BL II-D TYPE A

SPECIFICATION (1st Edition)

OKUMA

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SECTION 1 GENERAL DESCRIPTION

This specification describes BLⅡ-D type A unit, the brushless motor driving unit. The BLⅡ-D type A controls current to the brushless motor according to the current commands sent from the servo processor board (SVPⅡD).

Features:

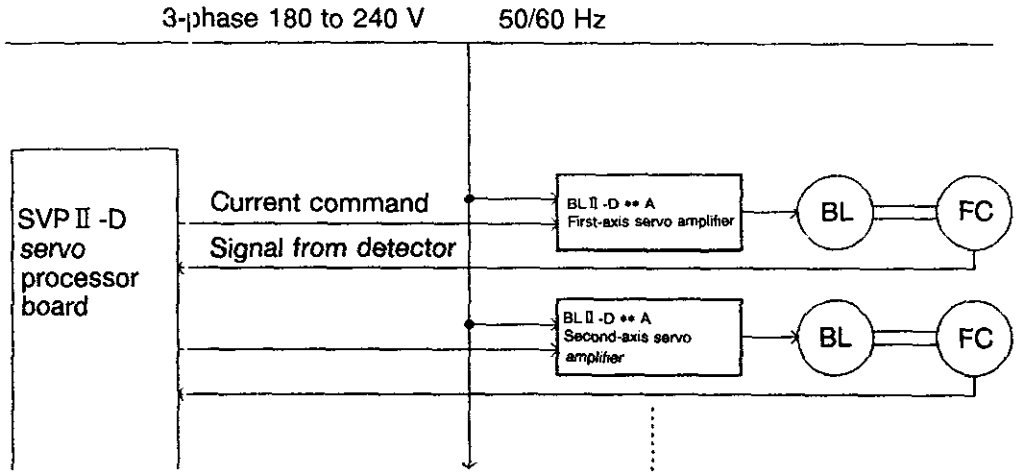
- Supplying commanded current to the motor in PWM method by IGBT.
- Eliminating the necessity for adding external circuits thanks to the built-in circuit for discharging regenerative energy.
- Indicating alarms with LEDs while transferring alarm data to SVPⅡD by two-way communication function.
- Braking the motor by DB (dynamic brake) function.
- Protecting the motor from overcurrent, overvoltage and overload.
- Enabling compact design by addition of 2-axis unit to BLⅡ-D series.
- Reducing wiring part by adoption of highly reliable large-current PC board.

SECTION 2 CONFIGURATION

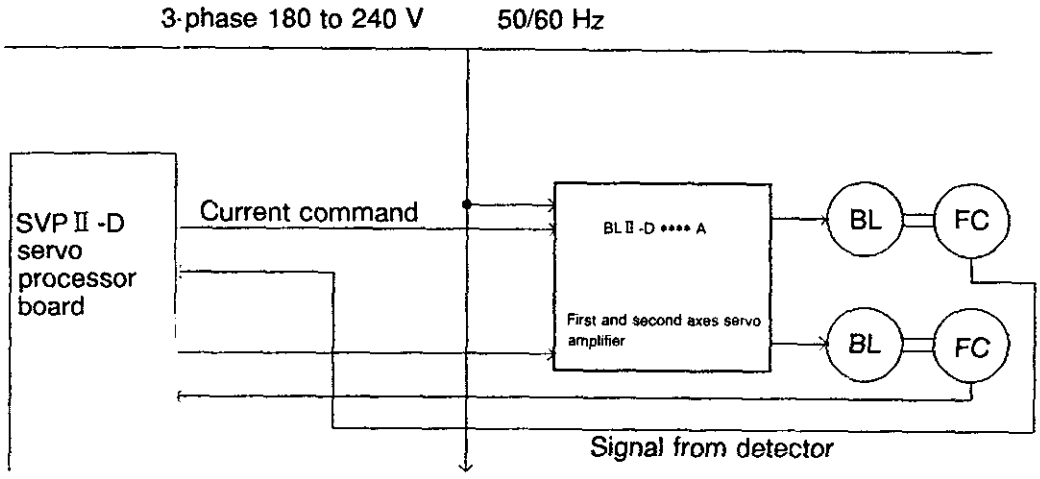
1. Total System Configuration

The BL-ACT type A is composed of the units shown in Fig. 1 and Fig. 2.

(1) Configuration with 1-axis unit



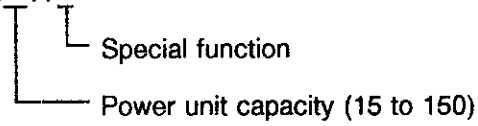
(2) Configuration with 2-axis unit



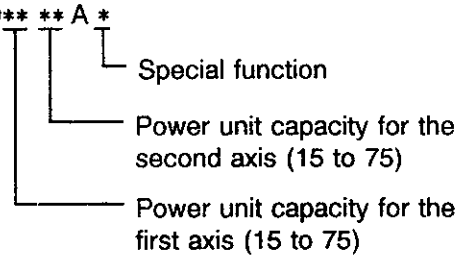
2. Unit Type

The BLⅡ-D series show their power unit capacity in their unit name.

- 1-axis unit ..... BLⅡ-D**A *



- 2-axis unit ..... BLⅡ-D** **A *



3. Unit Configuration

The BLⅡ-D is composed of control boards (SVCⅡ) and power units (BLⅡ-D P.U).

Order No.	Name
A006-0600	SVCⅡ BOARD 1-axis
A006-0601	SVCⅡ BOARD 2-axis
A006-0610	BLⅡ-D15A P.U
A006-0611	BLⅡ-D30A P.U
A006-0612	BLⅡ-D50A P.U
A006-0613	BLⅡ-D75A P.U
A006-0614	BLⅡ-D100A P.U
A006-0615	BLⅡ-D150A P.U
A006-0620	BLⅡ-D1515A P.U
A006-0621	BLⅡ-D3015A P.U
A006-0622	BLⅡ-D5015A P.U
A006-0623	BLⅡ-D7515A P.U
A006-0624	————
A006-0625	BLⅡ-D3030A P.U
A006-0626	BLⅡ-D5030A P.U
A006-0627	BLⅡ-D7530A P.U
A006-0628	————
A006-0629	BLⅡ-D5050A P.U
A006-0630	BLⅡ-D7550A P.U
A006-0631	————
A006-0632	BLⅡ-D7575A P.U
A006-0644	(*1) BLⅡ-D100AS P.U
A006-0645	(*1) BLⅡ-D150AS P.U

(*1) Used for the BLⅡ-D with pick-off function

4. Applicable Motor List

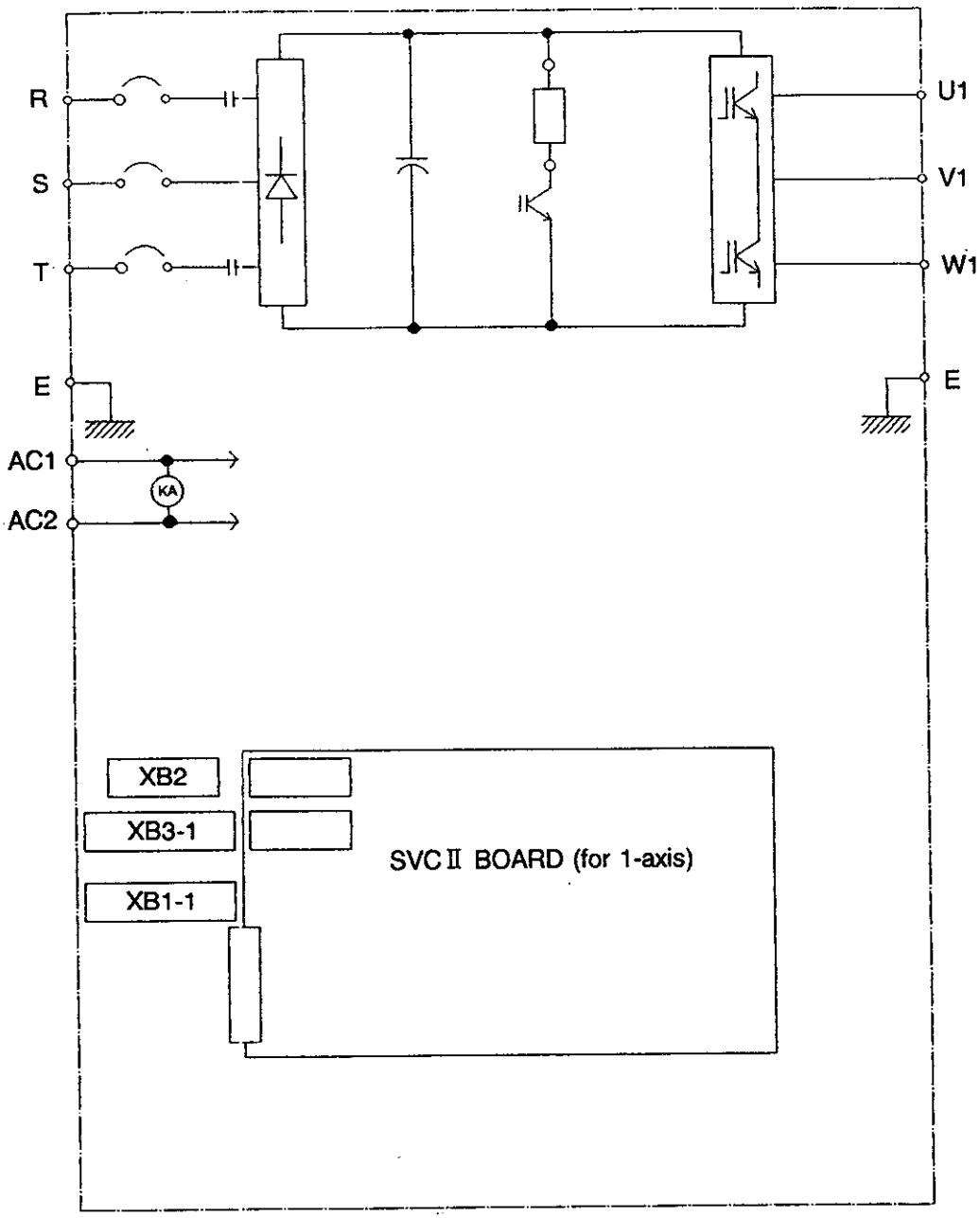
Power unit is determined by the required motor capacity.

