

ZJ-12591-B

INSTRUCTION MANUAL FOR
POWER AMPLIFIER MODEL LE-P□□A

MITSUBISHI ELECTRIC CORPORATION

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Foreword

Thank you very much for your selection of Mitsubishi Power Amplifier. Please read through this manual before use, so that your LE-P□□A power unit will be operated correctly with thorough understanding of its specifications.

It is requested that the manual is delivered to the end user along with the Tension Controller.

This Power Amplifier has been adjusted for use on the voltage control system using 0 to 5 VDC/FS signals. So, you can use it with our Tension Controllers of the LE-MC and LE-HC series, with no further adjustments.

1. Outline

This Power Amplifier supplies loads with stable voltage outputs proportional to the externally supplied control signal voltages. It is used as the power unit for various kinds of control devices, or as a stand-alone controller by connecting necessary controls.

2. Features

- (1) Less susceptible to fluctuation in supply voltage.

The constant-voltage control system employed insures stable outputs without being affected by possible fluctuation in supply voltage.

- (2) In addition to the DC analog voltage signals fed from various kinds of control devices or sequencers as the control signals, operation is also possible via controls.

- (3) Broader range of adaptability

In case of constant-voltage control, it can adapt to a broader range of loads, from such very low load as 0.1A/24V to 5.0A/24V.

(4) Quick response

The transistor-switching control adopted has improved response time substantially as compared with conventional thyristor control.

(5) Self-contained auxiliary power supply

The Power Amplifier contains an auxiliary power supply of a fixed voltage of approx. 10 VDC.

It can be utilized as the power supply for operating the brake for stopping old reel in the turret-switching system let-out/take-up control, or for pre-driving new reel.

(6) Reliable protective functions

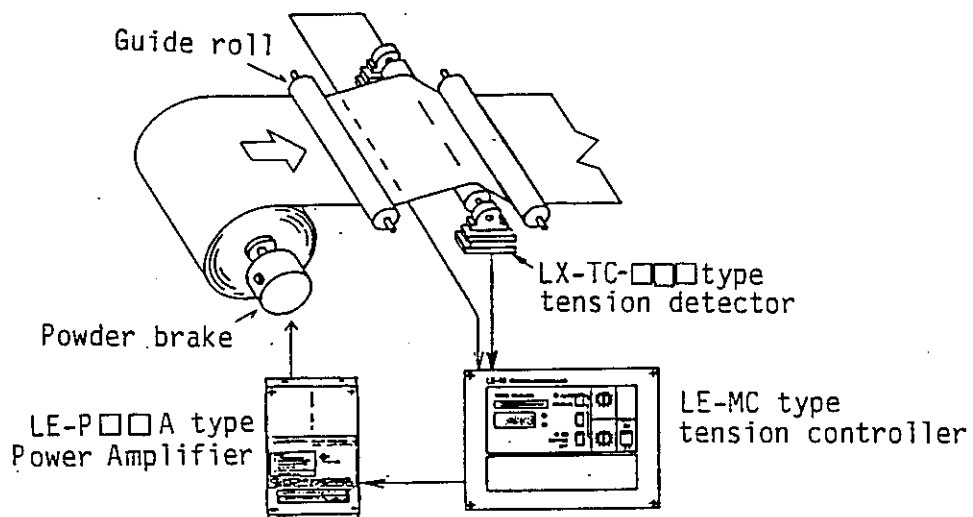
The current limiter is activated in case of an abnormal load. Also, the output cut-off function is put in motion in case of a shorting occurred in the load, to protect the Power Amplifier.

(7) It is also possible to change to constant-current control by changing over the internal switch.

(8) Use of the removable type terminal board has improved maintainability.

3. Example of System Configuration

Combined use with LE-MC type fine displacement detection tension controller.



4. Specifications

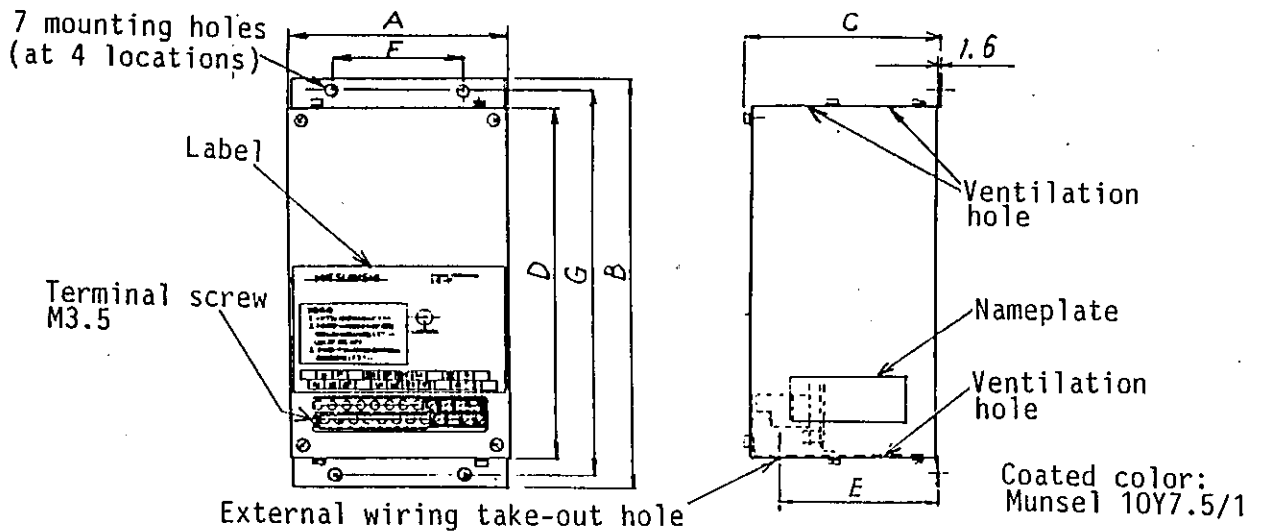
Model	LE-P06A	LE-P38A	LE-P50A
Power requirements	<ul style="list-style-type: none"> 200/200/220 VAC $\pm 10\%$, 50/60/60 Hz (when shipped) 100/100/110 VAC $\pm 10\%$, 50/60/60 Hz 		
	50 VA	150 VA	300 VA
Input signal	DC 0 ~ (0.5~5)V/FS (input resistance: approx. 10k Ω)		
Rated output	24VDC, 0.6A max.	24VDC, 3.8A max.	24VDC, 5.0A, max.
Characteristics			
Function	<ul style="list-style-type: none"> Selectable between constant-voltage control and constant-current control (by changing over internal switch) Provided with constant-current limiter (for use in constant-voltage control mode) Provided with output cut-off function for use in case of shorting occurred in load. 		
Adjustment made before shipment	<ul style="list-style-type: none"> For constant-voltage control (with input 0 to 5 V/FS) For use on 200 VAC power supply 		
Aux. functions	<ul style="list-style-type: none"> Provided with extra terminals for connecting controls for use as stand-alone unit. Provided with terminals for connecting output meter (1 mA rating output current measuring ammeter (in %)) With ammeter connection terminals With fixed voltage power supply connection terminals (10 VDC, 10-sec rating) 		
Applications	<ul style="list-style-type: none"> For driving powder clutch/brake operated on 24 VDC For driving hysteresis clutch/brake, etc. 		
Weight	3.5 kg	5.7 kg	7.1 kg
Environmental requirements	<ul style="list-style-type: none"> Ambient temperature: -10°C to 50°C Ambient humidity : 80% RH max. Vibration : 0.5 G max. Atmosphere: Shall be free from corrosive gases or dust. Shall not be subjected to rain or splashes of water. 		

