

## **Prior to Use**

- Please read this instruction manual carefully.
- Please use product only as directed or severe damage to the product may occur.
- Not properly following these guidelines may result in extremely hazardous conditions that could cause electric shock or fire.

### **WARNING**

- Do not modify the product nor remove the protective enclosure. Under the protective enclosure are contained high voltage and high temperature components during normal operation and after complete shutdown. Avoid electric shock or burns by avoiding them.
- Keep face and hands away at all times during operation to avoid unexpected injury.
- DANGER. Risk of fire, electric shock, and injury. DO NOT continually operate if there is smoke, odor, or irregular noise. Instead immediately turn off the power and contact us. Do not attempt to repair it yourself because it is dangerous to do so.
- DANGER. Risk of fire, electric shock, and injury. DO NOT insert or drop any object in openings, this could cause unit failure or severe hazardous conditions.
- DANGER. Risk of fire, electric shock, and injury. DO NOT use the product with condensation present, this could result in electric shock or fire.

### **CAUTION**

- This power supply is intended to be used as a component of a larger system of electrical equipment. User is responsible for the safe design when this product is to be integrated in the equipment which requires particularly high quality and reliability. There is a possibility to endanger persons or property by a failure or malfunction of this product.
- Ensure and maintain input voltage, output current, output power, ambient temperature, and humidity within specification or unit may be damaged.
- Ensure that wires are properly secured to the input and output terminals as specified in this manual. Incorrect wiring or poor connection may cause a failure.
- Be sure to turn off the power before making the output connection.
- DO NOT use in a special environment (e.g. in the presence of strong electromagnetic field or erosive gas) or environment where conductive foreign substance is present.
- DO NOT use or store product where condensation may occur due to moisture or humidity. For use in such conditions, waterproof protection is necessary and must be installed.
- Do not operate under over current or short-circuit conditions for more than 10 seconds otherwise damage and electrical insulation failure will likely result.
- No stress (e.g. twist, deflection) should be applied to the print board when the product is installed.
- Avoid impacts, such as dropping this product.
- Do not apply the load to signal connector CN501.
- DANGER. Output of this product is regarded as hazardous energy so this should not be accessible to end users.
- Use appropriate connectors for the terminal connection.  
For the crimping of the contact, use the crimping tool recommended by the manufacturer.
- Prevent accidental contact with the output terminal of this product from dropped items such as tools by insuring proper orientation and shielding/cover.
- Turn off the input power and ensure that the input and output terminal voltage drops to zero before repair.

For the use in medical equipment

### **CAUTION**

- When using this product based on the IEC 60601-1 standard, a fuse or overcurrent breaker must be provided on each input line.
- These products are not suitable for use in the presence of flammable anesthetic mixtures with oxygen or with nitrous oxide.
- Although these products have not been assessed to IEC/EN/UL60601-1-2(EMC), EMC test data is available.

## 1. Terminal

- Ensure AC power is off prior to connecting inputs and outputs.
- Connect the functional ground terminal to earth terminal of device or equipment.
- Route AC and DC wires separately to minimize noise.

### ● TERMINAL BLOCK (TB101)

L	: AC Line
N	: AC Neutral
$\perp$	: Frame Ground
-V	: - Output terminal
+V	: +Output terminal

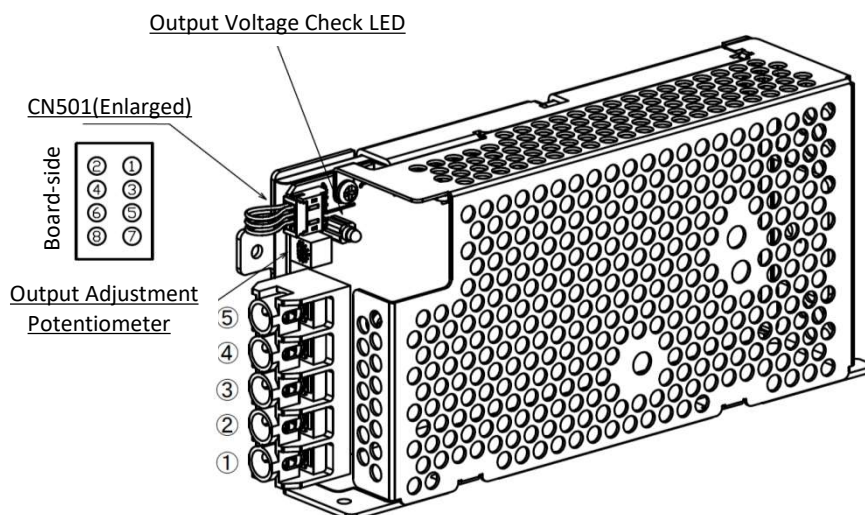
Terminal screws area all M3.5.

