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## Installation Instructions

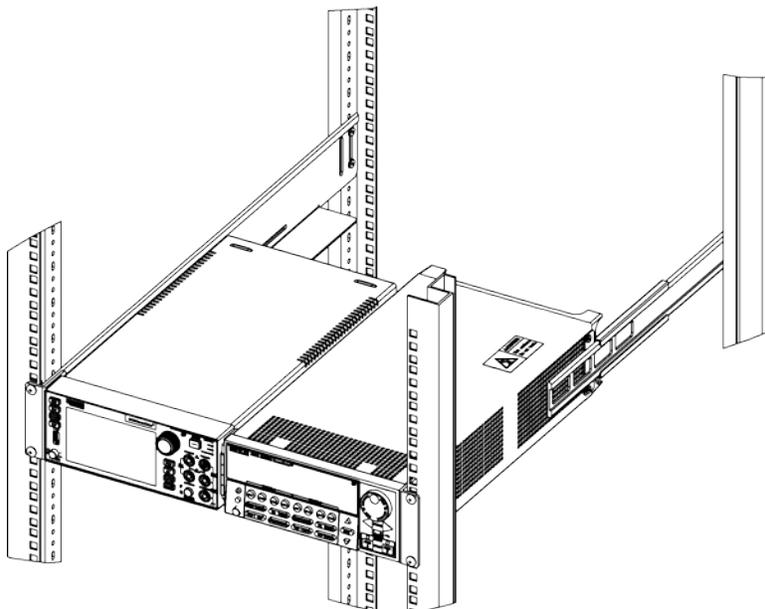
### Introduction

The Model 4299-10 Dual Fixed Rack-Mount Kit contains all the hardware to install a Graphical Display instrument and an adjacent 2U Series 26xx instrument in a standard 48.3 cm. (19-in.) equipment rack.

### NOTE

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

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



### Tools required

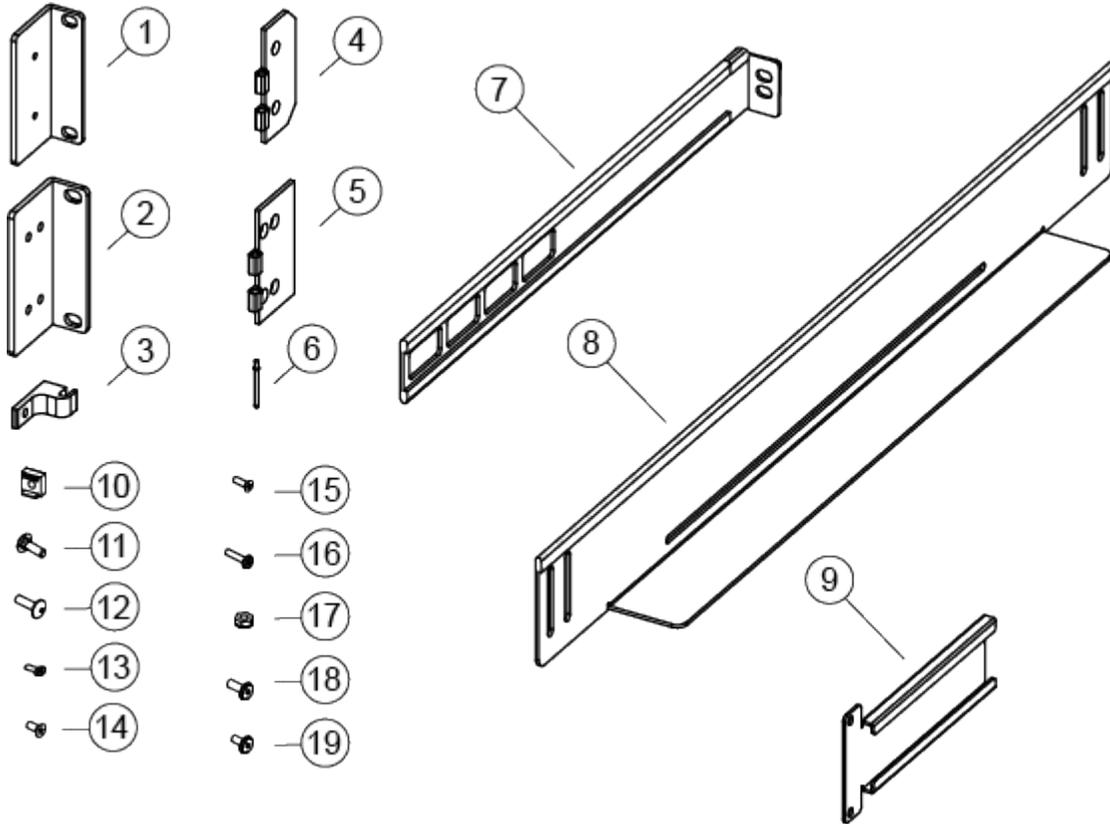
- Medium (#2) Phillips head screwdriver
- 3/8" wrench
- Flat-bladed screwdriver or cage nut installation tool, such as Knurr part number 01.130.985.9



## 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 4299-10 Rack Mount Kit parts**



#	Description	Part number	Quantity
1	Front-rack ear (Graphical Display)	2450-360	1
2	Front-rack ear (26xx)	2602-355	1
3	Shelf clip	2450-364	1
4	Hinge (Graphical Display)	2450-361	1
5	Hinge (26xx)	2602-328	1
6	Hinge pin	FA-352	1
7	Rack mount extension arm	2602-335	1
8	Support shelf	2450-363	1
9	Rear-rack mount bracket	2602-334	1
10	Cage nut	FA-274	6
11	Carriage bolt	212026400	1
12	10-32 x 5/8" Phillips truss head screw	10-32X5/8PHTRSH	6
13	10-32 x 1/2" Phillips pan head screw	10-32X1/2PPHSEM	4
14	8-32 x 3/8" Phillips flat head screw	8-32X3/8PFH	2
15	6-32 x 7/16" Phillips flat head screw	6-32X7/16PFH	2
16	6-32 x 5/8" Phillips pan head screw	6-32x5/8PPHSEM	2
17	10-32 Keps® washer nut	10-32KEPNUT	5
18	10-32 x 3/8" Phillips pan head screw	10-32X3/8PPHSEM	2
19	8-32 x 3/8" Phillips pan head screw	8-32X3/8PPH	2