(When used on constant-current control)

Model	LE-P06A	LE-P38A	LE-P50A
External wiring take-out hole	0.2 to 0.6 A	0.39 to 1.42 A, or 1.21 to 3.8A	3.6 to 5.0 A

5. Dimensions

Fig. 1 Dimensions of Power Amplifier LE-P□□A



	A	B	C	D	E	F	G
LE-P06A	135	262	120	225	97	80	246
LE-P38A	135	262	120	225	97	80	246
LE-P50A	175	292	126	255	100	130	276

6. Installation

- Upon delivery, check with the nameplate stuck on the right side face, to confirm that you have received the right product ordered. Models LE-P06A and LE-P38A are of the identical size and shape. So, check with special care in identifying the model number stamped on the nameplate.

(2) Standard accessories

The following standard accessories are delivered together with the Power Amplifier. Please check to see if they are delivered in the correct type and quantities.

- ① For model LE-P06A° Fuse 0.5A 2 pcs., ° Fuse 1A 2 pcs.
 - ° Jumper wire for changing over supply voltage 1 pc.
- ② For model LE-P38A° Fuse 2A 2 pcs., ° Fuse 3A 2 pcs.
 - ° Fuse 5A 2 pcs.,
 - ° Jumper wire for changing over supply voltage 1 pc.
- ③ For model LE-P50A° Fuse 3A 2 pcs., ° Fuse 5A 2 pcs.
 - ° Fuse 8A 2 pcs.
 - ° Jumper wire for changing over supply voltage 1 pc.

Please supply these accessories to the end user, together with the Power Amplifier proper.

(3) Installation

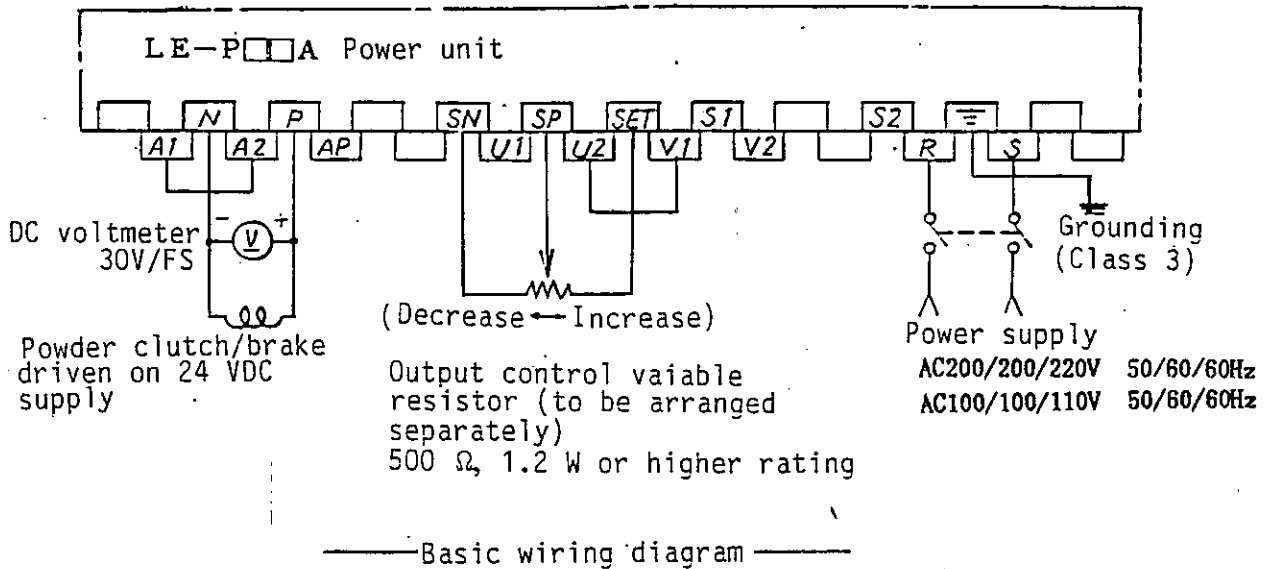
To allow releasing heat, the Power Amplifier should be mounted vertically on a wall without fail. Also, avoid installing it in a high-temperature and high-humidity environment, or at a place where an extreme vibration is anticipated.

7. Wiring

Arrange wiring properly to fit the intended purpose, using the terminal board provided at the lower part on the front face.

