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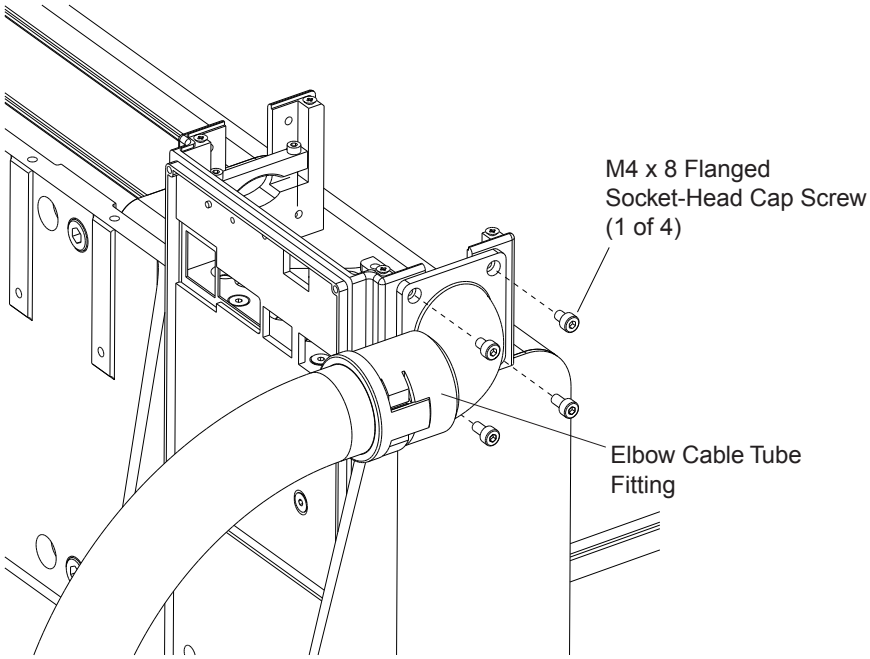


Figure 6-20. R-G(HMZT): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

7. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the R-M module is closest to SmartAmp #1. Tighten the screws on the clamp to secure it.
8. Slide the cable tube support tray into place near the end of the module so that the tube is supported at the end of travel. Tighten the screws on the tray to secure it.

6.9 Installing Cable Tube Assembly for Z-Theta Module

Installing Cable Tube Fitting at SmartAmp #4

1. Locate the Z-Theta cable tube assembly and position it as shown in **Figure 6-21**. Remove the top of the cable tube support clamp on the R-M module.
2. At the open end of mounting bracket #4, remove the cable clamp from inside by removing the two M3 screws. See **Figure 6-18 on page 271** for reference.

   NOTE: Remove the cable clamps at the openings between SmartAmp mounting brackets #2, 3, and 4. Installing these clamps after the wiring is finished is optional.

3. Install the straight fitting on the outside of the mounting bracket #4. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 6-19 on page 272** for reference.

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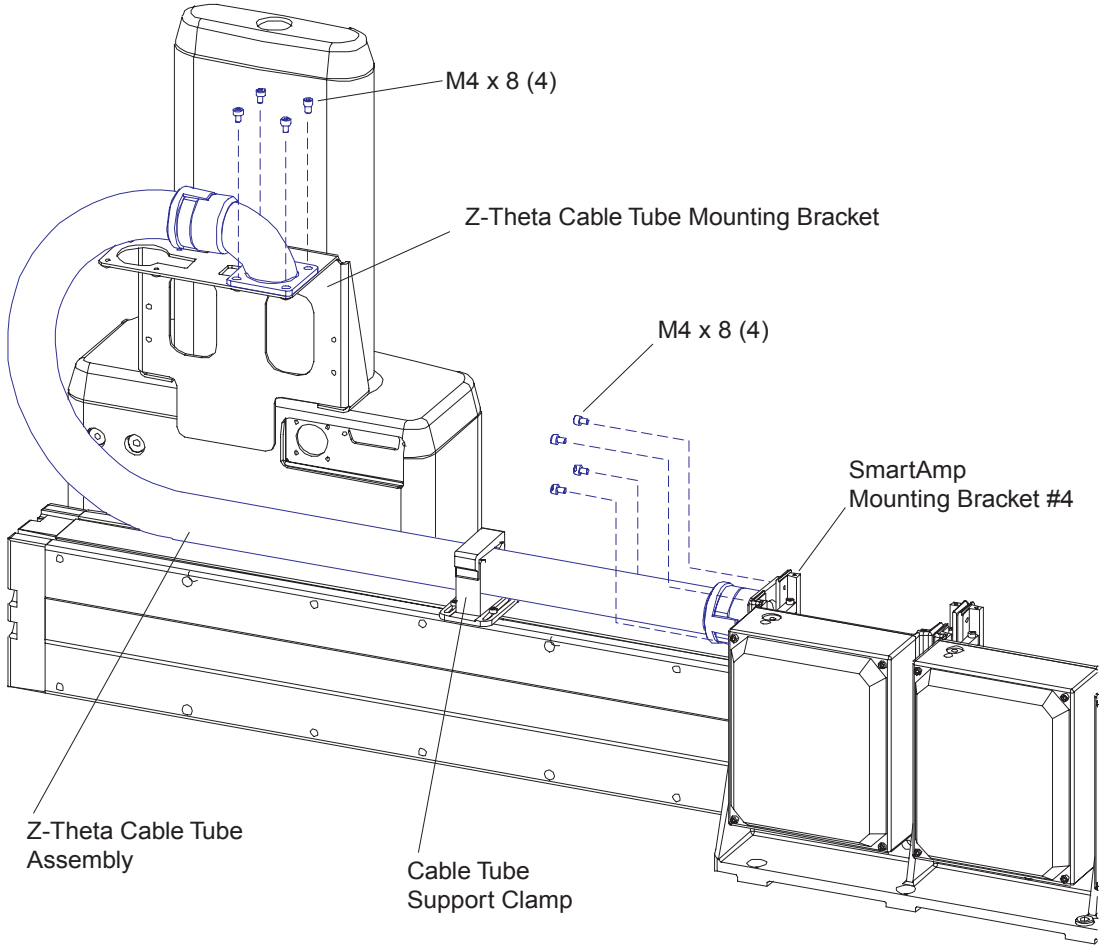


Figure 6-21. R-G(HMZT): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #4

4. In SmartAmp #4, connect these cables (for the Theta-axis):
   - shorter Z-Theta motor cable (labeled Motor #4)
   - shorter Z-Theta encoder cable (labeled Encoder #4)

   See **Figure 6-17 on page 270** for connector locations.
5. In SmartAmp #3, connect these cables (for the Z axis):
   - longer Z-Theta motor cable (labeled Motor #3)
   - longer Z-Theta encoder cable (labeled Encoder #4) and brake cable (labeled Brake #3)
6. Slide the cable clamp into the channel inside the mounting bracket.
7. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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Installing Fitting at Z-Theta Cable Tube Bracket

1. Roll the cable tube assembly up to the Z-theta cable tube bracket as shown in Figure 6-21 on page 274. Slide the cables through the opening in the bracket.
2. Install the elbow fitting onto the Z-theta bracket with four M4 x 8 screws.
3. Connect the motor and encoder cables to the matching connectors on the Z-theta module. Attach the captive screws to secure the encoder connector.
4. Slide the cable tube support clamp to the approximate location as shown in Figure 6-21 on page 274. Tighten the screws to secure the clamp.
5. Snap the cable tube into the clamp.
6. Replace the top of the cable tube support clamp.

6.10 Connecting Cables Between SmartAmps #2, #3, and #4

1. Install a short IEEE 1394 cable between SmartAmp #2 and #3, and a second cable between SmartAmp #3 and #4. See Figure 6-17 on page 270.
2. Install a short AC power cable between SmartAmp #2 and #3 and connect the ground ring lug to the grounding pad at each location.
3. Install another short AC power cable between SmartAmp #3 and #4 and connect the ground ring lug to the ground screw hole at each location.
4. Install a short 24VDC cable between SmartAmp #2 and #3, and a second short 24VDC cable between SmartAmp #3 and #4.

6.11 Connecting Cables from Controller to SmartAmp #1

See "Connecting Cables from Controller to SmartAmp #1" on page 51 for instructions.

6.12 Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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Installing Optional R-Series Equipment 7

7.1 Introduction

This chapter details how to assemble the optional equipment available for the Adept R-Series SmartModules systems. The optional equipment includes:

- Extended X-Axis
- Extended Y-Axis
- Gantry Support Module
- Cleanroom Equipment

Precautions

Observe the following precautions when configuring modules:

1. When assembling cables, avoid applying unreasonable force to cables.
2. Before applying power, check for correct cable connections.



WARNING: Improper connection may result in damage to the controller or module motor.

Mounting Screw Torque Specifications

When mounting screws used to install modules, mounting plates, and other components, apply the amount of torque specified in **Table 3-1 on page 43** and **Table 3-2 on page 44**.

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7.2 Extended X-Axis Installation Procedure

Overview

This section describes the process of installing an extended X-axis. In the standard X-axis configuration, the motor is in-line with the module. In the extended X-axis configuration, the motor is on the side of the module. The steps for installing the extended X-axis are very similar to the steps for installing a standard X-axis.

Installing the Extended X-Axis Module

The extended X-axis option is available in R-H- and R-M-module configurations. The extended X-axis module is typically mounted to the work surface. For information on installing the extended X-axis module, see the section on installing the R-H module or R-M module, that appears in the system-specific installation section in this manual. For example, to install the extended X-axis on an R-G(HH) system, see **"Installing the First R-H Module" on page 68**; to install the extended X-axis on an R-G(MSzr) system, see **"Installing the R-M Module" on page 96**.

Installing Adept SmartAmp #1

Installing SmartAmp #1 on the Extended X-Axis Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Install the mounting bracket onto the extended X-axis module's motor cover using four M4 x 10 flathead screws; see **Figure 7-1 on page 279**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the extended X-axis module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

3. Install the SmartAmp onto the mounting bracket using four M3 x 40 screws. See **Figure 7-2 on page 279**.
4. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 7-3 on page 280**. Attach the captive screws to secure the encoder connector.

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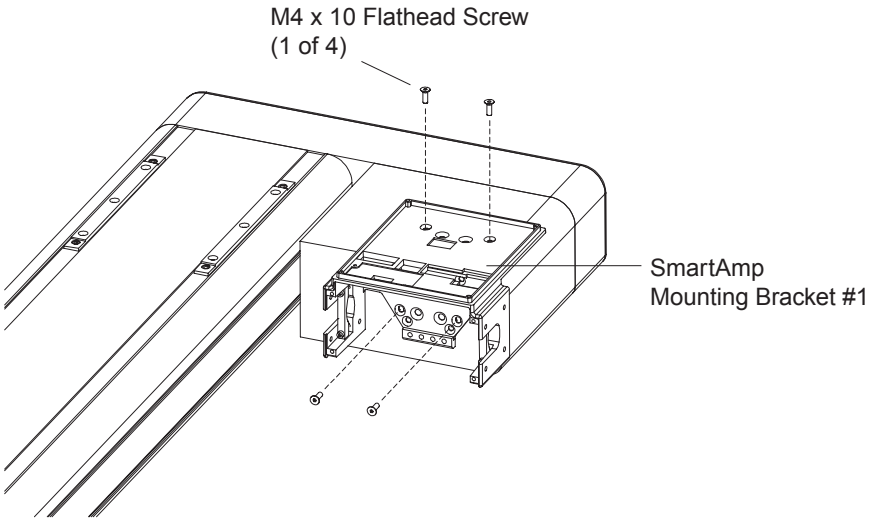


Figure 7-1. Installing SmartAmp Mounting Bracket #1

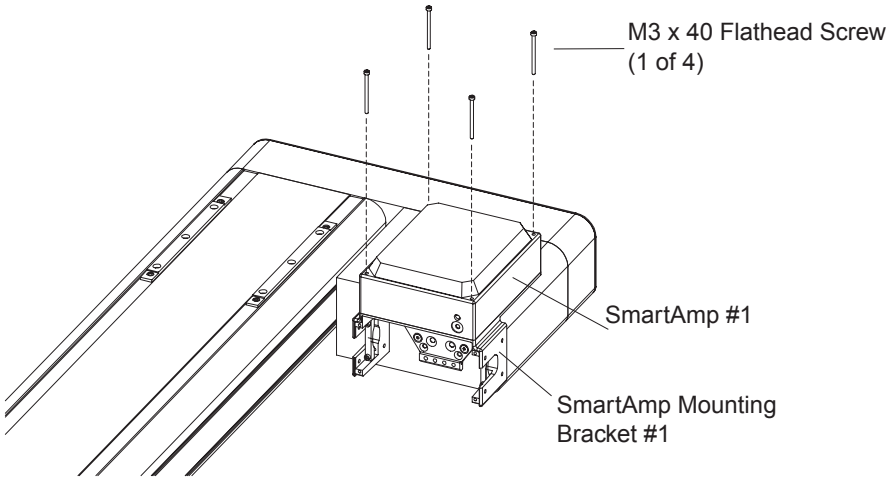


Figure 7-2. Installing SmartAmp #1

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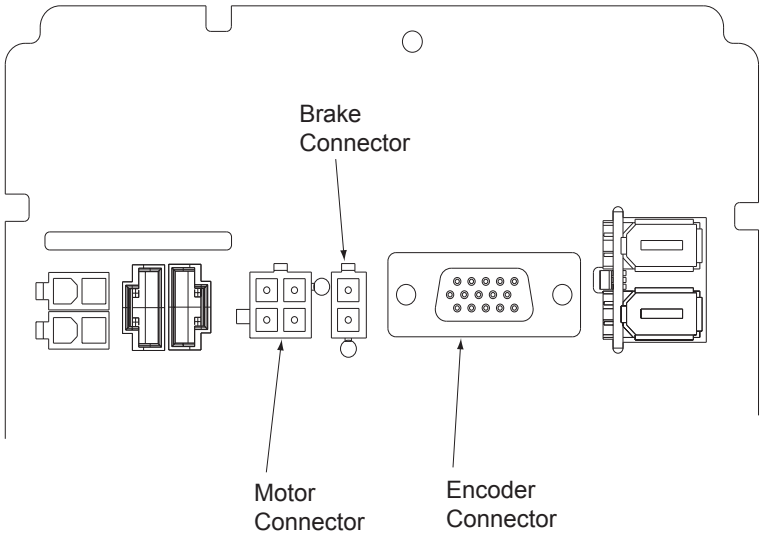


Figure 7-3. Connecting Cables to the SmartAmp

Installing Cable Tube Assembly Between Amp #1 and Amp #2

NOTE: For multi-axis systems, a cable tube assembly must be installed between SmartAmp #1 and SmartAmp #2. For single-axis systems, such as the R-H, a cable tube assembly is not required. Users of a single-axis system may skip this entire section. See the system-specific section in this manual for information on how to complete the system installation.

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 7-4 on page 281**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.

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3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

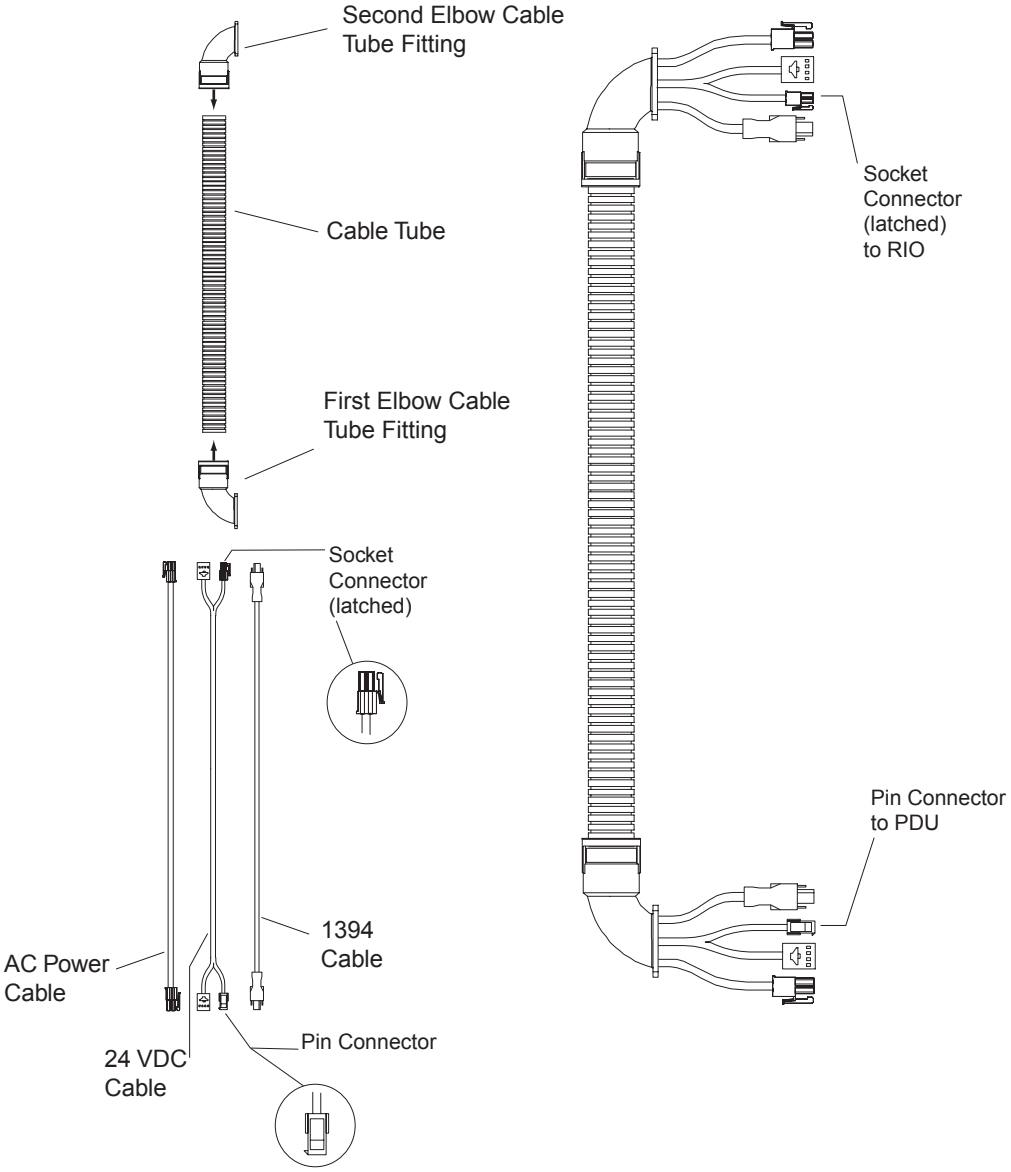


Figure 7-4. Cable Tube Assembly (Two Elbow Fittings)

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Installing Cable Tube Fittings on Cable Tube

NOTE: For both cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate one of the elbow cable tube fittings.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the cable tube fitting with the 24V pin connector on SmartAmp #1; install the other cable tube fitting onto SmartAmp #2. See **Figure 7-4 on page 281**.

2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 7-4 on page 281**.
3. Locate the other elbow cable tube fitting.
4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 7-5 on page 283**.

   NOTE: **Figure 7-5** shows a straight cable tube fitting instead of the elbow cable tube fitting used on the extended X-axis. However, the illustration of the cable clamp is correct.

2. Position the cable tube assembly next to the extended X-axis module with the pin connector end of the 24V cable near SmartAmp #1.
3. Install the cable fitting on the outside of the mounting bracket. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 7-6 on page 283**.
4. In SmartAmp #1, connect these cables:

   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 7-7 on page 284**.

5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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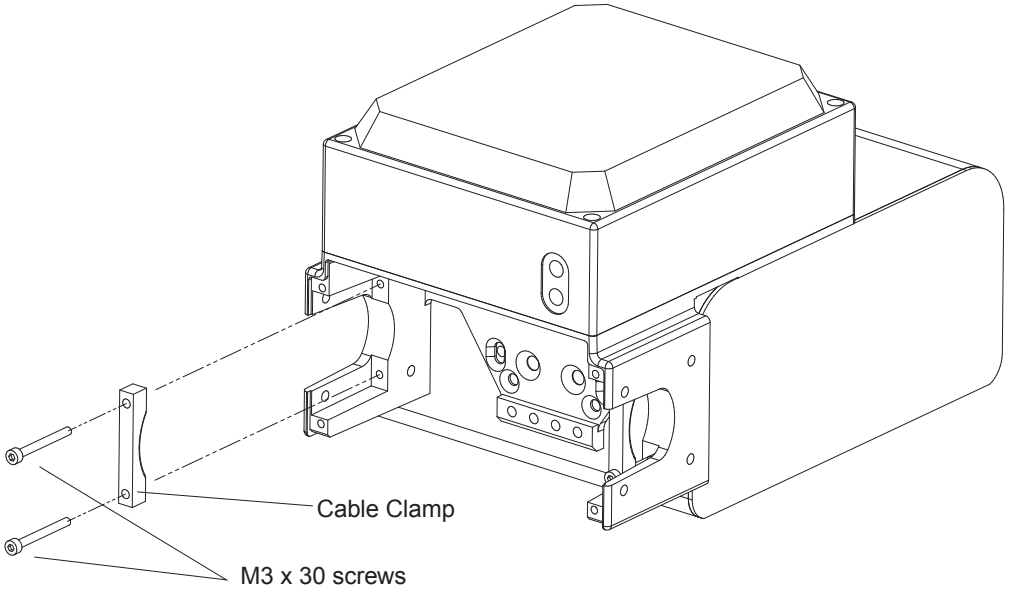


Figure 7-5. Removing the Cable Clamp

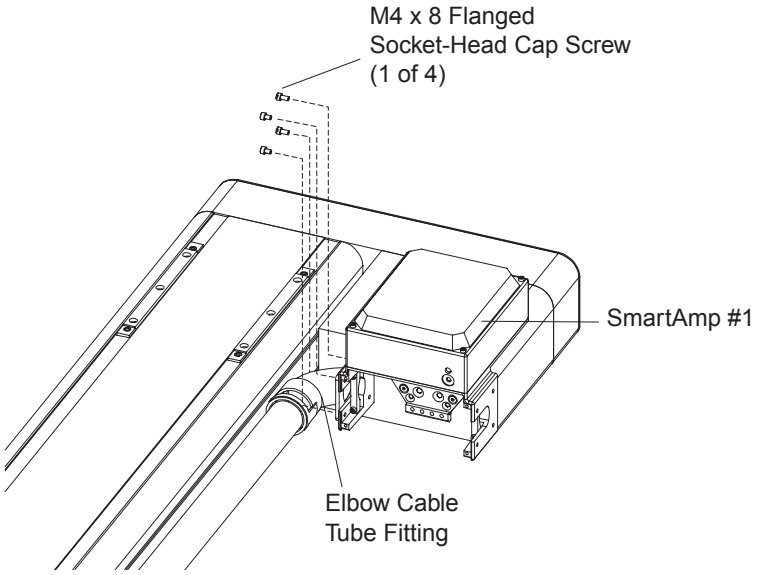


Figure 7-6. installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

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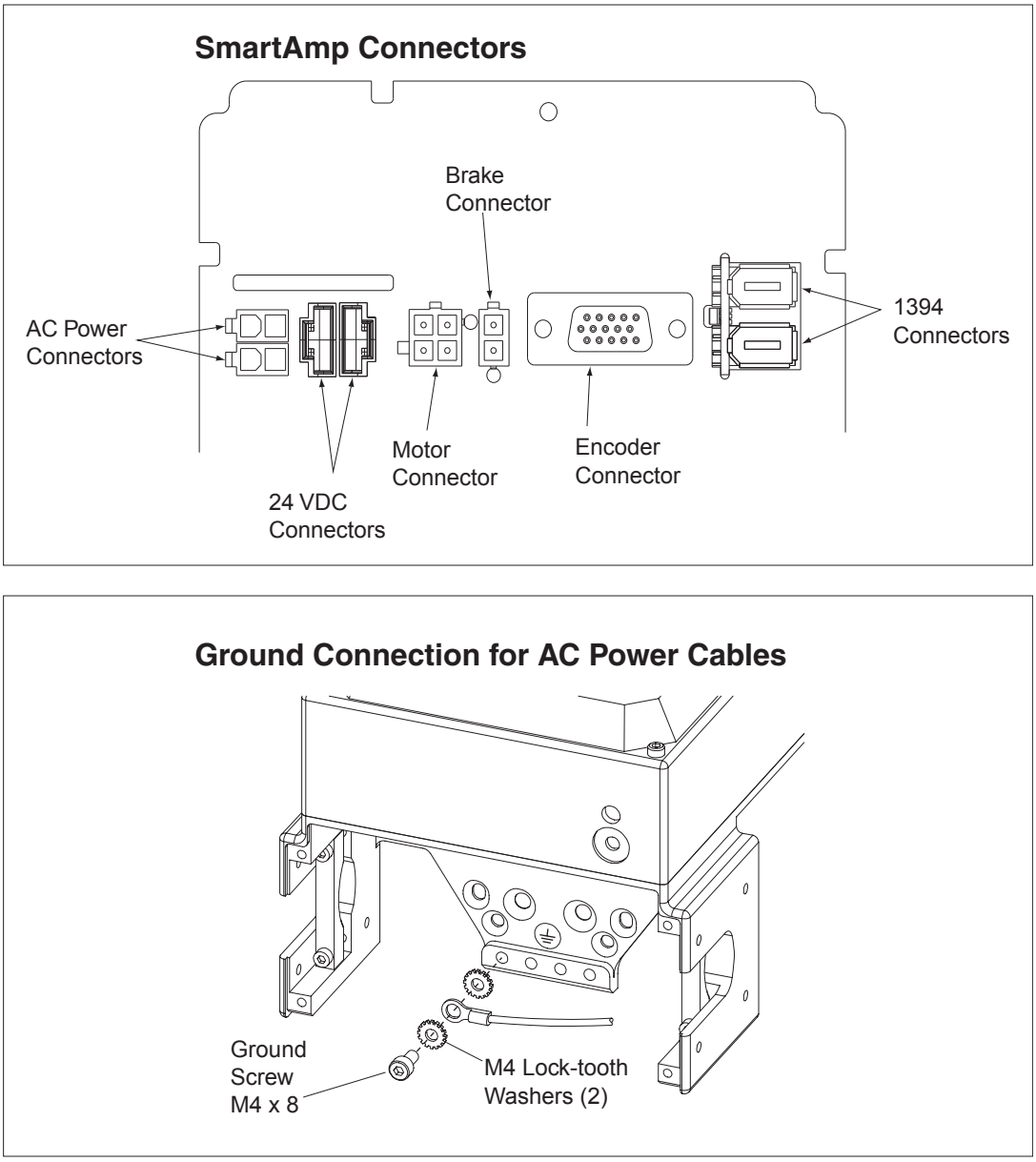


Figure 7-7. Connecting Cables to SmartAmp

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

See the section appropriate for your system (R-G(HH), R-G(HM), R-P(HHMz), and so on) in this manual for instructions on how to install the other cable tube fitting.

Connecting Cables from Controller to SmartAmp #1

See "Connecting Cables from Controller to SmartAmp #1" on page 51 for instructions.

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Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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7.3 Extended Y-Axis Installation Procedure

Overview

This section describes the process of installing an extended Y-axis. In the standard Y-axis configuration, the motor is in-line with the module. In the extended Y-axis configuration, the motor is on the side of the module. The steps for installing the extended Y-axis are very similar to the steps for installing a standard Y-axis.

The extended Y-Axis option is available in R-H and R-M module configurations.

Installing the Extended Y-Axis Module

To install the extended Y-axis:

1. Perform the steps for installing the X- and Y-axis modules that appear in the system-specific section in this manual. To install the modules on an R-G(HH) system, see **"Installing the First R-H Module" on page 68**, **"Installing Alignment Pins on R-GHH Combining Bracket" on page 69** and **"Installing the Second R-H Module" on page 71**. To install the modules on an R-G(HM) system, see **"Installing the R-H Module" on page 87**, **"Installing Alignment Pins on R-GHM Combining Bracket" on page 87**, and **"Installing the R-M Module" on page 89**.
2. Perform the steps for installing SmartAmp #1 that appear in the system-specific section in this manual. To install SmartAmp #1 on a standard X-axis module, see **"Installing SmartAmp #1 on First R-H Module" on page 72**; to install SmartAmp #1 on an extended X-axis module, see **"Installing SmartAmp #1 on the Extended X-Axis Module" on page 278**.
3. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
4. Install the mounting bracket onto the extended Y-axis module using four M4 x 10 flathead screws. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the extended Y-axis, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #2 onto the mounting bracket.

5. Install a SmartAmp onto the mounting bracket using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. **Figure 7-9 on page 287** shows the SmartAmp mounting bracket and SmartAmp correctly mounted on an extended Y-axis R-M module. (For R-G(HH) systems, the extended Y-axis module is an R-H module.)
6. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 7-3 on page 280**. Attach the captive screws to secure the encoder connector.
7. Install the cable tube support bracket on the combining bracket using four M4 x 8 screws. See **Figure 7-8** and **Figure 7-9 on page 287**.

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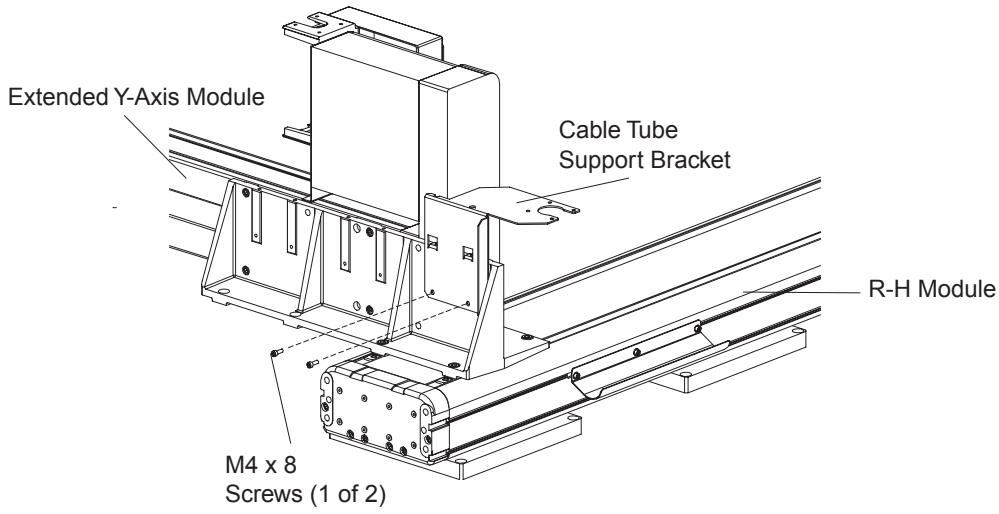


Figure 7-8. Installing Cable Tube Support Bracket (1)

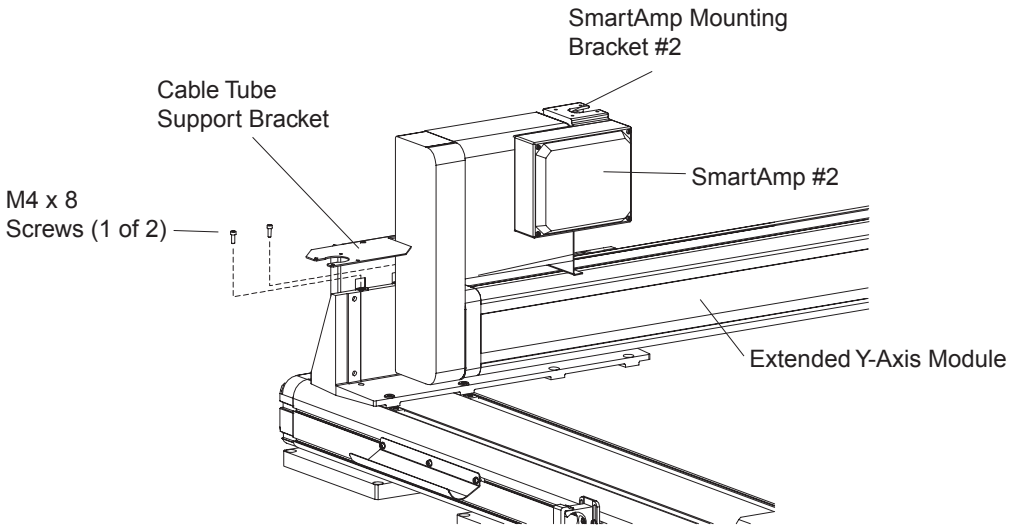


Figure 7-9. Installing Cable Tube Support Bracket (2)

8. See **"Installing the Cable Tube Support Clamp on R-H Module" on page 76** and **"Installing the Cable Tube Support Tray" on page 77** for information on how to install the cable tube support clamp and cable tube support tray on the R-H module (the first R-H module for the R-G(HH) system).

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Installing Cable Tube Assembly Between Amp #1 and Amp #2

The procedure to install cables consists of these steps:

- install cable tube fittings on cable tube
- route cables through the cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Installing Cable Tube Fittings on Cable Tube

The extended Y-axis cable tube assembly consists of two cable tubes. Each cable tube requires a straight and an elbow cable tube fitting.

> **NOTE:** For all cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate the longer of the two cable tubes.
2. Locate one of the straight cable tube fittings.

   > **NOTE:** For extended X-axis systems, the long cable tube requires an elbow fitting on each end.

3. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 7-10 on page 289**.
4. Locate one of the elbow cable tube fittings.
5. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.
6. Locate the other (shorter) cable tube and repeat the above steps to install a straight cable tube fitting on one end and an elbow fitting on the other end.

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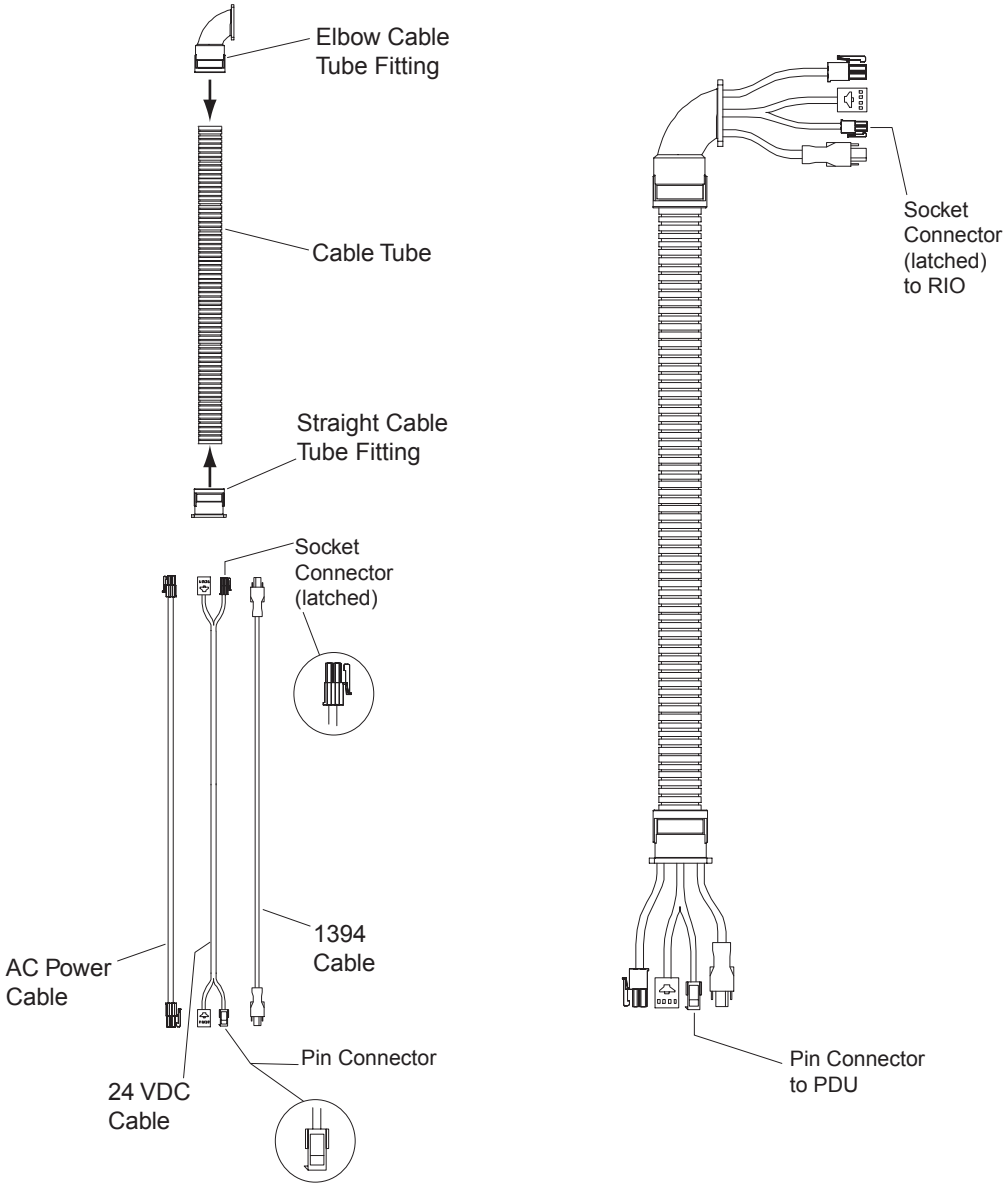


Figure 7-10. Cable Tube Assembly (One Straight/One Elbow Fitting)

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 7-10**.

