JZ990D41201A

MITSUBISHI *Changes for the Better*

ZJ-4065A

MITSUBISHI POWER AMPLIFIRE

POWER AMPLIFIRE
TYPE LD-40PSU

INSTRUCTION MANUAL

Manual number	JZ990D41201
Sub number	A
Date of preparation	Nov. 2005

Thoroughly read this instruction manual, and then use the unit correctly. Especially, make sure to read "Cautions on Safety" before using the unit.
Carefully store this instruction manual, and see to it that the end user receives it.

This printed matter is issued in March 2005. The specifications are subject to change without prior notice.

Cautions on Safety

(Make sure to read this paragraph before using the unit.)

Make sure to thoroughly read this instruction manual, technical data, etc. before using the unit, and pay attention to assure safety while using the unit.
In this manual, cautions on safety are classified into "DANGER" and "CAUTION".°

⚠ Danger	When the unit is handled incorrectly, a dangerous situation may occur and the possibility of death or serious injury is expected.
⚠ Caution	When the unit is handled incorrectly, a dangerous situation may occur and the possibility of medium or slight injury is expected or property damage exclusively is expected.

Even an item is classified as "CAUTION", its contents are important and it may lead to a serious result depending on the situation. Make sure to observe every item.
The unit is manufactured under severe quality control system. When applying the unit to a facility where a failure of the unit may lead to a serious accident or loss, however, systematically install the backup or fail-safe function.
Carefully store this instruction manual so that it can be referred to at any time if necessary, and see to it that the end user receives it.

⚠ Danger Caution on design

- Set up the emergency stop circuit independently outside this power supply unit. Otherwise, the machine may become out of order and an accident may occur when malfunction occurs in the power supply unit.
- Use the wire size suitable to the current capacity in wiring. If a wire having smaller current capacity is used, the insulation sheath will be melted and insulation will become defective. In this situation, electrical shock or short-circuit may occur, and fire may occur also.

⚠ Danger Caution on installation and wiring

- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.
- Perform grounding (grounding resistance :100 Ω or less) to the grounding terminal or casing sheet metal area of the unit using a wire of 2 mm^2 or more. Otherwise, electrical shock may occur.

⚠ Caution Caution on installation and wiring

- Separate the wiring of the strong electric system from the wiring of the weak electric system, and avoid common grounding. Otherwise, noise may be superimposed on the wiring of the weak electric system, and malfunction may be caused.
- Correctly connect the AC power supply to specified terminals, and never use unused terminals for any external lines. Otherwise, the unit may be damaged.

⚠ Danger Installation and environment

- Never use the unit in an atmosphere having danger of inflammation or explosion. Otherwise, inflammation or explosion may occur.
- Never modify nor disassemble the unit. Otherwise, the unit may fail, or an accident such as fire and damage may occur.
- Never drop cutting chips and wire chips while tapping screw holes and performing wiring. Cutting chips and wire chips may cause damage in the unit, fume, fire, malfunction or others.
- When disposing of the unit, handle it as industrial waste.

⚠ Caution Installation and environment

- Never install the unit in a place where dusts, soot, conductive dusts or corrosive gas is present or a place exposed to high temperature, condensation or wind and rain. Never install the unit directly in a place where vibration or impact is applied. Otherwise, the unit may be damaged, malfunction or be deteriorated.

⚠ Danger Caution on operation

- Never touch a switch or key with wet hand. Otherwise, electrical shock may occur.
- Never supply the power to the unit nor operate the unit while the main body panel, terminal cover, etc. are open. While the panel or cover is open, a high voltage area may be exposed and electrical shock may occur.

- We shall not be responsible for any damage caused by repair, disassembly, modification, etc. performed by a third party other than MITSUBISHI or a company specified by MITSUBISHI. Accordingly, ask a service network specified by MITSUBISHI for repairs and disassemblies.

The above cautions on safety and the specifications described in the instruction manual and technical data are subject to change without prior notice.

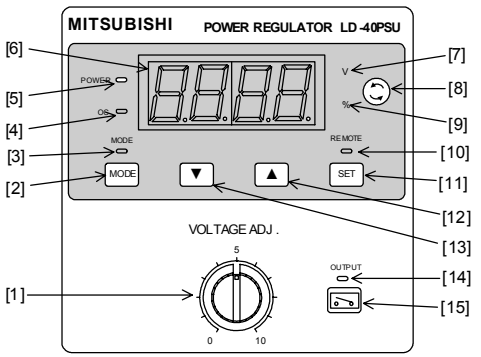
1. Functions and Features

The power amplifire LD-40PSU is designed only for powder clutches/brakes and hysteresis clutches/brakes. This power amplifire operates in a wide power range of 85 to 264 VAC, and is equipped with built-in control outputs of 24 VDC/3.8 A.

1) Features
   (1) Switching regulator method
   (2) Operates in a wide power range of 85 to 264 VAC.
   (3) Constant voltage control method
   (4) External control signal
   (RC: Remote control ON/OFF input)
   (5) Digital display (4-digit, 7-segment LED)
   (6) Input for external variable resistor
   (SP: Analog signal input)
   (7) Protection against load short-circuit and short-circuit warning indication (OC-LED)
   (8) Output two-step switching function
   (9) Power factor of 80% or more

2) Major applications
   (1) Manual power supply unit controlled through the variable resistor on the panel surface.
   (2) Manual power supply unit controlled through an external variable resistor.
   • The output can be adjusted using an external variable resistor when the variable resistor provided on the panel surface is made invalid and a variable resistor of 500 to 2kΩ (1/2 W or more) is connected to the output terminal (5V) and input terminal (SP-SN).
   (3) Power amplifier using an external voltage signal
   • The output can be adjusted using an external voltage signal when the variable resistor provided on the panel surface is made invalid and the voltage of 0 to 5 V is input to the input terminal (SP-SN).
   (4) Output two-step switching function
   • The output in the output OFF condition can be adjusted within the range from 0 to 100%. The output can be switched in two steps using a knob or an external voltage signal.

3) Panel configuration



[1] Voltage adjusting variable resistor
[2] [MODE] key --Changes over the adjustment mode.
[3] Adjustment mode indicator LED (green)
[4] Overcurrent detection indicator LED (red)
[5] Power ON indicator LED (green)
[6] 7-segment display
[7] Voltage indicator LED (red)
[8] Output voltage (V)/output percentage (%) display selector key
[9] Output percentage (%) indicator LED (red)
[10] External variable resistor validity indicator LED (green)
[11] [SET] key -----Determines data setting.
[12] [▲] key
[13] [▼] key
[14] Output ON indicator LED (green)
[15] Output ON/OFF selector switch

2. Installation and Wiring

1) Installation

⚠ Danger

- Never drop cutting chips and wire chips while tapping screw holes and performing wiring. Cutting chips and wire chips may cause damage in the unit, fume, fire, malfunction or others.
- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.

⚠ Caution

- Never install the unit in a place where dusts, soot, conductive dusts or corrosive gas is present or a place exposed to high temperature, condensation or wind and rain.
- Never install the unit directly in a place where vibration or impact is applied. Otherwise, the unit may be damaged, malfunction or be deteriorated.
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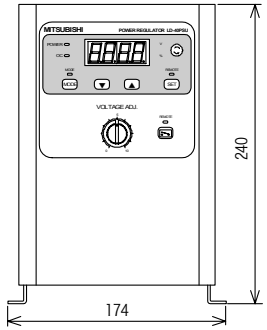
This power amplifire can be installed on the floor surface or panel surface.

