4.3.1 Spindle Check Board

By connecting the check board, you can observe:

1 Various signal waveforms.
2 Internal data

(1) Check board specification

There are two types of check boards. They are not interchangeable. Select one that matches your application.

For the items that vary between the two check boards, they are identified by the drawing number of the printed–circuit board.

Table 4.3.1 (1) Check Board Specification

Name	Applicable unit	Specification	Printed–circuit board drawing number
Spindle check board	SPM–2.2 to 11 TYPE I SPM–2.2 to 11 TYPE II	A06B–6078–H001	A20B–2001–0830
	SPM–15 to 30 TYPE I SPM–15 to 30 TYPE II SPM–11 to 30 TYPE III	A06B–6072–H051	A20B–1005–0740

(2) Check terminal output signal. (See Section 4.3.3 for details of signals.)

Table 4.3.1 (2)–1 Check Terminal Output Signals (A20B–2001–0830)

Check terminal	Signal name	Check terminal	Signal name
LM	Load meter signal	PA1	Phase A sine wave signal 1
SM	Speedometer signal	PB1	Phase B sine wave signal 1
CH1	Channel 1, for internal data observation	PS1	Phase Z signal 1
CH2	Channel 2, for internal data observation	PA2	Phase A sine wave signal 2
CH1D	Bit 0 on channel 1, for internal data observation	PB2	Phase B sine wave signal 2
CH2D	Bit 0 on channel 2, for internal data observation	PS2	Phase Z signal 2
VRM	Reference voltage (2.5 VDC)	PA3	Phase A sine wave signal 3
LSA1	Magnetic sensor output LSA signal 1	PB3	Phase B sine wave signal 3
EXTSC1	External reference signal 1	PA4	Phase A sine wave signal 4
LSA2	Magnetic sensor output LSA signal 2	PB4	Phase B sine wave signal 4
EXTSC2	External reference signal 2	OVR2	Analog override input signal
PAD	Equivalent position coder output signal phase A	24V	DC+24V
PBD	Equivalent position coder output signal phase B	15V	DC+15V
PSD	Equivalent position coder output signal phase Z	5V	DC+5V
		GND	0V

Table 4.3.1 (2)–2 Check Terminal Output Signals (A20B–1005–0740)

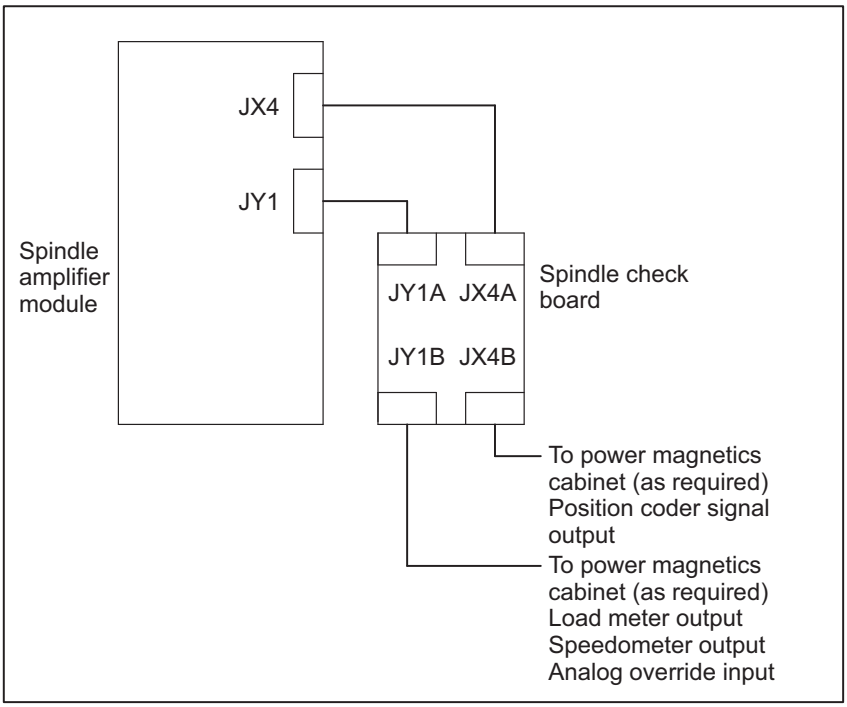
Check terminal	Signal name	Check terminal	Signal name
LM	Load meter signal	PAD	Equivalent position coder signal phase A
SM	Speedometer signal	PBD	Equivalent position coder signal phase B
IU	Phase U current	PSD	Equivalent position coder signal phase Z
IV	Phase V current	PA1	Phase A sine wave signal 1
		PB1	Phase B sine wave signal 1
		PS1	Phase Z signal 1
		PA2	Phase A sine wave signal 2
		PB2	Phase B sine wave signal 2
		PS2	Phase Z signal 2
		PA3	Magnetic sensor output LSA signal 1
VDC	DC link voltage signal	PB3	Phase B sine wave signal 3
VRM	Reference voltage (2.5 VDC)	PA4	Phase A sine wave signal 4
MSA1	Magnetic sensor output MSA signal 1	PB4	Phase B sine wave signal 4
LSA1	Magnetic sensor output LSA signal 1	OVR2	Analog override input signal
EXTSC1	External reference signal 1	24V	DC+24V
MSA2	Magnetic sensor output MSA signal 2	15V	DC+15V
LSA2	Magnetic sensor output LSA signal 2	5V	DC+5V
EXTSC2	External reference signal 2	GND	DC 0V

The current is positive when it is input to the amplifier.

