

Model 4299-7 Fixed Rack Mounting Kit

Keithley Instruments
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Assembly and Mounting Instructions

Introduction

This document contains the parts list and installation information for products that can be mounted with this rack-mount kit. The Model 4299-7 Fixed Rack Mounting Kit includes all of the hardware necessary for side-by-side rack mounting of two 3 1/2" high instruments. The kit also includes a front-panel plate that supports installation of a single 3 1/2" high instrument. The kit can be installed in a standard 19" rack.

CAUTION

This Model 4299-7 Fixed Rack Mounting Kit is intended for use in fixed installations only. It is not intended for mobile applications or any other application where the rack mount and mounted instruments are subject to vibration or shock.

Supported products

The Model 4299-7 Fixed Rack Mounting Kit allows you to mount one or two of the following models on a shelf-type mount.

Keithley

This kit supports the following Keithley instruments.

<ul style="list-style-type: none">• Series 2000• Series 2100• Series 2200• Series 2300• Series 2400• Series 2500	<ul style="list-style-type: none">• Model 2182A• Model 2290-5• Model 2290E-5• Model 2290J-5• Model 2290-10• Model 2700• Model 2701• Model 6220	<ul style="list-style-type: none">• Model 6221• Model 6485• Model 6487• Model 6514• Model 6517B• Model 7001• Model 6430• Model 3390• Model 428-PROG
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Tektronix

This kit supports the following Tektronix bench instruments:

- PWS2000 and PWS4000 Series Power Supplies
- DMM4020, DMM4040, and DMM4050 Digital Multimeters

Getting started

This topic provides information to prepare the rack and the instrument for rack mounting.

Refer to the information in the [Minimum tool and equipment list](#) (on page 2) and make sure all required equipment is available.

Refer to the information in the [Rack mount kit parts list](#) (on page 2) and select the parts and hardware required for the instrument you are mounting.



Minimum tool and equipment list

Required tools and equipment	Part number
Screwdriver, Phillips, #2	Standard tool
11/32 in. nut driver	Standard tool

Rack mount kit parts list

NOTE

This kit provides parts to mount several different instruments. Some of the parts in the kit may not be used to mount all of the supported instruments. Save parts that are not used for use in the future.

Parts used on all instruments

See the table below for information about parts to mount all instruments listed in [Supported products](#) (on page 1).

Use	Part number	Quantity	Item description
Assembly			
	4299-7	1	Rack-mount kit
	4299-7-301	1	Chassis
	4299-7-302	1	Bracket rear support, right
	4299-7-303	1	Front panel
	4299-7-304	1	Bracket rear support, left
	4299-7-305	1	Front-panel plate (optional)
	4299-7-306	2	Hold-down bracket
Fasteners			
Front panel to chassis	8-32KEPNUT	6	#8-32 Keps® washer nut
Rear support brackets to rear rack rails and chassis to rack rails	10-32 × 5/8PPH	8	#10-32 × 5/8 Phillips pan-head screws
	FA-148	8	Captive nut
Rear support brackets to chassis	10-32KEPNUT	4	#10-32 Keps washer nut
	10-32 × 3/8PPH	4	#10-32 × 3/8 Phillips pan-head screws

Parts for Keithley 2U instruments (except for Series 2200 and 3390 instruments)

See the following table for information about additional parts that you need to mount Keithley 2U instruments.

Use	Part number	Quantity	Item description
Assembly			
	4288-4-302	2	Bracket rear support
Fasteners			
Instrument to chassis	#8-32 × 3/8PPHSEM	8	#8-32 × 3/8 Phillips pan-head screw
	WA-137-1	4	Flat washer

Parts for Keithley Series 2200, Tektronix PWS2000, and Tektronix PWS4000 instruments

See the following table for information about additional parts that you need to mount Series 2200, Tektronix PWS2000, and Tektronix PWS4000 instruments.

Use	Part number	Quantity	Item description
Assembly			
	386-7813-00	2	Rear clamp
Fasteners			
Rear clamp to unit	211-1533-00	4	M4x6 mm Phillips flat-head screws
Rear clamp to chassis	#8-32 x 3/8PPHSEM	4	#8-32 x 3/8 Phillips pan-head screw

Parts for Keithley Series 2100 and Model 3390 instruments

See the following table for information about additional parts that you need to mount Series 2100 and 3390 instruments.

Use	Part number	Quantity	Item description
Assembly			
Clamp to chassis	4299-7-307	2	Rear unit clamp
Fasteners			
Rear unit clamp to chassis	6-32 x 5/16PFH	2	#6-32 x 5/16 Phillips flat-head screws
Instrument to chassis	M4 x 10PPH	4	M4 x 10 mm Phillips pan-head screw
	WA-137-1	4	Flat washer

Parts for Tektronix DMM Series 4000 instruments

See the following table for information about any additional parts that you need to mount DMM Series 4000 instruments.

Use	Part number	Quantity	Item description
Assembly			
Clamp to chassis	42997-7-307	2	Rear unit clamp
Fasteners			
Chassis to instrument	8-32 x 7/16PHTRSH	2	#8-32 x 7/16 Phillips truss-head screws
Rear unit clamp to chassis	6-32 x 5/16PFH	2	#6-32 x 5/16 Phillips flat-head screws

Parts for Keithley Models 2290-5, 2290E-5, 2290J-5, and 2290-10

See the following table for information about additional parts that you need to mount Model 2290 instruments.