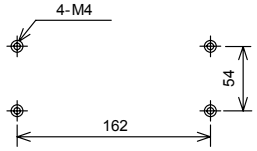
⚠ Caution

- Never install the unit in such a manner that the panel surface of the main body faces upward or downward.

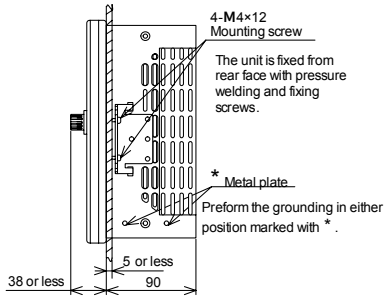
a) Installation on floor surface



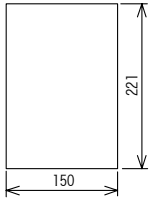
Screw hole dimension for mounting on floor



b) Installation on panel surface



Panel cut dimension for mounting on panel surface



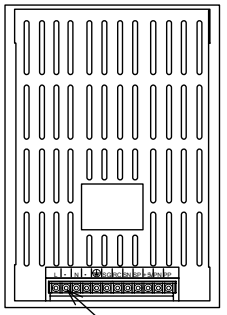
⚠ Caution

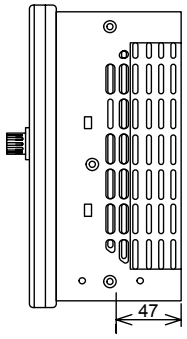
- When installing the unit on the floor surface or wall surface, use accessory screws for fixing the main body and the plate.
- Screws of 10 mm or more in length cannot be used because contact may occur inside the main body.
  - Tightening torque: 0.5 to 0.8 N•m
- Perform grounding (grounding resistance : 100 Ω or less) to the casing using the mounting plate fixing screw area when installing the unit on the floor surface or using the mounting plate fixing screw holes (marked with *) when installing the unit on the panel surface.

2) Wiring

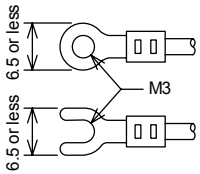
a) Wiring method and cautions

- The terminal block for external connection is provided in the lower portion of the rear face.





- Use crimp style terminals having the dimensions shown on the right.



- Set the terminal tightening torque to 0.5 to 0.8 N•m, and securely tighten each terminal to prevent a cause of malfunction.
- Perform grounding (grounding resistance: 100 Ω or less) using a shielding wire on the signal receiving side for the analog signal input and output lines and spool pulse input line.
- Never put the input and output lines together with other power lines into a same duct. Never bundle the input and output lines together with other power lines.
- Never tighten two wires together on the terminal block. Otherwise, the terminal block may fail. (When tightening two wires together, attach two wires to one terminal, and attach one wire to the terminal block.) Generally, set the wiring length to 10 m or less to assure safety against noise.

<Caution>

Note that the knob may be damaged if load is applied on the panel surface facing downward during wiring to the terminal block.

⚠ Danger

- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.
- Perform grounding (grounding resistance : 100 Ω or less) to the grounding terminal or casing sheet metal area of the unit using a wire of 2 mm^2 or more. Otherwise, electrical shock may occur.
- Use the wire size suitable to the current capacity in wiring. If a wire having smaller current capacity is used, the insulation sheath will be melted and insulation will become defective. In this situation, electrical shock or short-circuit may occur, and fire may occur also.
- Make sure to attach the terminal cover offered as an accessory of the unit to prevent electrical shock before supplying the power after the wiring work.

⚠ Caution

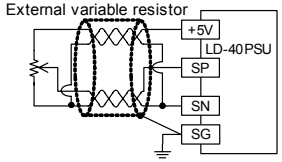
- Correctly connect the AC power supply to specified terminals, and never use unused terminals for any external lines. Otherwise, the unit may be damaged.
- Separate the wiring of the strong electric system from the wiring of the weak electric system, and avoid common grounding. Otherwise, noise may be superimposed on the wiring of the weak electric system, and malfunction may be caused.
- If the wiring is too long and excessive wires are present, do not put excessive wires into the case of the tension controller. Otherwise, malfunction may occur.
- Never lay the AC power cable on the panel surface. Otherwise, malfunction may occur.

Note:

This manual power supply unit is electronic equipment equipped with a built-in micro computer (CPU). If conductive substances enter the main body or if the CPU becomes out of order due to abnormal noise entered from the outside, the output from the unit is fixed. When the cause is noise, remove the noise source, turn off the power, and then turn on the power to recover the unit to the normal status.

b) Wiring of an external variable resistor

- Wire an external knob using four-core shielding wires as shown in the figure below.
- Do not ground the SG terminal together with the [⏚] terminal. Separately ground the SG terminal.



c) Power switch

- This unit is not equipped with the power ON/OFF switch. It is recommended to connect a switch or breaker outside the unit.

3. Operations and Functions during Operation

1) Version display

- When the power is turned on, the version is displayed on the 7-segment display for 2 seconds.

2) Adjustment of the output voltage

a) Adjustment using the variable resistor on the panel surface

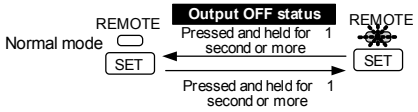
- The output voltage can be adjusted within the range from "0" to the maximum value using the voltage adjusting variable resistor [1].
  (Maximum output voltage = 26 V)

b) Adjustment using an external variable resistor

- The output voltage can be adjusted using an external variable resistor described in 2-2)-b) by pressing and holding the [SET] key as described in 3-3) below.

3) Changeover of output voltage adjustment between the variable resistor on the panel surface and the input signal for control

- In the output OFF status in the normal mode, press and hold the [SET] key [11] for 1 second or more to light the [REMOTE] indicator LED [10], make invalid the knob on the panel surface, and make valid the input signal for control (SP-SN).
- Press and hold the [SET] key [11] again for 1 second or more to extinguish the [REMOTE] indicator LED [10] , make valid the variable resistor on the panel surface, and make invalid the input signal for control.



- The output OFF setting described in 4-4)-a) remains valid.

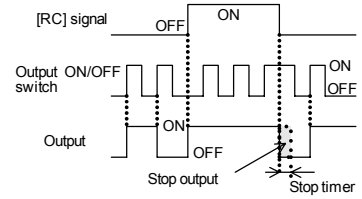
4) Changeover of output display

- The output voltage (V) or output percentage (%) is displayed on the 7-segment display [6].
- Press the display selector key [8] to alternately select the output voltage (V) and output percentage (%).

5) Output ON/OFF function

a) Use the output ON/OFF switch [15] on the panel surface or [RC] signal to set the output to ON or OFF.

- When the [RC] signal is set to ON, the output is generated without regard to the setting of the output ON/OFF switch [15] on the panel surface.
- When the [RC] signal is set to OFF, the output ON/OFF switch [15] on the panel surface becomes valid. Every time the output ON/OFF switch is pressed, the output is set to "ON → OFF → ON " alternately.
- While the output is ON, the output indicator LED [14] is lit.



b) In the output OFF condition, the output voltage set in the "output OFF setting" in the adjustment mode is output.