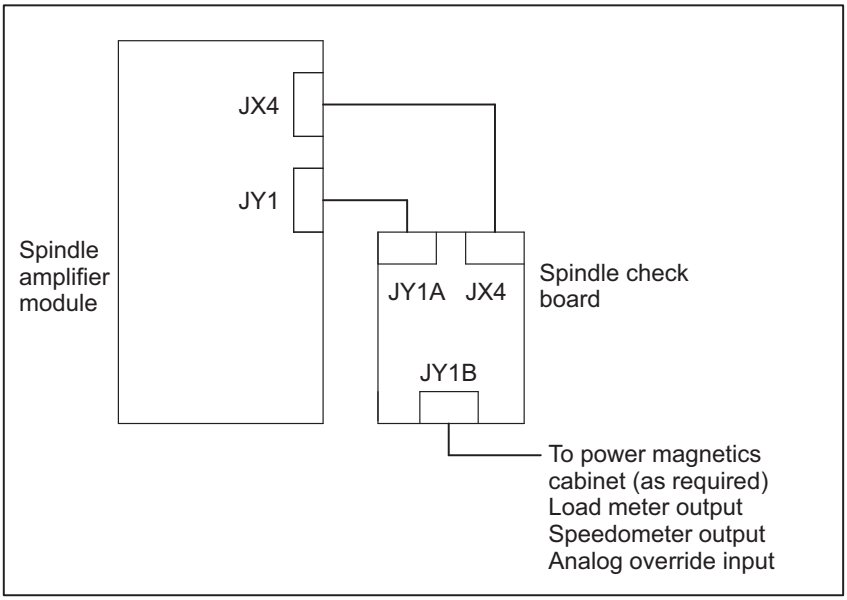
Model	Conversion result
SPM- 11	33. 3A/ 1V
SPM- 15	50. 0A/ 1V
SPM- 22	66. 7A/ 1V
SPM- 26	100A/ 1V
SPM- 30	133A/ 1V