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NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the cable tube fitting with the 24V pin connector on SmartAmp #1; install the other end of this and the other cables onto SmartAmp #2. See **Figure 7-10 on page 289**.

2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Roughly assemble the two cable tube assemblies in the way shown in **Figure 7-11 on page 291**. In other words, place the two cable tube assemblies together, with the long cable tube's elbow fitting meeting the straight fitting on the short cable tube.
4. Gently pull the cables through the tube until they are evenly spaced at each end. Make sure the 24V pin connector is near the straight fitting on the long cable tube. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

See **"Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1" on page 80** for information. Make sure to attach the cable tube fitting with the 24V pin connector to SmartAmp #1.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

1. Remove the cable clamp from inside SmartAmp mounting bracket #2 by removing the two M3 screws.
2. Rest the long cable tube in the support tray. Fold the cable tube up 180 degrees so the cables go through the opening in the cable tube support bracket. The elbow fitting on the long cable tube should be positioned at the bottom of the cable tube support bracket and the short cable tube's straight fitting should be positioned on top. Align the holes on the two fitting clamps. See **Figure 7-11 on page 291**.
3. Use four M4 x 14 screws and four M4 washers and nuts to connect the two cable tube fittings. See **Figure 7-11**.
4. Install the short cable tube's elbow fitting on the outside of SmartAmp mounting bracket #2 (on the extended Y-axis). See **Figure 7-11**. Use four M4 x 8 screws to secure the fitting to the mounting bracket.
5. In SmartAmp #2, connect these cables (see **Figure 7-7 on page 284**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
6. Slide the cable clamp into the channel inside the mounting bracket.
7. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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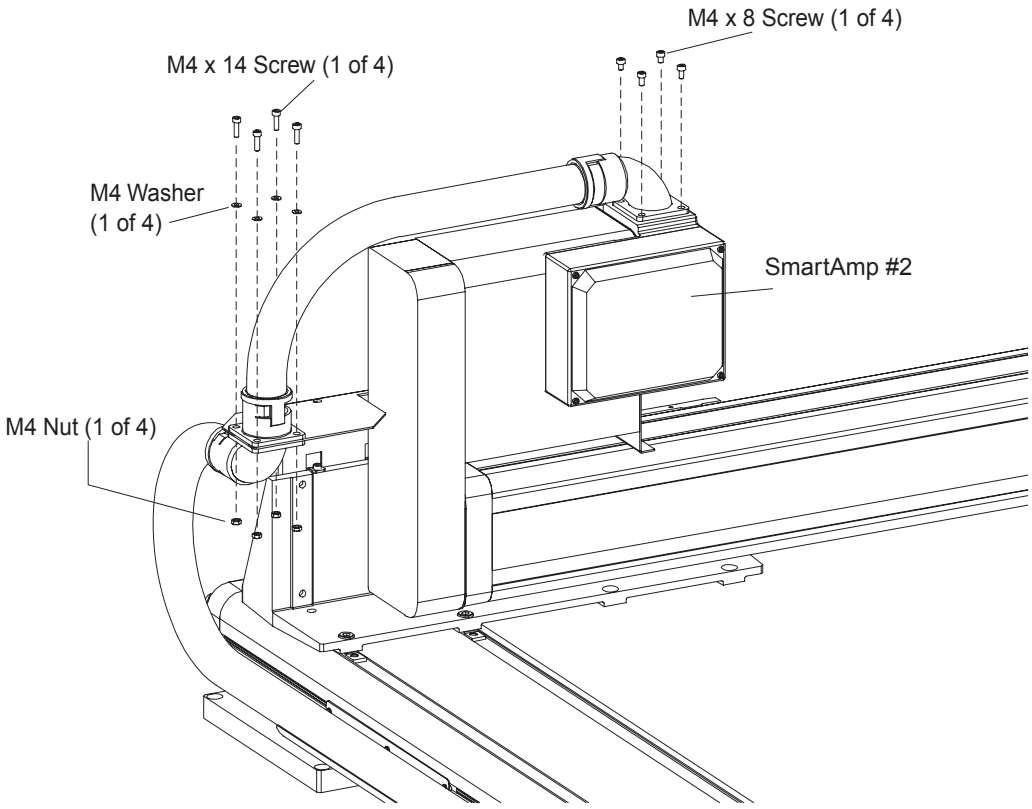


Figure 7-11. Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

8. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the other module is closest to SmartAmp #1. Tighten the screws on the clamp to secure it.
9. Slide the cable tube support tray into place near the end of the module so that the tube is supported at the end of travel. Tighten the screws on the tray to secure it.

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7.4 Gantry Support Module Installation Procedure

Overview

This section describes the process of installing the optional Gantry Support Module. The Gantry Support Module supports one end of the Y-axis module on certain systems. The Gantry Support Module is available in R-H- and R-M-module configurations.

Installing the Gantry Support Module

To install the support module:

1. Install the Gantry Support Bracket on the Y-axis module. Use four M8 x 25 screws for Y-axis R-H modules (for example, R-G(HH) systems); use four M6 x 20 screws for Y-axis R-M modules (for example, R-G(HM) systems). See **Figure 7-12** and **Figure 7-13**.

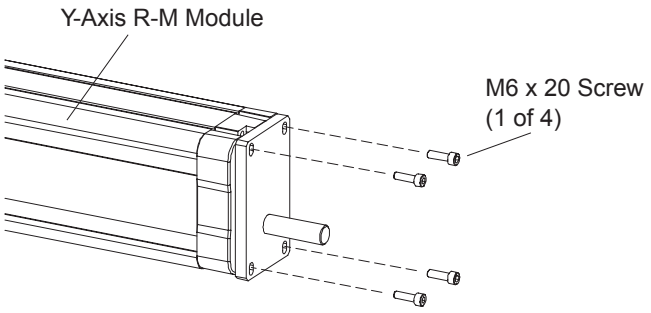


Figure 7-12. Installing the Gantry Support Bracket, Y-Axis R-M Module

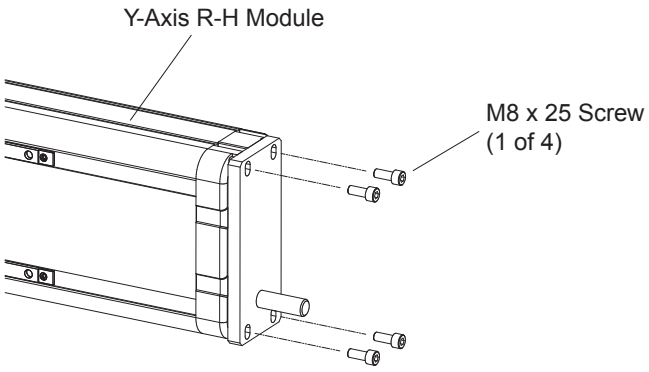


Figure 7-13. Installing the Gantry Support Bracket, Y-Axis R-H Module

2. Install three mounting plates to the under side of the Gantry Support Module using four M5 x 16 screws per mounting bracket. See **Figure 7-14**.

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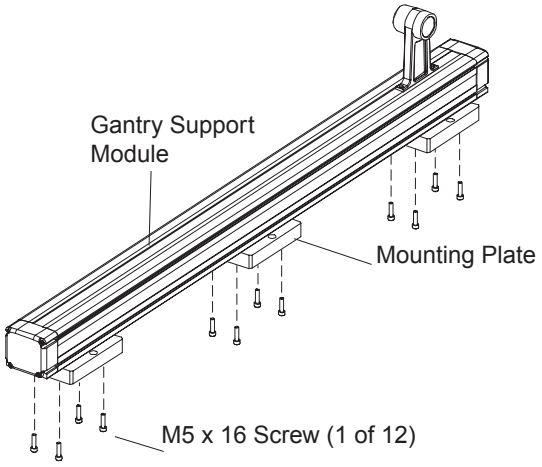


Figure 7-14. Installing the Gantry Support Module

3. Insert the pin on the Gantry Support Bracket into the mating hole in the Gantry Support Module. See **Figure 7-15**.

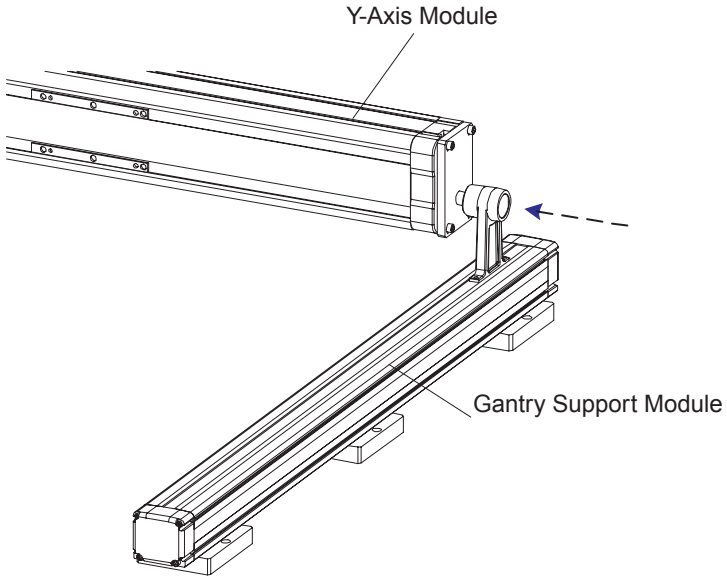


Figure 7-15. Connecting Y-Axis Module to Gantry Support Module

4. Prepare the work surface by drilling and tapping six M6 holes for the mounting plates. See "**Chapter 10** - Technical Specifications" for dimensions of the Gantry Support Module and the plates.
5. Mount the Gantry Support Module to the work surface using two M6 socket head cap screws per mounting plate.

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7.5 Cleanroom Equipment Installation Procedure

Cleanroom versions are available for the following R-Series modules: R-H, R-M, R-Mz, and R-Sz. These modules meet Class 10 Airborne Particulate Cleanliness Limits, as defined by Federal Standard 209E. Cleanroom modules provide two elbow fittings that can be connected to a vacuum source via air (pneumatic) lines to help remove particles from within the module.

The Cleanroom Air Kit includes a length of pneumatic tubing and some extra fittings for connecting the modules to the vacuum source.

Prior to installing the air lines, do the following for all types of systems:

- Follow the system-specific instructions in this manual for installing the modules, SmartAmp mounting brackets, and SmartAmps (and if applicable, the cable tube support clamps and trays).
- Cut two sections of pneumatic tubing per cleanroom module to use for the air lines. Make sure the air lines are long enough to extend from the vacuum source to the modules when routed through the cable tubes.

When installing the cleanroom modules, note the following.

- To maintain Class 10 cleanliness, make sure that the module speed does not exceed 400 mm/sec.
- Supply 75 liters/minute of air flow from the vacuum source at the point where the air lines enter the module. Note that due to air loss along the lengths of tubing, it might be necessary to supply more than 75 liters/minute from the vacuum source to achieve this level at the module entry point.

Installing Air Lines on One-Axis Systems

For one-axis systems, simply connect two air lines between the vacuum source and the two elbow connectors on the module.

Installing Air Lines on Two-Axis Systems

Perform the steps below to connect air lines to a two-axis, cleanroom system.

1. Connect two air lines to the vacuum source.
2. Connect the other ends of the air lines to the two elbow fittings on the first module (the module on which SmartAmp #1 is mounted).
3. Connect two more air lines to the vacuum source.
4. Route the second set of air lines through one of the openings in SmartAmp mounting bracket #1. (In general, use the opening closest to the controller; the other end is used to connect the cable tube assembly between SmartAmp #1 and SmartAmp #2.)
5. Continue routing the second set of air lines through the cable tube assembly used to connect SmartAmp #1 to SmartAmp #2 (see the system-specific section of this manual for information on routing cables and assembling cable tubes).

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6. Follow the system-specific instructions in this manual for attaching the cable tube assembly to SmartAmp mounting bracket #1 and connecting the electrical cables to SmartAmp #1.
7. Route the cable tube assembly containing the second set of air lines to SmartAmp mounting bracket #2.
8. Follow the system-specific instructions in this manual for connecting the cable tube assembly to SmartAmp mounting bracket #2 and the electrical cables to SmartAmp #2 and for completing the system installation.
9. Connect the ends of the second set of air lines to the elbow fittings on the second module (the module on which SmartAmp #2 is mounted).

Installing Air Lines on Three-Axis Systems

For three-axis systems, perform the steps below to attach air lines to the three modules.

1. Connect one set of air lines between the vacuum source and the first module.
2. Connect a second and third set of air lines to the vacuum source and route the air lines inside SmartAmp mounting bracket #1 and through the first cable tube assembly. Follow the system-specific instructions in this manual for routing cables and connecting cable tube assemblies.
3. Route the third set of air lines inside SmartAmp mounting bracket #2 and through the second cable tube assembly.
4. Connect the second set of air lines to the two elbow connectors on the second module.
5. Connect the third set of air lines to the two elbow connectors on the third module.
6. Follow the system-specific instructions in this manual for connecting the cable tube assemblies to the SmartAmp mounting brackets and electrical cables to the SmartAmps and for completing the installation.

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Installing V-Series Configurations 8

8.1 Introduction

This chapter details how to assemble the one-, two-, and three-axis V-Series Adept SmartModules systems.

Precautions

Observe the following precautions when configuring modules in multi-axis combinations:

1. When assembling cables, avoid applying unreasonable force to cables.

   NOTE: Combinations other than those illustrated are possible.

2. Before applying power, check for correct cable connections.



WARNING: Improper connection may result in damage to the controller or module motor.

Mounting Screw Torque Specifications

When mounting screws used to install modules, mounting plates, and other components, apply the amount of torque specified in **Table 3-1 on page 43** and **Table 3-2 on page 44**.

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8.2 V-H and V-M Installation Procedure

Overview

This section describes the process of installing the one-axis V-H and V-M Adept SmartModules systems. The steps for installing these two systems are very similar; the differences are called out in the instructions. The V-H configuration consists of one V-H module; the V-M system consists of a V-M module. Each configuration (V-H and V-M) has a SmartAmp and a SmartAmp mounting bracket. See **Figure 8-1** for an overview of the V-H system components; see **Figure 8-2 on page 299** for an overview of the V-M system components.

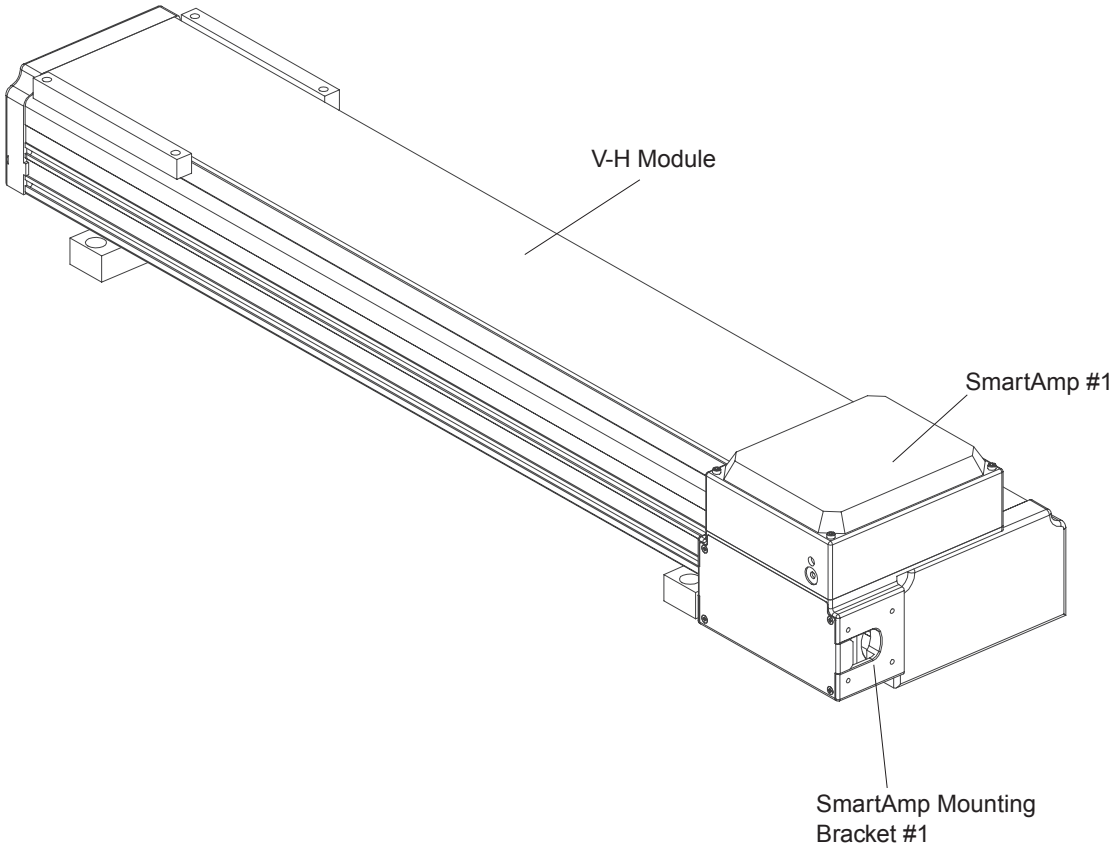


Figure 8-1. V-H: System Component Overview

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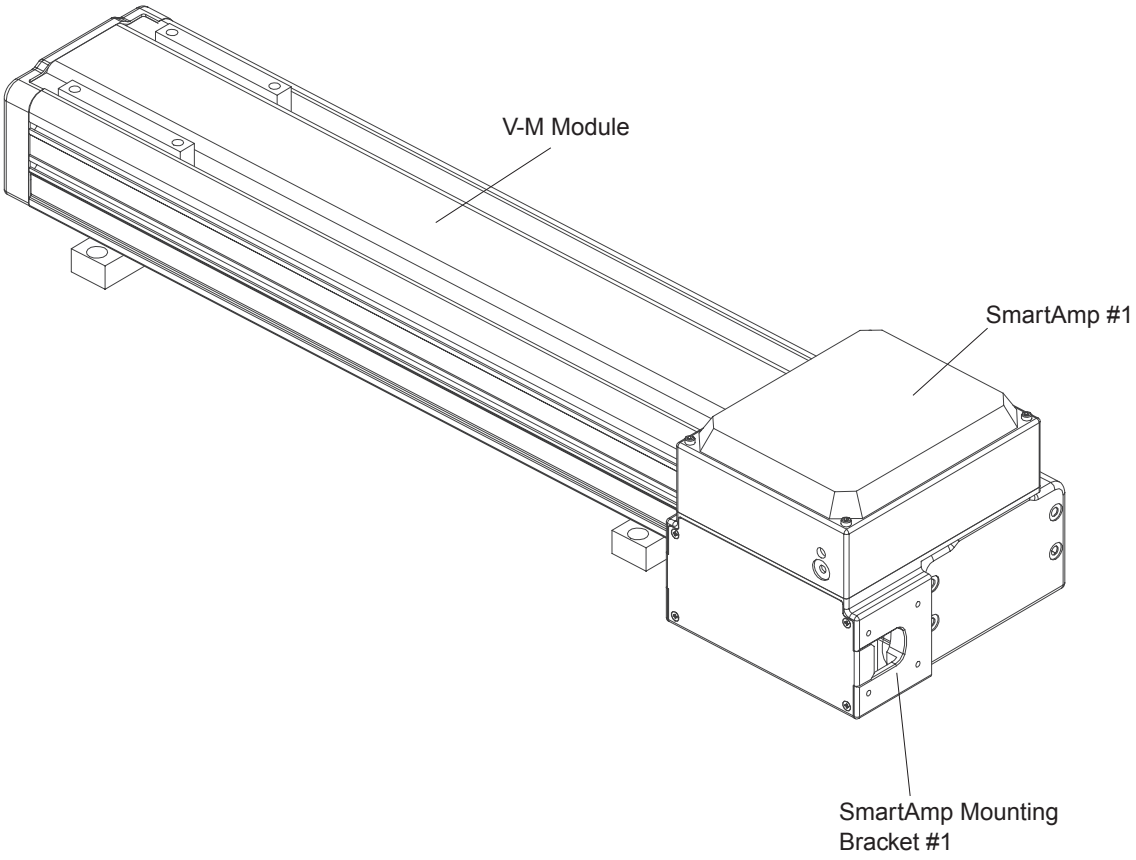


Figure 8-2. V-M: System Component Overview

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Table 8-1. V-H Parts List

Description	Part Number	Qty
V-H module	90404-6xxxx	1
SmartAmp	30410-10000	1
SmartAmp mounting bracket	30410-20000	1
Mounting plate, VH	90404-07100	2
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[a]

[a] Quantity will vary according to order.

Table 8-2. V-M Parts List

Description	Part Number	Qty
V-M module	90404-7xxxx	1
SmartAmp	30410-10000	1
SmartAmp mounting bracket	30410-20000	1
Mounting plate, VM	90404-07200	2
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[a]

[a] Quantity will vary according to order.

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Installing the V-H Module

Perform the steps below to install a V-H module (see "Installing the V-M Module" on page 302 to install the V-M module).

1. Prepare the work surface by drilling and tapping four M8 holes for the V-H module mounting plates. See "Chapter 10 - Technical Specifications " for dimensions of the V-H module and the plate.
2. Install two V-H module mounting plates to the under side of the V-H module using two M8 x 20 screws provided for each plate. See Figure 8-3.
3. Mount the V-H module to the work surface using two M8 screws per mounting plate.

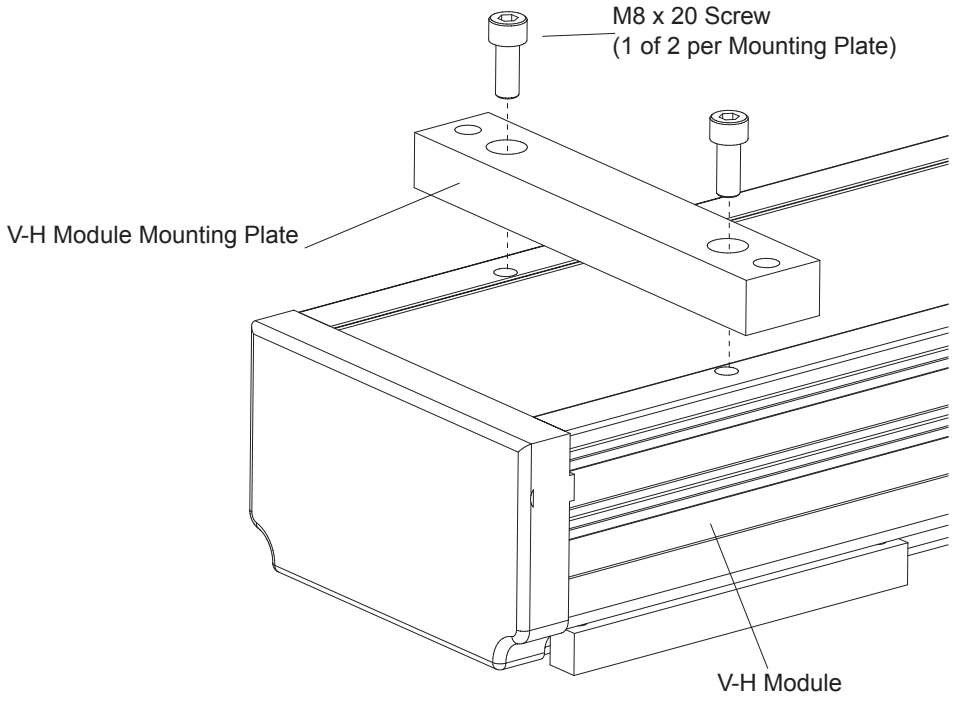


Figure 8-3. V-H: Installing the V-H Module

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Installing the V-M Module

Perform the steps below to install a V-M module.

1. Prepare the work surface by drilling and tapping four M6 holes for the V-M module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-M module and the plate.
2. Install two V-M module mounting plates to the under side of the V-M module using two M6 x 20 screws provided for each plate. See **Figure 8-4**.
3. Mount the V-M module to the work surface using two M6 screws per mounting plate.

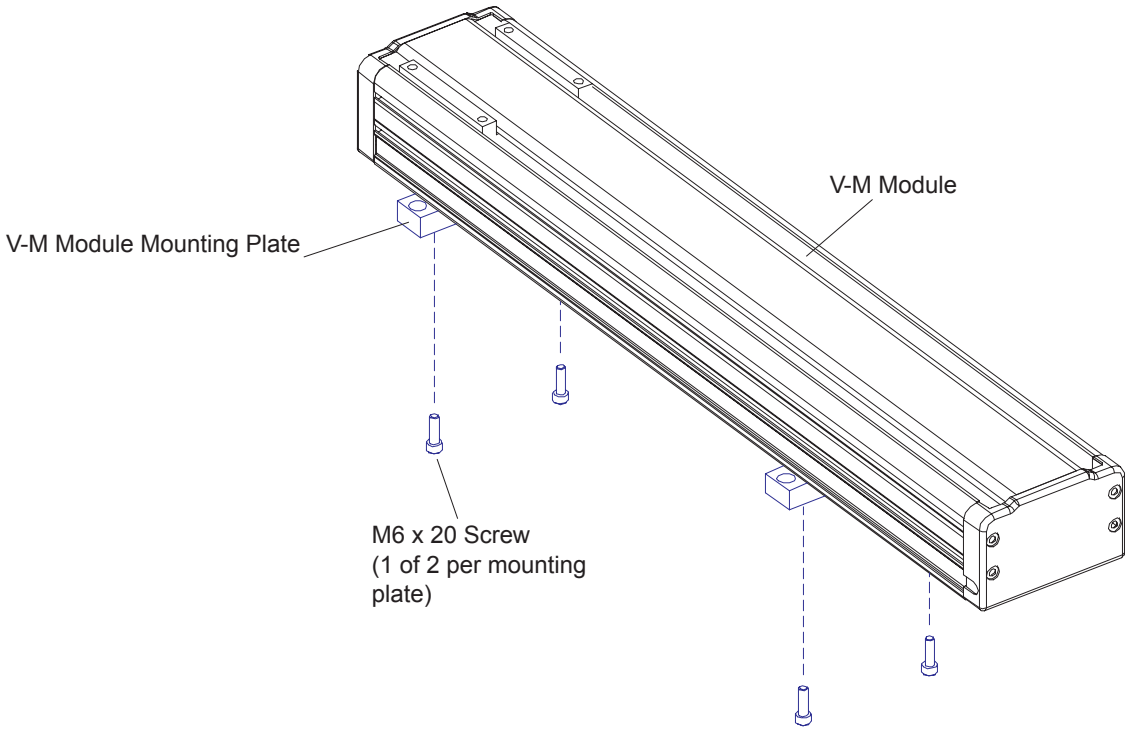


Figure 8-4. V-M: Installing the V-M Module

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Installing Adept SmartAmps

Installing SmartAmp #1

The steps for installing a SmartAmp on a V-H or V-M configuration are very similar and are described below.

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the module (V-H or V-M, depending on your configuration). Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. For V-H modules, install the mounting bracket onto the V-H module using two M4 x 10 flathead screws; see **Figure 8-5**. For V-M modules, install the mounting bracket using four M4 x 10 screws and four V-module T-slot nuts; see **Figure 8-6 on page 304**. Install the first pair of T-slot nuts in the upper side channel; install the second pair in the lower side channel. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-7 on page 305**. Note that **Figure 8-7** shows a V-H module; however, the V-M module is very similar.
5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-8 on page 305**. Attach the captive screws to secure the encoder connector.

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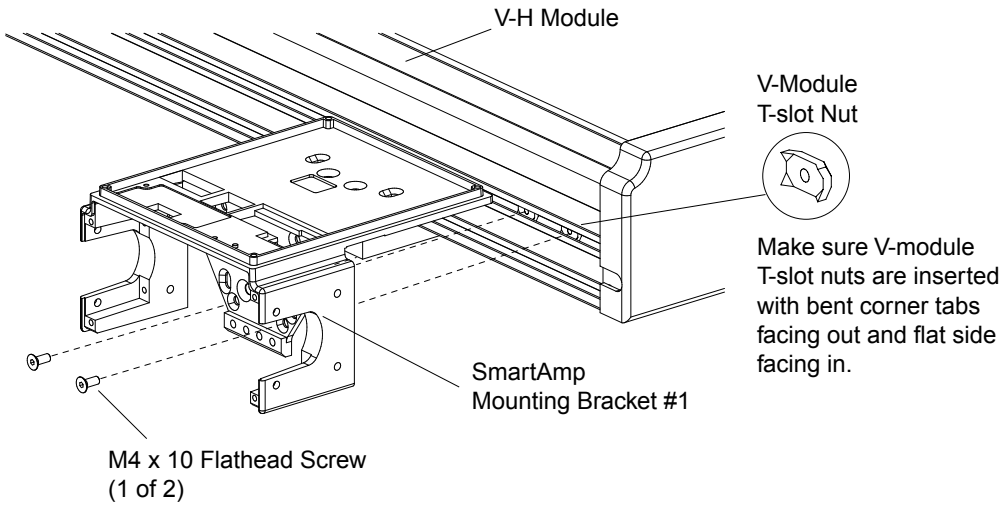


Figure 8-5. V-H: Installing SmartAmp Mounting Bracket #1 on the V-H Module

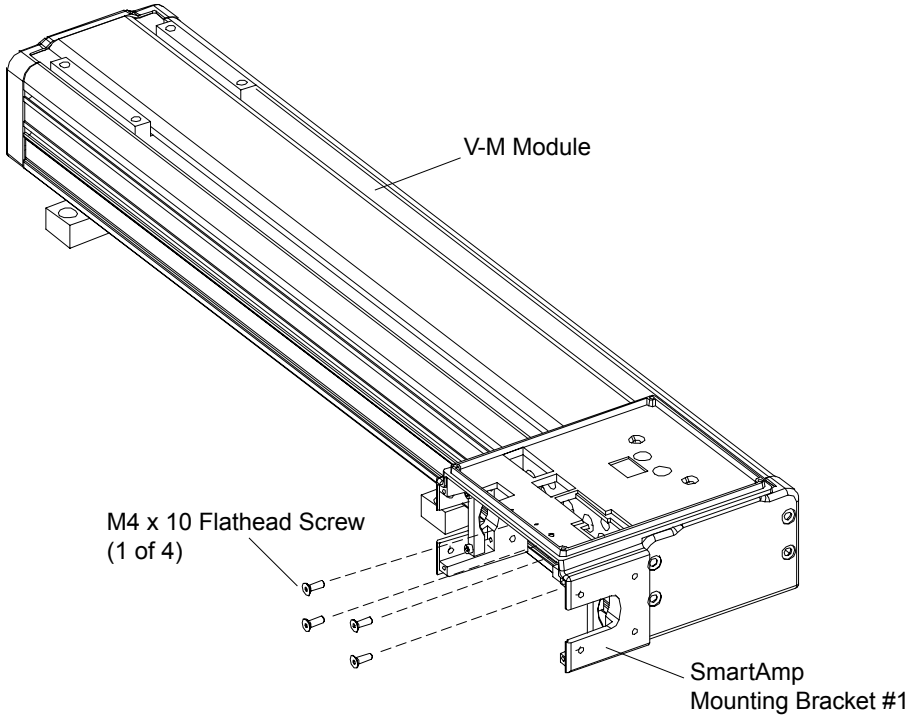


Figure 8-6. V-M: Installing SmartAmp Mounting Bracket #1 on the V-M Module

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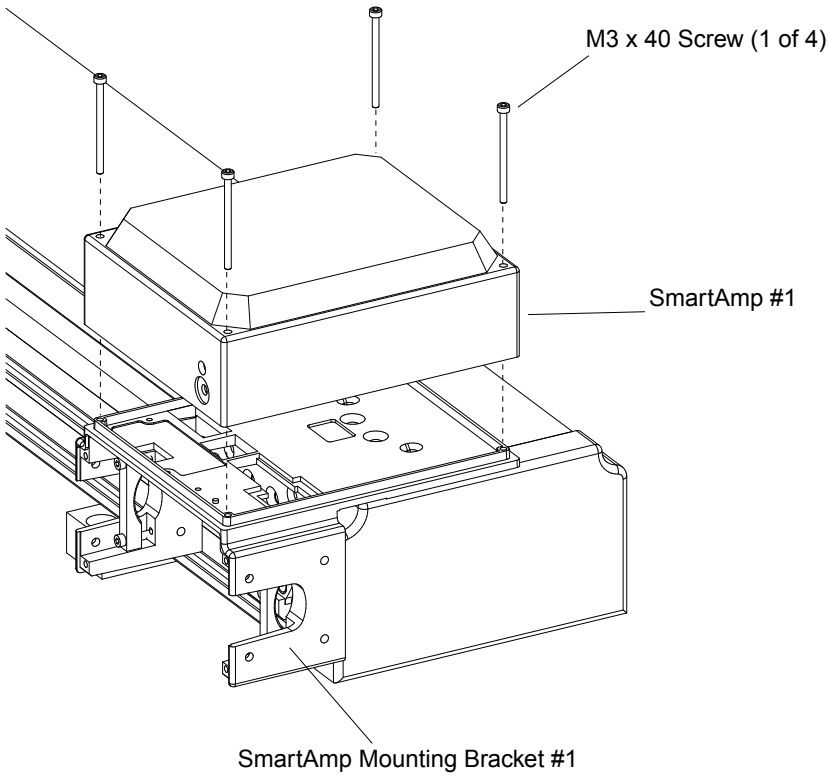


Figure 8-7. V-H/V-M: Installing SmartAmp #1 on the Module

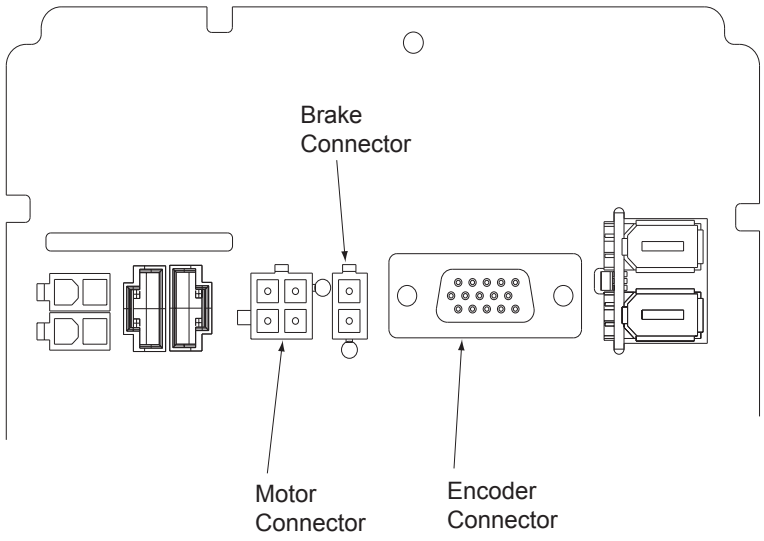


Figure 8-8. V-H/V-M: Connecting Motor and Encoder Cables to SmartAmp

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Connecting Cables from Controller to SmartAmp #1

See "Connecting Cables from Controller to SmartAmp #1" on page 51 for instructions.

Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of the axis. (Modules with brakes must be checked when the power is turned on.)