Use	Part number	Quantity	Item description
Assembly			
Clamp to chassis	4299-7-307	2	Rear unit clamp
Fasteners			
Chassis to instrument	6-32 x 1/4PPH	12	#6-32 x 1/4 Phillips pan-head screws
Chassis to instrument	6FWA	12	Stainless steel washers

Instrument preparation

The section provides instrument-specific procedures to prepare an instrument for rack mounting. Use the appropriate procedure for the instrument you are mounting to a rack.

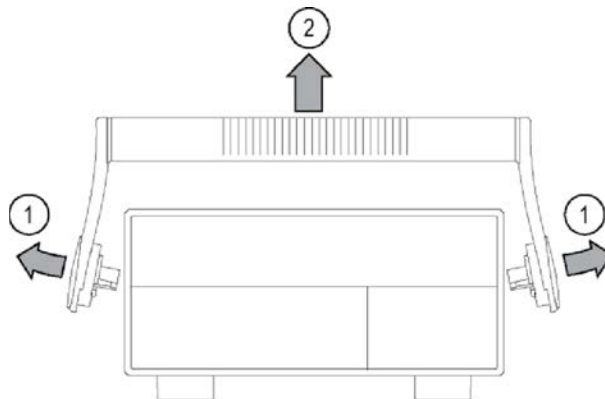
NOTE

Save all removed parts for reinstallation if the instrument is removed from the rack in the future.

To prepare Keithley Series 2100, 2200, 3390, and Tektronix instruments:

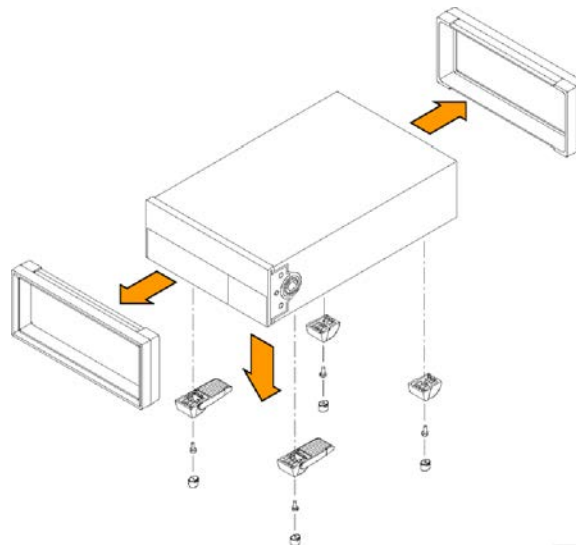
1. Remove the handle from the instrument, if present.

Figure 1: Remove handle



2. Remove all boots and feet from the instrument.

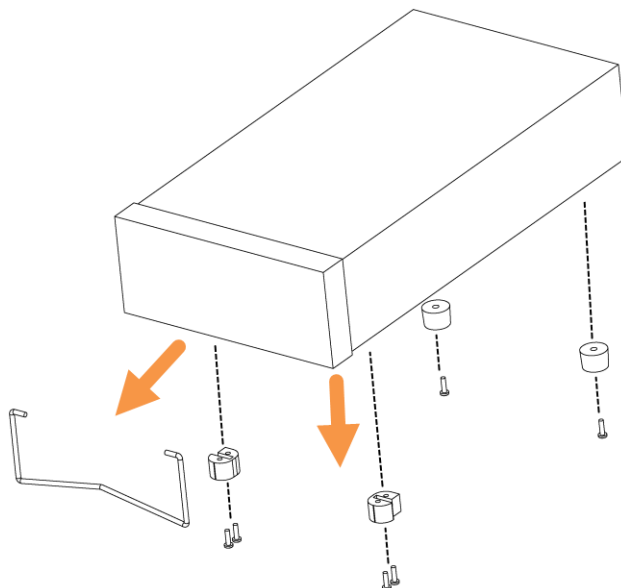
Figure 2: Remove feet and boots



To prepare Keithley Models 2290-5, 2290E-5, 2290J-5, and 2290-10 instruments:

1. Remove all feet from the bottom of the instrument.
2. Remove the tilt bail handle.

Figure 3: Model 2290 feet and handle removal



To prepare other Keithley 2U products:

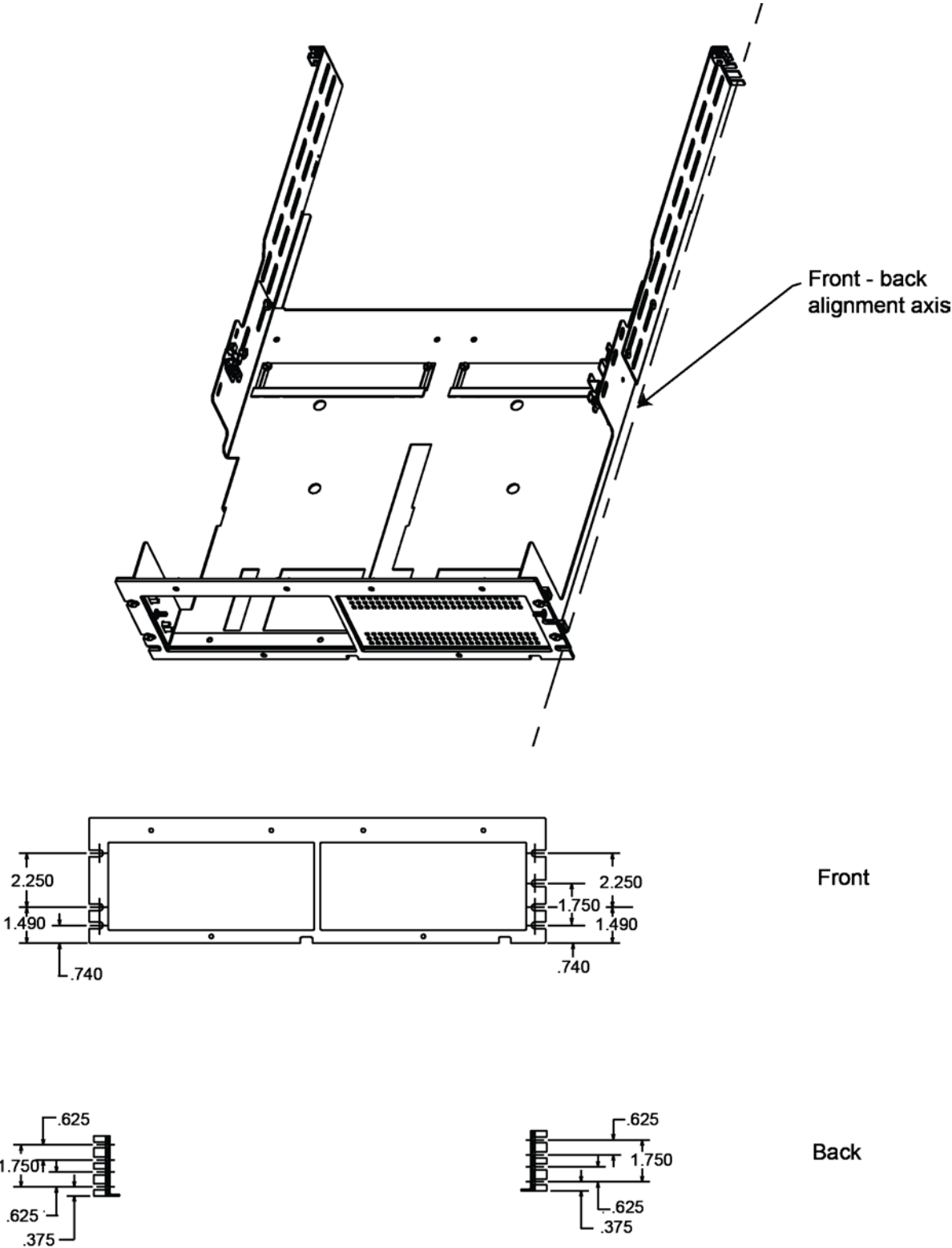
1. Remove the handles from the instruments. There are two styles of handles:
 - The newer style handle has orientation arrows at each end that are molded into the plastic. With this style, rotate the handle under the instrument until the arrows on the handle line up with arrows on the mounting ears. Pull out on the handle ends until the handle is clear of the mounting ears, and then remove the handle.
 - The older style of handle does not have orientation arrows. With this style, rotate the handle to the uppermost position.
2. Remove the screw that secures each mounting ear to the case, then remove both mounting ears. You do not need to remove the rear feet.
3. Remove the rubber from the two rear foot assemblies to expose the screws. Remove the screws that secure the plastic feet to the instrument.
4. Retain all material for future use.

Rack preparation

To prepare the rack:

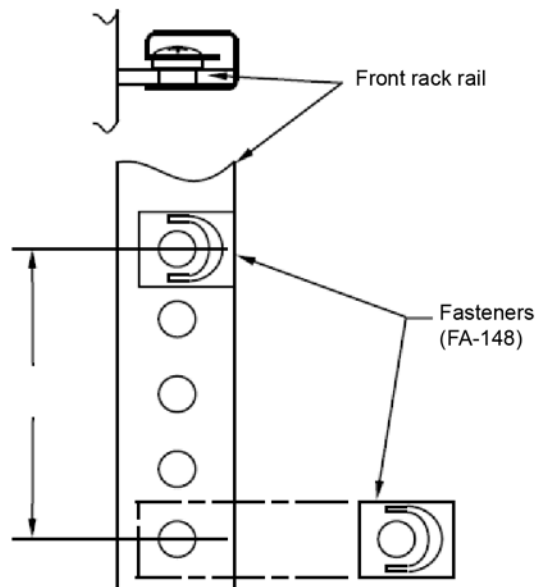
1. Select a location in the rack. The assembled rack and instrument fills 5 1/2" or 3 U of vertical space.
2. Hold up the front panel at the selected location in the rack. The four slotted mounting holes in the front panel dictate the location of the captive nut fasteners (FA-148) on the four rack rails. When the instrument is mounted in the rack, the lower slot in the front panel should be aligned with the lower slot in the rear support bracket, causing the chassis to tilt slightly towards the rear of the rack, as shown in the next figure.

Figure 4: Rack preparation



3. Install the eight captive nut fasteners (FA-148) so that the captive nuts are located behind the appropriate holes on the front and rear rack rails of the cabinet, as shown in the following figure.

