

# Model 4299-9 Dual Fixed Rack-Mount Kit

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## Assembly and Mounting Instructions

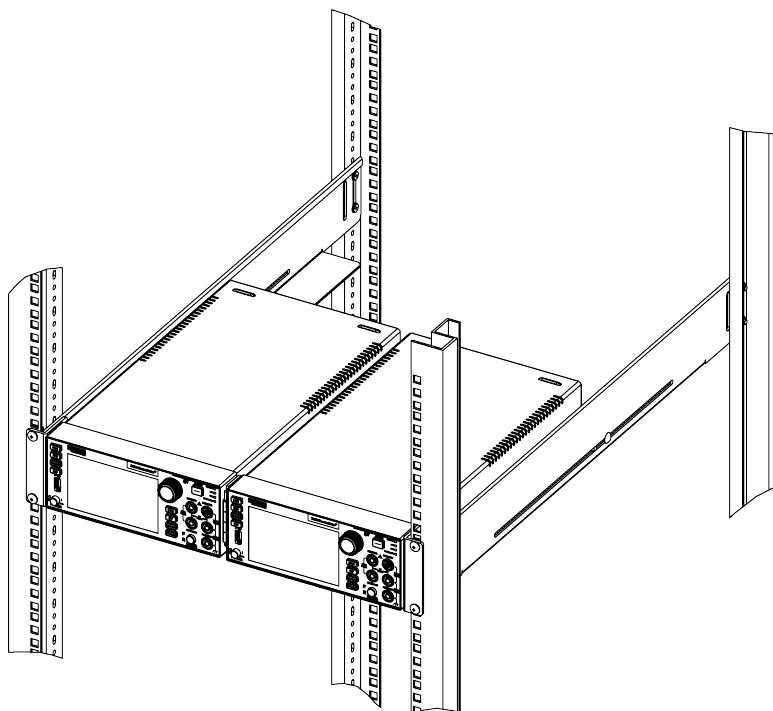
### Introduction

The Model 4299-9 Dual Fixed Rack-Mount Kit for 2U Graphical Display Instruments contains all the hardware to install two adjacent 2U Graphical Display instruments in a standard 19-inch equipment rack.

### NOTE

1U is a standard vertical spacing that is equal to 1.75 inches (about 4.45 cm).

**Figure 1: Typical installation (instruments and rack not included)**



### Tools required

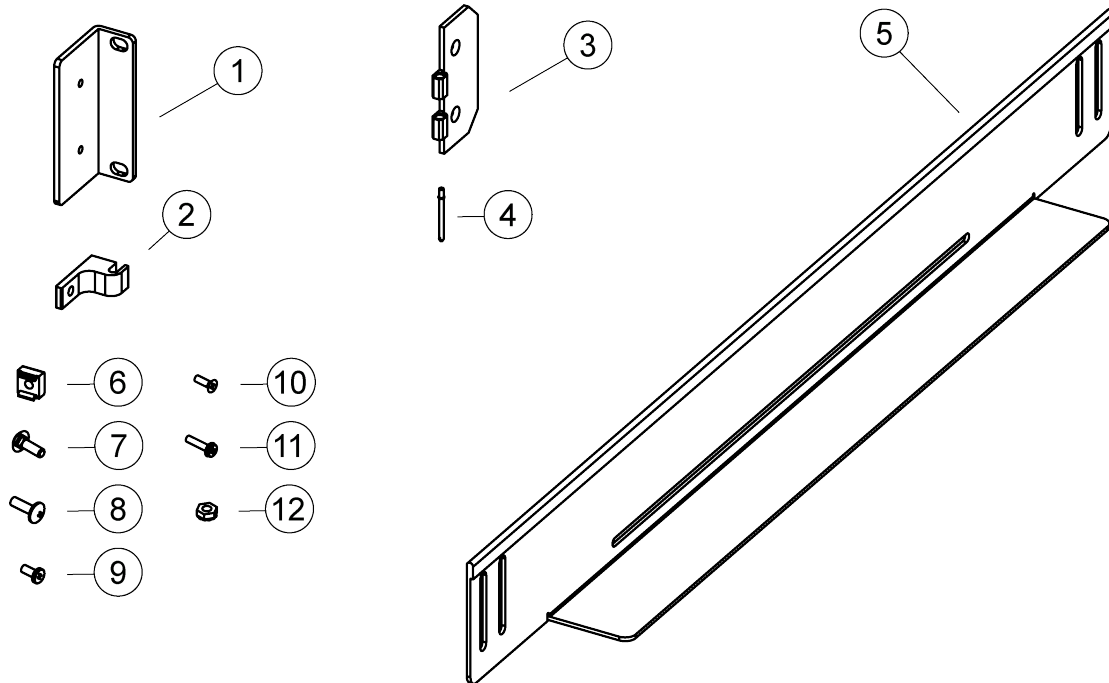
- Medium (#2) Phillips head screwdriver
- 3/8" wrench
- Flat-bladed screwdriver or cage nut installation tool, such as Knurr part number 01.130.985.9