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8.3 V-G(HM) Installation Procedure

Overview

This section describes the process of installing a two-axis V-G(HM) Adept SmartModules system. This configuration consists of one V-H and one V-M module joined together with a V-GHM combining bracket. Each V-H and V-M module has a SmartAmp and a SmartAmp mounting bracket. A cable tube assembly contains the cabling to interconnect the SmartAmps. See **Figure 8-9** for an overview of the system components.

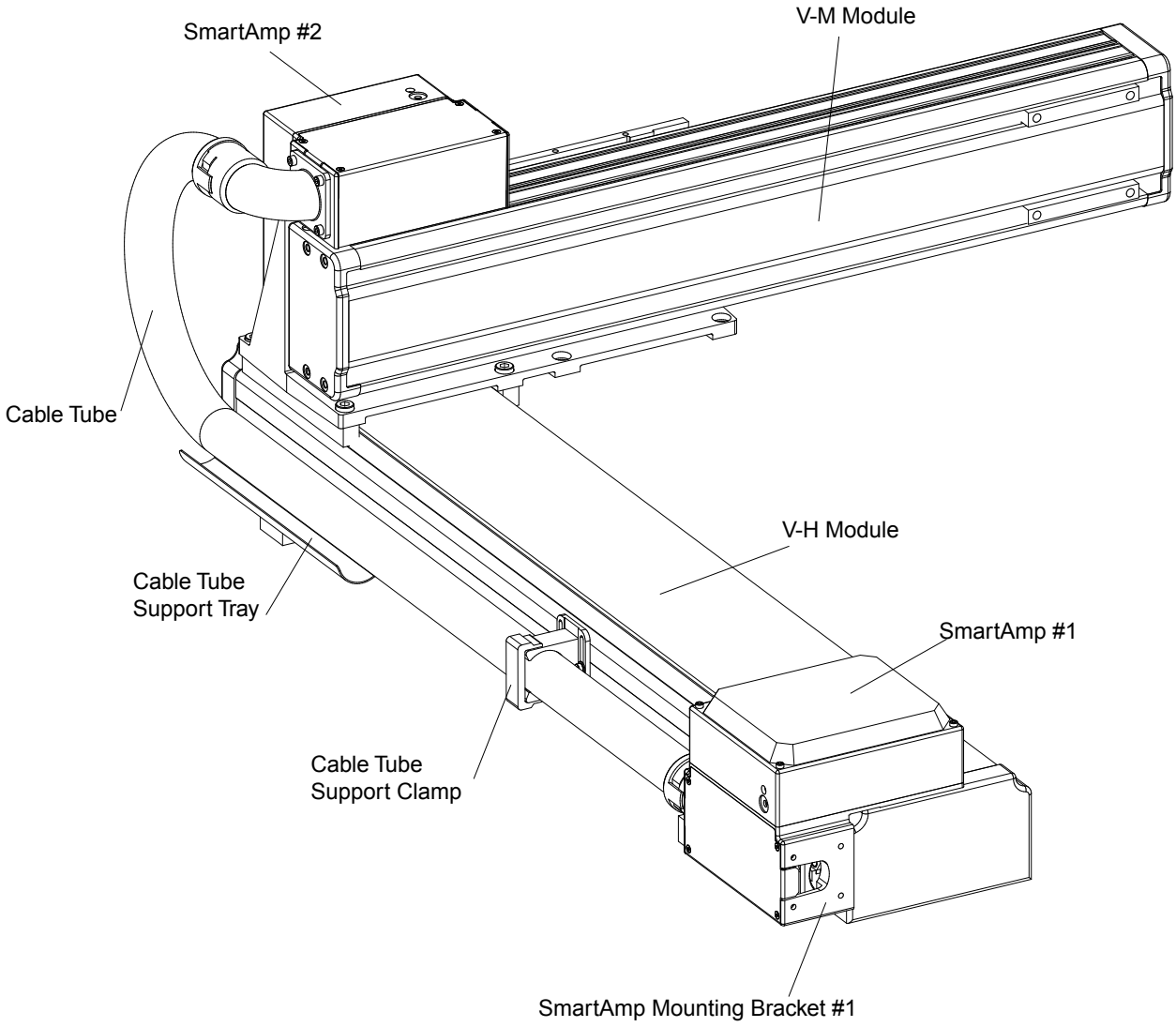


Figure 8-9. V-G(HM): System Component Overview

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Table 8-3. V-G(HM) Parts List

Description	Part Number	Qty
V-H module	90404-6xxxx	1
V-M module	90404-7xxxx	1
SmartAmp	30410-10000	2
SmartAmp mounting bracket	30410-20000	2
Combining bracket, V-GHM	40404-07001	1
Mounting plate, VH	90404-07100	2
Cable tube fitting, elbow	40410-40090	1
Cable tube fitting, straight	40410-40000	1
Cable tube, hi-flex	40410-310xx	1
Cable tube clamp	30410-42000	1[a]
Cable tube support tray	30410-60000	1[a]
Cable kit, amp to amp AC power cable 24V DC cable IEEE 1394 cable	90410-100xx 10410-006xx 10410-007xx 10410-005xx	1
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[a]

[a] Quantity will vary according to order.

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Installing the V-H Module

1. Prepare the work surface by drilling and tapping four M8 holes for the V-H module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-H module and the plate.
2. Install two V-H module mounting plates to the under side of the V-H module using two M8 x 20 screws provided for each plate. See **Figure 8-10**.
3. Mount the V-H module to the work surface using two M8 screws per mounting plate.

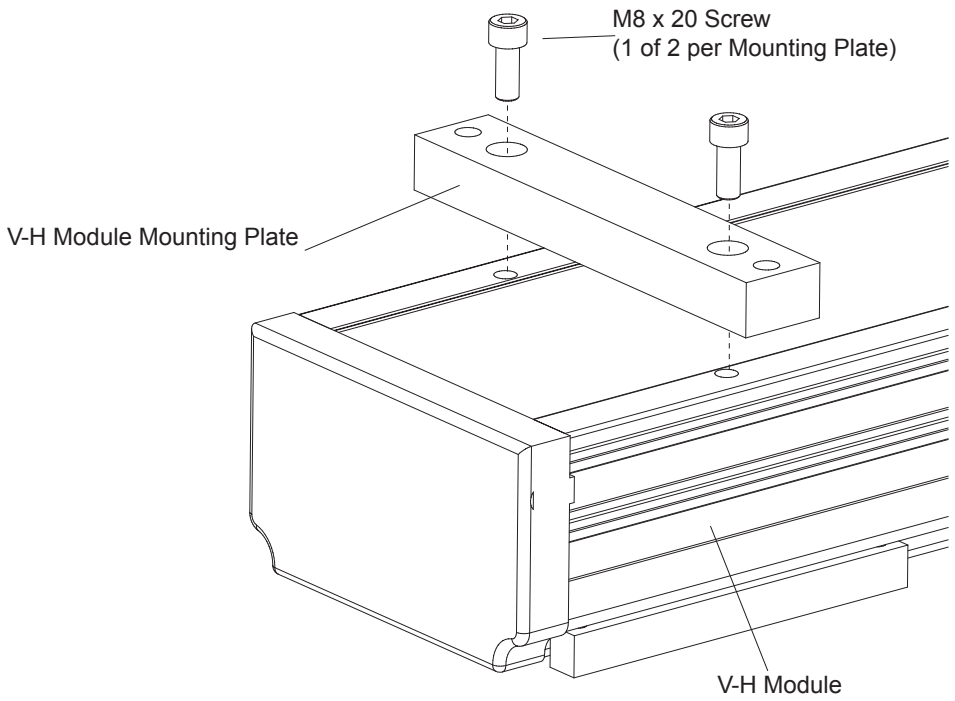


Figure 8-10. V-G(HM): Installing the V-H Module

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Installing the V-M Module

Moving Module Cables to Upper Cable Opening

Before installing the V-M module, it is necessary to move the module cables on the V-M module from the lower cable opening to the upper opening on the module.

1. Remove the four screws on the motor end of the V-M module.
2. Re-route the cables inside the module to the upper opening (on the same side of the module).
3. Replace the end cap and the four screws.

Installing the Module

1. Mount the V-GHM combining bracket to the V-H-module's slider with four M8 x 14 screws. Position the bracket as shown in **Figure 8-11**.
2. Mount the V-M module on the V-GHM combining bracket with four M6 x 16 screws. See **Figure 8-12 on page 311**.

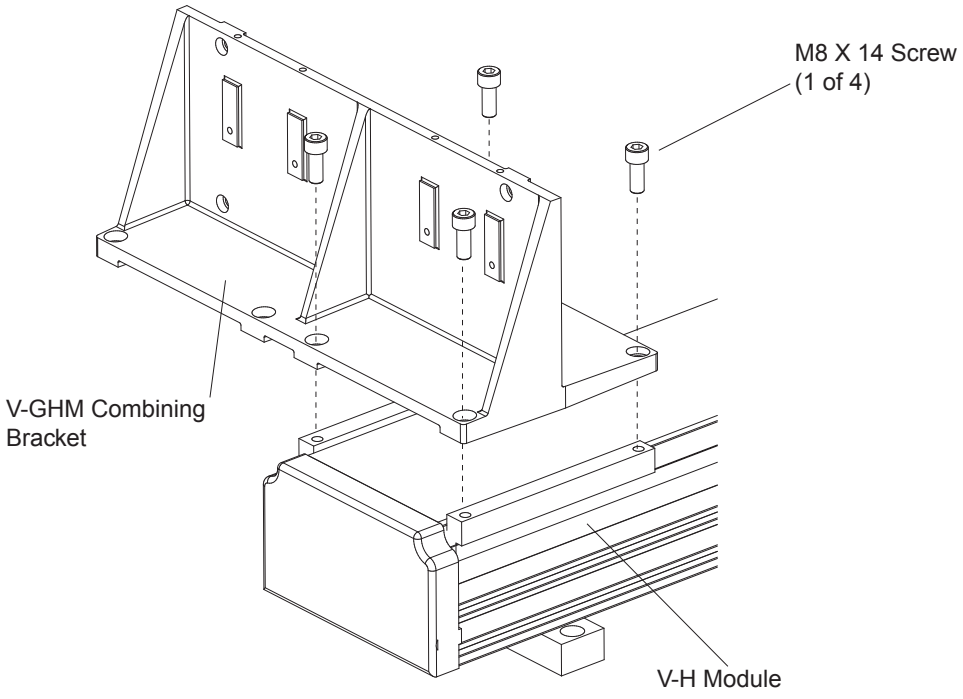


Figure 8-11. V-G(HM): Installing the V-GHM Combining Bracket

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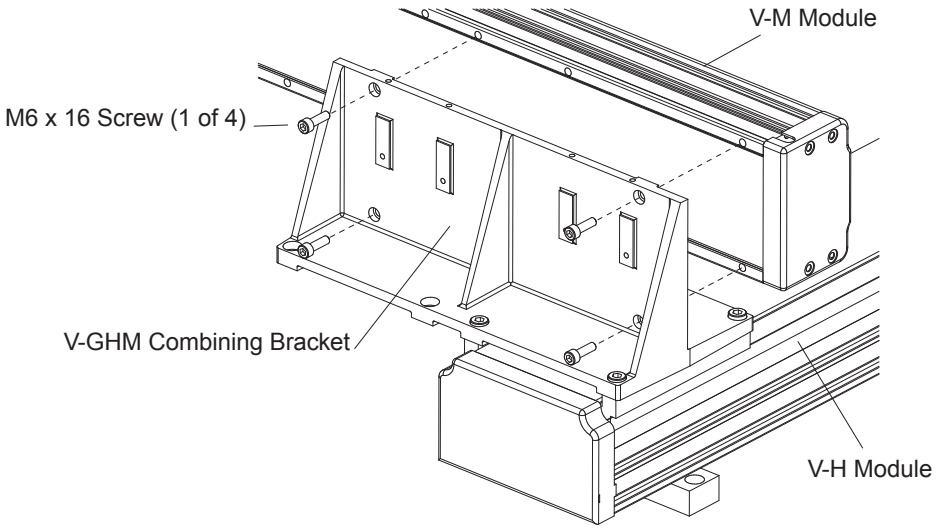


Figure 8-12. V-G(HM): Installing the V-M Module

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Installing Adept SmartAmps

Installing SmartAmp #1 on V-H Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts into the upper side channel in the V-H module. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install the mounting bracket onto the V-H module using two M4 x 10 flathead screws; see **Figure 8-13**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-H module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-14 on page 313**.
5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

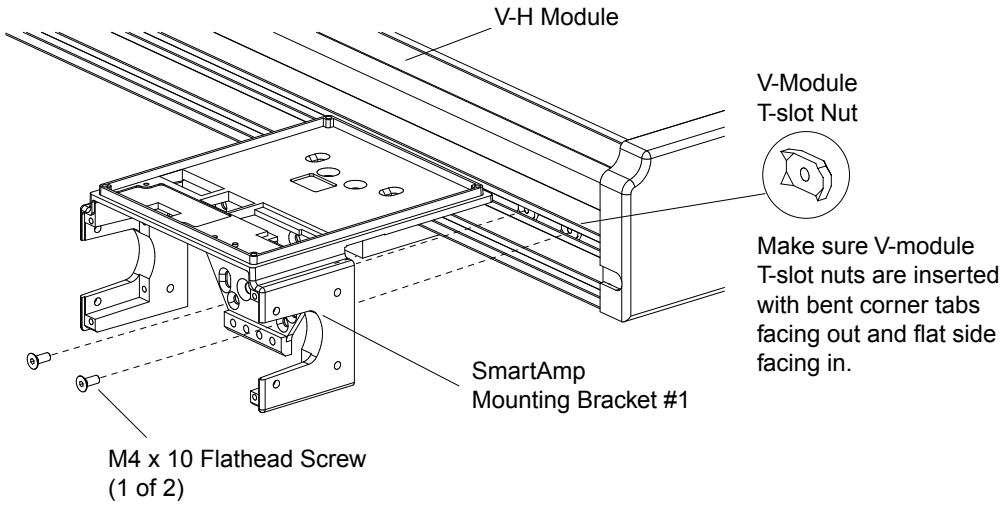


Figure 8-13. V-G(HM): Installing SmartAmp Mounting Bracket #1 on the V-H Module

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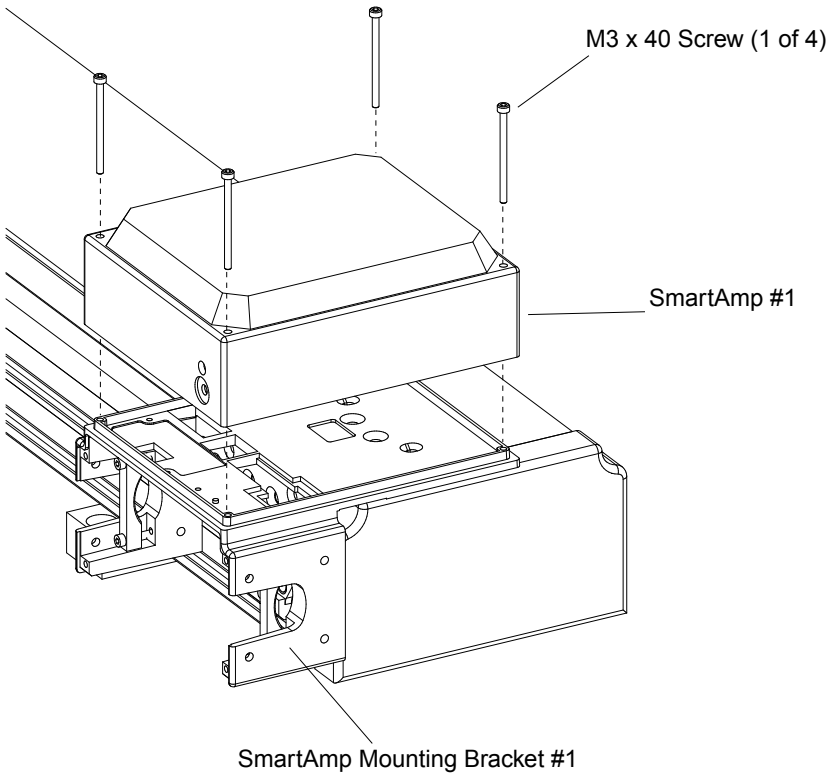


Figure 8-14. V-G(HM): Installing SmartAmp #1 on the V-H Module

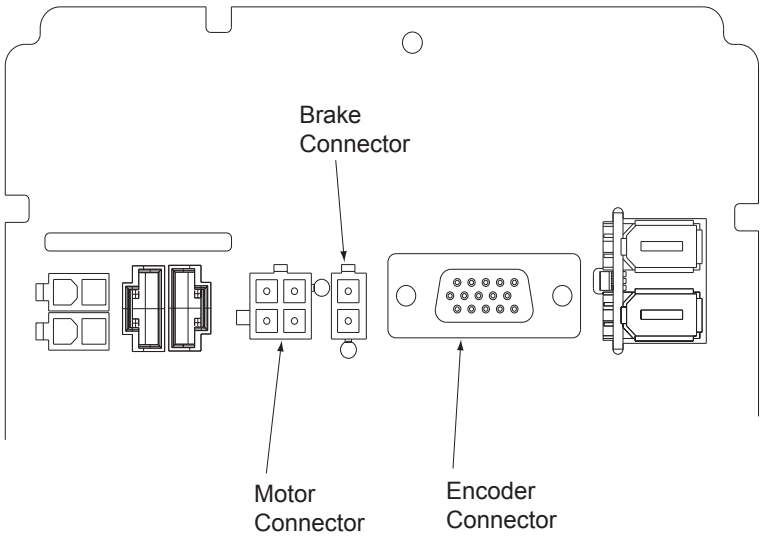


Figure 8-15. V-G(HM): Connecting Motor and Encoder Cables to SmartAmp

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Installing SmartAmp #2 on V-GHM Combining Bracket

1. Remove the cable cover from the other SmartAmp mounting bracket by removing four M3 screws.
2. Install a mounting bracket onto the V-GHM combining bracket in position #2 using four M4 x 10 flathead screws; see **Figure 8-16**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-M module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #2 onto the mounting bracket.

3. Install a SmartAmp onto the mounting bracket in position #2 using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. See **Figure 8-17 on page 315**.
4. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

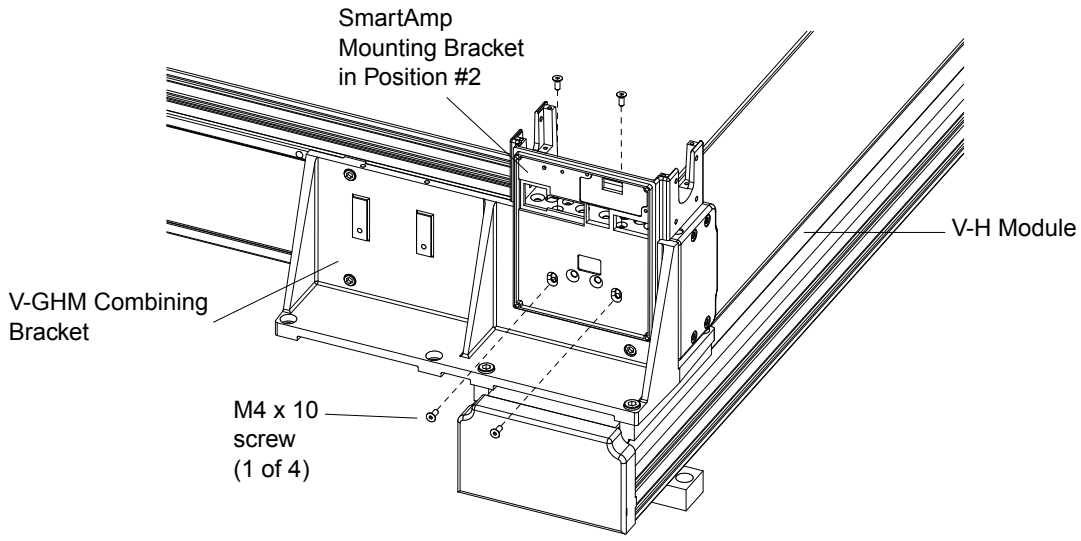


Figure 8-16. V-G(HM): Installing SmartAmp Mounting Bracket #2 on the V-GHM Bracket

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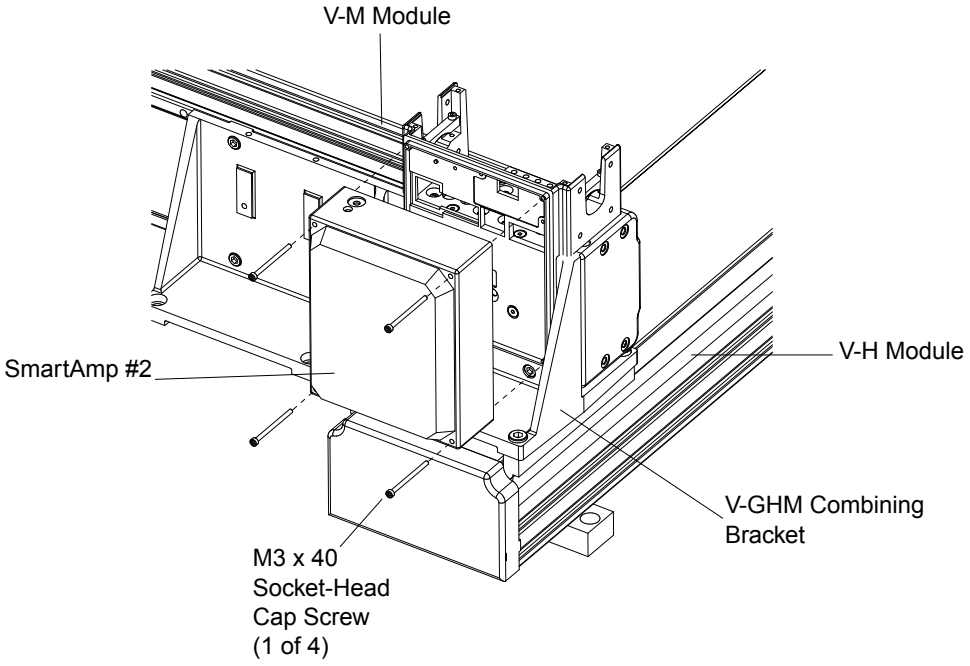


Figure 8-17. V-G(HM): Installing SmartAmp #2 on the V-GHM Combining Bracket

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Installing the Cable Tube Support Clamp on the V-H Module

1. Insert two V-module T-slot nuts into the upper side channel in the V-H module; see **Figure 8-18**. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support clamp.
2. Install the cable tube support clamp using two M4 x 8 screws. Leave the M4 screws loose for repositioning later after the cable tube has been installed.

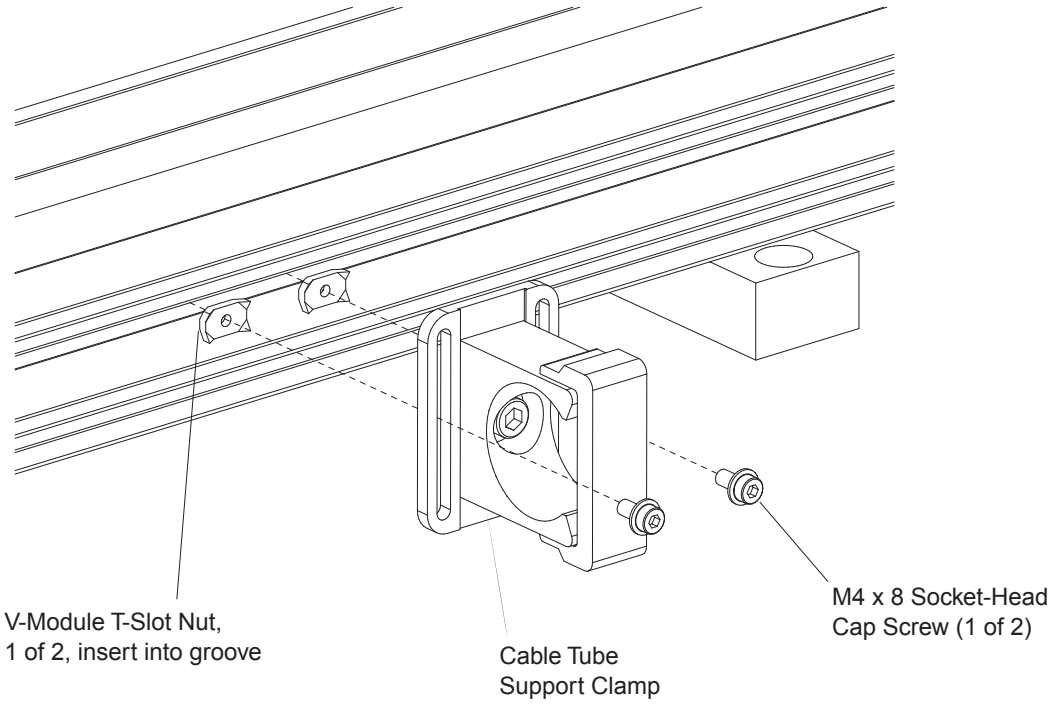


Figure 8-18. V-G(HM): Installing the Cable Tube Support Clamp

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Installing the Cable Tube Support Tray

1. Insert three V-module T-slot nuts (from the hardware kit) into the upper side channel in the V-H module; see **Figure 8-19**. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support tray.
2. Install the cable tube support tray using three M4 x 8 screws (from the hardware kit).

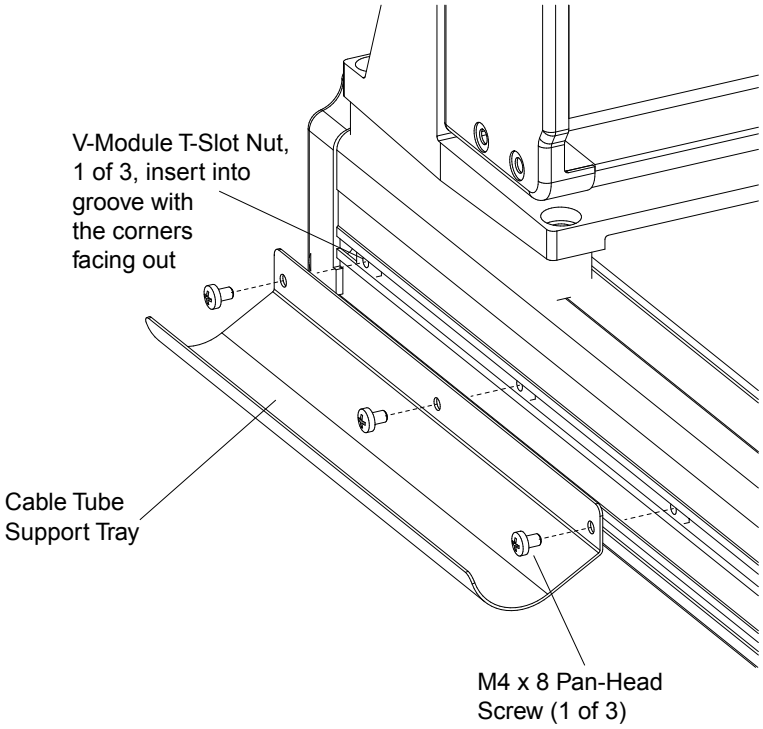


Figure 8-19. V-G(HM): Cable Tube Support Tray

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Installing Cable Tube Assembly Between Amp #1 and Amp #2

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 8-20 on page 319**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

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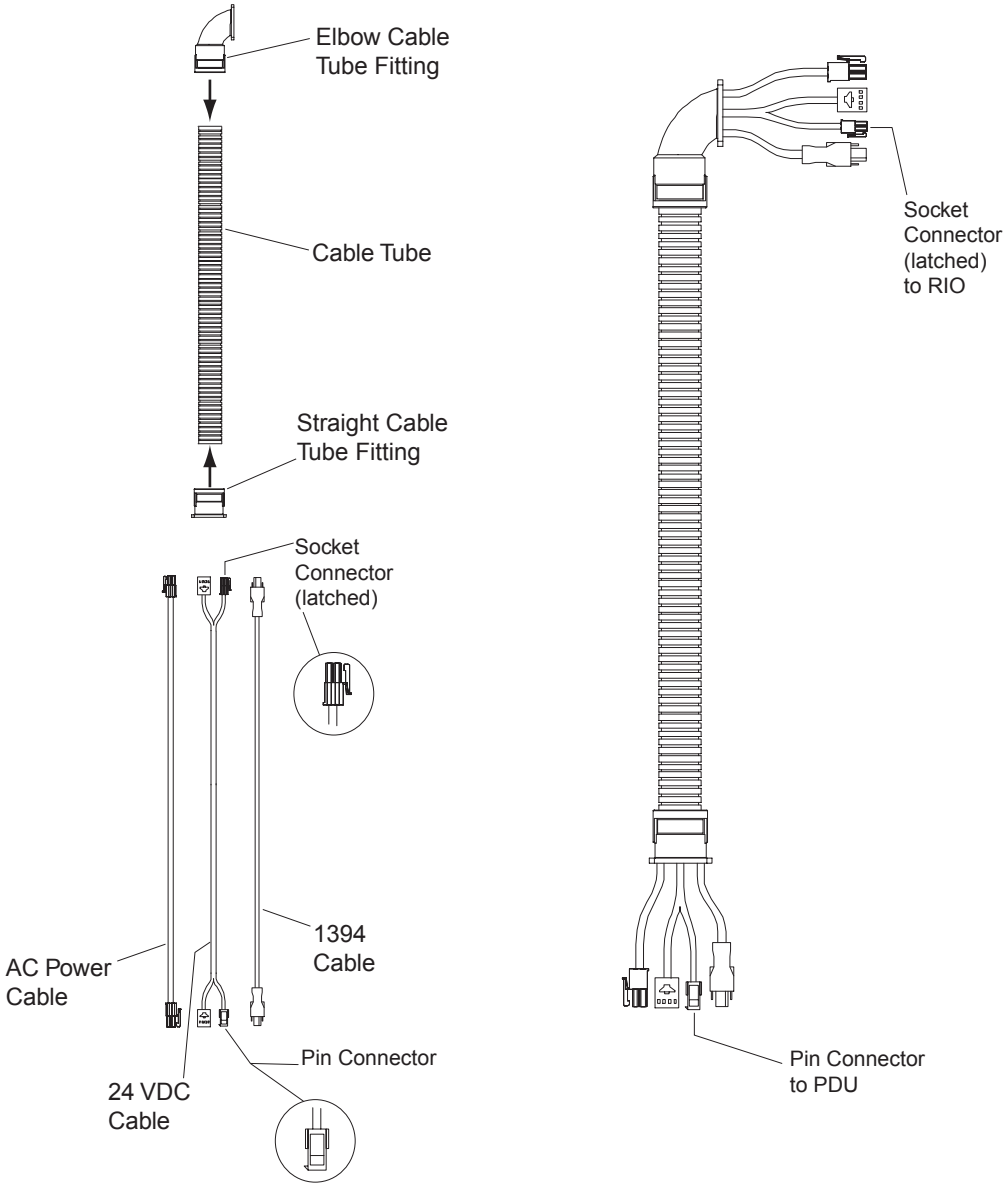


Figure 8-20. V-G(HM): Cable Tube Assembly (One Straight/One Elbow Fitting)

Installing Cable Tube Fittings on Cable Tube

NOTE: For both cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate the straight cable tube fitting.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the straight cable tube fitting on the end near the 24V pin connector; install the elbow fitting on the other end. See **Figure 8-20**.

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2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 8-20 on page 319**.
3. Locate the elbow cable tube fitting.
4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 8-21 on page 321**.
2. Position the cable tube assembly next to the V-H module, with the straight fitting near SmartAmp #1.
3. Install the straight fitting on the outside of the mounting bracket. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-22 on page 321**.
4. In SmartAmp #1, connect these cables:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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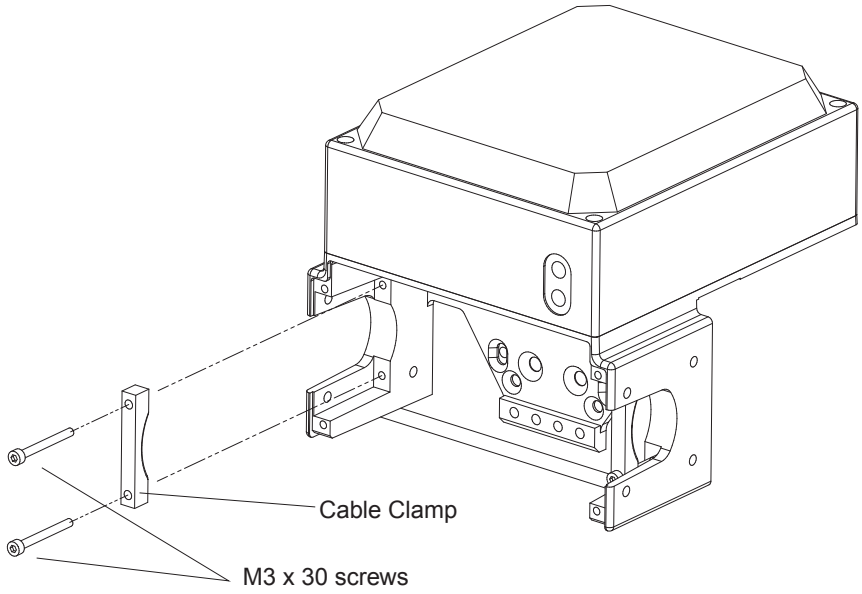


Figure 8-21. V-G(HM): Removing the Cable Clamp

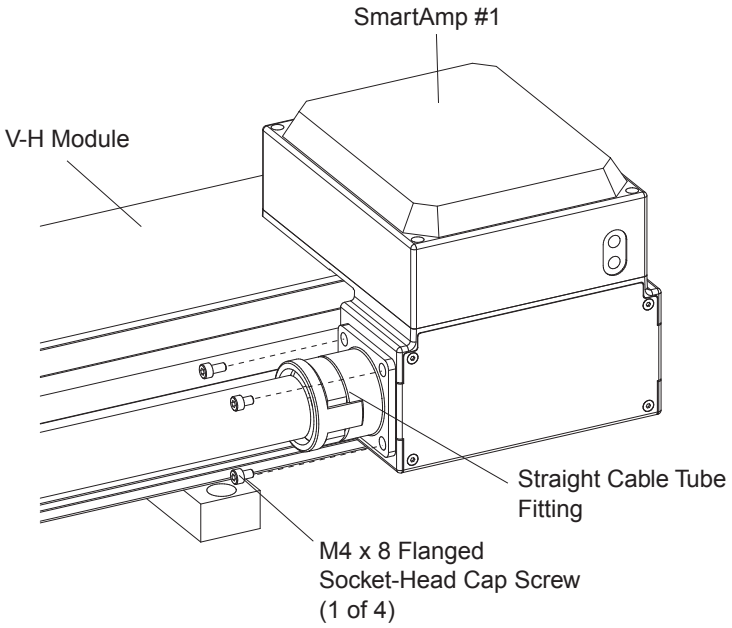


Figure 8-22. V-G(HM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

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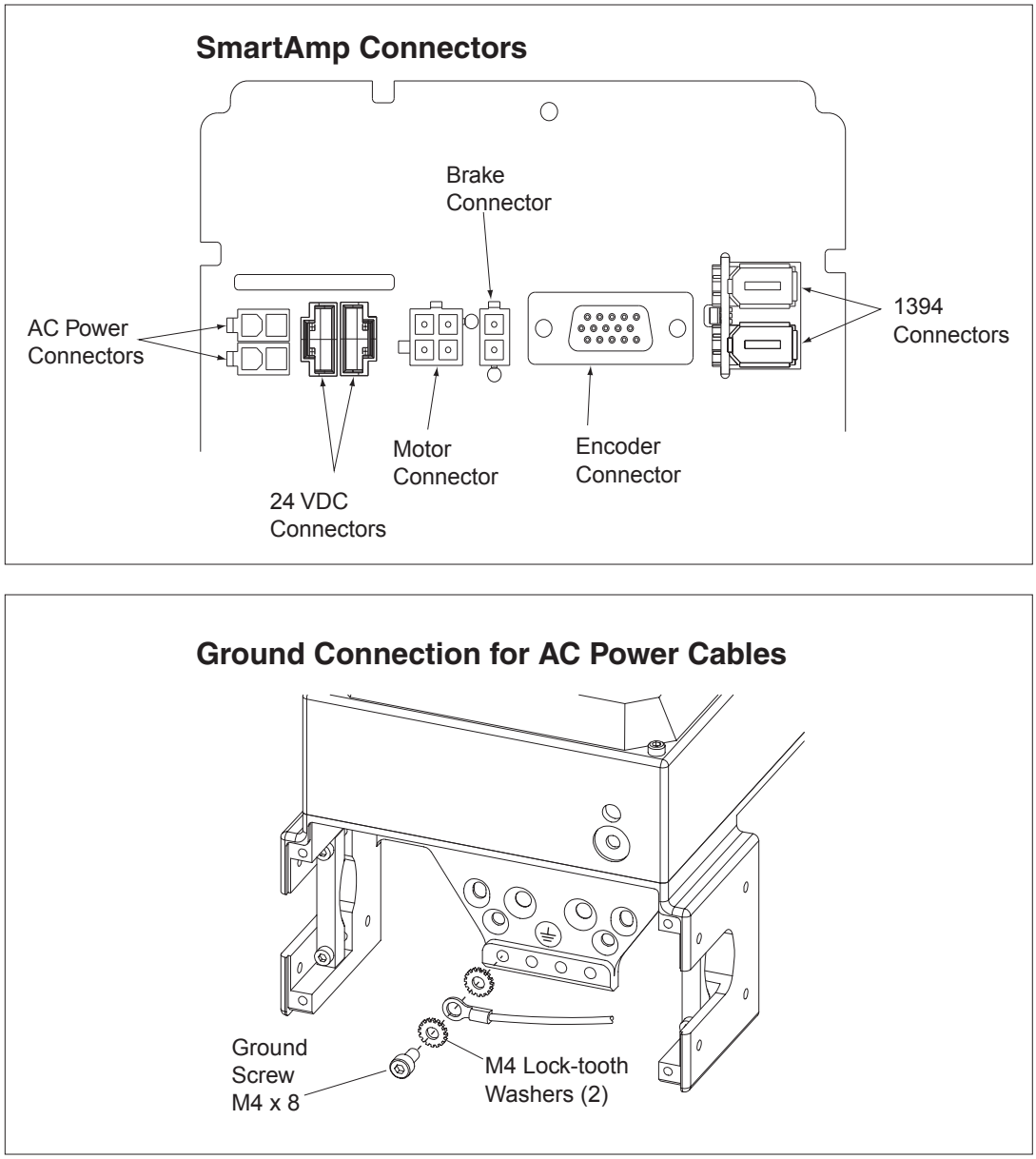


Figure 8-23. V-G(HM): Connecting Cables to SmartAmp

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

1. Remove the cable clamp from inside SmartAmp mounting bracket #2 by removing the two M3 screws.
2. Rest the cable tube in the support tray. Fold the cable tube up 180 degrees so the elbow fitting is positioned next to mounting bracket #2.
3. Install the elbow fitting on the outside of the mounting bracket. See **Figure 8-24 on page 323**. Use four M4 x 8 screws to secure the fitting to the mounting bracket.