(3) Connecting the check board

1 Connecting the check board (A20B–2001–0830)

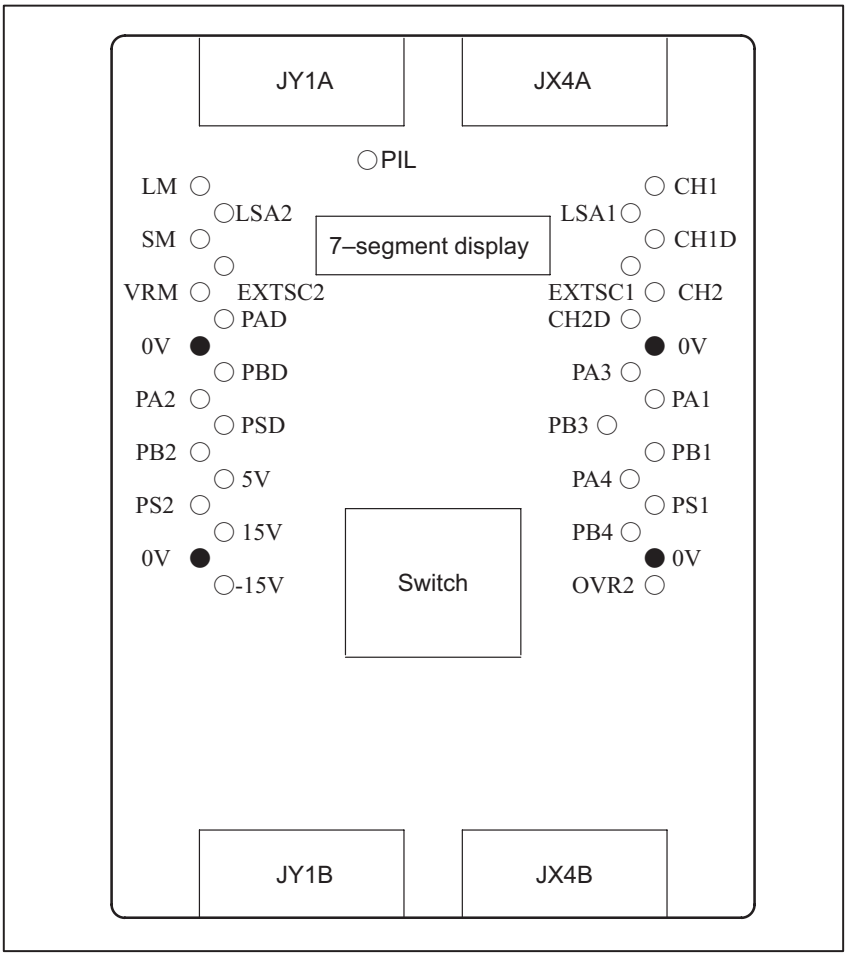


2 Connecting the check board (A20B–1005–0740)

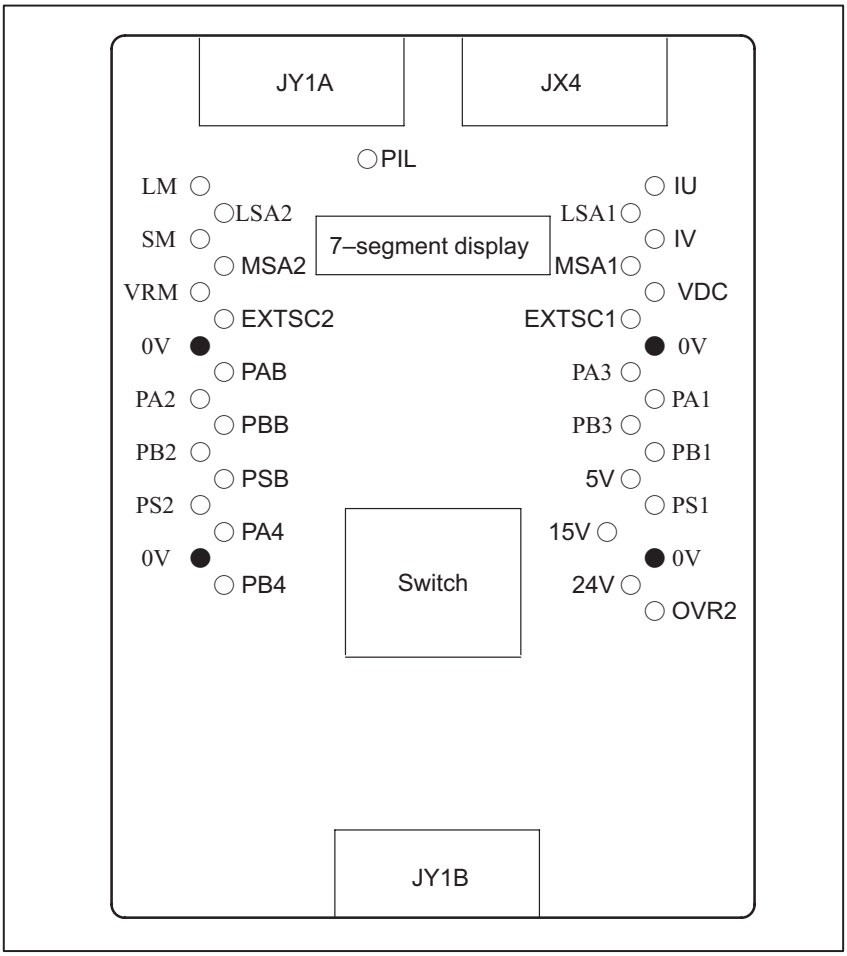


(4) Check terminal arrangement

1 Check terminal arrangement (A20B–2001–0830)



2 Check terminal arrangement (A20B–1005–0740)



4.3.2 Checking The Control Power Supply Voltage

(1) SPM–2.2 to –11 types I and II

Table 4.3.2 (1) Checking the Control Power Supply Voltage

Check item	Check method		
Control power supply voltage	Check on the check terminals on the check board.	Check terminal	Rating
		+5 – 0V	5V^5%
		+15V – 0V	15V^5%
		–15V – 0V	–15V^5%

(2) SPM–15 to –30 types I and II, SPM–11 to –30 types III

Table 4.3.2 (2) Checking the Control Power Supply Voltage

Check item	Check method		
Control power supply voltage	Check on the check terminals on the check board.	Check terminal	Rating
		+5 – 0V	5V^5%
		+15V – 0V	15%^5%
		+24V – 0V	24V^5%

4.3.3 STATUS Display

No.	STATUS display On ▪ Off ▫ The LED that is on is indicated in black.	Description
1.	PIL ALM ERR	The PIL LED (power ON indicator) is off. The control power supply has not been switched on. The power supply circuit is defective. See Section 4.3.2.
2. ↓ 3.	PIL ALM ERR 00	For about 1.0 s after the control power supply is switched on, the lower two digits of the ROM series No. are indicated. **Example)** 00: ROM series No. 9D00
	PIL ALM ERR 04	The ROM edition number is displayed for about 1.0 s. 01, 02, 03, and so on correspond to A, B, C, and so on, respectively. **Example)** 04: ROM edition D
4.	PIL ALM ERR – – Blinking	The CNC has not been switched on. The machine is waiting for serial communication and parameter loading to end.
5.	PIL ALM ERR – –	Parameter loading has ended. The motor is not supplied with power.
6.	PIL ALM ERR 00	The motor is supplied with power.
7.	PIL ALM ERR 0 1 Alarm codes 01 or above is displayed.	Alarm state The SPM is not operable. See Section 3.3 of Part II.
8.	PIL ALM ERR 0 1 Error code 01 or above is displayed.	Error state Incorrect parameter setting or improper sequence. Refer to the parameter manual.

4.3.4 The PIL LED (power ON indicator) Is Off.

When the power supply module is supplied with control power, if the PIL LED on the spindle amplifier module is off, check according to the table below.

Table 4.3.4 Check Method and Action

No.	Cause of trouble	Check method	Action
1.	Control power is not supplied.	Check for 24 V and 0 V on connector CX2.	Ensure a secure connection.
2.	The power supply circuit is defective.	The PIL LED operates on +5 V. Check the control power supply voltages with the values described in section 4.3.2.	Check the printed–circuit board.

4.3.5 The STATUS Display Is Blinking With ”– –”

After the CNC has started up, if the STATUS display is still blinking with ”– –”, check according to the table below.

Table 4.3.5 Check Method and Action

No.	Cause of trouble	Check method	Action
1.	When only one SPM is available, the setting is such that two SPMs are connected. (SPM–15 to –30).	Check the switch setting.	Set DIP switch S1 to OFF.
2.	The CNC has not been set in such a way that α series (serial spindle) can be used.	Check the parameters. Refer to the parameter manual.	Set the parameters correctly.
3.	The CNC has not been connected.	Be careful that the specification of the electric–to–electric interface cable is different from that of the I/O link adaptor cable.	Check the connection and specification.

4.3.6 Checking The Feedback Signal Waveform

The measurement positions and connector connections vary from one detector configuration to another. Check the waveform with Table 4.3.4. The check terminals are on the check board.

Do not observe the feedback signal before the parameters for the detectors are set. Phase A, B, and Z signals are not output until the parameters are loaded from the CNC.

Table 4.3.6 Check Terminals by Detector Configuration

No.	Detector		Motor speed feedback signal	Position feedback signal	One–rotation signal	Cs contour control		Connector connection
						Motor speed	Spindle position	
1.	Pulse generator		PA1,PB1					JY2
	Position coder			PAD,PBD	PSD			JY4
	Magnetic sensor			MSA1	LSA1			JY3
2.	Built–in sensor		PA1,PB1	PA1,PB1	PS1			JY2
	External reference signal				EXTSC1			JY3
3.	Pulse generator		PA2,PB2					JY5 (NOTE1)
	Separate built–in sensor (spindle)			PA1,PB1	PS1			JY2 (NOTE1)
4.	High–resolution magnetic pulse coder (built–in motor)		PA2,PB2	PA2,PB2	Z (NOTE2) PSD	PA3,PB3	PA3,PB3	JY5
5.	High–resolution magnetic pulse coder (motor)		PA1,PB1			PA4,PB4		JY2
	High–resolution magnetic pulse coder (spindle)			PA2,PB2	Z(NOTE2) PSD		PA3,PB3	JY5
6.	High–resolution magnetic pulse coder (motor)		PA1,PB1			PA4,PB4		JY2
	High–resolution magnetic pulse coder (spindle)			PAD,PBD	PSD		PA3,PB3	JY4
7.	MAIN side (NOTE 3)	Pulse generator	PA1,PB1					JY2
		Position coder		PAD,PBD	PSD			JY4
		Magnetic sensor		MSA1	LSA1			JY3
	SUB side (NOTE 3)	Pulse generator	PA2,PB2					JY6
		Position coder		PAD,PBD	PSD			JY8
		Magnetic sensor		MSA2	LSA2			JY7
8.	MAIN side (NOTE 3)	Built–in sensor	PA1,PB1	PA1,PB1	PS1			JY2
		External reference signal			EXTSC1			JY3
	SUB side (NOTE 3)	Built–in sensor	PA2,PB2	PA2,PB2	PS2			JY6
		External reference signal			EXTSC2			JY7

NOTE1
Position where the connector for SPM–2.2 to –11 is connected.
For SPM–15 to –30, see the table below.

