push **FSSB** ⇐ **AXIS**

```
 AXIS SETTING
  AXIS NAME  AMP   M1      M2      1DSP   Cs     TNDM

    1    X1    A1-L   0       0       0      0      0
    2    Z1    A1-M   0       0       0      0      0
    3    C     -- --   0       0       0      1      0




  >
```

Please push soft key **SETING**

Path 2:

Please set parameter No. 1023

X2 : 9   Z2 : 10   C2: -1

Please set the servo initial setting to each axis.

Turn Off/On CNC power

Input AXIS NO. in Amplifier setting screen

AMPLIFIER SETTING						
NO.	AMP	SERIES	UNIT	CUR	AXIS	NAME
1	A2-L	α	SVM	40A	11	X2
2	A2-M	α	SVM	40A	12	Z2

NO. EXTRA TYPE PCB ID

Please push soft key   `SETING`

Push function key   **SYSTEM**   FSSB screen appears pushing   [＋]   several times

Push   `FSSB`   ⇐   `AXIS`

```
 AXIS SETTING
    AXIS  NAME  AMP    M1      M2      1DSP    Cs    TNDM

     1     X2    A2-L    0       0       0       0      0
     2     Z2    A2-M    0       0       0       0      0
     3     C2    -- --   0       0       0       1      0



    >


```

Please push soft key   SETING

2.2. Manual setting 2

Please set the following parameter by hand in order to carry out manual setting 2:

Parameter 1902#0=1, 1902#1=0
Parameter 1023
Parameter 1905
Parameter 1910 … 1919
Parameter 1936, 1937

No.	7	6	5	4	3	2	1	0
1902							ASIGN	FSBMD

Data type. Bit

FSBMD setting mode selection

> 0 : Automatic setting mode
>> (By using of FSSB setting screen, when the information of axis and amplifier have been entered, parameter No. 1023,1905,1910…1919, 1936, 1937 will be set automatically.
>
> 1 : Manual setting 2
>> (Please input parameter No. 1023,1905,1910…1919, 1936, 1937 by hand)

ASIGN Automatic setting of FSSB

> 0: is not complete
> 1: is complete
>> (After automatic setting have been carry out successfully, this bit becomes 1 automatically)

No.	7	6	5	4	3	2	1	0
1905	FSBM2	FSBM1						FSBSL

Data type: Bit

FSBSL Select the interface between servo amplifier and servo software

> 0 : Fast type
> 1 : Slow type

The 2 interface types of servo data transfer are related to the execution order of servo data in the internal process. The data for fast axis will be executed first and as the next the data for slow axis, but booth within one processing cycle time.
There is no difference in point of view of performance between fast and slow type.

The following conditions need to be considered while choosing interface type:

- In case of single axis amplifier Fast or Slow type is available
- In case of 2 axes amplifier, fast type can be used for only one axis
  Doe not set Fast type for booth axes
  Slow type could be set for booth axes.

- In case of 3 axes amplifier, the first and the second axis are restricted in the same way like for 2 axes amplifier. For the third axis you can set either fast or slow type.
- Please select fast type for axes, which are set as odd number in parameter 1023.
  (In case of EGB, Learning control or high speed current loop, slow type is also available as an exception)
- Please select Slow type for axis, which are set as even number in parameter 1023.
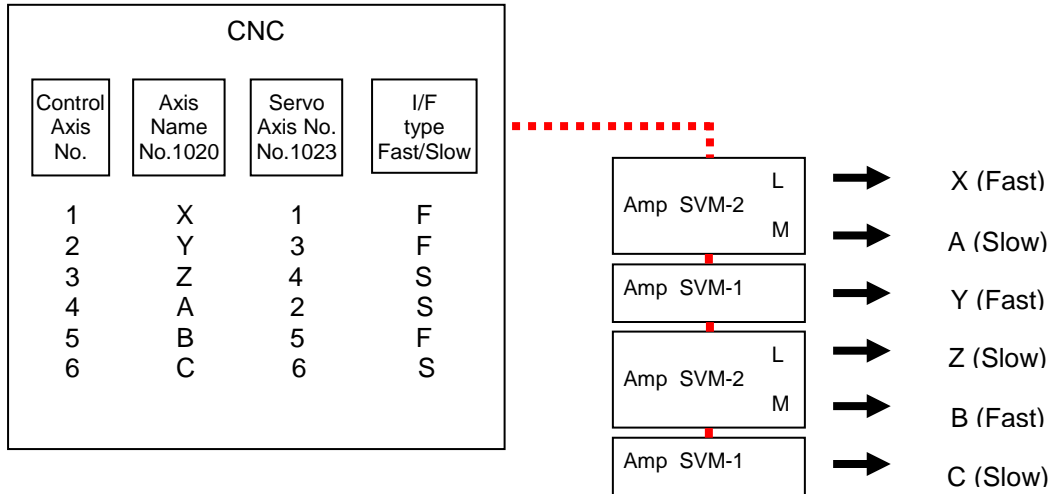
No.

1910	Address conversation table value for Slave1 (ATR)
1911	Address conversation table value for Slave2 (ATR)
1912	Address conversation table value for Slave3 (ATR)
1913	Address conversation table value for Slave4 (ATR)
1914	Address conversation table value for Slave5 (ATR)
1915	Address conversation table value for Slave6 (ATR)
1916	Address conversation table value for Slave7 (ATR)
1917	Address conversation table value for Slave8 (ATR)
1918	Address conversation table value for Slave9 (ATR)
1919	Address conversation table value for Slave10 (ATR)

Data type: bit
Data range: 0…7, 16, 40, 48

Please set the value of address conversion table for slave 1…10
Each device, amplifier or pulse module connected to CNC by optical cable is called "Slave".
The slave order start with 1 (next module after CNC) up to 10.
Two axes amplifier consists of two slaves and three axes has three slaves.

Please set the parameter as follows:

- In case of amplifier:

  Set the related value of parameter No. 1023-1

- In case of pulse module:

  Please set 16 for first pulse module (near from CNC) and 48 for the second pulse module (far from CNC)
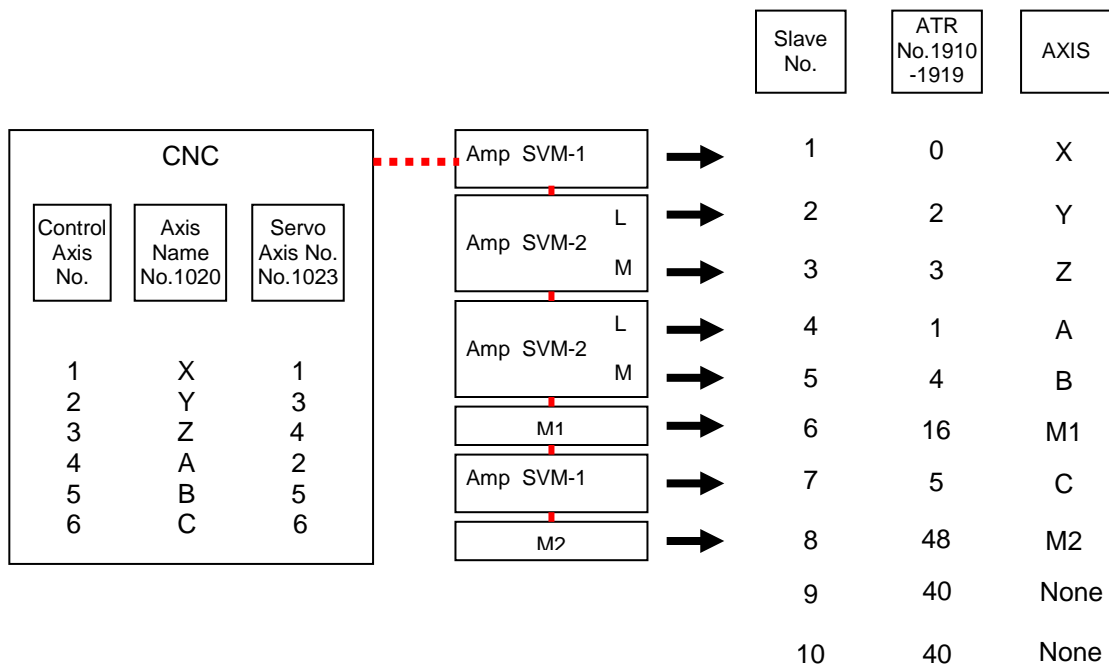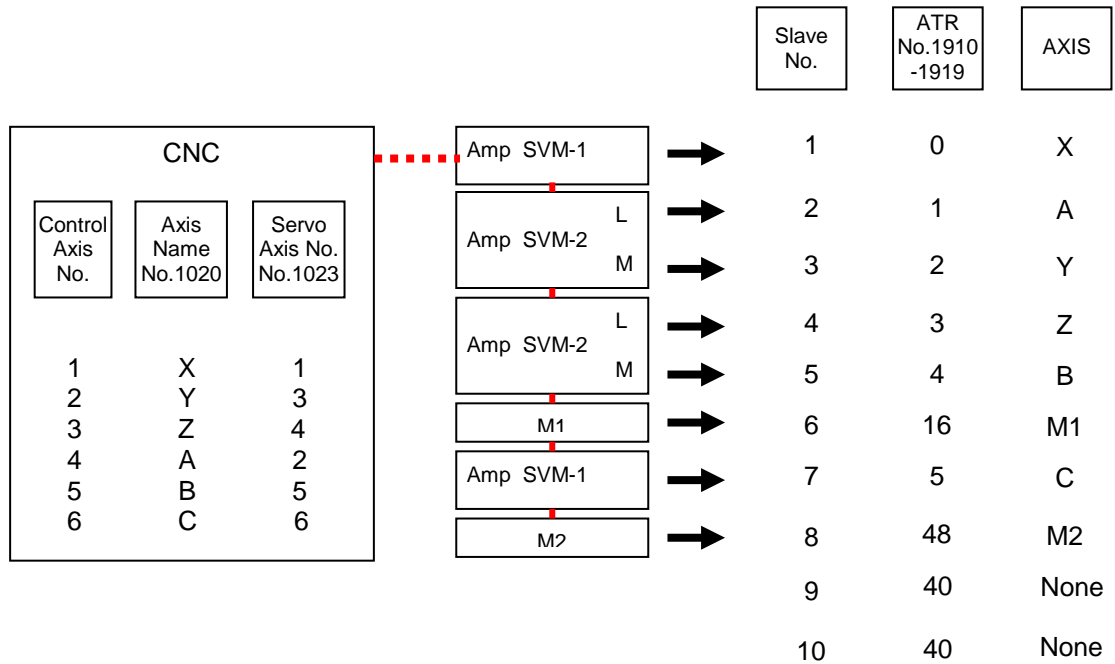
- No slave connected:

  Please set 40

In case of using Electrical Gear Box function, please set these parameter as follows:

  EGB dummy axis designated in parameter no. 7771 does not require an amplifier.
  Don't set not 40 for such EGB dummy axis but the value in parameter No. 1023-1
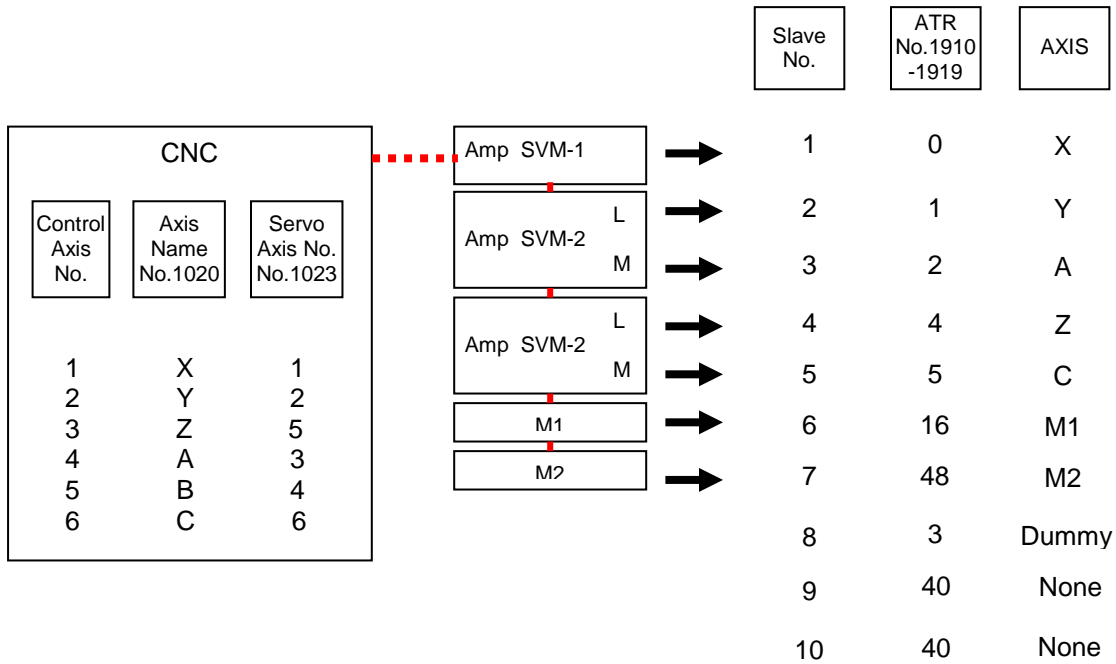
Example of axis configuration and parameter setting:

	CNC			Amp		Slave No.	ATR No.1910 -1919	AXIS

First configuration:

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

Amp		Slave No.	ATR No.1910 -1919	AXIS
Amp SVM-1		1	0	X
Amp SVM-2	L	2	1	A
	M	3	2	Y
Amp SVM-2	L	4	3	Z
	M	5	4	B
M1		6	16	M1
Amp SVM-1		7	5	C
M2		8	48	M2
		9	40	None
		10	40	None