## Parts list

The following figure shows the hardware that is supplied with this kit. The following table lists the hardware, part number, and quantity.

**Figure 2: Model 4299-9 Rack Mount Kit parts**



	Description	Part number	Quantity
1	Front-rack ear	2450-360	2
2	Shelf clip	2450-364	2
3	Hinge	2450-361	2
4	Hinge pin	FA-352	1
5	Support shelf	2450-363	2
6	Cage nut	FA-274	4
7	Carriage bolt	212026400	2
8	10-32 x 5/8" Phillips truss head screw	10-32X5/8PHTRSH	4
9	10-32 x 1/2" Phillips pan head screw	10-32X1/2PPHSEM	8
10	6-32 x 7/16" Phillips flat head screw	6-32X7/16PFH	4
11	6-32 x 5/8" Phillips pan head screw	6-32x5/8PPHSEM	4
12	10-32 Keps® washer nut	10-32KEPNUT	10

## Installation

To install two Graphical Display instruments using the Model 4299-9 Dual Fixed Rack-Mount Kit:

1. Review the [installation precautions](#) (on page 3).
2. Select a location in the rack.
3. Take steps to make it easier to manipulate and install the Graphical Display instrument:
  - Clear as much space as possible around the selected rack location
  - If practical, remove the cabinet sides from the rack
1. Perform the installation procedure beginning with [Step 1: Prepare the rack](#) (on page 4).

## Installation precautions

Observe the following safety precautions while installing instruments.

### WARNING

***Turn off instrument power and unplug all cables before installing an instrument in a rack. Failure to remove power before installation may cause personal injury or death from electrical shock.***

### CAUTION

Heat sources should be mounted away from the instrument, its cabling, and its accessories, with sufficient space provided between the instrument and heat source for airflow and cooling.

### NOTE

To prevent damaging heat build-up and ensure specified performance, make sure there is adequate ventilation and air flow around the instrument to ensure proper cooling. Do not cover the ventilation holes on the top, sides, or bottom of the instrument.