Use shielded cables for wiring the signal supply lines (to be connected via terminals **SET**, **SP**, **SN** and **AP**), and arrange conduits separately from other lines.

Case of independent manual control:

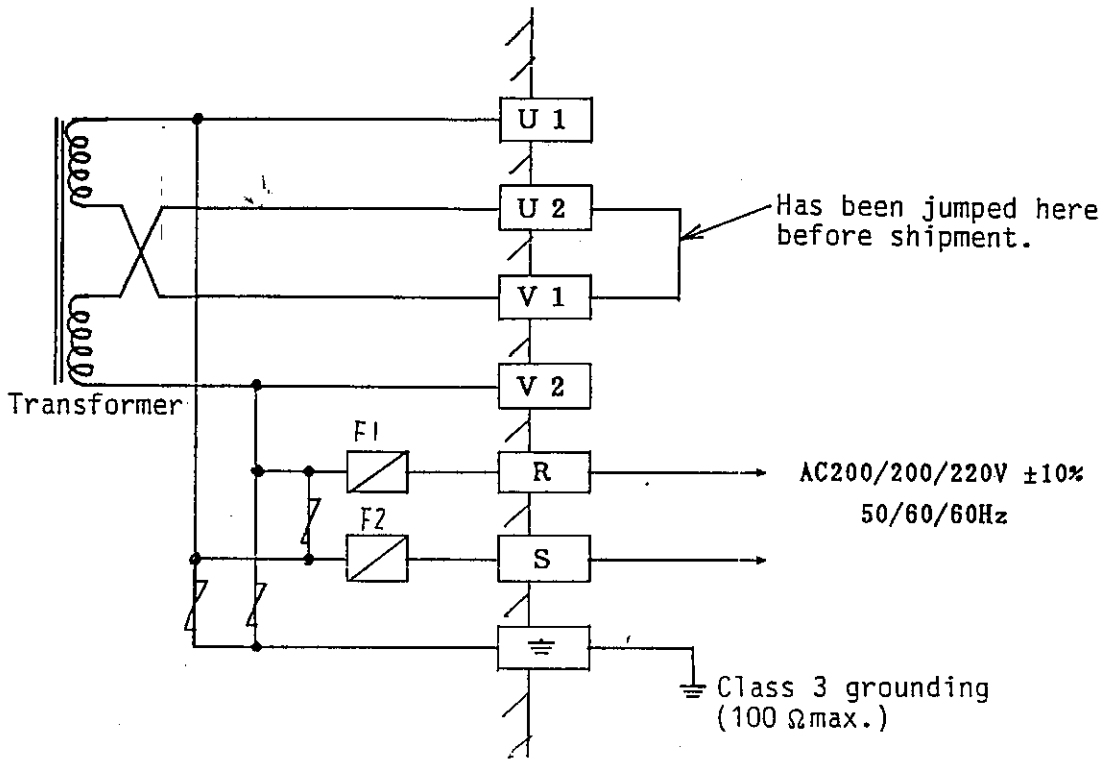


(1) **U1** **U2** **V1** **V2** **R** **S** **⏏** Power supply and grounding terminals

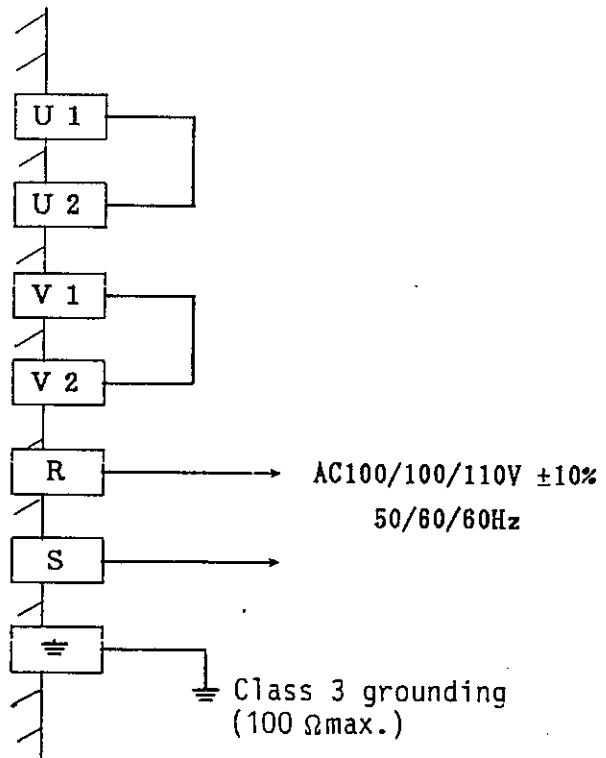
The Power Amplifier is to be set for either a 200 VAC or 100 VAC power supply source by connecting with terminals **U1** **U2** **V1** **V2** properly. The unit has been set for 200 VAC system before shipment. Supply voltage is connected to terminals **R** and **S**.

The **⏏** terminal is for absorbing noise surge voltages that may come in through terminals **R** or **S**, so it must be grounded correctly by class 3 grounding.

(a) Where supply voltage is 200 VAC:

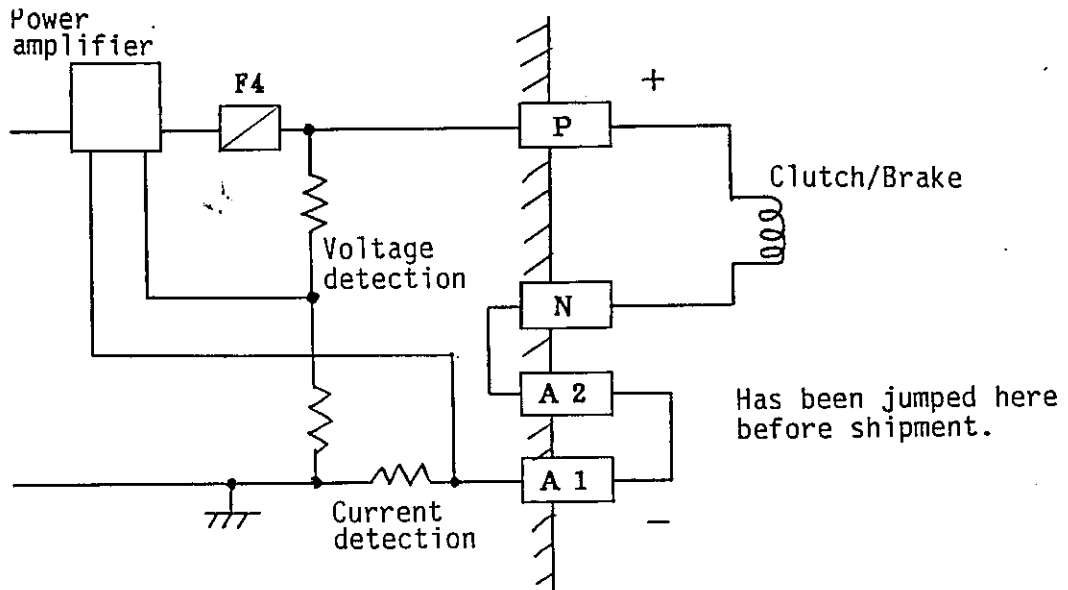


(b) Where supply voltage is 100 VAC:



For both 200 VAC and 100 VAC systems, voltage to ground of the power supply lines should be made to be 275 VAC or 350 VDC max.

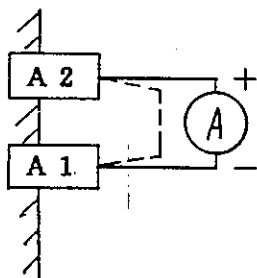
(2) **P** **N** **A1** **A2** Output terminals and ammeter connection terminals



Terminals with which powder clutch/brake (load) is connected. Use powder clutch/brake for use on a 24 VDC power supply, whose current rating is not greater than the maximum output rating for the Power Amplifier.

Note: Should an excessive current flow through terminals **P** and **N** by shorting, the overcurrent protection function is activated to cut off output instantaneously, thus protecting the internal on the power switch.

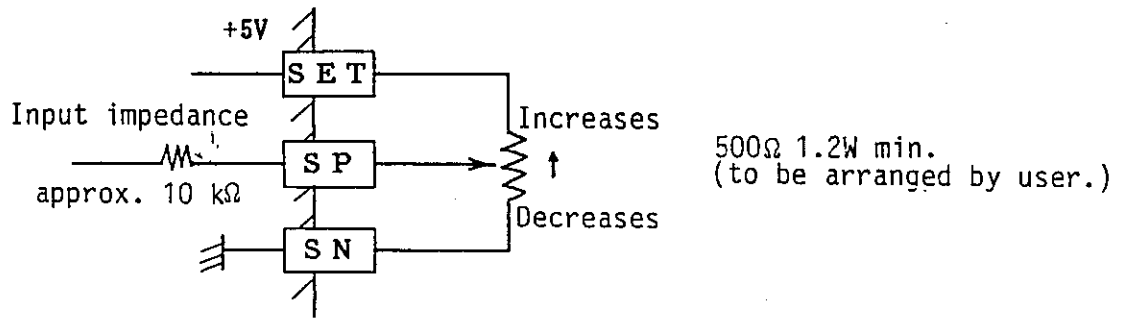
Output current can be read directly by connecting a DC ammeter with the jumper wire removed from terminals **A1** and **A2**.



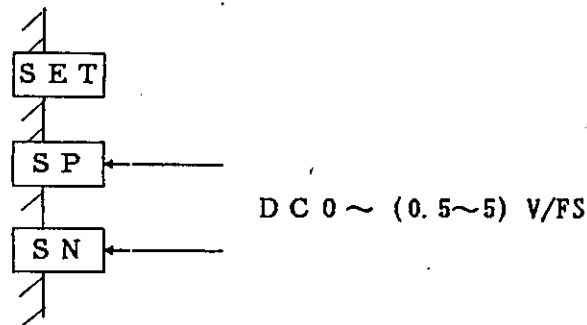
- ① Use ammeter with proper range matching the current rating of the loads connected.
- ② When no ammeter is inserted, keep these terminals jumped. (If left open, no output current can flow therethrough.)
- ③ When operated on the constant-voltage control system, current readings change as load resistances change. In this case, -connect a DC voltmeter (0 to 30 V/FS) between terminals **P** and **N** and read the voltage indicated.

(3) **SET** **SP** **SN** Signal input terminals

(a) Case of independent operation with controls:



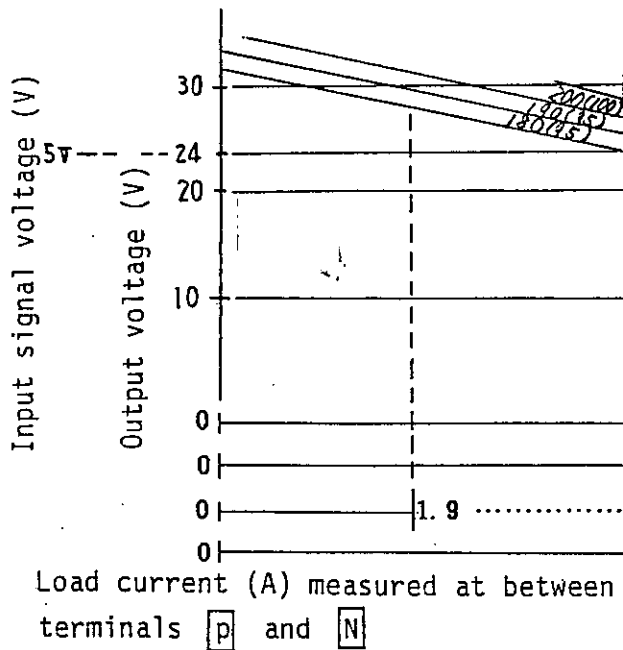
(b) Case of controlling with voltage signals:



If an input signal should exceed the FS value, the current limiter function is activated for the constant-current control at the rated current value, or controlled with the supply voltage within the range of stabilized operation under the constant-voltage control.