- Output OFF setting range :
  0 to 100%--------- Initial value = 0%
- While the output is OFF, “OFF” flickers on the 7-segment display [6].
- While the output OFF setting is not set to "0", output OFF setting “1. OFS” flickers.

6) Inertia compensation function

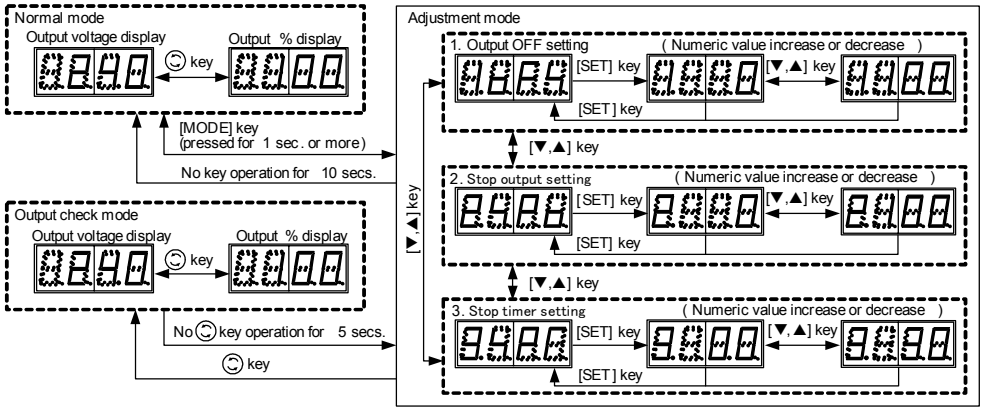
- During the "stop timer" setting period after the [RC] signal is set to OFF from ON, the output set in "stop output" is generated.
  - Stop timer setting range :
    0.0 to 9.9 s,10.0 to 30.0 s-- Initial value = 0.0 s
  - Stop output setting range :
    0 to 100% ---------- Initial value = 0%

7) Load short-circuit protection function

- When the load between the PP and PN terminals is short-circuited, the output is shut down. At this time, [OC] is displayed on the 7-segment display [6], and [OC] and the overcurrent detection indicator LED [4] flicker alternately.
- When the overcurrent detection indicator LED [4] lights, check the external wiring and release the short-circuit status.
- After releasing the short-circuit status, turn off the power, wait for 30 seconds or more, and then turn on the power to recover the unit to the normal status.

4. Adjustment

1) Screen changeover method

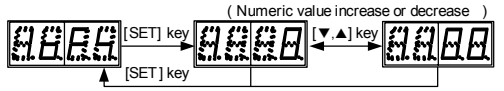


2) Changeover to the adjustment mode
- While the power is ON, press and hold the [MODE] key [2] for 1 second or more to select the adjustment mode. At this time, the adjustment mode indicator LED [3] lights.
- The output voltage value just before changeover to the adjustment mode is maintained.
  If the voltage adjusting variable resistor [1] or an external variable resistor is turned after the adjustment mode is selected, the output voltage changes accordingly. However, the value after change is not displayed on the 7-segment display [6].
  When the adjustment mode is finished, the output voltage value or output percentage value after change is displayed.
- For finishing the adjustment mode, press and hold the [MODE] key [2] again for 1 second or more.
- Press the display selector key in the adjustment mode to display the present output.
  (Note) If any key is not pressed for 10 seconds or more after the adjustment mode is selected, the normal mode is automatically selected.

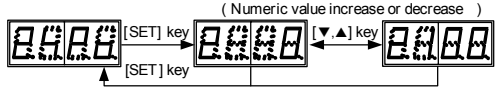
3)Functions of the keys on the panel surface ---------- In the adjustment mode, each key has the following function.
- [MODE] key [2]
  Press and hold this key for 1 second or more in the normal mode to select the adjustment mode. When the adjustment mode is selected, the adjustment mode indicator LED [3] lights.
  For selecting the normal mode after setting of the parameters is completed, press and hold this key for 1 second or more.
- [▲] key [12]
  Use this key for selecting either of the adjustment items 1 to 3 in the adjustment mode. Every time this key is pressed, the adjustment item No. is changed in the order "3 → 2 → 1".
  After selecting an adjustment item, press this key to increase the set value. Press and hold this key for 2 seconds or more to automatically increase the set value.
- [▼] key [13]
  Use this key for selecting either of the adjustment items 1 to 3 in the adjustment mode. Every time this key is pressed, the adjustment item No. is changed in the order "1 → 2 → 3".
  After selecting an adjustment item, press this key to decrease the set value. Press and hold this key for 2 seconds or more to automatically decrease the set value.
- [SET] key [11]
  After selecting an adjustment item, press this key to determine the selected adjustment item and enable setting of a numeric value.
  After setting a numeric value, press this key to store the set value and return to the adjustment item selection status.
- [⟲] key [8]
  Press this key once in the adjustment mode to change over the display contents on the 7-segment display between the output voltage (V) monitoring and the output voltage adjustment (%) monitoring.
  If any key is not pressed for 5 seconds in the monitoring display status, the display contents automatically return to the status just before the display selector key is pressed. At this time, if the display selector key is in the numeric value setting status, the numeric value being set is canceled.
  If the display selector key is pressed again in the monitoring display status, the output voltage (V) monitoring and output voltage adjustment (%) monitoring are changed over alternately every time the display selector key is pressed.
- [OUTPUT] key [14]
  This key turns on and off the output voltage between the PP and PN terminals.
  Every time this key is pressed, the output is set to "ON → OFF → ON" alternately.
  The RC signal input has higher priority. Even if this key is set to "output OFF", the output is ON while the RC signal input is ON.

4) Adjustment method---------- Press and hold the [MODE] key [2] for 1 second or more to select the adjustment mode, and then set the value of each item described below.

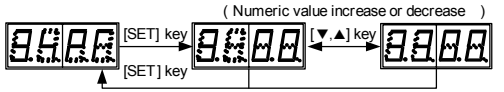
a) OFS (output OFF) setting
- Set the voltage output while the output is set to OFF (while the OUTPUT LED [14] is extinguished).
- When the output is set to OFF using the procedure described in 3-3), the voltage set here is output.
- This function can be used for setting the weak exciting voltage of the powder clutch while the output is OFF.
- Setting range-------0 to 100% --------- Initial value = 0% (100% = Maximum output voltage, approx. 26 V)
- Setting method
  [1] Select "1. OFS" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 1.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.



b) SPO (stop output) setting
- Set the voltage output while the stop timer is operating.
- Setting range-------0 to 100%---------- Initial value = 0% (100% = Maximum output voltage 26 V)
- Setting method
  [1] Select "2. SPO" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 2.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.



c) SPT (stop timer) setting
- Set the stop timer.
- Setting range-------0.0 to 9.9 s and 10.0 to 30.0 s ----------Initial value = 0.0 s
- Setting method
  [1] Select "3. SPT" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 3.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.