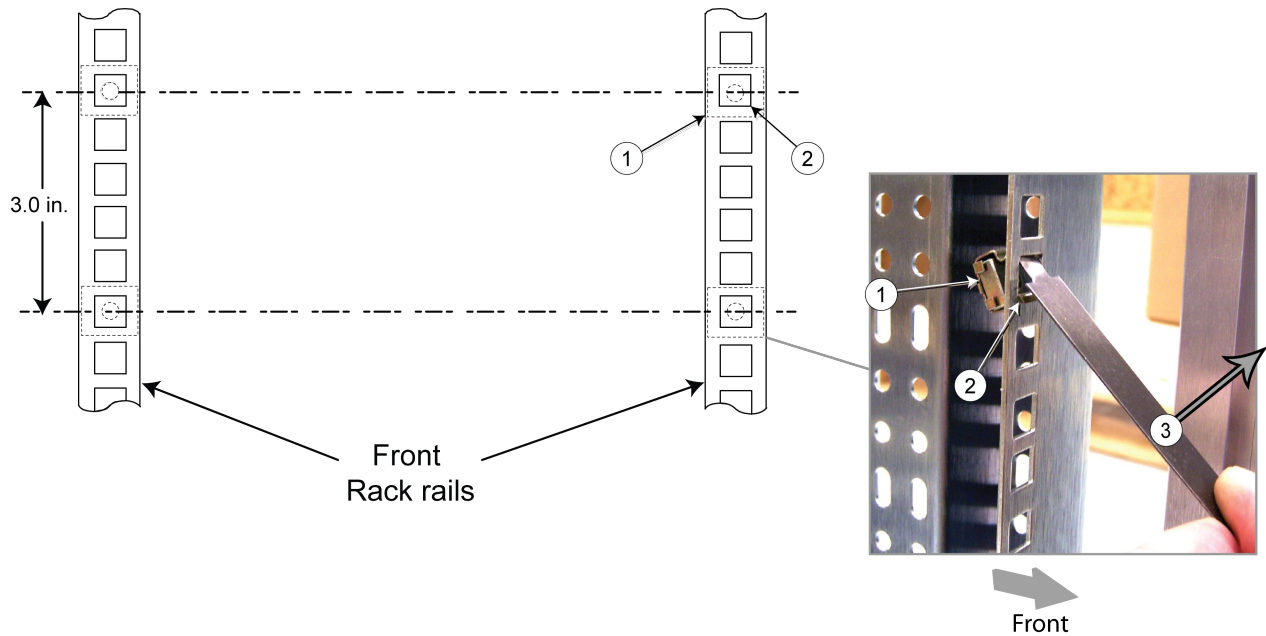
## Step 1: Prepare the rack

To prepare the rack for installation, install the cage nuts and the support shelf for the selected location.

### To install the cage nuts on the rack rails:

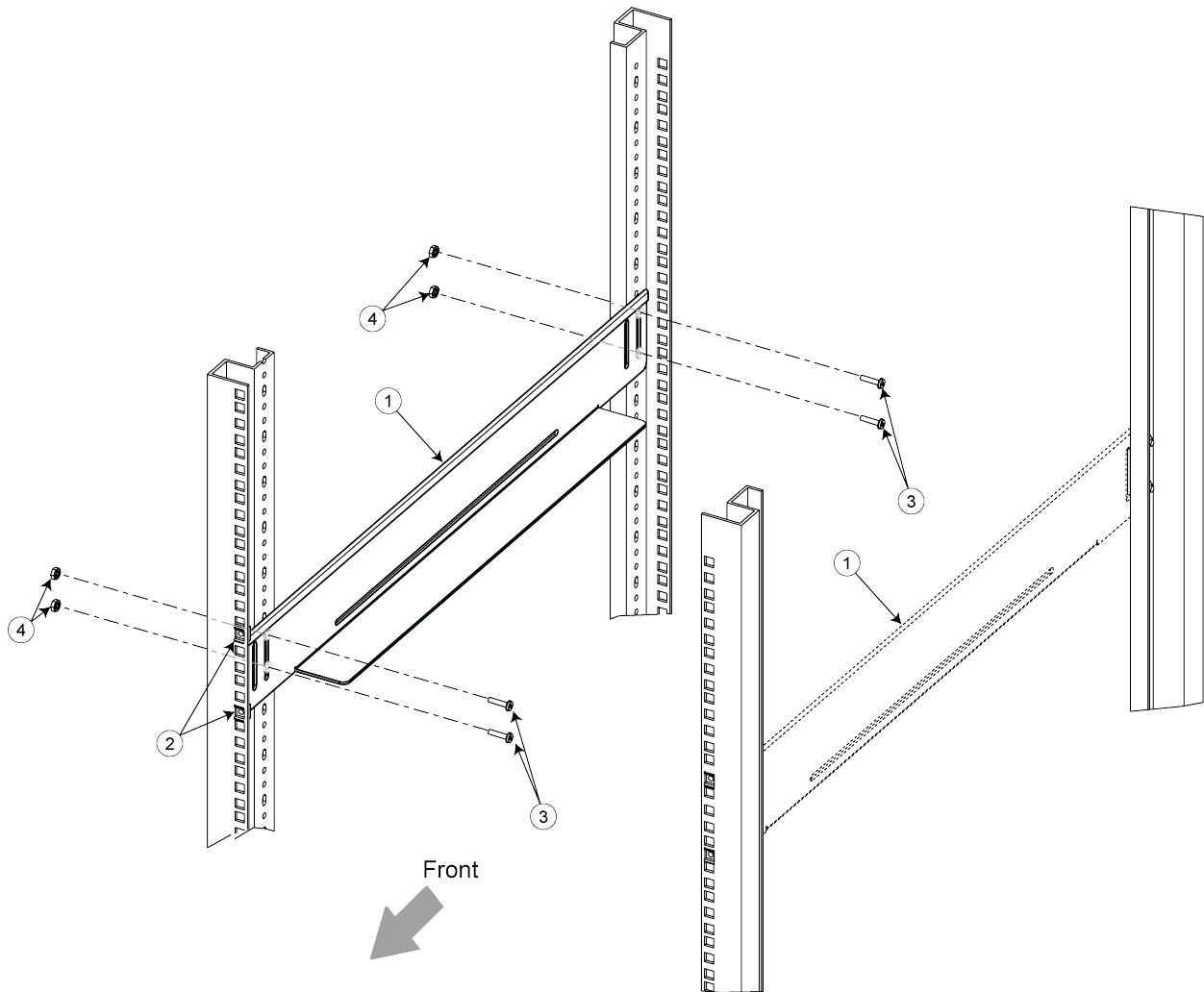
1. Using the front-rack ear (2450-360) as a guide, mark holes for the selected installation location (four places total, two for each rail).
2. Install the cage nuts (1) in the backside of each rail hole (2) where marked in step 1. To install a cage nut, place the bottom lip of the nut so it rests in the rail hole. If you are using a cage nut installation tool, through the rail hole, grab the top lip of the nut with the tool and pull (3) until the nut snaps in place. Repeat for each cage nut.

