

# **7550A Precision Current Shunt Operation Manual**

P/N: 9007550A01 REV: H



# Material Contents Declaration

(材料含量宣称)

| (Part Name)<br>零件名称                           | Hazardous Substance (有毒有害物质或元素) |           |           |               |                   |                     |
|---|---------------------------------|-----------|-----------|---------------|-------------------|---------------------|
|   | 铅<br>(Pb)                       | 汞<br>(Hg) | 镉<br>(Cd) | 六价铬<br>(Cr6+) | 多溴<br>联苯<br>(PBB) | 多溴<br>二苯醚<br>(PBDE) |
| PCBA<br>(印刷电路装配件)                             | X                               | 0         | X         | 0             | 0                 | 0                   |
| Electrical part not on PCBA's<br>未在PCBA上的电子零件 | X                               | 0         | X         | 0             | 0                 | 0                   |
| Metal parts<br>金属零件                           | 0                               | 0         | 0         | X             | 0                 | 0                   |
| Plastic parts<br>塑料零件                         | 0                               | 0         | 0         | 0             | X                 | X                   |
| Wiring<br>电线                                  | X                               | 0         | 0         | 0             | 0                 | 0                   |
| Package<br>封装                                 | X                               | 0         | 0         | 0             | 0                 | 0                   |

对销售之日的所售产品,本表显示, PRODIGIT 供应链的电子信息产品可能包含这些物质。注意:在所售产品中可能会也可能不会含有所有列出的部件。This table shows where these substances may be found in the supply chain of Prodigit electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product. 0 : 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006 标准规定的限量要求以下。○ : Indicates that the concentration of the hazardous substance in all homogeneous materials in the parts is below the relevant threshold of the SJ/T 113632006 standard. × : 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006 标准规定的限量要求。× : Indicates that the concentration of the hazardous substance of at least one of all homogeneous materials in the parts is above the relevant threshold of the SJ/T 11363-2006 standard.

Note(注释):

1.Prodigit has not fully transitioned to lead-free solder assembly at this moment ; However, most of the components used are RoHS compliant.

(此刻, Prodigit 并非完全过渡到无铅焊料组装;但是大部份的元器件一至于RoHS的规定。)

2. The product is labeled with an environment-friendly usage period in years.

The marked period is assumed under the operating environment specified in the product specifications.

(产品标注了环境友好的使用期限(年)。所标注的环境使用期限假定是在此产品定义的使用环境之下。)



Example of a marking for a 10 year period:

(例如此标制环境使用期限为10年)

## **SAFETY SUMMARY**

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. PRODIGIT assumes no liability for the *customer's failure to comply with these requirements*.

### **GENERAL**

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

### **ENVIRONMENTAL CONDITIONS**

This instrument is intended for indoor use in an installation category I, pollution degree 2 environments. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

### **BEFORE APPLYING POWER**

Verify that the product is set to match the available line voltage and the correct fuse is installed.

### **GROUND THE INSTRUMENT**

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument must be connected to the ac power supply mains through a three conductor

power cable, with the third wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

### **FUSES**

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired

Fuses or short circuited fuse holder. To do so could cause a shock or fire hazard.

### **DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.**

Do not operate the instrument in the presence of flammable gases or fumes.

### **KEEP AWAY FROM LIVE CIRCUITS.**

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

### **DO NOT SERVICE OR ADJUST ALONE.**

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

### **DO NOT EXCEED INPUT RATINGS.**

This instrument may be equipped with a line filter to reduce electromagnetic interference and must be connected to a properly grounded receptacle to minimize electric shock hazard.

Operation at line voltages or frequencies in excess of those stated on the data plate may cause leakage currents in excess of 5.0 mA peak.

### **DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.**

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a PRODIGIT ELECTRONICS Sales and Service Office for service and repair to ensure that safety features are maintained.

*Instruments which appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.*

## SAFETY SYMBOLS



**Direct current (DC)**



**Alternating current (AC)**



**Both direct and alternating**



**Three-phase alternating current**



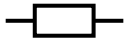
**Protective earth (ground)**



**On (Supply)**



**Off (Supply)**



**Fuse**



**Caution ! Refer to this manual before using the meter.**



**Caution, risk of electric shock**

**CAT IV** – Is for measurements performed at the source of the low-voltage installation.

**CAT III** – Is for measurements performed in the building installation.

**CAT II** – Is for measurements performed on circuits directly connected to the low-voltage installation.

**CAT I** – Is for measurements performed on circuits not directly connected to Mains.

This equipment is not for measurements performed for CAT II, III, and IV.

# 7550A Precision Current Shunt Operation Manual

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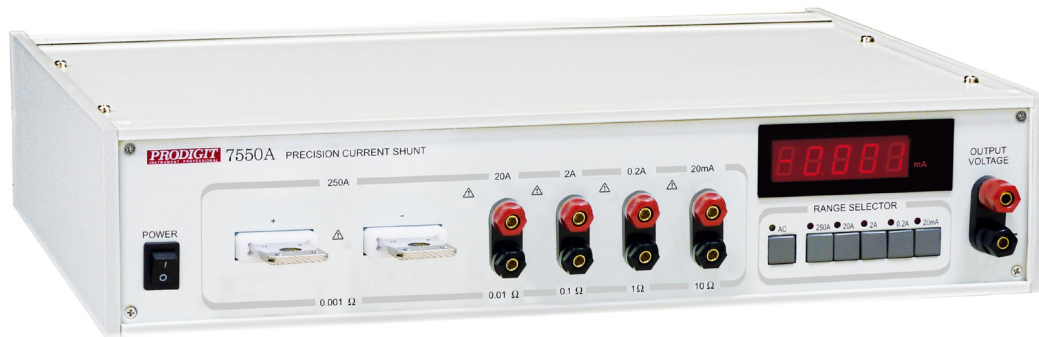