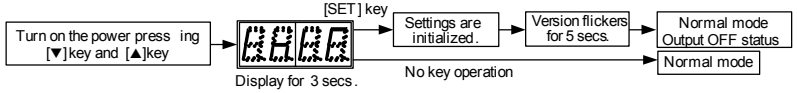


5) Set item list

Set item	Unit	Setting range		Initial value
		Minimum value	Maximum value	
Output OFF setting	%	0	100	0
Stop output	%	0	100	0
Stop timer	sec	0.0	30.0	0.0

5. Setting Initialization

- If the [▲] key [12] and [▼] key [13] are pressed at the same time when the power is turned on, "InIT" is displayed for 10 seconds on the 7-segment display [6]. The version is not displayed.
- Press the [SET] key [11] while "InIT" is displayed to initialize various settings and return the unit to the status at the time of shipment.
- At this time, the "V" unit indicator LED [7] and "%" unit indicator LED [9] are extinguished, and only the power ON indicator LED [5] is lit.
- When initialization is completed, the version flickers for 5 seconds, the normal mode, voltage monitoring display and output OFF status are selected, and then the power ON indicator LED [5] and voltage indicator LED [7] light.
- If the [SET] key [11] is not pressed, "InIT" flickers for 10 seconds, and then the normal mode is selected in the same way as the usual power ON method.



6. Inspection and Maintenance

1) Initial inspection

a) Before turning on the power, check whether the applied load is proper (24 VDC, 3.8 A or less).

b) Incorrect connection of the power terminal, contact between the DC input/ output wiring and the power wiring, short-circuit of the output wiring, etc. can cause serious damage in the equipment.

c) Before turning on the power, check whether the power supply is connected correctly, whether the grounding terminal is connected correctly, and whether the input/output wiring is performed correctly.

d) Check whether the commutation diode is not directly connected to the exciting coil of the clutch or brake connected to the control output terminal, and whether the PN and SN terminals are not short-circuited.

e) Take care so that wire chips and lead wire chips do not enter from ventilation holes on the case top face and sides during wiring.

f) To the power ON indicator LED[5], the power is supplied from the secondary circuit of the internal switching power supply.

2) Maintenance inspection

a) Consumable parts which can reduce the life of the unit are not built in the unit. However, the standard replacement frequency of the aluminum electrolytic capacitor is 5 years. This frequency varies depending on the ambient working temperature, output current, operating time, etc. Contact Mitsubishi System Services if necessary.

b) The life of the EEPROM for storing various setting data is 100,000 times of writing. The number of times of power ON/OFF is limited to 100,000 times or less.

c) In the periodic inspection, check the following items:

- Whether the temperature inside the panel is not normally high due to heating devices and direct sunlight
- Whether dusts and conductive dusts have not entered the panel
- Whether abnormality in the wiring, loose terminals and other abnormalities are not present

7. Specifications

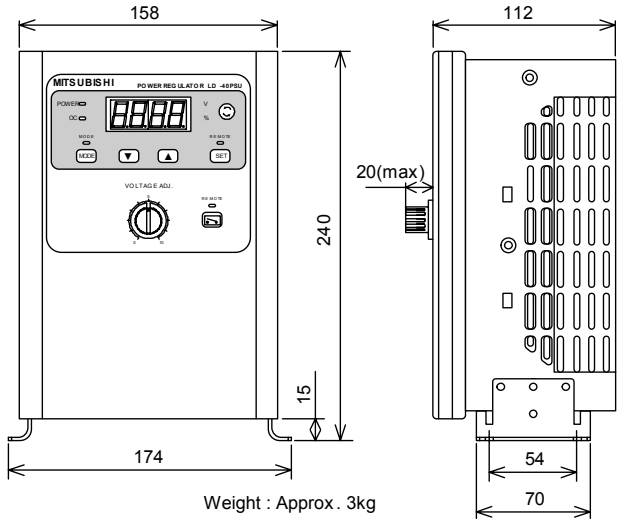
1) I/O specifications

Item		Terminal name	Specifications	
Power supply	Input	L	• 100 to 240 VAC (-15% to +10%) , 50/60 Hzo • Power consumption : 200 VA (at 24 VDC, 3.8A) • Power factor : 80% • Power fuse : 250 V, 5 A x1, built in • Rush current : 30A, 300ms (depending on line impedance) • Allowable instantaneous power interruption :10 ms	
		N		
		⏚	Grounding	
	Output	+5V	Power supply for external variable resistor DC5V 10mA or less	
		SN		
Contact signal	Input	RC	Output remote control ON = Output is generated. OFF = Output is stopped. (Depending on output OFS setting)	DC12V/5mA Supplied internally
		SN		
Analog singal	Input	SP	Input signal for control : 0 to 5 VDC	
		SN		
		SG	Relay terminal for shield grounding	
	Output	PP	For 24 VDC series powder clutch/brake or hysteresis clutch/brake 0 to 24 VDC, 3.8 A or less	
		PN		

2) Environmental specificationsl

Ambient temperature	-5 ~ +55°c
Ambient humidity	35 ~ 80% RH or less (no condensation)
Vibration resistance	In accordance with JIS C0040. 10 to 55 Hz, 0.5mm (4. 9m / s^2 maximum), 2 hours in each of three axis directions
Impact resistance	In accordance with JIS C0041. 98m / s^2, 3 times in each of three axis directions.
Supply noise resistance	By noise simulator with 1,000 Vp-p noise voltage, 1 μs noise width and 30 to 100 Hz .
Withstand voltage	1,500V AC, 1 minute • Between entire terminals as a whole (except grounding terminal) and ground terminal. • Between entire terminals as a whole (except grounding terminal) and metal fixture.
Insulation resistance	5MΩ or more by 500V DC megger Between entire terminals as a whole and ground terminal.
Grounding	Solid grounding (100Ωor less)
Operating atmosphere	Corrosive gas, combustible gas, conductive dusts and many dusts shall not be present.

8. Outside Dimensions

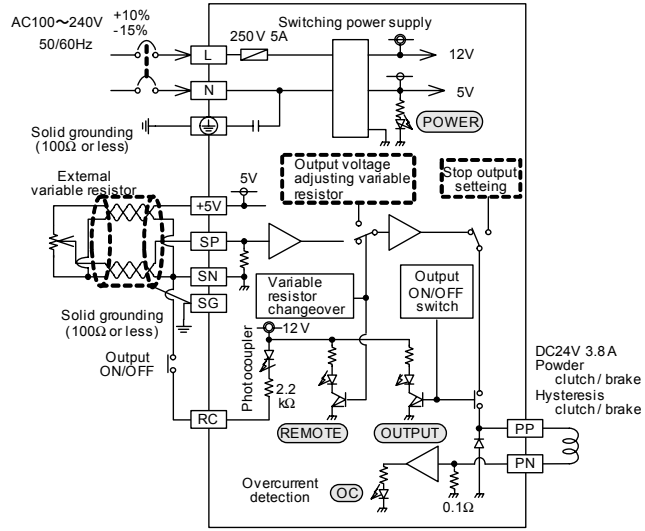


Weight : Approx. 3kg

⚠ Danger Caution on installation and wiring

- Never apply voltage exceeding 240 VAC (380 VAC or 400 VAC, for example) to the area between the L and N terminals. Otherwise, the unit may be damaged, or an accident such as fire may be caused.

9. External wiring diagram and terminal arrangement



L	•	N	•	⏚	SG	RC	SN	SP	+5V	PN	PP

Connect the active line side to the [L] terminal, and connect the non-active line side to the [N] terminal.

JZ990D41201A

MITSUBISHI *Changes for the Better*

ZJ-4065A

MITSUBISHI POWER AMPLIFIRE

POWER AMPLIFIRE
TYPE LD-40PSU

INSTRUCTION MANUAL

Manual number	JZ990D41201
Sub number	A
Date of preparation	Nov. 2005

Thoroughly read this instruction manual, and then use the unit correctly. Especially, make sure to read "Cautions on Safety" before using the unit.
Carefully store this instruction manual, and see to it that the end user receives it.