Figure 5: Fastener installation



Rack mounting an instrument

Perform the following procedure to rack mount an instrument.

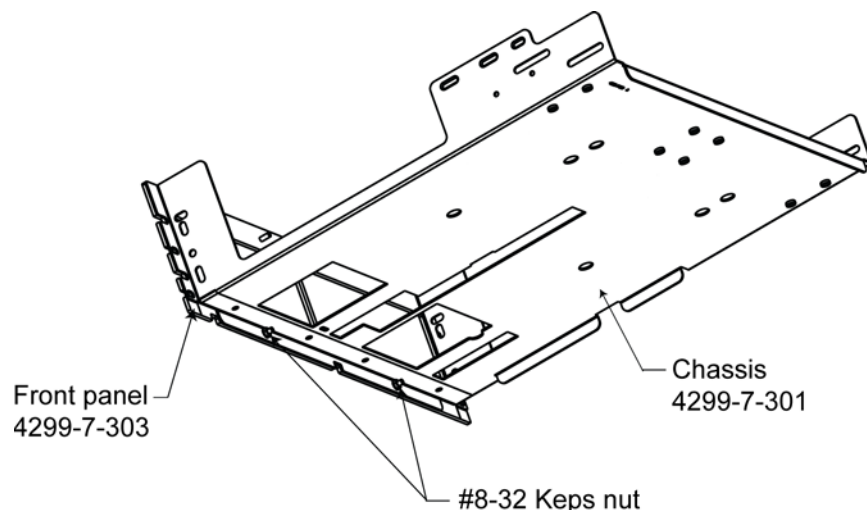
WARNING

Make sure all instruments you are mounting are turned off, the line cords are disconnected, and they are not connected to any external circuitry. Failure to disconnect all power could result in personal injury or death from electrical shock.

To rack mount instruments:

1. See the next figure and align the front panel (4299-7-303) to the chassis (4299-7-301) with the threaded studs.

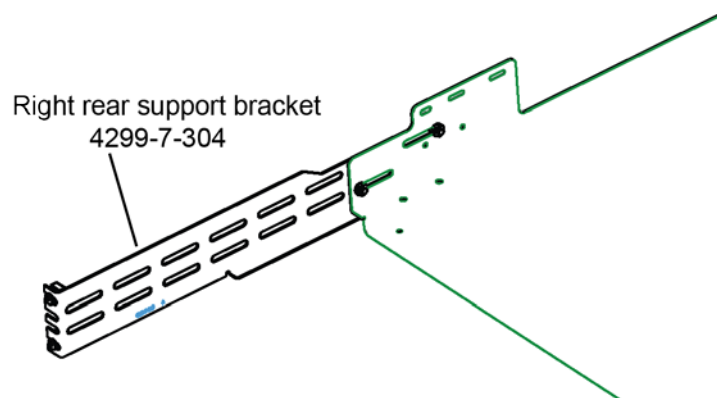
Figure 6: Installing front panel to chassis



2. Attach the front panel to the chassis using two #8-32 Keps® washer nut fasteners.
3. Place the instrument on the left or right side of the chassis with the front of the instrument against the front panel.
4. If you are mounting two instruments, place the second instrument on the chassis against the front panel.
5. If you are mounting one instrument, align the front-panel plate (4299-7-305) to the front panel on the side that will not mount an instrument. Refer to [Keithley 2U instruments](#) (on page 10) for an example of a chassis with a front-panel plate. Attach the front-panel plate using two # 8-32 Keps washer nut fasteners.
6. Secure the instruments to the chassis using the brackets and clamps shown in the instrument-specific figures as follows:
 - Refer to the [Keithley 2U instruments](#) topic if you are mounting any of the Keithley 2U instruments listed in [Supported products](#) (except Series 2200, 2100, and 3390 instruments).
 - Refer to the [Keithley Series 2200 and Tektronix PWS2000, PWS4000](#) topic if you are mounting Keithley Series 2200, Tektronix PWS2000, or Tektronix PWS4000 Series power supplies.
 - Refer to the [Keithley Series 2100 and 3390](#) topic if you are mounting Keithley Series 2100 or 3390 digital multimeters.
 - Refer to the [Tektronix DMM4020, DMM4040, and DMM4050](#) topic if you are mounting Tektronix DMM4020, DMM4040, or DMM4050 digital multimeters.
 - Refer to the [Models 2290-5, 2290E-5, 2290J-5, 2290-10](#) topic if you are mounting the Model 2290-5, 2290E-5, 2290J-5, or 2290-10 high-voltage power supply.

7. Ensure that all fasteners are tight.
8. Attach the two rear support brackets to the rear rack rails using four #10-32 x 5/8 Phillips pan-head screws.
9. Slide the chassis into the rack using the horizontal shoulders of the rear bracket supports that are already installed in the rack to stabilize the chassis.
10. Secure the front panel to the rack using four #10-32 x 5/8 pan-head screws.
11. See the next figure and attach the left rear support bracket (4299-7-302) to the left rear side of the chassis using two #10-32 x 3/8 pan-head screws and two #10-32 Keps washer nut fasteners.
12. Attach the right rear support bracket (4299-7-304) to the right rear side of the chassis using two #10-32 x 3/8 pan-head screws and two #10-32 Keps washer nut fasteners.