## Installation

To install a Graphical Display instrument and an adjacent Series 26xx instrument using the Model 4299-10:

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
4. 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, cabling, and 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

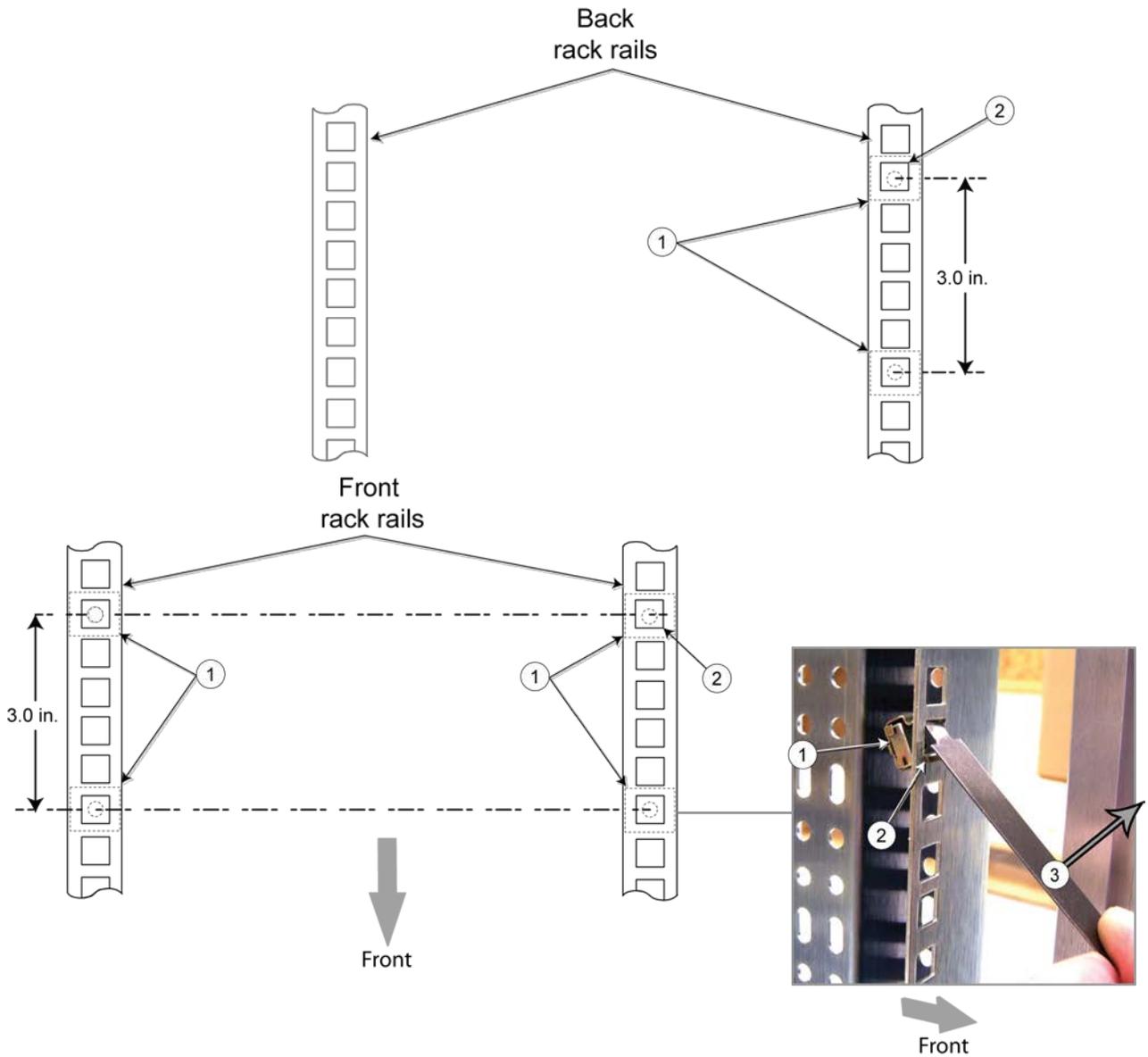
***To prepare the rack for installation:***

1. Install the cage nuts.
2. Install the support shelf for the Graphical Display instrument.
3. Install the rear-rack mount bracket for the Series 26xx instrument.

**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 (six places total, two for each front rail, and two for the back right 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, if you are using a cage nut installation tool, place the bottom lip of the nut so it rests in the rail hole. Grab the top lip of the nut and pull (3) until the nut snaps in place. Repeat for each cage nut.