Figure 3: Install the cage nuts



**To install the support shelves in the rack:**

1. Align the first support shelf (1) with the installed cage nuts (2).
2. Secure the support shelf (1) with 10-32 x 1/2" screws (3) and nuts (4) as shown (four places).
3. Repeat steps 1 and 2 on the other side of the rack to install the second support shelf (1).

**Figure 4: Install the support shelf**

## Step 2: Prepare the instrument

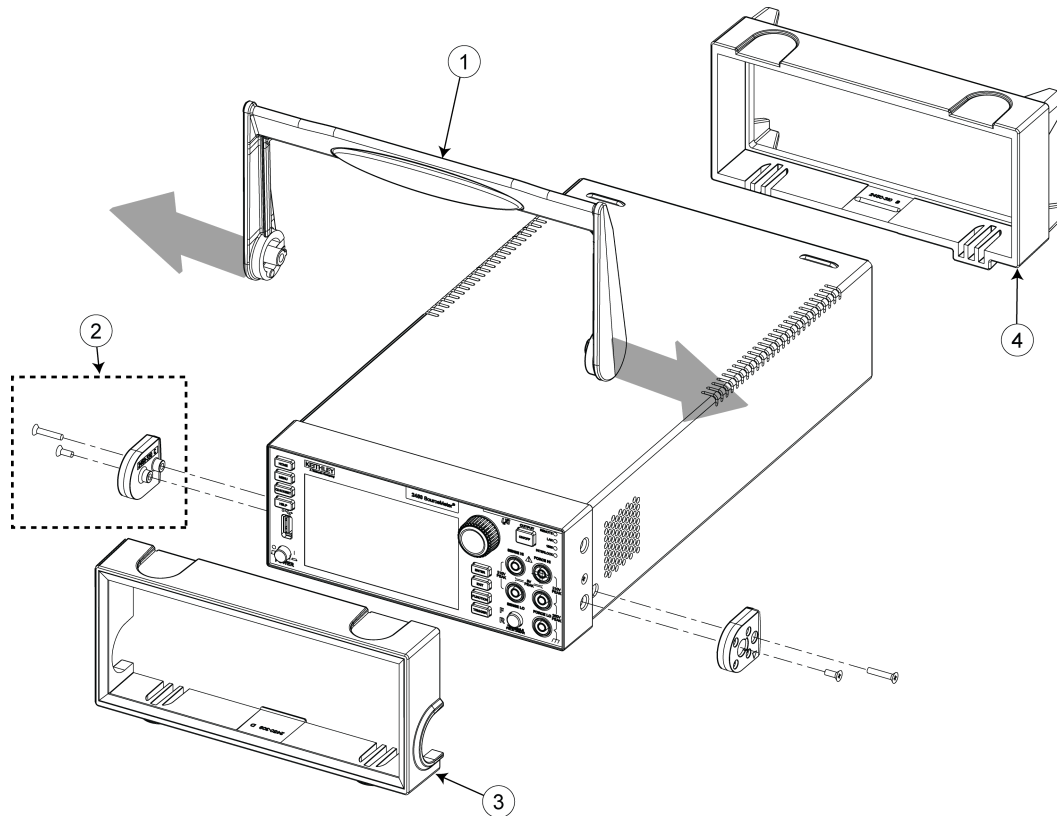
To prepare a Graphical Display instrument for rack mounting, remove the handle and bumpers (if installed), and then install the mounting hardware.

