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Series 2200 Multichannel Power Supplies
Quick Start Front Panel and Programming Operation Guide

Introduction

This operating guide describes front panel operation and corresponding SCPI command code to perform essential functions of the model 2230-30-1 Triple Channel Power Supply and the model 2220-30-1 Dual Channel Power Supply. References to the third channel specifically apply to the model 2230-30-1 triple channel power supply.

Single Channel Operation

The series 2200 multichannel power supplies have all channels enabled in their default state. However, any channel can be disabled and enabled independently. The following example demonstrates the steps to enable and output a voltage on channel 2.

Front Panel Operation

STEP 1 Enabling Channel 2
1. Press Menu.
2. Use the arrow keys or the navigation wheel to select **Enable Channels**.
3. Press Enter to enter the submenu.
4. Use the arrow keys or the navigation wheel to select **Enable/Disable CH2**.
5. Press Enter to enter the submenu.
6. Use the arrow keys or the navigation wheel to select **Enable CH2 (default).**
7. Press Enter to enable channel 2.
8. Press Esc a couple of times to return to the main display.

STEP 2 Setting the Output Voltage on Channel 2
9. Press CH2.
10. Press V-Set.
11. Use the arrow keys, numeric keypad, or the navigation wheel to enter the desired voltage output value. If using the arrow keys or the navigation wheel, use the left arrow key to highlight the digit that represents the resolution for adjustments.
12. Press Enter to set the voltage.

STEP 3 Setting the Current Limit on Channel 2
13. Press I-Set.
14. Use the arrow keys, numeric keypad, or the navigation wheel to enter the current limit. If using the arrow keys or the navigation wheel, use the left arrow key to highlight the digit that represents the resolution for adjustments.
15. Press Enter to set the current.

STEP 4 Turning on the Output
16. Press Output On/Off to turn on the output.

Remote Operation

The following SCPI command example enables channel 2, sets the voltage output to 2.22V, the current limit to 1.5A and turns the output on.

```
INST:SEL CH2
SOURCE:OUTP:ENAB ON
SOURCE:VOLT 2.22V
SOURCE:CURR 1.5A
SOURCE:OUTP ON
```

Combining Channels 1 and 2 in Series to Output More than 30V

The series 2200 multichannel power supplies have all channels isolated in their default state. However, channel 1 and channel 2 can be combined in series to output a higher total voltage. The following example demonstrates the steps to enable and output a combined voltage from channel 1 and 2.

Front Panel Operation

STEP 1 Configure the Instrument to Series Combination
1. Press Menu.
2. Use the arrow keys or the navigation wheel to select **Combine CH1+CH2**.
3. Press Enter to enter the submenu.
4. Use the arrow keys or the navigation wheel to select **V1+V2 Series**.
5. Press Enter to set to series combination. See an example of a series combination front panel display below.

STEP 2 Setting the Voltage Output and the Current Limit
6. Press CH1.
7. Press V-Set.
8. Use the arrow keys, numeric keypad, or the navigation wheel to enter the voltage output.
9. Press Enter to set the voltage of the combined channels.
10. Press I-Set.
11. Use the arrow keys, numeric keypad, or the navigation wheel to enter the current limit.
12. Press Enter to set the current of the combined channel.

STEP 3 Turning on the Output
13. Press Output On/Off to turn on the output.

Remote Operation

The following SCPI command example configures the power supply for the series combination mode, sets the voltage output to 36V, the current limit to 1.5A and turns the output on.

```
*RST
INST:COM:SER
SOURCE:VOLT 36V
SOURCE:CURR 1.5A
SOURCE:OUTP ON
```