Unit Capacity	Motor Output (kW)	Motor Type		
15	Up to 0.8	BL-MH10E-20 BL-MS10E-30	BL-MH20E-20	
30	0.8 to 1.5	BL-MH51E-20 BL-MS50E-20	BL-MH101E-12	
50	1.5 to 2.5	BL-MH101E-20 BL-MS50E-30	BL-MH201E-12 BL-MS75E-20	 BL-MS75E-30
75	2.5 to 4.0	BL-MH201E-20 BL-MH101E-30 BL-MS125E-20	BL-MH301E-12 BL-MS125E-30	
100	4.0 to 6.0	BL-MH401E-12	(BL-MH301E-20)	(BL-MH201E-30)
150	4.0 to 8.0	BL-MH301E-20 BL-MH201E-30 BL-MS125E-60	BL-MH700E-10 BL-MH101E-60 BL-MS140E-30	

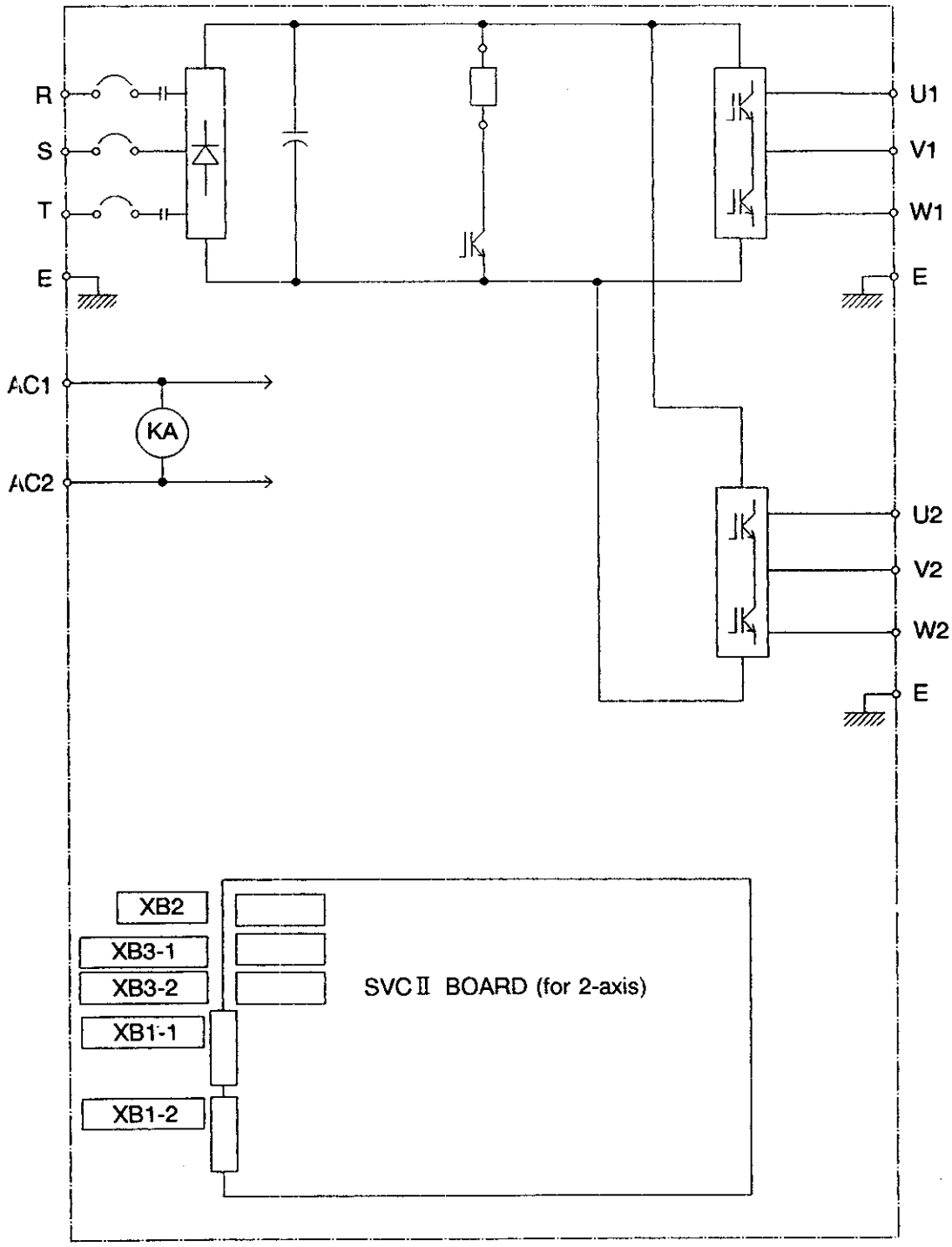
Output of the motors indicated in ( ) are reduced to approx. 80 % depending on the combination with power units.

5. Circuit Diagrams

(1) 1-axis unit



(2) 2-axis unit


R
S
T
E
AC1
KA
AC2
U1
V1
W1
E
U2
V2
W2
E
XB2
XB3-1
XB3-2
XB1-1
XB1-2
SVC Ⅱ BOARD (for 2-axis)

SECTION 3 FUNCTIONS

1. Specifications

Unit Capacity			15	30	50	75	100	150
Input power	Main circuit	V (rms)	Three-phase 180 to 240 VAC (50/60 Hz)					
	Control circuit	V (rms)	Single-phase 85 to 125 VAC					
Max. output current		A (p)	13	25	42	63	83	125
Continuous output current		Arms	4	8	13	20	25	40
Control method			PWM method by IGBT					
Frequency characteristic		Hz	1200 or over					
Ambient conditions	Working temperature	°C	0 to 60					
	Storage temperature	°C	−20 to 85					
	Humidity	%	80 or less					
Built-in functions	Protective function		Protection of the unit from ground fault, overcurrent, overvoltage, low voltage, and overload Protection of control power source from overcurrent.					
	DB function		Actuated when main power is turned off and servo alarm is generated.					
	Discharging regenerative energy		Capacitor discharge circuit with resistance					
	Applied load inertia		Less than five times as large as rotor inertia					
	Display		Alarm status display with LEDs					

2. Protective and Abnormality Detecting Function

	Function	Purpose/Content
1	Protection from ground fault	The circuit protector shuts off the power the moment ground fault occurs inside the servo amplifier or the motor.
2	Protection of control power source from overcurrent	The 3.2 A fuse is blown by the overcurrent from the power circuit caused by control circuit failure. Power is thus shut off immediately.
3	Motor transient overcurrent (OCM)	When a large current exceeding 150 % of the limit value flows into the motor, an alarm occurs to prevent breakage of main circuit elements and motor demagnetization.
4	Short-circuit in DC power source (OCS)	When the inverter DC power is shorted because of the trouble in main circuit elements or control circuit, or when an overcurrent flows because of ground fault inside the motor, an alarm occurs to prevent secondary breakage of the main circuit elements.
5	Abnormally high voltage (OV)	If the inverter DC power voltage increases to an abnormally high level, an alarm occurs to prevent breakage of the main circuit elements.
6	Abnormally low voltage (UV)	If the inverter DC power voltage decreases to an abnormally low level, an alarm occurs to prevent unstable operation of the motor.
7	Regenerative energy discharge resistance overheat (ROH)	If the regenerative energy discharge resistances pass the current continuously or is overheated by excessive regenerative energy, an alarm occurs to prevent burning of the resistances.
8	Power board overheat (BOH)	If the power board is overheated by the trouble in main circuit elements or control circuit, an alarm occurs to prevent burning of the board.
9	Abnormal power in control circuit (LOSS)	If the control circuit voltage exceeds the safety operation range because of circuit failure, an alarm occurs to prevent malfunction of the circuit.