## Chapter 1 General information

### 1-1. Introduction

The model 7550A precision current shunt is a precision AC/DC shunt. It incorporates five shunt ranges from 10 $\Omega$ , 1 $\Omega$ , 0.1 $\Omega$ , 0.01 $\Omega$  to 0.001 $\Omega$ . The AC/DC measuring current range from 20mA, 200mA, 2A, 20A to 220A (250Amax) full scale and a built-in 4 1/2 digit precision AC/DC current meter with "AUTO-ZERO" and "AUTO-RANGE" function. Each shunt range has its own current input terminals and a select key provides access to the voltage output terminals of each shunt resistor. A single set of binding post conveniently provides output voltage to the measuring voltmeter.

The compliance voltage of the shunt is less than 0.2 volts at full scale for each range except the 220 Ampere range which has a compliance voltage of 0.22 volts. The shunt is a highly stable AC/DC resistor connected in a four-terminal non-inductive configuration for each range except the 20mA range.



### 1-2. Specifications

SHUNT all types are 4 terminal networks with calibration adjustments for each network.

| Range | Shunt Value    | *DC Accuracy |        | *AC Accuracy $\leq$<br>400Hz | Max input DC/AC rms |
|-------|----------------|--------------|--------|------------------------------|---------------------|
|       |                | Typ.         | Max.   |                              |                     |
| 200 A | 0.001 $\Omega$ | 0.02 %       | 0.04 % | 0.1 %                        | 250 A               |
| 20 A  | 0.01 $\Omega$  | 0.01 %       | 0.02 % | 0.1 %                        | 30 A                |
| 2 A   | 0.1 $\Omega$   | 0.01 %       | 0.02 % | 0.1 %                        | 4 A                 |
| 200mA | 1 $\Omega$     | 0.01 %       | 0.02 % | 0.1 %                        | 400mA               |
| 20 mA | 10 $\Omega$    | 0.01 %       | 0.02 % | 0.1 %                        | 40 mA               |

\*AC accuracy is limited to 100A.

4 1/2 digit current meter



| Shunt Range | 4 1/2 DAM resolution | * DC                           |       | * AC(50Hz~400Hz) |
|-------------|----------------------|--------------------------------|-------|------------------|
|             |                      | Accuracy $\pm$ (rdg% + counts) |       |                  |
|             |                      | Typ.                           | Max.  |                  |
| 200 A       | 0.01 A/0.1 A         | 0.05+2                         | 0.1+2 | 0.5+20           |
| 20 A        | 0.001 A/0.01 A       | 0.05+2                         | 0.1+2 | 0.5+20           |
| 2 A         | 0.1 mA/1 mA          | 0.05+2                         | 0.1+2 | 0.5+20           |
| 200mA       | 0.01 mA/0.1 mA       | 0.05+2                         | 0.1+2 | 0.5+20           |
| 20 mA       | 0.001 mA/0.01 mA     | 0.05+2                         | 0.1+2 | 0.5+20           |

- \* For Sinewave input  $\geq$  1800 count.
- \* The specifications apply when the 7550A is powered on for at least 30 minutes
- \* The typical not apply when 20A, 200A use over 50% range current and over 3 mins or the ON/OFF current period ratio less than 1/3.
- \* For high accuracy measurement please use the 6 1/2 D.V.M. to measure the voltage output which is proportional to the current value.

General information's :

Temperature range : 0 to 40°C ; stated accuracy for 1 years at 23°C $\pm$ 2°C .

Temperature coefficient :

Range 0.02A 、 0.2A 、 2A Less than 0.001% per °C (20 °C - 40 °C)

Range 20A Less than 0.002% per °C (20 °C - 40 °C)

Range 200A Less than 0.003% per °C (20 °C - 40 °C)

|          |                        |                          |
|----------|------------------------|--------------------------|
| AC INPUT | LINE                   | 115Vac/ 230Vac $\pm$ 10% |
|          | FREQUENCY              | 50/60 Hz                 |
|          | PROTECT                | FUSE                     |
|          | MAX. POWER CONSUMPTION | 12W                      |

Table 1-1 7550A Specifications

|       |                         |        |
|-------|-------------------------|--------|
| Model | Dimension(HxWxD)        | WEIGHT |
| 7550A | 88 mm x 420 mm x 325 mm | 13.5Kg |

Table 1-2 7550A Dimensions

### 1-3. Accessories

| PRODIGIT PART NO. | DESCRIPTIONS                   | Quantity |
|-------------------|--------------------------------|----------|
| 60300320          | H5.5-8;HOOK TRML, YEL INS      | 2        |
| 60501080          | GDL100;FUSE,5X20MM 0.10A,SLOW  | 1        |
| 60510080          | GDL1;FUSE,5X20MM 1.00A, SLOW   | 1        |
| 60550081          | GDL5;FUSE ,5X20MM 5.00A SLOW   | 1        |
| 74100350          | RND SCREW M8X1.25 L=25mm NI    | 2        |
| 74200140          | RND SCREW #6-32+S+P L=9/16" NI | 8        |
| 74500110          | NUT M8X1.25 NI                 | 2        |
| 74800070          | WASHER INSIDE DIA-8.5 OUTSIDE  | 4        |