This printed matter is issued in March 2005. The specifications are subject to change without prior notice.

Cautions on Safety

(Make sure to read this paragraph before using the unit.)

Make sure to thoroughly read this instruction manual, technical data, etc. before using the unit, and pay attention to assure safety while using the unit.
In this manual, cautions on safety are classified into "DANGER" and "CAUTION".°

⚠ Danger	When the unit is handled incorrectly, a dangerous situation may occur and the possibility of death or serious injury is expected.
⚠ Caution	When the unit is handled incorrectly, a dangerous situation may occur and the possibility of medium or slight injury is expected or property damage exclusively is expected.

Even an item is classified as "CAUTION", its contents are important and it may lead to a serious result depending on the situation. Make sure to observe every item.
The unit is manufactured under severe quality control system. When applying the unit to a facility where a failure of the unit may lead to a serious accident or loss, however, systematically install the backup or fail-safe function.
Carefully store this instruction manual so that it can be referred to at any time if necessary, and see to it that the end user receives it.

⚠ Danger — Caution on design

- Set up the emergency stop circuit independently outside this power supply unit. Otherwise, the machine may become out of order and an accident may occur when malfunction occurs in the power supply unit.
- Use the wire size suitable to the current capacity in wiring. If a wire having smaller current capacity is used, the insulation sheath will be melted and insulation will become defective. In this situation, electrical shock or short-circuit may occur, and fire may occur also.

⚠ Danger — Caution on installation and wiring

- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.
- Perform grounding (grounding resistance :100 Ω or less) to the grounding terminal or casing sheet metal area of the unit using a wire of 2 mm^2 or more. Otherwise, electrical shock may occur.

⚠ Caution — Caution on installation and wiring

- Separate the wiring of the strong electric system from the wiring of the weak electric system, and avoid common grounding. Otherwise, noise may be superimposed on the wiring of the weak electric system, and malfunction may be caused.
- Correctly connect the AC power supply to specified terminals, and never use unused terminals for any external lines. Otherwise, the unit may be damaged.

⚠ Danger — Installation and environment

- Never use the unit in an atmosphere having danger of inflammation or explosion. Otherwise, inflammation or explosion may occur.
- Never modify nor disassemble the unit. Otherwise, the unit may fail, or an accident such as fire and damage may occur.
- Never drop cutting chips and wire chips while tapping screw holes and performing wiring. Cutting chips and wire chips may cause damage in the unit, fume, fire, malfunction or others.
- When disposing of the unit, handle it as industrial waste.

⚠ Caution — Installation and environment

- Never install the unit in a place where dusts, soot, conductive dusts or corrosive gas is present or a place exposed to high temperature, condensation or wind and rain. Never install the unit directly in a place where vibration or impact is applied. Otherwise, the unit may be damaged, malfunction or be deteriorated.

⚠ Danger — Caution on operation

- Never touch a switch or key with wet hand. Otherwise, electrical shock may occur.
- Never supply the power to the unit nor operate the unit while the main body panel, terminal cover, etc. are open. While the panel or cover is open, a high voltage area may be exposed and electrical shock may occur.

- We shall not be responsible for any damage caused by repair, disassembly, modification, etc. performed by a third party other than MITSUBISHI or a company specified by MITSUBISHI. Accordingly, ask a service network specified by MITSUBISHI for repairs and disassemblies.

The above cautions on safety and the specifications described in the instruction manual and technical data are subject to change without prior notice.

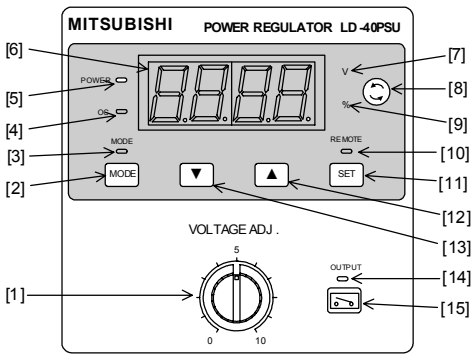
1. Functions and Features

The power amplifire LD-40PSU is designed only for powder clutches/brakes and hysteresis clutches/brakes. This power amplifire operates in a wide power range of 85 to 264 VAC, and is equipped with built-in control outputs of 24 VDC/3.8 A.

1) Features
(1) Switching regulator method
(2) Operates in a wide power range of 85 to 264 VAC.
(3) Constant voltage control method
(4) External control signal
(RC: Remote control ON/OFF input)
(5) Digital display (4-digit, 7-segment LED)
(6) Input for external variable resistor
(SP: Analog signal input)
(7) Protection against load short-circuit and short-circuit warning indication (OC-LED)
(8) Output two-step switching function
(9) Power factor of 80% or more

2) Major applications
(1) Manual power supply unit controlled through the variable resistor on the panel surface.
(2) Manual power supply unit controlled through an external variable resistor.
• The output can be adjusted using an external variable resistor when the variable resistor provided on the panel surface is made invalid and a variable resistor of 500 to 2kΩ (1/2 W or more) is connected to the output terminal (5V) and input terminal (SP-SN).
(3) Power amplifier using an external voltage signal
• The output can be adjusted using an external voltage signal when the variable resistor provided on the panel surface is made invalid and the voltage of 0 to 5 V is input to the input terminal (SP-SN).
(4) Output two-step switching function
• The output in the output OFF condition can be adjusted within the range from 0 to 100%. The output can be switched in two steps using a knob or an external voltage signal.

3) Panel configuration



[1] Voltage adjusting variable resistor
[2] [MODE] key --Changes over the adjustment mode.
[3] Adjustment mode indicator LED (green)
[4] Overcurrent detection indicator LED (red)
[5] Power ON indicator LED (green)
[6] 7-segment display
[7] Voltage indicator LED (red)
[8] Output voltage (V)/output percentage (%) display selector key
[9] Output percentage (%) indicator LED (red)
[10] External variable resistor validity indicator LED (green)
[11] [SET] key -----Determines data setting.
[12] [▲] key
[13] [▼] key
[14] Output ON indicator LED (green)
[15] Output ON/OFF selector switch

2. Installation and Wiring

1) Installation

⚠ Danger

- Never drop cutting chips and wire chips while tapping screw holes and performing wiring. Cutting chips and wire chips may cause damage in the unit, fume, fire, malfunction or others.
- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.

⚠ Caution

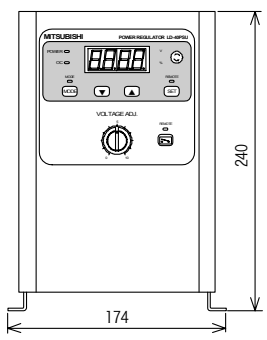
- Never install the unit in a place where dusts, soot, conductive dusts or corrosive gas is present or a place exposed to high temperature, condensation or wind and rain.
- Never install the unit directly in a place where vibration or impact is applied. Otherwise, the unit may be damaged, malfunction or be deteriorated.
-

This power amplifire can be installed on the floor surface or panel surface.