Figure 7: Attaching rear support bracket to chassis



Keithley 2U instruments

Use the following instructions and figures to rack mount all Keithley 2U instruments listed in [Supported products](#) (on page 1) (except Series 2200, 2100, and 3390).

NOTE

The following two figures show the rack with one instrument. The two figures following those show you where to install the front-panel plate if you are only mounting one instrument in the rack.

To rack mount Keithley 2U instruments:

1. Align the front-panel plate with preinstalled chassis screws on the inside of the rack.
2. Secure plate to rack with two #8-32 Keps nuts.
3. Ensure that the panel appears as shown in the following figures.

Figure 8: Model 4299-7 One instrument front-panel plate install view #1

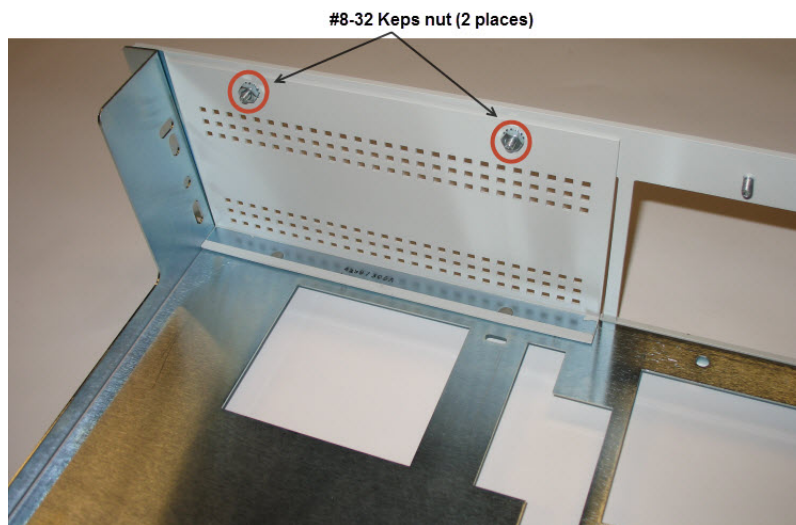


Figure 9: Model 4299-7 One instrument front-panel plate install view #2, front of rack

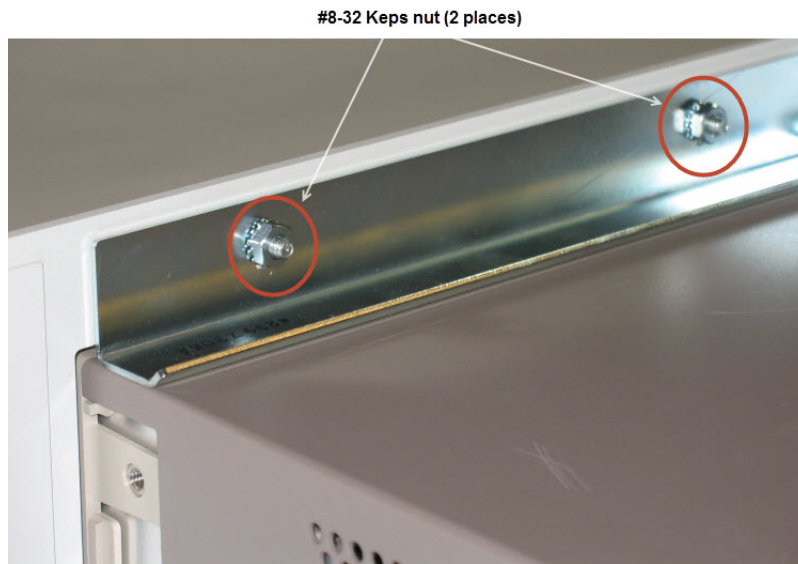


NOTE

If you are mounting two different types of instruments in the same rack, refer to the applicable figure for each type of instrument.

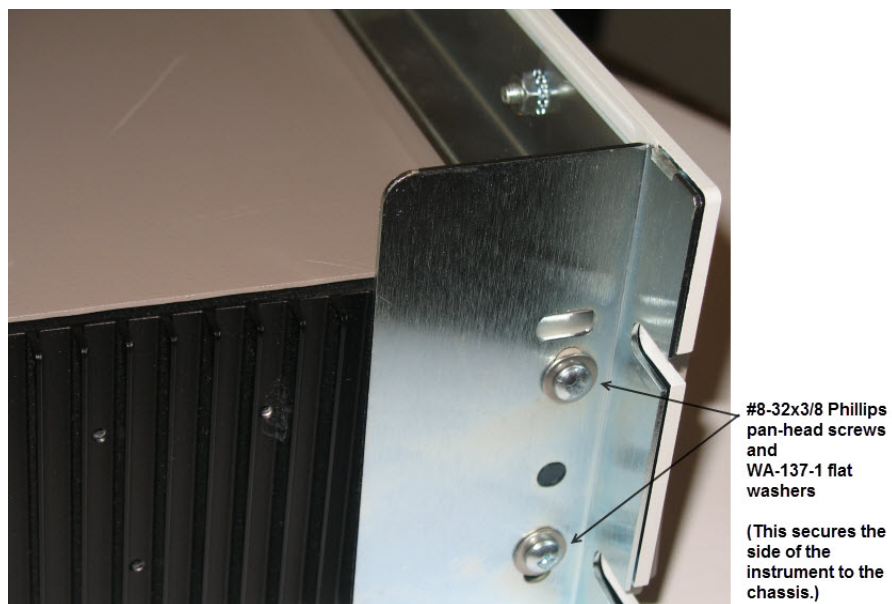
4. Place the instrument in a vacant rack space.
5. Secure the instrument to the inside front of the rack with the hold-down bracket (4299-7-306) and two #8-32 Keps nuts (see below illustration).