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4. In SmartAmp #2, connect these cables (see Figure 8-23 on page 322):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

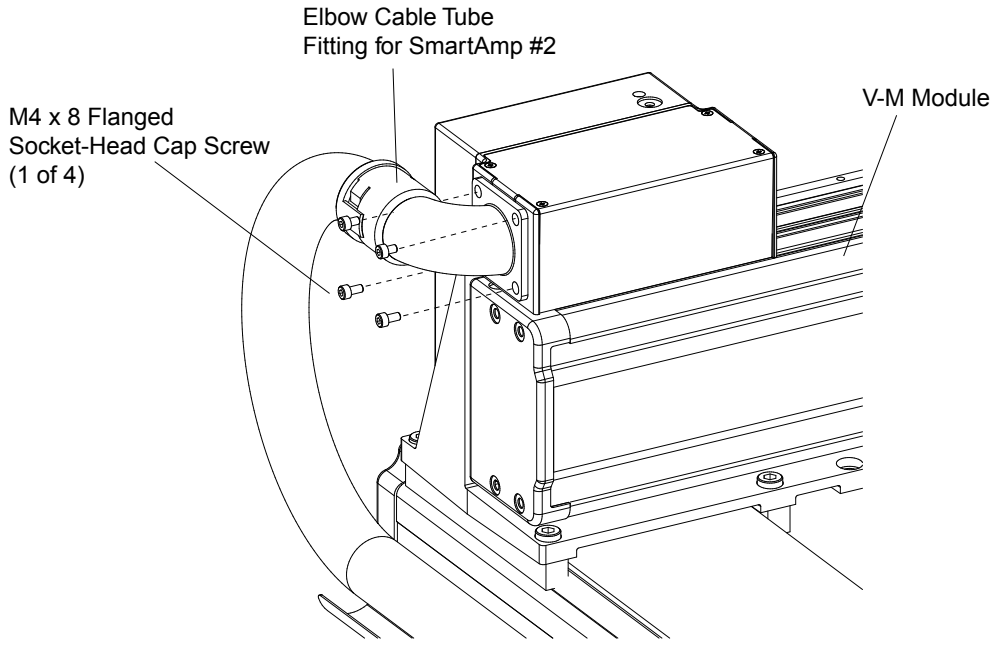


Figure 8-24. V-G(HM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

7. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the other module is closest to SmartAmp #1. Tighten the screws on the clamp to secure it.
8. Slide the cable tube support tray into place near the end of the module so that the tube is supported at the end of travel. Tighten the screws on the tray to secure it.

Connecting Cables from Controller to SmartAmp #1

See "Connecting Cables from Controller to SmartAmp #1" on page 51 for instructions.

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Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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8.4 V-D(HM) Installation Procedure

Overview

This section describes the process of installing a two-axis V-D(HM) Adept SmartModules system. This configuration consists of one V-H and one V-M module joined together with a V-DHM combining bracket. Each V-H and V-M module has a SmartAmp and a SmartAmp mounting bracket. A cable tube assembly contains the cabling to interconnect the SmartAmps. See **Figure 8-25** for an overview of the system components.

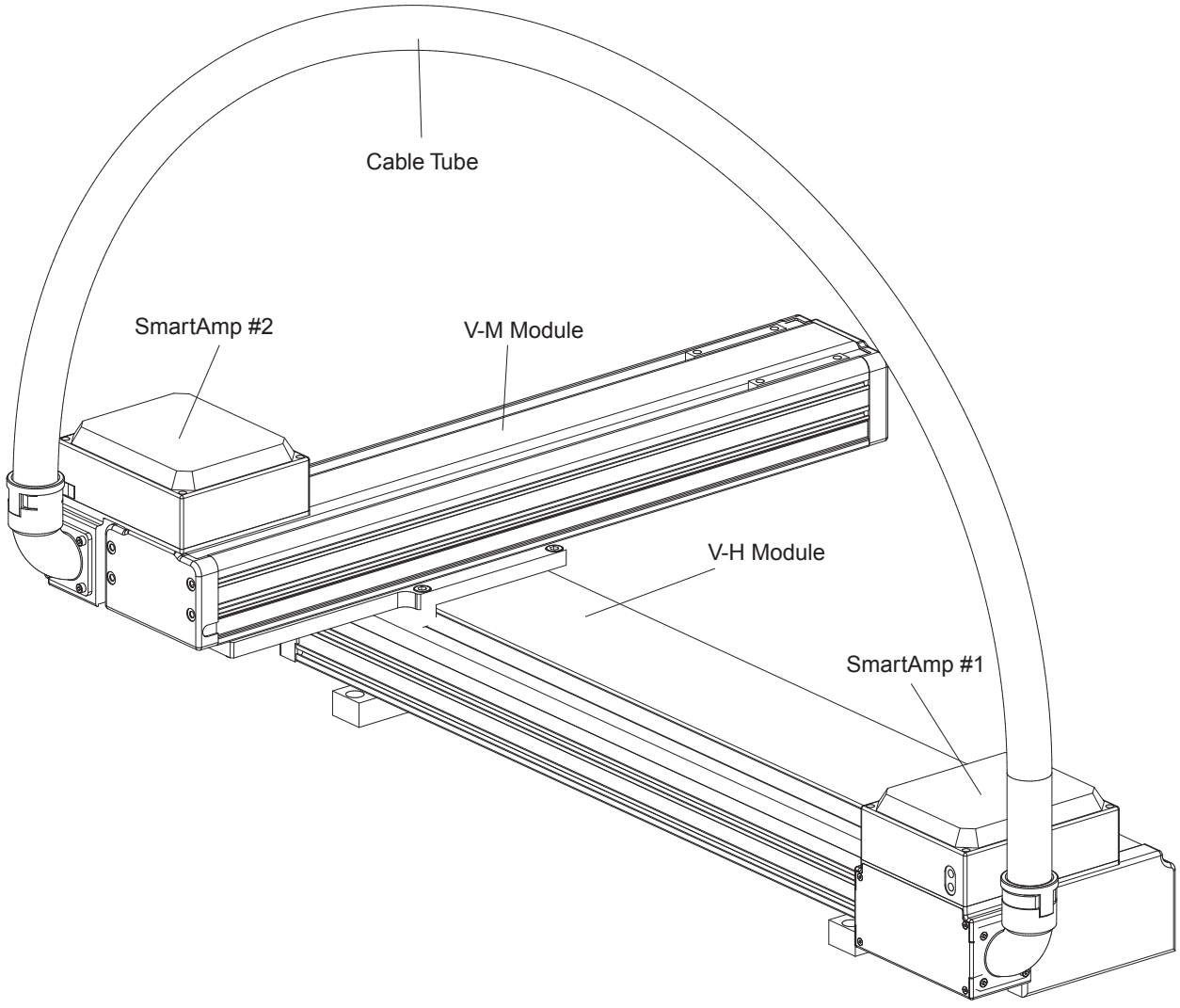


Figure 8-25. V-D(HM): System Component Overview

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Table 8-4. V-D(HM) Parts List

Description	Part Number	Qty
V-H module	90404-6xxxx	1
V-M module	90404-7xxxx	1
SmartAmp	30410-10000	2
SmartAmp mounting bracket	30410-20000	2
Combining bracket, V-DHM	40404-07002	1
Mounting plate, VH	90404-07100	2
Cable tube fitting, elbow	40410-40090	2
Cable tube, flyover	40410-32xxx	1
Cable kit, amp to amp AC power cable 24V DC cable IEEE 1394 cable	90410-100xx 10410-006xx 10410-007xx 10410-005xx	1
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[a]

[a] Quantity will vary according to order.

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Installing the V-H Module

1. Prepare the work surface by drilling and tapping four M8 holes for the V-H module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-H module and the plates.
2. Install two V-H module mounting plates to the under side of the V-H module using two M8 x 20 screws provided for each plate. See **Figure 8-10 on page 309**.
3. Mount the V-H module to the work surface using two M8 screws per mounting plate.

Installing the V-M Module

1. Mount the V-DHM combining bracket to the V-M module's slider with four M6 x 16 screws. Position the bracket as shown in **Figure 8-26**.
2. Mount the V-M module and V-DHM combining bracket on the V-H module's slider with four M8 x 14 screws. See **Figure 8-27 on page 328**.

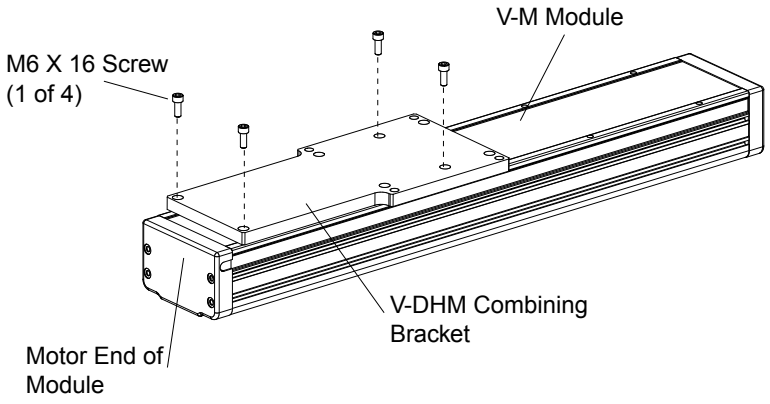


Figure 8-26. V-D(HM): Installing the V-DHM Combining Bracket

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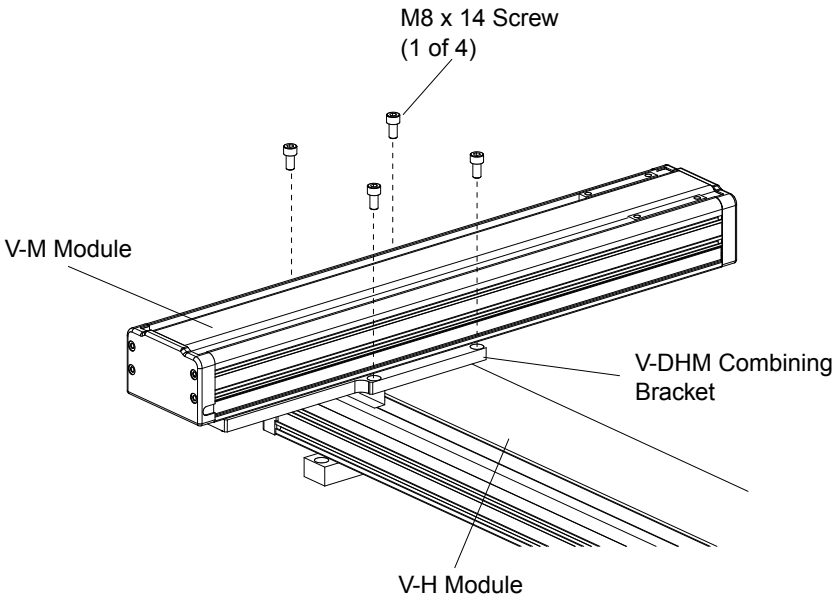


Figure 8-27. V-D(HM): Installing the V-M Module

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Installing Adept SmartAmps

Installing SmartAmp #1 on the V-H Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-H module. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install the mounting bracket onto the V-H module using two M4 x 10 flathead screws; see **Figure 8-13 on page 312**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-H module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-14 on page 313**.
5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

Installing SmartAmp #2 on the V-M Module

1. Remove the cable cover from the other SmartAmp mounting bracket by removing four M3 screws.
2. In the V-M module, insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel and two other T-slot nuts into the lower side channel. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install a mounting bracket onto the V-M module using four M4 x 10 flathead screws; see **Figure 8-28 on page 330**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-M module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #2 onto the mounting bracket.

4. Install a SmartAmp onto mounting bracket #2 using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. See **Figure 8-29 on page 330**.
5. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

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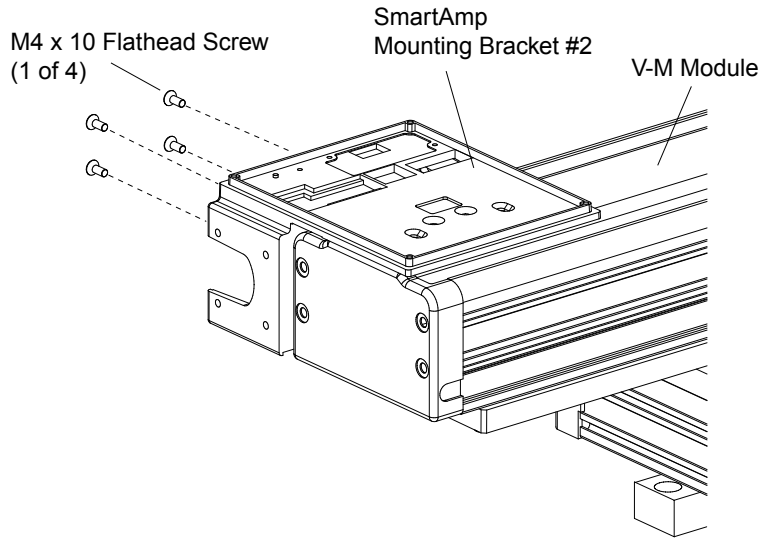


Figure 8-28. V-D(HM): Installing SmartAmp Mounting Bracket #2 on the V-M Module

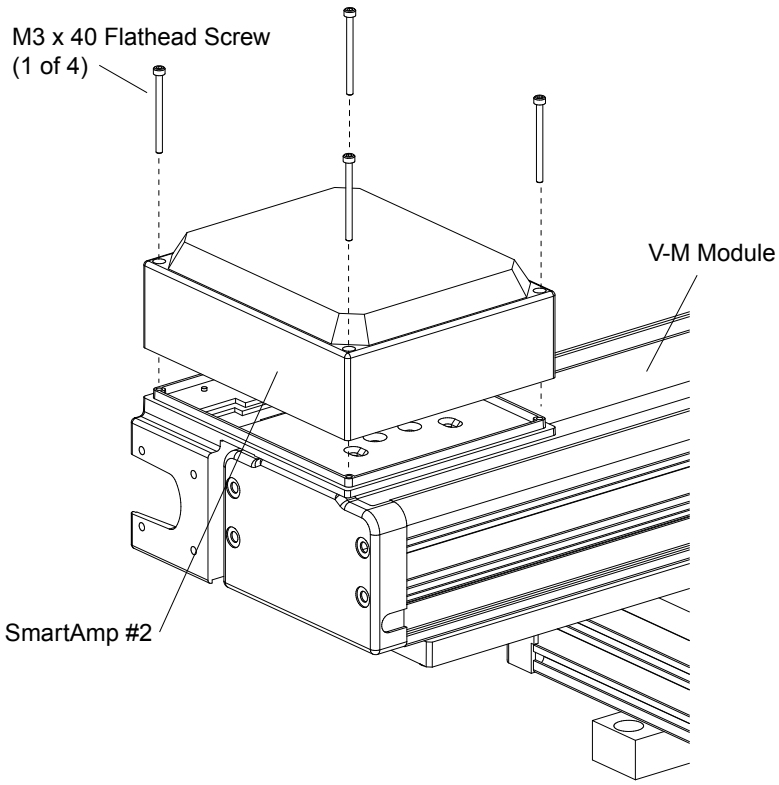


Figure 8-29. V-D(HM): Installing SmartAmp #2 on the V-M Module

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Installing Cable Tube Assembly Between Amp #1 and Amp #2

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 8-30 on page 332**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

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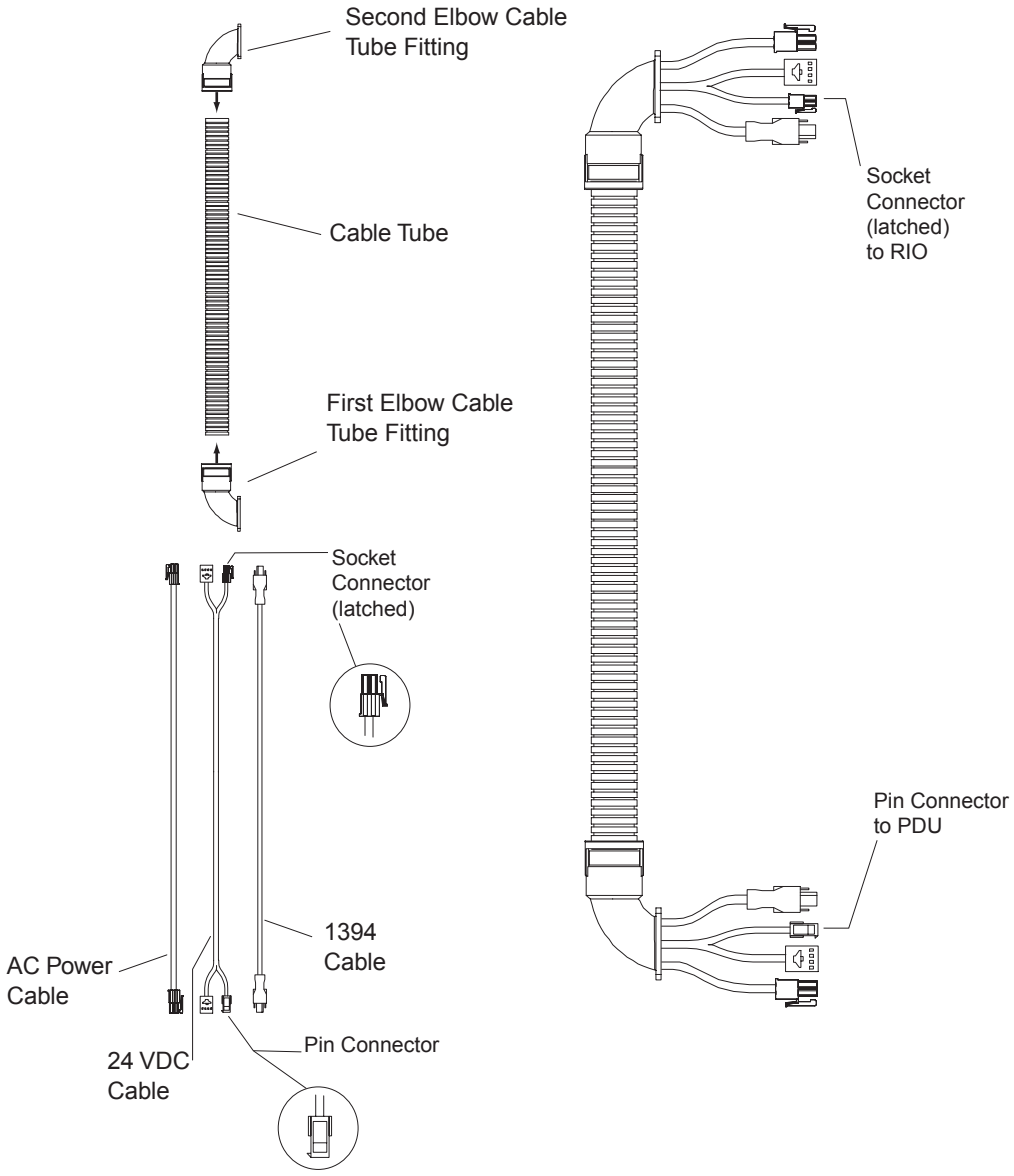


Figure 8-30. V-D(HM): Cable Tube Assembly (Two Elbow Fittings)

Installing Cable Tube Fittings on Cable Tube

NOTE: For both cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate one of the elbow cable tube fittings.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the elbow cable tube fitting near the 24V pin connector on SmartAmp #1; install the other elbow fitting onto SmartAmp #2. See **Figure 8-30**.

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2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 8-30 on page 332**.
3. Locate the other elbow cable tube fitting.
4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 8-21 on page 321** for reference.

   NOTE: Figure 8-21 shows a straight cable tube fitting instead of the elbow cable tube fitting used on the V-D(HM). Also, the fitting is mounted on the other side of the mounting bracket. However, the illustration of the cable clamp is correct.

2. Position the cable tube assembly next to the V-H module with the pin connector end of the 24V cable near SmartAmp #1.
3. Install the cable fitting on the outside of the mounting bracket. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-31 on page 334**.
4. In SmartAmp #1, connect these cables:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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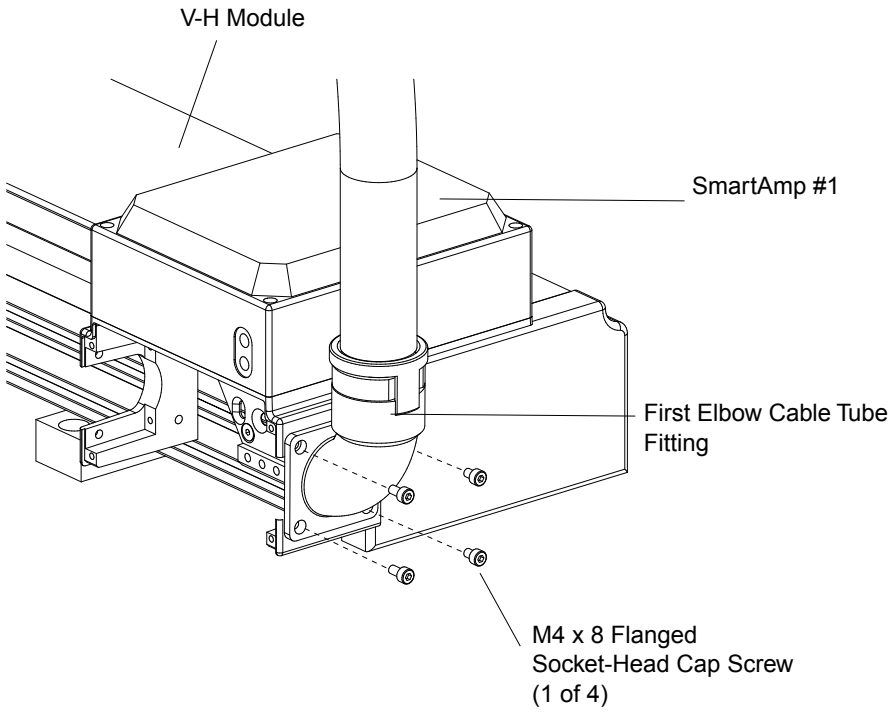


Figure 8-31. V-D(HM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

1. Remove the cable clamp from inside mounting bracket #2 by removing the two M3 screws.
2. Fold the cable tube so the other elbow fitting is positioned next to mounting bracket #2.
3. Install the elbow fitting on the outside of the mounting bracket. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-32 on page 335**.
4. In SmartAmp #2, connect these cables (see **Figure 8-23 on page 322**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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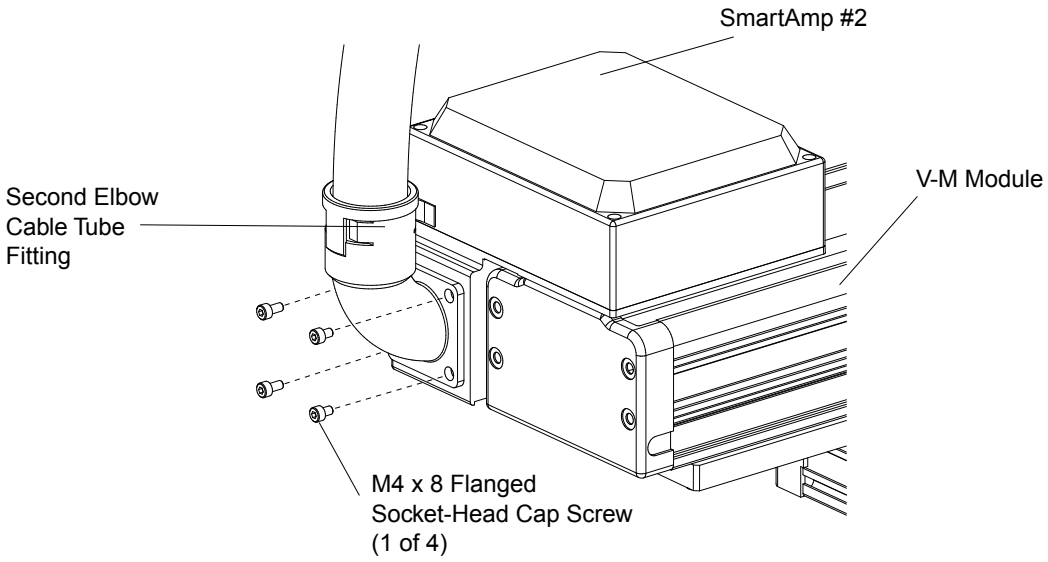


Figure 8-32. V-D(HM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

Connecting Cables from Controller to SmartAmp #1

See "Connecting Cables from Controller to SmartAmp #1" on page 51 for instructions.

Installing the Cable Covers

After you connect all the cables inside the SmartAmps, attach the cable cover to each SmartAmp bracket using four M3 screws.

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8.5 V-K(HMz) Installation Procedure

Overview

This section describes the process of installing a two-axis V-K(HMz) Adept SmartModules system. This configuration consists of one V-H and one V-Mz module joined together with a V-DHM combining bracket. Each V-H and V-Mz module has a SmartAmp and a SmartAmp mounting bracket. A cable tube assembly contains the cabling to interconnect the SmartAmps. See **Figure 8-33** for an overview of the system components.

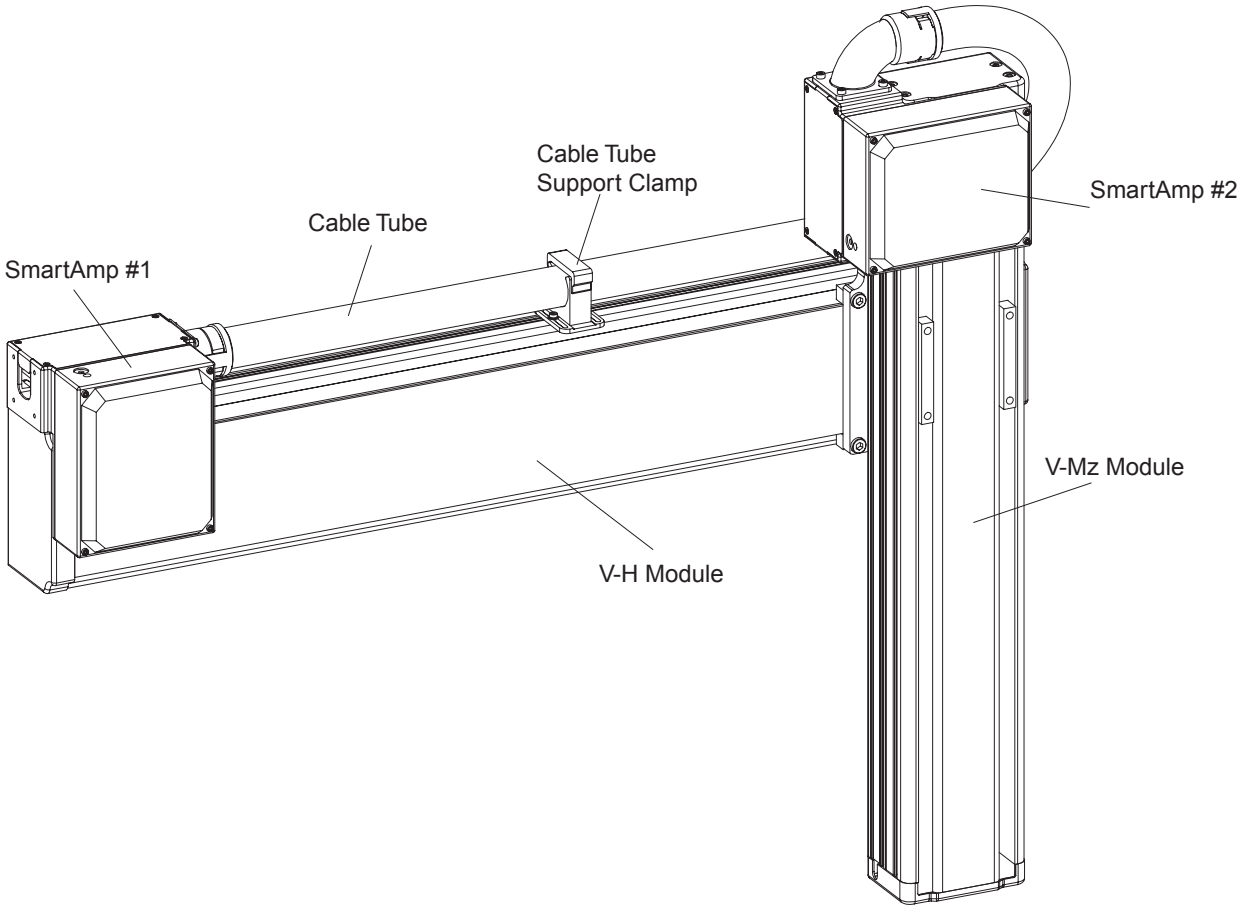


Figure 8-33. V-K(HMz): System Component Overview

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Table 8-5. V-K(HMz) Parts List

Description	Part Number	Qty
V-H module	90404-6xxxx	1
V-Mz module	90404-7xxxx	1
SmartAmp	30410-10000	2
SmartAmp mounting bracket	30410-20000	2
Combining bracket, V-DHM	40404-07002	1
Mounting plate, VH	90404-07100	2
Cable tube fitting, elbow	40410-40090	1
Cable tube fitting, straight	40410-40000	1
Cable tube, hi-flex	40410-310xx	1
Cable tube clamp	30410-42000	1[a]
Cable tube support tray	30410-60000	1[a]
Cable kit, amp to amp AC power cable 24V DC cable IEEE 1394 cable	90410-100xx 10410-006xx 10410-007xx 10410-005xx	1
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[b]

[a] Quantity will vary according to module lengths.
[b] Quantity will vary according to order.

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Installing the V-H Module

1. Prepare the work surface by drilling and tapping four M8 holes for the V-H module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-H module and the plate.
2. Install two V-H module mounting plates to the under side of the V-H module using two M8 x 20 screws provided for each plate. See **Figure 8-34**.

   NOTE: To facilitate installation of the SmartAmp on the Mz module, wait to mount the V-H module until after system assembly is complete. Then mount the V-H module to the work surface using two M8 screws per mounting plate.

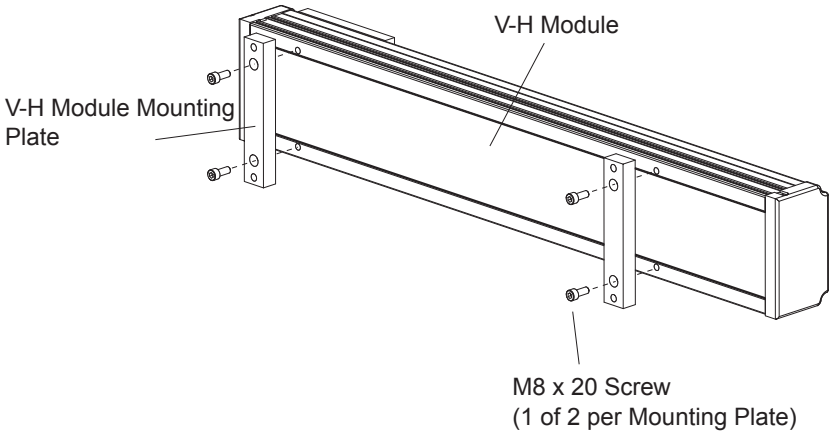


Figure 8-34. V-K(HMz): Installing the V-H Module

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Installing the V-Mz Module

1. Mount the V-DHM combining bracket to the V-Mz-module with four M6 x 16 screws. Position the bracket as shown in **Figure 8-35**.
2. Mount the V-Mz module and V-DHM combining bracket on the V-H module's slider with four M8 x 14 screws. See **Figure 8-36 on page 340**.

