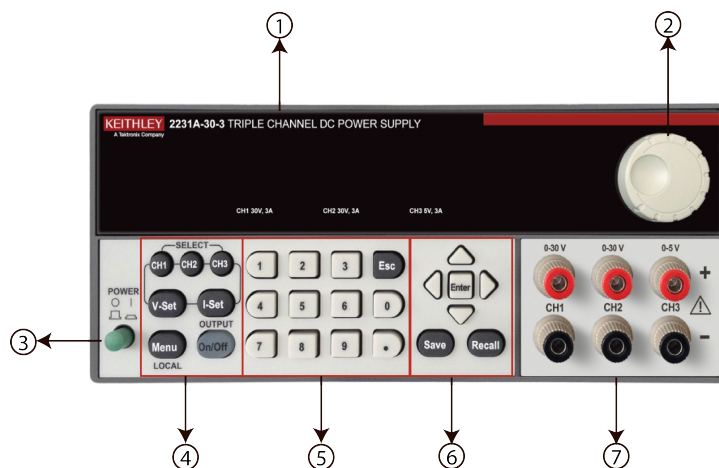# Quick reference

Front-panel overview

The front panel of Model 2231A-30-3 is shown below. Descriptions of the controls on the front panel follow the figure.

Figure 1: Model 2231A-30-3 front panel

Item	Description
1	Vacuum fluorescent display (VFD)
2	Rotary knob
3	POWER button
4	Function buttons: Channel select buttons, V-Set (voltage setting), I-Set (current setting), Menu and Output On/OFF
5	Numeric buttons and ESC button
6	Up/Down/Left/Right arrow buttons, Enter button and Save/Recall function buttons
7	Output terminals

General operation

Front-panel operation overview

Within a few seconds after powering on, the power supply shows the actual voltage for each channel on the top line of the display and the actual current for each channel on the bottom line of the display.

You can enable or disable the output of the power supply from the front-panel by pushing the output **On/Off** button. When the output is off, the **OFF** message will appear on the display.

The display shows the present operating status of each channel with display messages. When a channel operates in constant voltage mode, the **CV** indicator is displayed. When it operates in the constant current mode, the **CC** indicator is displayed.
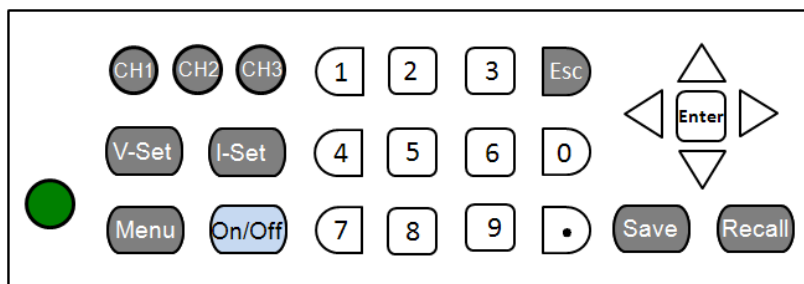
NOTE

To cancel a function operation (**V-set**, **I-set**, **Save**, **Recall**, or **Menu**), push the **Esc** button.

If the front-panel was locked with a password, enter the correct password after you push the function buttons (**V-set**, **I-set**, **Save**, **Recall**, or **Menu**), then you can change the settings.

Panel description

Figure 8: Keyboard

Item	Description
CH1	Select channel 1
CH2	Select channel 2
CH3	Select channel 3
V-Set	Set the voltage limit
I-Set	Set the current limit
Menu	Open the menu
On/Off	Turn on or off all enabled channels. You can enable or disable each using the menu. When turning on the output, the **CC** or **CV** indicator is displayed on the screen. When turning off the output, **OFF** indicator is displayed on the screen.
0 to 9	Numeric buttons
Esc	Return to previous menu level
◁ ▷	Use left/right arrow buttons to move the cursor
△ ▽	Use up/down arrow keys to adjust the parameters or select the menu operation.
Save	Save the present instrument settings as a user-saved setup. The Model 2231A-30-3 supports up to 30 setups.
Recall	Return the instrument to the specified setup.
Enter	Select the menu item or confirm the cooperation.

Indicator description

Item	Description
CC	Constant current mode.
CV	Constant voltage mode.
Y	The power supply is in remote control mode.
Series	The outputs of Channel 1 and channel 2 are wired in series.
Para	The outputs of Channel 1 and channel 2 are wired in parallel.
T	Channel 1 and channel 2 are in tracking mode.

Basic settings

Set the voltage output or voltage limit for a specific channel

You may set the voltage limit from 0 V to the maximum voltage rating shown on the instrument nameplate. To set the voltage limit, do the following:

1. The position of the cursor determines which channel will be adjusted. If the cursor is not located on the correct channel, select the correct channel by pushing the appropriate channel select button.
2. Push **V-set**.
3. Use the numeric buttons and push **Enter** to set the voltage limit. You can also use the up, down, right and left arrow buttons.

Set the current output or current limit for a specific channel

You may set the current limit from 0 A to the maximum current value of each model. The maximum current rating is shown on the instrument nameplate. To set the current limit, do the following:

1. The position of the cursor determines which channel will be adjusted. If the cursor is not located in the correct channel, select the correct channel by pushing the appropriate channel select button.
2. Push **I-set**.
3. Use the numeric buttons and push **Enter** to set the current limit. You can also use the up, down, right and left arrow buttons.