**Figure 3: Install the cage nuts**



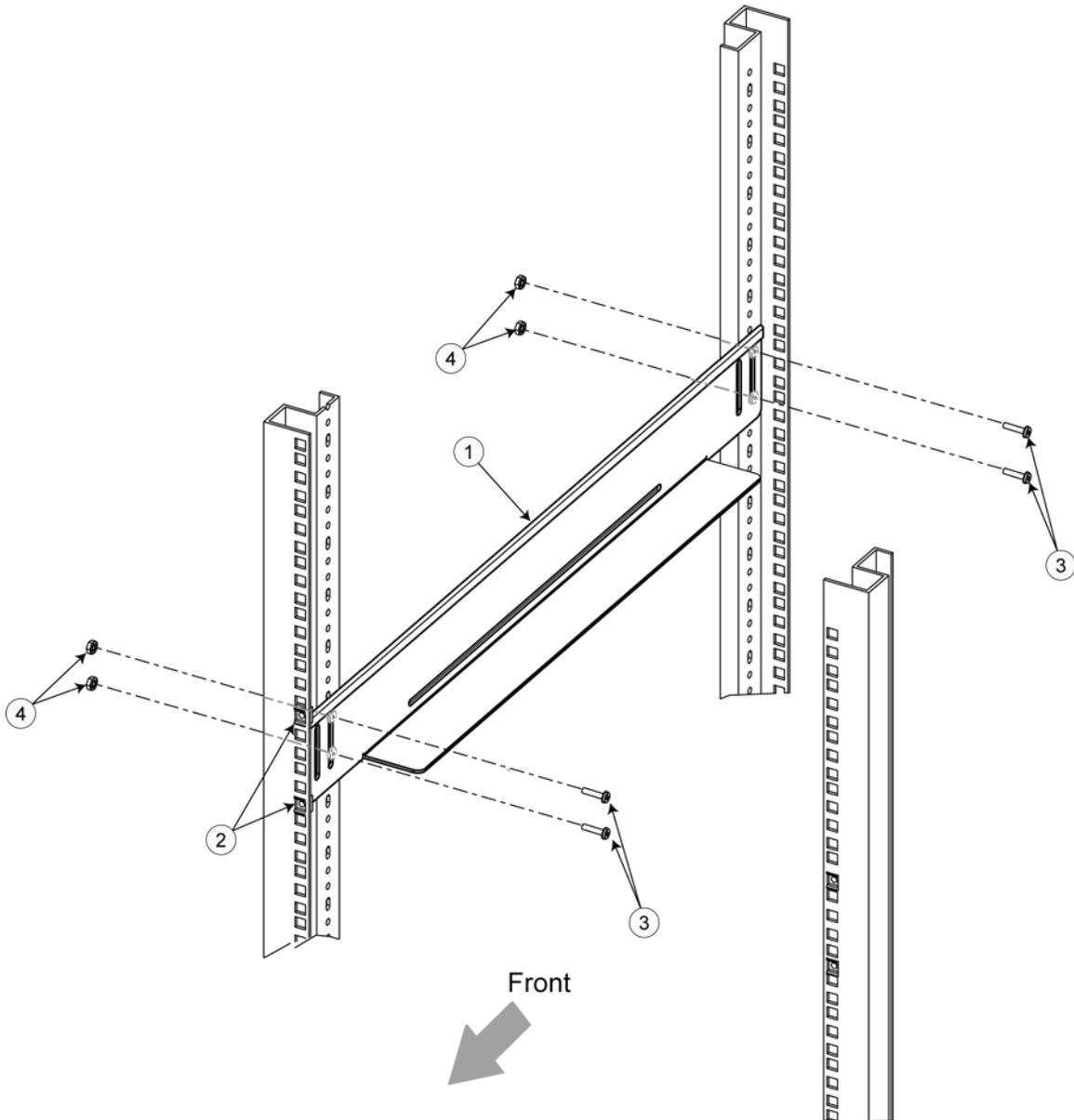
## NOTE

You can install the Graphical Display instrument on either side of the rack. The following steps describe installation of the instrument on the left side of the rack. To install the instrument on the other side, install the support shelf (2450-363) on the right side of the rack (not shown).

