PSP

603/ 405/ 2010

Verification/ Adjustment Manual

Table of Contents

How to Use this Manual

This manual describes how to verify and adjust the performance of PSP-603/ 405/ 2010 Programmable Switching D.C. Power Supplies.

Specification, page5, shows PSP electronic and mechanical specifications. It also shows the locations of relevant verification and adjustment procedures in this manual.

Front Panel, page6, describes the front panel switches, terminals, and indicators. The **Default Settings** column shows the basic panel settings applicable to all verification and adjustment items.
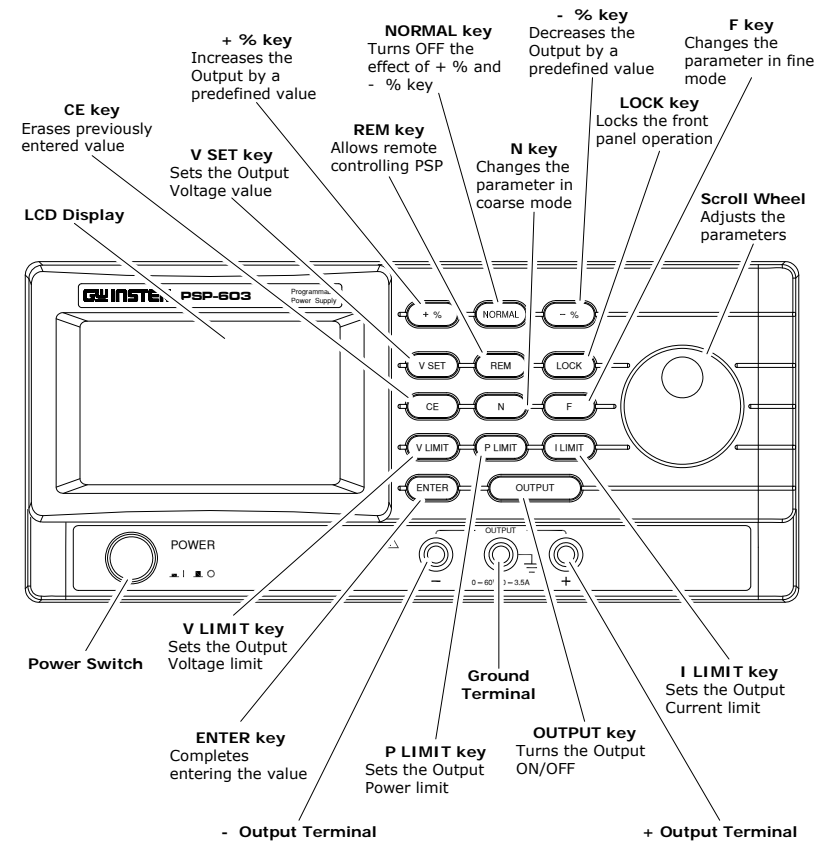
Performance Verification, page7, shows how to verify PSP performance, step by step. Check the necessary equipment and the overall procedure before start working on each item.

Adjustment, page17, shows how to adjust PSP specification. Same as Performance Verification, check the equipment and the overall procedure before start working on each item.