⚠ Caution

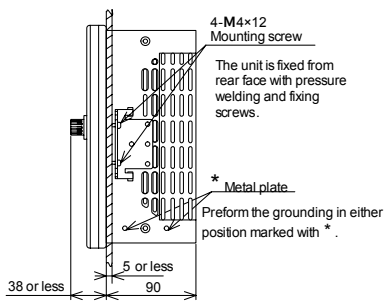
- Never install the unit in such a manner that the panel surface of the main body faces upward or downward.

a) Installation on floor surface

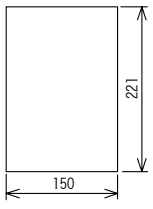


Screw hole dimension for mounting on floor

b) Installation on panel surface



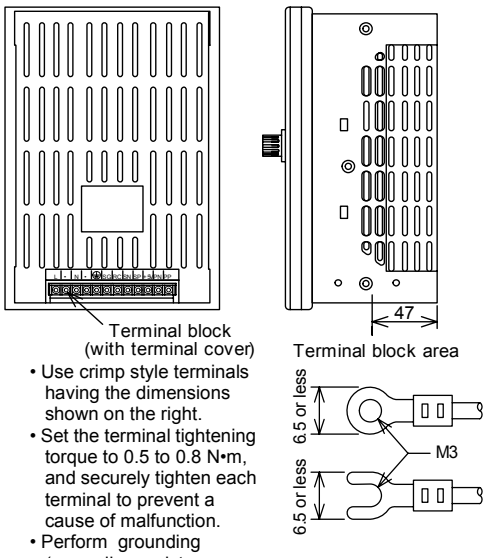
Panel cut dimension for mounting on panel surface



⚠ Caution

- When installing the unit on the floor surface or wall surface, use accessory screws for fixing the main body and the plate.
- Screws of 10 mm or more in length cannot be used because contact may occur inside the main body.
• Tightening torque: 0.5 to 0.8 N•m
- Perform grounding (grounding resistance : 100 Ω or less) to the casing using the mounting plate fixing screw area when installing the unit on the floor surface or using the mounting plate fixing screw holes (marked with *) when installing the unit on the panel surface.

2) Wiring
a) Wiring method and cautions
• The terminal block for external connection is provided in the lower portion of the rear face.



• Use crimp style terminals having the dimensions shown on the right.
• Set the terminal tightening torque to 0.5 to 0.8 N•m, and securely tighten each terminal to prevent a cause of malfunction.
• Perform grounding (grounding resistance: 100 Ω or less) using a shielding wire on the signal receiving side for the analog signal input and output lines and spool pulse input line.
• Never put the input and output lines together with other power lines into a same duct. Never bundle the input and output lines together with other power lines.
• Never tighten two wires together on the terminal block. Otherwise, the terminal block may fail.
(When tightening two wires together, attach two wires to one terminal, and attach one wire to the terminal block.)
Generally, set the wiring length to 10 m or less to assure safety against noise.

<Caution>
Note that the knob may be damaged if load is applied on the panel surface facing downward during wiring to the terminal block.

⚠ Danger

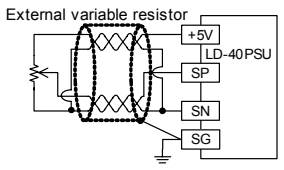
- Make sure to turn off all phases of the external power supply before starting the installation and wiring works. Otherwise, electrical shock or damage in the unit may occur.
- Perform grounding (grounding resistance : 100 Ω or less) to the grounding terminal or casing sheet metal area of the unit using a wire of 2 mm^2 or more. Otherwise, electrical shock may occur.
- Use the wire size suitable to the current capacity in wiring. If a wire having smaller current capacity is used, the insulation sheath will be melted and insulation will become defective. In this situation, electrical shock or short-circuit may occur, and fire may occur also.
- Make sure to attach the terminal cover offered as an accessory of the unit to prevent electrical shock before supplying the power after the wiring work.

⚠ Caution

- Correctly connect the AC power supply to specified terminals, and never use unused terminals for any external lines. Otherwise, the unit may be damaged.
- Separate the wiring of the strong electric system from the wiring of the weak electric system, and avoid common grounding. Otherwise, noise may be superimposed on the wiring of the weak electric system, and malfunction may be caused.
- If the wiring is too long and excessive wires are present, do not put excessive wires into the case of the tension controller. Otherwise, malfunction may occur.
- Never lay the AC power cable on the panel surface. Otherwise, malfunction may occur.

Note:
This manual power supply unit is electronic equipment equipped with a built-in micro computer (CPU). If conductive substances enter the main body or if the CPU becomes out of order due to abnormal noise entered from the outside, the output from the unit is fixed. When the cause is noise, remove the noise source, turn off the power, and then turn on the power to recover the unit to the normal status.

b) Wiring of an external variable resistor
• Wire an external knob using four-core shielding wires as shown in the figure below.
• Do not ground the SG terminal together with the [⏚] terminal. Separately ground the SG terminal.



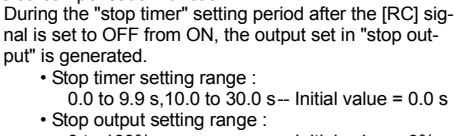
c) Power switch
• This unit is not equipped with the power ON/OFF switch. It is recommended to connect a switch or breaker outside the unit.

3. Operations and Functions during Operation

1) Version display
• When the power is turned on, the version is displayed on the 7-segment display for 2 seconds.

2) Adjustment of the output voltage
a) Adjustment using the variable resistor on the panel surface
• The output voltage can be adjusted within the range from "0" to the maximum value using the voltage adjusting variable resistor [1].
(Maximum output voltage = 26 V)
b) Adjustment using an external variable resistor
• The output voltage can be adjusted using an external variable resistor described in 2-2)-b) by pressing and holding the [SET] key as described in 3-3) below.

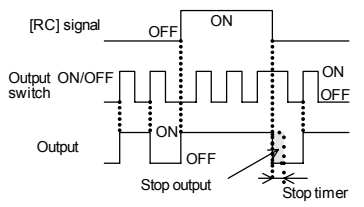
3) Changeover of output voltage adjustment between the variable resistor on the panel surface and the input signal for control
• In the output OFF status in the normal mode, press and hold the [SET] key [11] for 1 second or more to light the [REMOTE] indicator LED [10], make invalid the knob on the panel surface, and make valid the input signal for control (SP-SN).
• Press and hold the [SET] key [11] again for 1 second or more to extinguish the [REMOTE] indicator LED [10] , make valid the variable resistor on the panel surface, and make invalid the input signal for control.



• The output OFF setting described in 4-4)-a) remains valid.

4) Changeover of output display
• The output voltage (V) or output percentage (%) is displayed on the 7-segment display [6].
• Press the display selector key [8] to alternately select the output voltage (V) and output percentage (%).

5) Output ON/OFF function
a) Use the output ON/OFF switch [15] on the panel surface or [RC] signal to set the output to ON or OFF.
• When the [RC] signal is set to ON, the output is generated without regard to the setting of the output ON/OFF switch [15] on the panel surface.
• When the [RC] signal is set to OFF, the output ON/OFF switch [15] on the panel surface becomes valid. Every time the output ON/OFF switch is pressed, the output is set to "ON → OFF → ON " alternately.
• While the output is ON, the output indicator LED [14] is lit.