3. Status Display Function

Lamp Name (Color)	Content
PON (G)	Power is supplied to the control board.
OP * (Y)	Control circuit is reset by an external command or alarm occurrence.
OCM * (R)	Overcurrent is supplied to the motor.
OCS * (R)	Overcurrent is supplied to the inverter circuit.
OV (R)	The inverter DC voltage is abnormally high.
UV (R)	The inverter DC voltage is abnormally low.
ROH (R)	The regenerative energy discharge circuit is overheated.
BOH (R)	The power board is overheated.
LOSS (R)	The control circuit voltage exceeds the safety operation range.

1 Symbols in ( ) show lamp color.

(G) . . . Green

(Y) . . . Yellow

(R) . . . Red

2 The mark * is a substitute for the axis No.

First axis . . . . * = 1

Second axis . . * = 2

4. Monitoring Function

The BLII-D drive unit is provided with the following monitoring functions.

Check Pin Name	Content	Rated Output
VEL 1	Analog signal indicating BL motor (first axis) speed	±10 V/±3750 rpm
TC 1	Analog signal indicating torque command given to BL motor (first axis)	10 V/(torque limit)
VEL 2	Analog signal indicating BL motor (second axis) speed * Board for 2-axis unit	±10 V/±3750 rpm
TC 2	Analog signal indicating torque command given to BL motor (second axis) * Board for 2-axis unit	10 V/(torque limit)
+ 5	Power source of 5 V for control circuit * Board for 1 axis unit	
COM	Ground for control circuit	

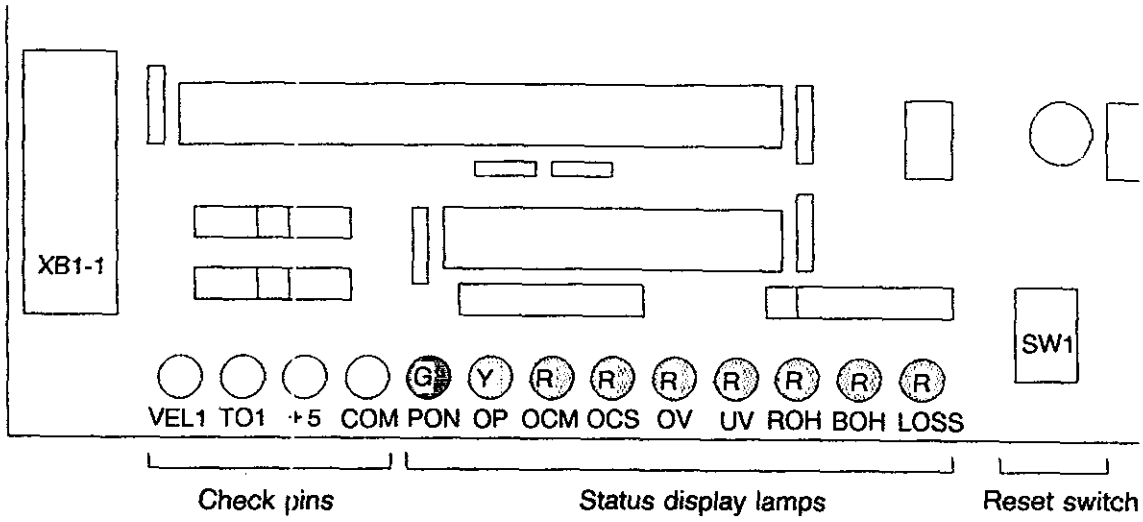
5. Servo Reset Function

The BLII-D drive unit can be reset using SW1.

DIP Switch Name	Content	Rated Output
SW1-1	Servo reset switch for first axis	Reset with the switch ON
SW2-2	Servo reset switch for second axis * Effective only in 2-axis board	Reset with the switch ON

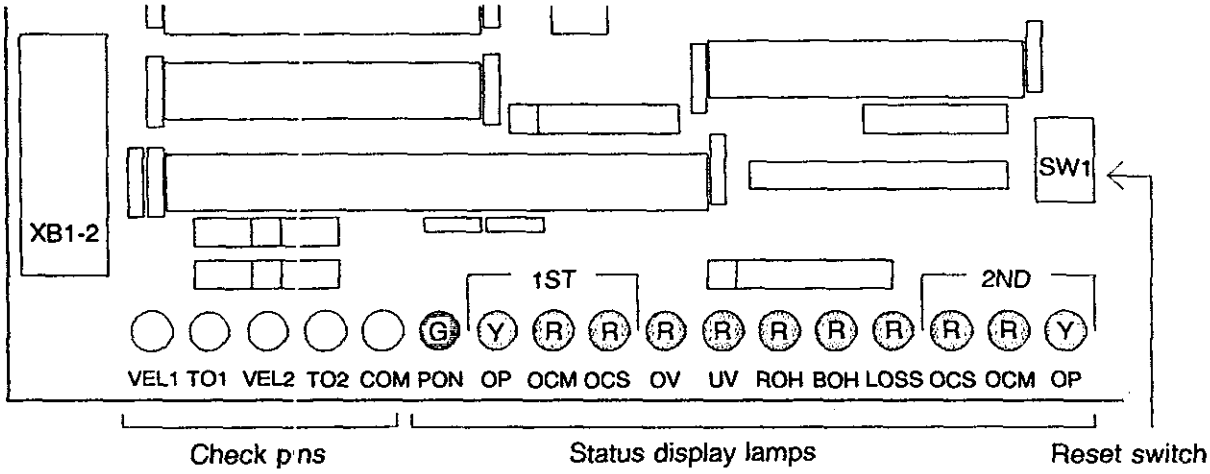
6. Layout Drawing of Status Display Lamps, Check Pins, Reset Switch

(1) 1-axis unit (SVC II 1-axis unit board)



(G) . . . Green
(Y) . . . Yellow
(R) . . . Red

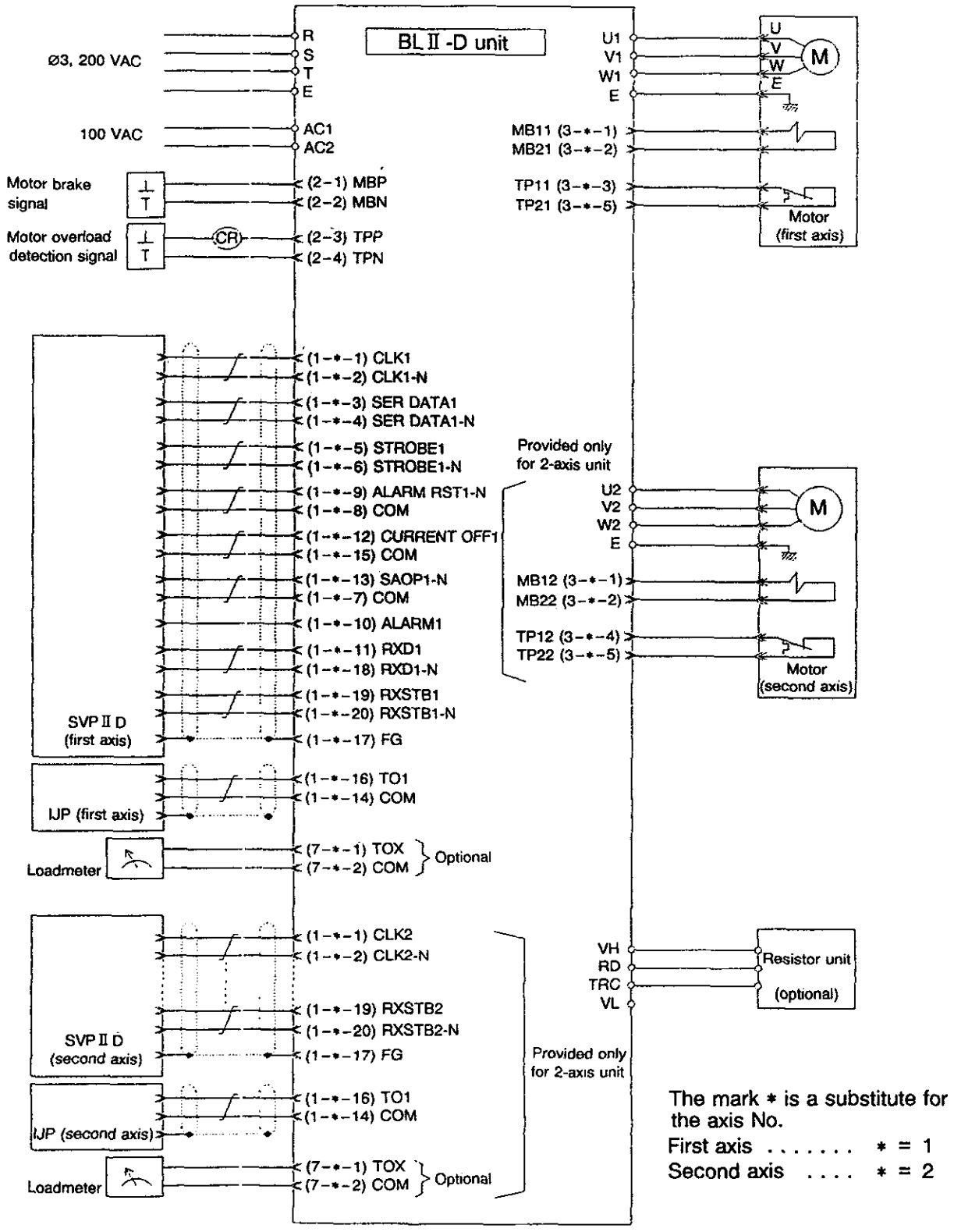
(2) 2-axis unit (SVC II 2-axis unit board)



(G) . . . Green
(Y) . . . Yellow
(R) . . . Red

SECTION 4 INPUT/OUTPUT INTERFACE

1. Wiring Connection Diagram



2. Notes for Connection

(1) Use the following wires in connecting the BL Ⅱ-D drive unit to externally supplied commercial power source.