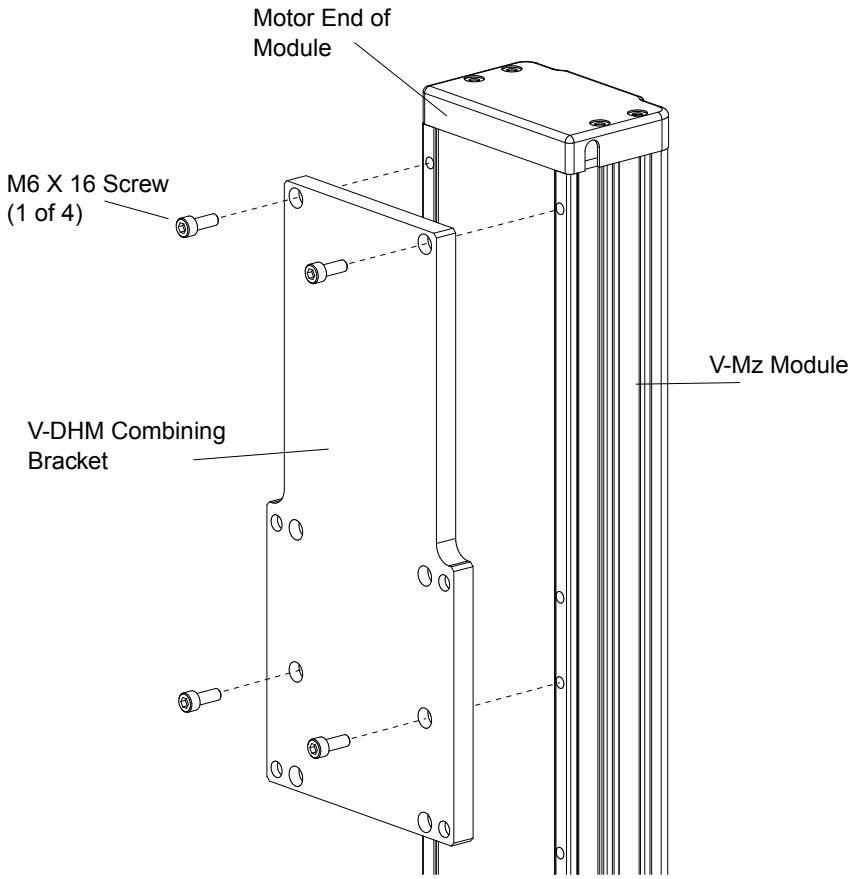


Figure 8-35. V-K(HMz): Installing the V-DHM Combining Bracket

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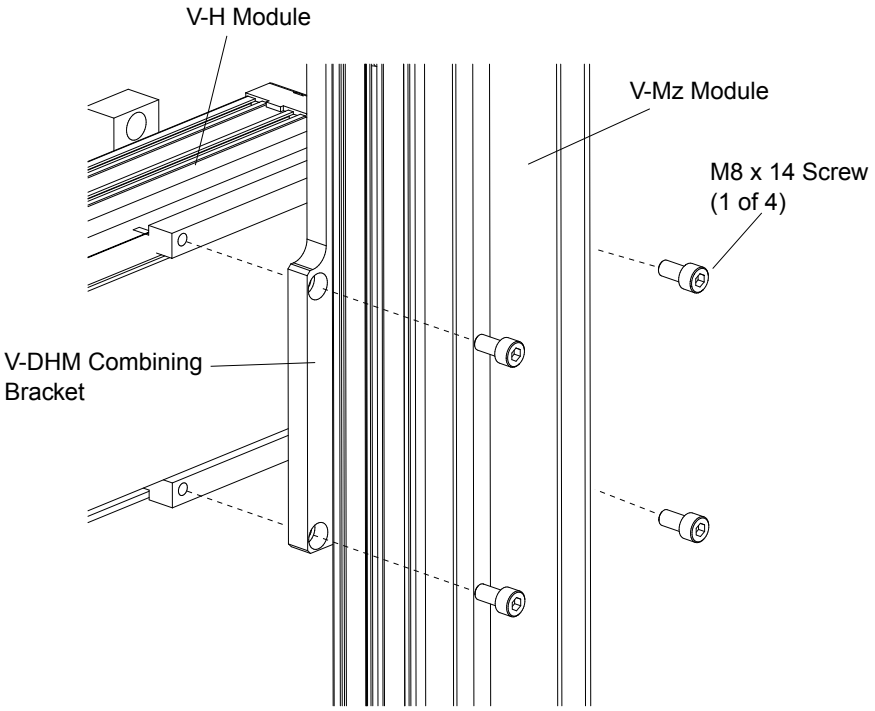


Figure 8-36. V-K(HMz): Installing the V-Mz Module

Installing Adept SmartAmps

Installing SmartAmp #1 on the V-H Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-H module. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install the mounting bracket onto the V-H module using two M4 x 10 flathead screws; see **Figure 8-37 on page 341**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-H module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-38 on page 342**.

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5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

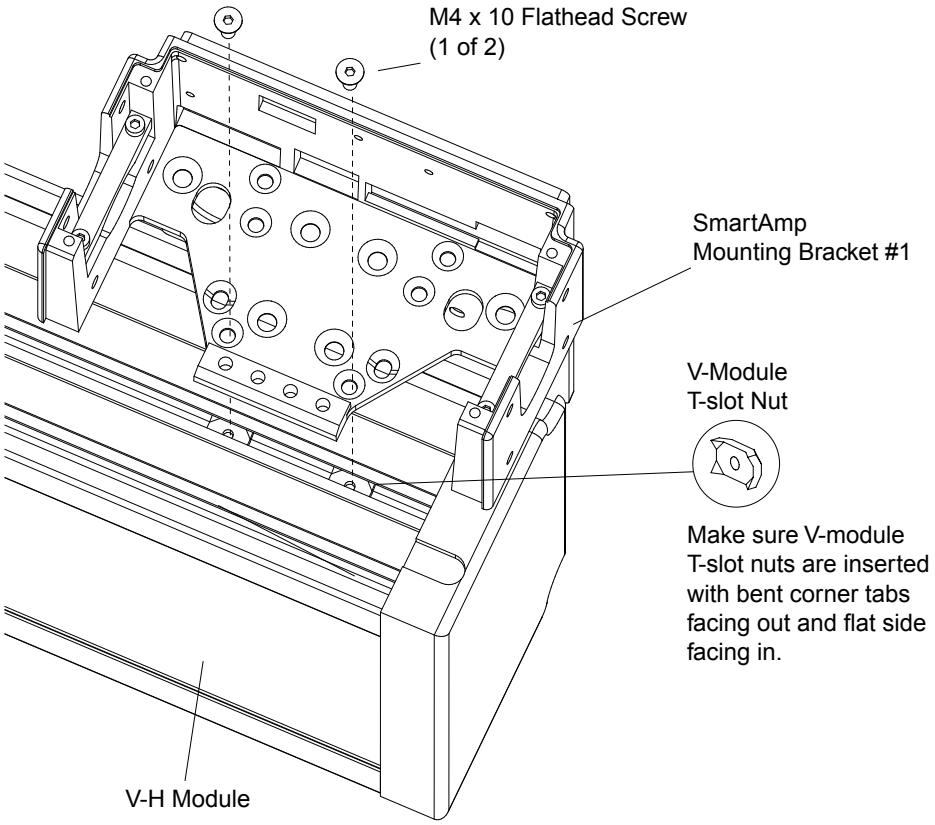


Figure 8-37. V-K(HMz): Installing SmartAmp Mounting Bracket #1 on the V-H Module

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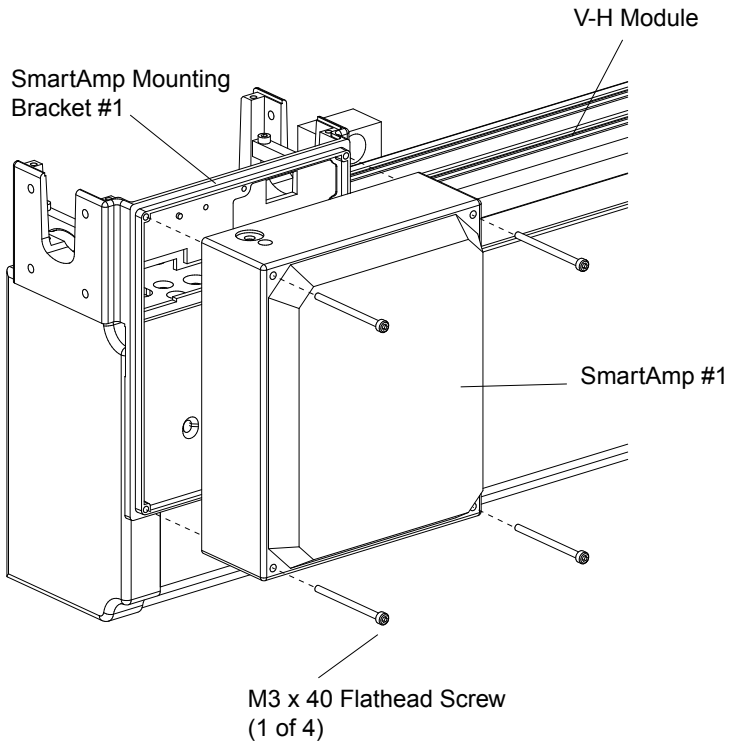


Figure 8-38. V-K(HMz): Installing SmartAmp #1 on the V-H Module

Installing SmartAmp #2 on the V-Mz Module

1. Remove the cable cover from the other SmartAmp mounting bracket by removing four M3 screws.
2. In the V-Mz module, insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel and two T-slot nuts into the lower side channel. Orient the T-slot nuts with the flat side against the module (see **Figure 8-37 on page 341**). Position the nuts for installing the SmartAmp mounting bracket.
3. Install a mounting bracket onto the V-Mz module using four M4 x 10 flathead screws; see **Figure 8-39 on page 343**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-Mz module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #2 onto the mounting bracket.

4. Install a SmartAmp onto mounting bracket #2 using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. See **Figure 8-40 on page 344**.

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5. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

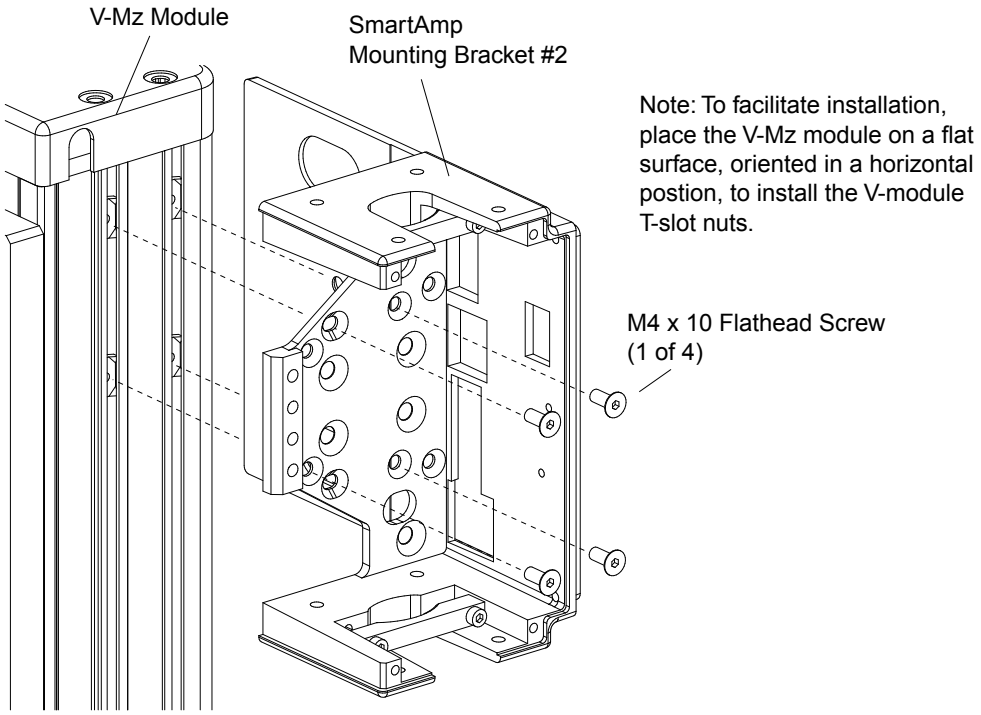


Figure 8-39. V-K(HMz): Installing SmartAmp Mounting Bracket #2 on the V-Mz Module

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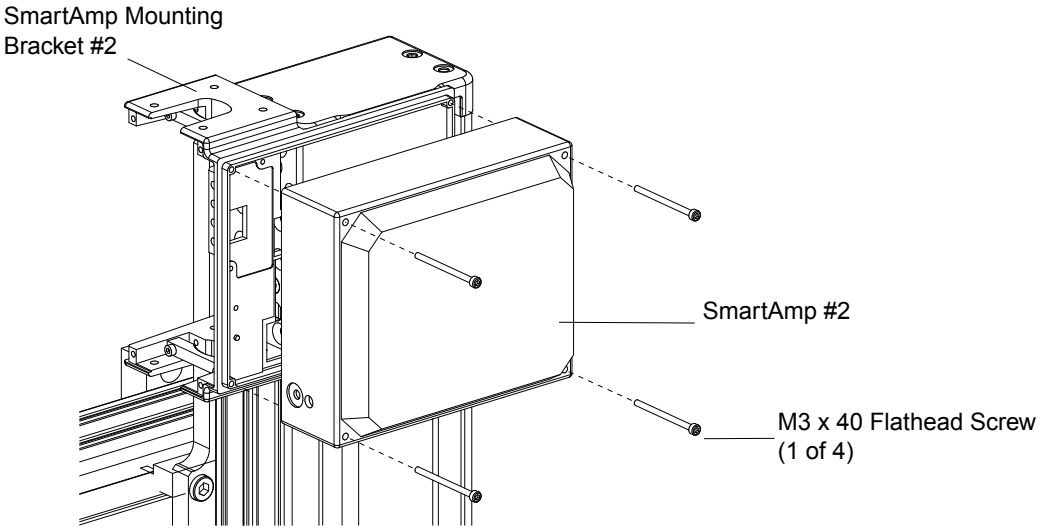


Figure 8-40. V-K(HMz): Installing SmartAmp #2 on the V-Mz Module

Installing the Cable Tube Support Clamp on the V-H Module

1. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-H module; see **Figure 8-41 on page 345**. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support clamp.
2. Install the cable tube support clamp using two M4 x 8 screws. Leave the M4 screws loose for repositioning later after the cable tube has been installed.

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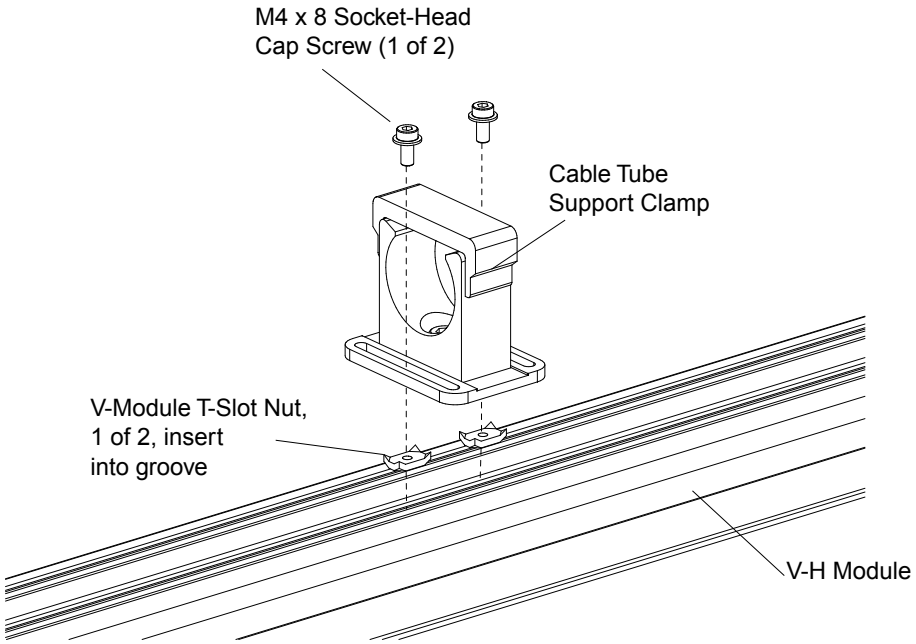


Figure 8-41. V-K(HMz): Installing the Cable Tube Support Clamp

Installing Cable Tube Assembly Between Amp #1 and Amp #2

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 8-20 on page 319**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

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Installing Cable Tube Fittings on Cable Tube

NOTE: For both cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate the straight cable tube fitting.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the straight cable tube fitting on the end near the 24V pin connector; install the elbow fitting on the other end. See **Figure 8-20 on page 319**.

2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 8-20 on page 319**.
3. Locate the elbow cable tube fitting.
4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 8-21 on page 321** for an illustration of a cable clamp.
2. Position the cable tube assembly next to the V-H module, with the straight fitting near SmartAmp #1.
3. Install the straight fitting on the outside of the mounting bracket. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-42 on page 347**.
4. In SmartAmp #1, connect these cables:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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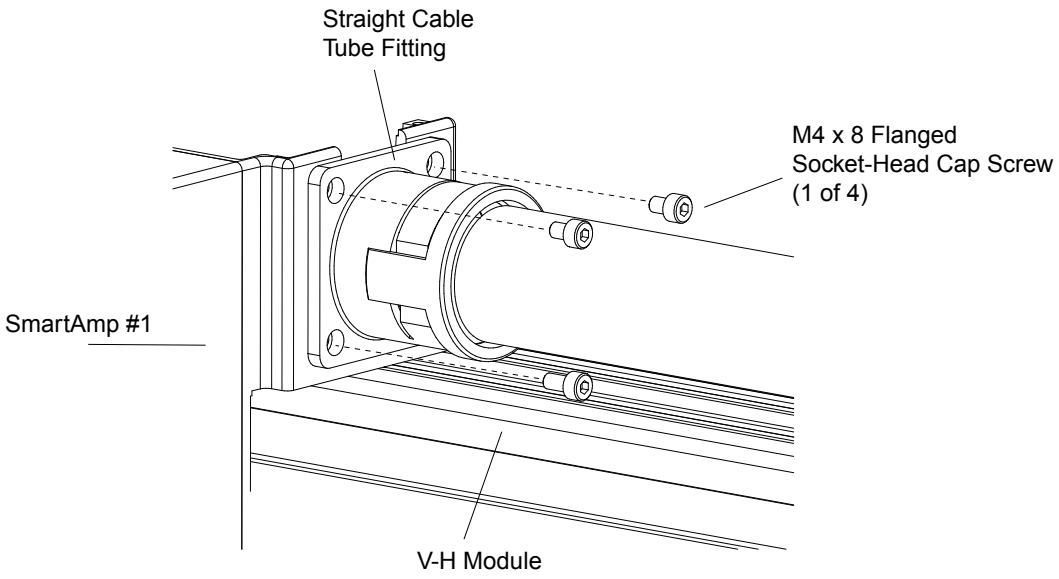


Figure 8-42. V-K(HMz): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

1. Remove the cable clamp from inside SmartAmp mounting bracket #2 by removing the two M3 screws.
2. Fold the cable tube up 180 degrees so the elbow fitting is positioned on top of mounting bracket #2.
3. Install the elbow fitting on the outside of the mounting bracket. See **Figure 8-43 on page 348**. Use four M4 x 8 screws to secure the fitting to the mounting bracket.
4. In SmartAmp #2, connect these cables (see **Figure 8-23 on page 322**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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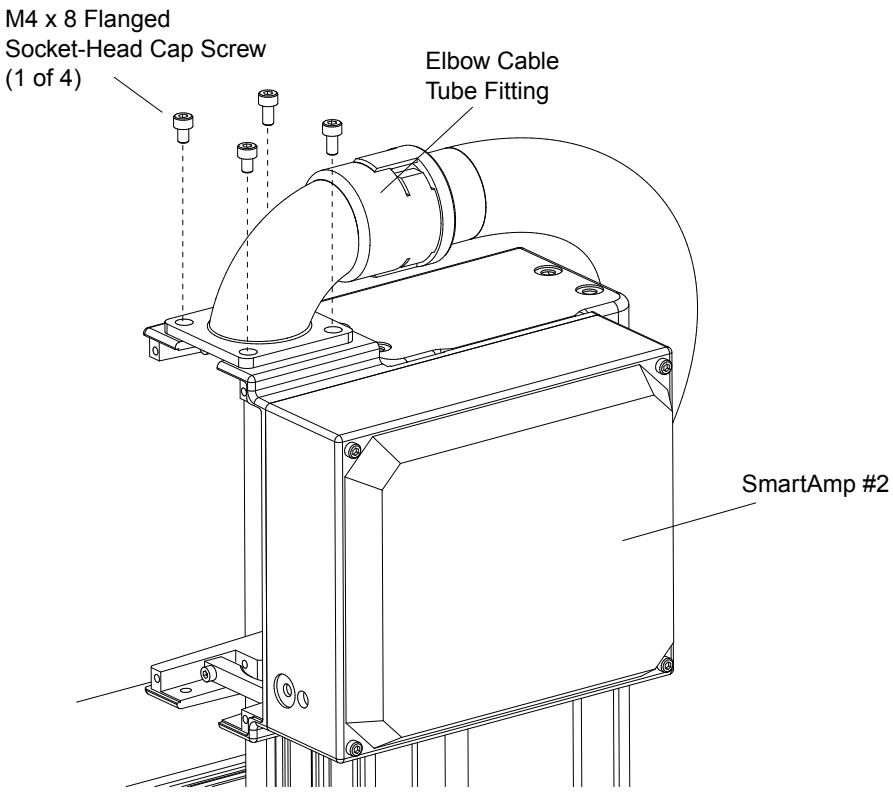


Figure 8-43. V-K(HMz): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

7. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the other module is closest to SmartAmp #1. Tighten the screws on the clamp to secure it.

Connecting Cables from Controller to SmartAmp #1

See **"Connecting Cables from Controller to SmartAmp #1" on page 51** for instructions.

Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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8.6 V-L(HzM) Installation Procedure

Overview

This section describes the process of installing a two-axis V-L(HzM) Adept SmartModules system. This configuration consists of one V-Hz and one V-M module joined together with a V-DHM combining bracket. Each V-Hz and V-M module has a SmartAmp and a SmartAmp mounting bracket. A cable tube assembly contains the cabling to interconnect the SmartAmps. See **Figure 8-44** for an overview of the system components.

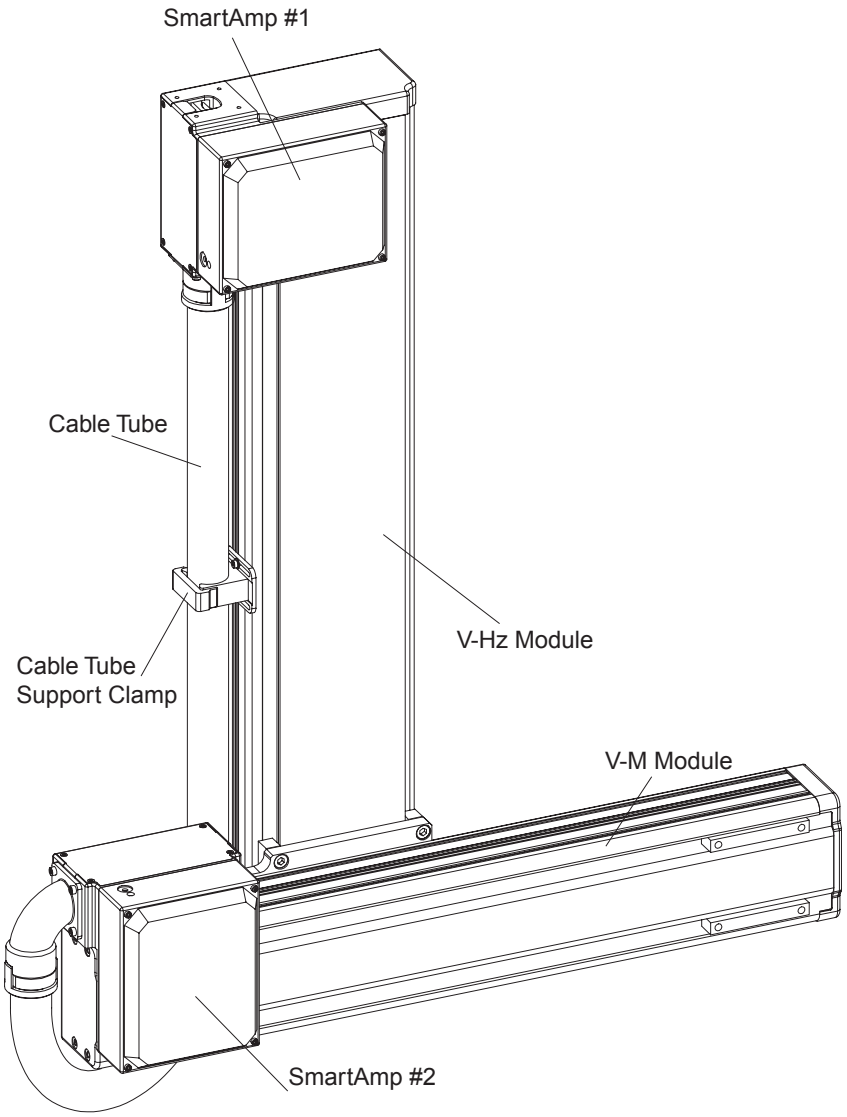


Figure 8-44. V-L(HzM): System Component Overview

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Table 8-6. V-L(HzM) Parts List

Description	Part Number	Qty
V-Hz module	90404-6xxxx	1
V-M module	90404-7xxxx	1
SmartAmp	30410-10000	2
SmartAmp mounting bracket	30410-20000	2
Combining bracket, V-DHM	40404-07002	1
Mounting plate, VH	90404-07100	2
Cable tube fitting, elbow	40410-40090	1
Cable tube fitting, straight	40410-40000	1
Cable tube, hi-flex	40410-310xx	1
Cable tube clamp	30410-42000	1[a]
Cable kit, amp to amp AC power cable 24V DC cable IEEE 1394 cable	90410-100xx 10410-006xx 10410-007xx 10410-005xx	1
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[b]

[a] Quantity will vary according to module lengths.
[b] Quantity will vary according to order.

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Installing the V-Hz Module

1. Prepare the work surface by drilling and tapping four M8 holes for the V-Hz module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-Hz module and the plate.
2. Install two V-Hz module mounting plates to the under side of the V-Hz module using two M8 x 20 screws provided for each plate. See **Figure 8-45**.

   NOTE: To facilitate installation of the SmartAmp on the V-Hz module, wait to mount the V-Hz module until after system assembly is complete. Then mount the V-Hz module to the work surface using two M8 screws per mounting plate.

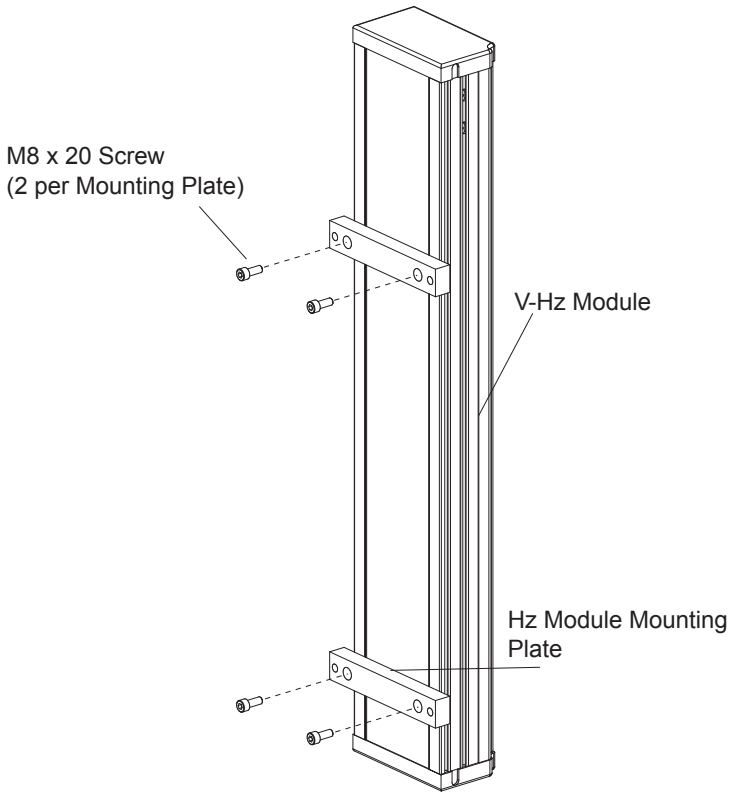


Figure 8-45. V-L(HzM): Installing the V-Hz Module

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Installing the V-M Module

1. Mount the V-DHM combining bracket to the V-M-module with four M6 x 16 screws. Position the bracket as shown in **Figure 8-46**.
2. Mount the V-M module and V-DHM combining bracket to the V-Hz module's slider with four M8 x 14 screws. See **Figure 8-47**.

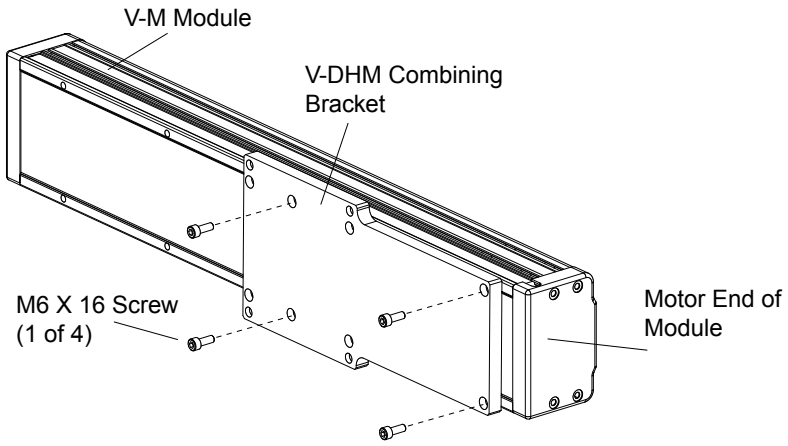


Figure 8-46. V-L(HzM): Installing the V-DHM Combining Bracket

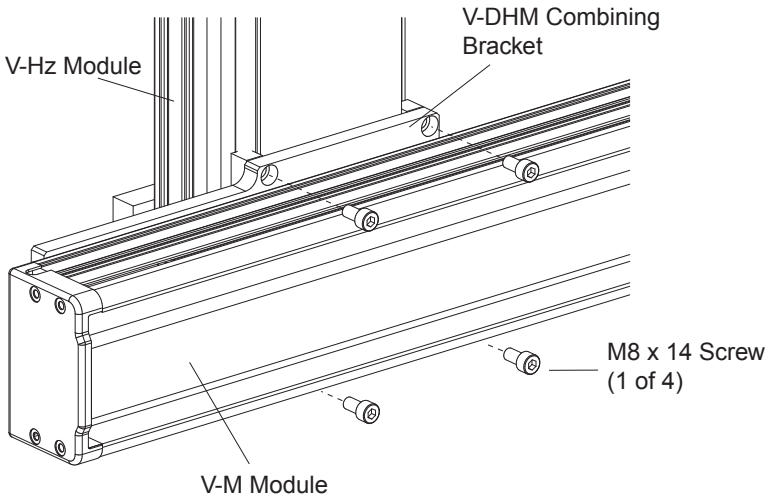


Figure 8-47. V-L(HzM): Installing the V-M Module

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Installing Adept SmartAmps

Installing SmartAmp #1 on the V-Hz Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-Hz module. Orient the T-slot nuts with the flat side against the module, see **Figure 8-13 on page 312** for reference. (Note that **Figure 8-13** shows the a V-H module instead of the V-Hz module on the V-L(HzM). However, the V-module T-slot information is correct.) Position the nuts for installing the SmartAmp mounting bracket.
3. Install the mounting bracket onto the V-Hz module using two M4 x 10 flathead screws; see **Figure 8-48**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-Hz module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-49 on page 355**.
5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

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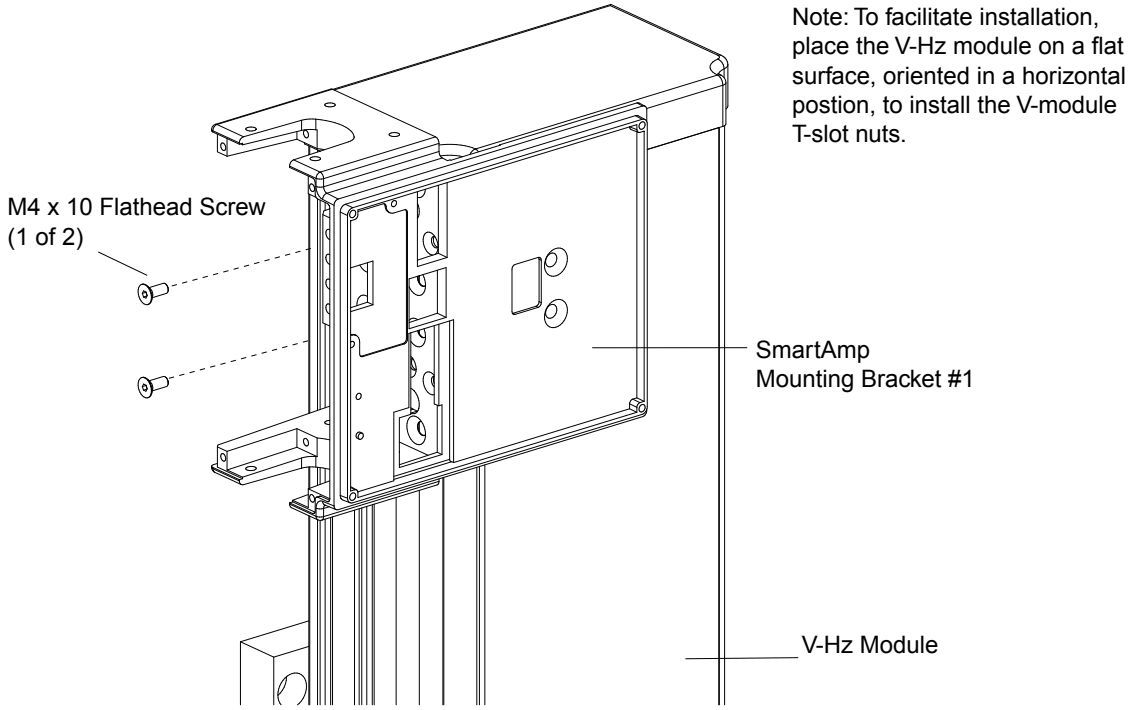


Figure 8-48. V-L(HzM): Installing SmartAmp Mounting Bracket #1 on the V-Hz Module

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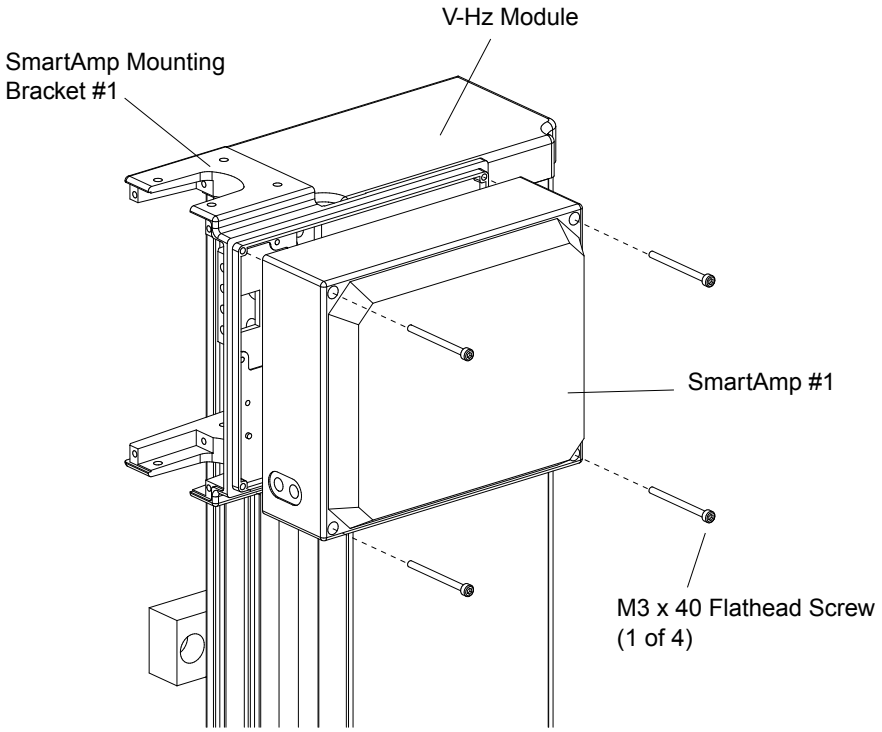


Figure 8-49. V-L(HzM): Installing SmartAmp #1 on the V-Hz Module

Installing SmartAmp #2 on the V-M Module

1. Remove the cable cover from the other SmartAmp mounting bracket by removing four M3 screws.
2. In the V-M module, insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel and two T-slot nuts in the lower side channel. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install a mounting bracket onto the V-M module using four M4 x 10 flathead screws; see **Figure 8-50 on page 356**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-M module, refer to the ***Adept SmartModules Instruction Handbook for Controller Installation*** for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #2 onto the mounting bracket.