### To install the support shelf in the rack:

1. Align the 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).

Figure 4: Install the support shelf



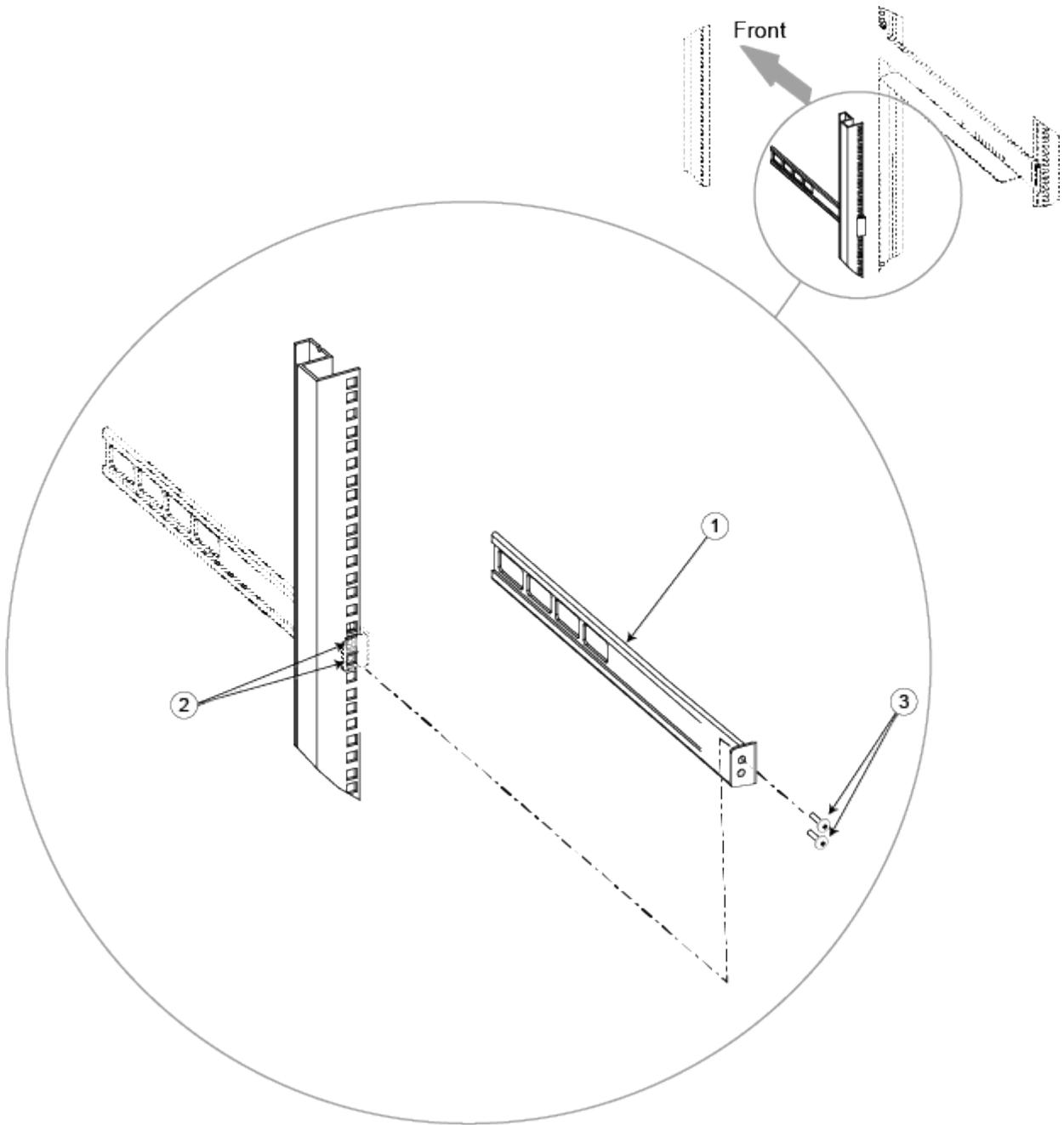
## NOTE

You can install either instrument on either side of the rack. The following steps describe installation of the Series 26xx instrument on the right side of the rack. To install the instrument on the other side, install the rear-rack mount bracket (2602-334) on the left side of the rack (not shown).

**To install the rear-rack mount bracket in the rack:**

1. Align the rear-rack mount bracket (1) with the installed cage nuts (2).
2. Secure the bracket (1) with 10-32 x 5/8" screws (3) as shown (two places).

**Figure 5: Install the rear-rack mount bracket**



## Step 2: Prepare the instrument

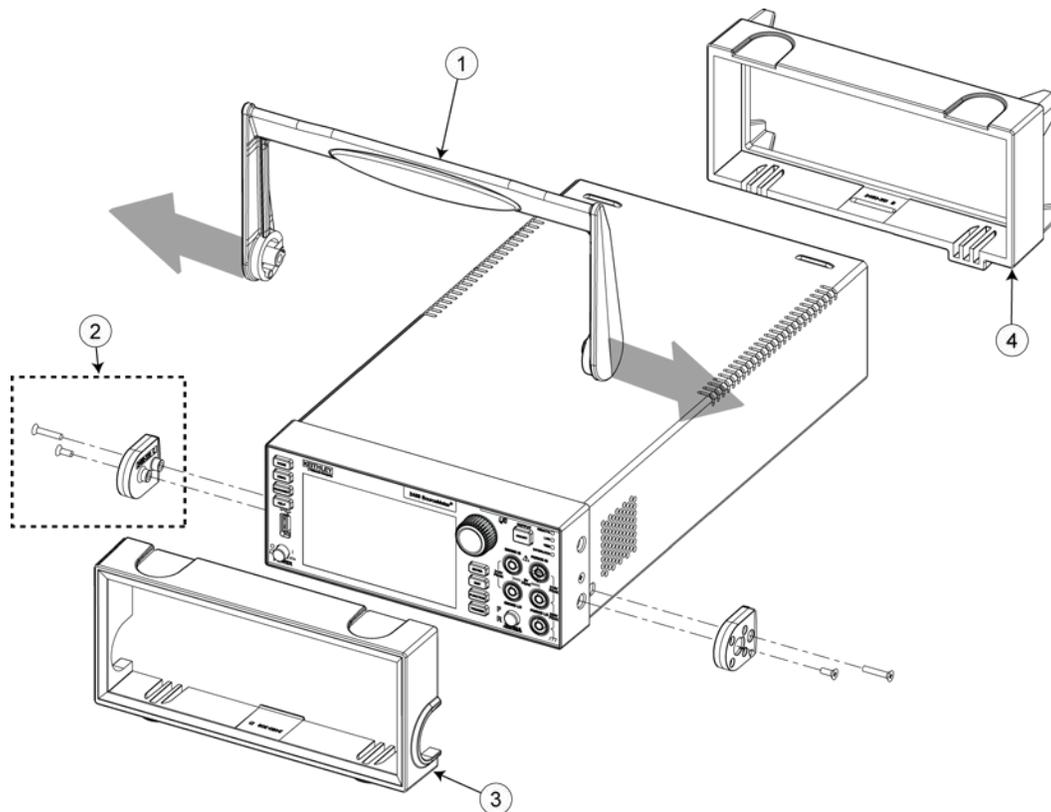
To prepare a Graphical Display instrument for rack mounting, remove the handle and bumpers (if installed), and then install the mounting hardware.

### 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 6: Remove handle and bumpers**



### Remove the handle, bumpers, and feet from the 26xx

Prepare the 26xx for mounting by removing the handle, mounting ears, and both rear feet.