1) R, S, T, and E wires on the terminal base

Motor Capacity (kW)	Unit Capacity	Input Current (A)	Applicable Wire	Terminal Base Size
Up to 0.8	15	3	2.0 mm^2 or over	M4
0.8 to 1.5	30	6	2.0 mm^2 or over	M4
1.5 to 2.5	50	10	2.0 mm^2 or over	M4
2.5 to 4.0	75	16	3.5 mm^2 or over	M4
4.0 to 6.0	100	21	3.5 mm^2 or over	M4
6.8 to 8.0	150	32	5.5 mm^2 or over	M4

For wiring of BL Ⅱ-D 2-axis unit, calculate the total input current suitable for required unit capacity and regard 80 % of the obtained value as a standard in selecting applicable wires.

For wires of 5.5 mm^2 or over, use the wires crimped by round terminals.

2) AC1 and AC2 wires on the terminal base
Use wires of 0.5 mm^2 or over for AC1 and AC2. (Terminal base size: M4)

(2) To connect the BL Ⅱ-D drive unit to the BL motor, use the cable specified by Okuma. For wires of 5.5 mm^2 or over, use wires crimped by round terminals.

(3) To connect the BL Ⅱ-D drive unit to the SVP board, use ten pairs of twisted pair shield wires of 0.2 mm^2.

(4) To connect the BL Ⅱ-D drive unit to the EC circuit, use wires of 0.5 mm^2.

3. Connector

Use the following connectors as input signal wires for BL II -D drive unit.

Use	Name	Type	Maker	Signal Name
*1XB1-1	Connector (20 cavities)	MRP-20F01	Honda Tsushin	Current command input signal for first axis
*1XB1-2	Connector (20 cavities)	MRP-20F01	Honda Tsushin	Current command input signal for second axis
*2XB2	Connector (5 cavities)	Dynamic series 178288-5	Nippon AMP	Input signal to motor thermal brake
*2XB3-1	Connector (5cavities)	Dynamic series 178288-5	Nippon AMP	Input signal to motor thermal brake for first axis
*2XB3-2	Connector (5 cavities)	Dynamic series 178288-5	Nippon AMP	Input signal to motor thermal brake for second axis
XB7-1	Connector (2 cavities)	EI series 171822-2	Nippon AMP	Optional: First axis load output
XB7-2	Connector (2 cavities)	EI series 171822-2	Nippon AMP	Optional: Second axis load output

*1 Place the connectors for XB1-1 and XB1-2 on the metal fixtures (MR20-OKT E3708-578-001 made by Nisshin Seigyo).

*2 Use the key-in plug (175855-1 made by Nippon AMP) together with the connectors for XB2 and XB3.

4. Connector Pin Layout

				Pin No.	Abbrev. Signal Name
14	COM	8	COM	1	CLK *
15	COM	9	ALARM RST *-N	2	CLK *-N
16	TO *	10	ALARM *	3	SER DATA *
17	FG	11	RXD *	4	SER DATA *-N
18	RXD *-N	12	CURRENT OFF *	5	STROBE *
19	RXSTB *	13	SAOP *-N	6	STROBE *-N
20	RXSTB *-N			7	COM

XB1-* Pin Layout
The mark * is a substitute for the axis No.

First axis ..... * = 1
Second axis ... * = 2

1	2	3	4	5
MBP	MBN	TPP	TPN	☆

XB2 Pin Layout
The star mark indicates the pin to be fitted by the key-in plug.

1	2	3	4	5
MB11	MB21	TP11	☆	TP21

XB3-1 Pin Layout
The star mark indicates the pin to be fitted by the key-in plug.

1	2	3	4	5
MB12	MB22	☆	TP12	TP22

XB3-2 Pin Layout (only for 2-axis unit)
The star mark indicates the pin to be fitted by the key-in plug.

1	2
TOX *	COM

XB7-* Pin Layout
The mark * is a substitute for the axis No.

First axis ..... * = 1
Second axis ... * = 2

5. Meaning of Signals

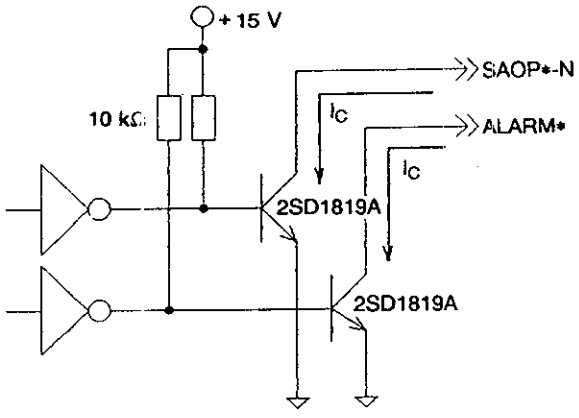
Signal Name	Meaning	Rated Output
R, S, T, E	AC current supplied to the servo amplifier	Source voltage: 180 to 240 V rms Frequency : 50/60 Hz Power source capacity depends on the BL motor used.
AC1, AC2	Excitation voltage signal supplied to the electromagnetic contactor that opens or closes the servo amplifier control circuit	Source voltage: 90 to 121 V rms Frequency : 50/60 Hz Excitation current: IF≦160 mA
U*, V*, W*, E	Three-phase current output supplied from the servo amplifier to the BL motor	The output varies depending on BL motor capacity.
VH, VL	Terminal for DC power source voltage in the servo amplifier power circuit	
TRC, VH	Terminal to be connected with the resistor unit	Terminal type depends on the unit capacity.
RD, VH	Terminal to be connected with external resistances for increasing regenerative energy discharging capacity	
THR, COM	Signal for detecting power board overheat	
MBP, MBN	Power source for the brake that locks the BL motor while the servo is not in operation for such reasons as operation circuit OFF or control circuit reset (This power source is used for preventing the controlled object from dropping.)	Rated power to the load open/close relay: 5 A/30 VDC
TPP, TPN	Output signal indicating that the thermostat with built-in motor is actuated by overload	
MB1*, MB2*	Power source for the brake connected with the BL motor	
TP1*, TP2*	Signals for detecting motor overload	
CLK* SER DATA* STROBE*	Current command signal given to U and V phases of the BL motor and signal for serially transmitting SVP internal signals for monitoring analog data (such as motor speed, torque command)	Use of the line receiver 26LS32
ALARM RST*-N	Signal for resetting the alarm hold circuit in the servo amplifier. The hold circuit is reset the moment the last transition edge changes from "H" to "L" or the contact changes from "open" to "close".	By inputting 15 VDC into ALARM RST-N ←→ COM or into the contact

The mark * is a substitute for the axis No. First axis . . . . . * = 1
Second axis . . * = 2

Signal Name	Meaning	Rated Output
CUR OFF*	This signal shuts off the three-phase current supplied to the BL motor and, at the same time, resets the circuit inside the servo amplifier at "H" level or with the contact "open". If the motor is provided with brake, its electromagnetic brake is actuated in synchronization with this signal to lock the motor.	By inputting 15 VDC into CURRENT OFF ←→ COM or into the contact
SAOP*-N	Signal indicating that the servo amplifier can be controlled by external commands. The output transistor goes off when CUR OFF is at "H" level or alarm occurs.	See Note 1.
ALARM*	Signal indicating that an alarm is caused in the servo amplifier. The output transistor goes off on occurrence of the alarm.	See Note 1.
RXD*-N RXSTB*	Signal for serially transmitting alarm data from the servo amplifier to SVP.	Use the line driver, 26LS31.
TO*	Analog signal indicating torque commands given to the BL motor. (Parameter must be set in servo data file.)	10 V/(torque limit) Zo = 200 Ω
TOX*	Analog signal indicating torque commands given to the BL motor. (Parameter must be set in servo data file.)	2.5 V/(motor rated torque) Zo = 200 Ω