Wiring Channels 1 and 2 in Series to the DUT

Connect two wires from either the front panel binding posts or the rear panel terminals, as shown in Figure 1 below, to your device under test (DUT). The SENSE lines are optional (rear panel only) and are used in a remote sense connection.
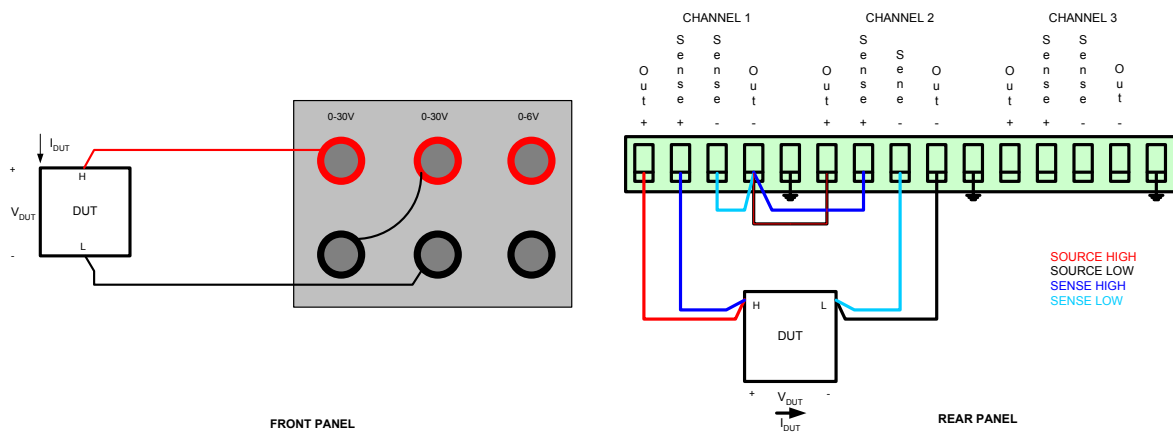

Figure 1 Connecting a Device in Series Combination on the Front Panel and the Rear Panel

Combining Channels 1 and 2 in Parallel to Output More than 1.5A

The series 2200 multichannel power supplies have all channels isolated in their default state. However, channel 1 and channel 2 can be combined in parallel to output a higher total current. The following example demonstrates the steps to enable and output a combined current from channel 1 and 2.

Front Panel Operation

STEP 1 Configure the Instrument to Parallel Combination
1. Press Menu.
2. Use the arrow keys or the navigation wheel to select **Combine CH1+CH2**.
3. Press Enter to enter the submenu.
4. Use the arrow keys or the navigation wheel to select **I1+I2 Parallel**.

5. Press Enter to set to parallel combination.   See an example of a parallel combination front panel display below.

STEP 2 Setting the Voltage Output and the Current Limit

6. Press CH1.
7. Press V-Set.
8. Use the arrow keys, numeric keypad, or the navigation wheel to enter the voltage output.
9. Press Enter to set the voltage of the combined channel.
10. Press I-Set.
11. Use the arrow keys, numeric keypad, or the navigation wheel to enter the current limit.
12. Press Enter to set the current of the combined channel.

STEP 3 Turning on the Output

13. Press Output On/Off.

Remote Operation

The following SCPI command example configures the power supply for the parallel combination mode, sets the voltage output to 30V, the current limit to 2.9A and turns the output on.

```
*RST
INST:COM:PARA
SOURCE:VOLT 30V
SOURCE:CURR 2.9A
SOURCE:OUTP ON
```