Figure 10: Model 4299-7 rack mount Keithley instrument with Keps nut



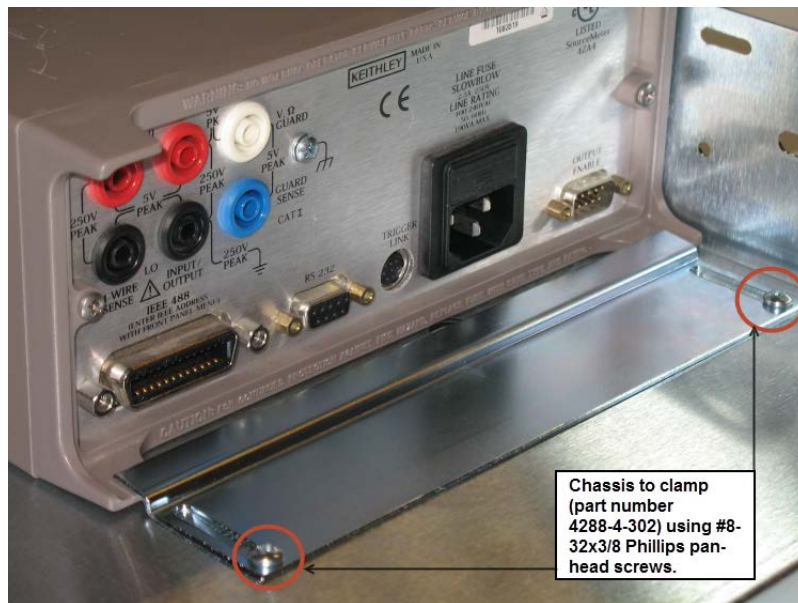
6. Attach right and left bracket rear supports to the instrument using two #8-32 Keps nuts per side (see figure below).

Figure 11: Model 4299-7 rack mount Keithley instrument to chassis screws



7. Attach the chassis bracket rear support rack using two #8-32 \times 3/8" screws (see the following figure).

Figure 12: Rack-mount Keithley 2U instrument to chassis clamp



Keithley Series 2200 and Tektronix PWS2000, PWS4000

Use the following instructions and figures to rack mount the Keithley Series 2200, or Tektronix PWS2000 or PWS4000 instruments to the chassis.

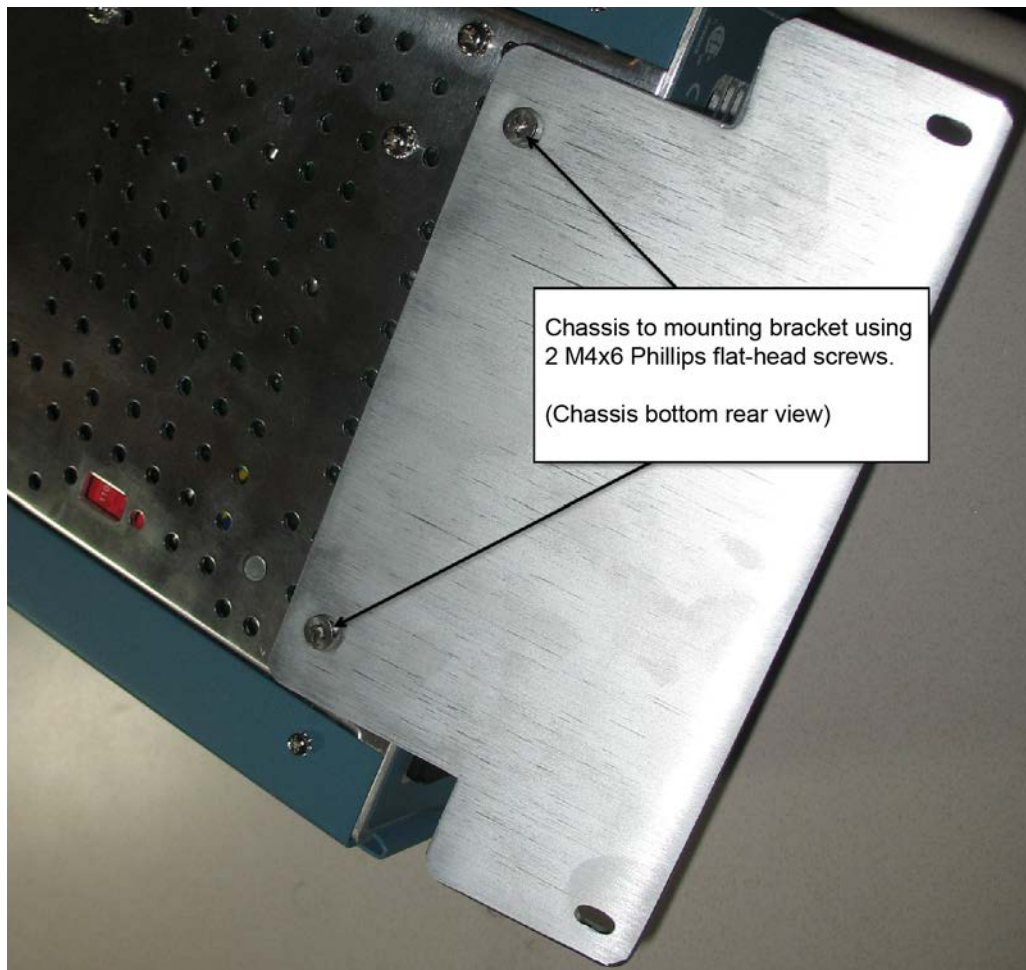
NOTE

The following figures show the rack with one instrument. If you are mounting two different types of instruments in the same rack, refer to the appropriate figure for each type of instrument.