Second configuration:

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

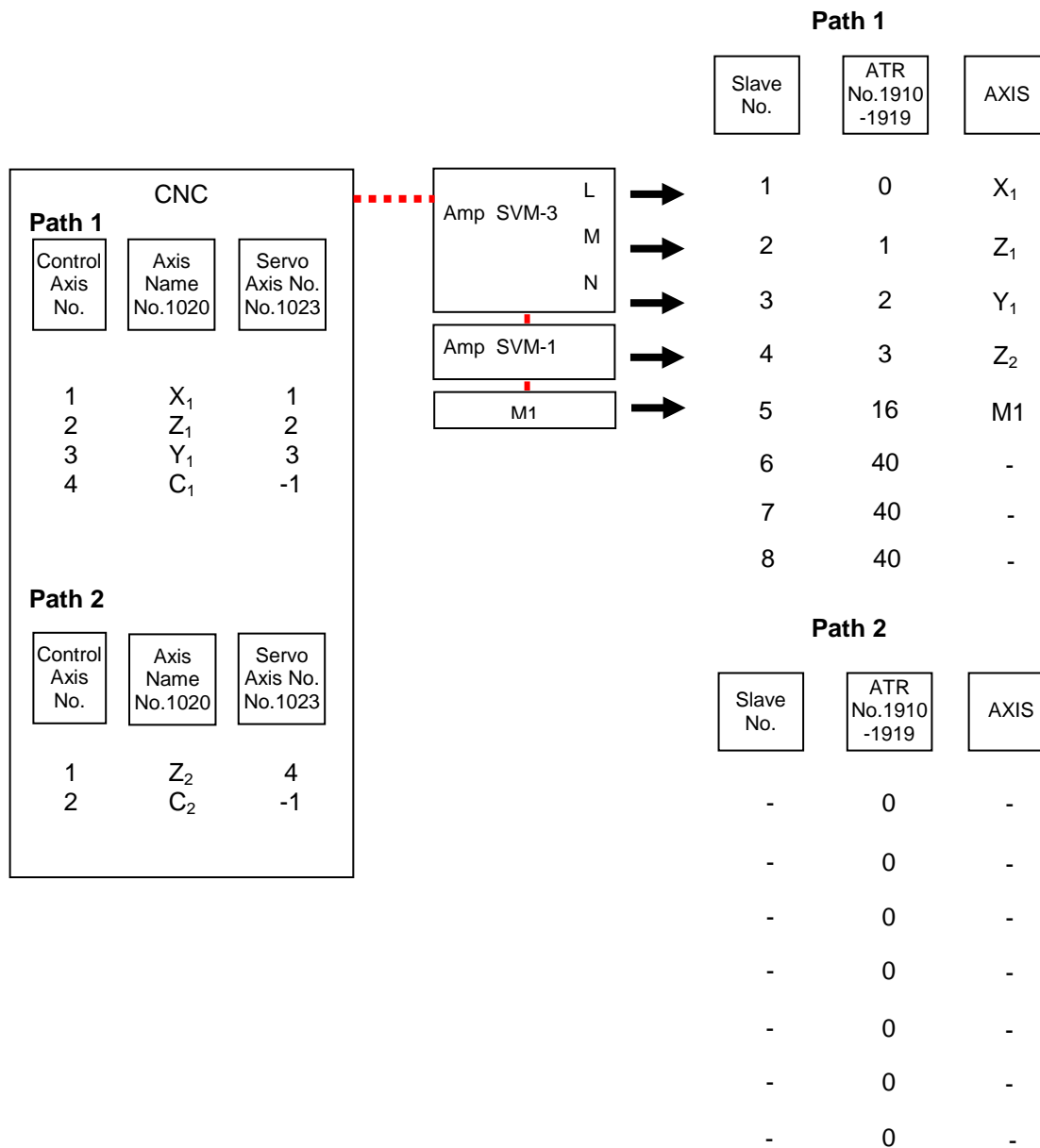| Amp		Slave No.	ATR No.1910 -1919	AXIS
Amp SVM-1		1	0	X
Amp SVM-2	L	2	2	Y
	M	3	3	Z
Amp SVM-2	L	4	1	A
	M	5	4	B
M1		6	16	M1
Amp SVM-1		7	5	C
M2		8	48	M2
		9	40	None
		10	40	None

Note: M1/M2: 1st / 2nd Pulse Module

Example of Electrical Gear Box (EGB) function:
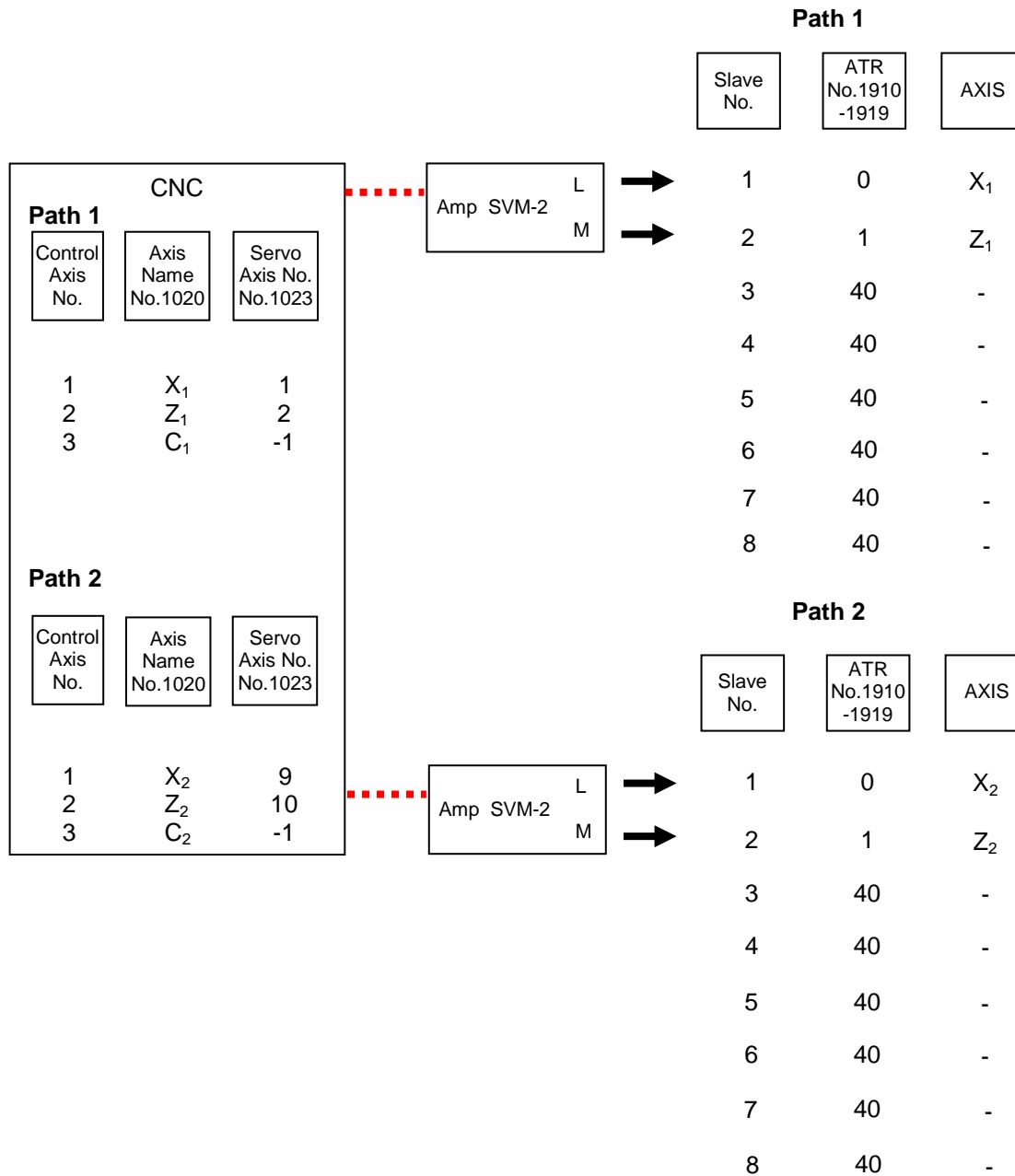(EGB work axis: A axis, EGB dummy axis: B axis parameter No. 7771=5)

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X	1
2	Y	2
3	Z	5
4	A	3
5	B	4
6	C	6

Slave No.	ATR No.1910 -1919	AXIS
1	0	X
2	1	Y
3	2	A
4	4	Z
5	5	C
6	16	M1
7	48	M2
8	3	Dummy
9	40	None
10	40	None

Note: M1/M2: 1st / 2nd Pulse Module

FANUC

Example of 1 CPU dual path with Cs contour control:

CNC

Path 1

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X_1	1
2	Z_1	2
3	Y_1	3
4	C_1	-1

Path 2

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	Z_2	4
2	C_2	-1

Amp SVM-3 — L, M, N

Amp SVM-1

M1

Path 1

Slave No.	ATR No.1910-1919	AXIS
1	0	X_1
2	1	Z_1
3	2	Y_1
4	3	Z_2
5	16	M1
6	40	-
7	40	-
8	40	-

Path 2

Slave No.	ATR No.1910-1919	AXIS
-	0	-
-	0	-
-	0	-
-	0	-
-	0	-
-	0	-
-	0	-

Parameter 1902 and 1910 – 1919 have to be set only for Path 1.

Example of 2 CPU's dual path with Cs contour control:

Path 1

CNC				Amp SVM-2		Slave No.	ATR No.1910 -1919	AXIS
Path 1					L →	1	0	X_1
Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023			M →	2	1	Z_1
						3	40	-
1	X_1	1				4	40	-
2	Z_1	2				5	40	-
3	C_1	-1				6	40	-
						7	40	-
						8	40	-

Path 2

CNC Path 2				Amp SVM-2		Slave No.	ATR No.1910 -1919	AXIS
Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023			L →	1	0	X_2
					M →	2	1	Z_2
1	X_2	9				3	40	-
2	Z_2	10				4	40	-
3	C_2	-1				5	40	-
						6	40	-
						7	40	-
						8	40	-

No.

No.	
1936	Connector number of 1st Pulse Module
1937	Connector number of 2nd Pulse Module

Data type: byte
Data range: 0…7

In case of Pulse Module, please set connector No. – 1 for each axis.
That means the number of connector 1…8 corresponds to setting 0…7.
The parameter No. 1905#6,#7 have to be set as well.
Please set 0 for connectors, which are not used.
If not all connectors are required, please start the range of connector from connector 1 and continue with connector 2 and so on. With other words it's not possible to use for instance connector 3 without using connector 2.

Example:

Control Axis	1st Connector No.	2nd Connector No.	No.1936	N0. 1937	No. 1905 (#7,#6)
X	1	Not used	0	0	0,1
Y	Not used	2	0	1	1,0
Z	Not used	1	0	0	1,0
A	Not used	Not used	0	0	0,0
B	2	Not used	1	0	0,1
C	Not used	3	0	2	1,0

Example for complete axis configuration and parameter setting using Manual setting 2
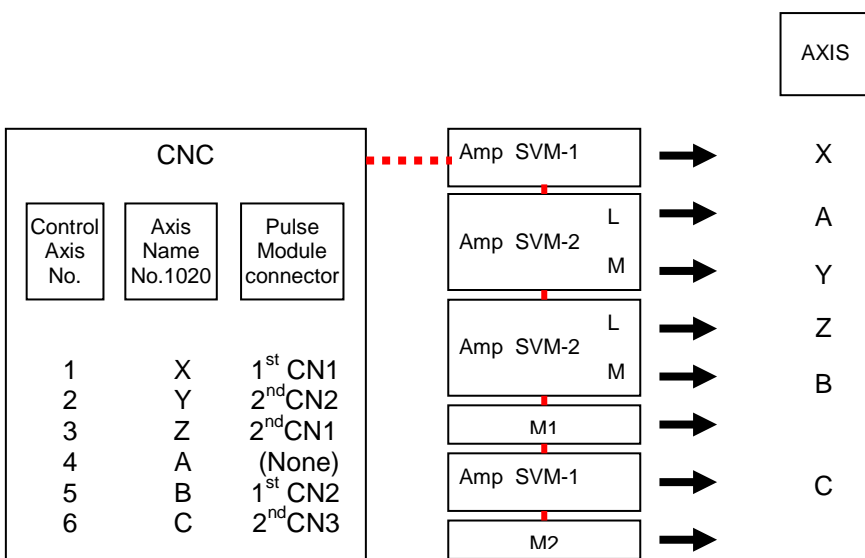
No.	1902#0 FSBMD
	1

No.	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
	0	1	2	3	4	16	5	48	40	40

No.	1023	1905#0 FSBLS	1905#6 FSBM1	1905#7 FSBM2	1936	1937
X	1	0	1	0	0	0
Y	3	0	0	1	0	1
Z	4	1	0	1	0	0
A	2	1	0	0	0	0
B	5	0	1	0	1	0
C	6	1	0	1	0	2

2.3. Manual setting 1

As default for manual setting 1 please set the following parameter:

No. 1902#0=0
No. 1902#1=0
No. 1910…1919 set all to 0

In manual setting 1, the slave No. has to correspond to the value in No. 1023 for each axis.
The axis, set in parameter No. 1023=1 is connected to the first amplifier (first slave) and the axis, set in parameter No. 1023=2 is connected to the second amplifier (second slave).
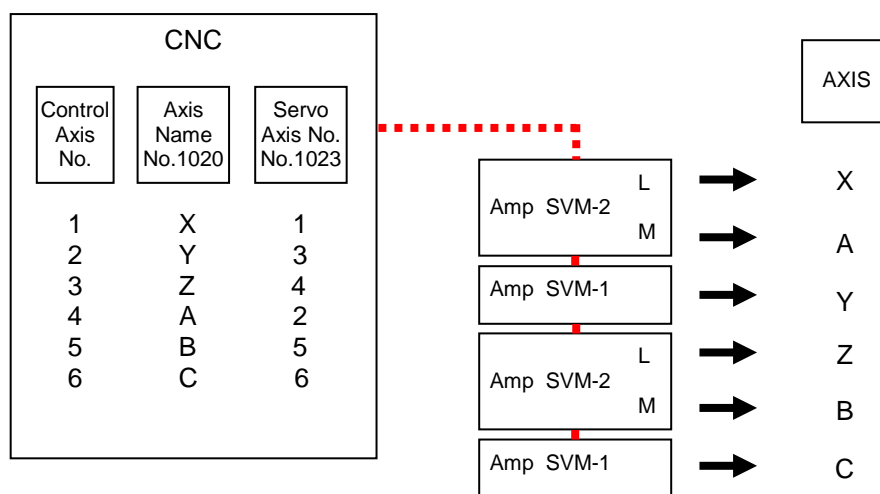
Please pay attention to the following restrictions:

- Pulse Module is not available by using this setting. That means external position detector is not usable.
- Please set consecutive value in parameter No. 1023. You can not set 3 without setting 2 in No. 1023.
- The following functions are not available:

  - Learning control
  - High speed current loop control
  - Electrical gear box function

FANUC

3.   Troubleshooting and Recovery

Alarm list: Pulse coder

Number of CNC Alarms	Message	Meaning
360	n AXIS : ABNORMAL CHECKSUM (INT)	A checksum error occurred in the built–in pulse coder.
361	n AXIS : ABNORMAL PHASE DATA (INT)	A phase data error occurred in the built–in pulse coder.
362	n AXIS : ABNORMAL REV.DATA (INT)	A rotation speed count error occurred in the built–in pulse coder.
363	n AXIS : ABNORMAL CLOCK (INT)	A clock error occurred in the built–in pulse coder.
364	n AXIS : SOFT PHASE ALARM (INT)	The digital servo software detected invalid data in the built–in pulse coder.
365	n AXIS : BROKEN LED (INT)	An LED error occurred in the built–in pulse coder.
366	n AXIS : PULSE MISS (INT)	A pulse error occurred in the built–in pulse coder.
367	n AXIS : COUNT MISS (INT)	A count error occurred in the built–in pulse coder.
368	n AXIS : SERIAL DATA ERROR (INT)	Communication data from the built–in pulse coder cannot be received.
369	n AXIS : BROKEN LED (EXT) (INT)	A CRC or stop bit error occurred in the communication data being received from the built–in pulse coder.
380	n AXIS : BROKEN LED (EXT)	The separate detector is erroneous.
381	n AXIS : ABNORMAL PHASE (EXT LIN)	A phase data error occurred in the separate linear scale.
382	n AXIS : COUNT MISS (EXT)	A pulse error occurred in the separate detector.
383	n AXIS : PULSE MISS (EXT)	A count error occurred in the separate detector.
384	n AXIS : SOFT PHASE ALARM (EXT)	The digital servo software detected invalid data in the separate detector.
385	n AXIS : SERIAL DATA ERROR (EXT)	Communication data from the separate detector cannot be received.
386	n AXIS : DATA TRANS. ERROR (EXT)	A CRC or stop bit error occurred in the communication data being received from the separate detector.

Alarm list: Servo Amplifier

| Number of CNC Alarms	Message	Meaning
430	n AXIS : SV. MOTOR OVERHEAT	A servo motor overheat occurred.
431	n AXIS : CNV. OVERLOAD	1) PSM: Overheat occurred. 2) β series SVU: Overheat occurred.
432	n AXIS : CNV. LOWVOLT CON./ POWFAULT	1) PSM: Phase missing occurred in the input voltage. 2) PSMR: The control power supply voltage has dropped. 3) α series SVU: The control power supply voltage has dropped.
433	n AXIS : CNV. LOW VOLT DC LINK	1) PSM: The DC link voltage has dropped. 2) PSMR: The DC link voltage has dropped. 3) α series SVU: The DC link voltage has dropped. 4) β series SVU: The DC link voltage has dropped.
436	n AXIS : SOFTTHERMAL (OVC)	The digital servo software detected the soft thermal state (OVC).
438	n AXIS : INV. ABNORMAL CUR-RENT	1) SVM: The motor current is too high. 2) α series SVU: The motor current is too high. 3) β series SVU: The motor current is too high.
439	n AXIS : CNV. OVERVOLT POWER	1) PSM: The DC link voltage is too high. 2) PSMR: The DC link voltage is too high. 3) α series SVU: The DC link voltage is too high. 4) β series SVU: The link voltage is too high.
440	n AXIS : CNV. EX DECELERATION POWER	1) PSMR: The regenerative discharge amount is too large. 2) α series SVU: The regenerative discharge amount is too large. Al-Alternatively, the regenerative discharge circuit is abnormal.
441	n AXIS : ABNORMAL CURRENT OFFSET	The digital servo software detected an abnormality in the motor current detection circuit. (current feedback)
443	n AXIS : CNV. COOLING FAN FAILURE	1) PSM: The internal stirring fan failed. 2) PSMR: The internal stirring fan failed. 3) β series SVU: The internal stirring fan failed.

Number of CNC alarms	Message	Meaning
445	n AXIS : SOFT DISCONNECT ALARM	The digital servo software detected a broken wire in the pulse coder.
446	n AXIS : HARD DISCONNECT ALARM	A broken wire in the built–in pulse coder was detected by hardware.
447	n AXIS : HARD DISCONNECT (EXT)	A broken wire in the separate detector was detected by hardware.
448	n AXIS : UNMATCHED FEEDBACK ALARM	The sign of feedback data from the built–in pulse coder differs from that of feedback data from the separate detector.
460	n AXIS : FSSB DISCONNECT	FSSB communication was disconnected suddenly. The possible causes are as follows: 1) The FSSB communication cable was disconnected or broken. 2) The power to the amplifier was turned off suddenly. 3) A low–voltage alarm has been detected by the amplifier.
461	n AXIS : ILLEGAL AMP INTERFACE	The axes of the 2–axis amplifier were assigned to the fast type interface.
462	n AXIS : SEND CNC DATA FAILED	Because of an FSSB communication error, a slave could not receive correct data.
463	n AXIS : SEND SLAVE DATA FAILED	Because of an FSSB communication error, the servo system could not receive correct data.
464	n AXIS : WRITE ID DATA FAILED	An attempt was made to write maintenance information on the amplifier maintenance screen, but it failed.
465	n AXIS : READ ID DATA FAILED	At power–up, amplifier initial ID information could not be read.
466	n AXIS : MOTOR/AMP COMBINA-TION	The maximum current rating for the amplifier does not match that for the motor. (Par.: 2165)
467	n AXIS : ILLEGAL SETTING OF AXIS	The servo function for the following has not been enabled when an axis occupying a single DSP (corresponding to two ordinary axes) is specified on the axis setting screen. 1. Learning control (bit 5 of parameter No. 2008 = 1) 2. High–speed current loop (bit 0 of parameter No. 2004 = 1) 3. High–speed interface axis (bit 4 of parameter No. 2005 = 1)

Alarm list: P/S alarm

Number of CNC Alarms	Message	Meaning
5134	FSSB : OPEN READY TIME OUT	Initialization did not place FSSB in the open ready state.
5135	FSSB : ERROR MODE	FSSB has entered error mode.
5136	FSSB : NUMBER OF AMPS IS SMALL	In comparison with the number of controlled axes, the number of amplifiers recognized by FSSB is not enough.
5137	FSSB : CONFIGURATION ERROR	FSSB detected a configuration error.
5138	FSSB : AXIS SETTING NOT COMPLETE	In automatic setting mode, axis setting has not been made yet. Perform axis setting on the FSSB setting screen.
5197	FSSB : OPEN TIME OUT	The CNC permitted FSSB to open, but FSSB was not opened.
5198	FSSB : ID DATA NOT READ	Temporary assignment failed, so amplifier initial ID information could not be read.

4. FSSB setting with 30i-A control

4.1. Hardware configuration

COP10A-3
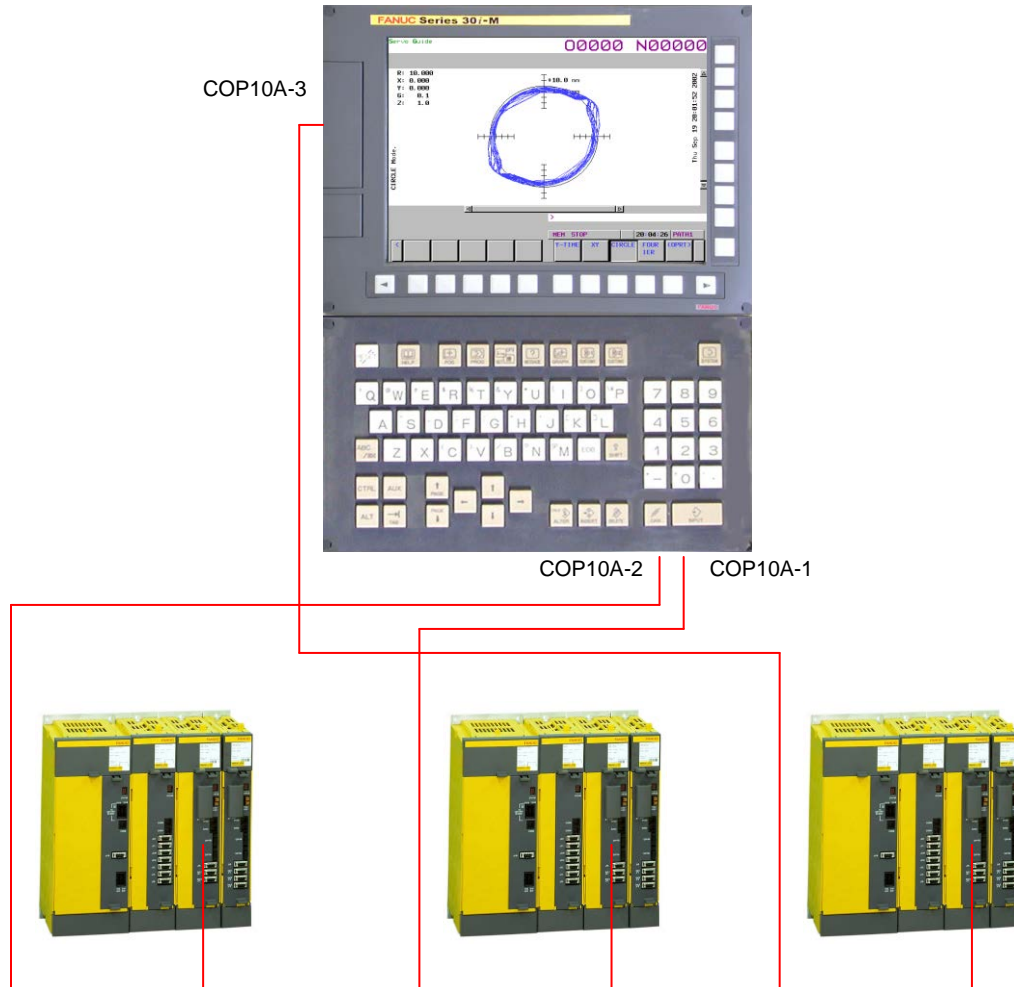
COP10A-2   COP10A-1

	Control method and maximum number of axes			Connector name	Remarks
	HRV2	HRV3	HRV4		
First FSSB line	16 axes	10 axes	4 axes	COP10A–1	On the servo card
Second FSSB line	8 axes	8 axes	2 axes	COP10A–2	On the servo card
Third FSSB line	8 axes	8 axes	4 axes	COP10A–3	On the additional axis board

new separate detection unit SDU is required

Vent holes   Flat cable

Basic unit   Expansion unit
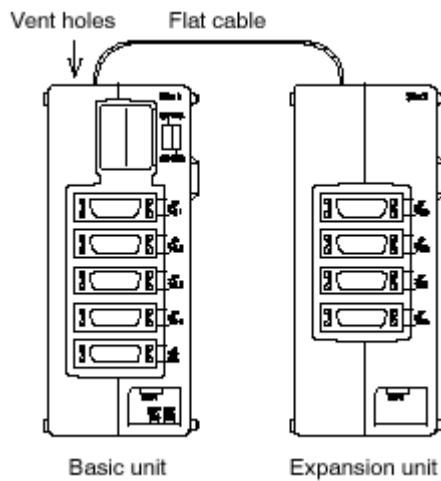
Order specification: A02B–0303–C205   A02B–0236–C204

Maximum No. of SDU's connectable to 1 FSSB line:

Using HRV2/3 ➜   2 SDU's +2 expansion ➜   16 external pulse coder or scales
Using HRV4   ➜   1 SDU+1expansion   ➜   8 external pulse coder or scales

Remark: SDU's connected to first or second FSSB line support only axes of first and second FSSB, not axis of third FSSB.
SDU's connected to third FSSB line support axes of third FSSB and not of first or second FSSB.

4.2. FSSB setting methods

Basically the same setting methods as with 16i, 18i, 21i are valid:
- Automatic setting
- Manual setting 1
- Manual setting 2

Differences in 30i conventional and new parameter setting:

			CONVENTIONAL	NEW
FSSB mode parameter			No.14476#0=1	No.14476#0=0
ATR value for Slave	**Basic axis card**	Line1	No.1910～1919	No.14340～14357
		Line2	No.1970～1979	No.14358～14375
	Additional axis board	Line1	No.14220～14229	No.14408～14425
ATR value for Separate detector I/F unit	**Basic axis card**	1st	—	No.14376～14383
		2nd	—	No.14384～14391
		3rd	—	No.14392～14399
		4th		No.14400～14407
	Additional axis board	1st	—	No.14444～14451
		2nd	—	No.14452～14459
Separate detector I/F unit is used		1st	No.1905#6=1	No.1905#6=1
		2nd	No.1905#7=1	No.1905#7=1
		3rd	—	No.1905#1=1
		4th	—	No.1905#2=1
Connector number of separate detector I/F unit		1st	No.1936	No.1936
		2nd	No.1937	No.1937
		3rd	—	No.1938
		4th	—	No.1939

Conventional parameter setting is still possible with 90D0 servo software. If HRV4 is required New setting and 90E0 servo software are necessary.