The mark * is a substitute for the axis No. First axis . . . . . * = 1
Second axis . . * = 2

Note 1: Output circuit for ALARM and SAOP*-N signal*



The output circuit for ALARM and SAOP*-N signals employs transistors. Therefore, when using this circuit, ensure that the circuit current I_C does not exceed the allowable range.*

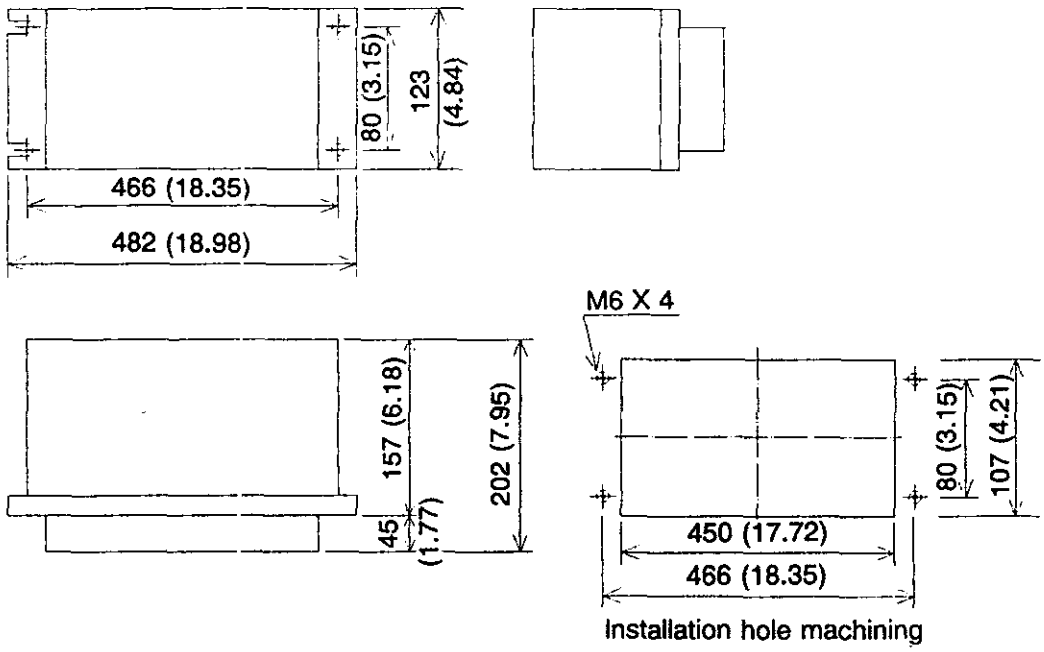
Absulute maximum rating of 2SD1819A

V_{CEO} = 50 V, I_C = 100 mA, P_W = 150 mW
On the condition of I_C = 10 mA, voltage of V_{CE} = approx. 0.1 V will be generated.

SECTION 5 DIMENSIONAL DRAWINGS

1. Dimensional Drawing of BLII-D

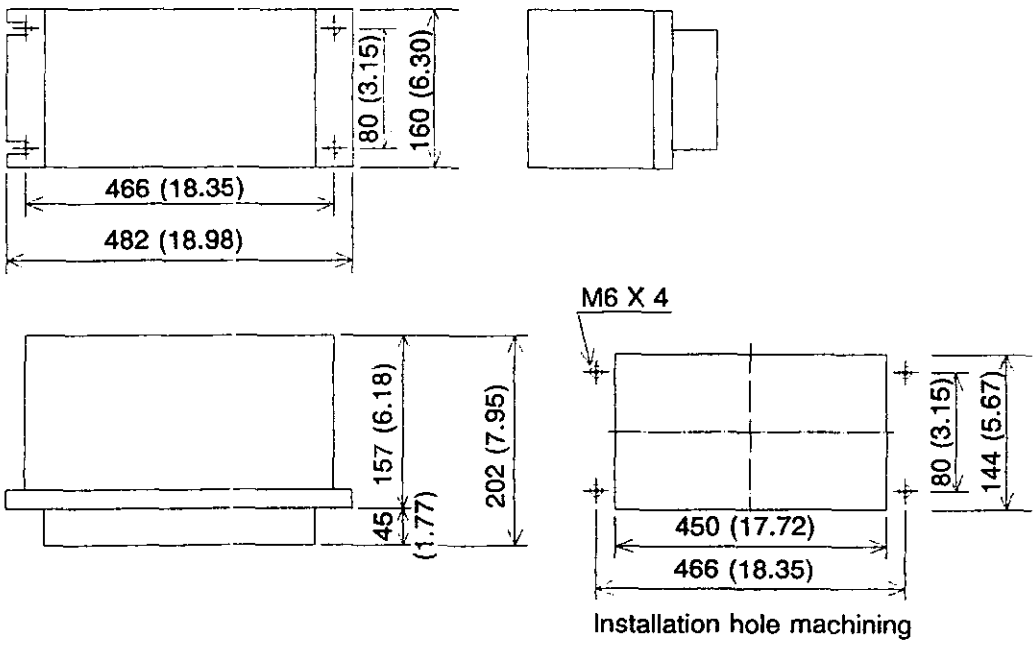
(1) BLII-D15A to BLII-D100A



Installation hole machining

When installing another unit close to this unit, provide clearance of 4 mm or over between them.

(2) BLII-D 2-axis unit and BLII-D150A

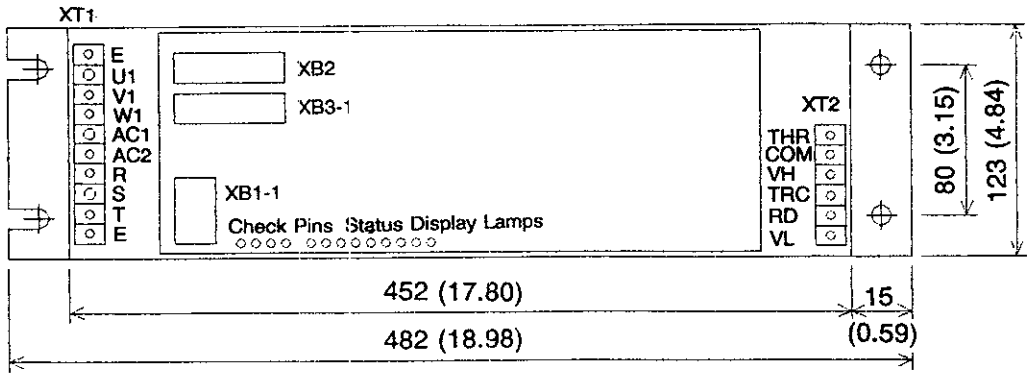


Installation hole machining

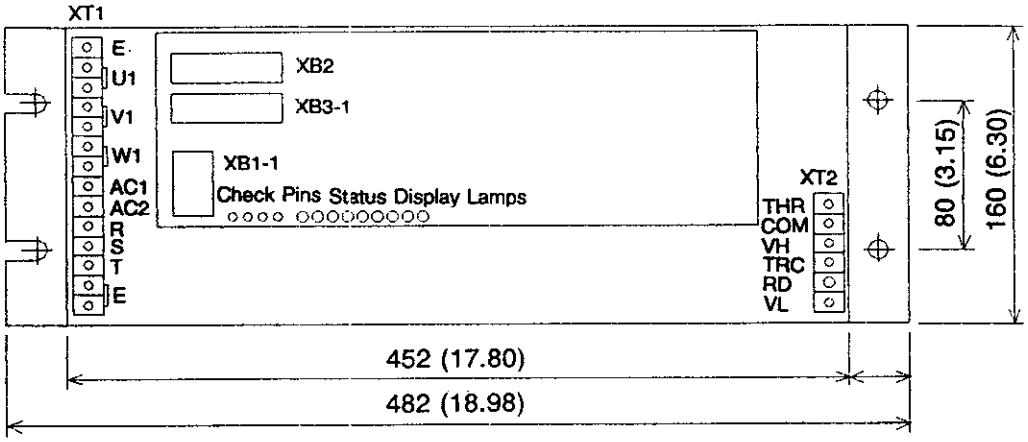
When installing another unit close to this unit, provide clearance of 4 mm or over between them.