### 1-4. Options

| PRODIGIT PART NO. | DESCRIPTIONS                  |
|-------------------|-------------------------------|
| 64180100          | 1 meter welding cable 80 SQMM |
| 71100170          | 19 inch rack mount kit        |

## Chapter 2 Installation

### 2-1 Check line voltage

The 7550A precision current shunt can be operated from a 100/115 or 200/230Vac input as indicated on the label on the rear panel. The input is switchable so please make sure that the switch is set correctly for your nominal mains input before turning on the mains power. The procedure below details how to change the switch position:

- 2.1.1 With the 7550A power OFF, disconnect the power cord.
  - 2.1.2 Refer the drawing on the rear panel in Fig 2-1, set the switches to the Proper voltage as described in the following:
    - a. Set Switch to 100V/115V for 115Vac line voltage
    - b. Set Switch to 200V/230V for 230Vac line voltage
- Note: 100Vac and 200Vac is used for Japan only (Option)

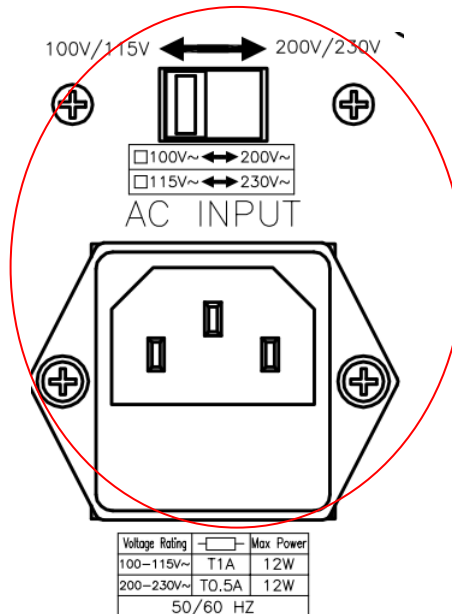


Fig 2-1 SET OF SWITCH

### 2-2 Input Fuse

This product is fitted with a mains input fuse. If it needs to be replaced please adhere to the Following procedure.



BEFORE replacing the fuse you must switch off the unit and mains power outlet and disconnect the plug of the AC Power cable from the input socket of the 7550A.



If prior to exchanging the fuse, there is any abnormal noise or odour do not use the unit. Please inform your local sales office to organise repair of the 7550A.

To avoid the risk of fire or electronic shock the fuse must only be replaced with same type and rating as the original. Any replacement fuse used should meet your national safety standards. Any use of improper fuse or shorting the Fuse holder would be extremely dangerous and would be strictly prohibited.

- 2.3.1 Check the rating of the mains input fuse. Replace only with the correct Type and rating.  
 For 100V/115Vac Input use T1A/250V (5\*20mm),  
 For 200V/230Vac Input use T0.5A/250V (5\*20mm)
- 2.3.2 The AC line fuse is located below the AC line socket (see Fig 2-2). Use A small screwdriver to remove the fuse holder. Replace the failed fuse With the appropriate type and rating according to your mains voltage. (See Table 1-1)
- 2.3.3 Refit the fuse holder and connect the power cord.

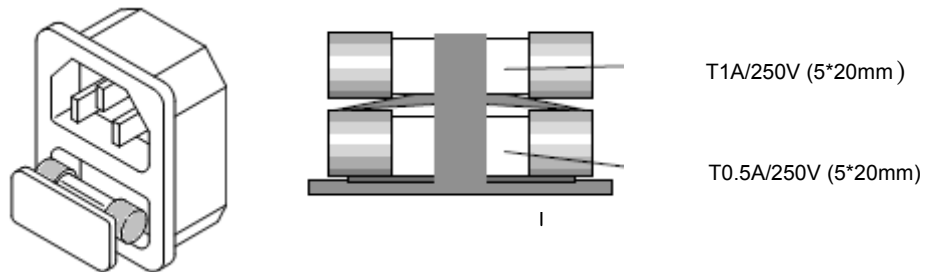


Fig 2-2 FUSE RECEPTACLE

## 2-3 Grounding requirements



### **SHOCK HAZARD**

The unit is grounded via the AC Input. It must be ensured that the correct mains lead with earth pin is used. Correct grounding of your electrical system infrastructure according to national standards must also be observed.

## 2-4 Environmental Requirements

- Indoor use.
- Insulation Category I.
- Pollution Degree 2.
- Altitude up to 2000 meters
- Relative Humidity 80% Max (non-condensing).
- Ambient Temperature 0 to 40°C
- The ideal operating temperature is 25°C ± 5°C


## 2-5 Observe the International Electrical Symbol Listed Below

⚠ Warning ! Risk of electric shock.

⚠ Caution ! Refer to this manual before using the instrument.

## 2-6 Cleaning

To clean this product uses a soft or slightly damp cloth .

CAUTION

BEFORE you clean the unit, switch the mains power off and disconnect the input lead.

- Please do NOT use any organic solvent capable of changing the nature of the plastic such as benzene or acetone.
- Please ensure that no liquid is allowed to penetrate this product.

## 2-7 Current shunt Placement

Place the Current shunt near the ground pin of the circuit. If this principle is not followed, the voltage drop generated by Current shunt may cause electric shock.