Track CH1/CH2

When tracking is turned on, channel 1 and channel 2 respond together to any adjustments in voltage. A constant ratio will be maintained between the voltage settings on the two channels. The ratio is determined by the voltage settings present on Channel 1 and Channel 2 when tracking is turned on.

For example, if Channel 1 and Channel 2 are both set to 1 V when tracking is turned on, a one to one ratio will be maintained and any voltage change on Channel 1 will result in an identical change on Channel 2. If Channel 1 is set to 10 V and Channel 2 is set to 5 V when tracking is turned on, a two to one ratio will be maintained and any voltage change on Channel 1 will result in a voltage change of half the size of Channel 2.

1. Push **CH1**, then **V-Set**, and then enter the desired voltage for channel 1. For example, set the voltage of channel 1 to 3 V.
2. Push **Enter**.
3. Push **CH2**, then **V-Set**, and then enter a voltage in the desired ratio to channel 1. For example, set voltage of channel 2 to 6 V. The ratio should be 2.
4. Push **Enter**.
5. Push **Menu**, use the down arrow key to navigate to **Track CH1/CH2**, and then push **Enter**.
6. Push the down arrow key to select **Track On** and then push **Enter** to turn on tracking.
7. Check that a **T** shows between the voltage readings of channel 1 and channel 2 on the display. This indicates the power supply is in the tracking mode.

To disable the track function:
1. Push **Menu**.
2. Use the arrow keys to select **Track CH1/CH2**.
3. Push **Enter**.
4. Use the arrow keys to select **Track Off**.
5. Push **Enter**.

NOTE

If the voltage/current is set to 0, then tracking voltage/current is ignored.

If tracking is enabled and CH1 and CH2 timers are both set, then the timer uses the shorter value.

Combine CH1+CH2

You can combine the meter readings of channel 1 and channel 2. The following procedures show you how to combine channels (for example, when outputs are wired in series or in parallel.)

V1+V2 Series

To combine metering of channel 1 and channel when the outputs are wired in series:

Figure 9: Series setup
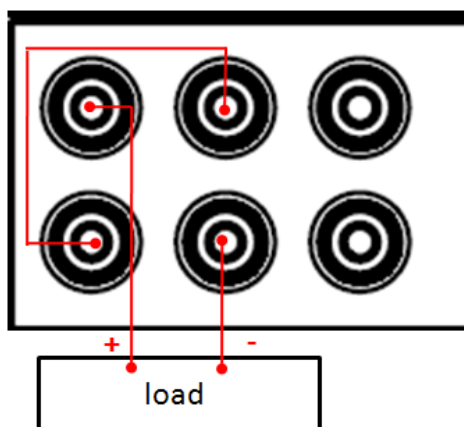
NOTE

The wiring between the supplies drives the accuracy of measurements in this mode. Ensure that wire sizes are sufficient, wires are short, and connections are tightened to maximize accuracy.

1. Wire the outputs in series, as shown in the figure above.
2. Push **Menu**.
3. Use the arrow keys to select **Combine CH1+CH2**.
4. Push **Enter**.
5. Push the down arrow key to select **V1+V2 Series**.
6. Push **Enter**. The screen will return to meter mode. Check that the indicator **Series** appears on the display, replacing the Channel 2 voltage and current readings. This indicates that the power supply is in the V1 + V2 Series state. The total output voltage is displayed on Channel 1.
7. Set the channel 1 voltage to the desired voltage value (up to 60 V).

I1+I2 parallel:

To combine metering of channel 1 and channel 2 when the outputs are wired in parallel:

Figure 10: Parallel setup
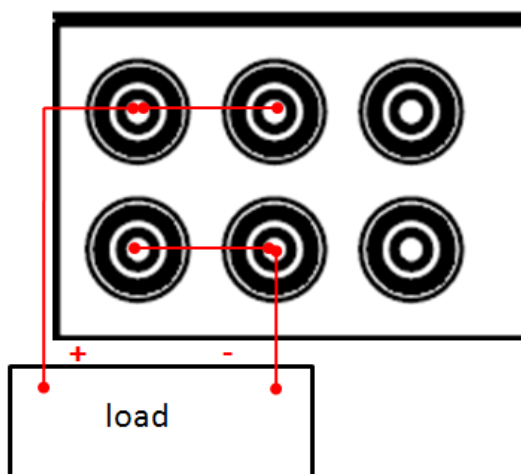
NOTE
All measurements are at the terminals. If the wires used to connect the channels together are too small, too long, or improperly tightened, accuracy of measurements will be adversely affected.

1. Wire the outputs in parallel, as shown in the figure above.
2. Push **Menu**.
3. Use the arrow keys to select **Combine CH1+CH2**.
4. Push **Enter**.
5. Push the down arrow key to select **I1+I2 parallel**.
6. Push **Enter**. The screen will return to meter mode. Check that the indicator **Para** appears on the display, replacing the channel 2 voltage and current readings. This indicates that the power supply is in the I1 + I2 state. The total output current is displayed on channel 1.
7. Set channel 1 to the desired current value (up to 6 A).

Combine Off

To turn of the combination of channel 1 and channel 2:

1. Remove all wires connected to the output terminals.
2. Push **Menu**.
3. Use the arrow keys to select **Combine CH1+CH2**.
4. Push **Enter**.
5. Push the down arrow key to select **Combine Off**.
6. Push **Enter**.