Note: Booth servo software versions can be loaded into 30i. Parameter 14476#1 defines
14476#1=0   90D0 servo software
14476#1=1   90E0 servo software

4.2.1. Automatic setting

- set parameter 1902#0=0
- specify on AMP - amplifier setting screen axis connected to each amplifier
- check on 2nd page No. of connected SDU's

- confirm amplifier setting by pushing

SETING

- define on AXIS – axis setting page:
  - M1-4: connector number of separate detector interface
  - 1-DSP: if number of high speed current loop axis is limited on 1 DS
    (0 – no limitation, 3 – 3axis per DSP➔ HRV3, 1 – 1axis per DSP➔ HRV4)
  - CS: CS contour controlled axis – displayed Spindle No. is used for interpolation with a servo axis
  - TNDM: setting of tandem controlled axis pairs – odd No. is Tandem master subsequent even No. is defined as appendant slave

- confirm axes setting by pushing **SETING**

- Check setting information on MAINTENANCE – amplifier maintenance screen

  - AXIS : Controlled axis number
  - NAME : Controlled axis name
  - AMP : Type of amplifier connected to each axis
  - SERIES : Servo amplifier series of an amplifier connected to each axis (Alpha, Beta)
  - UNIT : Unit type of a servo amplifier connected to each Axis (SVM, SVPM)
  - AXES : Maximum number of axes controlled by an amplifier connected to each axis
  - CUR. : Maximum rating current for amplifiers connected to each axis
  - EDITION : Unit version number of an amplifier connected to each axis
  - TEST :Date of test performed on an amplifier connected to each axis – Example: 030123 = January 23, 2003
  - MAINTE-No. :Engineering change number for an amplifier connected to each axis Setting

4.2.2. Manual setting 2

Please set the following parameter by hand in order to carry out manual setting 2:

Parameter 1902#0=1, 1902#1=0
Parameter 1023
Parameter 1905
Parameter 14340 … 14407 (14408-14425, 14444-14459 in case additional axis board is used)
Parameter 1936 - 1939

No.		7	6	5	4	3	2	1	0
1902								ASIGN	FSBMD

Data type. Bit

FSBMD setting mode selection

　　　　0 : Automatic setting mode
　　　　　　(By using of FSSB setting screen, when the information of axis and amplifier
　　　　　　have been entered, parameter No. 1023,1905,1910…1919, 1936, 1937 will be set
　　　　　　automatically.
　　　　1 : Manual setting 2
　　　　　　(Please input parameter No. 1023,1905,1910…1919, 1936, 1937 by hand)

ASIGN Automatic setting of FSSB

　　　　0: is not complete
　　　　1: is complete
　　　　　　(After automatic setting have been carry out successfully, this bit becomes 1 automatically)

No.		7	6	5	4	3	2	1	0
1905		PM2	PM1				PM4	PM3	

Data type: Bit

PM3　　3rd separate detector interface

　　　　0 : is not used
　　　　1 : Used

PM4　　4th separate detector interface

　　　　0 : is not used
　　　　1 : Used

PM1   1st separate detector interface

      0 : is not used
      1 : Used

PM2   2nd separate detector interface

      0 : is not used
      1 : Used

1936	Connector number of 1st Pulse Module
1937	Connector number of 2nd Pulse Module
1938	Connector number of 3rd Pulse Module
1939	Connector number of 4th Pulse Module

Data type: byte
Data range: 0…7

In case of Pulse Module, please set connector No. – 1 for each axis.
That means the number of connector 1…8 corresponds to setting 0…7.
The parameter No. 1905 have to be set as well.
Please set 0 for connectors, which are not used.
If not all connectors are required, please start the range of connector from connector 1 and continue with connector 2 and so on. With other words it's not possible to use for instance connector 3 without using connector 2.

Correspondence between connectors and connector numbers	
Connector	Connector number
JF101	0
JF102	1
JF103	2
JF104	3
JF105	4
JF106	5
JF107	6
JF108	7

Example of setting)

Controlled axis	Separate detector connection destination				Parameter setting				
	Connectors for 1st unit	Connectors for 2nd unit	Connectors for 3rd unit	Connectors for 4th unit	No. 1936	No. 1937	No. 1938	No. 1939	No.1905 (#7,#6,#2,#1)
X1	JF101	-	-	-	0	-	-	-	0,1,0,0
Y1	-	JF102	-	-	-	1	-	-	1,0,0,0
Z1	-	-	JF102	-	-	-	1	-	0,0,0,1
X2	-	JF101	-	-	-	0	-	-	1,0,0,0
Y2	-	-	-	JF101	-	-	-	0	0,0,1,0
Z2	-	-	-	-	-	-	-	-	0,0,0,0
A1	-	-	JF101	-	-	-	0	-	0,0,0,1
B1	-	-	-	JF102	-	-	-	1	0,0,1,0
C1	-	JF104	-	-	-	3	-	-	1,0,0,0
A2	JF102	-	-	-	1	-	-	-	0,1,0,0
B2	-	JF103	-	-	-	2	-	-	1,0,0,0
C2	-	-	-	JF103	-	-	-	2	0,0,1,0

No.

| 14340 | | ATR value corresponding to slave 01 on FSSB line 1 |

to

| 14357 | | ATR value corresponding to slave 18 on FSSB line 1 |

Data type: bit
Data range: 0…23, 64, -56, -96

Please set the value of address conversion table for slave 1…18
Each device, amplifier or pulse module connected to CNC by optical cable is called "Slave".
The slave order start with 1 (next module after CNC) up to 18.
Two axes amplifier consists of two slaves and three axes has three slaves.

Please set the parameter as follows:

- In case of amplifier:

    Set the related value of parameter No. 1023-1

- In case of pulse module:

    Please set 64 for first pulse module (near from CNC) and -56 for the second pulse module (far from CNC)
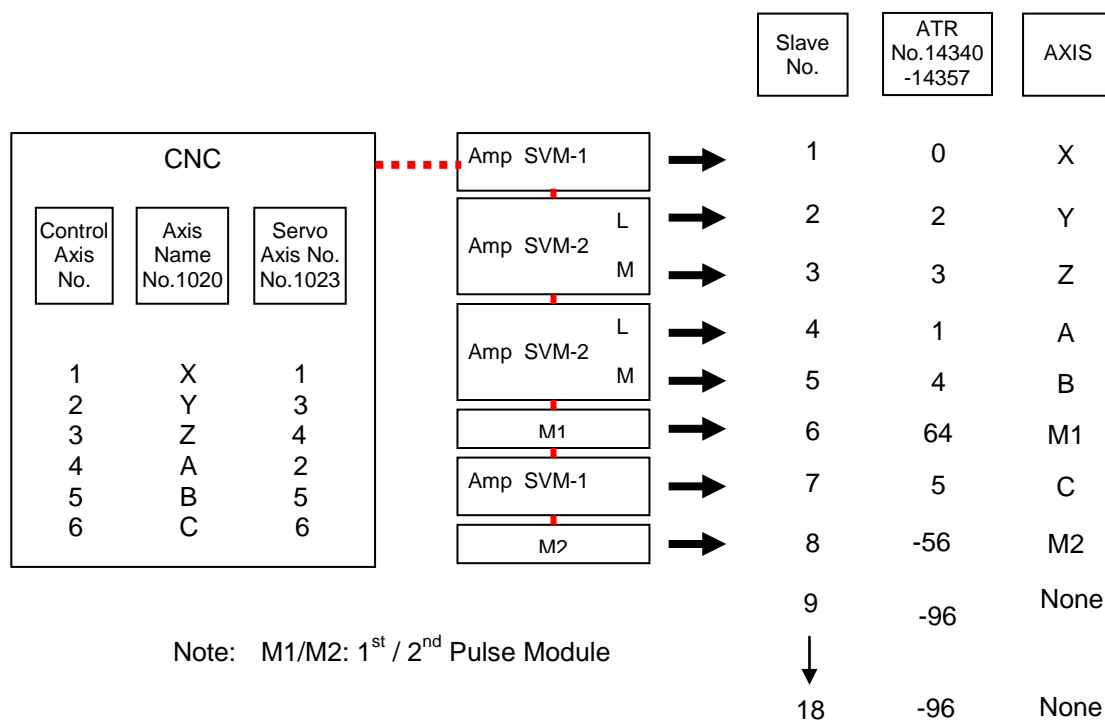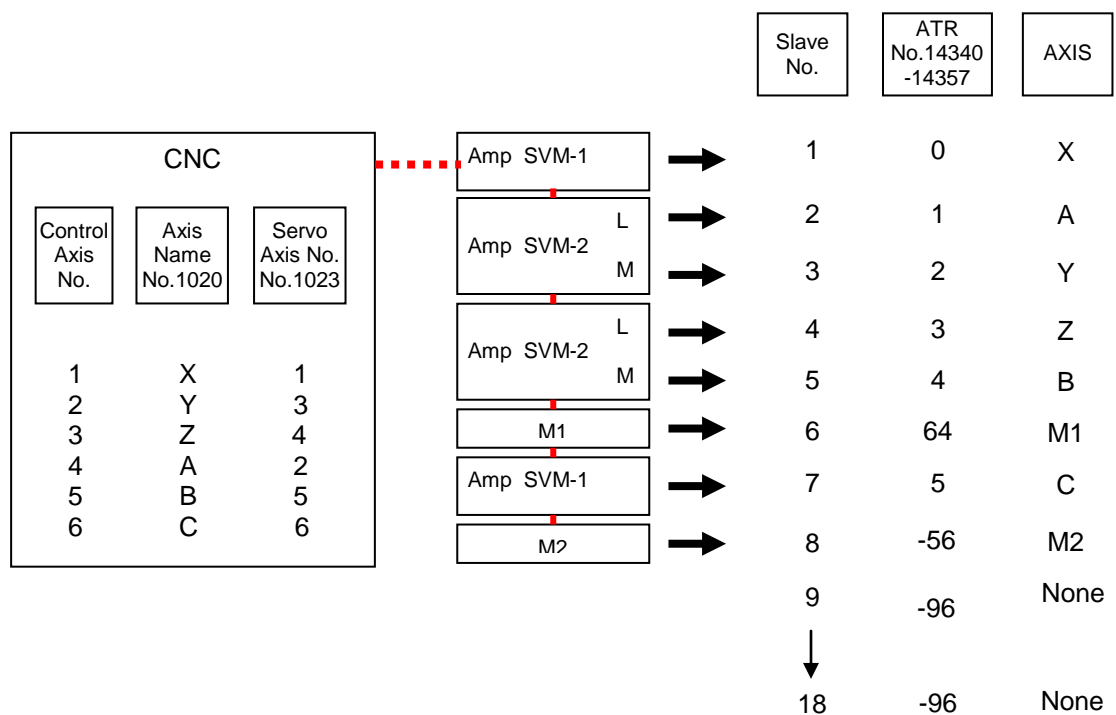
- No slave connected:

    Please set -96

In case of using Electrical Gear Box function, please set these parameter as follows:

EGB dummy axis designated in parameter no. 7771 does not require an amplifier.
Don't set not 40 for such EGB dummy axis but the value in parameter No. 1023-1

Example of axis configuration and parameter setting:

Slave No.	ATR No.14340 -14357	AXIS
1	0	X
2	1	A
3	2	Y
4	3	Z
5	4	B
6	64	M1
7	5	C
8	-56	M2
9	-96	None
18	-96	None

CNC

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

Amp SVM-1
Amp SVM-2 L M
Amp SVM-2 L M
M1
Amp SVM-1
M2

Slave No.	ATR No.14340 -14357	AXIS
1	0	X
2	2	Y
3	3	Z
4	1	A
5	4	B
6	64	M1
7	5	C
8	-56	M2
9	-96	None
18	-96	None

CNC

Control Axis No.	Axis Name No.1020	Servo Axis No. No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

Amp SVM-1
Amp SVM-2 L M
Amp SVM-2 L M
M1
Amp SVM-1
M2

Note: M1/M2: 1st / 2nd Pulse Module

No.

| 14358 | ATR value corresponding to slave 01 on FSSB line 2 |

to

| 14375 | ATR value corresponding to slave 18 on FSSB line 2 |

Data type: bit
Data range: 0…23, 80, -40, -96

Please set the value of address conversion table for slave 1…18
Each device, amplifier or pulse module connected to CNC by optical cable is called "Slave".
The slave order start with 1 (next module after CNC) up to 18.
Two axes amplifier consists of two slaves and three axes has three slaves.

Please set the parameter as follows:

- In case of amplifier:

  Set the related value of parameter No. 1023-1

- In case of pulse module:

  Please set 80 for third pulse module (near from CNC) and -40 for the forth
  pulse module (far from CNC)

- No slave connected:

  Please set –96

No.