Wiring Channels 1 and 2 in Parallel to the DUT

Connect two wires from either the front panel binding posts or the rear panel terminals, as shown in Figure 2 below, to your DUT. The SENSE lines are optional (rear panel only) and are used in a remote sense connection.
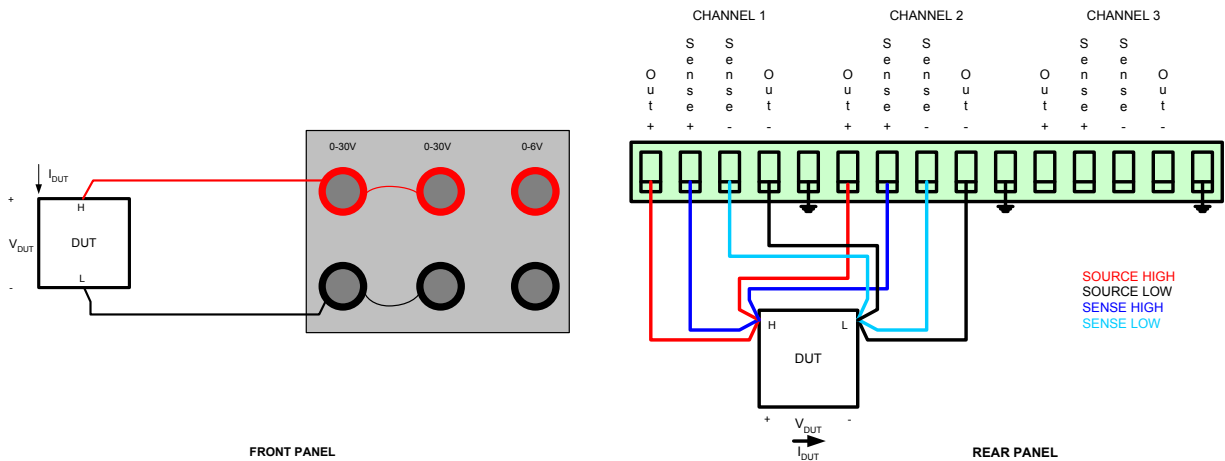
Figure 2 Connecting a Device in Parallel Combination on the Front Panel and the Rear Panel

Track Mode – Changing the Channel 1 and 2 Voltages at the Same Time

The series 2200 multichannel power supplies offer a track mode feature that allows channel 1 and 2 voltages to maintain a desired ratio whenever channel 1 or channel 2 voltages are modified. The following example demonstrates the steps to enable track mode operation.

Front Panel Operation

STEP 1 Configure CH1 and CH2 voltages to the desired ratio

1. Press CH1.
2. Press V-Set.
3. Use the arrow keys, numeric keypad, or the navigation wheel to enter a voltage output (e.g. 10V).
4. Press Enter to set the voltage of the combined channel.
5. Press I-Set.
6. Use the arrow keys, numeric keypad, or the navigation wheel to enter a current limit (e.g. 1.5A).
7. Press Enter to set the current of the combined channel.
8. Press CH2.
9. Press V-Set.
10. Use the arrow keys, numeric keypad, or the navigation wheel to enter a voltage output based on a ratio for the desired change between the channels. Set channel 1 and 2 voltages to the same value so that both channel voltages change by the same amount (e.g. set channel 2 to 10V). To have channel 2 change by ½ of the voltage change of channel 1, set the channel 2 voltage to ½ the voltage of channel 1 (e.g. 5V).
11. Press Enter to set the voltage of the channel 2.
12. Press I-Set.
13. Use the arrow keys, numeric keypad, or the navigation wheel to enter a current limit (e.g. 1.5A).
14. Press Enter to set the current of channel 2.

STEP 2 Configure the Instrument Track Mode
15. Press Menu.
16. Use the arrow keys or the navigation wheel to select **Track CH1/CH2**.
17. Press Enter to enter the submenu.
18. Use the arrow keys or the navigation wheel to select **Track On**.
19. Press Enter to activate the track mode.   See an example of track mode front display below.

STEP 3 Turning on the Output
20. Press Output On/Off to turn on the output. Now varying the voltage on channel 1 or the channel 2 voltage will change the other channel by the desired ratio.

Remote Operation

The following SCPI command example sets CH1 voltage output to 10V, the current limit to 1.5A, CH2 voltage output to track half of CH1's value, or 5V, the current limit to 1.5A, enables the track mode and turns the output on.

```
*RST
INST:SEL CH1
SOURCE:VOLT 10V
SOURCE:CURR 1.5A
INST:SEL CH2
SOURCE:VOLT 5V
SOURCE:CURR 1.5A
INST:COM:TRAC
SOURCE:OUTP ON
…
<the following example steps CH1 voltages from
2V to 10V at 2V increment.  Observe CH2
voltage varying from 1V to 5Vat 1V increment
on the front panel>
INST:SEL CH1
SOURCE:VOLT 2V
..<delay>
SOURCE:VOLT 4V
..<delay>
SOURCE:VOLT 6V
..<delay>
SOURCE:VOLT 8V
..<delay>
```

```
SOURCE:VOLT 10V
..<delay>
```