2. Connector and Terminal Base Layout

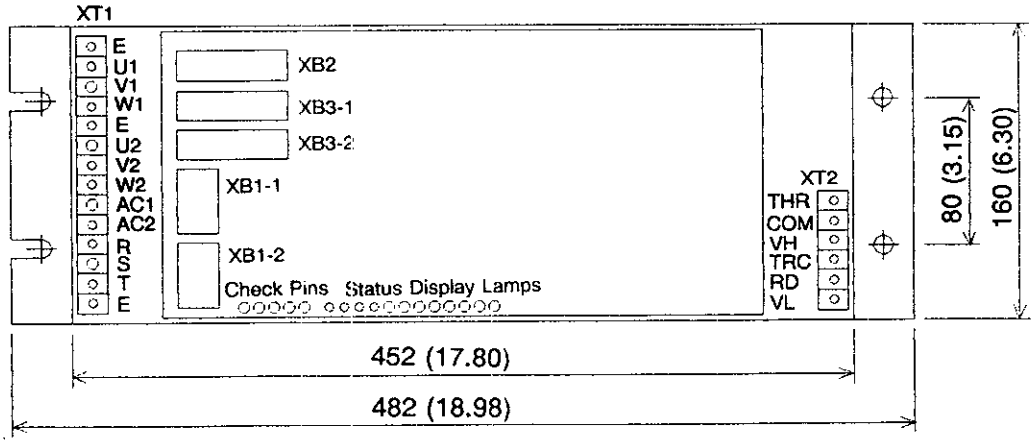
(1) 1-axis unit (15 to 100 A)



(2) 1-axis unit (150 A)



(3) 2-axis unit



APPENDIX 1 SVP BOARD AND SERVO DATA FILE

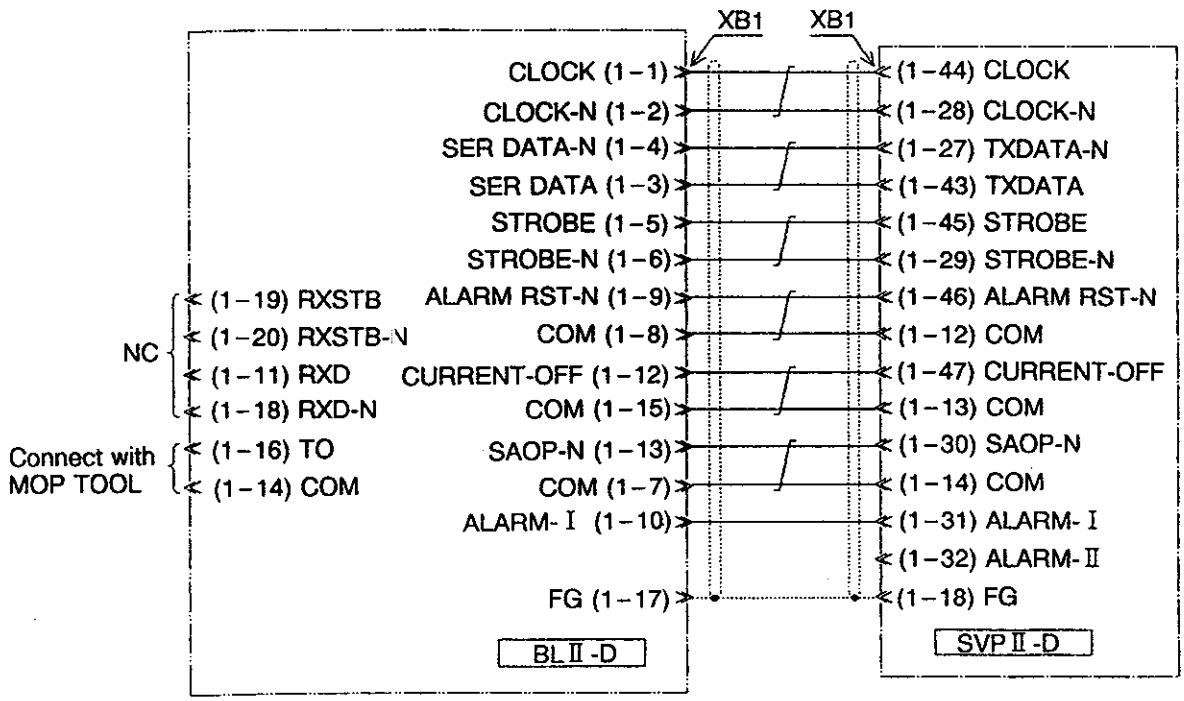
The BL Ⅱ-D must be used together with SVP board and SVP control software.

(1) Use SVP Ⅱ D.

(2) Use [SVPE104A or a newer version] as SVP control ROM.

(3) Use a servo data PBU file of which [revision No. is F or after F].
[Ex.] LSU16-1A-F.PBU

(4) Wiring connection between BL Ⅱ-D and SVP Ⅱ D
Connect BL Ⅱ-D with SVP Ⅱ D in the method shown below.



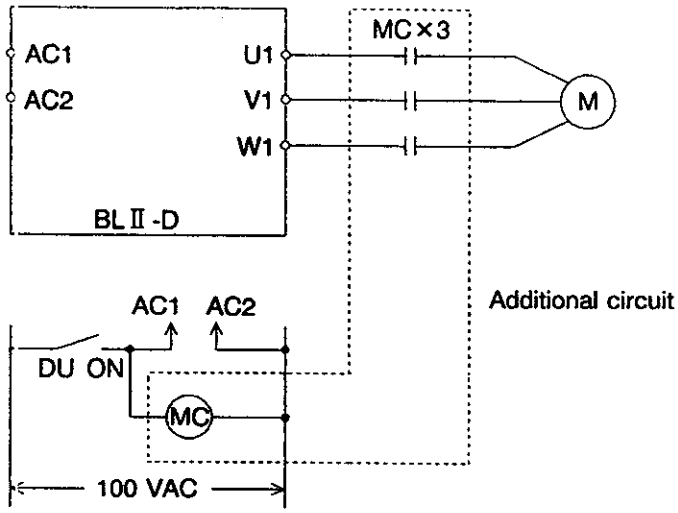
APPENDIX 2 DB FUNCTION AGAINST OVERLOAD INERTIA

The BLⅡ-D is provided with the DB (dynamic brake) function. The standard DB circuit, however, may not function perfectly to brake the load with large inertia energy. If the load inertia is more than five times as large as the motor inertia, it is necessary to add the circuit shown below.

(1) Additional peripheral circuits

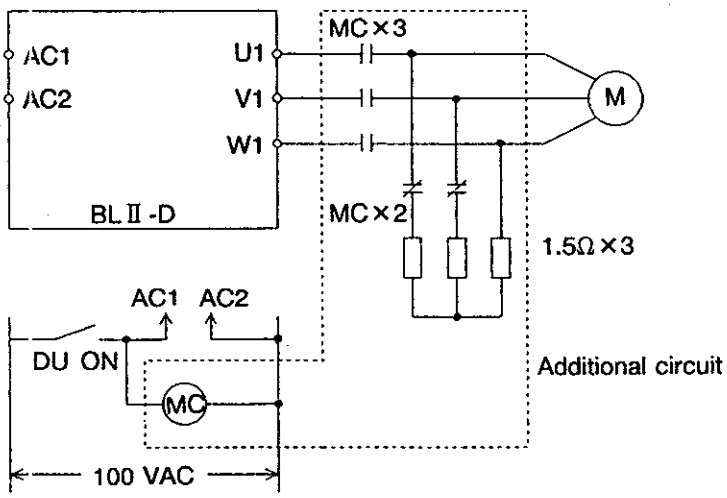
1) Without DB function

The electromagnetic contactors in the additional circuit separate the BLⅡ-D from the motor.



2) Adding DB resistance externally

Not only the electromagnetic contactors separate the BLⅡ-D from the motor but also the externally added resistances carry out DB function.



(2) Specifications for Electromagnetic Contactor

The electromagnetic contactor used in the additional circuits must satisfy the following condition:

Motor rated current ≦ Rated current flow in electromagnetic contactor

(3) Specifications for Externally Added DB Resistance

Select the resistance that satisfy the following conditions:

1) Resistance type . . . . . Anti-surge

2) Resistance value . . . . . 1.5 Ω K (10 %)

3) Power required by resistance:

$$W \geqq \frac{\frac{1}{2}\,(J_M + J_L) \cdot (2\pi \frac{N}{60})^2}{8\ (\text{Times}) \times 3\ (\text{Elements})}$$

W : Power required by externally added resistance

J_M : Motor inertia (kgm^2)

J_L : Load inertia (kgm^2)

N : Motor speed in rapid feed (rpm)

(4) Applicable Machines

- Machines with pick-off function (Sine the pick-off unit is connected with the spindle through the workpiece, excessive inertia energy is caused.)
- Machines using a servomotor for spindle rotation

APPENDIX 3 INSTALLATION OF RESISTOR UNIT

The BL II -D contains the circuit for discharging regenerative energy as a standard function. This circuit, however, may not discharge all the energy caused by a large load. In such a case, install a resistor unit.

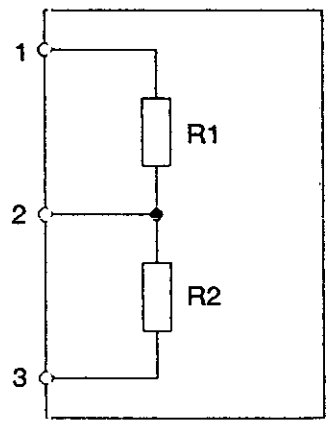
(1) Necessity of Resistor Unit

The resistor unit must be installed if the regenerated energy exceeds the built-in circuit capacity.