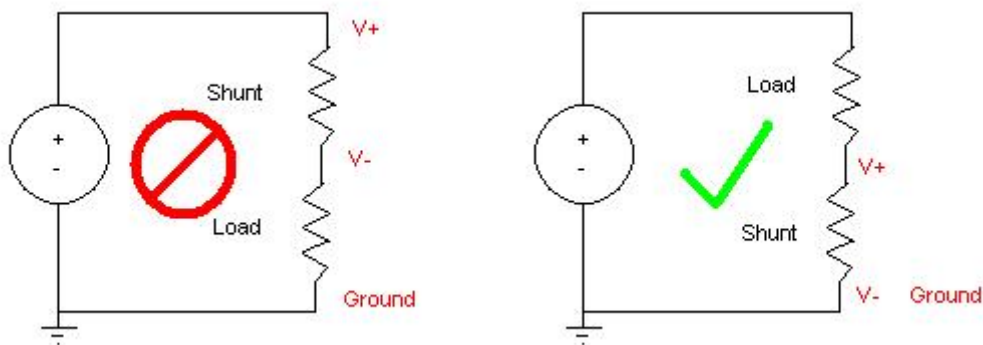


Fig 2-3 7550A Current shunt Placement

## 2-8 Power Up

The following procedure should be followed before applying mains power:

The following procedure should be followed before applying mains power:

- Check that the POWER switch is in the off (O) position
- Check the rear panel voltage selector of the 7550A is correctly set.
- Connect correct AC mains lead to the 7550A
- Turn on (I) the POWER switch.

## 2-9 Bench mounting

The 7550A are equipped with plastic feet and tilt stands in place ready for use as a bench instrument. A side handle is provided for easy portability. see figure 2-4 shows the viewing angle for bench-top use.

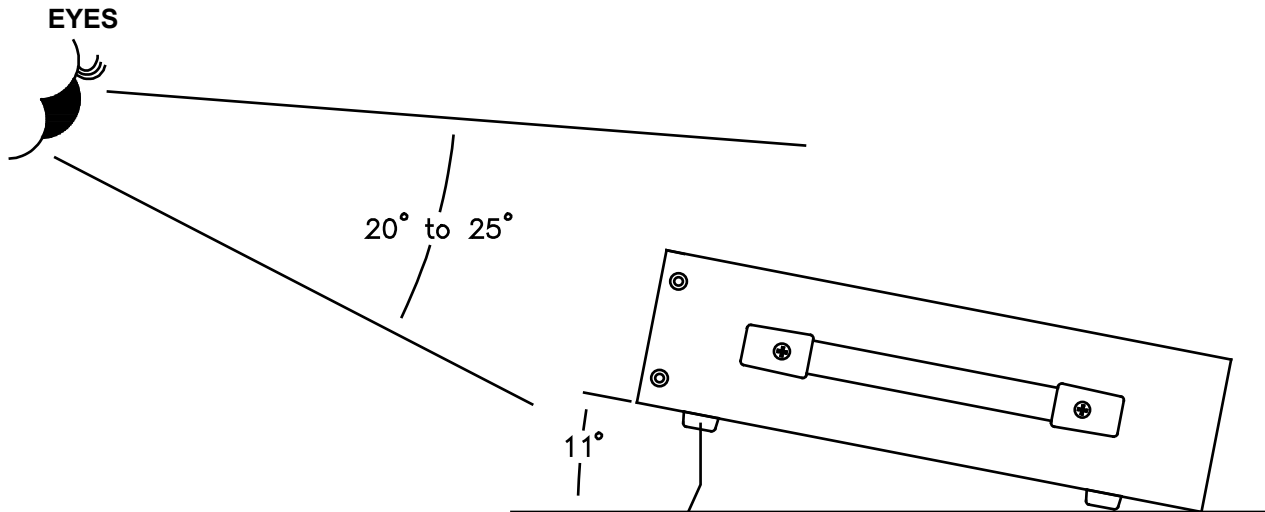


Fig 2-4 The viewing angle for bench-top use

## 2-10 Rack mounting

The instrument may be rack mounted in standard 19 inch EIA rack using the option P/N : 71100170 rack mount kit.