Constant-voltage stable operation range

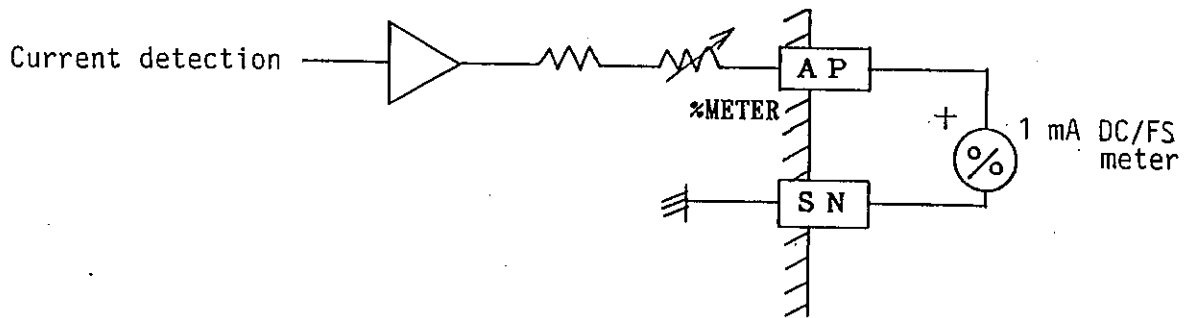
Boundaries for the stable output voltage (across terminals **P** and **N**), allowed for setting with respect to input voltage (across terminals **SP** and **SN**) are as shown below, depending on the actual loads then connected.



If input signal voltage increases beyond this range, output voltage becomes unstable and fails to increase. In such a case, check to see if the input signal voltage is appropriate.

- 0.6 (LE-P06A)
- 3.8 (LE-P38A, with connector CNJ set at side 1.)
- 1.9 (LE-P38A, with connector CNJ set at side 2.)
- 5.0 (LE-P50A)

(4) **AP** **SN** Output current meter (indication in percentage) connection terminals



Used when any of the following controllers is used in combination. The % meter is provided with these controllers. For detail on adjustment, please refer to the Instruction Manual for these Controllers.

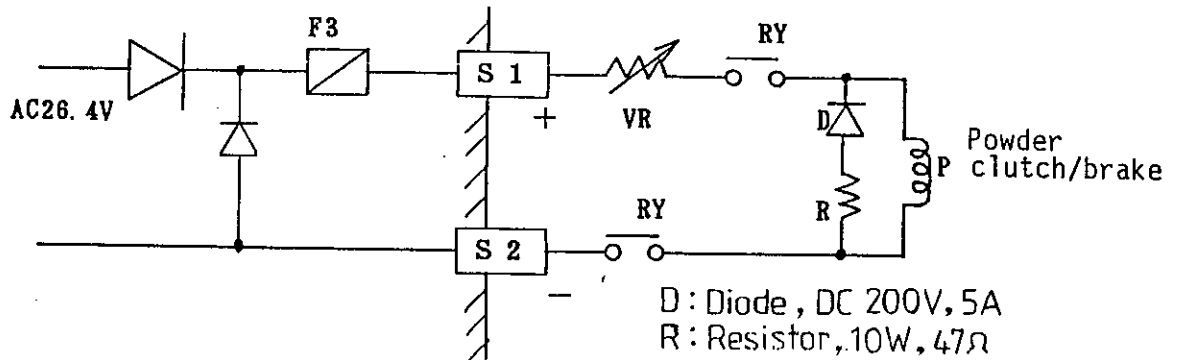
Controllers used in combination:

- LE-PN type Tension controller
- LD-PA-□□□ type Tension controller
- LD-PB-□□□ type Tension controller
- LD-PC-015 type Control panel

(5) **S1** **S2**..... Auxiliary output terminals

Auxiliary output terminals used for stopping old reel or for pre-driving new reel in selecting 2- or 3-shaft type turret, in a system built-in combination with tension controller LE-MC or LE-HC type. When used for pre-driving, connect a variable resistor (VR) used for adjustment.

Establish a change-over sequence in combination with terminals **P** and **N**.



Note: Separate terminals **N** and **S2** with change-over relay contacts. (Note that they are not in the same potential.)
... For details on connections, refer to the Instruction Manual for the controller used in combination.

Output ratings

- LE-P06A: approx. 10 VDC (fixed) 0.3 A, 10-sec rating
- LE-P38A: approx. 10 VDC (fixed) 1.9 A, 10-sec rating
- LE-P50A: approx. 10 VDC (fixed) 2.5 A, 10-sec rating

Note: Although outputs from these terminals are rated for short time of 10 seconds, they can be used continuously by limiting the output current from these terminals to the following I_{MAX} values or lower by means of an adjusting variable resistor (VR). Please note, however, that if the I_{MAX} exceeds 1.2 A with either LE-P38A or LE-P50A, keep it at 1.2 A at the maximum.

$$I_{MAX} \leq (I_1 - I_2) \times 1/2$$

where

I_{MAX} : Max. output current allowed to flow through terminals **S1** and **S2**.

I_1 : Rated current for the Power Amplifier as shown below.
LE-P06A ... 0.6 A
LE-P38A ... 3.8 A
LE-P50A ... 5.0 A

I_2 : Rated current for load used in combination

8. Initial Adjustment

This Power Amplifier requires no initial adjustment, in principle, when it is operated on the voltage control system or used in combination with the following controllers. It does need some initial adjustments, however, if it is specified for special signal voltage other than 5 V/FS, or if used on the current control system.

8-1. Case of voltage control

No initial adjustment is needed for the following cases, where it is operated with control signal voltage of 0 to 5 V/FS. Use by connecting as instructed below.

- Case of using on manual operation of the Power Amplifier alone
.... Refer to the Basic Wiring Diagram on page 6.
- When used in combination with Tension Controller LE-MC type
.... Refer to the attached Drawings 1 and 2.
- When used in combination with Tension Controller LE-HC type
.... Refer to the attached Drawing 3.