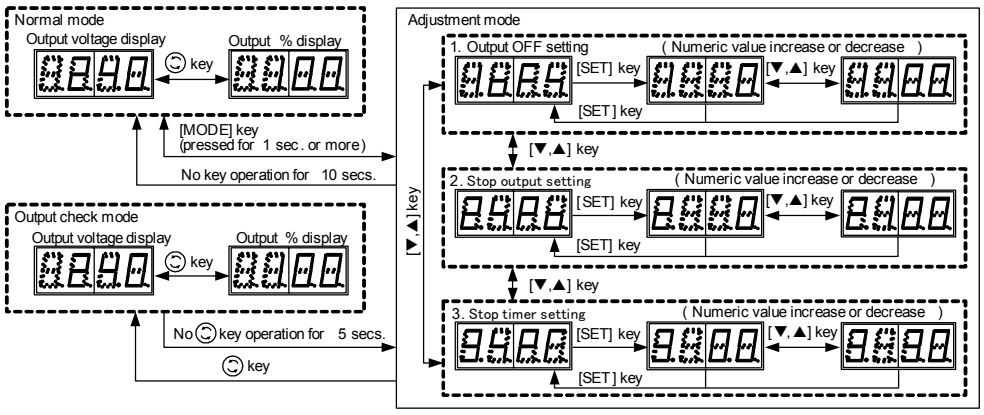
b) In the output OFF condition, the output voltage set in the "output OFF setting" in the adjustment mode is output.
• Output OFF setting range :
0 to 100%--------- Initial value = 0%
• While the output is OFF, “OFF” flickers on the 7-segment display [6].
• While the output OFF setting is not set to "0", output OFF setting “1. OFS” flickers.

6) Inertia compensation function
• During the "stop timer" setting period after the [RC] signal is set to OFF from ON, the output set in "stop output" is generated.
• Stop timer setting range :
0.0 to 9.9 s,10.0 to 30.0 s-- Initial value = 0.0 s
• Stop output setting range :
0 to 100% ---------- Initial value = 0%

7) Load short-circuit protection function
• When the load between the PP and PN terminals is short-circuited, the output is shut down. At this time, [OC] is displayed on the 7-segment display [6], and [OC] and the overcurrent detection indicator LED [4] flicker alternately.
• When the overcurrent detection indicator LED [4] lights, check the external wiring and release the short-circuit status.
• After releasing the short-circuit status, turn off the power, wait for 30 seconds or more, and then turn on the power to recover the unit to the normal status.

4. Adjustment

1) Screen changeover method

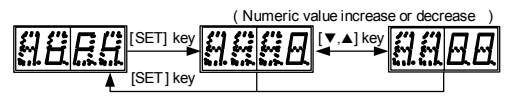


2) Changeover to the adjustment mode
- While the power is ON, press and hold the [MODE] key [2] for 1 second or more to select the adjustment mode. At this time, the adjustment mode indicator LED [3] lights.
- The output voltage value just before changeover to the adjustment mode is maintained.
  If the voltage adjusting variable resistor [1] or an external variable resistor is turned after the adjustment mode is selected, the output voltage changes accordingly. However, the value after change is not displayed on the 7-segment display [6].
  When the adjustment mode is finished, the output voltage value or output percentage value after change is displayed.
- For finishing the adjustment mode, press and hold the [MODE] key [2] again for 1 second or more.
- Press the display selector key in the adjustment mode to display the present output.
  (Note) If any key is not pressed for 10 seconds or more after the adjustment mode is selected, the normal mode is automatically selected.

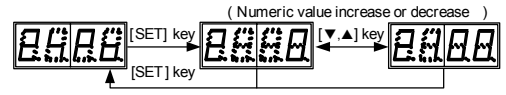
3)Functions of the keys on the panel surface ---------- In the adjustment mode, each key has the following function.
- [MODE] key [2]
  Press and hold this key for 1 second or more in the normal mode to select the adjustment mode. When the adjustment mode is selected, the adjustment mode indicator LED [3] lights.
  For selecting the normal mode after setting of the parameters is completed, press and hold this key for 1 second or more.
- [▲] key [12]
  Use this key for selecting either of the adjustment items 1 to 3 in the adjustment mode. Every time this key is pressed, the adjustment item No. is changed in the order "3 → 2 → 1".
  After selecting an adjustment item, press this key to increase the set value. Press and hold this key for 2 seconds or more to automatically increase the set value.
- [▼] key [13]
  Use this key for selecting either of the adjustment items 1 to 3 in the adjustment mode. Every time this key is pressed, the adjustment item No. is changed in the order "1 → 2 → 3".
  After selecting an adjustment item, press this key to decrease the set value. Press and hold this key for 2 seconds or more to automatically decrease the set value.
- [SET] key [11]
  After selecting an adjustment item, press this key to determine the selected adjustment item and enable setting of a numeric value.
  After setting a numeric value, press this key to store the set value and return to the adjustment item selection status.
- [⟲] key [8]
  Press this key once in the adjustment mode to change over the display contents on the 7-segment display between the output voltage (V) monitoring and the output voltage adjustment (%) monitoring.
  If any key is not pressed for 5 seconds in the monitoring display status, the display contents automatically return to the status just before the display selector key is pressed. At this time, if the display selector key is in the numeric value setting status, the numeric value being set is canceled.
  If the display selector key is pressed again in the monitoring display status, the output voltage (V) monitoring and output voltage adjustment (%) monitoring are changed over alternately every time the display selector key is pressed.
- [OUTPUT] key [14]
  This key turns on and off the output voltage between the PP and PN terminals.
  Every time this key is pressed, the output is set to "ON → OFF → ON" alternately.
  The RC signal input has higher priority. Even if this key is set to "output OFF", the output is ON while the RC signal input is ON.

4) Adjustment method---------- Press and hold the [MODE] key [2] for 1 second or more to select the adjustment mode, and then set the value of each item described below.

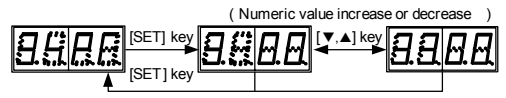
a) OFS (output OFF) setting
- Set the voltage output while the output is set to OFF (while the OUTPUT LED [14] is extinguished).
- When the output is set to OFF using the procedure described in 3-3), the voltage set here is output.
- This function can be used for setting the weak exciting voltage of the powder clutch while the output is OFF.
- Setting range-------0 to 100% --------- Initial value = 0% (100% = Maximum output voltage, approx. 26 V)
- Setting method
  [1] Select "1. OFS" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 1.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.



b) SPO (stop output) setting
- Set the voltage output while the stop timer is operating.
- Setting range-------0 to 100%---------- Initial value = 0% (100% = Maximum output voltage 26 V)
- Setting method
  [1] Select "2. SPO" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 2.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.



c) SPT (stop timer) setting
- Set the stop timer.
- Setting range-------0.0 to 9.9 s and 10.0 to 30.0 s ----------Initial value = 0.0 s
- Setting method
  [1] Select "3. SPT" using the [▲] key [12] or [▼] key [13].
  [2] Press the [SET] key [11] to determine the item No. 3.
  [3] Set a numeric value using the [▲] key [12] or [▼] key [13].
  [4] Press the [SET] key [11] to determine the numeric value.