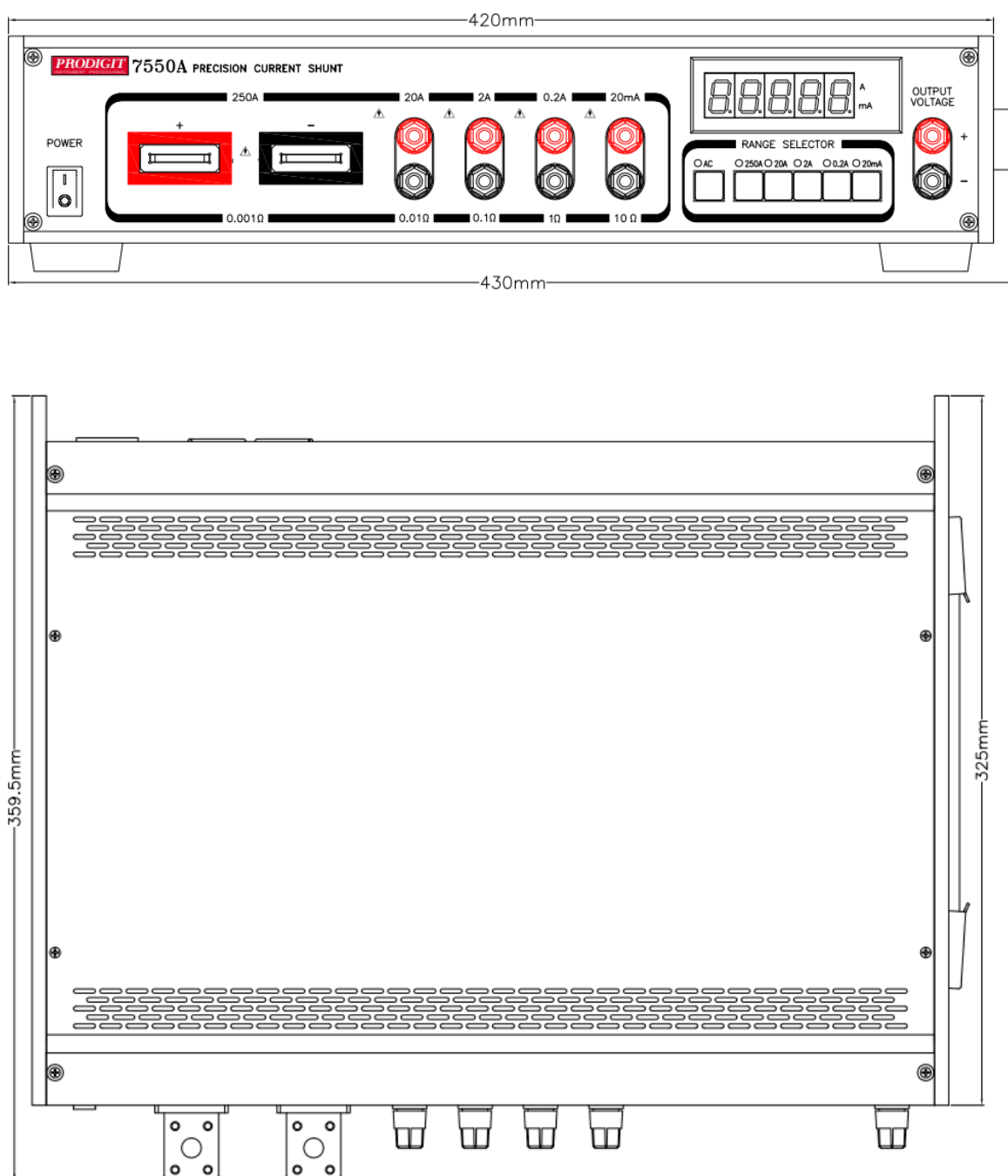
To rack mount, remove the feet and tilt stands from the bottom cover set the instrument with its bottom cover attached into the rack mount frame and fasten it to the rack mount shelf. Use four screws to attach the bottom cover to the rack mount shelf.

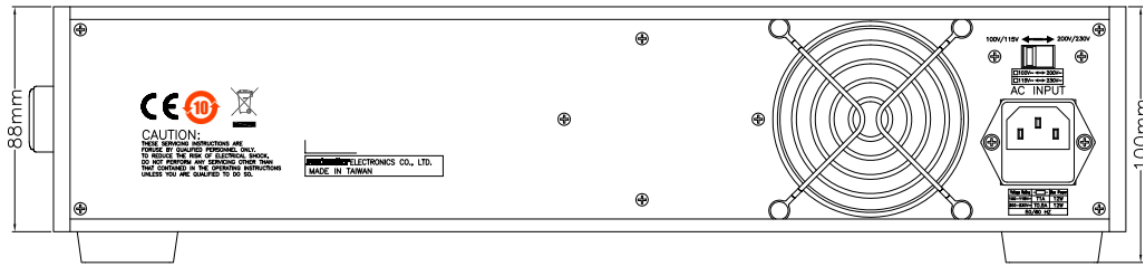
Do not mount the 7550A into a rack where high temperatures or large temperature variations occur. Do not locate the instrument near large magnetic or electrostatic field so as to avoid measurement error.

## Chapter 3 Operation

This chapter describes the front panel function and operation of each 7550A current shunt

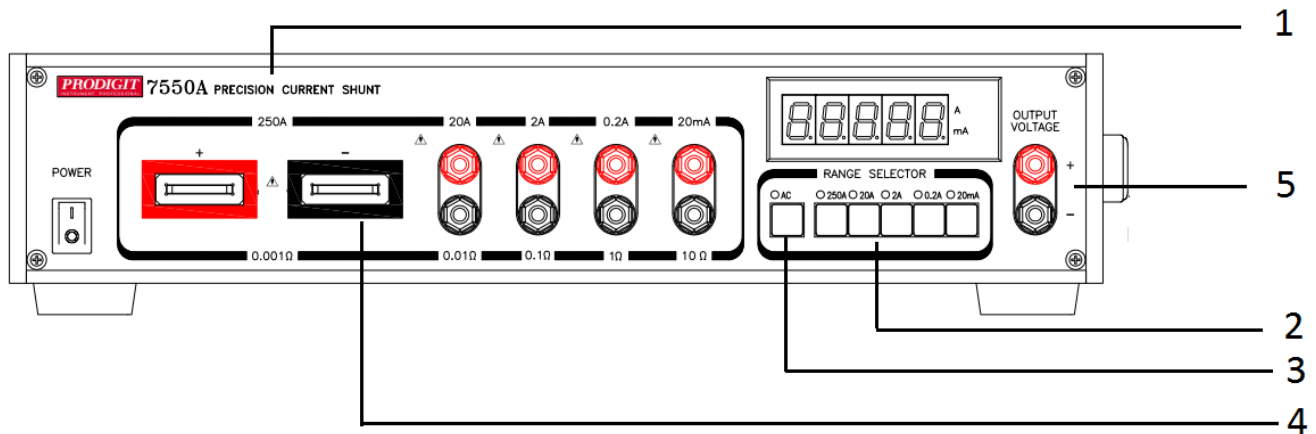
### 3-1. 7550A current shunt Size description





### 3-2. Front panel description

The following sketch shows the layout of the front panel of the unit. Please refer to the relevant section as indicated by the number assigned to a front panel function.