8-2. Adjustment required when used independently on the current control system

- (1) Set the VOLT/CURR select switch SW1 at CURR side.
- (2) In the case of LE-P38A type, it is necessary to change over the current detection resistor depending on the current rating specified for the load used in combination.

Case of a load whose current rating is 0.39 A to 1.42 A:

Set connector CN at CNJ2 side.

Case of a load whose current rating is 1.21 A to 3.8 A:

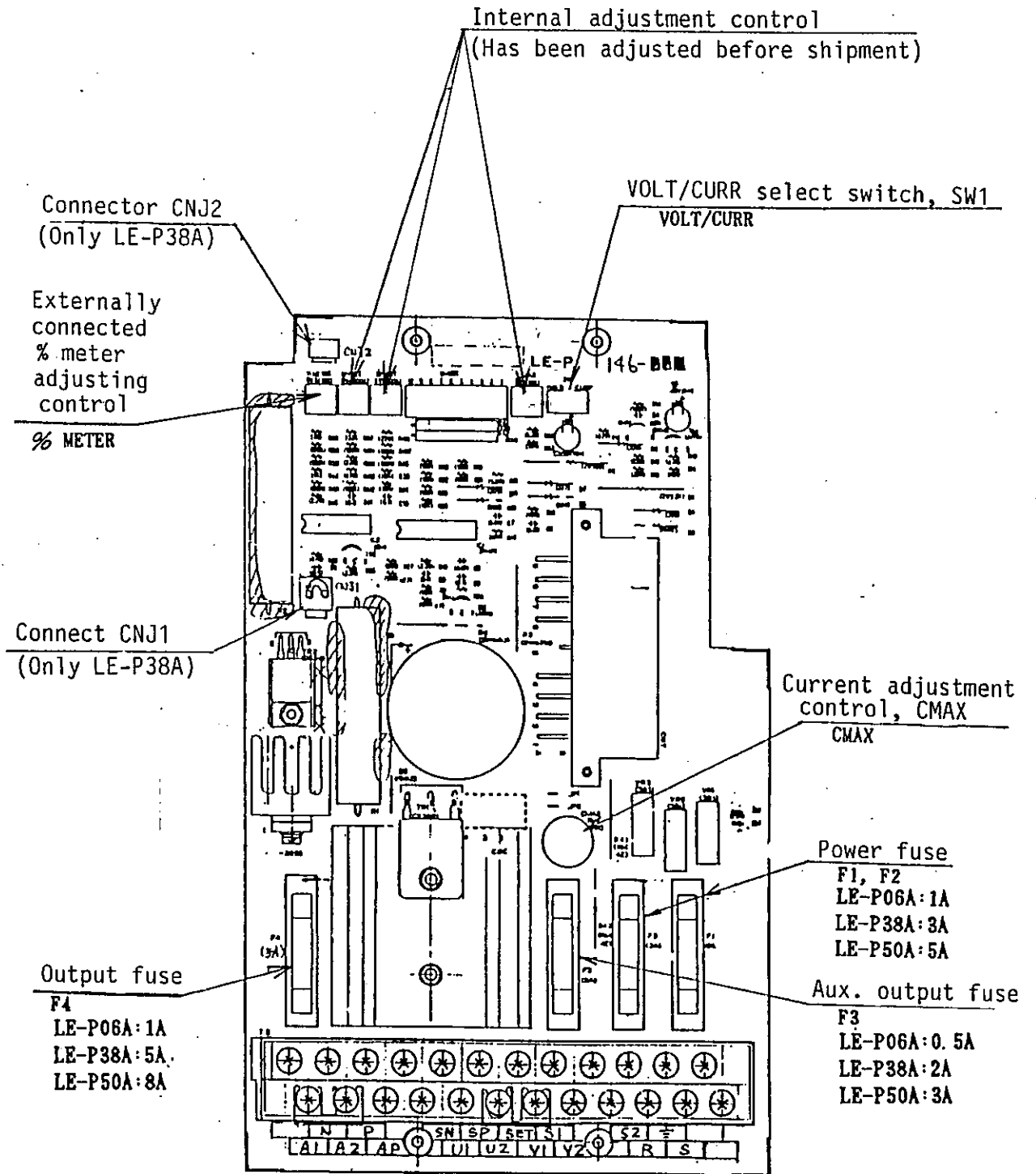
Set connector CN at CNJ1 side.

- (3) Operating control, adjust voltage across terminals SP and SN to 2.5 V.
- (4) Operating control CMAX with this state, so that the output current will become the value equivalent to the rated current value of the load multiplied by 1/2.

With the above steps, all the necessary adjustment are complete.

Note: The voltage-limiting function becomes effective in the current control operation. Therefore, if the coil resistance becomes higher because of the rise in temperature of the coil in the load used in combination, there may be a case, where the voltage limiting function may be activated with a voltage of about 24 V to 27 V, before the rated current value is reached.