Connecting a Device in Track Mode to Create a Bipolar Supply

Connect two wires from either the front panel binding posts or the rear panel terminals, as shown in Figure 3 below, to your DUT. The SENSE lines are optional (rear panel only) and are used in a remote sense connection.
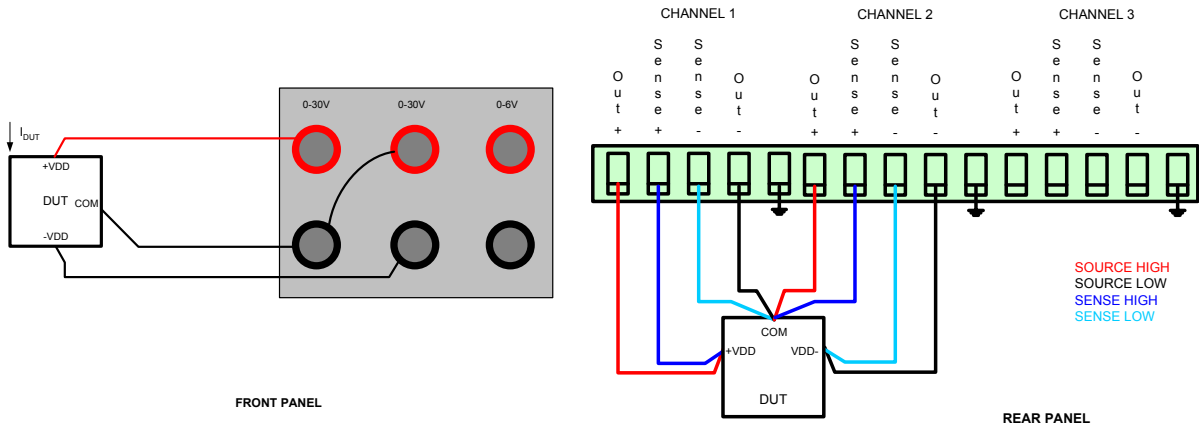

Figure 3 Connecting a Device in Track Mode on the Front Panel and the Rear Panel

Turning On Multiple Channels Sequentially

The Series 2200 multichannel power supplies have all channels enabled in its default state. The following example demonstrates the steps to output a voltage on each channel sequentially, CH1 (3V) -> CH2 (9V) -> CH3 (5V) , and to turn off each output sequentially, CH3->CH2->CH1. This example assumes that all channels are disabled on a 2230-30-1.
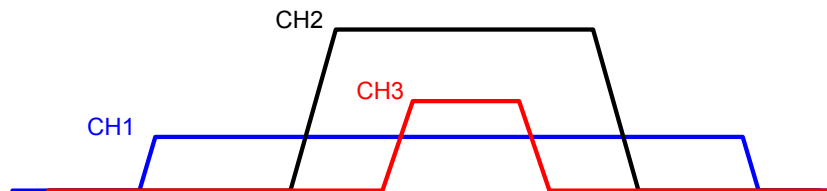
Front Panel Operation

STEP 1 Configuring the Output Voltages and Current Limit on each channel

1. Press CH1.
2. Press V-Set.
3. Use the arrow keys, numeric keypad, or the navigation wheel to enter the desired voltage output value, or 3V in this example.
4. Press Enter to set the voltage.
5. Press I-Set.
6. Use the arrow keys, numeric keypad, or the navigation wheel to enter a current limit.

7. Press Enter to set the current.
8. Press CH2.
9. Press V-Set.
10. Use the arrow keys, numeric keypad, or the navigation wheel to enter the desired voltage output value, or 9V in this example.
11. Press Enter to set the voltage.
12. Press I-Set.
13. Use the arrow keys, numeric keypad, or the navigation wheel to enter a current limit.
14. Press Enter to set the current.
15. Press CH3.
16. Press V-Set.
17. Use the arrow keys, numeric keypad, or the navigation wheel to enter the desired voltage output value, or 5V in this example.
18. Press Enter to set the voltage.
19. Press I-Set.
20. Use the arrow keys, numeric keypad, or the navigation wheel to enter a current limit.
21. Press Enter to set the current.