### 3-3. Instructions

#### 3.3.1. Model number and sink ranges

The model number along with maximum current values is detailed in this position  
At the top of the current shunt front panel.

**PRODIGIT** **7550A** PRECISION CURRENT SHUNT  
INSTRUMENT PROFESSIONAL

It indicates the model number and specifications of 7550A Current shunt.

#### 3.3.2. Range Select

There are five operating range, the sequence is 250A, 20A, 2A, 0.2A, 20mA.

Pressing the "250A" key on the 7550A current Shunt, the appropriate LED will illuminate according to the operating range is selected.





Pressing the "20A" key on the 1000A current Shunt, the appropriate LED will illuminate according to the operating range is selected.



Pressing the "2A" key on the 7550A current Shunt, the appropriate LED will illuminate according to the operating range is selected.



Pressing the "0.2A" key on the 7550A current Shunt, the appropriate LED will illuminate according to the operating range is selected.

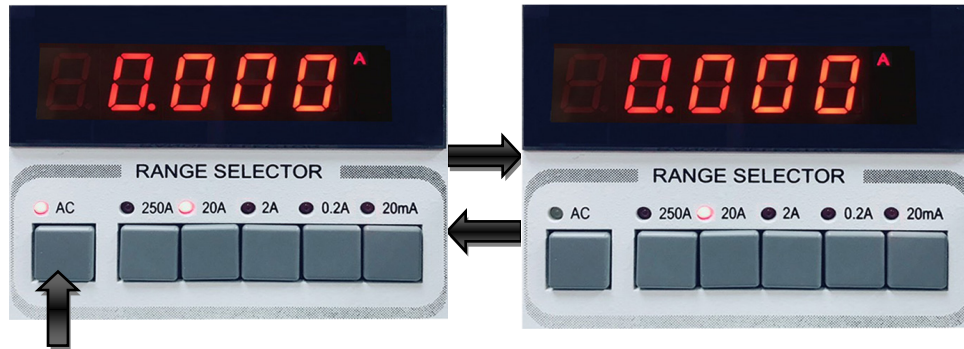


Pressing the "20mA" key on the 7550A current Shunt, the appropriate LED will illuminate according to the operating range is selected.



### 3.3.3. AC/DC Select key

Pressing the "AC/DC" key on the 7550A current Shunt, the appropriate LED will illuminate according to the operating AC or DC mode is selected.



### 3.3.4. Current measurements

The 7550A use a four terminal current shunt configuration. Two terminals (CURRENT INPUT) are connecting the load in series with the front panel terminals of the appropriate current shunt. Note the maximum current limit label on the panel. The RANGE selector key-switch is used to select the voltage sense terminals (VOLTAGE OUTPUT) and the 4 1/2 digit precision current meter. The VOLTAGE OUTPUT sense terminal and the 4 1/2 digit precision current meter are connected directly across the calibration adjustment divider of the shunt resistor selected by the RANGE key-switch.

### 3.3.5. Output

To measuring the load current can "direct reading" from 4 1/2 digit precision AC/DC current meter in normally application. For the higher accuracy & Resolution application, the OUTPUT voltage can be measured with a measuring Device (thermal transfer standard, 6 1/2) precision DVM, etc).

It is not necessary that a load connected to one range be disconnected when Connecting a load to another range as the range key-switch isolates the shunts From one another.


### 3-4. Protect

The protect device (current fuse) protects the 20mA, 200mA and 2A range from an input current greater than 100mA, 1A and 5A. To replace the current fuse, perform the following steps :

1. Turn off the power and disconnect all equipment.
2. Remove the top cover of instrument to replace the fuse. Top cover is removed by removing four screws.
3. Remove the defective fuse and replace it with the recommended fuse. (see table 3-1) or equivalent.

| PRODIGIT PART NO. | REF. | RANGE | DESCRIPTIONS                 |
|-------------------|------|-------|------------------------------|
| 60501080          | F3   | 20 mA | 0.1 A/250 V 5×20mm Slow Blow |
| 60510080          | F2   | 200mA | 1.0 A/250 V 5×20mm Slow Blow |
| 60550081          | F1   | 2 A   | 5.0 A/250 V 5×20mm Slow Blow |

Table 3-1 recommended fuse

 **CAUTION : Use only the recommended fuse type. If a fuse with a higher current rating is installed, instrument damage may occur.**

## Chapter 4 Calibration

### 4.1 Introduction

The 7550A should be calibrated, at intervals best determined by the user. It will be necessary to remove the top cover of instrument to gain access to the calibration adjustments. Top cover is removed by removing six screws. The adjust potentiometer and reference are shown on fig 4-1. There are two circuitry needs to be calibrated : shunt and DAM these calibrations may be performed independently.

### 4.2 Calibration equipment

Calibration equipment requires

1A digital voltmeter with a DC accuracy of 0.005% and AC accuracy of 0.05% on 100mV range.

2A current calibrator with current ranges of 100A, 10A, 0.1A and 0.01A.

An alternative way to calibration the 7550A is to return the instrument to PRODIGIT.