9. Parts Layout Plan



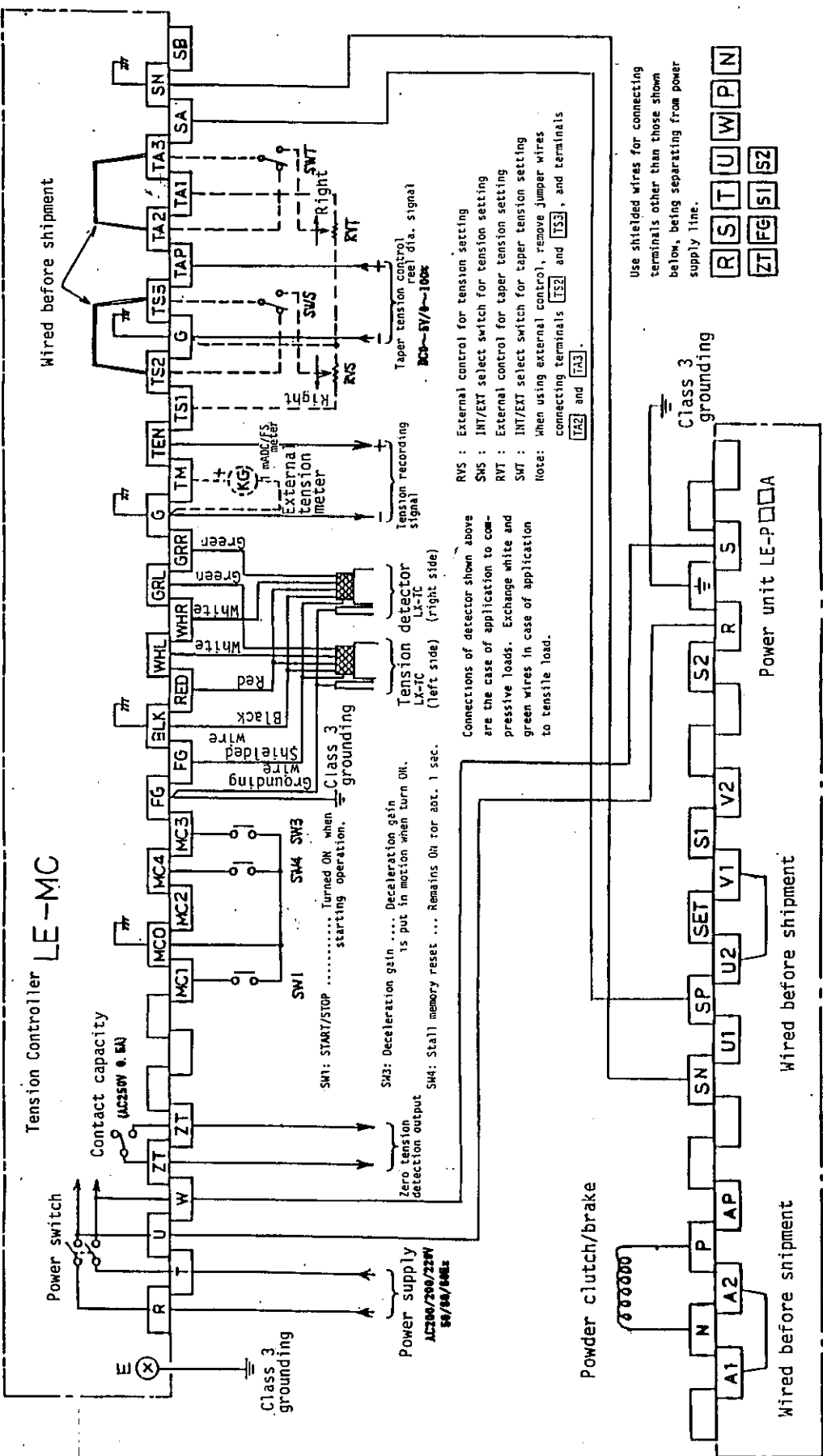
10. Insulation Resistance and Breakdown Voltage Tests _____

(1) To avoid possible damage of the Power Amplifier used in case of an erroneous wiring or mis-operation, all the connections for the Power Amplifier must be disconnected before measuring insulation resistance and breakdown voltage for the control panel. Use a low-voltage tester of 6 VDC max. for simplified measurement of insulation resistance of the Power Amplifier.

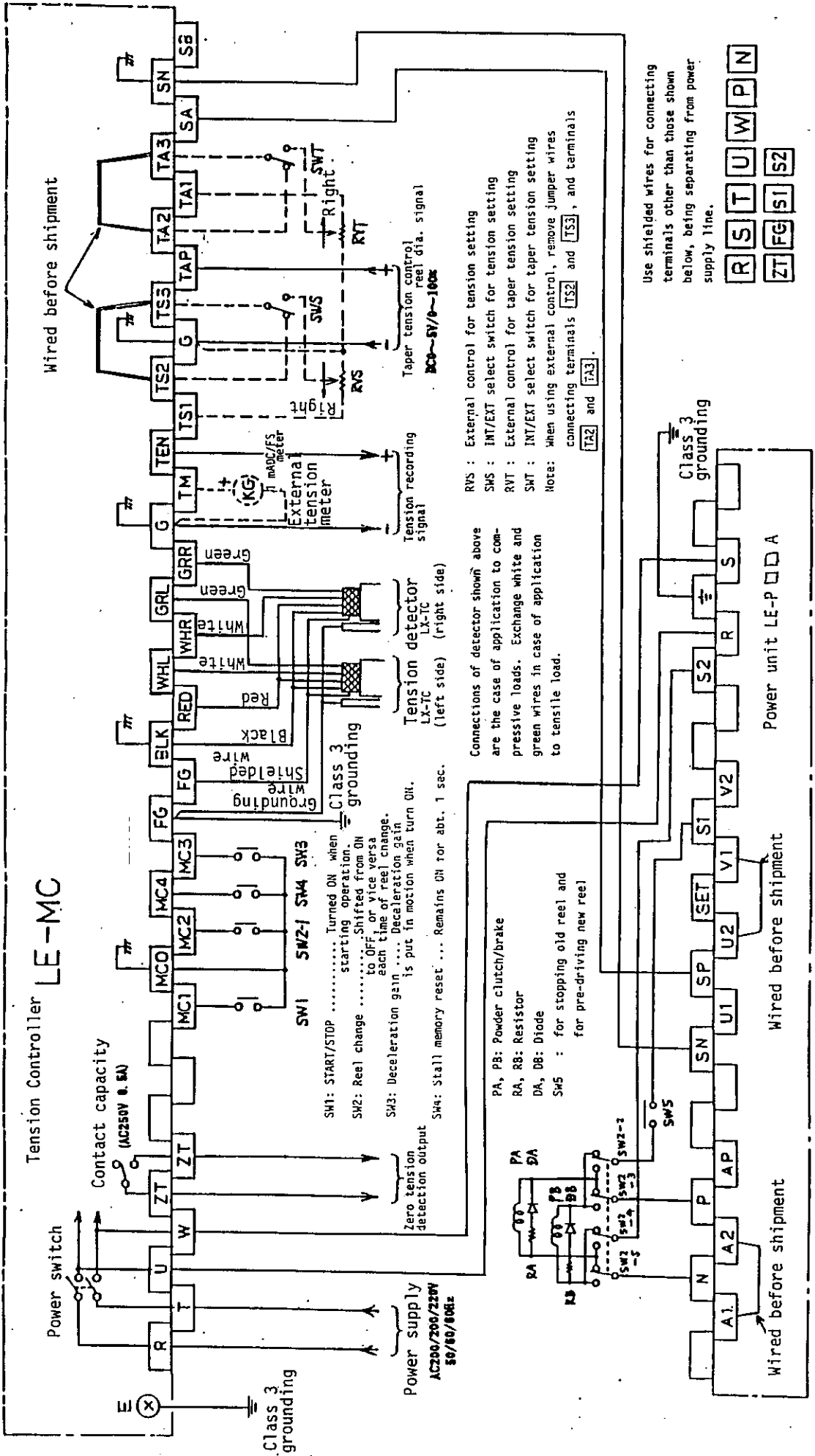
(2) The following conditions should be complied with in the case of formal measurement of insulation resistance and breakdown voltage on the Power Amplifier.