No.	
14376	ATR value corresponding to connector 1 of 1st separate detector interface unit
to	
14383	ATR value corresponding to connector 8 of 1st separate detector interface unit
14384	ATR value corresponding to connector 1 of 2nd separate detector interface unit
to	
14391	ATR value corresponding to connector 8 of 2nd separate detector interface unit
14392	ATR value corresponding to connector 1 of 3rd separate detector interface unit
to	
14399	ATR value corresponding to connector 8 of 3rd separate detector interface unit
14400	ATR value corresponding to connector 1 of 4th separate detector interface unit
to	
14407	ATR value corresponding to connector 8 of 4th separate detector interface unit

Data type: bit
Data range: 0…32

Each of these parameters sets the value (ATR value) of the address translation table corresponding to each connector on a separate detector interface unit.
The first and second separate detector interface units are connected to FSSB line 1, and the third and fourth separate detector interface units are connected to FSSB line 2.
In each of these parameters, set a value of parameter No. 1023 –1 for the axis connected to a connector on a separate detector interface unit.
When for an axis separate detector interface unit is not used, set 32 for those connectors.

No.

14408	ATR value corresponding to slave 01 on additional axis board
to	
14425	ATR value corresponding to slave 18 on additional axis board

Data type: bit
Data range: 0…23, 64, -56, -96

Please set the value of address conversion table for slave 1…18
Each device, amplifier or pulse module connected to CNC by optical cable is called "Slave".
The slave order start with 1 (next module after CNC) up to 18.
Two axes amplifier consists of two slaves and three axes has three slaves.

Please set the parameter as follows:

- In case of amplifier:

    Set the related value of parameter No. 1023-25

- In case of pulse module:

    Please set 64 for first pulse module (near from CNC) and -56 for the second pulse module (far from CNC)

- No slave connected:

    Please set -96

No.

14444	ATR value corresponding to connector 1 of 1st separate detector interface unit connected to additional axis board
to	
14451	ATR value corresponding to connector 8 of 1st separate detector interface unit connected to additional axis board
14452	ATR value corresponding to connector 1 of 2nd separate detector interface unit connected to additional axis board
to	
14459	ATR value corresponding to connector 8 of 2nd separate detector interface unit connected to additional axis board

Data type: bit
Data range: 0…32

Each of these parameters sets the value (ATR value) of the address translation table corresponding to each connector on a separate detector interface unit connected to an additional axis board.
The first and second separate detector interface are connected to an additional axis board.
In each of these parameters, set a value of parameter No. 1023 –25 for the axis connected to a connector on a separate detector interface unit.
When for an axis separate detector interface unit is not used, set 32 for those connectors.

Parameter setting example with following configuration:

The number of controlled axes is 32.
For each axis, a separate detector is used.

Servo axis control card FSSB line 1 (16 axes: X1 to Y5)
Three-axis amplifier, three-axis amplifier, three-axis amplifier,
three-axis amplifier, two-axis amplifier, two-axis amplifier,
first pulse module, and second pulse module are connected
in this order.

Servo axis control card FSSB line 2 (8 axes: Z5 to X8)
Three-axis amplifier, three-axis amplifier, two-axis amplifier,
third pulse module, and fourth pulse module
are connected in this order.

Additional axis board FSSB line (8 axes: Y8 to Z10)
Three-axis amplifier, three-axis amplifier, two-axis amplifier,
first pulse module, and second pulse module
are connected in this order.

No.	14340	14341	14342	14343	14344	14345	14346	14347	14348
	0	1	2	3	4	5	6	7	8
No.	14349	14350	14351	14352	14353	14354	14355	14356	14357
	9	10	11	12	13	14	15	64	-56

No.	14358	14359	14360	14361	14362	14363	14364	14365	14366
	16	17	18	19	20	21	22	23	80
No.	14367	14368	14369	14370	14371	14372	14373	14374	14375
	-40	-96	-96	-96	-96	-96	-96	-96	-96

No.	14408	14409	14410	14411	14412	14413	14414	14415	14416
	0	1	2	3	4	5	6	7	64
No.	14417	14418	14419	14420	14421	14422	14423	14424	14425
	-56	-96	-96	-96	-96	-96	-96	-96	-96

No.	14376	14377	14378	14379	14380	14381	14382	14383
	0	1	2	3	8	9	10	11
No.	14384	14385	14386	14387	14388	14389	14390	14391
	4	5	6	7	12	13	14	15
No.	14392	14393	14394	14395	14396	14397	14398	14399
	16	17	18	19	32	32	32	32
No.	14400	14401	14402	14403	14404	14405	14406	14407
	20	21	22	23	32	32	32	32
No.	14444	14445	14446	14447	14448	14449	14450	14451
	0	1	2	3	32	32	32	32
No.	14452	14453	14454	14455	14456	14457	14458	14459
	4	5	6	7	32	32	32	32

| No.	1023	1905#6 PM1	1905#7 PM2	1905#1 PM3	1905#2 PM4	1936	1937	1938	1939
X1	1	1	0	0	0	0	-	-	-
Y1	2	1	0	0	0	1	-	-	-
Z1	3	1	0	0	0	2	-	-	-
A1	4	1	0	0	0	3	-	-	-
X2	5	0	1	0	0	-	0	-	-
Y2	6	0	1	0	0	-	1	-	-
Z2	7	0	1	0	0	-	2	-	-
A2	8	0	1	0	0	-	3	-	-
X3	9	1	0	0	0	4	-	-	-
Y3	10	1	0	0	0	5	-	-	-
Z3	11	1	0	0	0	6	-	-	-
X4	12	1	0	0	0	7	-	-	-
Y4	13	0	1	0	0	-	4	-	-
Z4	14	0	1	0	0	-	5	-	-
X5	15	0	1	0	0	-	6	-	-
Y5	16	0	1	0	0	-	7	-	-
Z5	17	0	0	1	0	-	-	0	-
X6	18	0	0	1	0	-	-	1	-
Y6	19	0	0	1	0	-	-	2	-
Z6	20	0	0	1	0	-	-	3	-
X7	21	0	0	0	1	-	-	-	0
Y7	22	0	0	0	1	-	-	-	1
Z7	23	0	0	0	1	-	-	-	2
X8	24	0	0	0	1	-	-	-	3
Y8	25	1	0	0	0	0	-	-	-
Z8	26	1	0	0	0	1	-	-	-
X9	27	1	0	0	0	2	-	-	-
Y9	28	1	0	0	0	3	-	-	-
Z9	29	0	1	0	0	-	0	-	-
X10	30	0	1	0	0	-	1	-	-
Y10	31	0	1	0	0	-	2	-	-
Z10	32	0	1	0	0	-	3	-	-

4.3. Alarm and Messages

Number of CNC Alarms	Message	Meaning
SV0456	ILLEGAL CURRENT LOOP	An attempt was made to set the current loop that could not be set. The amplifier pulse module in use does not comply with HIGH SPEED HRV. Or, requirements to control are not satisfied in the system.
SV0458	CURRENT LOOP ERROR	The specified current loop differs from the actual current loop.
SV0459	HI HRV SETTING ERROR	For two axes whose servo axis numbers (parameter No. 1023) are consecutively even and odd numbers, HIGH SPEED HRV control is possible for one axis and impossible for the other.
SV0460	FSSB DISCONNECT	The FSSB connection was discontinued. Or, the FSSB connection cable was disconnected or broken. The amplifier was turned off . In the amplifier, the low-voltage alarm occurred.
SV0462	SEND CNC DATA FAILED	The correct data could not be received on a slave side because of the FSSB communication error.
SV0463	SEND SLAVE DATA FAILED	The correct data could not be received in the servo software because of the FSSB communication error.
SV0465	READ ID DATA FAILED	A read of the ID information for the amplifier has failed at power-on.
SV0466	MOTOR/AMP. COMBINATION	The maximum current of an amplifier is different to that of a motor. Or, the connection command for an amplifier is incorrect. The parameter setting is incorrect

SV0468	HI HRV SETTING ERROR(AMP)	An attempt was made to set up HIGH SPEED HRV control for use when the controlled axis of an amplifier for which HIGH SPEED HRV control could not be used.
SV5134	FSSB:OPEN READY TIME OUT	In the initialization, the FSSB could not be in an open ready state. The axis card is thought to be defective.
SV5136	FSSB:NUMBER OF AMP. IS INSUFFICIENT	The number of amplifier identified by the FSSB is insufficient than the number of control axes. Or, the setting of the number of axes or the amplifier connection is in error.
SV5137	FSSB:CONFIGURATION ERROR	An FSSB configuration error occurred. The connecting amplifier type is incompatible with the FSSB setting value.
SV5138	FSSB:AXIS SETTING NOT COMPLETE	The axis setting has not completed yet, in an automatic setting mode.
SV5139	FSSB:ERROR	The axis setting has not completed yet, in an automatic setting mode.
SV5197	FSSB:OPEN TIME OUT	Servo initialization has not completed successfully. It is probable that an optical cable failed or a connection between the amplifier and another module failed.
SV5311	FSSB:ILLEGAL CONNECTION	1. This alarm is issued if axes, whose servo axis numbers (parameter No. 1023) are even and odd numbers, are allocated to the amplifiers connected to the FSSB's of different paths. 2. This alarm is issued if an attempt is made to set up for use of the pulse modules connected to the FSSB's of different paths. And the system did not satisfy the requirements for performing HIGH SPEED HRV control.

5. FSSB setting with 30i-B control

5.1. Hardware configuration

COP10A-3

COP10A-2   COP10A-1
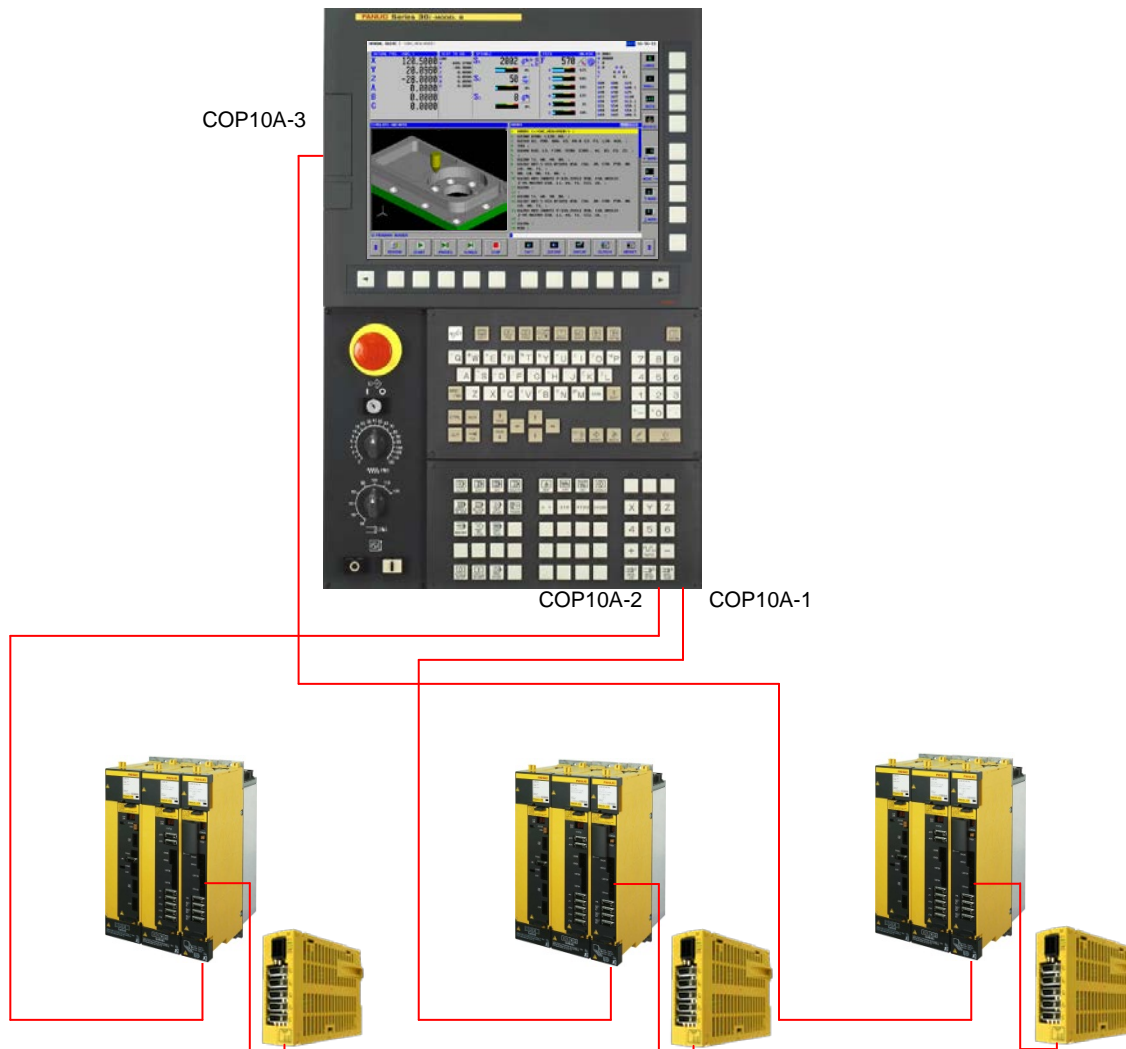
New: Spindle amplifier can also be connected to FSSB line

Function		30i-A	30i-B	
			Case of automatic parameter setting mode	**Case of manual parameter setting mode**
Total of servo and spindle axes per one FSSB line	HRV2	16 Note1)	28+4SDU	32 Note 2)
	HRV3	10 Note1)	13+2SDU	15 Note 2)
	HRV4	5 Note1)	6+1SDU	7 Note 2)
Multiple HRV setting on servo card		Not available	Not available	Available

Note 1) Spindle axis is not included.
Note 2) When SDU is used SDU is counted as one axis.