**To remove the handle, mounting ears, and rear feet:**

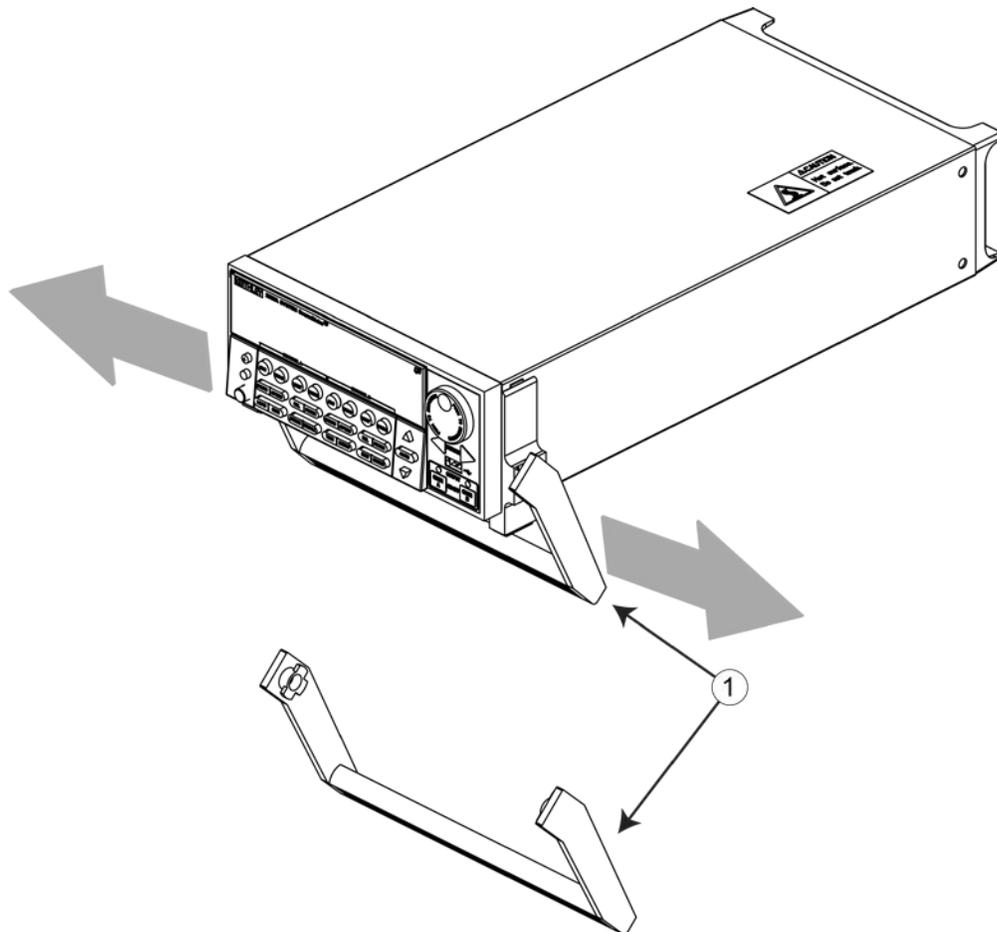
1. Gently pull the handle away from the sides of the instrument case and swing it below the bottom of the case and back until the arrows on the handles line up with the arrows on the mounting ears (1); see the figure below.

**Figure 7: Line up arrows on handle**



2. After you align the arrows, pull the ends of the handle (1) away from the case.

**Figure 8: Removing the handle**



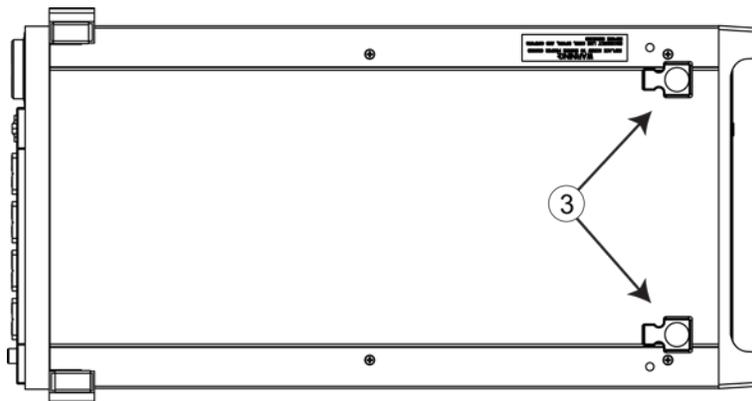
3. Remove the screw that secures each mounting ear (2).

**Figure 9: Remove mounting ears**



4. Pull down and out to remove each ear.
5. From the bottom of the instrument, pull out the rubber feet (4) and remove the screws.