4. Install a SmartAmp onto mounting bracket #2 using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. See **Figure 8-51 on page 356**.
5. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

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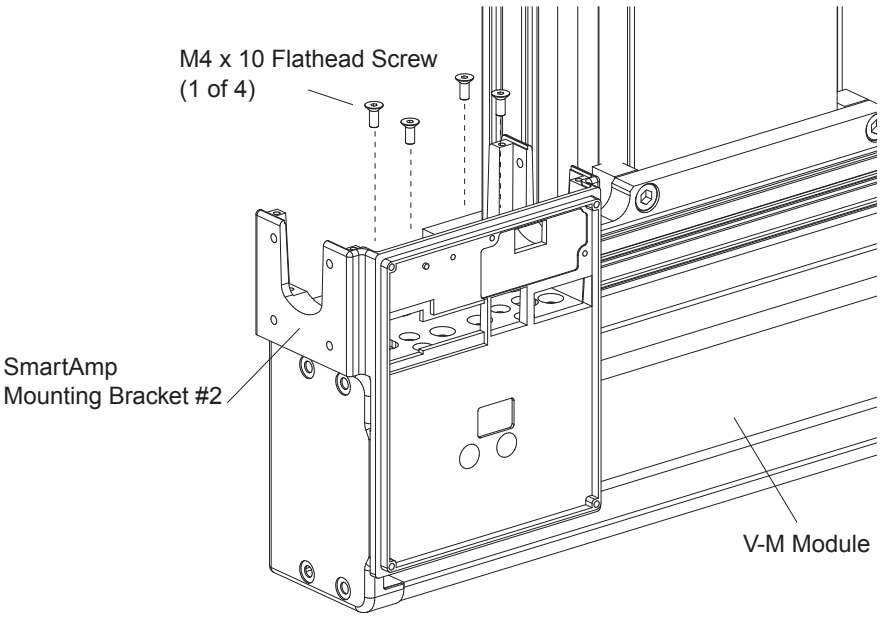


Figure 8-50. V-L(HzM): Installing SmartAmp Mounting Bracket #2 on the V-M Module

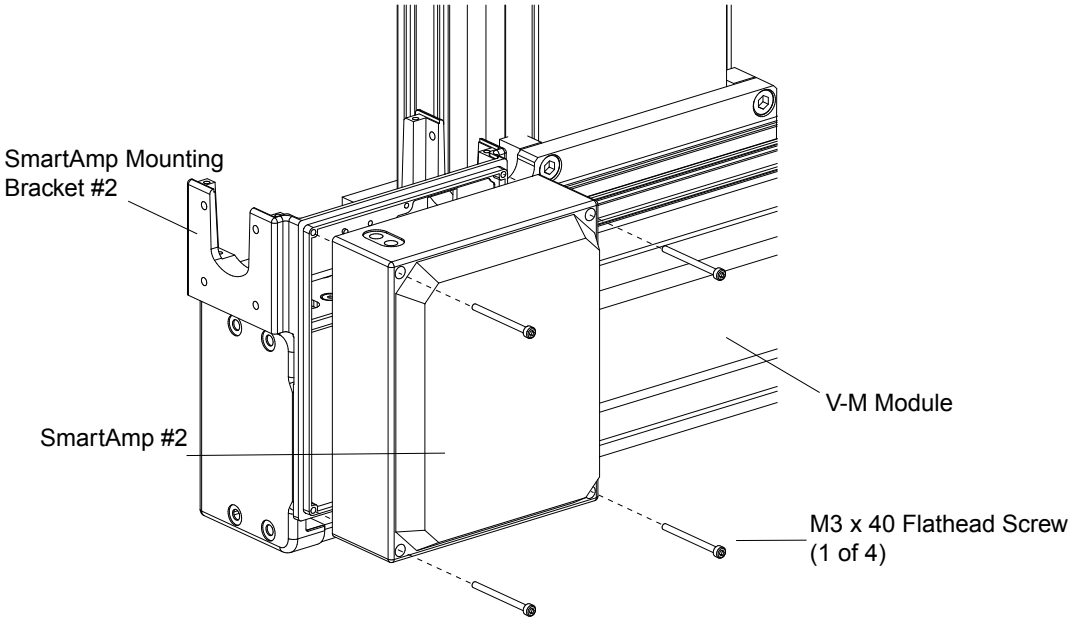


Figure 8-51. V-L(HzM): Installing SmartAmp #2 on the V-M Module

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Installing the Cable Tube Support Clamp on the V-Hz Module

1. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-Hz module; see **Figure 8-41 on page 345** for reference. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support clamp.
2. Install the cable tube support clamp using two M4 x 8 screws. Leave the M4 screws loose for repositioning later after the cable tube has been installed.

Installing Cable Tube Assembly Between Amp #1 and Amp #2

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 8-20 on page 319**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.

Installing Cable Tube Fittings on Cable Tube

NOTE: For both cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

1. Locate the straight cable tube fitting.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. Install the straight cable tube fitting on the end near the 24V pin connector; install the elbow fitting on the other end. See **Figure 8-20 on page 319**.
2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 8-20 on page 319**.
3. Locate the elbow cable tube fitting.

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4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 8-21 on page 321** for an illustration of a cable clamp.
2. Position the cable tube assembly next to the V-Hz module, with the straight fitting near SmartAmp #1.
3. Install the straight fitting on the outside of the mounting bracket. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-52** for reference. Note that **Figure 8-52** shows the module oriented differently than the module on the V-L(HzM). The rest of the graphic is correct, however.
4. In SmartAmp #1, connect these cables:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

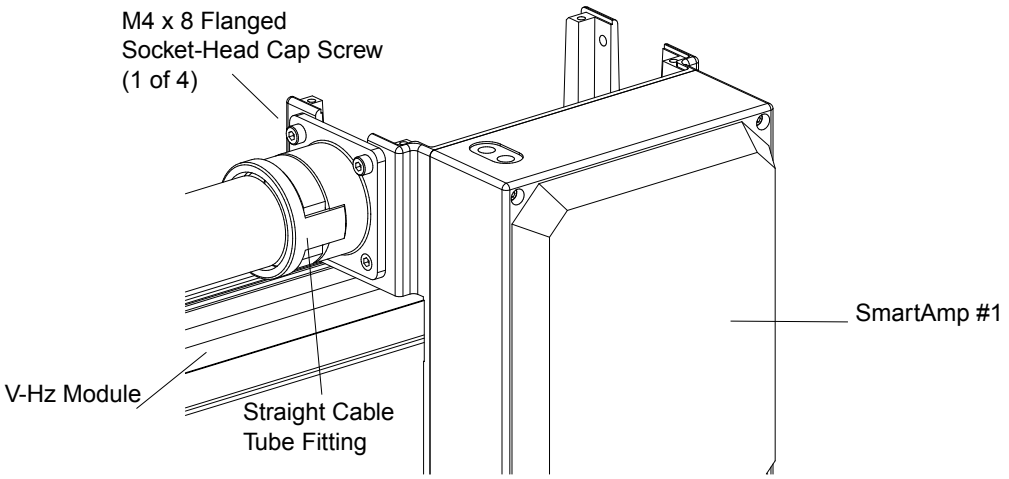


Figure 8-52. V-L(HzM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1

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Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

1. Remove the cable clamp from inside SmartAmp mounting bracket #2 by removing the two M3 screws.
2. Fold the cable tube up 180 degrees so the elbow fitting is positioned beside mounting bracket #2.
3. Install the elbow fitting on the outside of the mounting bracket. See **Figure 8-53**. Use four M4 x 8 screws to secure the fitting to the mounting bracket.
4. In SmartAmp #2, connect these cables (see **Figure 8-23 on page 322**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

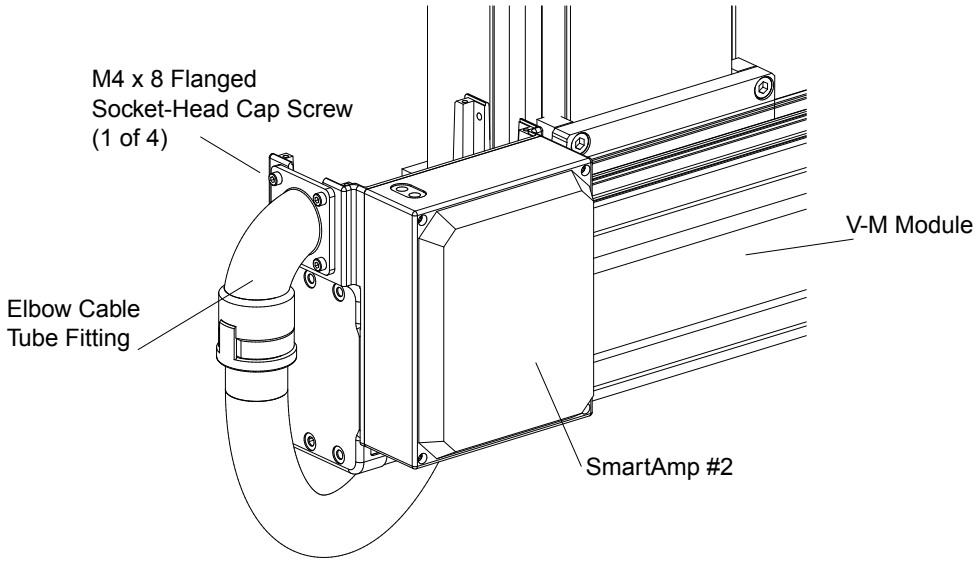


Figure 8-53. V-L(HzM): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

7. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the other module is closest to SmartAmp #1. Tighten the screws on the clamp to secure it.

Connecting Cables from Controller to SmartAmp #1

See **"Connecting Cables from Controller to SmartAmp #1" on page 51** for instructions.

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Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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8.7 V-P(HHMz) Installation Procedure

Overview

This section describes the process of installing a three-axis V-P(HHMz) Adept SmartModules system. This configuration consists of two V-H modules joined together with a V-GHH combining bracket, and an V-Mz module connected with a V-DHM combining bracket. Each module (V-H, V-H, and V-Mz) has a SmartAmp and a SmartAmp mounting bracket. Two cable tube assemblies contain the cabling to interconnect the SmartAmps. See **Figure 8-54** for an overview of the system components.

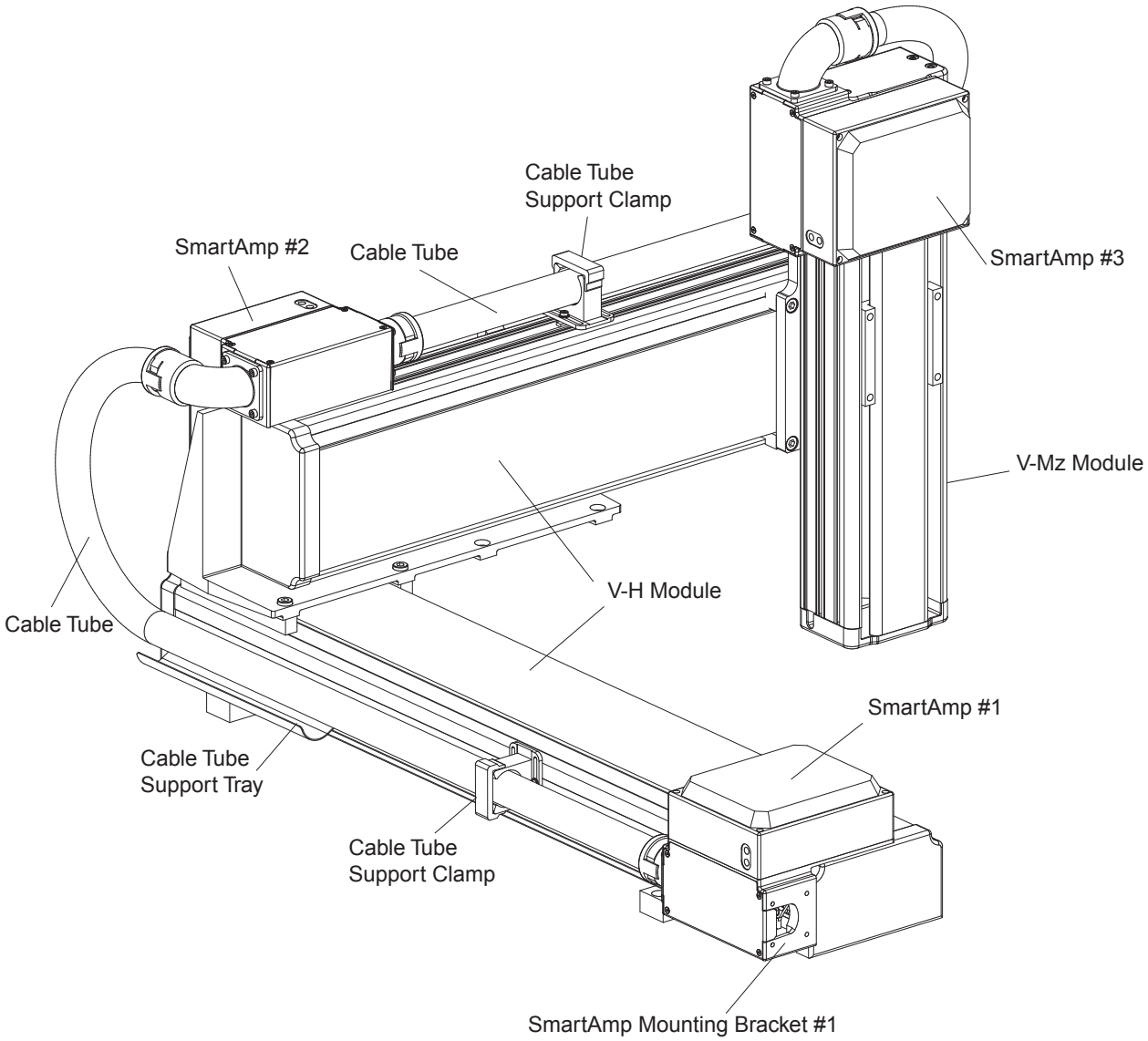


Figure 8-54. V-P(HHMz): System Component Overview

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Table 8-7. V-P(HHMz) Parts List

Description	Part Number	Qty
V-H module	90404-6xxxx	2
V-Mz module	90404-7xxxx	1
SmartAmp	30410-10000	3
SmartAmp mounting bracket	30410-20000	3
Combining bracket, V-DHM	40404-07002	1
Combining bracket, V-GHH	40404-07000	1
Mounting plate, VH	90404-07100	2
Cable tube fitting, elbow	40410-40090	2
Cable tube fitting, straight	40410-40000	2
Cable tube, hi-flex	40410-310xx	2
Cable tube clamp	30410-42000	2[a]
Cable tube support tray	30410-60000	1[a]
Cable kit, amp to amp AC power cable 24V DC cable IEEE 1394 cable	90410-100xx 10410-006xx 10410-007xx 10410-005xx	2
Cable kit, controller AC power cable 24V DC cable IEEE 1394 cable Ferrite core	90410-200xx 10410-009xx 10410-010xx 10410-105xx 27200-00117	1
Hardware kit	90405-00200	1
Optional Items		
Remote I/O (RIO) kit	90410-20050	1[b]

[a] Quantity will vary according to module lengths.
[b] Quantity will vary according to order.

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Installing the First V-H Module

NOTE: 300 to 600 mm V-H modules use two mounting plates; 800 mm and longer modules use three plates.

1. Prepare the work surface by drilling and tapping four M8 holes for the V-H module mounting plates. See "**Chapter 10** - Technical Specifications " for dimensions of the V-H module and the plates.
2. Install the V-H module mounting plates to the under side of the V-H module using two M8 x 20 screws provided for each plate. See **Figure 8-10 on page 309**.
3. Mount the V-H module to the work surface using two M8 screws per mounting plate.

Installing the Second V-H Module

1. Mount the V-GHH combining bracket to the first V-H module's slider with four M8 x 14 screws. See **Figure 8-55**.
2. Mount the second V-H module on the V-GHH combining bracket with four M8 x 20 screws. See **Figure 8-56**.

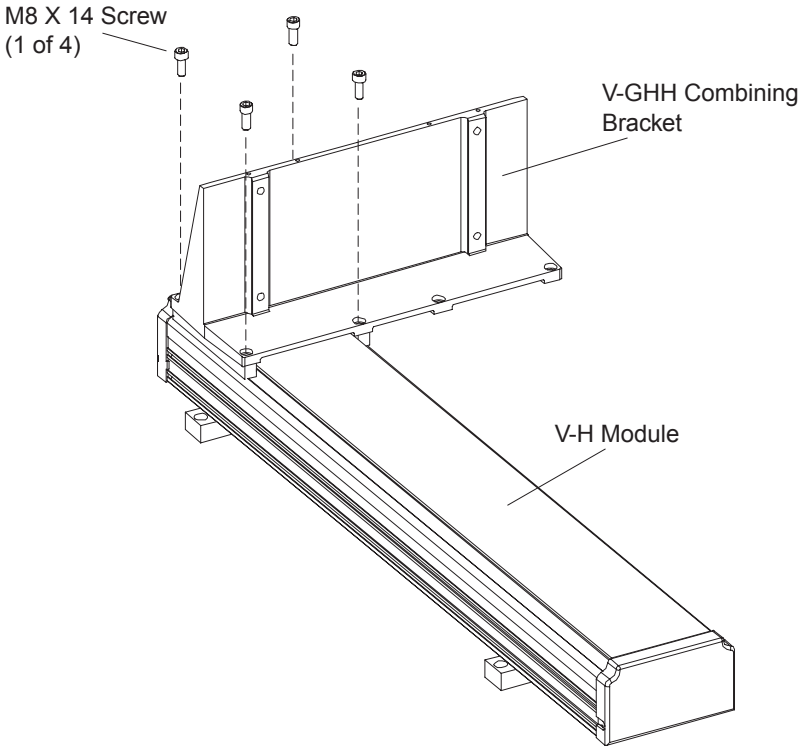


Figure 8-55. V-P(HHMz): Installing the V-GHH Combining Bracket

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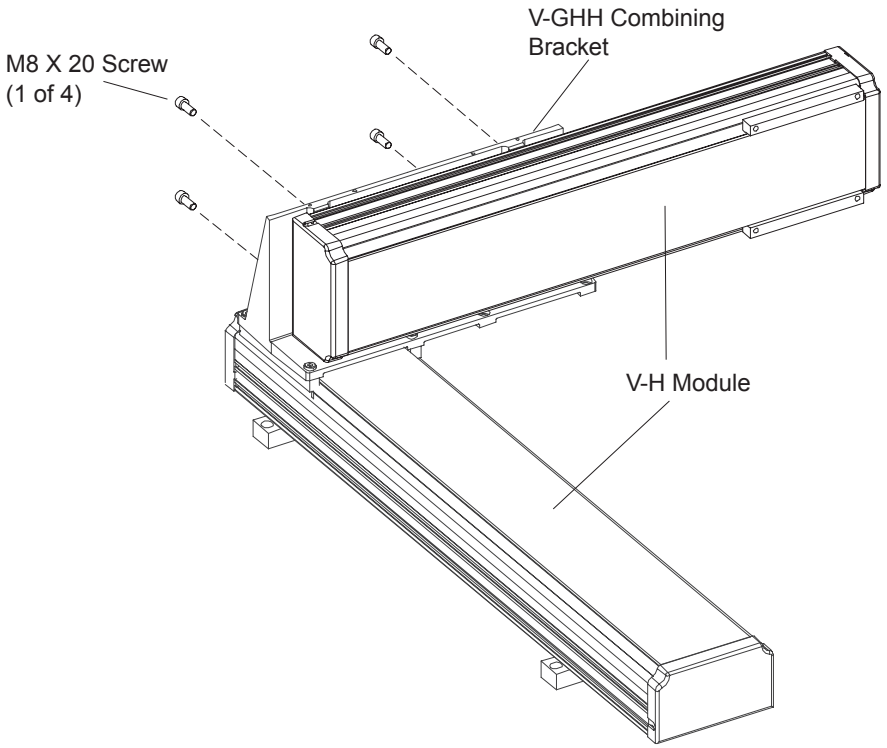


Figure 8-56. V-P(HHMz): Installing the Second V-H Module

Installing the V-Mz Module

1. Mount the V-DHM combining bracket to the V-Mz module with four M6 x 16 screws. Position the bracket as shown in **Figure 8-35 on page 339**.
2. Mount the V-Mz module and V-DHM combining bracket on the second V-H module with four M8 x 14 screws. See **Figure 8-36 on page 340**.

Installing Adept SmartAmps

Installing SmartAmp #1 on the First V-H Module

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the first V-H module. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install the mounting bracket onto the V-H module using two M4 x 10 flathead screws; see **Figure 8-13 on page 312**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

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NOTE: If you have an optional RIO unit that will be mounted on the V-H module, refer to the *Adept SmartModules Instruction Handbook for Controller Installation* for information on installing the SPI board at this time. This needs to be done before you install the SmartAmp onto the mounting bracket.

4. Install SmartAmp #1 onto the mounting bracket using four M3 x 40 screws. See **Figure 8-14 on page 313**.
5. Plug the motor and encoder cables from the module into the mating receptacles in the SmartAmp. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

Installing SmartAmp #2 on the V-GHH Combining Bracket

1. Remove the cable cover from a SmartAmp mounting bracket by removing four M3 screws.
2. Install a mounting bracket onto the V-GHH combining bracket using four M4 x 10 flathead screws. Route the motor and encoder cables from the module through the opening in the mounting bracket.
3. Install a SmartAmp onto the mounting bracket using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket.
4. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

Installing SmartAmp #3 on the V-Mz Module

1. Remove the cable cover from the remaining SmartAmp mounting bracket by removing four M3 screws.
2. In the V-Mz module, insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel and two T-slot nuts into the lower side channel. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the SmartAmp mounting bracket.
3. Install a mounting bracket onto the V-Mz module using four M4 x 10 flathead screws; see **Figure 8-57 on page 366**. Route the motor and encoder cables from the module through the opening in the mounting bracket.

   NOTE: If you have an optional RIO unit that will be mounted on the V-Mz module, refer to the *Adept SmartModules Instruction Handbook for Controller Installation* for information on installing the SPI board at this time. This needs to be done before you install SmartAmp #3 onto the mounting bracket.

4. Install a SmartAmp onto mounting bracket #3 using four M3 x 40 screws. Position the SmartAmp so that the connectors extend through the mounting bracket. See **Figure 8-58 on page 366**.
5. Plug the motor and encoder cables from the module into the mating receptacles in SmartAmp #2. See **Figure 8-15 on page 313**. Attach the captive screws to secure the encoder connector.

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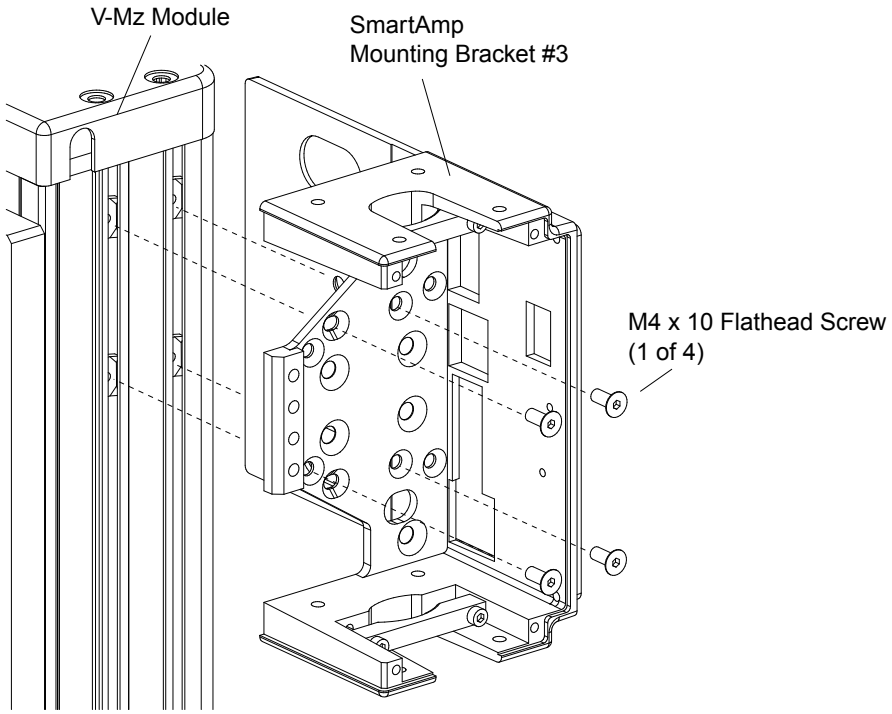


Figure 8-57. V-P(HHMz): Installing SmartAmp Mounting Bracket #3 on the V-Mz Module

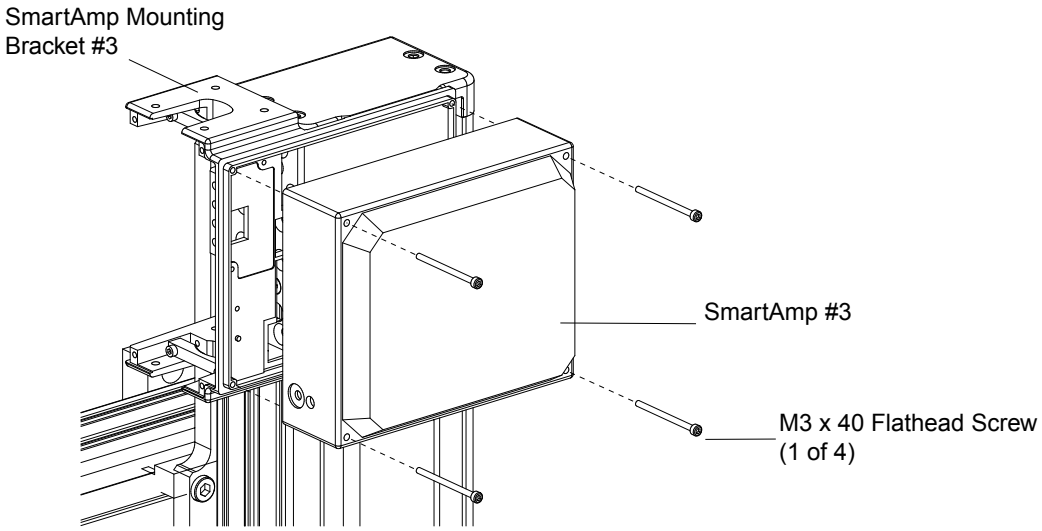


Figure 8-58. V-P(HHMz): Installing SmartAmp #3 on the V-Mz Module

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Installing the Cable Tube Support Clamps on V-H Modules

Mount a cable tube support clamp on each of the V-H modules: one clamp mounts on the side of the first V-H module; the other clamp mounts on the top of the second V-H module. See **Figure 8-59** for an illustration of the two properly mounted cable tube support clamps. For each V-H module, perform the following steps.

1. Insert two V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the V-H module; see **Figure 8-18 on page 316**. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support clamp.
2. Install the cable tube support clamp using two M4 x 8 screws. Leave the M4 screws loose for repositioning later after the cable tube has been installed.
3. Repeat the above steps for the other cable tube support clamp.

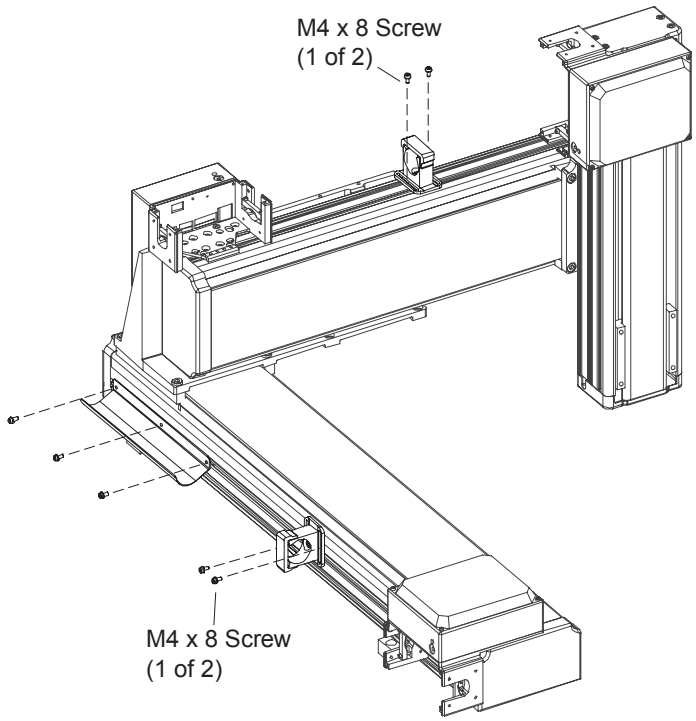


Figure 8-59. V-P(HHMz): Cable Tube Support Clamps

Installing the Cable Tube Support Tray

Install the cable tube support tray on the first V-H module only.

1. Insert three V-module T-slot nuts (from the hardware mounting bracket kit) into the upper side channel in the first V-H module; see **Figure 8-19 on page 317**. Orient the T-slot nuts with the flat side against the module. Position the nuts for installing the cable tube support tray.

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2. Install the cable tube support tray using three M4 x 8 screws (from the hardware mounting bracket kit).

Installing Cable Tube Assemblies Between the SmartAmps

Create one cable tube assembly to connect SmartAmp #1 to SmartAmp #2; create another cable tube assembly to connect SmartAmp #2 to SmartAmp #3.

The procedure to install cables consists of these steps:

- route cables through the cable tube
- install cable tube fittings on cable tube
- install assembled cable tube on SmartAmp mounting brackets and plug in all cables

The lengths of the cables and cable tube depend on which modules you have ordered.

Routing Cables Through Cable Tube

Perform the steps below for each of the two cable tube assemblies.

1. Locate three cables in the cable kit.
   - AC power cable
   - 24VDC cable
   - IEEE 1394 cable

   See **Figure 8-20 on page 319**.
2. Group the three cables together, plus any additional user cables or air lines, and slide them through the cable tube.
3. Gently pull the cables through the tube until they are evenly spaced at each end. Try to make sure the cables do not get twisted or tangled as you pull them through the tube.
4. Repeat the above steps for the other cable tube assembly.

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Installing Cable Tube Fittings on Cable Tube

NOTE: For all cable tube fittings, make sure the arrows on the fitting clamp are pointing toward the end of the tube.

Perform the steps below for each of the two cable tube assemblies.

1. Locate a straight cable tube fitting.

   NOTE: The 24V cable has two additional connectors for the optional RIO system. There is a socket (latched) connector at one end of the cable and a pin connector at the other end. For both cable tube assemblies, install the straight cable tube fitting on the end near the 24V pin connector; install the elbow fitting on the other end. Each cable tube assembly should have a straight cable tube fitting on one end (near the 24V pin connector), and an elbow fitting (near the 24V socket connector) on the other end. See **Figure 8-20 on page 319**.

2. Install the fitting by pushing it onto the end of the cable tube until the fitting has fully snapped into place inside the fitting. See **Figure 8-20 on page 319**.
3. Locate an elbow cable tube fitting.
4. Install the fitting by pushing it onto the opposite end of the cable tube until the fitting has fully snapped into place inside the fitting.
5. Repeat the above steps for the other cable tube assembly.

Installing the First Cable Tube Assembly

Install the first cable tube assembly between SmartAmp #1 and SmartAmp #2.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #1 Perform the steps below to attach the first cable tube assembly to SmartAmp mounting bracket #1 and connect cables to SmartAmp #1.

1. Remove the cable clamp from inside the mounting bracket by removing the two M3 screws. See **Figure 8-21 on page 321**.
2. Position the straight fitting of the cable tube assembly near SmartAmp #1.
3. Install the straight fitting on the outside of the mounting bracket. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-22 on page 321**.
4. In SmartAmp #1, connect these cables:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   There are two identical mating connectors for each cable in the SmartAmp, you can use either one. See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.

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6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2 Perform the steps below to attach the first cable tube assembly to SmartAmp mounting bracket #2 and connect cables to SmartAmp #2.

1. Remove the cable clamp from inside mounting bracket #2 by removing the two M3 screws.
2. Rest the cable tube in the support tray. Fold the cable tube up 180 degrees so the elbow fitting is positioned next to mounting bracket #2.
3. Install the elbow fitting on the outside of mounting bracket #2. See **Figure 8-60** for reference. Use four M4 x 8 screws to secure the fitting to the mounting bracket. (Note that **Figure 8-60** shows an R-GHH bracket, instead of the V-GHH bracket used for the V-P(HHMz). Otherwise, the figure is correct.)
4. In SmartAmp #2, connect these cables (see **Figure 8-23 on page 322**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

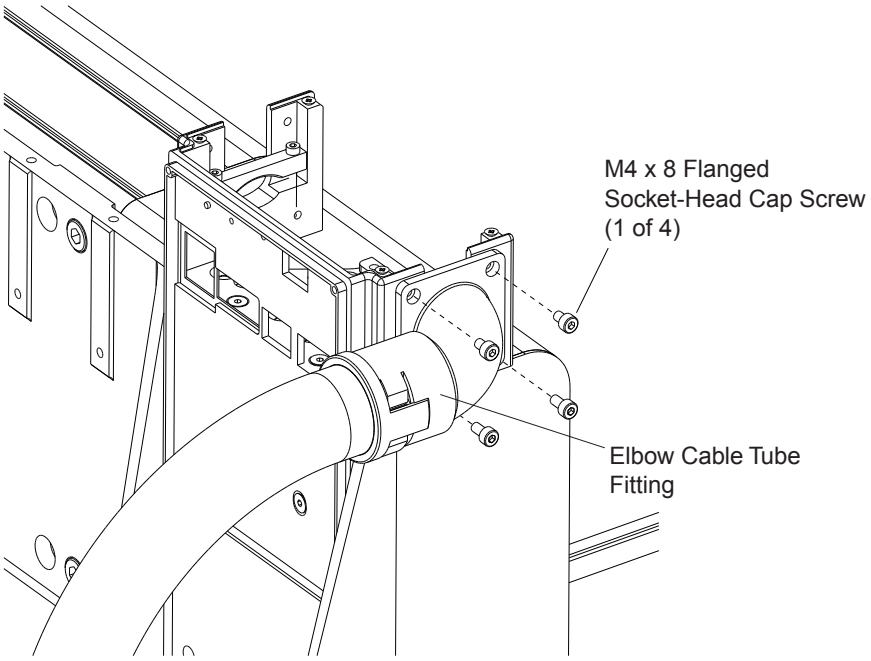


Figure 8-60. V-P(HHMz): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

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7. Slide the cable tube support clamp to the desired position and snap the tube into place. The clamp should be positioned just past the point where the cable tube bends when the second V-H module is closest to SmartAmp #1.
8. Slide the cable tube support tray into place near the end of the module so that the tube is supported at the end of travel.

Installing the Second Cable Tube Assembly

Install the second cable tube assembly between SmartAmp #2 and SmartAmp #3.

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2 Perform the steps below to attach the second cable tube assembly to SmartAmp mounting bracket #2 and connect cables to SmartAmp #2.

1. Remove the cable clamp from inside mounting bracket #2 by removing the two M3 screws. See **Figure 8-21 on page 321** for an illustration of the cable clamp (note that this illustration is oriented differently from the correct mounting position for mounting bracket #2).
2. Position the straight fitting of the cable tube assembly near SmartAmp #2, opposite from the elbow cable tube fitting already connected to SmartAmp #2.
3. Install the straight cable tube fitting on the outside of the mounting bracket. Make sure the fitting clamp is accessible. Use four M4 x 8 screws to secure the fitting to the mounting bracket. See **Figure 8-61 on page 372**.
4. In SmartAmp #2, connect these cables from the second cable tube assembly:
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable

   See **Figure 8-23 on page 322**.
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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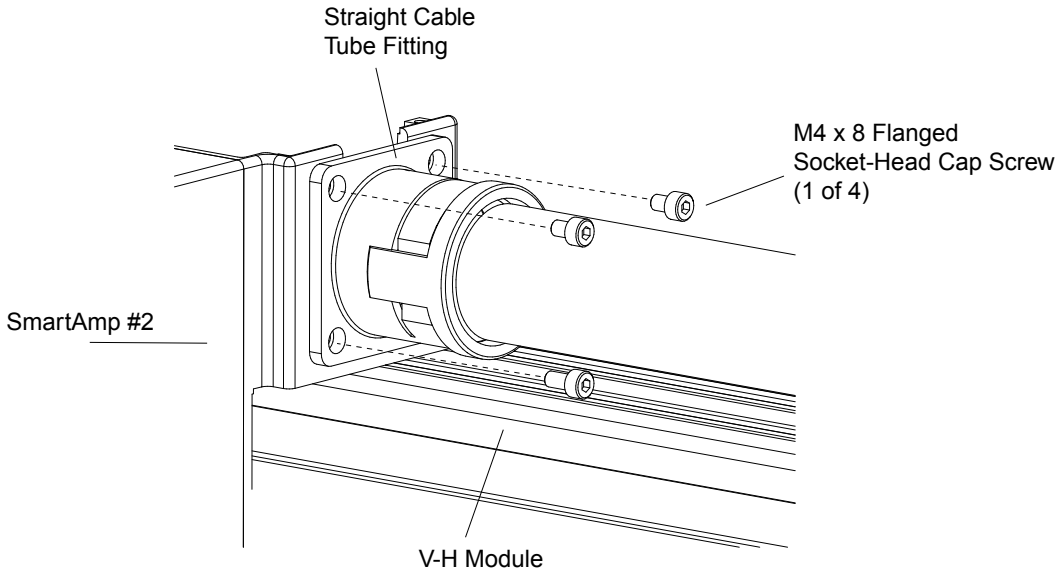


Figure 8-61. V-P(HHMz): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #2

Installing Cable Tube Fitting on SmartAmp Mounting Bracket #3 Perform the steps below to attach the second cable tube assembly to SmartAmp mounting bracket #3 and connect cables to SmartAmp #3.