Specification

Output				Verification	Adjustment
	PSP-603	PSP-405	PSP-2010		
Voltage	0 ~ 60V	0 ~ 40V	0 ~ 20V	Page8	Page19
Current	0 ~ 3.5A	0 ~ 5A	0 ~ 10A	Page9	Page20
Voltage Regulation				Verification	Adjustment
Load	≤ 10mV			Page12	—
Line	≤ 0.05%			—	—
Current Regulation				Verification	Adjustment
Load	≤ 5mA			Page10	—
Line	≤ 0.05%			—	—
Ripple				Verification	Adjustment
Voltage	≤ 20mVrms			Page14	—
Current	≤ 10mArms			—	—
Resolution				Verification	Adjustment
Voltage	20mV (PSP-603) 10mV (PSP-405/ PSP-2010)			—	—
Current	2mA (PSP-603/ PSP-405) 5mA (PSP-2010)			—	—
Program Accuracy				Verification	Adjustment
Voltage	≤ 0.05% rdg + 20mV			—	Page19
Current	≤ 0.1% rdg + 5 digits (PSP-603/ PSP-405) ≤ 0.3% rdg + 10 digits (PSP-2010)			—	Page20
Readback (METER) Resolution				Verification	Adjustment
Voltage	20mV (PSP-603) 10mV (PSP-405/ PSP-2010)			—	—
Current	2mA (PSP-603/ PSP-405) 5mA (PSP-2010)			—	—
Readback (METER) Accuracy				Verification	Adjustment
Voltage	≤ 0.05% rdg + 20mV			—	—
Current	≤ 0.1% rdg + 5 digits (PSP-603/ PSP-405) ≤ 0.3% rdg + 10 digits (PSP-2010)			—	—
Protection				Verification	Adjustment
OVP/ OCP/ OPP/ OTP				—	—
Power Source				Verification	Adjustment
AC 115V ±10%/ 230V ±15%, 50/ 60Hz				—	—
Dimensions & Weight				Verification	Adjustment
225(W) x 100(H) x 305(D) mm, 4kg				—	—
Others				Verification	Adjustment
Output ON/OFF Control, RS-232C Interface, LCD Display				—	—

Front Panel

+ % key Increases the Output by a predefined value

NORMAL key Turns OFF the effect of + % and - % key

- % key Decreases the Output by a predefined value

F key Changes the parameter in fine mode

CE key Erases previously entered value

REM key Allows remote controlling PSP

N key Changes the parameter in coarse mode

LOCK key Locks the front panel operation

V SET key Sets the Output Voltage value

Scroll Wheel Adjusts the parameters

LCD Display

Power Switch

V LIMIT key Sets the Output Voltage limit

ENTER key Completes entering the value

P LIMIT key Sets the Output Power limit

Ground Terminal

OUTPUT key Turns the Output ON/OFF

I LIMIT key Sets the Output Current limit

- Output Terminal

+ Output Terminal

Performance Verification

Overall Procedure

1. Prepare the Equipment according to the following table.

2. Verify a specification item and record the result (page8 to page14). The *Recording Table* is at the end of this chapter (page16).

3. Repeat step 2 for all items.

4. In case of over- or under-specification, continue with the relevant item in the *Adjustment* chapter (page17).

Verification Equipment

Equipment	Required Specification	Used in	Recommended Model
Digital Multimeter	• AC & DC Voltage Accuracy: < ±0.1% • DC Current Range: > 10A • DC Current Accuracy: <±0.1%	All items	• GDM-8245 • GDM-8246
Electronic Load	• DC Voltage Range: > 60V • DC Current Range: > 10A • CV, CC, CR Mode • Short Mode	• Current Load Regulation • Voltage Load Regulation • Ripple Voltage	• Agilent N3305A
AC Power Supply	• Capacity: ≥ 1k VA • Frequency: 50 – 60Hz • Line Voltage: ±15%	• Ripple Voltage	• APS-9102 • Agilent 6813B
PSP – Multimeter cable	• Voltage rating: > 60V • Current rating: > 6A	All items	—
PSP – Electronic Load cable	• Voltage rating: > 60V • Current rating: > 6A	• Current Load Regulation • Voltage Load Regulation • Ripple Voltage	—
Calculator	• For calculating the acceptance ranges	All items	—

Output Voltage Verification

Here we verify the accuracy of Minimum and Maximum Output Voltage.
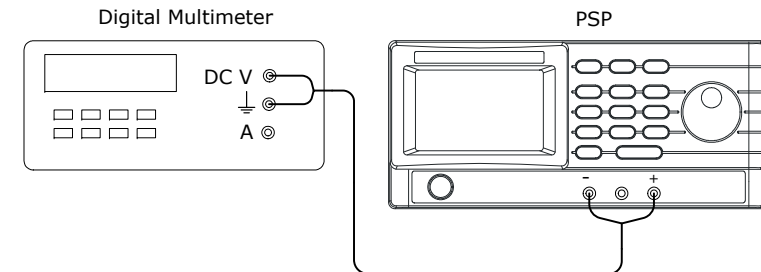
Connection