### Remove handle and bumpers from the Graphical Display instrument

**To remove the handle and bumpers (if installed):**

1. While pulling the ends of the handle (1) away from the sides of the instrument, swing the handle to the upright position (the upright position is illustrated in the figure).
2. With the handle aligned in the upright position, pull the ends of the handle away from the case and remove.
3. Remove the screws and the handle mounts (2) from both sides of the instrument.
4. Pull on one of the front bumper corners (3) and remove the front bumper from the instrument.
5. Remove the rear bumper (4) the same way as you removed the front bumper.
6. Store the handle, bumpers, and hardware for future bench-top use.

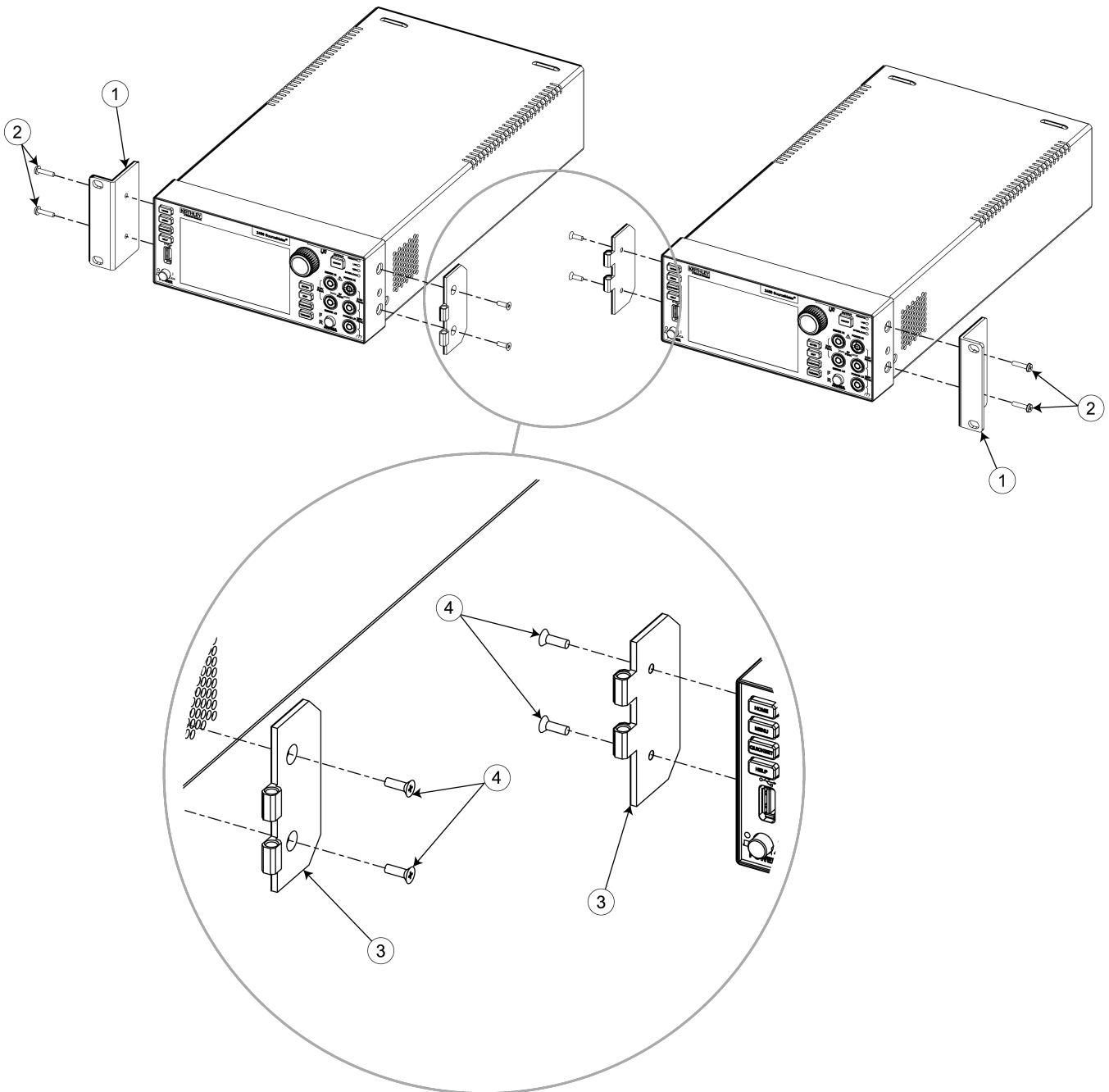
**Figure 5: Remove handle and bumpers**



**To install the mounting hardware on the instruments:**

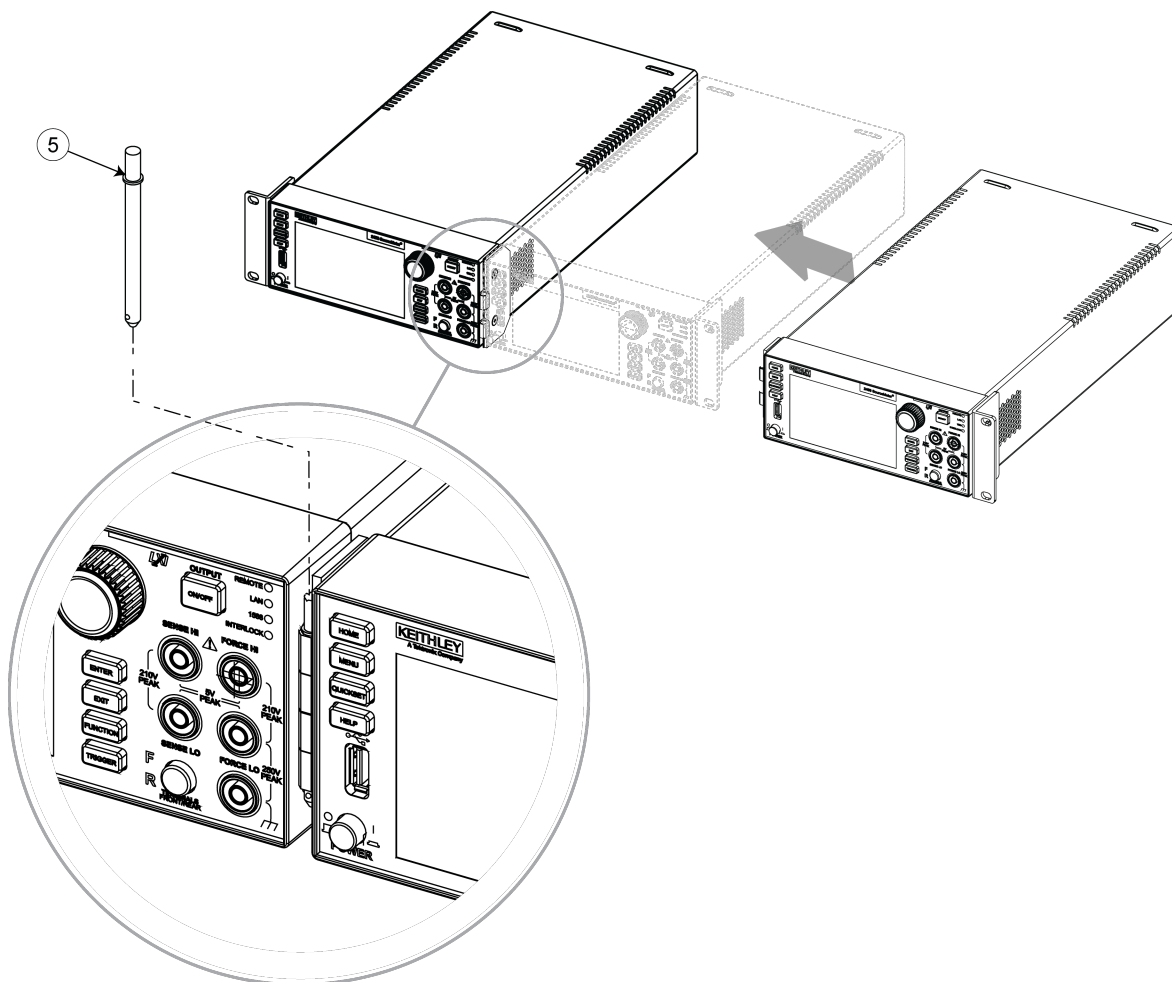
1. Place the instruments side-by-side (see figure).
2. Secure a front-rack ear (1) to each instrument using two 6-32 x 5/8" pan head screws (2) as shown in the figure.
3. Orient the hinges so that the knuckles are toward the front of the instruments.
4. Secure one-half of the hinge (3) to the right instrument with two 6-32 x 7/16" flat head screws (4).
5. Secure the other half of the hinge (3) to the left instrument with two 6-32 x 7/16" flat head screws (4)