### ● Connector CN501

①	+S	: + Output Remote Sensing
②	+VS	: + Output Voltage Check
③	-S	: - Output Remote Sensing
④	-VS	: - Output Voltage Check
⑤	VR+	: + External Output Voltage Adjustment
⑥	VR-	: - External Output Voltage Adjustment
⑦	+R	: +Remote Control ON/OFF
⑧	-R	: - Remote Control ON/OFF

CN502(not included)  
 Connector : S8B-PHDSS(JST)  
 Housing : PHDR-08VS  
 (Terminal) : SPHD-001T-P0.5  
 Crimping tool : AP-K2N

For proper connection to CN501 please assemble CN502 (not included) using parts above



## 2. Functions

### 2-1 Input voltage

- AC input voltage range: Single phase 85 to 264V AC (47 to 63Hz)
- To avoid damage, please use within the recommended range.

### 2-2 Output voltage setting

- Adjust DC voltage out put by using Output Adjustment Potentiometer located next to the CN501 connector.
- CW = increase, CCW = decrease.
- Use in the following range:
  - Within the rated output voltage  $\pm 10\%$  at the output terminal (For LFS150A-5, it a variable range of 4.5 to 6V.)
  - Do not exceed the maximum output power and rated output current.
- Slowly turn the potentiometer, not to exceed the rated voltage.

### 2-3 Inrush current

- This unit comes with an integral inrush current limiting circuit.
- Since SCR is used to prevent inrush current, the inrush current limiting circuit may have been released if the power is turned on again in a short time. Be sure to wait enough time before powering up again.
- Proper selection of component providing power (contactor, fuse, circuit breaker, etc...) to this unit requires ratings compatible with AC IN 100V : 20A / ACIN 200V : 40A (Ta=25°C Cold Start) due to internal SCR circuitry

### 2-4 Over-current protection (OCP)

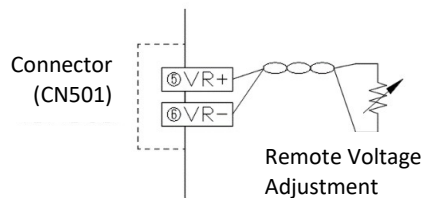
- When it exceeds 110% of the rated output current, OCP shuts off the output.
- Turn off power and remove fault and wait a few minutes before powering up again.
- Avoid operation in the over current state longer than 10 seconds or damage or insulation failure may occur.

### 2-5 Over-voltage protection (OVP)

- During an over voltage fault OVP circuitry will disable output until fault is removed and unit is allowed to reset.
- Once OVP is activated, output is continuously shut off as long as the input power is supplied.
- Turn off power and ensure supplied voltage stays within tolerable limits (100-240VAC) and wait a few minutes before powering up again.
- After reset, the output voltage might be abnormal, so it should be confirmed and adjusted as needed. If this is the case, OVP will be activated, again.

### 2-6 Remote voltage adjustment

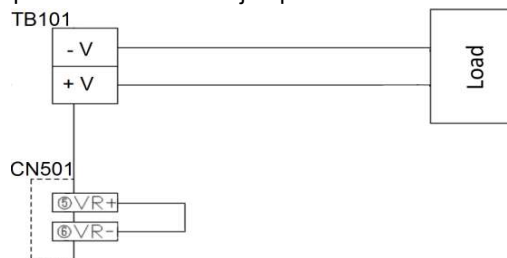
- This unit comes with an external voltage adjustment function.
- Voltage can be adjusted by adding a remote potentiometer externally from the ⑤-⑥ pins of the CN501 connector.
- Adjust the integral potentiometer next to the CN501 connector to be fully CCW(counter-clockwise)
- SLOWLY turn the remote potentiometer, not to exceed the rated range. Rapid change like with switch will damage unit.
- Use twisted pair wires installed in parallel with load wire as shown below, to minimize external noise influence.