To rack mount Keithley Series 2200 and Tektronix PWS2000 and PWS4000 instruments:

1. Align the front-panel plate with preinstalled chassis screws on bottom-rear of instrument.

Figure 13: Model 4299-7 rack mount Series 2200 instrument to chassis screws



2. Secure the plate to the rack with two M4 × 6 Phillips flat-head screws.
3. Ensure that the panel appears as shown in the following two pictures.

Figure 14: Rack-mount Series 2200, Tektronix PWS 2000, and PWS 400 Keps nut to chassis



Figure 15: Model 4299-7 rack mount Series 2200 instrument to chassis bracket



Keithley Series 2100 and 3390

Use the following instructions and figures to rack mount the Series 2100 and Model 3390 instruments.

NOTE

The following figures show the rack with one instrument. If you are mounting two different types of instruments in the same rack, refer to the appropriate figure for each type of instrument.

To rack mount Keithley Series 2100 and 3390 instruments:

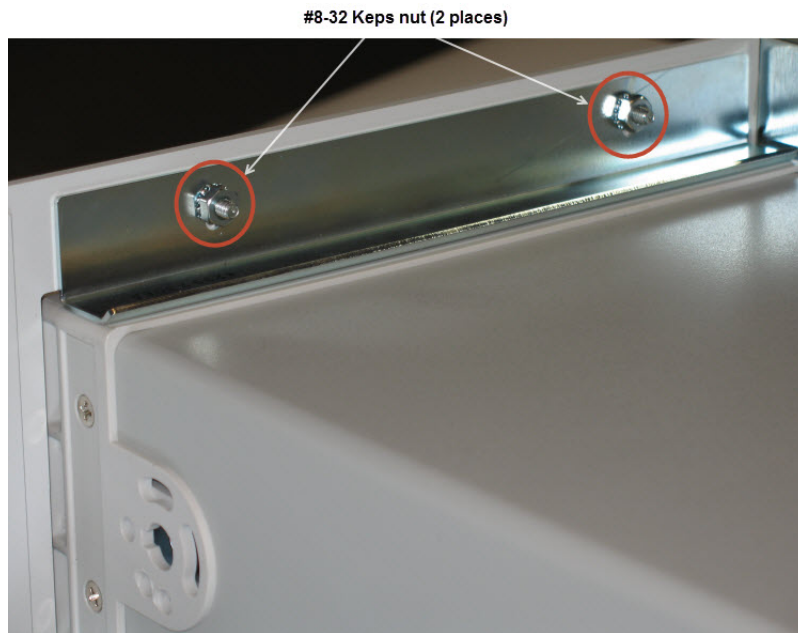
1. Secure the instrument using instrument to chassis clamp and two M4 × 10PPH Phillips pan-head screws and WA-137-1 flat washers.

Figure 16: Rack-mount Series 2100 and Model 3390 instrument to chassis screws



2. Attach clamp with two #8-32 Keps nuts.

Figure 17: Rack-mount Series 2100 and Model 3390 Keps nut to chassis



3. Attach clamp to chassis with #6-32 x 5/16" PFH screw.



Tektronix DMM4020, DMM4040, and DMM4050

Use the following figures to rack mount DMM4020, DMM4040, and DMM4050 instruments.

NOTE

The following figures show the rack with one instrument. If you are mounting two different types of instruments in the same rack, refer to the appropriate figure for each type of instrument.

To rack mount Tektronix DMM4020, DMM4040, and DMM4050 instruments:

1. Secure the instrument using instrument to chassis clamp and a #8-32 \times 7/16" Phillips pan-head screw.

Figure 18: Rack-mount Tektronix DMM 4020, DMM 4040, DMM 4050 instrument to chassis screw



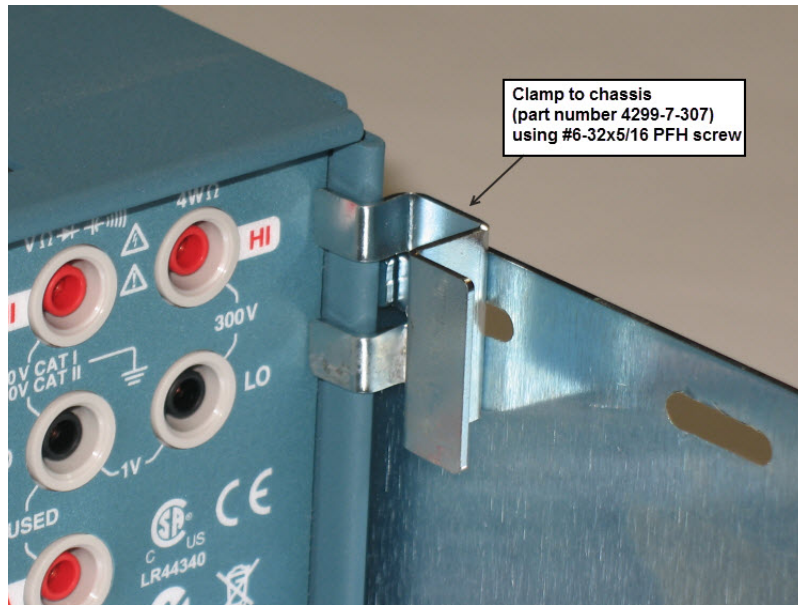
2. Attach clamp with two #8-32 Keps nuts.