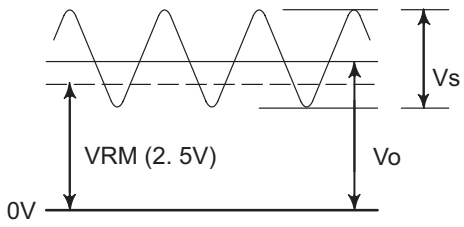
Table 4.3.6 Check Terminals by Detector Configuration (continued)

No.	Detector	Motor speed feedback signal	Position feedback signal	One–rotation signal	Cs contour control		Connector connection
					Motor speed	Spindle position	
9.	Pulse generator	PA1,PB1					JY2
	Separate built–in sensor (spindle)		PA2,PB2	PS2			JY6

NOTE2
Check terminal Z is on the preamplifier printed–circuit board.
The PSD signal is a square wave produced from the Z signal (analog waveform). It is on the check board.

NOTE3
All output signals are for the currently selected spindle (MAIN or SUB).

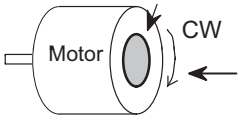
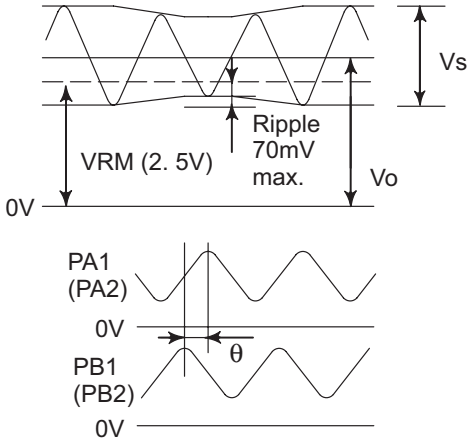
(1) Motor speed feedback signal (pulse generator)
Measurement conditions
Direction of rotation: Normal (CCW), reverse (CW)
Motor speed : 1500 rpm

No.	Measurement location	Sample waveform
1.	PA1,PB1 (PA2, PB2 for the sub–spindle)	

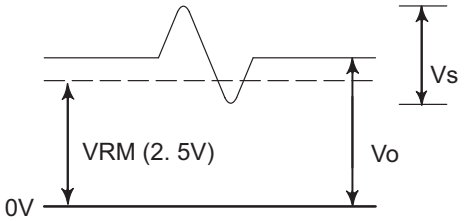
Measurement item	Standard	Make sure that the measurement meets the standard.
Vs amplitude	0.64 to 0.90V	
Vo offset	2.5V ±90mV	Measure with a digital voltmeter in the DC range.

(2) Motor speed feedback signal (for other than built–in sensor α 0.5)
Measurement conditions
Direction of rotation: Normal (CCW), reverse (CW)
Motor speed : 1500 rpm

<table>
<tr><th>No.</th><th>Measurement location</th><th>Sample waveform</th></tr>
<tr><td>1.</td><td>PA1,PB1
(PA2, PB2 for the sub–spindle)

Detection gear
 
</td><td> 

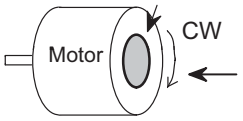
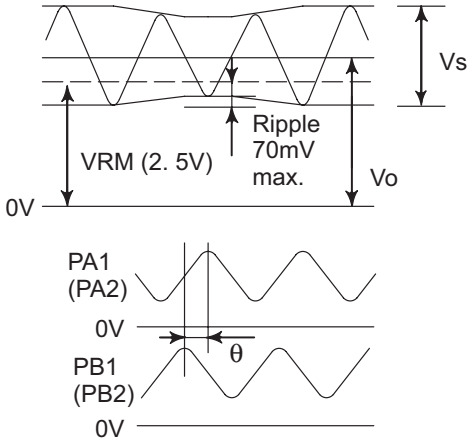
Adjust the mounting position of the detector so that the ripple in the output signal does not exceed 70 mV.

<table>
<tr><th>Measurement item</th><th>Standard</th><th>Make sure that the measurement meets the standard.</th></tr>
<tr><td>Vs amplitude</td><td>0.66 to 0.93V</td><td></td></tr>
<tr><td>Vo offset</td><td>2.5V ±272mV</td><td>Measure with a digital voltmeter in the DC range.</td></tr>
<tr><td>θ phase difference</td><td>90±3°</td><td>When the motor is rotating clockwise (CW) as viewed from the detection gear side</td></tr>
</table></td></tr>
<tr><td>2.</td><td>PS1
(PS2 for the sub–spindle)</td><td> 

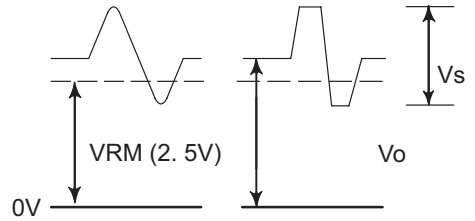
<table>
<tr><th>Measurement item</th><th>Standard</th><th>Make sure that the measurement meets the standard.</th></tr>
<tr><td>Vs amplitude</td><td>1.08 to 2.40V</td><td></td></tr>
<tr><td>Vo offset</td><td>2.5V ±500mV</td><td>Measure with a digital voltmeter in the DC range.</td></tr>
</table></td></tr>
</table>

(3) Motor speed feedback signal
Measurement conditions
Direction of rotation: Normal (CCW), reverse (CW)
Motor speed: 1500 rpm

<table>
<tr><th>No.</th><th>Measurement location</th><th>Sample waveform</th></tr>
<tr><td>1.</td><td>PA1,PB1
(PA2, PB2 for the sub–spindle)

Detection gear
 
</td><td> 

Adjust the mounting position of the detector so that the ripple in the output signal does not exceed 70 mV.