New separate detection unit SDU is required
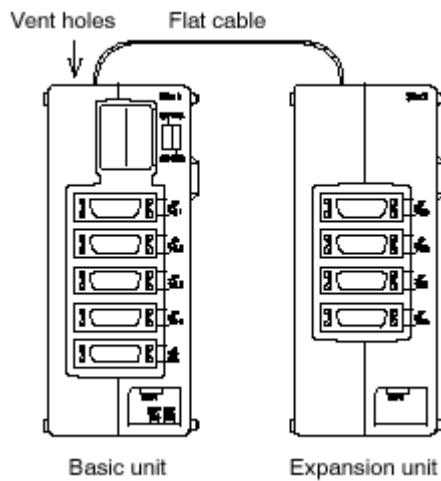
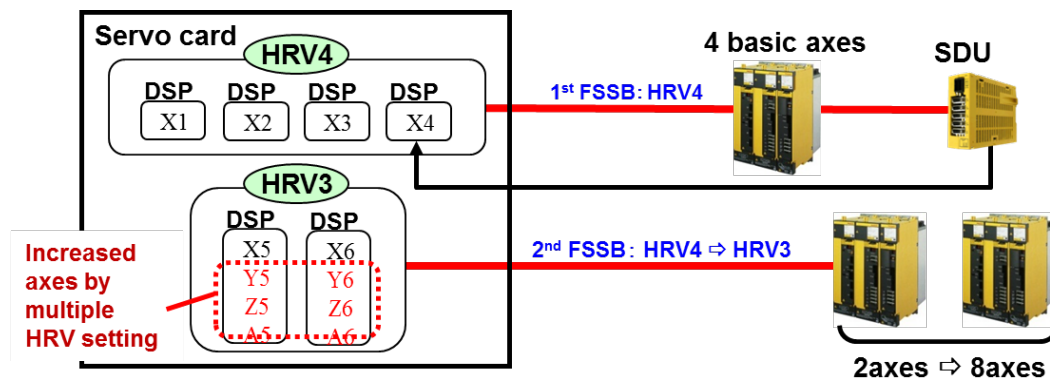Order specification: A02B–0323–C205   A02B–0333–C204

Controllable axes per one DSP:

HRV2	6
HRV3	4
HRV4	1

Combination of HRV2+3 or HRV4+3 is possible in the servo card with 2 FSSB output.

Example : Servo card with two FSSB line and 6 DSPs controls 4 basic axes in HRV4 mode

Servo Software: 90G0 series

No. of servo axes needs to be defined in **P1023** as follows:

For 6 axes (HRV2):

Axes	Parameter No.1023 Setting value
(1st axis)	1
(2nd axis)	2
(2rd axis)	3
(4th axis)	4
(5th axis)	5
(6th axis)	6

For more than 6 axes in HRV2

Axes	Parameter No.1023 Setting value
(1st axis)	1
(2nd axis)	2
(3rd axis)	3
(4th axis)	4
(5th axis)	5
(6th axis)	6
(7th axis)	9
(8th axis)	10
(9th axis)	11
(10th axis)	12
(11th axis)	13
(12th axis)	14
(13th axis)	17
(14th axis)	18

Setting in HRV3

Axes	Parameter No.1023 Setting value
(1st axis)	1
(2nd axis)	2
(3rd axis)	3
(4th axis)	4
(5th axes)	9
(6th axes)	10
(7th axis)	11
(8th axis)	12
(9th axis)	17
(10th axis)	18

Setting in HRV4

Axes	Parameter No.1023 Setting value
(1st axis)	1
(2nd axis)	9
(3rd axis)	17
(4th axis)	25
(5th axes)	33
(6th axes)	41

5.2. FSSB setting methods

Basically the same setting methods as with 16i, 18i, 21i, 30i-A are valid:
- Automatic setting
- Manual setting 1
- Manual setting 2

Differences in 30i-A and 30i-B parameter setting:

			30i-A		30i-B
ATR value for Slave	Basic axis card	Line1	No.14340～14357		No. 24000~24031
		Line2	No.14358～14375		No. 24032~24063
	Additional axis board	Line1	No.14408～14425		No. 24064~24095
ATR value for Separate detector I/F unit	Basic axis card	1st	No.14376～14383	1st	No. 24104~24111
		2nd	No.14384～14391	2nd	No. 24112~24119
		3rd	No.14392～14399	3rd	No. 24120~24127
		4th	No.14400～14407	4th	No. 24128~24135
	Additional axis board	1st	No.14444～14451	5th	No. 24136~24143
		2nd	No.14452～14459	6th	No. 24144~24151
				7th	No. 24152~24159
				8th	No. 24160~24167
				9th	No. 24168~24175
				10th	No. 24176~24183
				11th	No. 24184~24191
				12th	No. 24192~24199
Separate detector I/F unit is used		1st	No.1905#6=1		-
		2nd	No.1905#7=1		-
		3rd	No.1905#1=1		-
		4th	No.1905#2=1		-
Connector number of separate detector I/F unit		1st	No.1936	1st/9th	No. 24096
		2nd	No.1937	2nd/10th	No. 24097
		3rd	No.1938	3rd/11th	No. 24098
		4th	No.1939	4th/12th	No. 24099
				5th	No. 24100
				6th	No. 24101
				7th	No. 24102
				8th	No. 24103
Separate detector for multiple axes					No. 14476#5=1

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5.2.1. Automatic setting

- set parameter 1902#0=0
- specify on Servo and Spindle amplifier setting screen axis connected to each amplifier
- select current control Mode HRV2,3,4
- check on 2nd page No. of connected SDU's, Cs contouring and Master/Slave axes

- confirm all setting by pushing

SETING

```
ACTUAL POSITION                          O0123 N00000

          ABSOLUTE          F                        0 MM/MIN
  X M1          0.000     PARTS COUNT                    14
  X S1          0.000     RUN TIME                 0H52M49S
                          CYCLE TIME               0H 0M 0S
  Y             0.000        SERVO AMPLIFIER SETTING
  Z             0.000            HRV      2
  A             0.000     NO.   AMP   SERIES    CUR.  AXIS  NAME
                          1-01  A1-L   αi SV    20A    01   XM1
          MODAL           1-02  A1-M   αi SV    20A    02   XS1
G00  G80  G15  F500.0000 M  1-03  A1-N   αi SV    20A    03   Y
G17  G98  G40.1H        M    1-04  A2-L   αi SV    20A    04   Z
G90  G50  G25  D        M    1-05  A2-M   αi SV    20A    05   A
G22  G67  G160 T            1-06  A2-N   αi SV    20A    06   B
G94  G97  G13.1S           2-01  A3-L   βi SV    40A    07   X2
G21  G54  G50.1           2-02  A3-M   βi SV    40A    08   Y2
G40  G64  G54.2          2-03  A3-N   βi SV    40A    09   Z2
G49  G69  G80.5         A>_
S           0/MIN

                        MDI   **** *** ***   12:00:00 PATH1
< ABSOLU RELATI ALL       SETTIN      CANCEL      INPUT
  TE    VE                G
```

```
ACTUAL POSITION                          O0123 N00000

          ABSOLUTE          F                        0 MM/MIN
  X M1          0.000     PARTS COUNT                    14
  X S1          0.000     RUN TIME                 0H52M49S
                          CYCLE TIME               0H 0M 0S
  Y             0.000        SPINDLE AMPLIFIER SETTING
  Z             0.000     NO.   AMP   SERIES   PWR.  SP NUM NAME
  A             0.000     1-07  B1-1   αi SP   5.5kW   01   SA1
                          1-08  B2-1   αi SP   5.5kW   02   S2
          MODAL           1-09  B3-1   αi SP   5.5kW   03   S3
G00  G80  G15  F500.0000 M
G17  G98  G40.1H        M
G90  G50  G25  D        M
G22  G67  G160 T
G94  G97  G13.1S
G21  G54  G50.1
G40  G64  G54.2
G49  G69  G80.5
S           0/MIN         A>_

                        MDI   **** *** ***   12:00:00 PATH1
< ABSOLU RELATI ALL       SETTIN      CANCEL      INPUT
  TE    VE                G
```

Check of FSSB settings:

Connection status screen displays FSSB lines, HRV type, connected Servo/Spindle amplifier, Pulse modules including connector No.

Separate detector interface unit screen shows FSSB line, No. type and PCB ID of SDU's

Servo and Spindle Maintenance screens are useful for checking Servo/Spindle axes – amplifier configuration, current/power values, axes per amplifier, amplifier specification, version No. and serial No.

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Screen 1: Servo Amplifier Maintenance

```
ACTUAL POSITION                          O0123 N00000

              ABSOLUTE          F                          0 MM/MIN
  Xм1              0.000      PARTS COUNT                        14
  Xs1              0.000      RUN TIME                     0H52M49S
  Y                0.000      CYCLE TIME                   0H 0M 0S
  Z                0.000        SERVO AMPLIFIER MAINTENANCE
  A                0.000      No NAME      SPEC NUMBER    SERIAL NUMB

                              1  XM1 A06B-6117-H106#000001 V0123456789
              MODAL           2  XS1 A06B-6117-H106#000001 V0123456789
 G00   G80   G15  F500.0000 M 3   Y  A06B-6117-H106#000001 V0123456789
 G17   G98   G40.1 H       M  4   Z  A06B-6117-H106#000001 V0123456789
 G90   G50   G25   D       M  5   A  A06B-6117-H106#000001 V0123456789
 G22   G67   G160  T          6   B  A06B-6117-H106#000001 V0123456789
 G94   G97   G13.1 S          7  X2  A06B-6117-H106#000001 V0123456789
 G21   G54   G50.1           8  Y2  A06B-6117-H106#000001 V0123456789
 G40   G64   G54.2           9  Z2  A06B-6117-H106#000001 V0123456789
 G49   G69   G80.5          10  A2  A06B-6117-H106#000001 V0123456789
  S           0/MIN         11  B2  A06B-6117-H106#000001 V0123456789
                            12  C2  A06B-6117-H106#000001 V0123456789

                            A>_

                            MDI  **** *** ***     12:00:00 PATH1

 <  ABSOLU RELATI  ALL        AXIS SERVO  SPNDLE               +
    TE     VE                      MAINTE MAINTE
```

Screen 2: Spindle Amplifier Maintenance

```
ACTUAL POSITION                          O0123 N00000

              ABSOLUTE          F                          0 MM/MIN
  Xм1              0.000      PARTS COUNT                        14
  Xs1              0.000      RUN TIME                     0H52M49S
  Y                0.000      CYCLE TIME                   0H 0M 0S
  Z                0.000        SPINDLE AMPLIFIER MAINTENANCE
  A                0.000      No NAME  AMP     SERIES  AXES PWR.  EDIT

                              1 SA1 1-B1-1   αi SP    1  5.5kW  1A
              MODAL           2 S2  1-B2-1   αi SP    1  5.5kW  1A
 G00   G80   G15  F500.0000 M 3 S3  1-B3-1   αi SP    1  5.5kW  1A
 G17   G98   G40.1 H       M
 G90   G50   G25   D       M
 G22   G67   G160  T
 G94   G97   G13.1 S
 G21   G54   G50.1
 G40   G64   G54.2
 G49   G69   G80.5
  S           0/MIN

                            A>_

                            MDI  **** *** ***     12:00:00 PATH1

 <  ABSOLU RELATI  ALL        AXIS SERVO  SPNDLE               +
    TE     VE                      MAINTE MAINTE
```

FANUC

```
ACTUAL POSITION                              O0123 N00000
                    ABSOLUTE          F                        0 MM/MIN
  X M1                 0.000         PARTS COUNT                      14
  X S1                 0.000         RUN TIME                  0H52M49S
                                     CYCLE TIME                0H 0M 0S
  Y                    0.000          SPINDLE AMPLIFIER MAINTENANCE
  Z                    0.000         No NAME      SPEC NUMBER      SERIAL NUMB
  A                    0.000         1 SA1 A06B-6142-H030#580CE V0912345678
                                     2 S2  A06B-6142-H030#580CE V0912345678
                                     3 S3  A06B-6142-H030#580CE V0912345678
                     MODAL
  G00   G80   G15   F500.0000 M
  G17   G98   G40.1 H         M
  G90   G50   G25   D         M
  G22   G67   G160  T
  G94   G97   G13.1 S
  G21   G54   G50.1
  G40   G64   G54.2
  G49   G69   G80.5
   S              0/MIN            A>_

                                    MDI   **** *** ***    12:00:00 PATH1

  < ABSOLU RELATI  ALL                  AXIS  SERVO  SPNDLE              +
    TE     VE                                 MAINTE MAINTE
```

5.2.2. Manual setting 2

Please set the following parameter by hand in order to carry out manual setting 2:

Parameter 1902#0=1, 1902#1=0
Parameter 1023 - No. of Servos
Parameter 2013#0, 2014#0 - HRV3/HRV4
Parameter 3717 – No. of Spindle amplifier
Parameter 24000…. 24063 (24064…24095 in case additional axis board is used) – ATR value for FSSB slave
Parameter 24096…. 24103 – Connector No. of SDU
Parameter 24104…. 24199 – ATR value corresponding to SDU connector

No.	7	6	5	4	3	2	1	0
1902							ASIGN	FSBMD

Data type. Bit

FSBMD setting mode selection

     0 : Automatic setting mode
        (By using of FSSB setting screen, when the information of axis and amplifier
        have been entered, parameter No. 1023, 2013#0, 2014#0, 3717, 11802#4, 24000 to 24103
        will be set automatically.
     1 : Manual setting 2
        (Parameters Nos. 1023, 2013#0, 2014#0, 3717, 11802#4, 24000 to 24103 are to
        be manually set.)

ASIGN Automatic setting of FSSB

     0: is not complete
     1: is complete
        (After automatic setting have been carry out successfully, this bit becomes 1 automatically)

No.	7	6	5	4	3	2	1	0
14476			SSC					

Data type. Bit

SSC The number of ATR values for a separate detector interface unit connector is:
     0: Only 1.
     1: More than 1.

No.