### 4.3 Shunt calibration

You can start to calibrate the 7550A after all equipment is stabilized. Connect the digital voltmeter to the VOLTAGE OUTPUT terminals of the model 7550A. Select its 100 Millie-volt range.

- 4.3.1. Press the key switch to the 20mA position calibrator cables to the 20mA range terminals. Set the current calibrator output for 10mA and adjust VR5 (see fig 4-1) until the DVM reading is the same as the current calibrator output.
- 4.3.2. Press the key switch to the 200mA position, connect the current calibrator cables to the 200mA range terminals. Set the current calibrator output for 100mA and adjust VR4 (see fig 4-1) until the DVM reading is the same as the current calibrator output.
- 4.3.3. Press the key switch to the 2A position, connect the current calibrator cables to the 2A range terminals. Set the current calibrator output for 1A and adjust VR1 (see fig 4-1) until the DVM reading is the same as the current calibrator output.
- 4.3.4. 20A Shunt calibration  
Press the key switch to the 20A position, connect the current calibrator cables to the 20A range terminals. Set the current calibrator output for 10A and adjust VR2 (see fig 4-1) until the DVM reading is the same as the current calibrator output.
- 4.3.5. 250A Shunt calibration  
Press the key switch to the 250A position, connect the current calibrator cables to the 250A range terminals. Set the current calibrator output for 100A and adjust VR3 (see fig 4-1) until the DVM reading is the same as the current calibrator output.

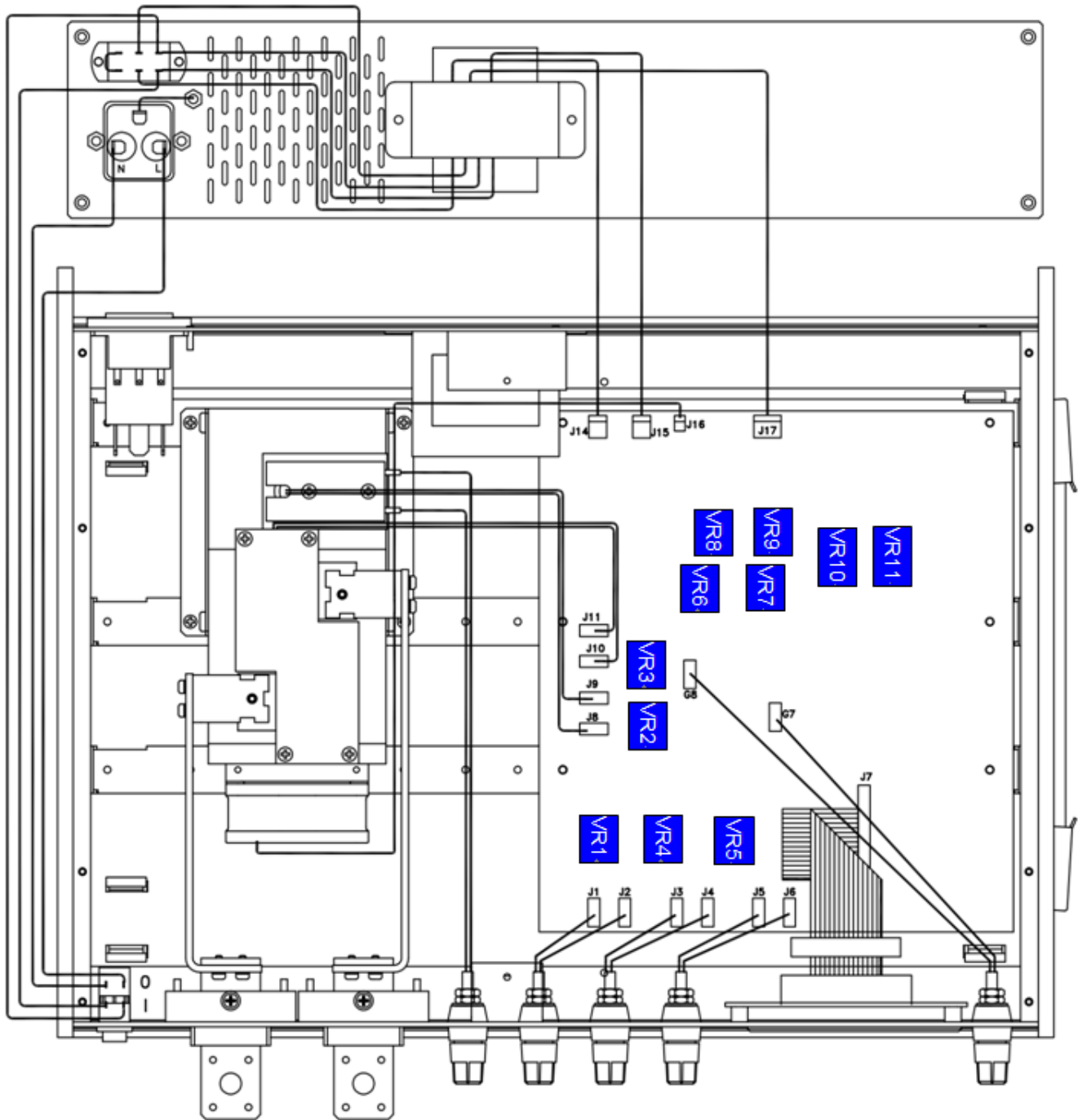


Fig 4-1 Potentiometer layout diagram

## **4.4 DC current meter calibration**

Connect the digital voltmeter to the VOLTAGE OUTPUT output terminals of the model 7550A. Press the key switch to the 20mA position and DC position.