With all the terminals excepting for the grounding terminal short-circuited properly, take measurement with the tester connected between the all terminals en block and the case.

- Insulation resistance: Should read 5 M Ω or more when measured with a 500 VDC megger.
- Breakdown voltage : Shall withstand 1,500 VAC applied for one minute.



Attached Drawing 1. Example of Combination with Tension Controller LE-MC (for single-shaft control)



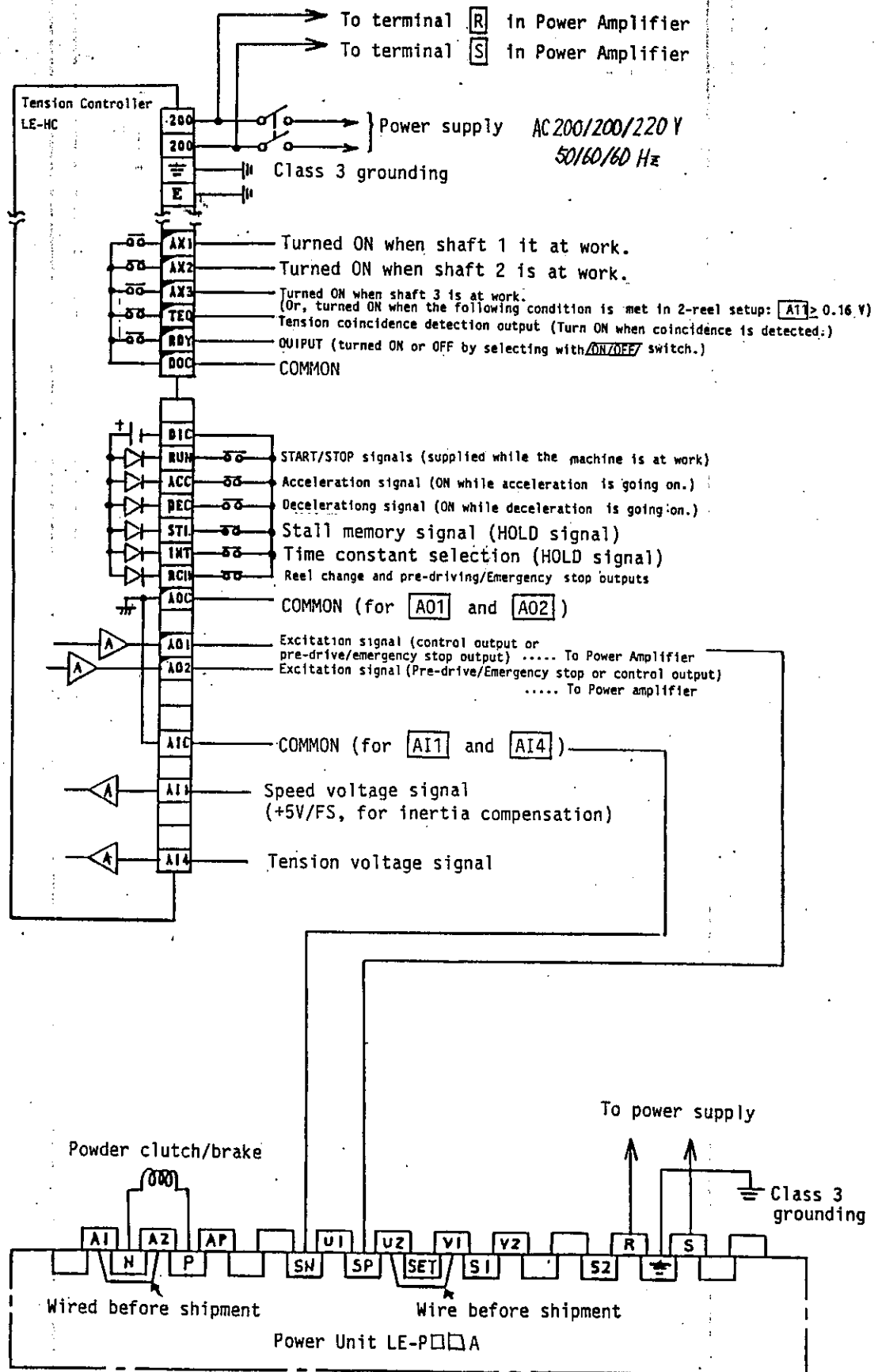
RVS : External control for tension setting
 SWS : INT/EXT select switch for tension setting
 RYT : External control for taper tension setting
 SWT : INT/EXT select switch for taper tension setting

Note: When using external control, remove jumper wires connecting terminals **TS2** and **TS3**, and terminals **TA2** and **TA3**.

Connections of detector shown above are the case of application to compressive loads. Exchange white and green wires in case of application to tensile load.

Use shielded wires for connecting terminals other than those shown below, being separating from power supply line.

Attached Drawing 2. Example of combination with Tension Controller LE-MC (for selective control of two shafts)



Attached Drawing 3. Example of Combination with Tension Controller LE-HC