24000	ATR value corresponding to slave 01 on FSSB line 1

to

24031	ATR value corresponding to slave 32 on FSSB line 1

Data type: word
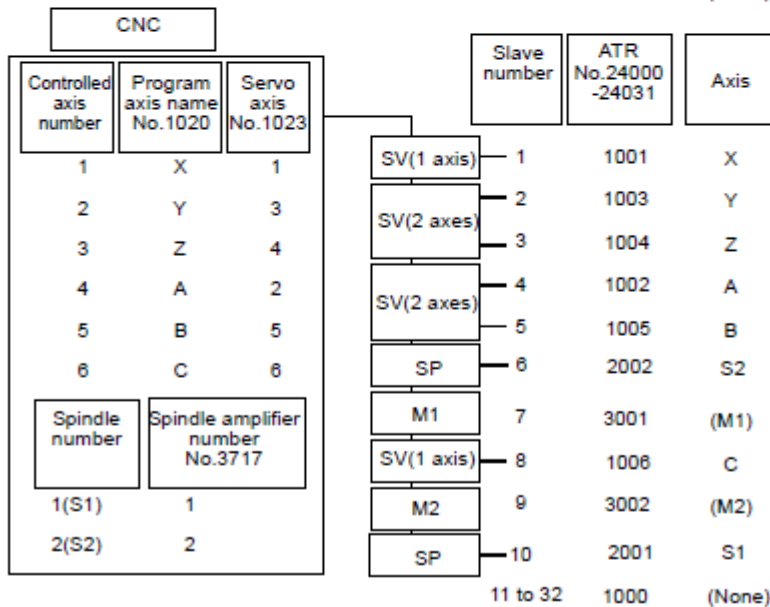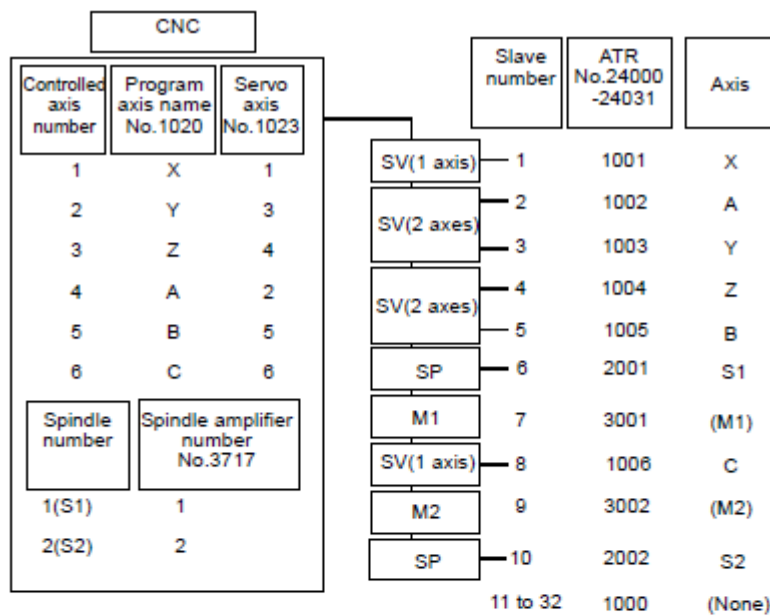Data range: 1001 to 1046, 2001 to 2016, 3001 to 3004, 1000

Each of these parameters sets the value (ATR value) of the address translation table corresponding to each of slave 1 to slave 32 on first FSSB line (first optical connector).

A 2-axis amplifier consists of two slaves, and a 3-axis amplifier consists of three slaves.
In each of these parameters, set a value as described below, depending on whether the slave is an amplifier, separate detector interface unit, or nonexistent.
- When the slave is a servo amplifier:
  Set the axis number of a servo amplifier to allocate (value set with parameter No. 1023) plus 1000.
- When the slave is a spindle amplifier:
  Set the spindle number of a spindle to allocate (value set with parameter No. 3717) plus 2000.
- When the slave is a separate detector interface unit:
  Set 3001, 3002, 3003, and 3004, respectively, for the first (one connected nearest to the CNC), second, third, and fourth separate detector interface units.
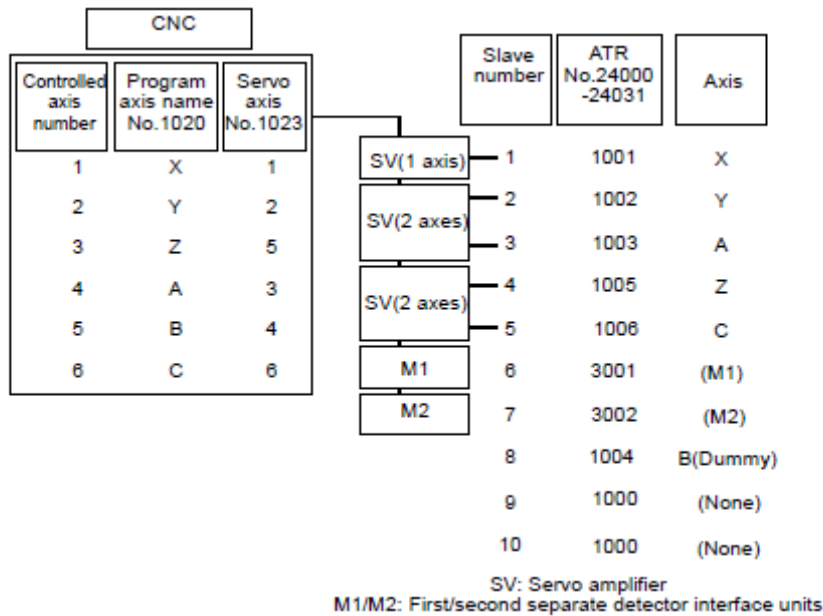- When the slave is nonexistent:
  Set 1000.

Typical setting Example:

First example

CNC

Controlled axis number	Program axis name No.1020	Servo axis No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

Spindle number	Spindle amplifier number No.3717
1(S1)	1
2(S2)	2

	Slave number	ATR No.24000-24031	Axis
SV(1 axis)	1	1001	X
SV(2 axes)	2	1002	A
	3	1003	Y
SV(2 axes)	4	1004	Z
	5	1005	B
SP	6	2001	S1
M1	7	3001	(M1)
SV(1 axis)	8	1006	C
M2	9	3002	(M2)
SP	10	2002	S2
	11 to 32	1000	(None)

Second example

CNC

Controlled axis number	Program axis name No.1020	Servo axis No.1023
1	X	1
2	Y	3
3	Z	4
4	A	2
5	B	5
6	C	6

Spindle number	Spindle amplifier number No.3717
1(S1)	1
2(S2)	2

	Slave number	ATR No.24000-24031	Axis
SV(1 axis)	1	1001	X
SV(2 axes)	2	1003	Y
	3	1004	Z
SV(2 axes)	4	1002	A
	5	1005	B
SP	6	2002	S2
M1	7	3001	(M1)
SV(1 axis)	8	1006	C
M2	9	3002	(M2)
SP	10	2001	S1
	11 to 32	1000	(None)

SV: Servo amplifier
SP: Spindle amplifier
M1/M2: First/second separate detector interface units

Setting example with dummy axis: (EGB slave axis: A-axis, EGB dummy axis: B-axis)

CNC

Controlled axis number	Program axis name No.1020	Servo axis No.1023		Slave number	ATR No.24000 -24031	Axis
1	X	1	SV(1 axis) — 1	1	1001	X
2	Y	2	SV(2 axes) — 2	2	1002	Y
3	Z	5	— 3	3	1003	A
4	A	3	SV(2 axes) — 4	4	1005	Z
5	B	4	— 5	5	1006	C
6	C	6	M1 6	6	3001	(M1)
			M2 7	7	3002	(M2)
				8	1004	B(Dummy)
				9	1000	(None)
				10	1000	(None)

SV: Servo amplifier
M1/M2: First/second separate detector interface units

No.

24032	ATR value corresponding to slave 01 on FSSB line 2

to

24063	ATR value corresponding to slave 32 on FSSB line 2

Data type: word
Data range: 1001 to 1046, 2001 to 2016, 3005 to 3008, 1000

To specify these parameters, follow the same procedure as for the first FSSB line (parameters Nos. 24000 to 24031). Note, however, that the valid data range varies depending on the separate detector interface unit used.

- When the slave is a separate detector interface unit: Set 3005, 3006, 3007, and 3008, respectively, for the first (one connected nearest to the CNC), second, third, and fourth separate detector interface units.

No.

24064	ATR value corresponding to slave 01 on FSSB line 3
to	
24095	ATR value corresponding to slave 32 on FSSB line 3

Data type: word
Data range: 1049 to 1078, 2001 to 2016, 3009 to 3012, 1000

To specify these parameters, follow the same procedure as for the first FSSB line (parameters Nos. 24000 to 24031). Note, however, that the valid data range varies depending on the separate detector interface unit used.

- When the slave is a separate detector interface unit: Set 3009, 3010, 3011, and 3012, respectively, for the first (one connected nearest to the CNC), second, third, and fourth separate detector interface units.

No.

24096	Connector number for the first or ninth separate detector interface unit
to	
24097	Connector number for the second or tenth separate detector interface unit

24098	Connector number for the third or eleventh separate detector interface unit
to	
24099	Connector number for the fourth or twelfth separate detector interface unit

24100	Connector number for the fifth separate detector interface unit
to	
24101	Connector number for the sixth separate detector interface unit

24102	Connector number for the seventh separate detector interface unit
to	
24103	Connector number for the eighth separate detector interface unit

Data type: byte axis
Data range: 0…8

Set a connector number for the connector to which a separate detector interface unit is attached if the separate detector interface unit is to be used. The following table lists the necessary settings. Be sure to specify 0 for connectors not in use.

Connectors and corresponding connector numbers:

Connector	Connector number
JF101	1
JF102	2
JF103	3
JF104	4
JF105	5
JF106	6
JF107	7
JF108	8

Setting example:

Controlled axis	Connector to which each separate detector interface unit is attached				Parameter setting			
	1st connector	2nd connector	5th connector	6th connector	No. 24096	No. 24097	No. 24100	No. 24101
X1	JF101	-	-	-	1	0	0	0
Y1	-	JF102	-	-	0	2	0	0
Z1	-	-	JF102	-	0	0	2	0
X2	-	JF101	-	-	0	1	0	0
Y2	-	-	-	JF101	0	0	0	1
Z2	-	-	-	-	0	0	0	0
A1	-	-	JF101	-	0	0	1	0
B1	-	-	-	JF102	0	0	0	2
C1	-	JF104	-	-	0	4	0	0
A2	JF102	-	-	-	2	0	0	0
B2	-	JF103	-	-	0	3	0	0
C2	-	-	-	JF103	0	0	0	3

No.

No.	Description
24104	ATR value corresponding to connector 1 on the first separate detector interface unit
to	
24111	ATR value corresponding to connector 8 on the first separate detector interface unit
24112	ATR value corresponding to connector 1 on the second separate detector interface unit
to	
24119	ATR value corresponding to connector 8 on the second separate detector interface unit
24120	ATR value corresponding to connector 1 on the third separate detector interface unit
to	
24127	ATR value corresponding to connector 8 on the third separate detector interface unit
24128	ATR value corresponding to connector 1 on the fourth separate detector interface unit
to	
24135	ATR value corresponding to connector 8 on the fourth separate detector interface unit
24136	ATR value corresponding to connector 1 on the fifth separate detector interface unit
to	
24143	ATR value corresponding to connector 8 on the fifth separate detector interface unit
24144	ATR value corresponding to connector 1 on the sixth separate detector interface unit
to	
24151	ATR value corresponding to connector 8 on the sixth separate detector interface unit
24152	ATR value corresponding to connector 1 on the seventh separate detector interface unit
to	
24159	ATR value corresponding to connector 8 on the seventh separate detector interface unit
24160	ATR value corresponding to connector 1 on the eighth separate detector interface unit
to	
24167	ATR value corresponding to connector 8 on the eighth separate detector interface unit

Data type: word
Data range: 1000 to 1046

Each of these parameters sets the value (ATR value) of the address translation table corresponding to each connector on a separate detector interface unit. The first to fourth separate detector interface units are connected to first FSSB line, and the fifth and eighth separate detector interface units are connected to second FSSB line. Specify each parameter with a value set in parameter No. 1023 (axis connected to a separate detector interface unit connector) plus 1000. If a connector attached to a separate detector interface unit is not in use, set 1000 for the connector.

24168	ATR value corresponding to connector 1 on the ninth separate detector interface unit
to	
24175	ATR value corresponding to connector 8 on the ninth separate detector interface unit

24176	ATR value corresponding to connector 1 on the tenth separate detector interface unit
to	
24183	ATR value corresponding to connector 8 on the tenth separate detector interface unit

24184	ATR value corresponding to connector 1 on the eleventh separate detector interface unit
to	
24191	ATR value corresponding to connector 8 on the s eleventh separate detector interface unit

24192	ATR value corresponding to connector 1 on the twelfth separate detector interface unit
to	
24199	ATR value corresponding to connector 8 on the twelfth separate detector interface unit

Data type: word
Data range: 1049 to 1078, 1000

Set an address translation table value (ATR value) for each separate detector interface unit connector on the third FSSB line. These parameters must be specified when the separate detector interface units are used with an additional axis board. The ninth to twelfth separate detector interface units are connected to third FSSB line. Specify each parameter with a value set in parameter No. 1023 (axis connected to a separate detector interface unit connector) plus 1000. If a connector attached to a separate detector interface unit is not in use, set 1000 for the connector.