<table><tr><th>Measurement item</th><th>Standard</th><th>Make sure that the measurement meets the standard.</th></tr><tr><td>Vs amplitude</td><td>0.50 to 1.45V</td><td></td></tr><tr><td>Vo offset</td><td>2.5V ±295mV</td><td>Measure with a digital voltmeter in the DC range.</td></tr><tr><td>θ phase difference</td><td>90±3°</td><td>When the motor is rotating clockwise (CW) as viewed from the detection gear side</td></tr></table></td></tr>
<tr><td>2.</td><td>PS1
(PS2 for the sub–spindle)</td><td>Example 1 Example 2
 

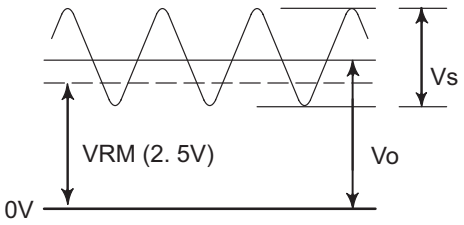
<table><tr><th>Measurement item</th><th>Standard</th><th>Make sure that the measurement meets the standard.</th></tr><tr><td>Vs amplitude</td><td>2V min.</td><td>If the Vs amplitude is not less the 2 V, the waveform may be clamped.</td></tr><tr><td>Vo offset</td><td>2.5V ±500mV</td><td>Measure with a digital voltmeter in the DC range.</td></tr></table></td></tr>
</table>

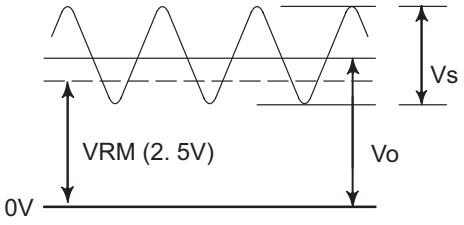
(4) Cs contour control feedback signal (motor speed feedback signal, spindle position feedback signal)

The preamplifier was factory–set, but you should check its waveform after it is mounted on the machine. If it does not meet the standard, you must readjust it.

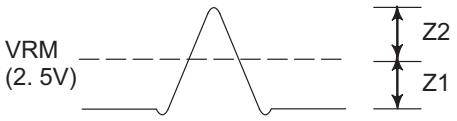
After mounting the sensor, check the waveform before you mount the pulley, draw bar, brake, etc.

Direction of rotation: Normal (CCW), reverse (CW)
Motor speed: 1500 rpm

<table>
<tr><th>No.</th><th>Measurement location</th><th>Sample waveform</th></tr>
<tr><td>1.</td><td>Motor speed feedback signal (128λ/rev.)
PA1,PB1
(PA2, PB2 for the built–in type)
Spindle position feedback signal (1λ28/rev.)
PA2,PB2</td><td>


<table>
<tr><td rowspan="2">Measurement item</td><td rowspan="2">Standard</td><td>Measurement point (The name of the potentiometer is underlined.)</td></tr>
<tr><td>If the measurement does not meet the standard, adjust by turning the potentiometer on the preamplifier.</td></tr>
<tr><td>Vs amplitude</td><td>0.86 to 1.20V</td><td>PA1(PA2) : A3G
PB1(PB2) : B3G</td></tr>
<tr><td>Vo offset</td><td>2.5V ±24mV</td><td>Measure with a digital voltmeter in the DC range.
PA1(PA2) : A30
PB1(PB2) : B30</td></tr>
</table>
</td></tr>
<tr><td>2.</td><td>Spindle position feedback signal (90,000λ/rev.)
PA3,PB3
Motor speed feedback signal (90,000λ/rev.)
PA4,PB4</td><td>


<table>
<tr><td rowspan="2">Measurement item</td><td rowspan="2">Standard</td><td>Measurement point (The name of the potentiometer is underlined.)</td></tr>
<tr><td>If the measurement does not meet the standard, adjust by turning the potentiometer on the preamplifier.</td></tr>
<tr><td>Vs amplitude</td><td>1.20 to 1.51V</td><td>PA3(PA4) : A1G
PB3(PB4) : B1G</td></tr>
<tr><td>Vo offset</td><td>2.5V ±15mV</td><td>Measure with a digital voltmeter in the DC range.
PA3(PA4) : A1O
PB3(PB4) : B1O</td></tr>
</table>
</td></tr>
</table>

No.	Measurement location	Sample waveform
3.	1. One–rotation signal Z Observe the waveform between the check terminal Z on the preamplifier and VRM.	

Measurement item	Standard	Measurement point (The name of the potentiometer is underlined.)
Z1,Z2	Z1≒Z2 Z1,Z2 ≧60mV	If the measurement does not meet the standard, adjust by turning potentiometer ZO on the preamplifier.

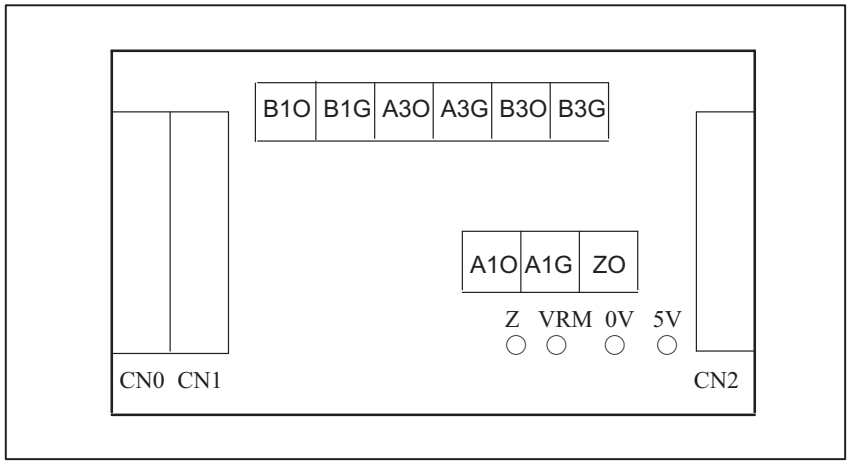


Table 4.3.4 (d) Preamplifier Printed–Circuit Board

4.3.7 Observing The Internal Data

(1) Overview

By using the check board, you can convert digital signals used for control in the spindle amplifier module to analog voltage, and observe the conversion result with an oscilloscope. The internal data can be indicated also with the five–digit display.

- A20B–2001–0830
  This model has two analog output channels (CH1 and CH2) at which the internal data (with output of –5 V to +5 V) can be observed. It also has CH1D and CH2D at which specific bits such as data bits can be observed.
- A20B–1005–0740
  This model outputs internal data (output of 0 to 11 V) at terminals LM and SM using the analog output circuit for the load meter (LM) and speedometer (SM).