Verification steps

1. Connect the Multimeter and turn ON the Output.

2. Set the Output Voltage to the minimum level.

3. Set the Output Current to the maximum level.

4. Record the difference between Multimeter and PST readout as Minimum Output Voltage Accuracy.

5. Set the Output Voltage to the maximum level.

6. Record the difference between Multimeter and PST readout as Maximum Output Voltage Accuracy.

Acceptance range

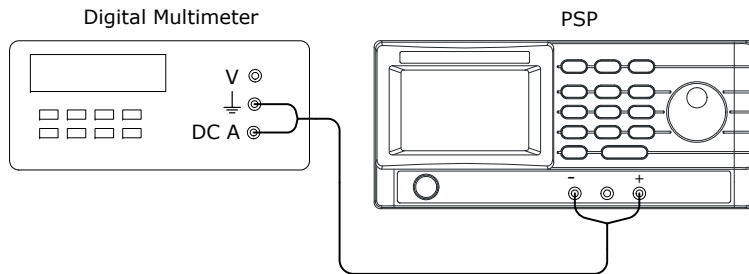|	PSP-603	PSP-405	PSP-2010
Minimum Output Voltage Accuracy	±10mV	±10mV	±10mV
Maximum Output Voltage Accuracy	±10mV	±10mV	±10mV

When out of range…

Refer to *Output Voltage Adjustment*, page19.

Output Current Verification

Here we verify the accuracy of Minimum and Maximum Output Current.

Connection

Verification steps

1. Connect the Multimeter and turn ON the Output.

2. Set the Output Current to the minimum level.

3. Set the Output Voltage to the maximum level.

4. Record the difference between Multimeter and PST readout as Minimum Output Current Accuracy.

5. Set the Output Current to the maximum level.

6. Record the difference between Multimeter and PST readout as Maximum Output Current Accuracy.

Acceptance range

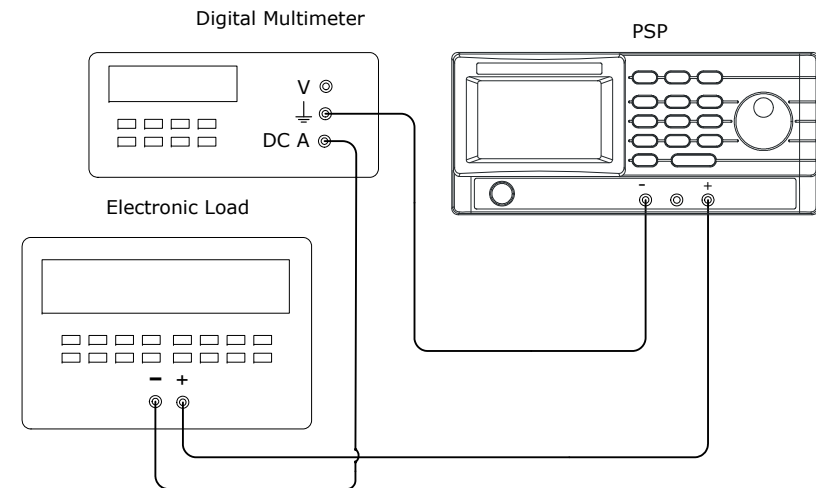|	PSP-603	PSP-405	PSP-2010
Minimum Output Current Accuracy	±1mA	±1mA	±1mA
Maximum Output Current Accuracy	±1mA	±1mA	±1mA

When out of range...

Refer to *Output Current Adjustment*, page20.

Current Load Regulation Verification

Here we verify the amount of Output Current change when the load fluctuates.

Connection

Connect the Digital Multimeter in series with the Electronic Load and PSP.