Volume Resistance:

5V, 12V, 15V	5k $\Omega$
24V, 30V, 48V	10k $\Omega$

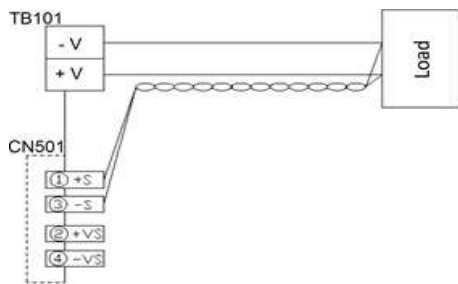
- If no External Voltage Adjustment will be used, please retain CN501 jumper connector as shown :



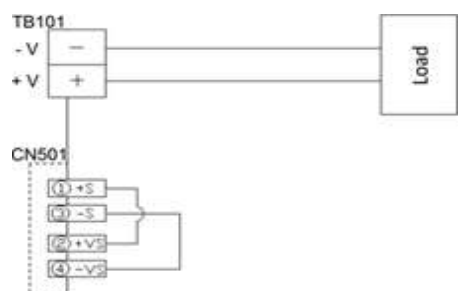
## 2. Functions

### 2-7 Remote sensing

- This unit comes with an integral remote sensing function.
- Please note that the maximum allowable voltage drop from Load to CN terminal is 0.3V. Keep the power supply terminal voltage within the rated range.
- Please twisted pair wires installed in parallel with load wire as shown below.

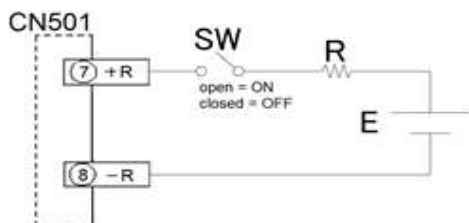


- If no Remote Sensing will be used, please retain CN501 jumper connector as shown:



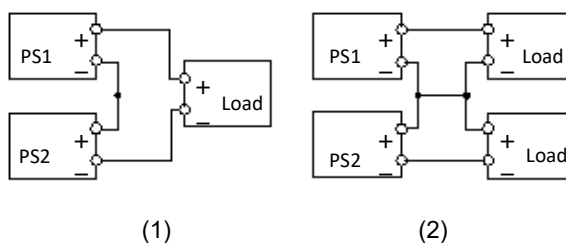
### 2-8 Remote ON/OFF circuit

- This unit comes with an integral on/off circuit, see wiring diagram below.
- Unit DC output is disabled when control voltage is applied to RC terminal in reference to -V terminal.
- If SW is open or control voltage E is:  $0 < E < 4.5V$  then unit output is enabled.
- If SW is closed and control voltage E is:  $4.5VDC < E < 6.5VDC$  then output is disabled, and no need for current limiting resistor R.
- If SW is closed and control voltage E is:  $6.5VDC < E < 24.5VDC$ , then current limiting resistor R must be =  $(E - (1.1 + 1000 \times 0.005)) / 0.005$ . For example if  $E = 24VDC$ ,  $R = (24 - (1.1 + 5)) / 0.005 = 3.5k\Omega$



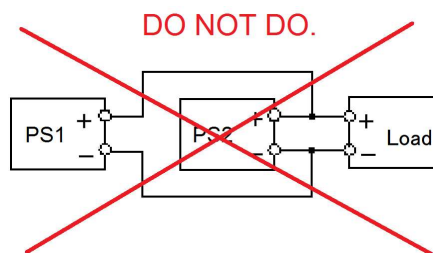
### 2-9 Series operation

- This Daitron power supply unit is configurable in series with another Daitron power supply (if it too is configurable in Series) in order to increase DC voltage or to provide both "+" and "-" DC voltage.
- In these configurations the MAXIMUM current delivered to the Load is limited to the maximum allowable from the power supply with the lowest current rating.
- To increase VDC (PS1 + PS2) see configuration (1) below. Example: If PS1 and PS2 are both 12VDC/30W each, then configuration (1) will provide 24VDC/60W
- To provide both "+" and "-" DC voltage to a load see configuration (2) below. Example: If PS1 and PS2 are both 12VDC/30W each, then configuration (2) will provide +12VDC to Load1 and -12VDC to Load2, with a maximum total wattage of 60W for both loads combined.