**Figure 10: Remove rubber feet**

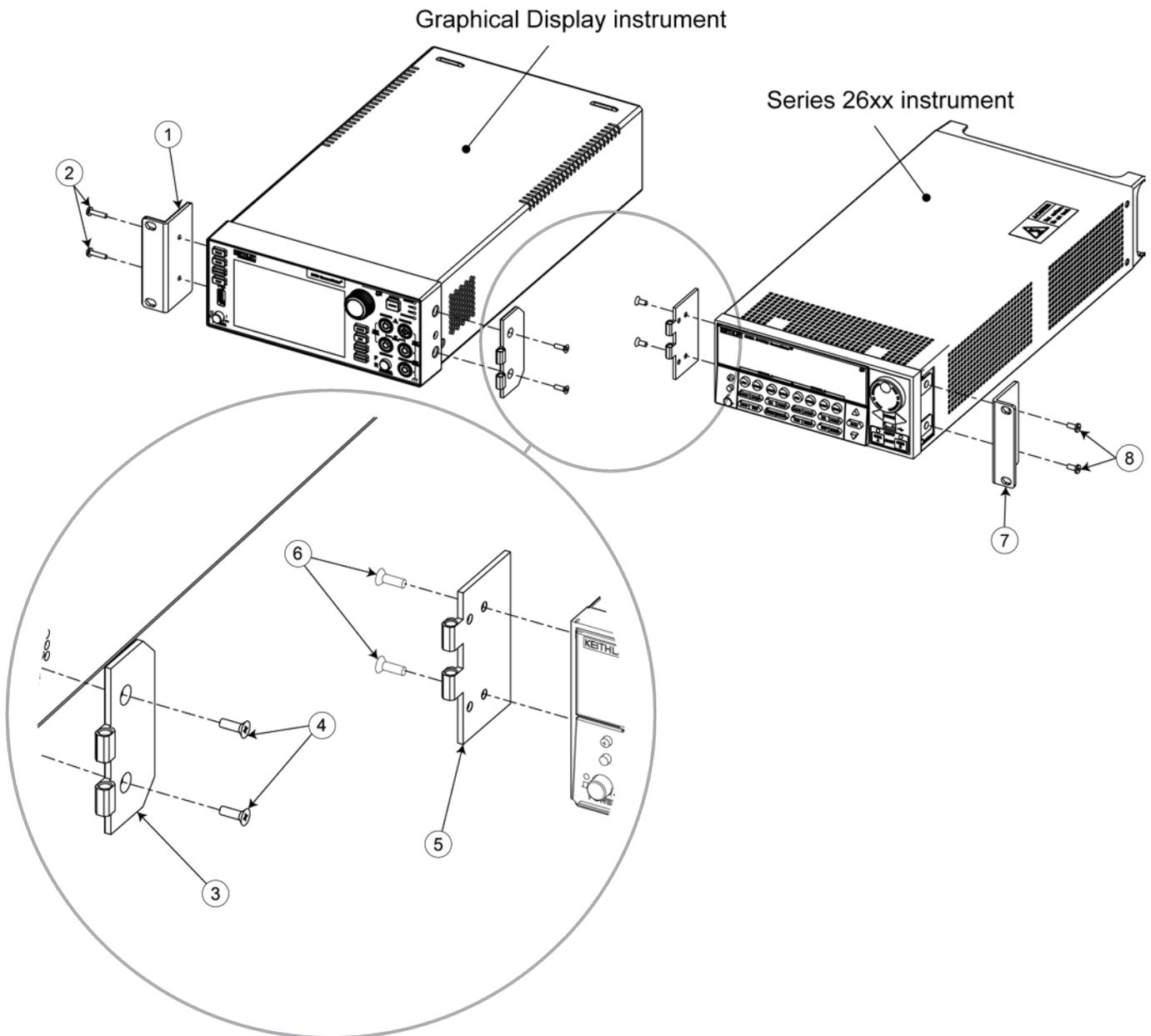


6. Store the handle, bumpers, rubber feet, and hardware for future use.

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

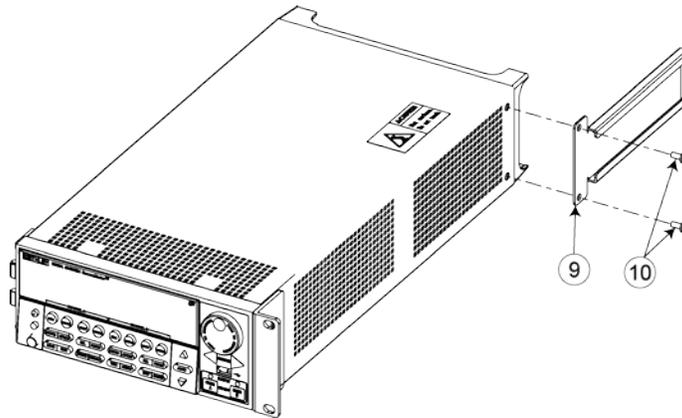
1. Place the instruments side-by-side (see figure).
2. Secure the front-rack ear (1) (2450-360) to the Graphical Display instrument using two 6-32 x 5/8" pan head screws (2) as shown in the figure.
3. Orient the hinge (3) (2450-361) so that the knuckles are toward the front of the Graphical Display instrument.
4. Secure the hinge (3) to the Graphical Display instrument with two 6-32 x 7/16" flat head screws (4).
5. Orient the hinge (5) (2602-328) so that the knuckles are toward the front of the Series 26xx instrument.
6. Secure the hinge (5) to the Series 26xx instrument with two 8-32 x 3/8" flat head screws (6).
7. Secure the front-rack ear (7) (2602-355) to the Series 26xx instrument with two 8-32 x 3/8" pan head screws (8).