STEP 2 Enabling Channel 1

22. Press Menu.
23. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
24. Press Enter to enter the submenu.
25. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH1**.
26. Press Enter to enter the submenu.
27. Use the arrow keys, or the navigation wheel to select **Enable CH1 (default).**
28. Press Enter to enable channel 1.
29. Press Esc a couple of times to return to the main display.

STEP 3 Turning on the Output

30. Press Output On/Off.

STEP 4 Enabling Channel 2

31. Press Menu.
32. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
33. Press Enter to enter the submenu.
34. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH2**.
35. Press Enter to enter the submenu.
36. Use the arrow keys or the navigation wheel to select **Enable CH2 (default).**
37. Press Enter to enable channel 2 and output channel 2's configured voltage.
38. Press Esc a couple of times to return to the main display.

STEP 5 Enabling Channel 3

39. Press Menu.
40. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
41. Press Enter to enter the submenu.
42. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH3**.
43. Press Enter to enter the submenu.
44. Use the arrow keys, or the navigation wheel to select **Enable CH3** (default).

45. Press Enter to enable channel 3 and output channel 3's configured voltage.
46. Press Esc a couple of times to return to the main display.

STEP 6 Disabling Channel 3

47. Press Menu.
48. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
49. Press Enter to enter the submenu.
50. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH3**.
51. Press Enter to enter the submenu.
52. Use the arrow keys, or the navigation wheel to select **Disable CH3**.
53. Press Enter to disable channel 3 and turn off channel 3's output voltage.
54. Press Esc a couple of times to return to the main display.

STEP 7 Disabling Channel 2

55. Press Menu.
56. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
57. Press Enter to enter the submenu.
58. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH2**.
59. Press Enter to enter the submenu.
60. Use the arrow keys, or the navigation wheel to select **Disable CH2**.
61. Press Enter to disable channel 2 and turn off channel 2's output voltage.
62. Press Esc a couple of times to return to the main display.

STEP 8 Disabling Channel 1

63. Press Menu.
64. Use the arrow keys, or the navigation wheel to select **Enable Channels**.
65. Press Enter to enter the submenu.
66. Use the arrow keys, or the navigation wheel to select **Enable/Disable CH1**.
67. Press Enter to enter the submenu.
68. Use the arrow keys, or the navigation wheel to select **Disable CH1**.
69. Press Enter to disable channel 1 and turn off channel 1's output voltage.
70. Press Esc a couple of times to return to the main display.

Remote Operation

The following SCPI command example assumes that all channels are disabled. The command sequence sets the voltage output to 3V, 9V and 5V on CH1, CH2 and CH3, respectively, sets all the current limits to 1.5A, turns the output on sequentially from CH1 to CH2 to CH3 and turns off each output from CH3 to CH2 to CH1.

```
INST:SEL CH1
SOURCE:VOLT 3V
SOURCE:CURR 1.5A
INST:SEL CH2
SOURCE:VOLT 9V
SOURCE:CURR 1.5A
```

```
INST:SEL CH3
SOURCE:VOLT 5V
SOURCE:CURR 1.5A

INST:SEL CH1
SOURCE:OUTP:ENAB ON
SOURCE:OUTP ON
..<insert desired amount of delay between channel 1 turn on and channel 2 turn on using
the appropriate command syntax of the programming environment>…
INST:SEL CH2
SOURCE:OUTP:ENAB ON
..<insert desired amount of delay between channel 2 turn on and channel 3 turn on using
the appropriate command syntax of the programming environment>…
INST:SEL CH3
SOURCE:OUTP:ENAB ON
…
<perform tests on the load>
…
INST:SEL CH3
SOURCE:OUTP:ENAB OFF
..<insert desired amount of delay between channel 3 turn off and channel 2 turn off
using the appropriate command syntax of the programming environment>…
INST:SEL CH2
SOURCE:OUTP:ENAB OFF
..<insert desired amount of delay between channel 2 turn off and channel 1 turn off
using the appropriate command syntax of the programming environment>…
INST:SEL CH1
SOURCE:OUTP:ENAB OFF
```

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