PSP & Electronic Load Settings

PSP-603	PSP-405	PSP-2010
60V, 3.5A	40V, 5A	20V, 10A

Verification steps

1. Connect the Multimeter and Electronic Load and turn ON the Output.
2. Set the Electronic Load level according to the Settings table on the previous page and turn ON the load.
3. Set the PSP Output Voltage and Current according to the Settings table on the previous page.
4. Record the Multimeter readout.
5. Short the Electronic Load.
6. Record the Multimeter readout.
7. Calculate the difference between the previous Multimeter readout and record it as Current Load Regulation.
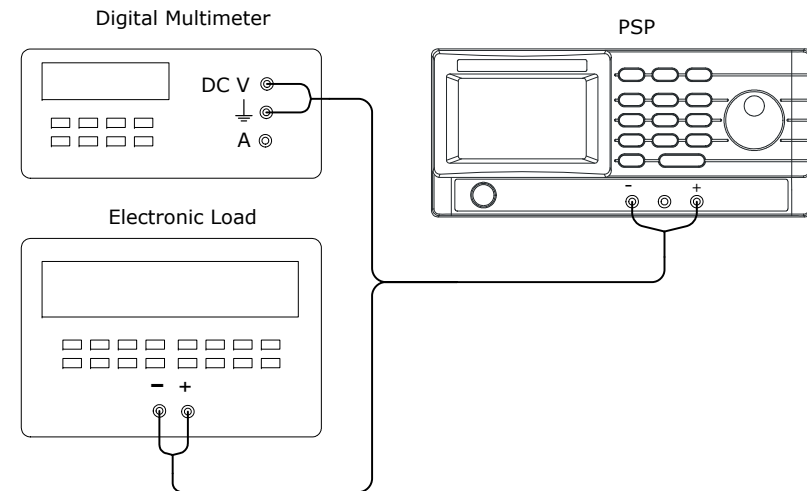
Acceptance range

PSP-603	PSP-405	PSP-2010
≤ 5mA	≤ 5mA	≤ 5mA

Voltage Load Regulation Verification

Here we verify the amount of Output Voltage change when the load fluctuates.

Connection

PSP & Electronic Load Settings

PSP-603	PSP-405	PSP-2010
60V, 3.5A	40V, 5A	20V, 10A

Verification steps

1. Connect the Multimeter and Electronic Load and turn ON the Output.
2. Set the Electronic Load level according to the Settings table on the previous page and turn ON the load.
3. Set the PSP Output Voltage and Current according to the Settings table on the previous page.
4. Record the Multimeter readout.
5. Turn OFF the Electronic Load.
6. Record the Multimeter readout.
7. Calculate the difference between the previous Multimeter readout and record it as Voltage Load Regulation.
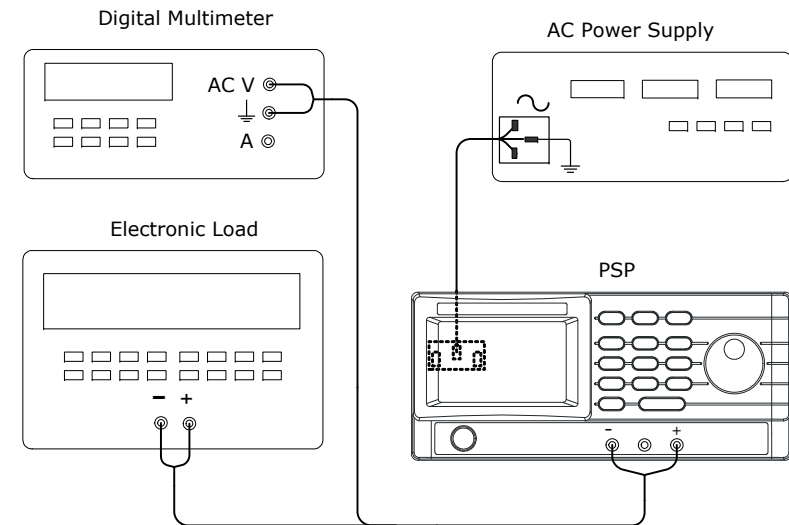
Acceptance range

PSP-603	PSP-405	PSP-2010
≤ 10mV	≤ 10mV	≤ 10mV

Ripple Voltage Verification

Here we verify the amount of AC Ripple Voltage when the power source fluctuates.