**Figure 11: Install mounting hardware on the instruments**



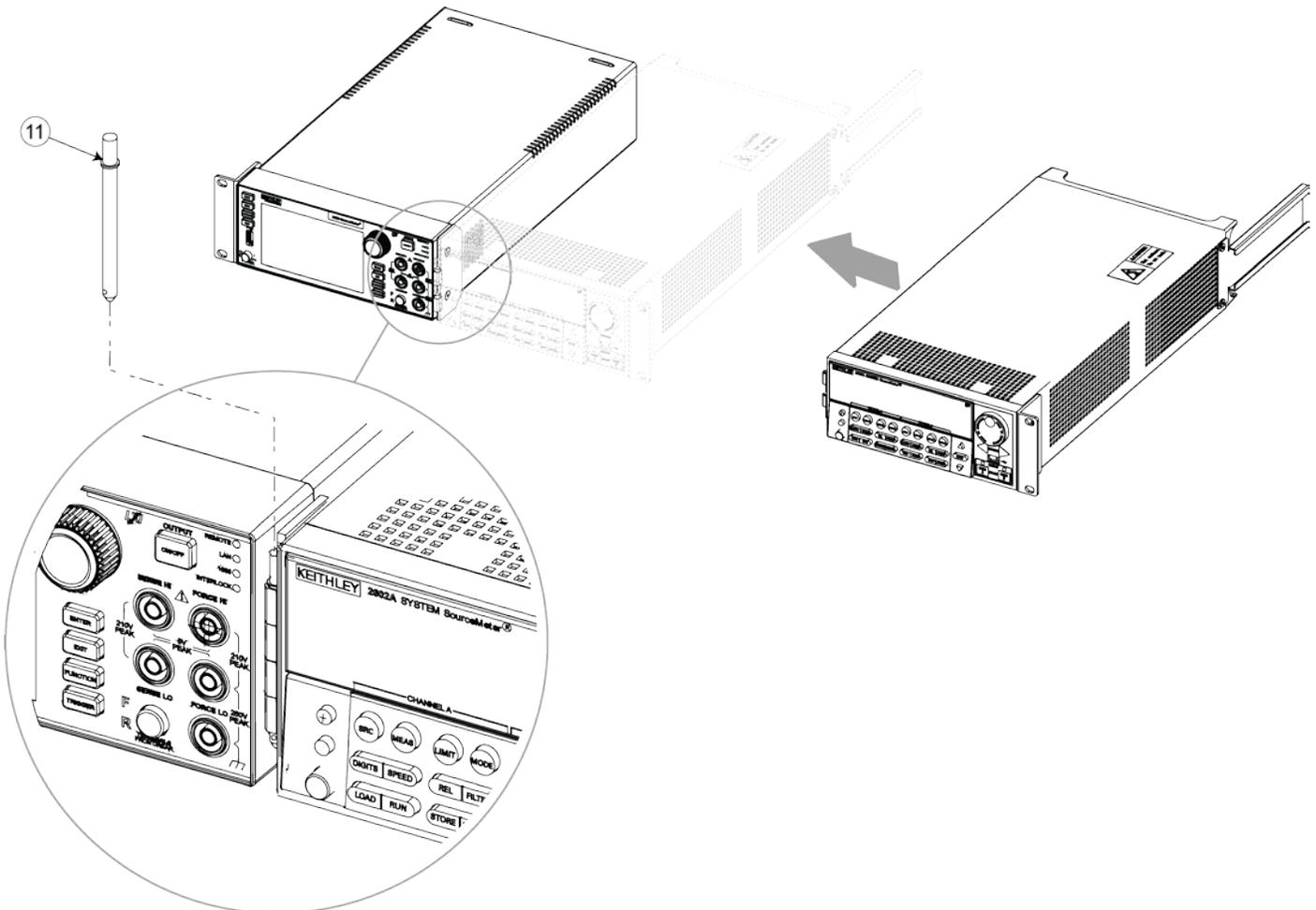
- Secure the rack mount extension arm (9) to the Series 26xx instrument with two 10-32 x 3/8" pan head screws (10).

Figure 12: Install rack mount extension arm



- Set the instruments next to each other.
- Secure them together by inserting the pin (11).