### **4.4.1. OFFSET**

Disconnect all of the CURRENT INPUT input terminals, adjust VR8 (see fig 4-1) until the 4 1/2 digit current meter on the front panel is display 0.000mA.

### **4.4.2. GAIN**

Connect the current calibration cables to the 20mA range terminals, set the current calibrator output for 40mA then the DVM reading is 400.00mV. Adjust VR11 (see fig 4-1) until the 4 1/2 digit current meter reading is 40.00mA of front panel.

Set the current calibrator output for 15.0mA then the DVM reading is 150.000mV. Adjust VR6 (see fig 4-1) until the 4 1/2 digit current meter reading is 15.000mA of front panel.

## **4.5 AC current meter calibration**

Connect the digital AC voltmeter to the VOLTAGE OUTPUT output terminals of the model 7550A. Press the key switch to the 200mA position and AC position.

### **4.5.1. OFFSET**

Disconnect all of the CURRENT INPUT terminals, adjust VR9 (see fig 4-1) until the 4 1/2 digit current meter on the front panel is display 0.000mA.

### **4.5.2. GAIN**

Connect the current calibrator cables to the 2A range terminals, set the current calibrator output for 1000mA then the DVM reading is 1000.00XmV. Adjust VR10 (see fig4-1) until the 4 1/2 digit current meter reading is 1000.0mA of front panel. Disconnect all equipment.

Calibration is now completed.

## Chapter 5 Block diagram

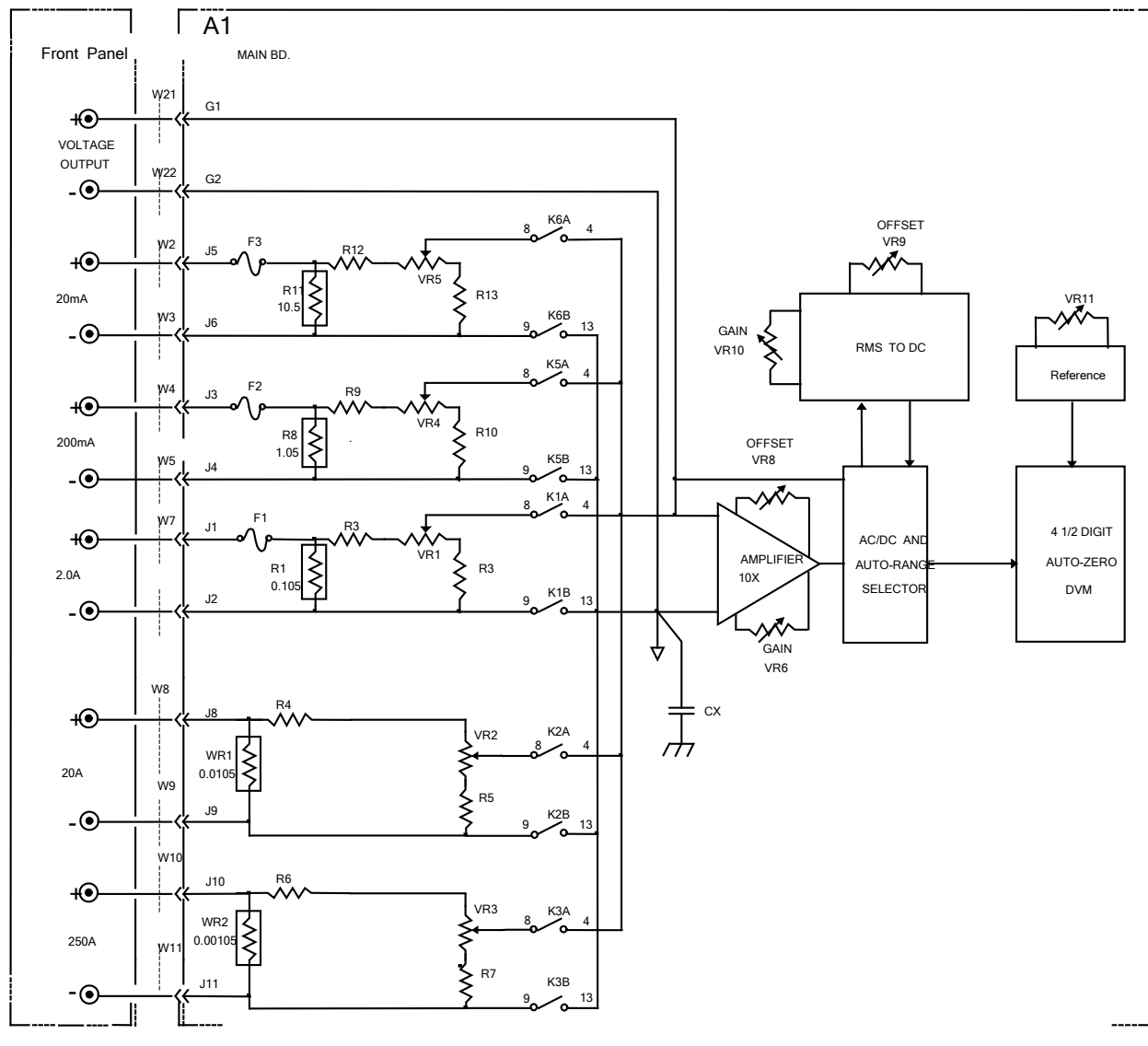


Fig 5-1 7550A Precision current shunt block diagram