Connection

PSP & Electronic Load Settings

PSP-603	PSP-405	PSP-2010
60V, 3.5A	40V, 5A	20V, 10A

AC Power Supply Settings

230V rating	115V rating
−15%, 50Hz	−10%, 50Hz
+15%, 50Hz	+10%, 50Hz
−15%, 60Hz	−10%, 60Hz
+15%, 60Hz	+10%, 50Hz

Verification steps

1. Connect the Multimeter and Electronic Load and turn ON the Output.

2. Set the Electronic Load level according to the Settings table on the previous page and turn ON the load.

3. Set the PSP Output Voltage and Current according to the Settings table on the previous page.

4. Check the Power Supply Select Switch on the rear panel for Power Supply Voltage Rating.

5. Set AC Power Supply Output to the top setting in the previous page's table.

6. Record the Multimeter readout (AC Voltage).

7. Repeat step 5 and 6 for the rest of the AC Power Supply Output settings.

8. Pick up the largest value of the four as Ripple Voltage.

Acceptance range

PSP-603	PSP-405	PSP-2010
≤ 20mV	≤ 20mV	≤ 20mV

Recording Table

☐PSP-603 ☐PSP-405 ☐PSP-2010

Minimum Output Voltage	Multimeter	PSP	Multimeter − PSP	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

Maximum Output Voltage	Multimeter	PSP	Multimeter − PSP	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

Minimum Output Current	Multimeter	PSP	Multimeter − PSP	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

Maximum Output Current	Multimeter	PSP	Multimeter − PSP	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

Current Load Regulation	Multimeter Load ON	Multimeter Load Short	Load ON − Short	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

Voltage Load Regulation	Multimeter Load ON	Multimeter Load OFF	Load ON − OFF	Pass/ Fail	Note
	V	V	mV	☐P ☐F	

| Ripple Voltage	AC Power	Multimeter	Largest	Pass/ Fail	Note
	−15/10%,50Hz	mV	☐		
	+15/10%,50Hz	mV	☐	☐P ☐F	
	−15/10%,60Hz	mV	☐		
	+15/10%,60Hz	mV	☐		

Adjustment

Overall Procedure

1. Prepare the Equipment according to the following table.

2. Adjust the specifications according to your needs (page19 to 20).

3. When the adjustment is completed, run the *Performance Verification* again to verify the result (page7).

Adjustment Equipment

| Equipment	Required Specification	Used in	Recommended Model
Digital Multimeter	• AC & DC Voltage Accuracy: < ±0.1% • DC Current Range: ≥ 6A • DC Current Accuracy: <±0.1%	All items	• GDM-8245 • GDM-8246
PSP – Multimeter cable	• Voltage rating: > 60V • Current rating: > 6A	All items	—
Flathead Screw Driver Small	• 1.5mm • For adjustment	All items	—
Phillips Screw Driver Large	• 3mm/ 4mm • For opening the case	All items	—