	Unit Capacity	Capacity of Discharge Circuit in BL II -D P_{D1} (W)	Capacity after Installation of Resistor Unit P_{D2} (W)
1-axis unit	15 to 100	80	320
1-axis unit	150	120	480
2-axis unit	15 to 75	80	320

(2) Configuration of Resistor Unit

1) Circuit diagram of the unit



Resistor Unit

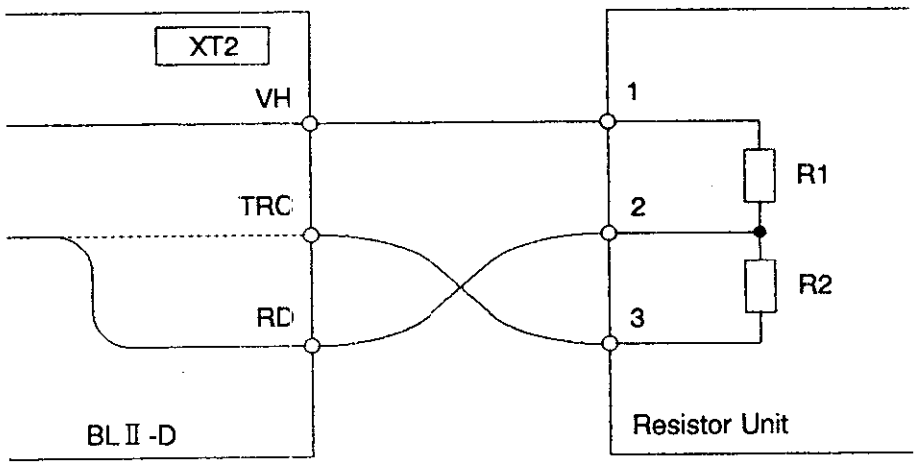
2) Configuration of the unit

	Resistance To Be Used		Applicable Unit
	R1	R2	
Resistor Unit Ⅰ	16 Ω, 100W	8 Ω, 200W	1-axis unit (30 to 75 A)
Resistor Unit Ⅱ	7 Ω, 150W	3.5 Ω, 300W	1-axis unit (150 A)
Resistor Unit Ⅲ	10 Ω, 100W	5 Ω, 200W	2-axis unit, 1-axis unit (100 A)

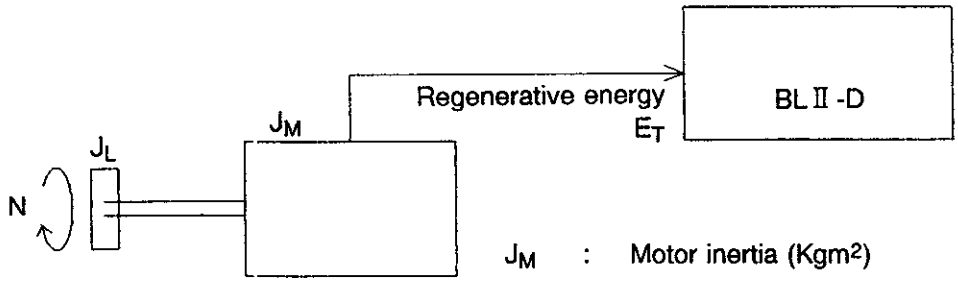
(3) Connection Method

1) Remove the resistance wire from [TRC] on the XT2 (terminal base) and connect it with [RD].

2) Connect the BLⅡ-D with the resistor unit as shown below.



(4) Calculation of Regenerative Energy



J_M : Motor inertia (Kgm^2)

J_L : Load inertia (conversion of load applied to motor axis) (Kgm^2)

N : Motor speed (rpm)

The regenerative energy E_T (J) can be obtained by the formula 1.

$$E_T = K \times \frac{1}{2} \cdot (J_M + J_L) \cdot \left(\frac{2\pi N}{60}\right)^2 \quad \ldots \quad 1$$

Substitute 0.7 for K in the case of normal machine tools, though the value varies a little depending on the machine structure.

Suppose the duty cycle for reducing motor speed is T (sec.), the regenerative energy capacity Ps (w) can be obtained by the formula 2.

$$P_S = \frac{E_T}{T} (w) \quad \ldots\ldots \quad 2$$

The regenerative capacity Ps (w) and the regenerative energy discharge capacity P_D (w) must satisfy the formula 3.

$$P_S \leqq P_D \quad \ldots\ldots \quad 3$$

APPENDIX 4 TREATMENT OF CONTINUOUS REGENERATIVE ENERGY

Installation of the regenerative energy discharge unit can increase the regenerative energy discharge capacity of BLⅡ-D. However, if the energy exceeds this capacity, BLⅡ-D cannot be normally used.

In this case, connect the BLⅡ-D with an external unit having the function for returning regenerative energy to the power source.

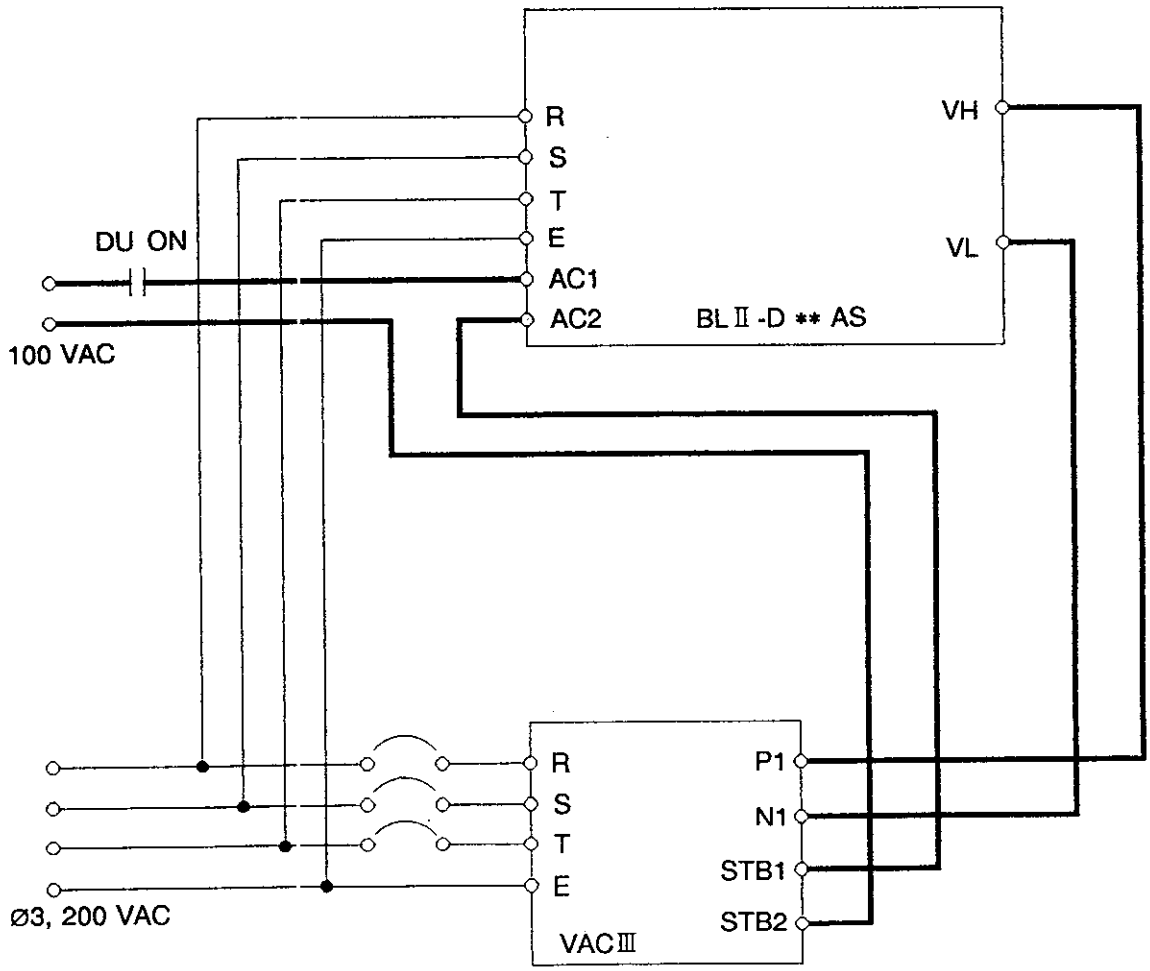
This section describes the method of treating the regenerative energy using VAC Ⅲ unit.

(1) Treatment of Regenerative Energy with VACⅢ Unit

When the spindle (VAC drive) and sub spindle (BLⅡ-D drive) are operated in synchronous control in such cases as pick-off operation, the sub spindle motor may cause regenerative energy continuously. In this case, treat the regenerative energy through VACⅢ unit.

(2) Connection Method

Conduct additional wiring (indicated in bold lines) in the diagram below.



(3) Applicable Units

To treat regenerative energy through VAC unit, ensure that:

1) The BL Ⅱ -D**AS unit is used.

The BL Ⅱ -D**AS is the unit made by removing DM, TRMD, and RM1 from the standard unit.