Figure 19: Rack-mount Tektronix DMM 4020, DMM 4040, DMM 4050 instrument to chassis Keps nut



3. Attach clamp to chassis with #6-32 \times 5/16" PFH screw.

Figure 20: Rack-mount Tektronix DMM 4020, DMM 4040, DMM 4050 instrument to chassis clamp

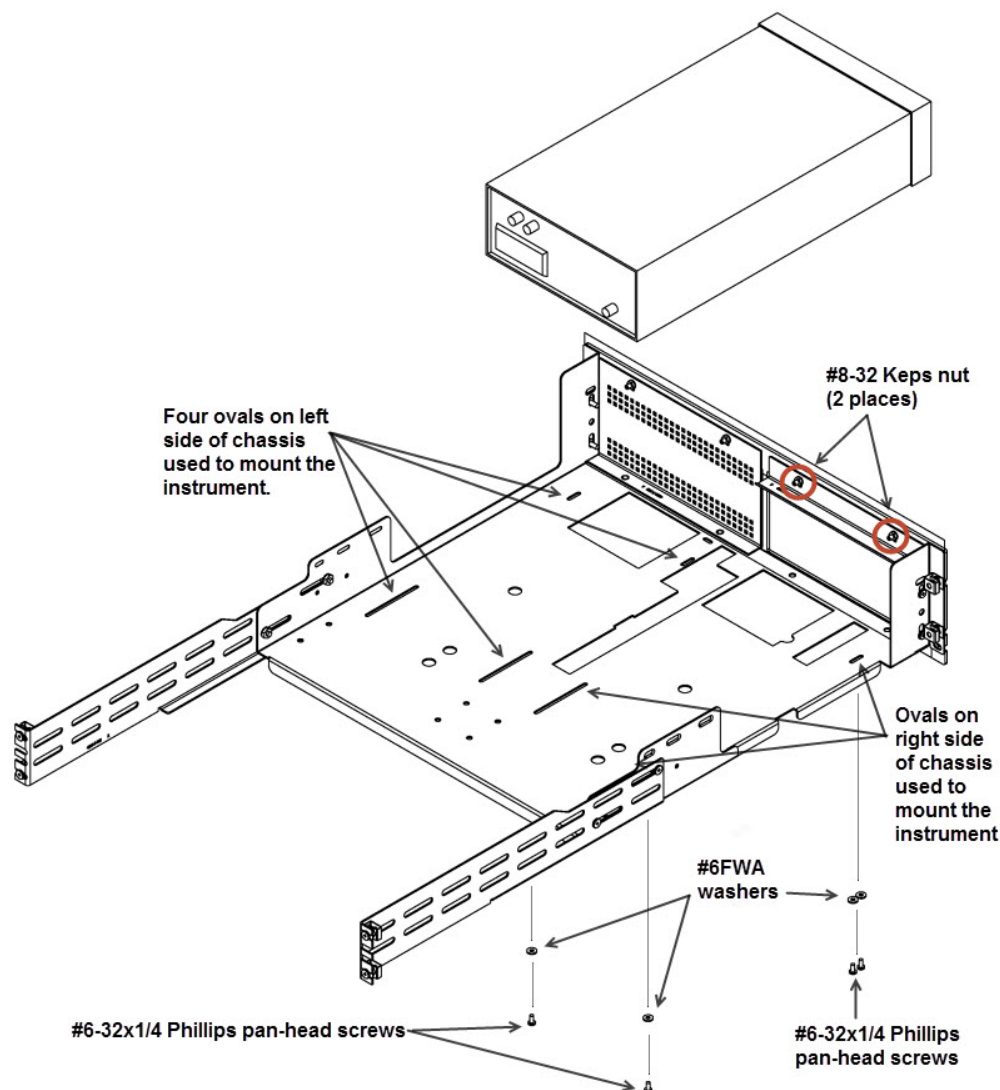


Models 2290-5, 2290E-5, 2290J-5, 2290-10

NOTE

The following figure shows the rack with one instrument. Due to the cutout of the chassis, you will notice that on the right side, there are only three ovals used for mounting the instrument. On the left side of the chassis, there are four ovals you can use for mounting the instrument. If you are mounting two different types of instruments in the same rack, refer to the appropriate figure for each type of instrument.

Figure 21: Model 2290 rack mount



Using the holes originally intended for the instrument feet, mount the instrument using two #6-32 x 1/4 PPH screws and washers in each front slot and one screw and washer in each rear slot.

NOTE

You will use a total of six screws and washers on the right side of the chassis and eight screws and washers on the left side.