### 2-10 Parallel operation

- This power supply can not configured in parallel with another power supply.

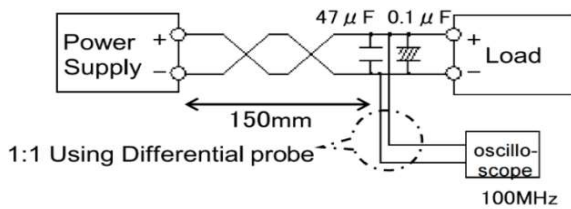


## 2. Functions

### 2-11 Ripple

- Maximum ripple voltage is measured using JEITA measurement method prescribed in RC-9131C.
- If ripple noise becomes excessive due to line length, connect an electrolytic capacitor(47 $\mu$ F) and film capacitor (0.1 $\mu$ F) at load side as shown.

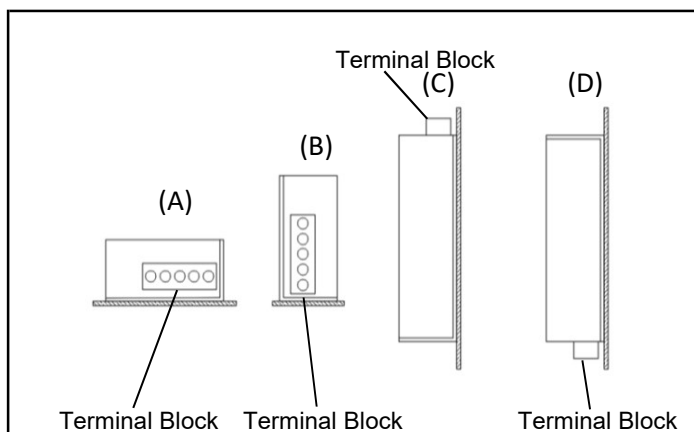
The maximum ripple voltage in the standard specification is a value measured using the specified measuring circuit in the anechoic chamber under the JEITA measuring method (See the drawing). When the load line is long, the ripple on the load edge may become large unless a capacitor, such as an electrolytic capacitor or a film capacitor is connected. The output ripple cannot be measured accurately if the ground lead of the oscilloscope is too long.



**Ripple measurement method**

## 3. Mounting

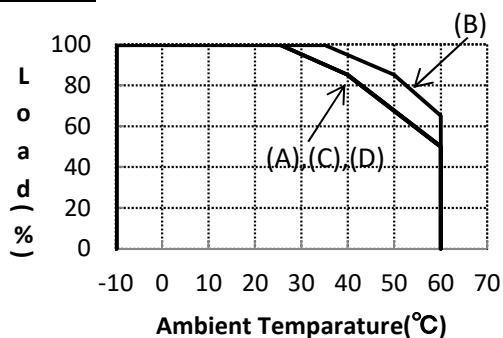
### 3-1 Mounting direction



### 3-2 Output derating

- Mounting direction (A), (B), (C), (D)
- By derating the output power (loading rate), this product can be used in a wide temperature range.