(2) Major characteristics

Item	Applicable module		
	Printed–circuit board		
	SPM–2.2 to –11 TYPE I SPM–2.2 to –11 TYPE II		SPM–15 to –30 TYPE I SPM–15 to –30 TYPE II SPM–11 to –30 TYPE III
	A20B–20001–0830		A20B–1005–0740
Measurement point	CH1,CH2	CH1D,CH2D	LM,SM
Output voltage range	–5V to 5V	H :2Vmin L :0.8Vmax	0V to 11V
Resolution	About 38mV (10V/256)	–	About 43mV (11V/256)
Input impedance of the external measuring instrument	10kΩmin	10kΩmin	10kΩmin

(3) Observation method

By setting data using four DIP switches on the check board, you can output internal data to the five–digit display, analog voltage output circuit, channels 1 and 2 (LM and SM or CH1 and CH2).

Data on channels 1 and 2 is the one from an 8–bit D/A convertor.

The correspondence between channel 1/2 and the check terminal is listed below.

Measurement point	Check terminal	
	Printed–circuit board	
	A20B–2001–0830	A20B–1005–0740
Channel 1	CH1 CH1D, data bit 0	LM
Channel 2	CH2 CH2D, data bit 0	SM

NOTE

When using printed–circuit board A20B–1005–0740, set DIP switches S2 and S3 on the spindle amplifier module front panel to OFF. After observation, set them to ON.

This operation is not necessary when you use printed–circuit board A20B–2001–0830.

DIP switch	ON position	OFF position
S2, S3	Output voltage is filtered out.	Output voltage is not filtered out.

(4) Specifying data to be monitored

1 Press the four setting switches at the same time for at least a second.HFFFFFIwill be displayed on the indicator.

2 Turn off the switches and press theHMODEIswitch.Hd-00Iwill be displayed on the indicator and the system will enter the mode for monitoring internal data.
In this mode, the motor can be operated normally.

3 Press theHUPIorHDOWNIswitch while holding down theHMODEIswitch. The indicator display will change in the range ofHd-00ItoHd-12I.

4 The following shows the correspondence between the destinations of the internal data of the serial spindle and addresses d-01 to d-12.
d-01 to d-04 : Specifies the amount of data to be output to the indicator, data shift, and output format (decimal or hexadecimal).
d-05 to d-08 : Specifies the amount of data to be output to the LM terminal, data shift, and whether an offset is provided.
d-09 to d-12 : Specifies the amount of data to be output to the SM terminal, data shift, and whether an offset is provided.

5 Select address d-xx in the procedure for setting data described in (3).

6 Turn off theHMODEIswitch. Hd-xxIwill disappear 0.5 second later, and the data will be displayed for a second.
Change the set data using theHUPIorHDOWNIswitch within the second the data is displayed.

7 When more than a second elapses without pressing theHUPIorHDOWNIswitch, data cannot be changed.
If theHMODEIswitch is turned on or off, however, setting can be started from the beginning of the step in item (6).

(5) Description of Addresses

[Output to the indicator]

Address	Description	Initial value
d–01	Specifies a data number.	0
d–02	Shift at data output (0 to 31 bits)	0
d–03	Data shift direction 0 : Data is shifted right. 1 : Data is shifted left.	0
d–04	Display format 0 : Decimal notation 1 : Hexadecimal notation(0 to F)	0

[Output to the channel 1]

Address	Description	Initial value	
		Printed–circuit board (output terminal name)	
		A20B–2001–0830 (CH1)	A20B–1005–0740 (LM)
d–05	Specifies a data number	218	132
d–06	Shift at data output (0 to 31 bits)	8	0
d–07	Data shift direction 0 : Data is shifted right 1 : Data is shifted left	0	0
d–08	Offset 0 : Not provided 1 : Provided	1	0

[Output to the channel 2]

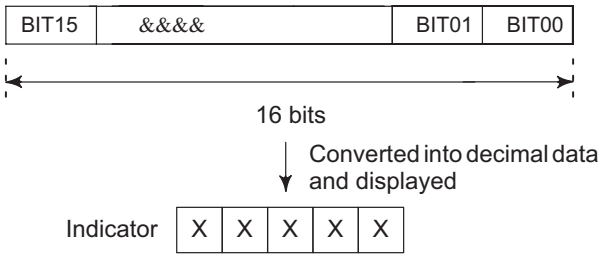
Address	Description	Initial value	
		Printed–circuit board (output terminal name)	
		A20B–2001–0830 (CH2)	A20B–1005–0740 (SM)
d–09	Specifies a data number	19	131
d–10	Shift at data output (0 to 31 bits)	18	0
d–11	Data shift direction 0 : Data is shifted right 1 : Data is shifted left	0	0
d–12	Offset 0 : Not provided 1 : Provided	1	0

(6) Principles in Outputting the Internal Data of the Serial Spindle
The length of data is 32 bits (BIT31 TO BIT00) unless it is described as 16 bits.

BIT31	&&&&	BIT03	BIT02	BIT01	BIT00

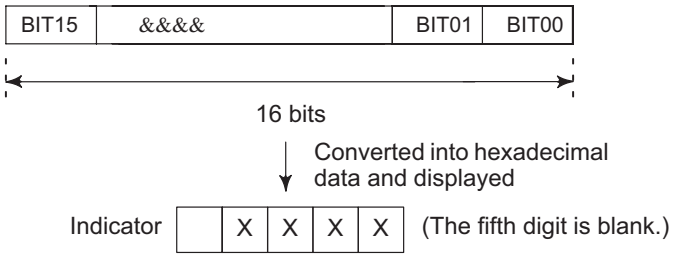
1 Example of output to the indicator

Example1 Displaying data in decimal
When the number of digits to shift data (d-02)=0 and display format (d-04)=0 (decimal notation): The last 16 bits of data (BIT15 to BIT00) are converted into decimal (0 to 65535 max.) and displayed.