Special setting – one connector of SDU for multiple axes

Example: two EGB pairs and common master axis

(EGB slave axis 1 : A axis, EGB dummy axis 1 : C1 axis)
(EGB slave axis 2 : B axis, EGB dummy axis 2 : C2 axis)

No.	14476#5 SSC
	1

No.	1023	24096
X	1	3
Y	2	4
Z	9	0
A	3	0
B	5	0
C1	4	1
C2	6	1

No.	24104	24105	24106	24107	24108	24109	24110	24111
	1004	1006	1001	1002	1000	1000	1000	1000

5.2.3. Setting for dummy axes

Dummy axes definition: No SVM connected but Feedback connected to SDU

P1023 should have value >0, value could be higher than No. of available CNC axes
Initialize Servo axes – P2001#1=1
Parameter P11802#4=0 (disable servo axis) is required for successful initialization, otherwise it may causes alarm SV1067
Keep P11802#4=0 to ensure receiving of feedback information
P2009#0=1 – No FSSB connection of dummy axes
P2165=0 – No amplifier
P240xx=10yy (xx: last slave of FSSB; yy: value of 1023)
P1815#1=1 for external encoder feedback
P24096/97=x (24096 for 1st SDU, 24097 for 2nd SDU; x=number of connector, i.e. JF103 --> x=3)

5.3. Alarm and Warning messages

5.3.1. Automatic setting messages

Warning message	Cause
Cs and M/S are set with the same axis	On the axis setting screen, a value is specified for Cs and M/S for an axis. Do not specify any value for Cs and M/S simultaneously.
Cs and M1-8 are set with the same axis	On the axis setting screen, a value is specified for Cs and M1-8 for an axis. Do not specify any value for Cs and M1-8 simultaneously.
Same number is set in AXIS	On the servo amplifier setting screen, an axis number is set more than once. Specify each axis number only once.
Same number is set in SP NUM	On the spindle amplifier setting screen, a spindle number is set more than once. Specify each spindle number only once.
Same number is set in CS	On the axis setting screen, a value is set for Cs more than once. Specify each value for Cs only once.
Same number is set in M/S	On the axis setting screen, a value is set for M/S more than once. Specify each value for M/S only once.
AXIS and Cs are set with the same axis	An axis number for which a value is set for Cs on the axis setting screen is set for AXIS on the servo amplifier setting screen. Do not set any axis number for which a value is set for Cs, on the servo amplifier setting screen.
Too many slaves (HRV4)	The maximum number (7) of slaves per FSSB line for servo HRV4 control is exceeded. Reduce the number of slaves connected to an FSSB line to 7 or less.
Too many slaves (HRV3)	The maximum number (15) of slaves per FSSB line for servo HRV3 control is exceeded. Reduce the number of slaves connected to an FSSB line to 15 or less.
Too many slaves (HRV2)	The maximum number (32) of slaves per FSSB line for servo HRV2 control is exceeded. Reduce the number of slaves connected to an FSSB line to 32 or less.
M/S is set with HRV4	For servo HRV4 control, a value is set for M/S. Do not set any value for M/S for servo HRV4 control.
AXIS is set with EGB dummy axis	An axis number set for EGB dummy axis setting is set for AXIS on the servo amplifier setting screen. Do not set any axis number for EGB dummy axis setting, on the servo amplifier screen.
M/S setting is illegal(EGB)	For M/S, the EGB slave axis setting corresponding to an EGB dummy axis setting is not made. Make the EGB slave axis setting.
AXIS is not set with EGB slave axis	An axis number for EGB slave axis setting is not set for AXIS on the servo amplifier setting screen. Set the axis number for EGB slave axis setting, on the servo amplifier setting screen.
AXIS is not set with M/S axis	An axis number set for M/S on the axis setting screen is not set for AXIS on the servo amplifier setting screen. Set the axis number for M/S, on the servo amplifier setting screen.
EGB dummy axis setting is illegal	EGB dummy axis setting is made when 32 slaves are connected to the second FSSB line. Decrease the number of slaves connected to the second FSSB line.
M/S setting is illegal	Invalid M/S setting. Correct the M/S setting.
Setting is illegal(servo)	Invalid servo axis setting (servo amplifier setting, axis setting). Correct the servo axis setting.
Setting is illegal(spindle)	Invalid spindle setting. Correct the spindle setting.

5.3.2. Automatic setting messages

Number	Message	Description
SV0456	ILLEGAL CURRENT LOOP	An attempt was made to set the current loop that could not be set. The amplifier pulse module in use does not comply with HIGH SPEED HRV. Or, requirements to control are not satisfied in the system.
SV0458	CURRENT LOOP ERROR	The specified current loop differs from the actual current loop.
SV0459	HI HRV SETTING ERROR	For two axes whose servo axis numbers (parameter No. 1023) are consecutively even and odd numbers, HIGH SPEED HRV control is possible for one axis and impossible for the other.
SV0462	SEND CNC DATA FAILED	The correct data could not be received on a slave side because of the FSSB communication error.
SV0463	SEND SLAVE DATA FAILED	The correct data could not be received in the servo software because of the FSSB communication error.
SV0465	READ ID DATA FAILED	A read of the ID information for the amplifier has failed at power-on.
SV0466	MOTOR/AMP. COMBINATION	The maximum current of an amplifier is different to that of a motor. Or, the connection command for an amplifier is incorrect. The parameter setting is incorrect
SV0468	HI HRV SETTING ERROR(AMP)	An attempt was made to set up HIGH SPEED HRV control for use when the controlled axis of an amplifier for which HIGH SPEED HRV control could not be used.
SV1067	FSSB:CONFIGURATION ERROR(SOFT)	An FSSB configuration error occurred (detected by software). The connected amplifier type is incompatible with the FSSB setting value.
SV5134	FSSB:OPEN READY TIME OUT	In the initialization, the FSSB could not be in an open ready sate. The axis card is thought to be defective.
SV5136	FSSB:NUMBER OF AMP. IS INSUFFICIENT	The number of amplifier identified by the FSSB is insufficient than the number of control axes. Or, the setting of the number of axes or the amplifier connection is in error.
SV5137	FSSB:CONFIGURATION ERROR	An FSSB configuration error occurred. The connecting amplifier type is incompatible with the FSSB setting value.
SV5139	FSSB:ERROR	The axis setting has not completed yet, in an automatic setting mode.
SV5197	FSSB:OPEN TIME OUT	Servo initialization has not completed successfully. It is probable that an optical cable failed or a connection between the amplifier and another module failed.
SV5311	FSSB:ILLEGAL CONNECTION	Different current loops (HRV) are set for FSSB lines. Specify the same current loop for the FSSB lines.

FANUC

Diagnostic screen

3510	FSSB alarm number

Detail alarm No.	Parameter number	Cause	Action
120 451 452	-	The FSSB internal status did not change to open.	Check the connection between the CNC and each amplifier. Alternatively, the servo card may be faulty.
140 450	24000 to 24095	The ATR value is inconsistent with the connected slave (servo, spindle, or separate detector).	Set the ATR value corresponding to the connected slave.
271	3717 24000 to 24095	The spindle amplifier number corresponding to the ATR value setting is not set.	Make the spindle amplifier number consistent with the ATR value setting.
272	24000 to 24031 24064 to 24095	The fifth to eighth separate detector is set for the first FSSB line (third FSSB line).	Do not set the fifth to eighth separate detectors for the first FSSB line (third FSSB line).
273	24032 to 24063	The first to fourth (ninth to twelfth) separate detector is set for the second FSSB line.	Do not set the first to fourth (ninth to twelfth) separate detectors for the second FSSB line.
276	24000 to 24095	The setting for a separate detector is made more than once.	Make the setting for each separate detector only once in the servo card.
290	24000 to 24095	The maximum number of slaves per FSSB line is exceeded for an FSSB line of servo HRV2 control.	Reduce the number of slaves to 32 (maximum number of slaves per FSSB line of servo HRV2 control) or less.
291	24000 to 24095	The maximum number of slaves per FSSB line is exceeded for an FSSB line of servo HRV3 control.	Reduce the number of slaves to 15 (maximum number of slaves per FSSB line of servo HRV3 control) or less.
293	24000 to 24095	The maximum number of slaves per FSSB line is exceeded for an FSSB line of servo HRV4 control.	Reduce the number of slaves to 7 (maximum number of slaves per FSSB line of servo HRV4 control) or less.
310	1023 24104 to 24199	The servo axis number corresponding to the ATR value setting of a separate detector is not set for parameter No. 1023.	Set the value corresponding to the ATR value setting for parameter No. 1023.
313	1023 14476#5 24104 to 24199	The servo axis number corresponding to the ATR value setting of a separate detector is not set for parameter No. 1023.	Set the value corresponding to the ATR value setting for parameter No. 1023.
314	1023 14476#5 24104 to 24199	The ATR value setting of a separate detector is invalid.	Correct the settings of parameters Nos. 24104 to 24199.
383	-	Manual setting 1 cannot be performed when a separate detector is used.	Disconnect the separate detector. Alternatively, perform manual setting or automatic setting.
453	-	Servo initialization has not completed successfully.	An optical cable may be faulty or the connection between the amplifier and another module may be incorrect.
454	-	Alarm No. 550 to 556 of diagnostic data No. 3511 occurred.	Check diagnostic data No. 3511.
460	24000 to 24095	The ATR value of a spindle or separate detector is set for a slave which is not connected.	Set the ATR value corresponding to the connected slave.
471	24000 to 24095	Although a separate detector is connected, the separate detector setting is not made.	Set the value for the separate detector in the corresponding parameter.
480	24000 to 24095	In ATR value setting, a servo axis number exceeds 80.	Make settings so that any servo axis number does not exceed 80.

FANUC

Diagnostic screen

3511	FSSB alarm number

Detail alarm No.	Parameter number	Cause	Action
210	24096 to 24103	Although a separate detector is not set, a value is set in parameter No. 24096 to 24103.	Set parameter Nos. 24096 to 24103 to all 0.
220	1023	An unavailable servo axis number is set.	Change the servo axis number.
221	1023	A servo axis number is set more than once.	Change the servo axis number.
250	24096 to 24103	For a specific servo axis, two or more separate detectors are used and the paired separate detectors are two of the first, third, fifth, and seventh units or the second, fourth, sixth, and eighth units.	To use two separate detectors for a specific servo axis, one separate detector must have an odd number and the other must have an even number. Three or more separate detectors cannot be used.
270	1023 24000 to 24095	• The servo axis number corresponding to the ATR value setting is not set for parameter No. 1023. • An unavailable servo axis number is set. • A servo axis number is set more than once.	Check the conditions on the left.
292	1023 2013#0	For an FSSB line of servo HRV3 control, only the following servo axis numbers can be used: $(1 + 8n, 2 + 8n, 3 + 8n, 4 + 8n (n = 0, 1, \cdots, 9))$	For the FSSB line of servo HRV3 control, set the servo axis numbers on the left.
294	1023 2014#0	For an FSSB line of servo HRV3 control, only the following servo axis numbers can be used: $(1+8n(n=0,1,\cdots,9))$	For the FSSB line of servo HRV3 control, set the servo axis numbers on the left.
311	24096 to 24103	A connector number is invalid.	Specify a value between 0 and 8.
314	24096 to 24103	A connector number is set more than once.	Make setting so that each connector number is used only once for one separate detector.
350	2013#0 2014#0	Different current loops (HRV) are used for FSSB lines.	Set the same current loop (HRV) for the FSSB lines.
360	1023 2013#0 2014#0	Different current loops (HRV) are set for the first and second FSSB lines and parameter No. 1023 setting is invalid.	Set servo axis numbers so that each set of (1 to 6), (9 to 14), (17 to 22), (25 to 30), (33 to 38), and (41 to 46) is set for the same FSSB line.
370	1902#0 1902#1 2013#0 2014#0	When servo HRV3 or HRV4 control is set, manual setting 1 cannot be performed.	To set servo HRV3 or HRV4 control, perform manual setting or automatic setting.
380	1023	When a servo axis number is skipped, manual setting 1 cannot be performed.	Set servo axis numbers without skipping any number.

Detail alarm No.	Parameter number	Cause	Action
382	1023	An attempt was made to perform manual setting 1 though the maximum number of controlled axes per FSSB line is exceeded.	Reduce the number of connected servo axes to the maximum number of controlled axes or less.
470	24000 to 24095	An ATR value is set more than once.	Set each ATR value only once.
481	1023 24000 to 24095	A servo axis number is inconsistent with the ATR value setting or the servo motor having a servo axis number is not connected.	Check whether the value set in parameter No. 1023 is consistent with ATR value setting and whether the servo motor corresponding to each servo axis number is connected.
520	2165	At power-on, amplifier ID information could not be read.	Check the connection between the CNC and each amplifier. Alternatively, an amplifier may be faulty.
550	1023 24000 to 24095	The ATR value setting is inconsistent with the servo axis number setting.	Make the value set in parameter No. 1023 consistent with the ATR value setting.
551	24000 to 24095	The number of ATR value settings exceeds the number of slaves connected to the CNC.	Make as many settings as the number of slaves connected to the CNC.
552	1023	An unavailable servo axis number is set.	Change the servo axis number.
553	1023	A servo axis number is set more than once.	Change the servo axis number.
554	24096 to 24103	A value is set in parameter No. 24096 to 24103 though no separate detector is connected.	Set parameters Nos. 24096 to 24103 to all 0.
555 557 558	2165	The maximum current of an amplifier (parameter No. 2165) differs from that of a motor.	Set the maximum current of the amplifier (parameter No. 2165) to that of the motor.
1023	1023	An invalid servo axis number is set.	Set a correct servo axis number.

Diagnostic screen

3513	FSSB alarm number (spindle)

Detail alarm No.	Parameter number	Cause	Action
271	3717 24000 to 24095	An ATR value is set more than once.	Make each spindle amplifier consistent with the ATR value setting.
381	3717	When a spindle amplifier number is skipped, manual setting 1 cannot be performed.	Set spindle amplifier numbers without skipping any number.