Figure 13: Insert hinge pin

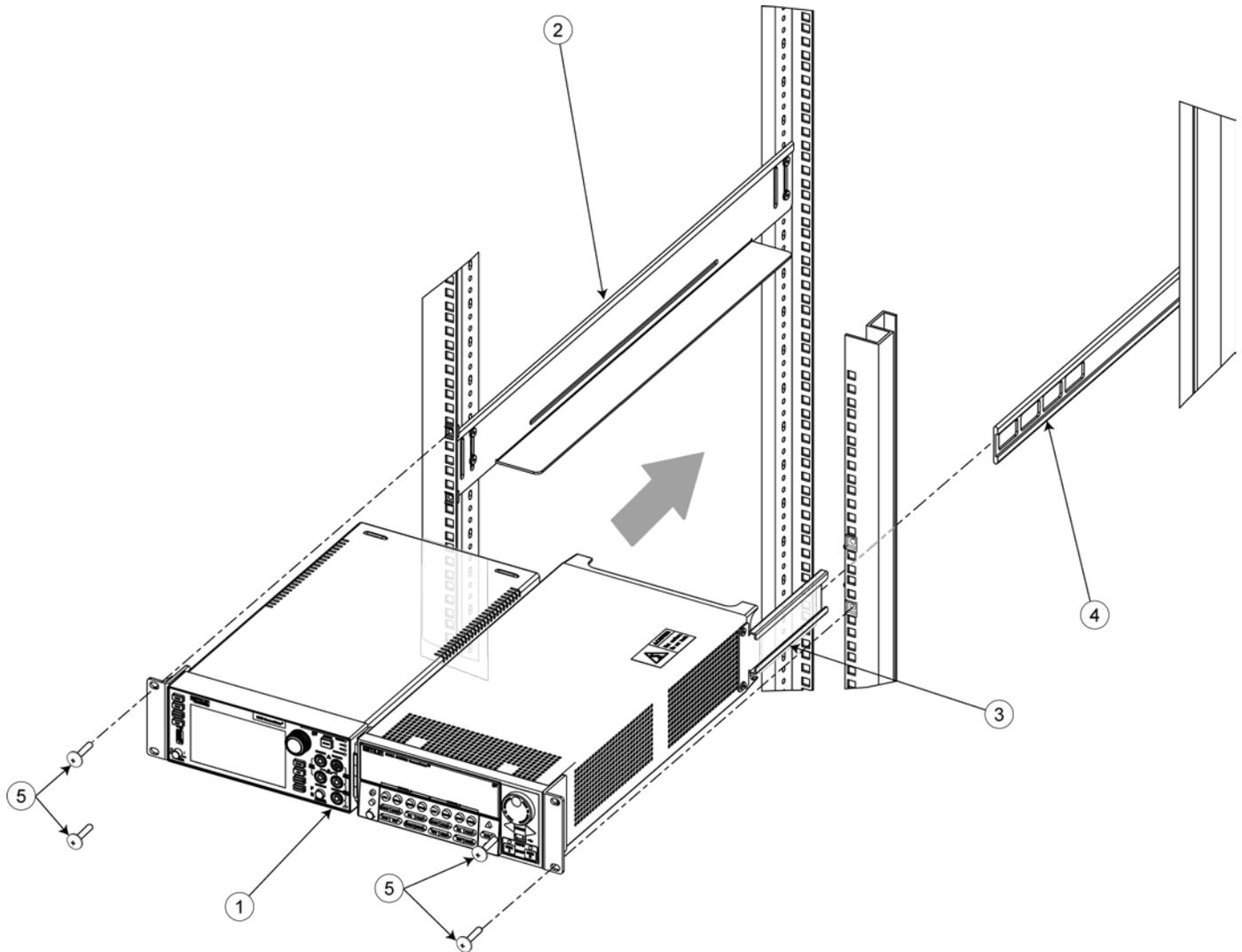


### Step 3. Install the instrument assembly

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

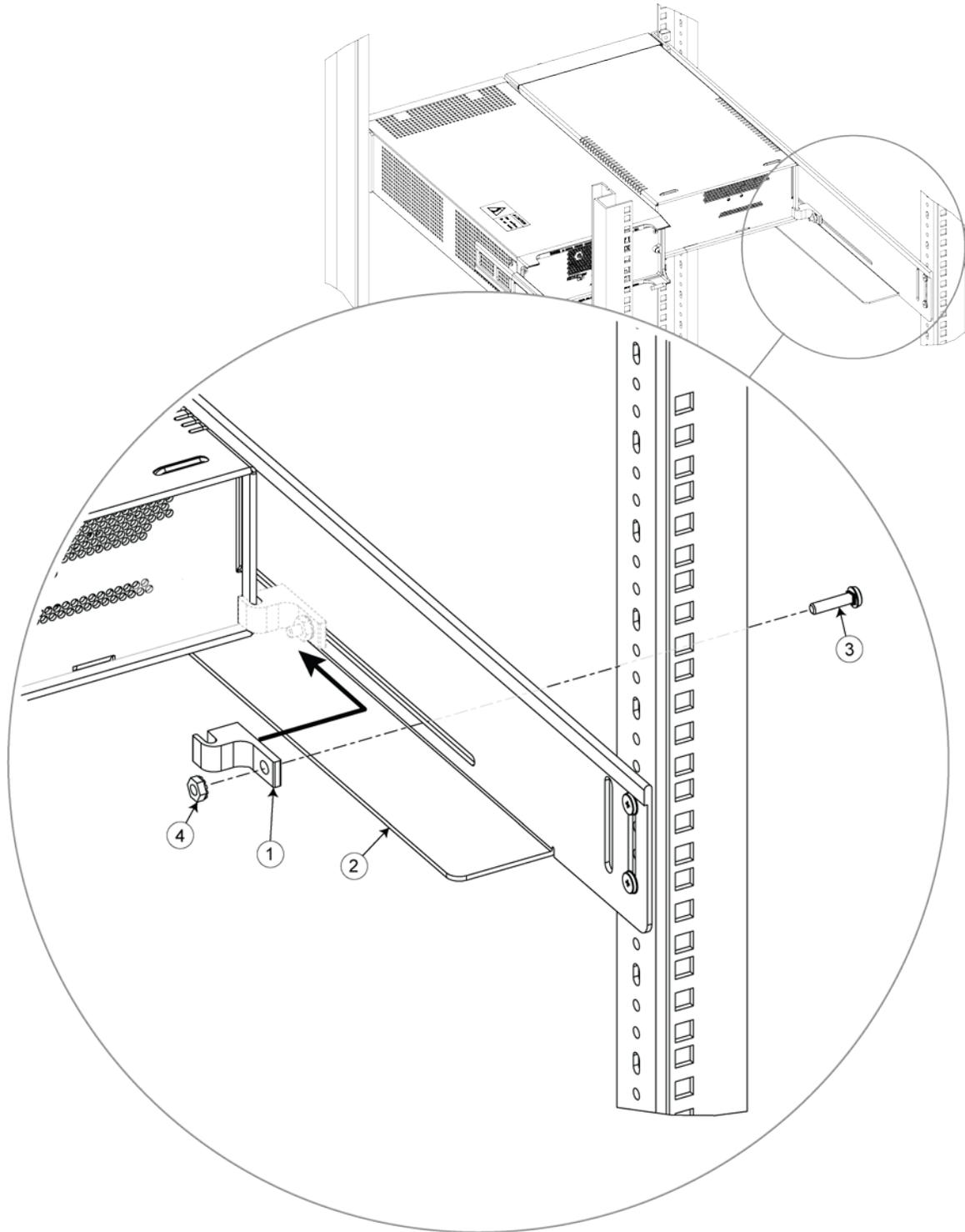
1. Place the Graphical Display instrument assembly (1) in the rack and on the support shelf (2). Make sure to align the rack mount extension arm (3) with the rear-rack mount bracket (4). Keep supporting the instrument assembly until it is secured.
2. Check that the instrument assembly (1) is fully seated.
3. Secure the instrument assembly (1) using 10-32 x 5/8" screws (5) (four places).

**Figure 14: 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).

**Figure 15: Install the shelf clip 4299-10**



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 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 Instruments 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. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.

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.

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

The **CAUTION** heading with the  symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument. Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument 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. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. 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.

Unless otherwise noted in product-specific literature, Keithley Instruments instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.

To clean an instrument, use a cloth dampened with deionized water 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 as of June 2017.