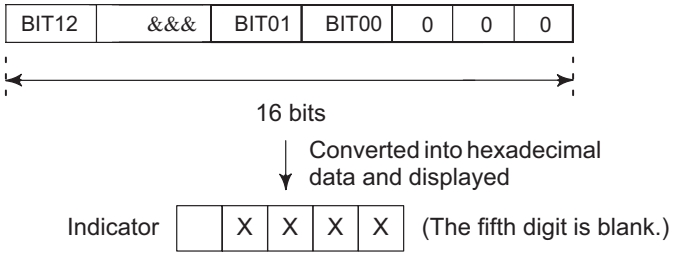
Example2 Displaying data in hexadecimal

When the number of digits to shift data (d-02)=0 and display format (d-04)=1 (hexadecimal notation): The last 16 bits of data (BIT15 to BIT00) are converted into hexadecimal (0 to FFFFF max.) and displayed.



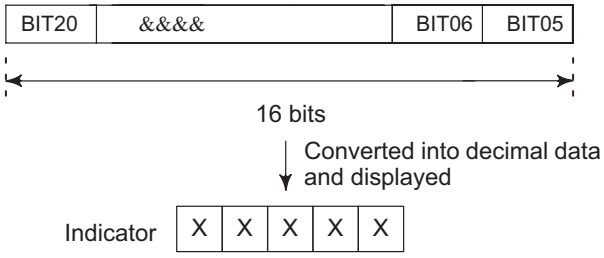
Example3 Shifting data left

When the number of digits to shift data (d-02)=3, the shift direction is left (d-03=1), and display format (d-04)=1 (hexadecimal notation): Data in BIT12 to BIT00 and the last three bits of data (=0) are converted into hexadecimal (0 to FFFFF max.) and displayed.



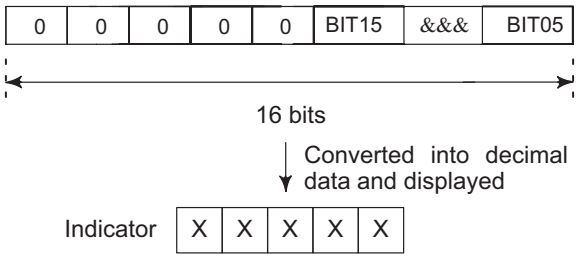
Example4 Shifting data right

When the number of digits to shift data (d-02)=5, shift direction is right (d-03=0), and display format (d-04)=0 (decimal notation): Data in BIT20 to BIT05 is converted into decimal (0 to 65535 max.) and displayed.



Example5 Shifting data right when the data length is 16 bits

When the data length is 16 bits, data shift (d-02)=5, shift direction is right (d-03=0), and display format is decimal notation (d-04=0): The first five bits of data and data in BIT15 to BIT05 are converted into decimal and displayed.



2 Example of output to the channel 1

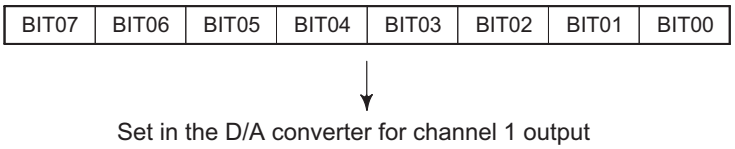
Internal data is output to channel 1 by setting it in an 8–bit D/A convertor.

The output range of the D/A convertor varies from one printed–circuit board to another. The output ranges from –5 V to +5 V (printed–circuit board A20B–2001–0830) or from 0 V to +11 V (printed–circuit board A20B–1005–0740) according to the internal data that is set. See the table below.

Internal data in binary (decimal)	Setting d–08 (whether there is offset)	Output on channel 1	
		Printed–circuit board	
		A20B–2001–0830	A20B–1005–0740
00000000(0)	0	–5V	0V
11111111(255)	0	+4.96V	+11V
10000000(-128)	1	–5V	0V
00000000(0)	1	0V	+5.5V
01111111(127)	1	+4.96V	+11V

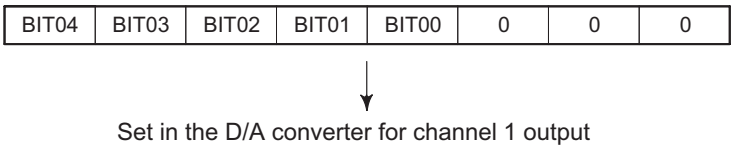
Example1 Data set

When the number of digits to shift data (d-06)=0 and when no offset is provided (d-08=0): The last eight bits of data (BIT07 to BIT00) is set in the D/A converter of the LM terminal.



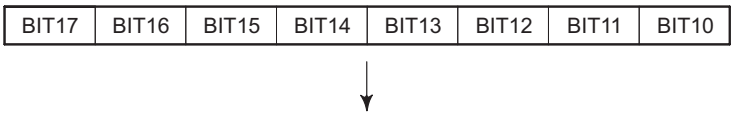
Example2 Shifting data left

When the number of digits to shift data (d-06)=3, shift direction is right (d-07=1), and no offset is provided (d-08=0): Data in BIT14 to BIT00 and the last three bits of data (=0) are set in the D/A converter.



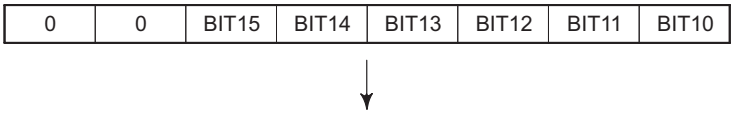
Example3 Shifting data right

When the number of digits to shift data (d-06)=10, shift direction is right (d-07=1), and no offset is provided (d-08=0): Data in BIT17 to BIT10 is set in the D/A converter.



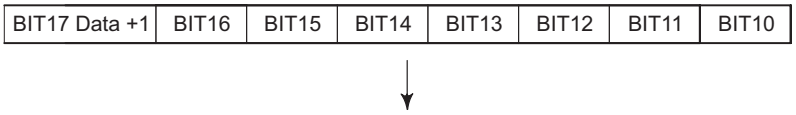
Example4 Shifting data right when the data length is 16 bits

When the data length is 16 bits, data shift (d-06)=10, shift direction is right (d-07=0), and no offset is provided (d-08=0): The first two bits of data (=0) and data in BIT15 to BIT10 are set in the D/A converter.



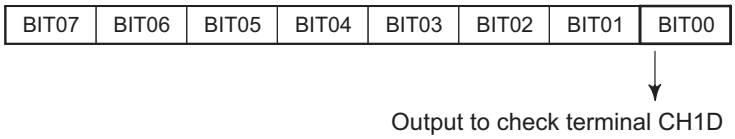
Example5 If an offset is provided

When the number of digits to shift data (d-06)=10, shift direction is right (d-07=0), and an offset is provided (d-08=1): Data in most significant bit BIT17 (to which 1 is added) and data in BIT16 to BIT10 are set in the D/A converter.