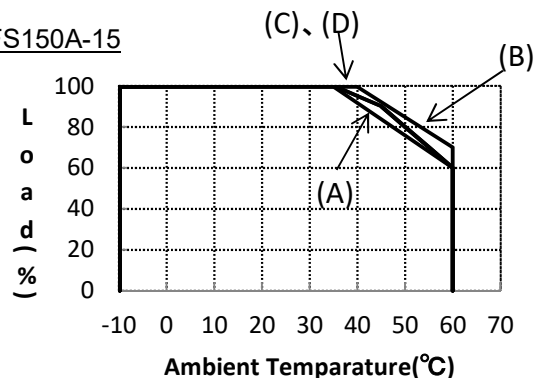
LFS50A-5



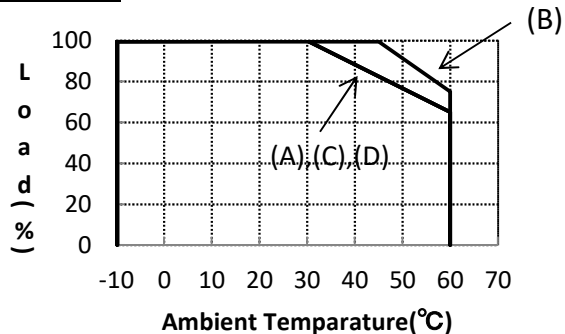
### 3-3 Mounting method

- Recommended tightening torque for M3 power supply mounting screws: 0.54Nm
- The LFS series cooling method is by convection, please mount with this consideration in mind.

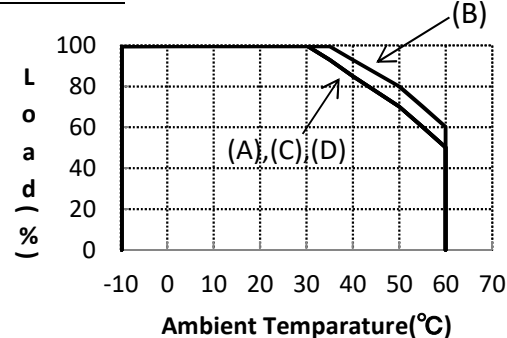
LFS150A-15



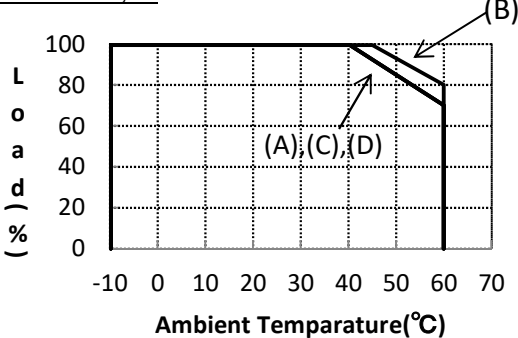
LFS150A-24



LFS150A-12



LFS150A-30,48



## 4. Connections

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- Using twisted pairs for the output load wire, remote control wire, remote sensing wire, and external voltage adjustment wire and routing them separately from the input wire is ideal to minimize noise interference.
- For improved noise filtering, add lower value of electrolytic capacitor(Section 2-11, 47  $\mu$  F).
- Attaching a small volume electrolytic capacitor to the load end is also effective to eliminate noise.
- Minimize length of output load wiring.
- For safety and noise prevention, connect the FG terminal with the earth ground of the system using the power supply using minimal length possible. There is a possibility for an electric shock
- Recommended tightening torque for M3.5 I/O terminal screws: 1.03Nm
- Shut off the power, and carefully make connections for the remote sensing function or external voltage adjustment function .  
Incorrect wiring or poor connection could cause malfunction.

## 5. Troubleshooting

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- Confirm input AC voltage to be within spec of 100-240VAC/50-60Hz.
- Confirm all input and output are wired correctly.
- Check if the wire material is not too thin.
- Check the output adjustment potentiometer. Sometimes OVP function turns off the output power when the potentiometer is adjusted too high.
- Please note that an excessive capacitive load can create over current situation.
- Confirm remote on/off is getting the appropriate voltage for desired operation.
- Before suspecting a failure.
  - Check if the rated input voltage is connected.
  - Check if the input/output wiring is appropriate.
  - Check if a large-capacity capacitor is not connected to the load side.
  - Check if the remote control is not active.
- Confirm the accessory connector for CN501 is connected.  
The accessory connector is required if the remote sensing function is not used.

## 6. Warranty

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The warranty is valid two year from the date of the delivery, except for the following cases.

- (1) Repair is provided at a cost for the following cases even during the valid warranty period.
  - Failures or damage caused by incorrect use or unauthorized repair of the product
  - Failures or damage caused by transport after delivery.
  - Failures or damage caused by a fire, earthquake, wind and water, and other natural disasters, or abnormal voltage.
  - Failures caused by other devices connected to the product.
- (2) For the use in special environments, such as salty, acid, alkaline, dusty, or corrosive environment, please contact us in advance.