1. Remove the cable clamp from inside mounting bracket #3 by removing the two M3 screws.
2. Fold the cable tube up 180 degrees so the elbow fitting is positioned on mounting bracket #3.
3. Install the elbow fitting on the outside of mounting bracket #3. See **Figure 8-62 on page 373**. Use four M4 x 8 screws to secure the fitting to the mounting bracket.
4. In SmartAmp #3, connect these cables (see **Figure 8-23 on page 322**):
   - IEEE 1394 cable
   - AC power cable and ground ring lug
   - 24VDC cable
5. Slide the cable clamp into the channel inside the mounting bracket.
6. Install two M3 x 30 screws through the cable clamp and into the holes in the mounting bracket. Tighten the clamp until the cables are secure. Do not over-tighten nor leave the cables too loose to allow them to slide.

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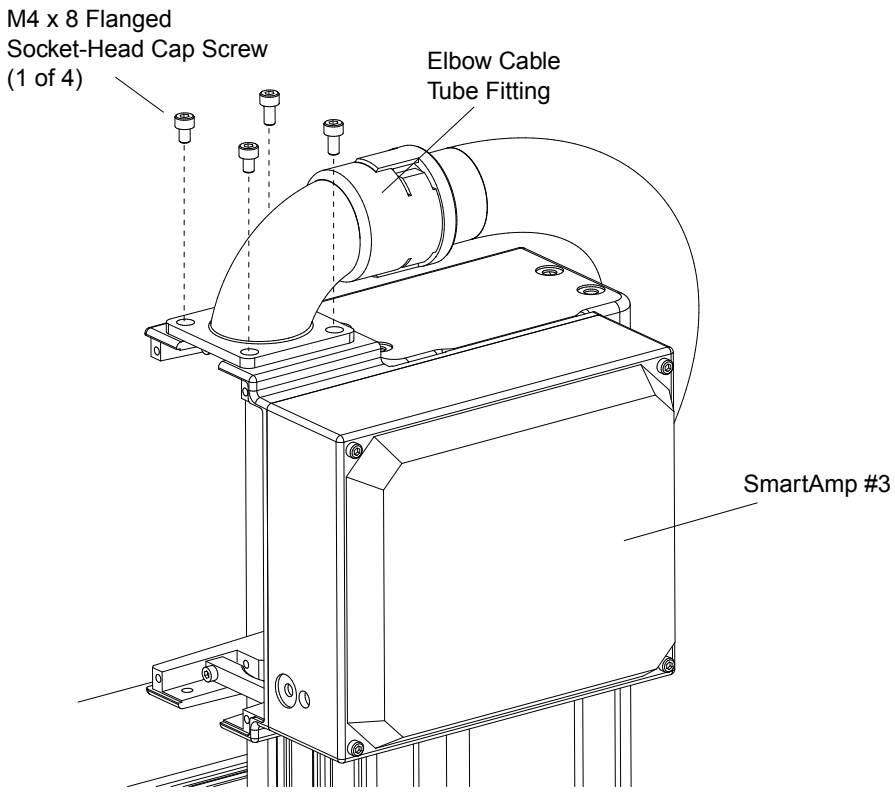


Figure 8-62. V-P(HHMz): Installing Cable Tube Fitting on SmartAmp Mounting Bracket #3

7. Slide the cable tube support clamp to the desired position and snap the tube into place. Tighten the screws on the clamp to secure it.
8. Slide the cable tube support tray into place near the end of the module so that the tube is supported at the end of travel. Tighten the screws on the tray to secure it.

Connecting Cables from Controller to SmartAmp #1

See **"Connecting Cables from Controller to SmartAmp #1" on page 51** for instructions.

Completing the Installation

Perform these steps to complete the installation.

- After you connect all the cables inside the SmartAmp, attach the cable cover to the SmartAmp bracket using four M3 screws.
- Check the mechanical motion of each axis. (Modules with brakes must be checked when the power is turned on.)

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9 Maintenance

9.1 Maintenance

To prevent accidents, observe the following precautions when inspecting or maintaining the unit.



WARNING: Turn off the power to the controller when personnel or tools are in the vicinity of the robot work area.



WARNING: Do not disassemble or modify the unit except as instructed in this manual.



WARNING: The V-Series modules are not sealed. Prevent foreign objects and liquids from entering the module body because these materials may damage the module.

NOTE: Most SmartModules (except for the Z-Theta module) are self-lubricating and do not require lubrication. See the **"Z-Theta Ball Screw/Spline Lubrication" on page 377** for instructions on lubricating this module.

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Daily Maintenance

Perform daily checks as shown in Table 9-1.

Table 9-1. Daily Maintenance Checks

Check Points	Procedures and Specifications
Base fixing bolts (bolts used to attach mounting plates to work surface)	Check for looseness; tighten as necessary.
Work fixing bolts (bolts used to attach equipment to module sliders)	See "Mounting Screw Torque Specifications" on page 43 for tightening torque.

NOTE: No brush replacement is required because AC servo motors are used in this product.

9.2 Other Periodic Maintenance

Table 9-2 gives a summary of other preventive maintenance procedures and guidelines on frequency.

Table 9-2. Inspection and Maintenance

Item	Period	Reference
Ball screw and linear guide	3 months	Visually inspect and look for unusual wear.
Cable connections	1 month	Visually inspect to ensure that all connections are secure.
SmartAmps, combining and other brackets, cable tube support trays	1 month	Visually inspect to ensure that these components are securely mounted.
Cable tubes, seal belts	1 month	Visually inspect for unusual wear and/or debris near these components.

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NOTE: The frequency of these procedures depends on the particular system, its operating environment, and amount of usage. Use the times in **Table 9-1** and **Table 9-2** as guidelines and modify the schedule as needed. In general, look for any unusual wear on components.

9.3 Z-Theta Ball Screw/Spline Lubrication

The Z-Theta ball screw/spline should be lubricated every 3 months. The recommended grease is "LG-2 lubricating Grease, Lithium Soap, Synthetic Hydrocarbon", Adept part number 85139-00002.

Perform the steps below to lubricate this component:

1. Turn off main power to the controller and power chassis.
2. Disconnect the encoder and motor connectors on the Z-Theta module.
3. Using a phillips screwdriver, remove the three screws from the top cover and set the cover aside.
4. Move joint 3 to the top of travel. Remove existing grease with a clean, lint free, soft cloth.
5. Using a syringe, apply a small bead of grease to the joint 3 ball screw grooves.
6. Move joint 3 to the bottom of travel. Remove any existing grease with a clean, lint free, soft cloth.
7. Apply a thin film of grease to any grooves of the ball screw that you did not reach in **Step 5**.
8. Replace the connectors, fasteners, and top cover in reverse order.

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10 Technical Specifications

10.1 Introduction

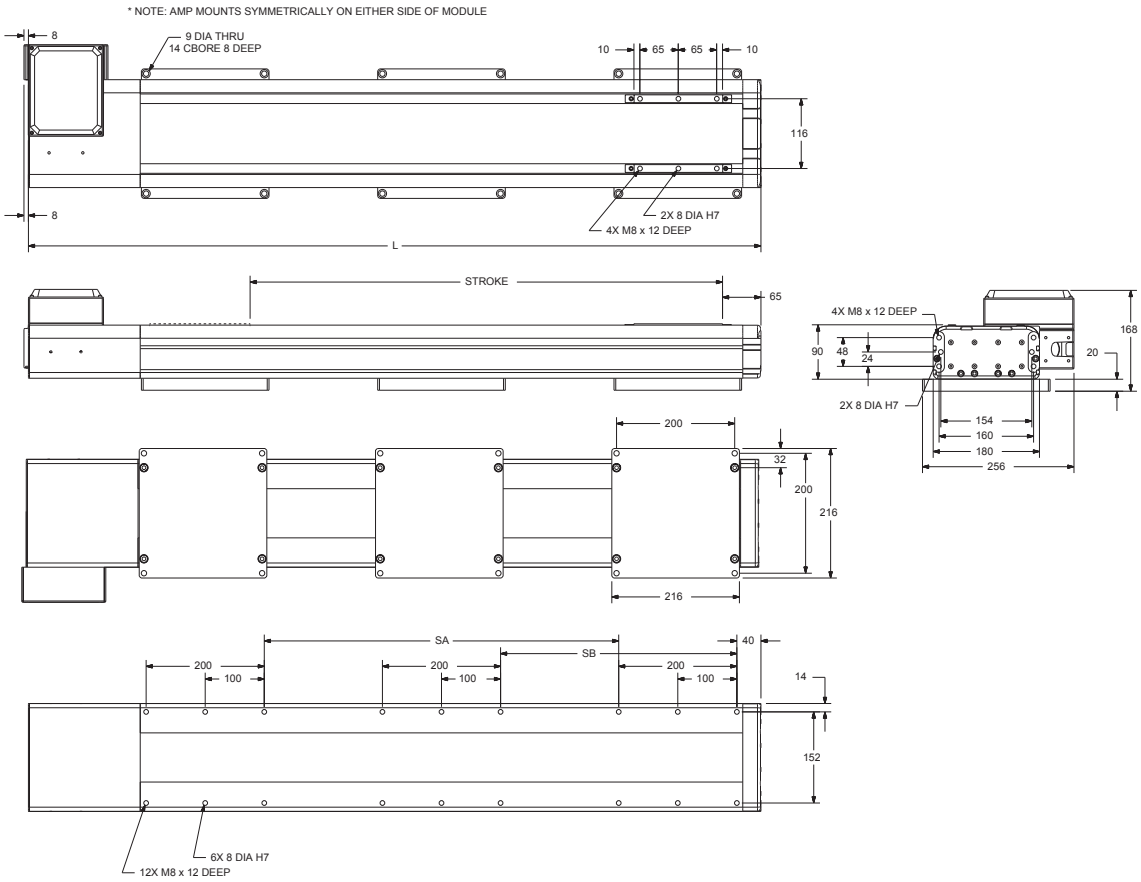
This chapter shows isometric drawings of all the SmartModule configurations, along with drawings and tables that display the various modules' dimensions.

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10.2 SmartModule Dimensions

This section contains isometric drawings and dimension drawings and tables for the one-axis R-Series and V-Series SmartModule configurations.

R-H Module



RH MODULE TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RH 300mm	90405-10030	300mm	740mm	100mm	150mm	19.0
RH 400mm	90405-10040	400mm	840mm	200mm	200mm	21.0
RH 500mm	90405-10050	500mm	940mm	300mm	250mm	23.0
RH 600mm	90405-10060	600mm	1040mm	400mm	300mm	25.0
RH 800mm	90405-10080	800mm	1240mm	600mm	400mm	29.0
RH 1000mm	90405-10100	1000mm	1440mm	800mm	500mm	34.0

Figure 10-1. R-H Module Dimensions

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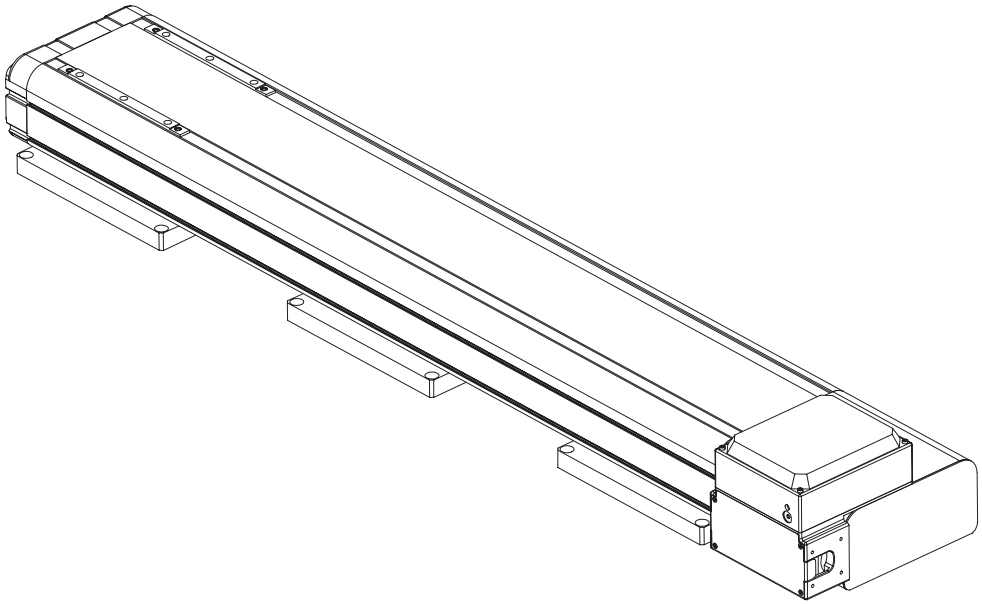
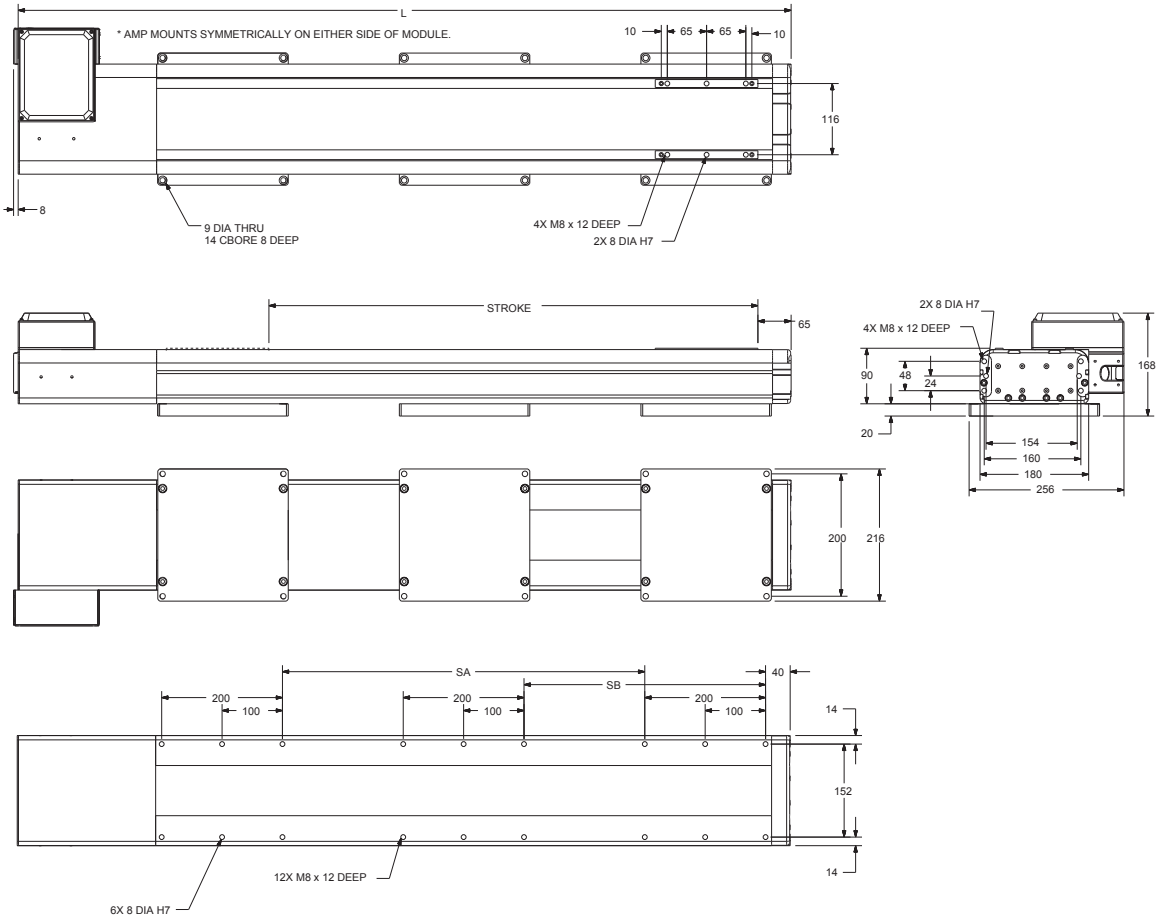


Figure 10-2. Isometric View of R-H Module

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R-Hz Module



RHz MODULE TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RHz 300mm	90405-14030	300mm	780mm	100mm	150mm	20.0
RHz 600mm	90405-14060	600mm	1080mm	400mm	290mm	26.0

Figure 10-3. R-Hz Module Dimensions

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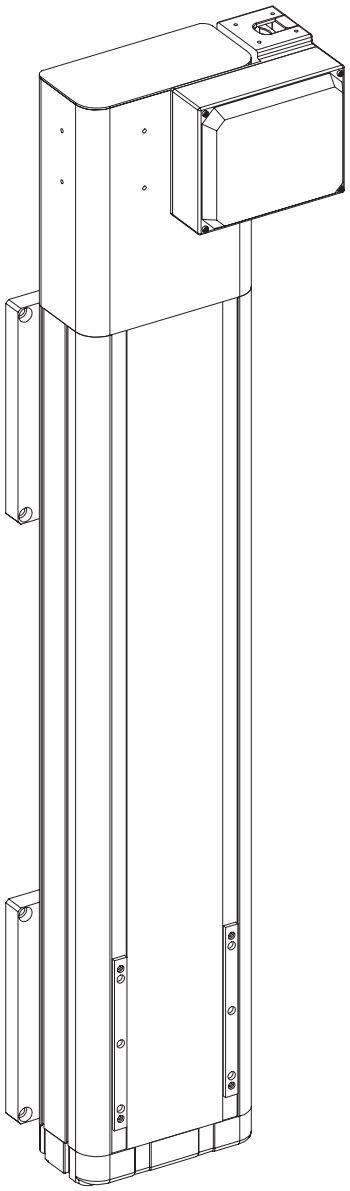
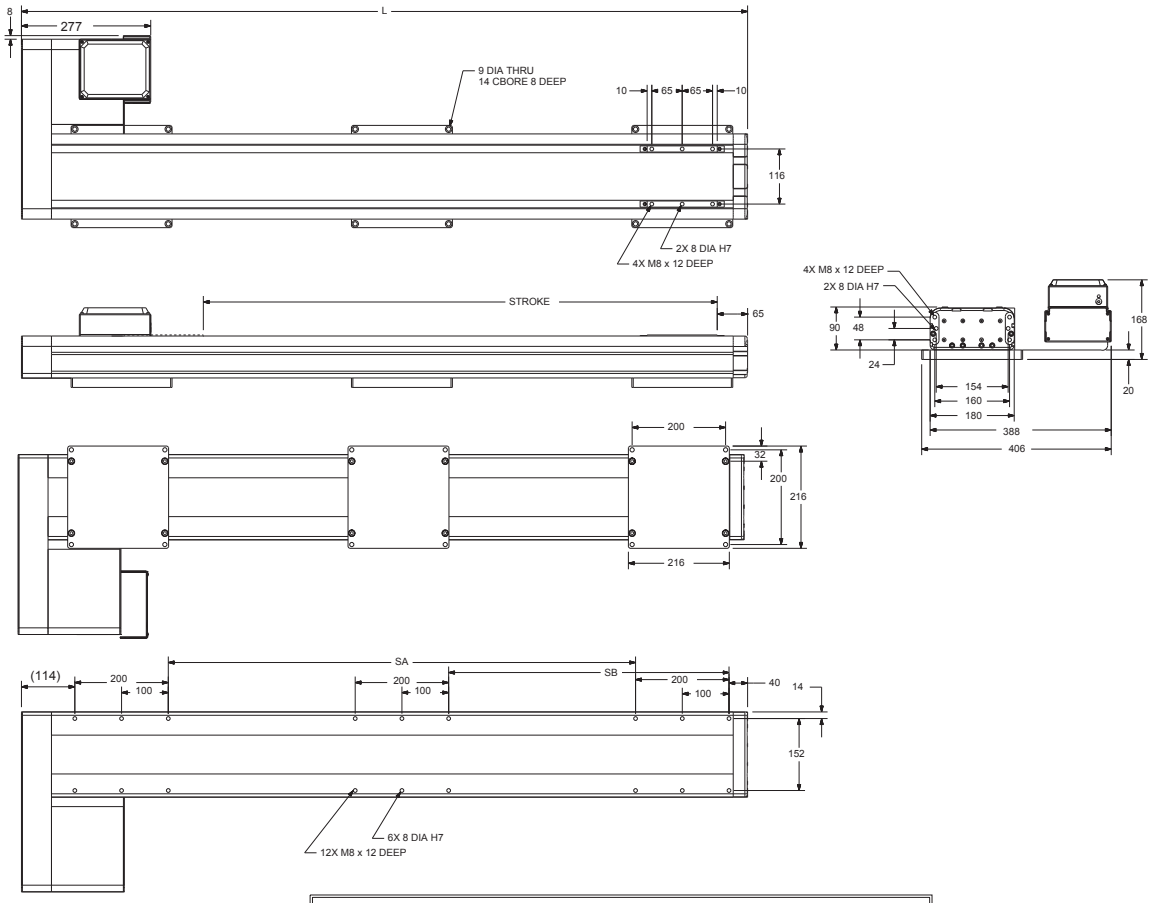


Figure 10-4. Isometric View of R-Hz Module

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R-H Extended Module



RH MODULE (EXTENDED) TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RH 1200mm	90405-11120	1200mm	1554mm	1000mm	600mm	40.5
RH 1400mm	90405-11140	1400mm	1754mm	1200mm	700mm	44.5
RH 2000mm	90405-11200	2000mm	2354mm	1800mm	1000mm	57.5

Figure 10-5. R-H Extended Module Dimensions

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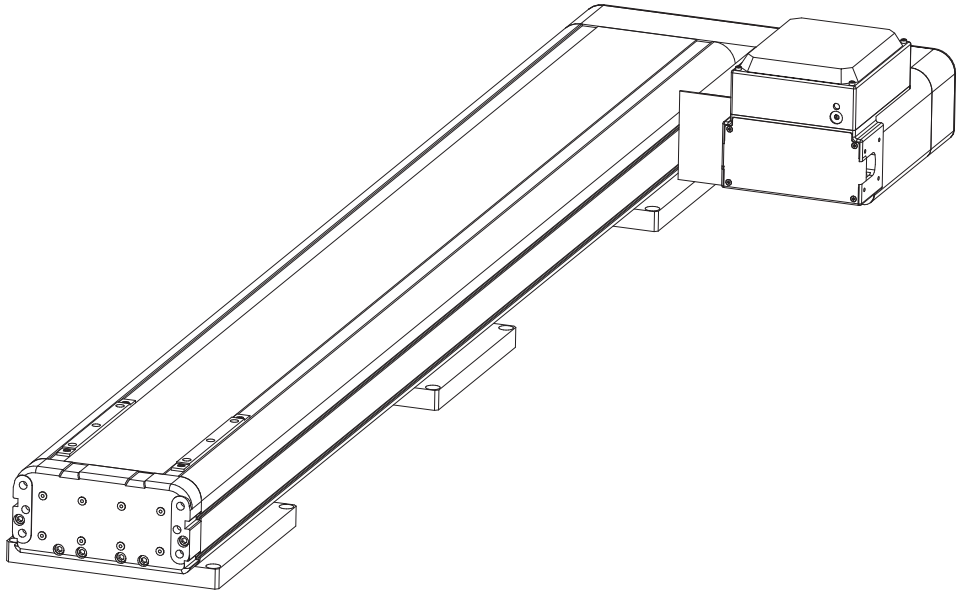
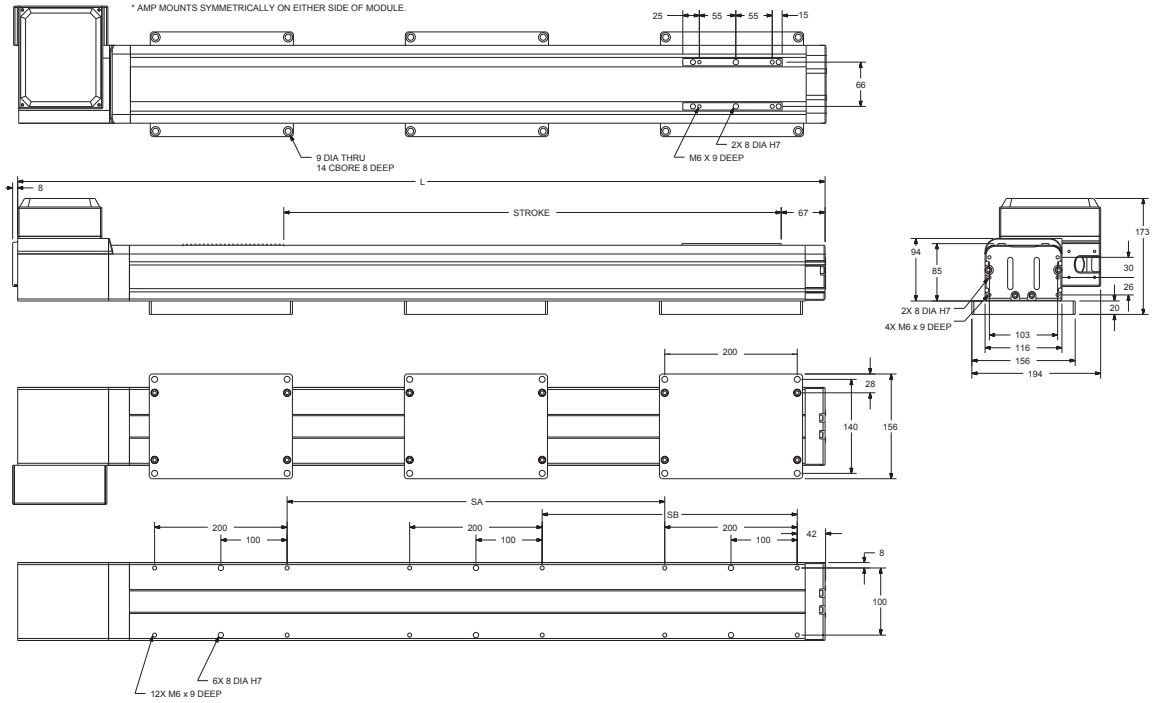


Figure 10-6. Isometric View of R-H Extended Module

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R-M Module



RM MODULE TABULATION

CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RM 250mm	90405-20025	250mm	720mm	70mm	135mm	11.0
RM 350mm	90405-20035	350mm	820mm	170mm	185mm	12.0
RM 450mm	90405-20045	450mm	920mm	270mm	235mm	13.0
RM 550mm	90405-20055	550mm	1020mm	370mm	285mm	14.0
RM 750mm	90405-20075	750mm	1220mm	570mm	385mm	17.0
RM 950mm	90405-20095	950mm	1420mm	770mm	485mm	19.0

Figure 10-7. R-M Module Dimensions

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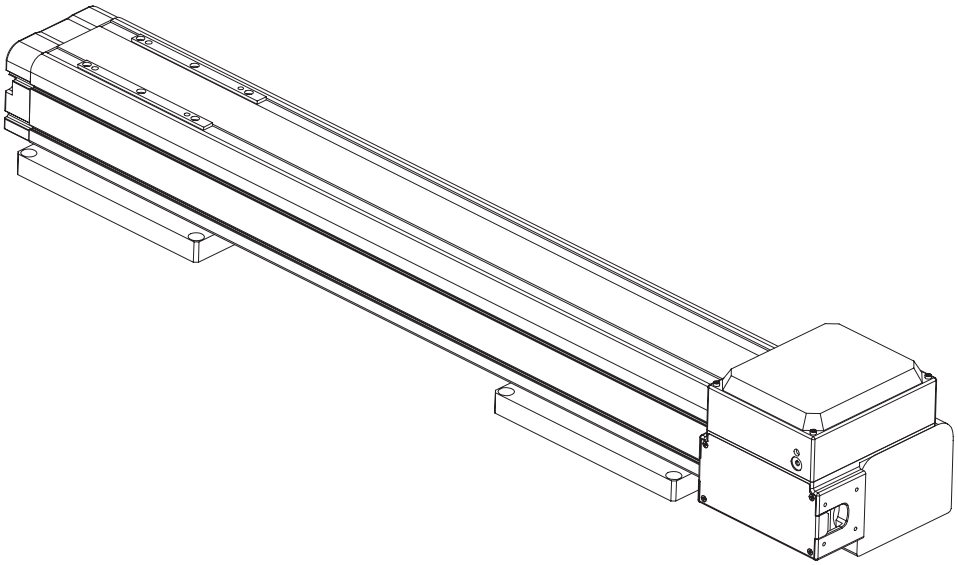
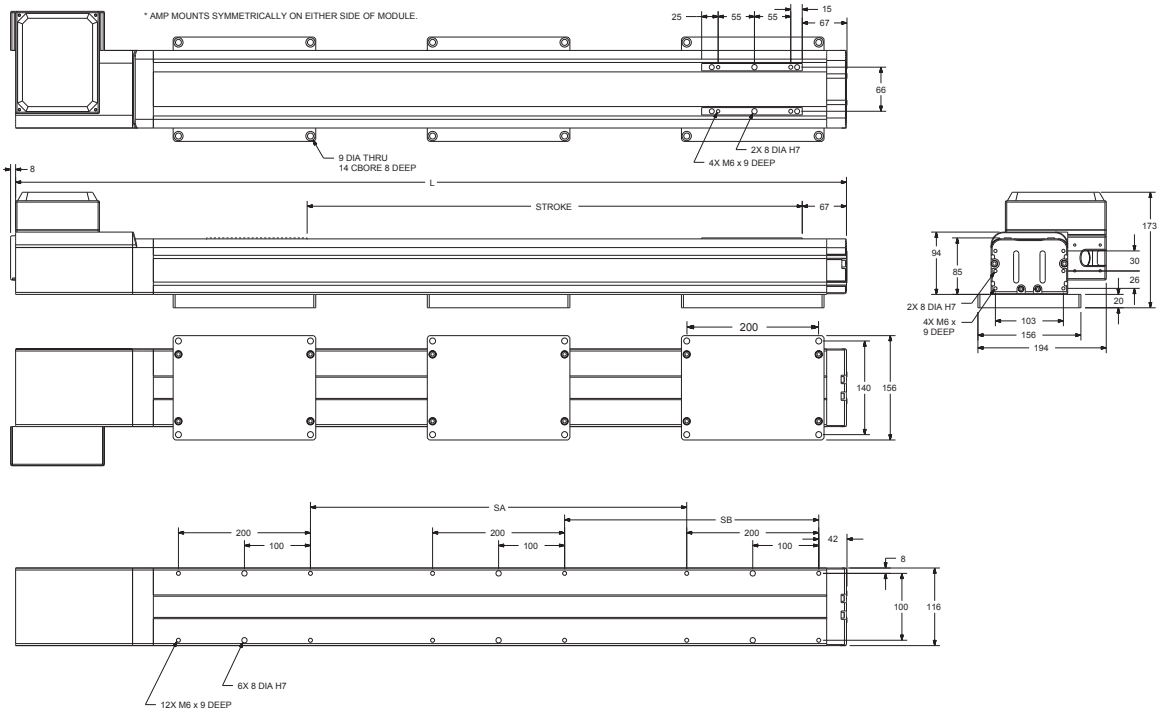


Figure 10-8. Isometric View of R-M Module

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R-Mz Module



RMz MODULE TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RMz 250mm	90405-24025	250mm	760mm	70mm	135mm	11.5
RMz 350mm	90405-24035	350mm	860mm	170mm	185mm	12.5
RMz 450mm	90405-24045	450mm	960mm	270mm	235mm	13.5
RMz 550mm	90405-24055	550mm	1060mm	370mm	285mm	14.5

Figure 10-9. R-Mz Module Dimensions

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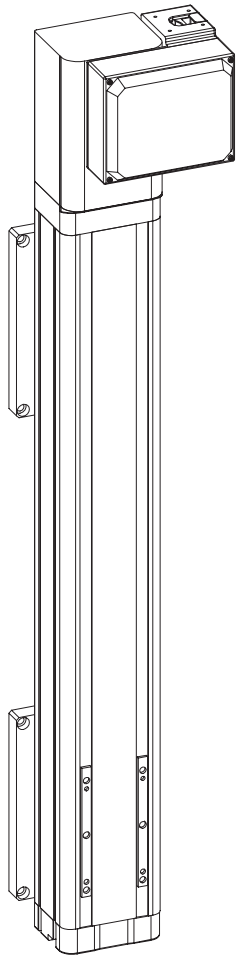
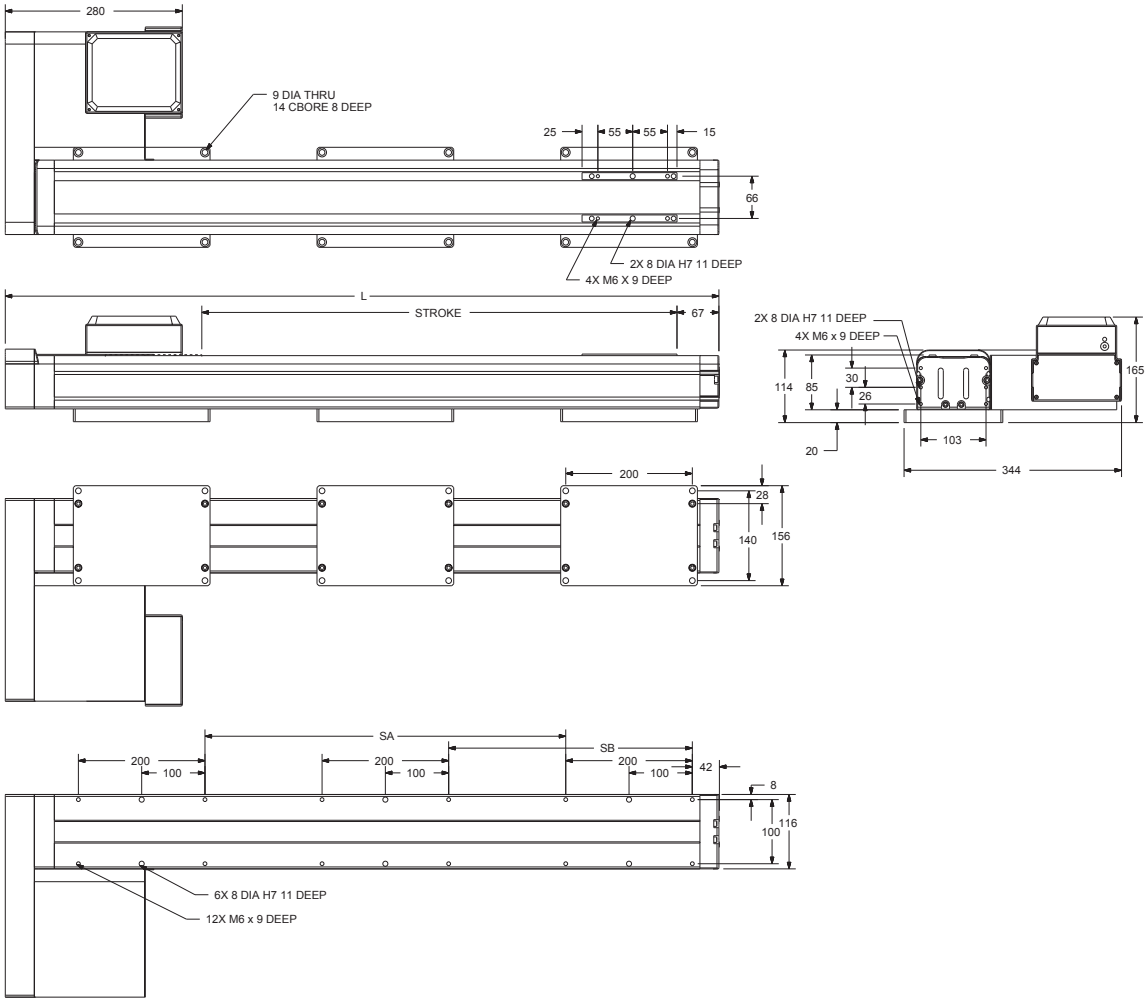