Example6 Data bit observation
(for printed–circuit board A20B–2001–0830 only)

For data shift (d–06) = 0 with no offset (d–08 = 0), the lowest data bit (BIT00) can be observed as a high/low level at check terminal CH1D.



3 Example of output to the channel 2

Output to the channel 2 is the same as that to the channel 1. However, the addresses for setting data (d-09 to d-12) are different from those for output to the channel 1.

Setting velocity information in the channel 1 and the number of errors in the channel 2 enables simultaneous monitoring of the change in each data item using the two channels.

(7) Data Numbers

1 Main data

Data No.	Description	Data length	Remarks
16	Motor speed command	32	The 12th bit (BIT12) indicates a units in rpm.
19	Motor speed	32	The 12th bit (BIT12) indicates a units in rpm.
25	Motor speed deviation (speed command - motor speed)	32	The 12th bit (BIT12) indicates a units in rpm.
4	Move command	32	Number of command pulses for ITP (usually 8 ms)
9	Positioning error	32	Number of erroneous pulses (Spindle synchronous control Cs contour control Rigid mode)
90	Torque command	16	0 to ±16384
131	Speedometer data	16	SM terminal
132	Load meter data	16	LM terminal
136	Position error	32	Number of erroneous pulses (Position coder orientation)

2 Data to be transmitted between the serial spindle and the CNC

Data No.	Description	Data length	Remarks
2	Control bit signal 1	16	Command bit sent from the CNC to the spindle
3	Control bit signal 2	16	Command bit sent from the CNC to the spindle
5	Speed command data	16	¿16384 for the maximum speed command
6	Spindle control signal	16	Command bit sent from the PMC to the spindle
10	Load meter data	16	0 to 32767 (maximum)
11	Motor speed data	16	±16384 for maximum speed
12	Spindle status signal	16	Status bit sent from the spindle to the PMC

3 Others

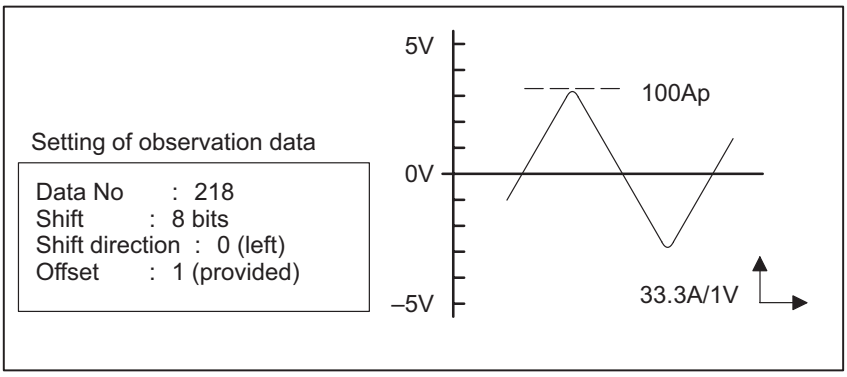
Data No.	Description	Data length	Remarks
112	Position coder data	16	Number of the pulses that return to the position coder for ITP (usually 8ms)
51	U–phase current command	16	
52	V–phase current command	16	
53	W–phase current command	16	
218	U–phase current (A/D changer data)	16	10V/FS with 8 bits shifted left(Note)
219	V–phase current (A/D changer data)	16	
121	Magnetic sensor signal (MS signal on the main spindle side)	16	15.4V/FS with 8 bits shif ted left(Note)
125	Magnetic sensor signal (MS signal on the sub–spindle side)	16	
162	DC link voltage	316	1000V/FS with 8 bits shifted left(Note)

Table 4.3.7 (1) Internal Data Conversion (A20B–2001–0830)

<table>
<tr><th>Data No.</th><th>Signal name</th><th colspan="2">Description
(conversion with 8 bits shifted left and with an offset)</th></tr>
<tr><td>218</td><td>IU</td><td>Phase U current</td><td rowspan="3">The current is positive when it is input to the amplifier.
<table><tr><th>Model</th><th>Conversion result</th></tr><tr><td>SPM–2.2
SPM–5.5</td><td>16.7A/1V</td></tr><tr><td>SPM- 11</td><td>33. 3A/ 1V</td></tr><tr><td>SPM- 15</td><td>50. 0A/ 1V</td></tr><tr><td>SPM- 22</td><td>66. 7A/ 1V</td></tr><tr><td>SPM- 26</td><td>100A/ 1V</td></tr><tr><td>SPM- 30</td><td>133A/ 1V</td></tr></table></td></tr>
<tr><td>219</td><td>IV</td><td>Phase V current</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>162</td><td>VDC</td><td colspan="2">DC link voltage signal 100V/1V</td></tr>
<tr><td>121</td><td>MSA1</td><td colspan="2">Magnetic sensor output MSA signal 1 1.54V/1V</td></tr>
<tr><td>125</td><td>MSA2</td><td colspan="2">Magnetic sensor output MSA signal 2 1.54V/1V</td></tr>
</table>

Example

Observation of phase U current in the SPM–11



Example of Monitoring Data

1 Example of monitoring a positioning error using the LM terminal

Address	Description	Set Data			
d–05	Data number	9	9	9	9
d–06	Data shift	0	1	1	2
d–07	Data shift direction	0	0	1	1
d–08	Offset	1	1	1	1
Data unit (NOTE)		256p/FS	512p/FS	128p/FS	64p/FS

NOTE
Printed–circuit board A20B–2001–0830 :
FS=10V (–5V to 5V)
Printed–circuit board A20B–1005–0740 :
FS=11V (0V to 11V)

2 Example of monitoring a motor speed using the SM terminal

Address	Description	Set Data		
d–09	Data number	19	19	19
d–10	Data shift	12	13	11
d–11	Data shift direction	0	0	0
d–12	Offset	1	0	0
Data unit (NOTE)		256p/FS	512p/FS	128p/FS

NOTE
Printed–circuit board A20B–2001–0830 :
FS=10V (–5V to 5V)
Printed–circuit board A20B–1005–0740 :
FS=11V (0V to 11V)