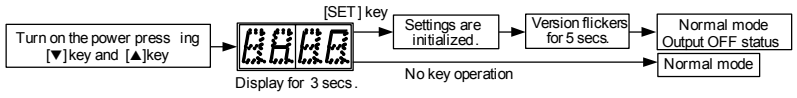


5) Set item list

Set item	Unit	Setting range		Initial value
		Minimum value	Maximum value	
Output OFF setting	%	0	100	0
Stop output	%	0	100	0
Stop timer	sec	0.0	30.0	0.0

5. Setting Initialization

- If the [▲] key [12] and [▼] key [13] are pressed at the same time when the power is turned on, "InIT" is displayed for 10 seconds on the 7-segment display [6]. The version is not displayed.
- Press the [SET] key [11] while "InIT" is displayed to initialize various settings and return the unit to the status at the time of shipment.
- At this time, the "V" unit indicator LED [7] and "%" unit indicator LED [9] are extinguished, and only the power ON indicator LED [5] is lit.
- When initialization is completed, the version flickers for 5 seconds, the normal mode, voltage monitoring display and output OFF status are selected, and then the power ON indicator LED [5] and voltage indicator LED [7] light.
- If the [SET] key [11] is not pressed, "InIT" flickers for 10 seconds, and then the normal mode is selected in the same way as the usual power ON method.



6. Inspection and Maintenance

1) Initial inspection
- a) Before turning on the power, check whether the applied load is proper (24 VDC, 3.8 A or less).
- b) Incorrect connection of the power terminal, contact between the DC input/output wiring and the power wiring, short-circuit of the output wiring, etc. can cause serious damage in the equipment.
- c) Before turning on the power, check whether the power supply is connected correctly, whether the grounding terminal is connected correctly, and whether the input/output wiring is performed correctly.
- d) Check whether the commutation diode is not directly connected to the exciting coil of the clutch or brake connected to the control output terminal, and whether the PN and SN terminals are not short-circuited.
- e) Take care so that wire chips and lead wire chips do not enter from ventilation holes on the case top face and sides during wiring.
- f) To the power ON indicator LED[5], the power is supplied from the secondary circuit of the internal switching power supply.

2) Maintenance inspection
- a) Consumable parts which can reduce the life of the unit are not built in the unit. However, the standard replacement frequency of the aluminum electrolytic capacitor is 5 years. This frequency varies depending on the ambient working temperature, output current, operating time, etc. Contact Mitsubishi System Services if necessary.
- b) The life of the EEPROM for storing various setting data is 100,000 times of writing. The number of times of power ON/OFF is limited to 100,000 times or less.
- c) In the periodic inspection, check the following items:
  - Whether the temperature inside the panel is not normally high due to heating devices and direct sunlight
  - Whether dusts and conductive dusts have not entered the panel
  - Whether abnormality in the wiring, loose terminals and other abnormalities are not present

7. Specifications

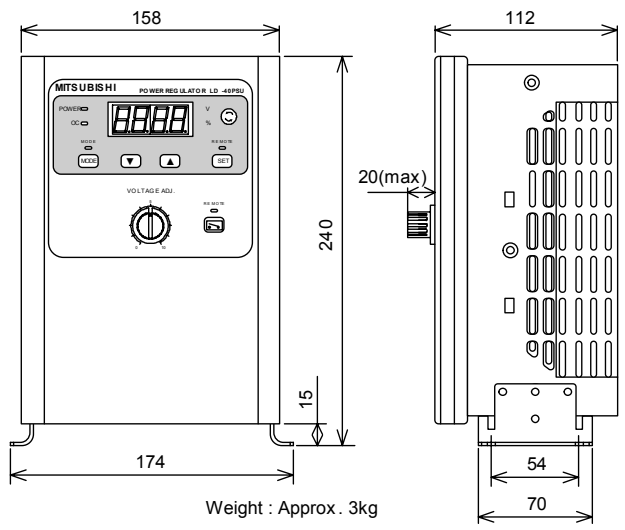
1) I/O specifications

Item		Terminal name	Specifications	
Power supply	Input	L	• 100 to 240 VAC (-15% to +10%) , 50/60 Hzo • Power consumption : 200 VA (at 24 VDC, 3.8A) • Power factor : 80% • Power fuse : 250 V, 5 A x1, built in • Rush current : 30A, 300ms (depending on line impedance) • Allowable instantaneous power interruption :10 ms	
		N		
		⏚	Grounding	
	Output	+5V	Power supply for external variable resistor DC5V 10mA or less	
		SN		
Contact signal	Input	RC	Output remote control ON = Output is generated. OFF = Output is stopped. (Depending on output OFS setting)	DC12V/5mA Supplied internally
		SN		
Analog singal	Input	SP	Input signal for control : 0 to 5 VDC	
		SN		
		SG	Relay terminal for shield grounding	
	Output	PP	For 24 VDC series powder clutch/brake or hysteresis clutch/brake 0 to 24 VDC, 3.8 A or less	
		PN		

2) Environmental specificationsl

Ambient temperature	-5 ~ +55°c
Ambient humidity	35 ~ 80% RH or less (no condensation)
Vibration resistance	In accordance with JIS C0040. 10 to 55 Hz, 0.5mm (4. 9m / s^2 maximum), 2 hours in each of three axis directions
Impact resistance	In accordance with JIS C0041. 98m / s^2, 3 times in each of three axis directions.
Supply noise resistance	By noise simulator with 1,000 Vp-p noise voltage, 1 µs noise width and 30 to 100 Hz .
Withstand voltage	1,500V AC, 1 minute • Between entire terminals as a whole (except grounding terminal) and ground terminal. • Between entire terminals as a whole (except grounding terminal) and metal fixture.
Insulation resistance	5MΩ or more by 500V DC megger Between entire terminals as a whole and ground terminal.
Grounding	Solid grounding (100Ωor less)
Operating atmosphere	Corrosive gas, combustible gas, conductive dusts and many dusts shall not be present.

8. Outside Dimensions

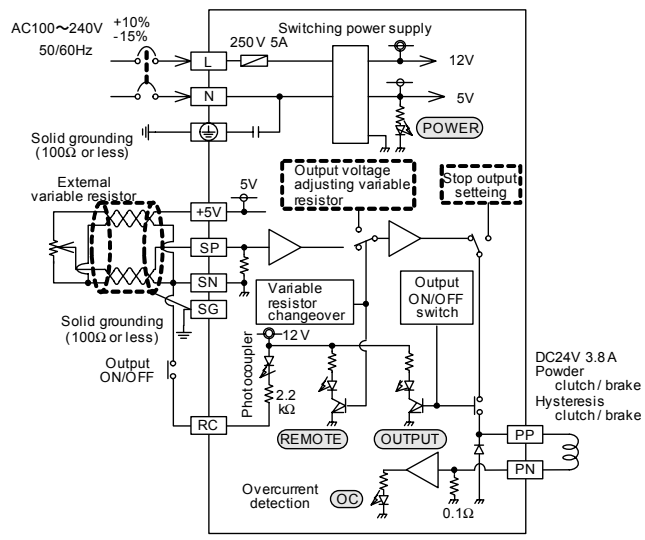


Weight : Approx. 3kg

Danger Caution on installation and wiring

- Never apply voltage exceeding 240 VAC (380 VAC or 400 VAC, for example) to the area between the L and N terminals. Otherwise, the unit may be damaged, or an accident such as fire may be caused.

9. External wiring diagram and terminal arrangement



L	•	N	•	⏚	SG	RC	SN	SP	+5V	PN	PP

Connect the active line side to the [L] terminal, and connect the non-active line side to the [N] terminal.