Opening the Case

1. Take off four screws, 3x6mm, on the side panels.

2. Take off two screws, 3x6mm, on the top of the rear panel.
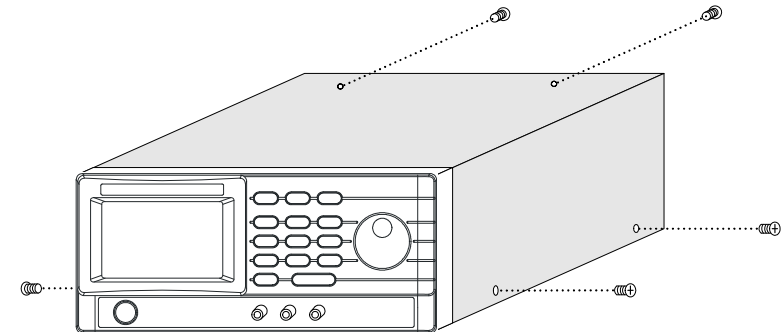
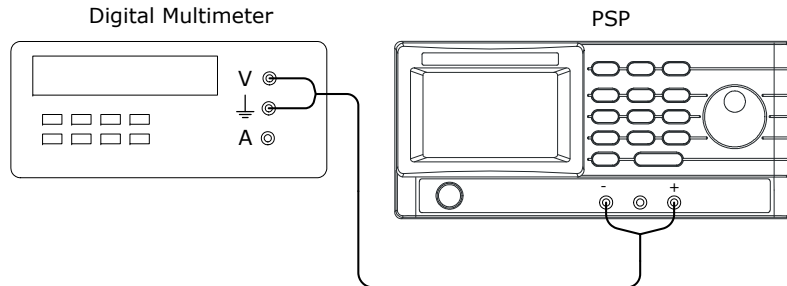3. Hold the case, slide it behind, and pull it off upward.
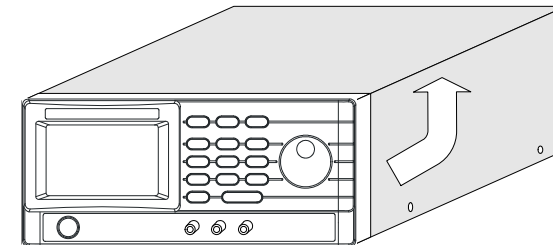
Adjustment Point
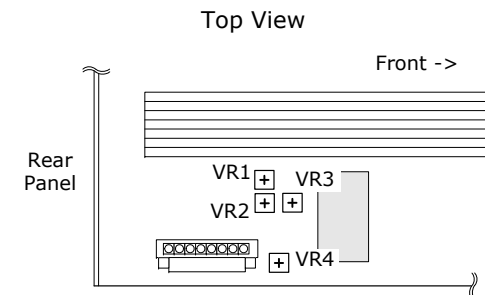
Output Voltage Adjustment

Here we adjust the accuracy of Minimum and Maximum Output Voltage.

Connection

Digital Multimeter   PSP

Adjustment steps

1. Connect the Multimeter. Turn ON the Power key and (VSET) key **together** and **keep pressing** (VSET) key.

2. The display will show ⎓⎓⎓⎓ (SAVE) message with a buzzer sound.

3. Set the Output Voltage to the minimum level.

4. Set the Output Current to the maximum level.

5. Adjust VR2 to bring the Multimeter readout close to PSP. For VR location, refer to page18.

6. Set the Output Voltage to the maximum level.

7. Adjust VR4 to bring the Multimeter readout close to PSP.
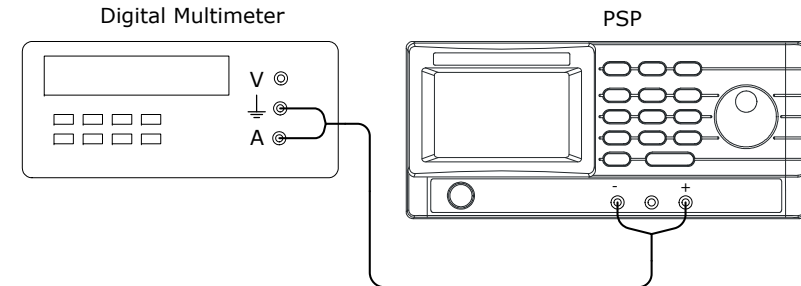
8. Press (ENTER) key to finish adjustment.

Acceptance Range

	PSP-603	PSP-405	PSP-2010
Minimum Output Voltage Accuracy	±10mV	±10mV	±10mV
Maximum Output Voltage Accuracy	±10mV	±10mV	±10mV

Output Current Adjustment

Here we adjust the accuracy of Minimum and Maximum Output Current.

Connection

Digital Multimeter   PSP

Adjustment steps

1. Connect the Multimeter. Turn ON the Power key and (VSET) key **together** and **keep pressing** (VSET) key.

2. The display will show ⎓⎓⎓⎓ message with a buzzer sound.

3. Set the Output Voltage to the minimum level.

4. Set the Output Current to the maximum level.

5. Adjust VR1 to bring the Multimeter readout close to PSP. For VR location, refer to page18.

6. Set the Output Voltage to the maximum level.

7. Adjust VR3 to bring the Multimeter readout close to PSP.

8. Press (ENTER) key to finish adjustment.

Acceptance Range

	PSP-603	PSP-405	PSP-2010
Minimum Output Current Accuracy	±1mA	±1mA	±1mA
Maximum Output Current Accuracy	±1mA	±1mA	±1mA