2) The VAC Ⅲ (with DC power output terminals) is used.

The VAC Ⅲ is the unit made by providing standard unit with output terminals P1, N1, STB1, and STB2.

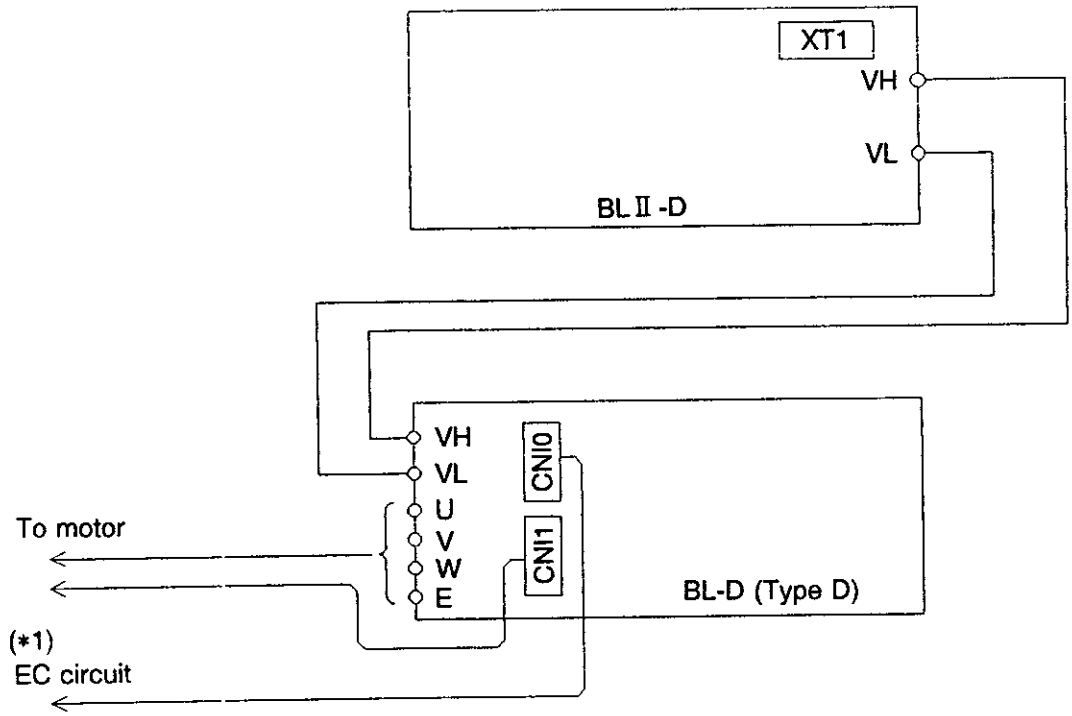
APPENDIX 5 DC POWER SUPPLY FROM BLⅡ-D TO EXTERNAL UNITS

The BLⅡ-D can supply DC power to external units depending on the load applied to the unit.

Use this function particularly when supplying DC power to the unit that does not require continuous load such as BL-D (type D).

(1) DC Power Supply from BLⅡ-D to BL-D

1) Connection method



(*1)
Connection method of [CNI0]
Make wiring connections of [CNI0] by referring to the connection method of DC-SIA [CN4].

2) Treatment of LV alarms

Before conducting the wiring shown in 1), turn on [SW6-2] so that closing the control circuit will not cause an LV alarm in BL-D unit.

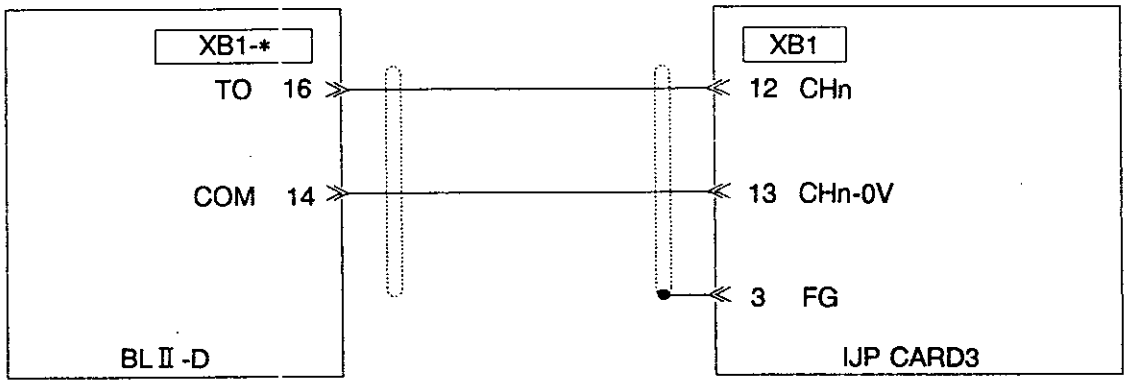
(2) DC Power Supply to The Other Units

Please consult your Okuma dealer.

APPENDIX 6 CONNECTION METHOD OF MOP-TOOL

When using MOP-TOOL, connect it in the following method.

(1) Connection Method



The mark * is a substitute for the axis No.

First axis .... * = 1

Second axis .. * = 2

(2) Applicable Machines

Machines designed for using MOP-TOOL

APPENDIX 7 REPLACEMENT OF BL-D WITH BLII-D

When installing BLII-D in the machine loaded with BL-D, it is necessary to make installation holes and change connection wires.

(1) Additions and Changes

1) Changing installation holes

Since the BL-D is different from the BLII-D in overall size, installation of BLII-D requires to make installation holes by referring to "5. Dimensional Drawings".

2) Changing connection wires

The BL-D is different from the BLII-D in input/output interface. Change the interface by referring to "4. Input/Output Interface".

3) Changing SVP board and servo data file

Change them by referring to "Appendix 1. SVP Board and Servo Data File".

APPENDIX 8 SIGNAL OUTPUT TO LOADMETER

To make the BL Ⅱ-D output signals to loadmeter, make wiring connections as shown below.

(1) Signal Output to Loadmeter

1) Use the SVC Ⅰ board loaded with XB7.

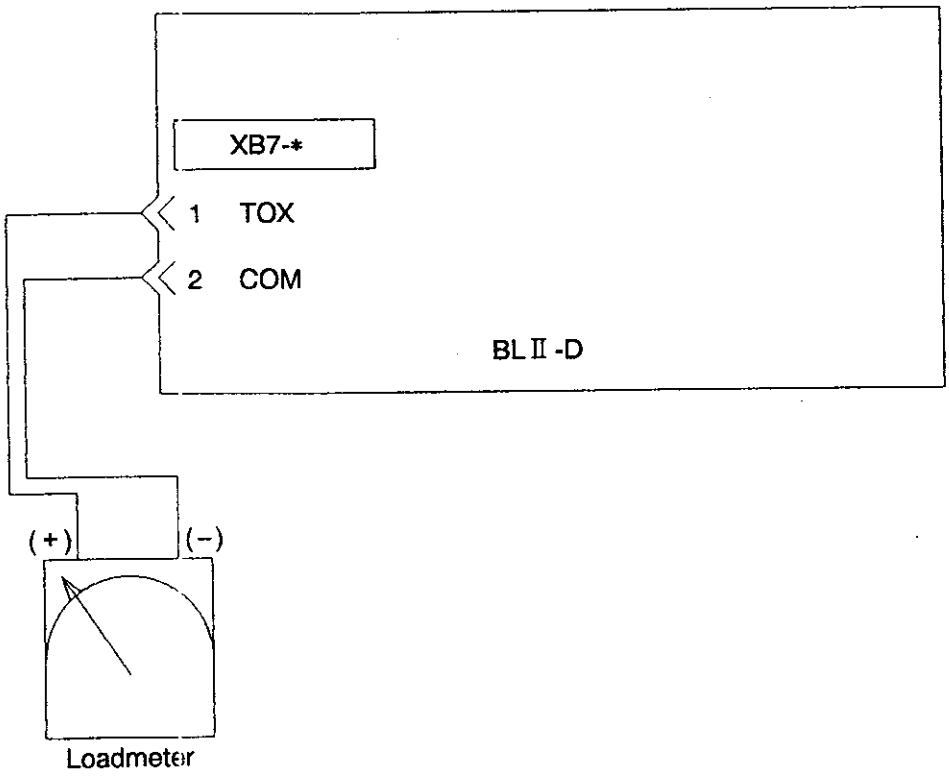
2) Enter #98 in SVP servo data area for optional parameter word (N032 for lathes and grinders, and N010 for machining centers).

(2) Loadmeter type

Use a meter which indicates 100 % at rated voltage 2.5 V.

(3) Connection Method

Connect the BL Ⅱ-D with the loadmeter as shown below.



LIST OF PUBLICATIONS

Publication No.	Date	Edition
3709-E	December 1992	1st

This manual may be at variance with the actual product due to specification or design changes.
Please also note that specifications are subject to change without notice.
If you require clarification or further explanation of any point in this manual, please contact your OKUMA representative.