**Figure 6: Install mounting hardware on the instrument**



6. Set the instruments next to each other.
7. Secure them together by inserting the pin (5).

Figure 7: Insert hinge pin



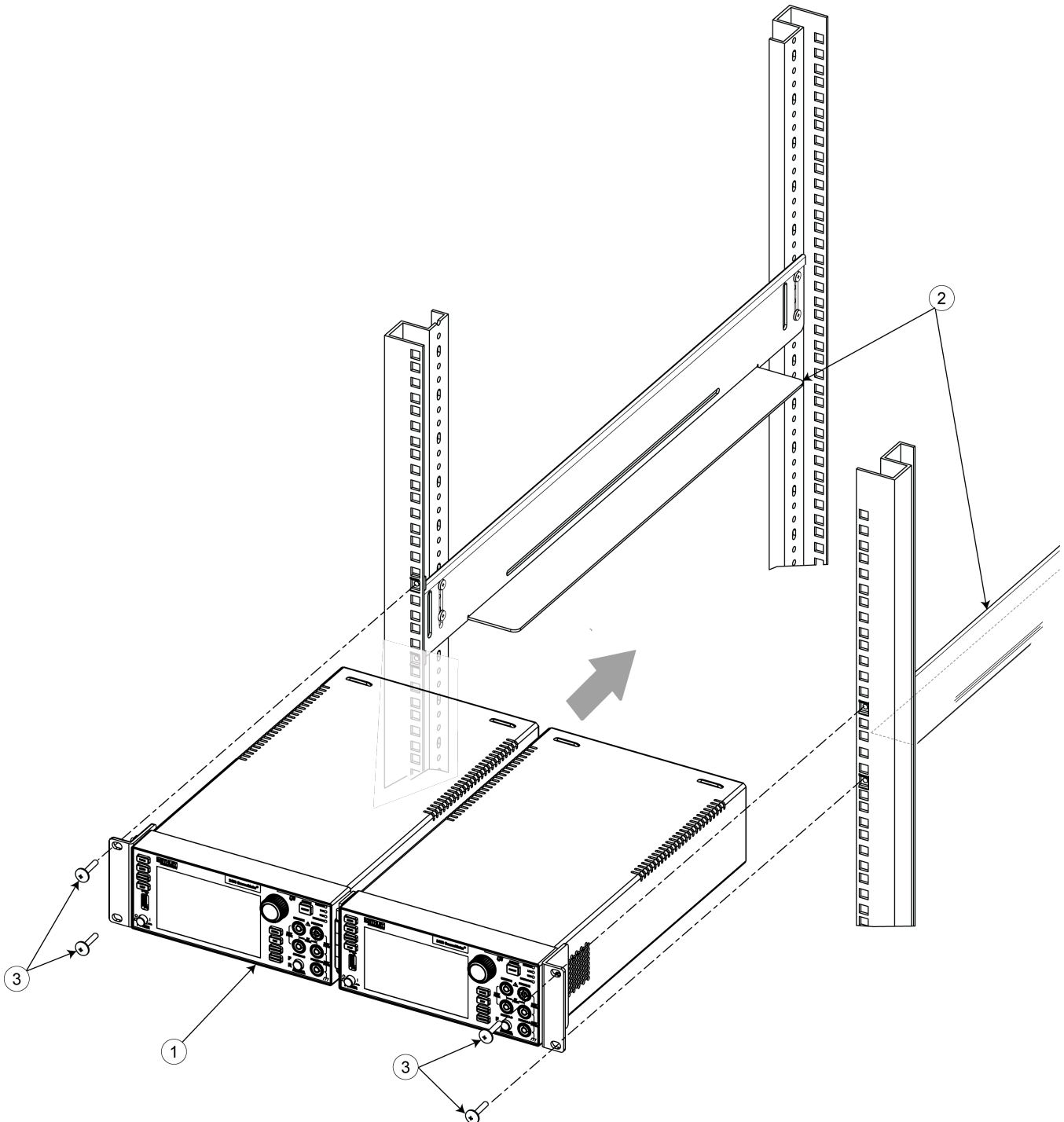


### Step 3. Install the instrument assembly

**To install the Graphical Display instrument assembly in the rack:**

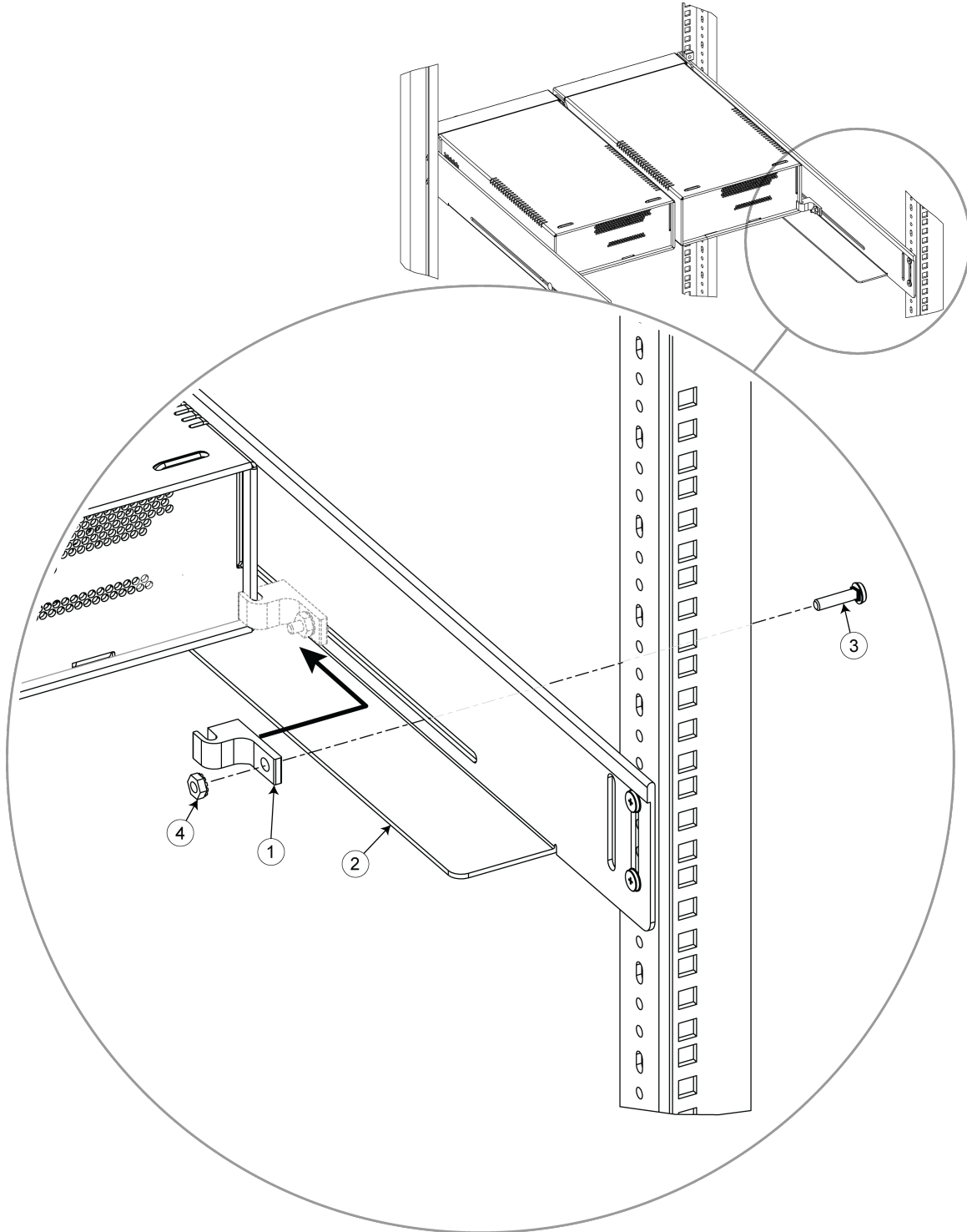
1. Place the Graphical Display instrument assembly (1) in the rack and on the support shelves (2). Keep supporting the instrument assembly until it is secured.
2. Check that the instrument assembly (1) is fully seated against the front rack rails against the front rack rails.
3. Secure the instrument assembly (1) using 10-32 x 5/8" screws (3) (four places).

**Figure 8: Install the instrument assembly in the rack**



4. Place the shelf clip (1) on the shelf (2) and lightly secure it with the carriage bolt (3) and nut (4).
5. Slide the shelf clip (1) toward the instrument and then fully tighten the nut (4).
6. Repeat steps 4 and 5 to install the shelf clip for the other instrument.

**Figure 9: Install the shelf clips**



The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

**Responsible body** is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

**Operators** use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

**Maintenance personnel** perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

**Service personnel** are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley Instruments products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories, as defined in the specifications and operating information, and as shown on the instrument or test fixture panels, or switching card.

Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

The **WARNING** heading in the user documentation explains dangers that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

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The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley Instruments. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley Instruments to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley Instruments office for information.

To clean an instrument, use a damp cloth or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

Safety precaution revision of January 2013.