Figure 10-10. Isometric View of R-Mz Module

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R-M Extended Module



RM MODULE (EXTENDED) TABULATION						
PART NUMBER	DESCRIPTION	STROKE	L	SA	SB	WEIGHT
90405-21115	MODULE-RM 1150mm	1150mm	1528mm	970mm	585mm	25.0
90405-21135	MODULE-RM 1350mm	1350mm	1728mm	1170mm	685mm	28.0
90405-21155	MODULE-RM 1550mm	1550mm	1928mm	1370mm	785mm	31.0

Figure 10-11. R-M Extended Module Dimensions

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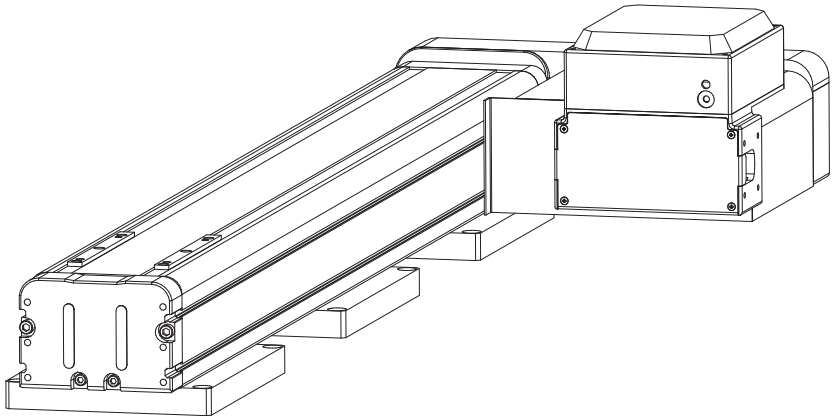
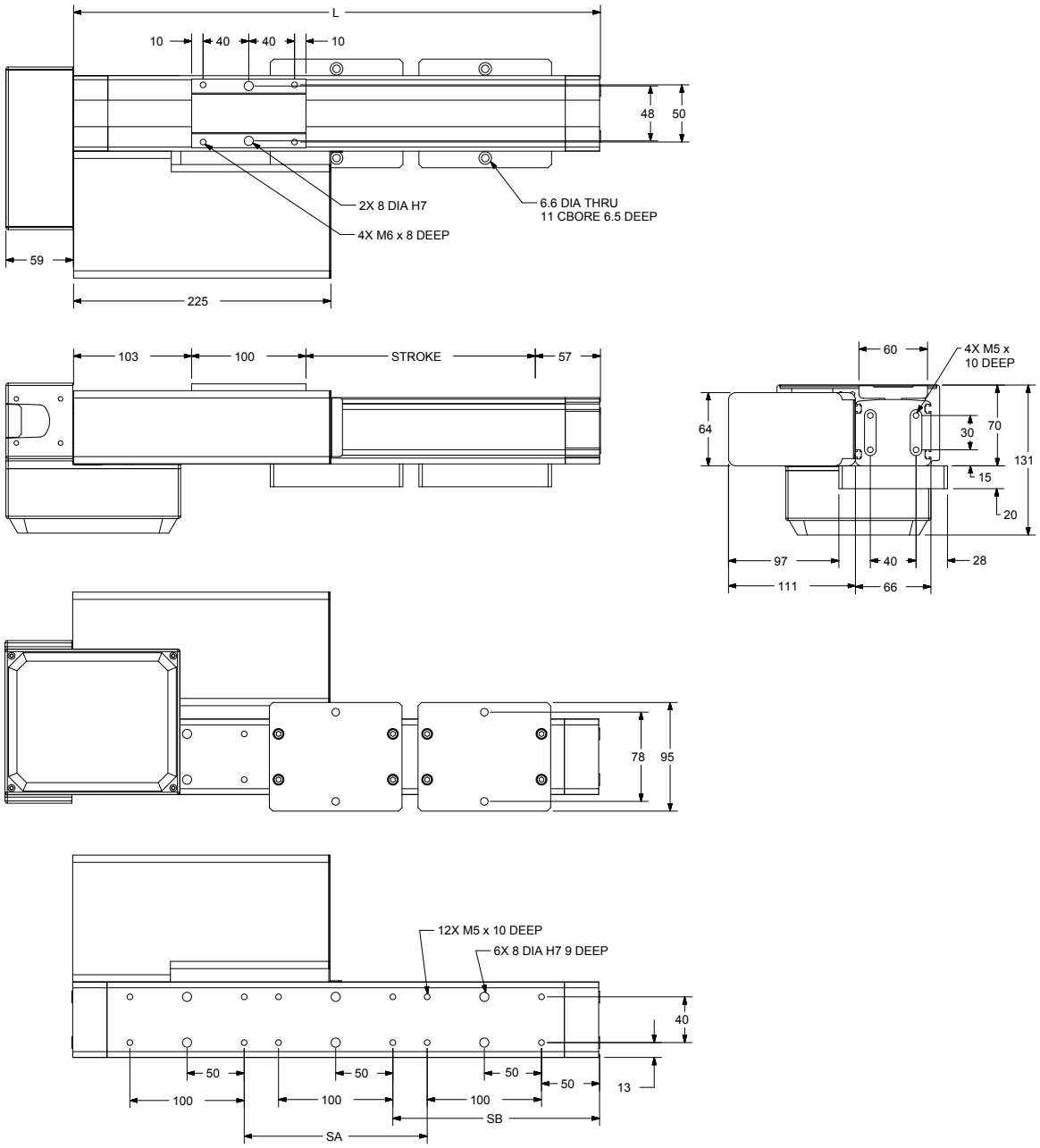


Figure 10-12. Isometric View of R-M Extended Module

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R-Sz Module



R-Sz (Left-motor) MODULE TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RSz 100mm	90405-45010	100mm	360mm	60mm	130mm	6.3
RSz 200mm	90405-45020	200mm	460mm	160mm	180mm	7.0
RSz 300mm	90405-45030	300mm	560mm	260mm	230mm	7.6
RSz 400mm	90405-45040	400mm	660mm	360mm	280mm	8.3
RSz 500mm	90405-45050	500mm	760mm	460mm	330mm	8.9

Figure 10-13. R-Sz Module Dimensions

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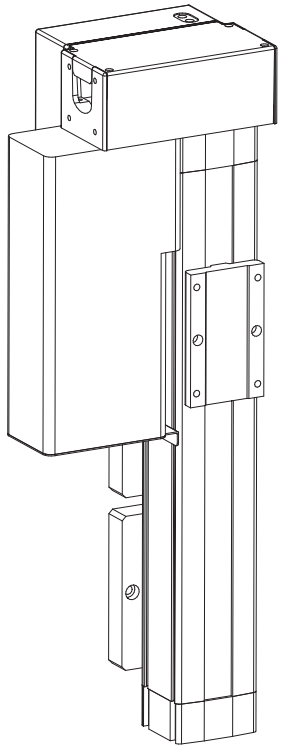
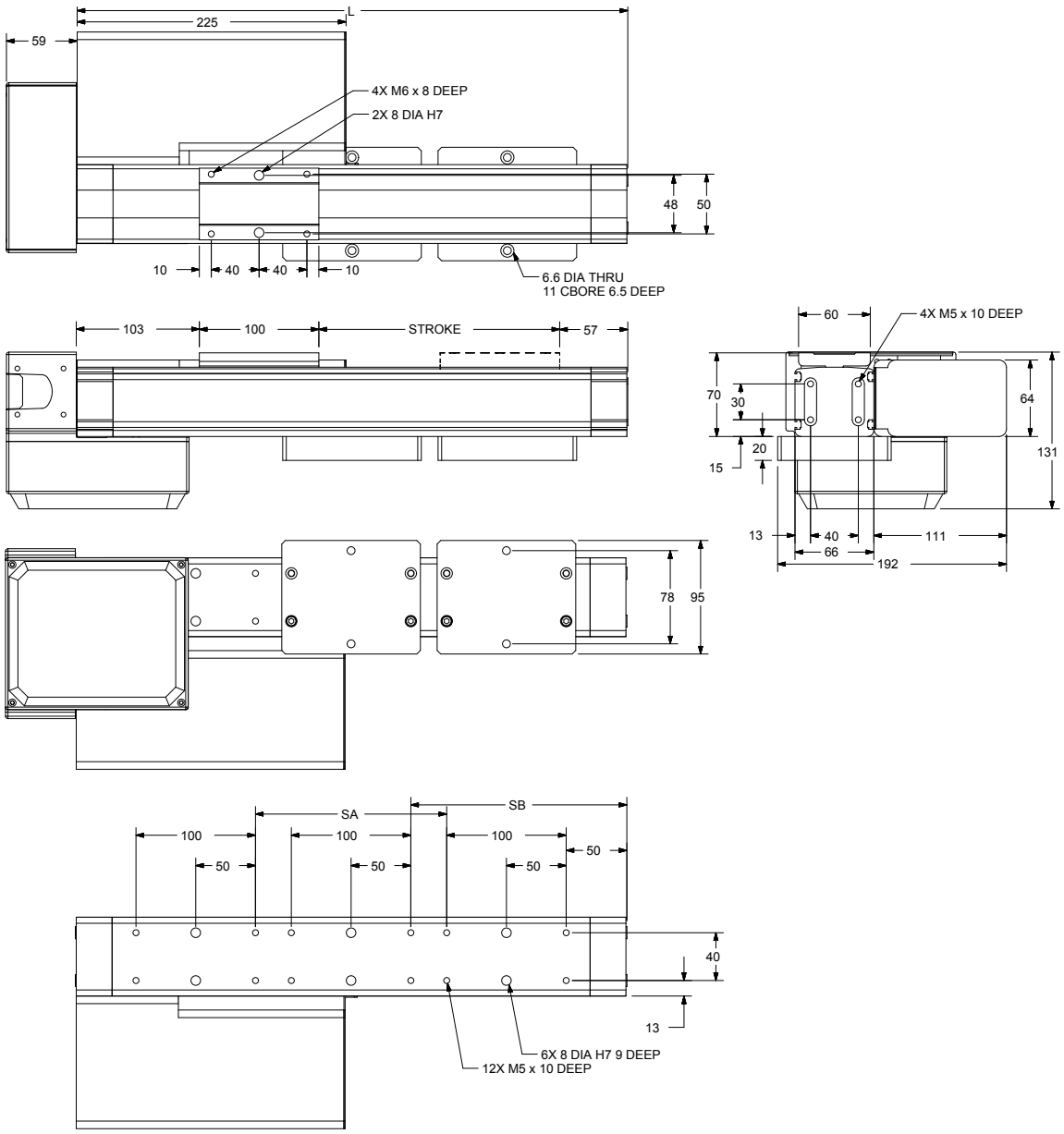


Figure 10-14. Isometric View of R-Sz Module

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R-Szr Module



R-Szr (Right-Motor) MODULE TABULATION						
CONFIGURATION	MODULE P/N	STROKE	L	SA	SB	MODULE Kg
RSz 100mm	90405-48010	100mm	360mm	60mm	130mm	6.3
RSz 200mm	90405-48020	200mm	460mm	160mm	180mm	7.0
RSz 300mm	90405-48030	300mm	560mm	260mm	230mm	7.6
RSz 400mm	90405-48040	400mm	660mm	360mm	280mm	8.3
RSz 500mm	90405-48050	500mm	760mm	460mm	330mm	8.9

Figure 10-15. R-Szr Module Dimensions

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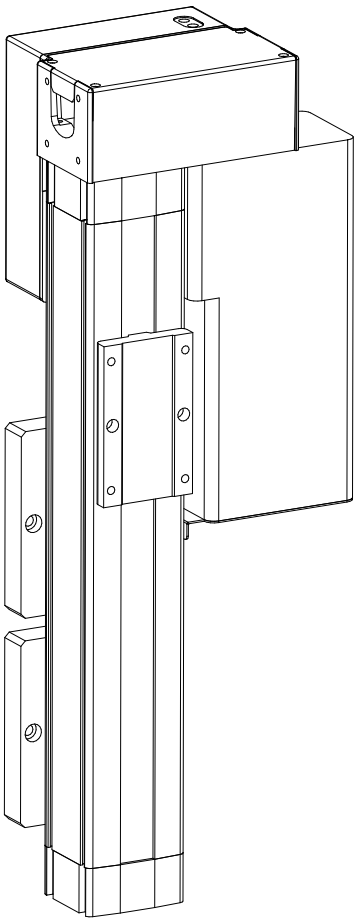
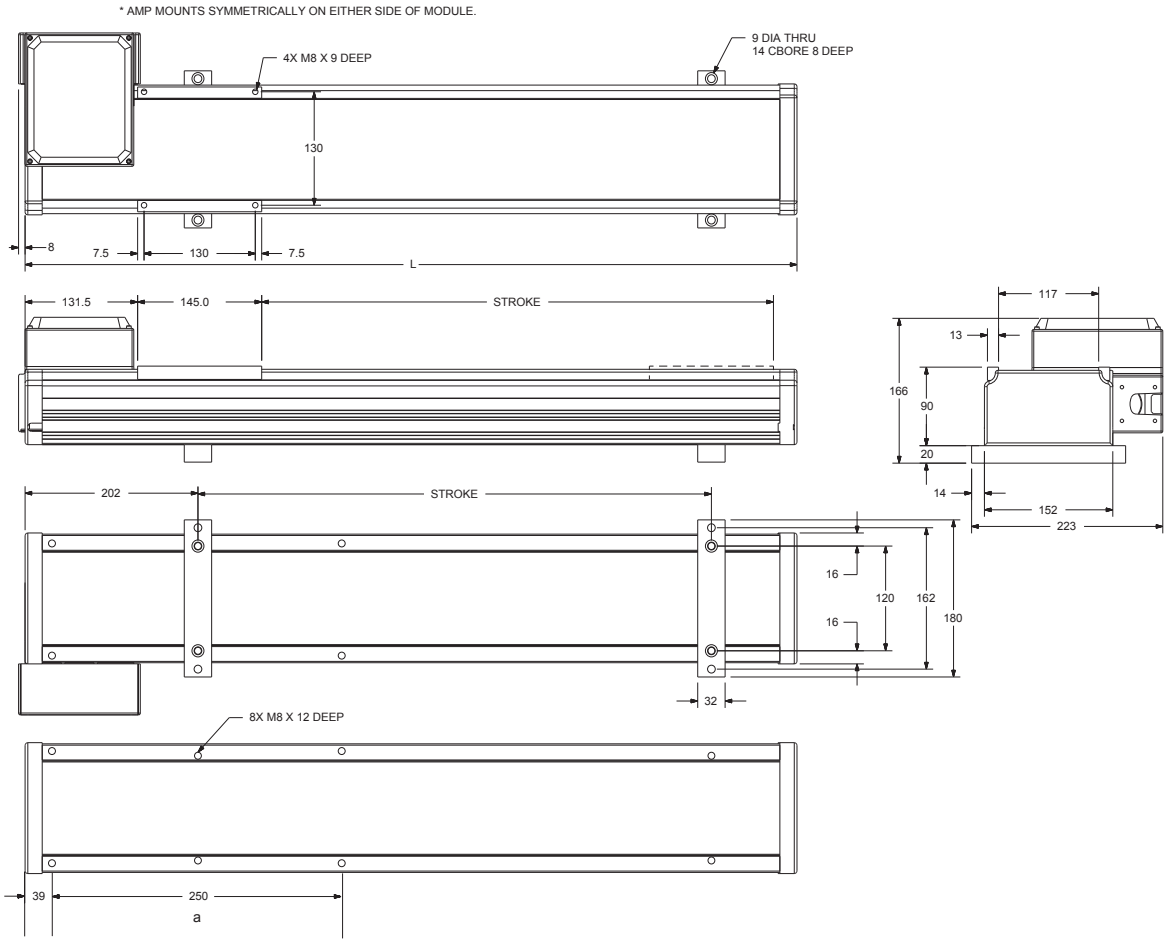


Figure 10-16. Isometric View of R-Szr Module

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V-H Module



V-H MODULE TABULATION				
CONFIGURATION	MODULE P/N	STROKE	L	MODULE Kg
VH 200mm [a]	90404-60020	200mm	502mm	9.7Kg
VH 300mm [a]	90404-60030	300mm	602mm	11.0Kg
VH 400mm [a]	90404-60040	400mm	702mm	12.2Kg
VH 500mm	90404-60050	500mm	802mm	13.5Kg
VH 600mm	90404-60060	600mm	902mm	14.7Kg
VH 700mm	90404-60070	700mm	1002mm	16.0Kg
VH 800mm	90404-60080	800mm	1102mm	17.2Kg

a V-H 200-400 modules ONLY

Figure 10-17. V-H Module Dimensions

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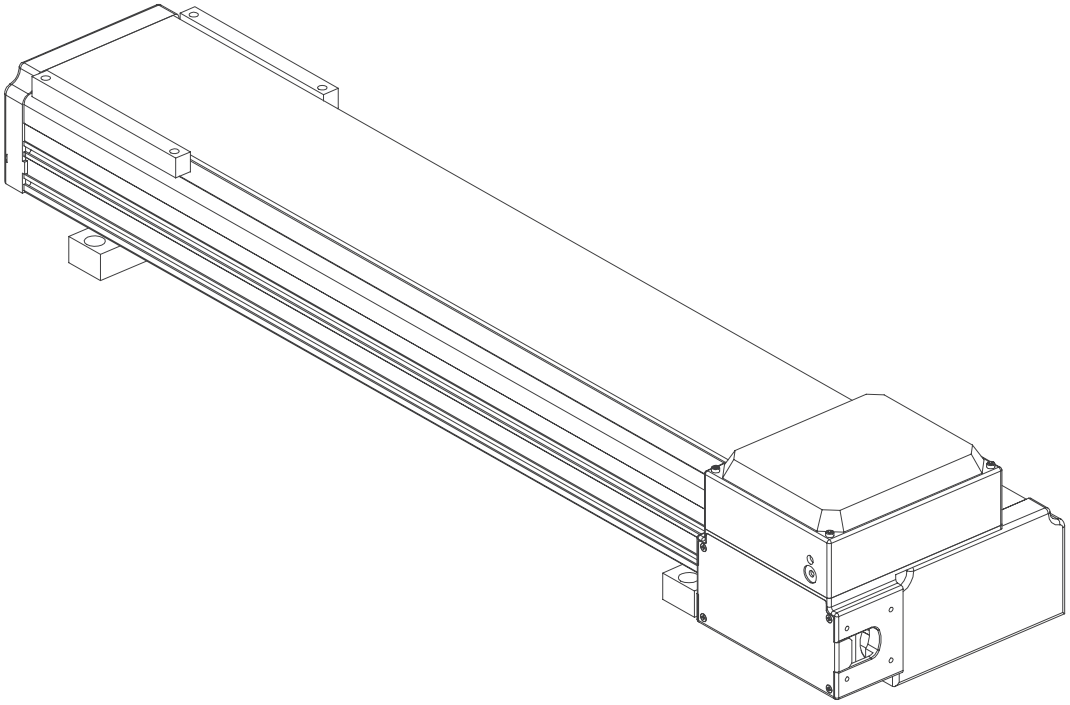
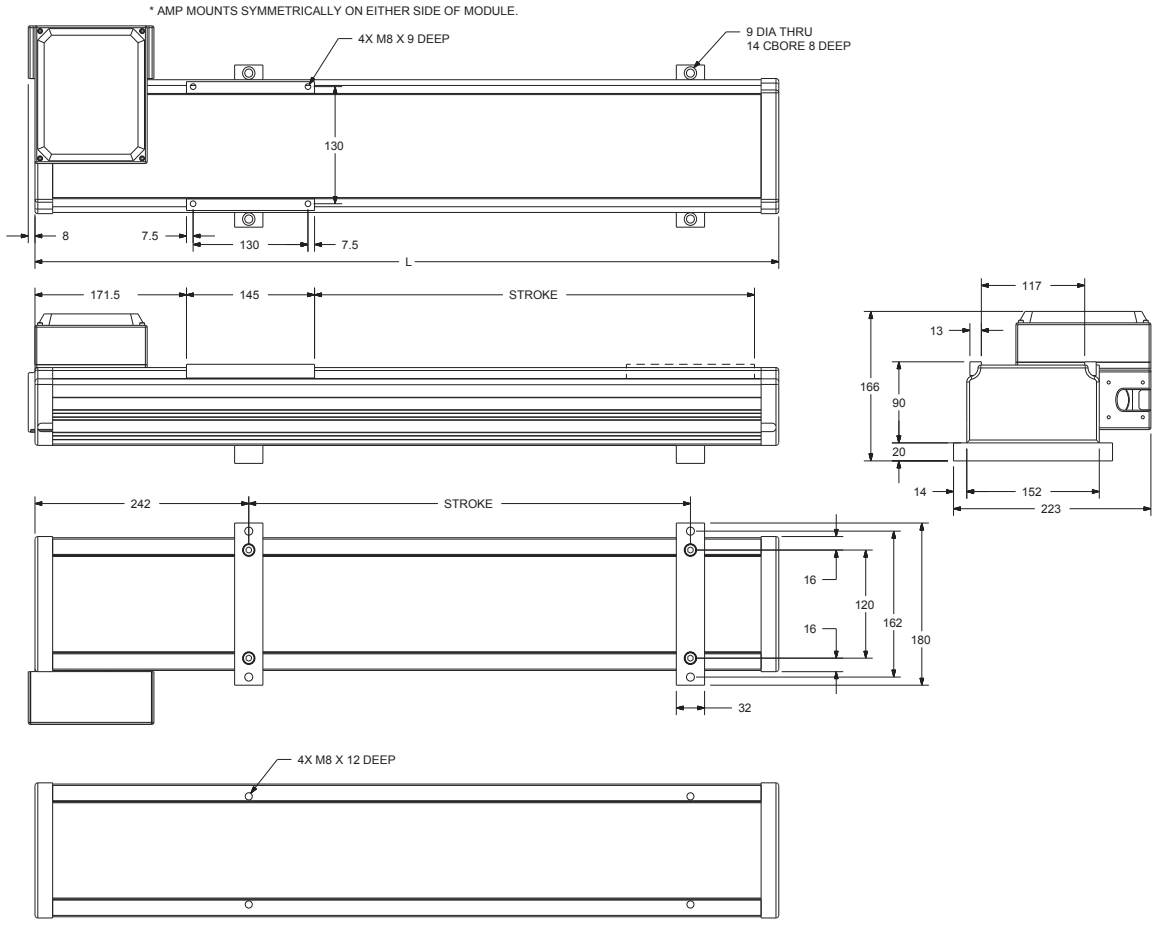


Figure 10-18. Isometric View of V-H Module

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V-Hz Module



V-Hz MODULE TABULATION				
CONFIGURATION	MODULE P/N	STROKE	L	MODULE Kg
VHz 300mm	90404-64030	300mm	642mm	11.9Kg
VHz 500mm	90404-64050	500mm	842mm	14.3Kg
VHz 700mm	90404-64070	700mm	1042mm	16.8Kg

Figure 10-19. V-Hz Module Dimensions

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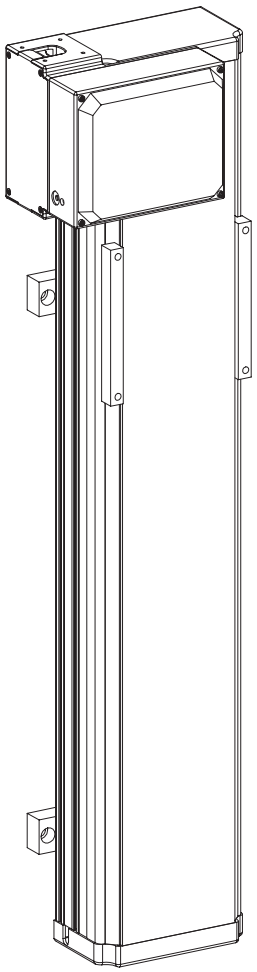
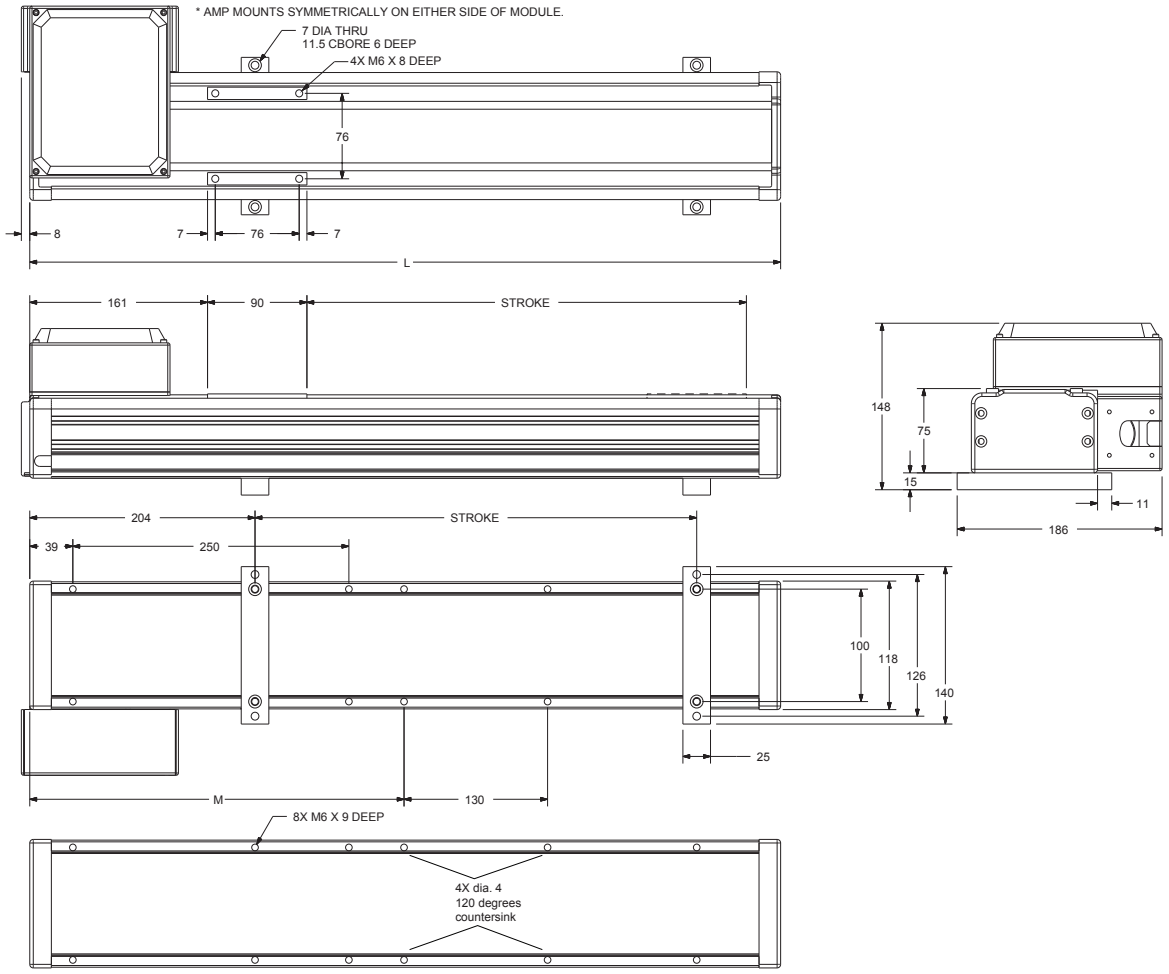


Figure 10-20. Isometric View of V-Hz Module

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V-M Module



VM MODULE TABULATION					
CONFIGURATION	MODULE P/N	STROKE	L	M	MODULE Kg
VM 100mm	90404-70010	100mm	380mm	189mm	4.6Kg
VM 200mm	90404-70020	200mm	480mm	239mm	5.5Kg
VM 300mm	90404-70030	300mm	580mm	289mm	6.4Kg
VM 400mm	90404-70040	400mm	680mm	339mm	7.3Kg
VM 500mm	90404-70050	500mm	780mm	389mm	8.2Kg
VM 600mm	90404-70060	600mm	880mm	439mm	9.1Kg
VM 700mm	90404-70070	700mm	990mm	489mm	10.1Kg
VM 800mm	90404-70080	800mm	1090mm	539mm	11.0Kg

Figure 10-21. V-M Module Dimensions

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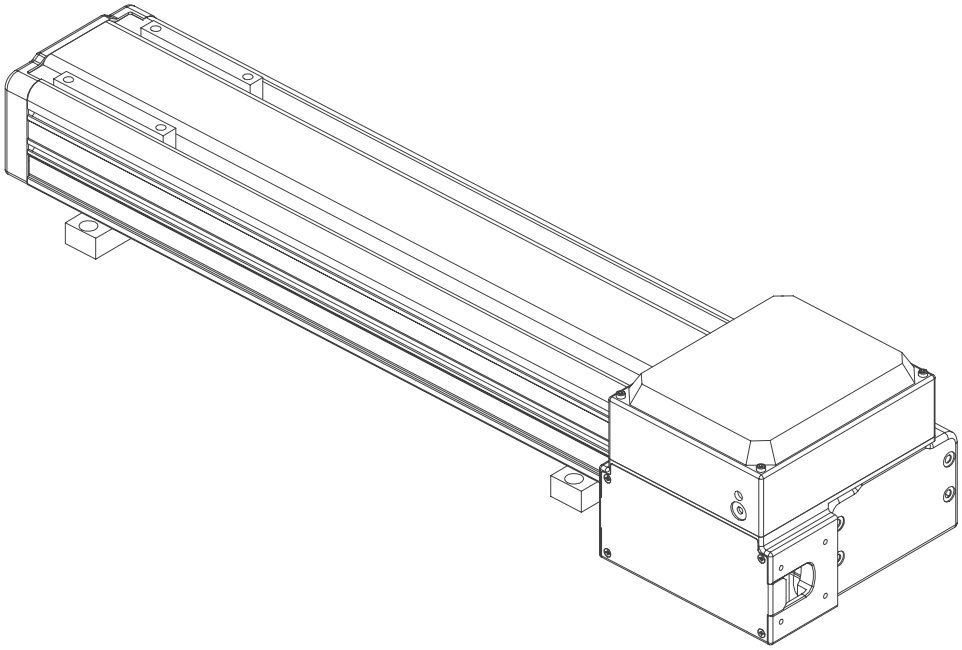
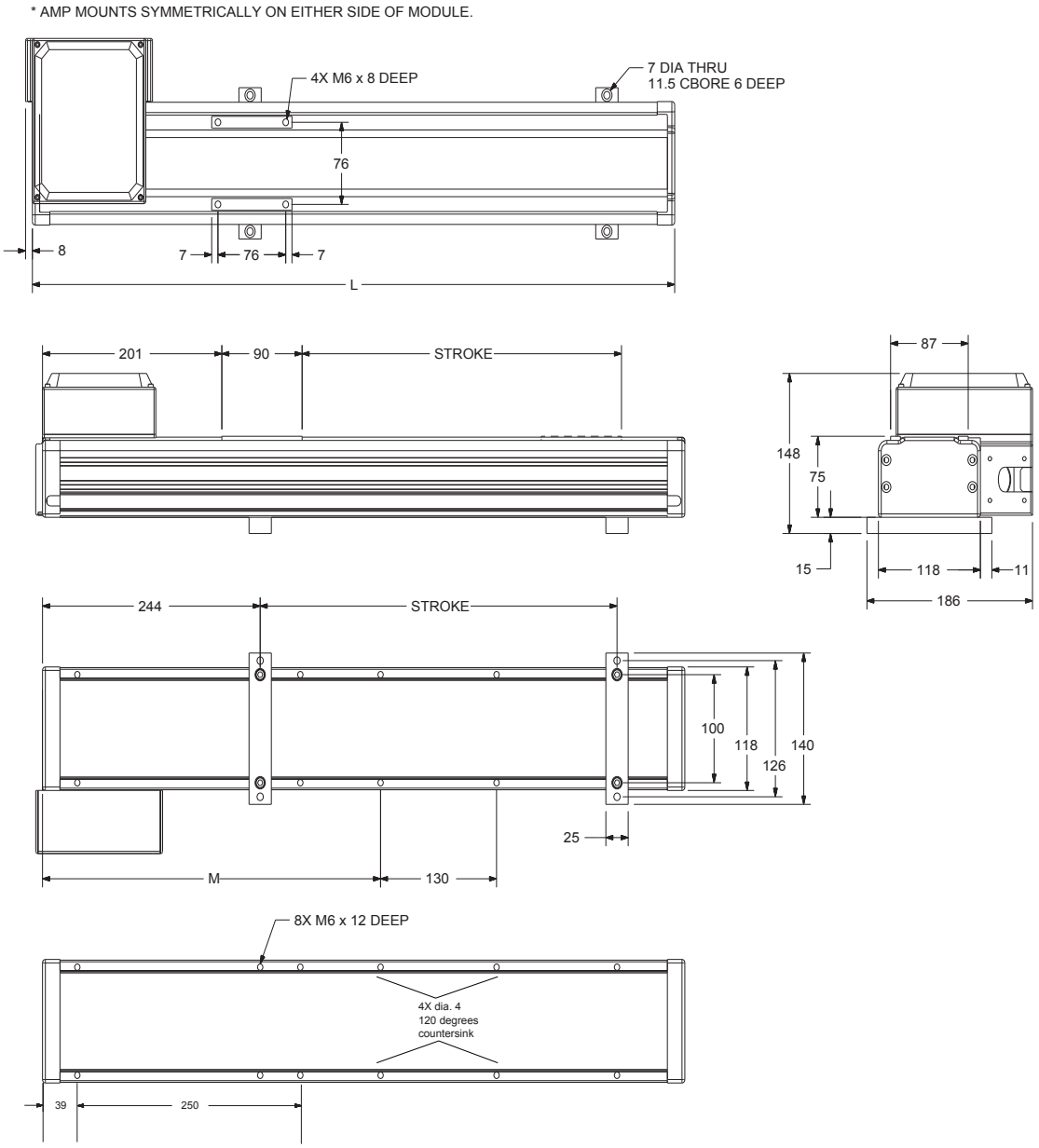


Figure 10-22. Isometric View of V-M Module

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V-Mz Module



VMz MODULE TABULATION					
CONFIGURATION	MODULE P/N	STROKE	L	M	MODULE Kg
VMz 100mm	90404-74010	100mm	420mm	229mm	5.1Kg
VMz 200mm	90404-74020	200mm	520mm	279mm	6.0Kg
VMz 300mm	90404-74030	300mm	620mm	329mm	6.9Kg
VMz 400mm	90404-74040	400mm	720mm	379mm	7.8Kg
VMz 500mm	90404-74050	500mm	820mm	429mm	8.9Kg
VMz 600mm	90404-74060	600mm	920mm	479mm	9.6Kg
VMz 700mm	90404-74070	700mm	1030mm	529mm	10.6Kg
VMz 800mm	90404-74080	800mm	1130mm	579mm	11.5Kg

Figure 10-23. V-Mz Module Dimensions

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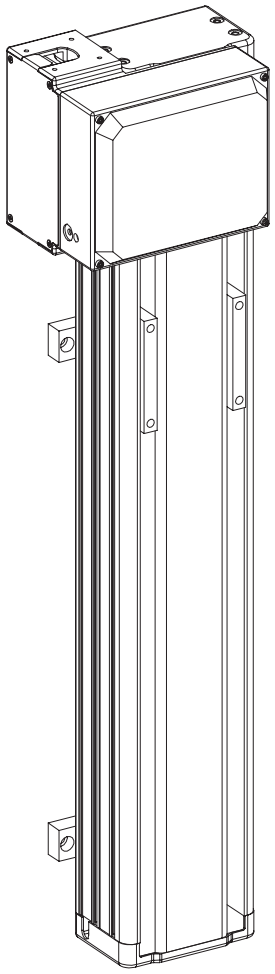


Figure 10-24. Isometric View of V-Mz Module

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10.3 SmartModule Work Envelope Drawings

This section contains isometric drawings and dimension drawings and tables for the two- and three-axis R-Series and V-Series SmartModule configurations.

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R-G(HH) Configuration

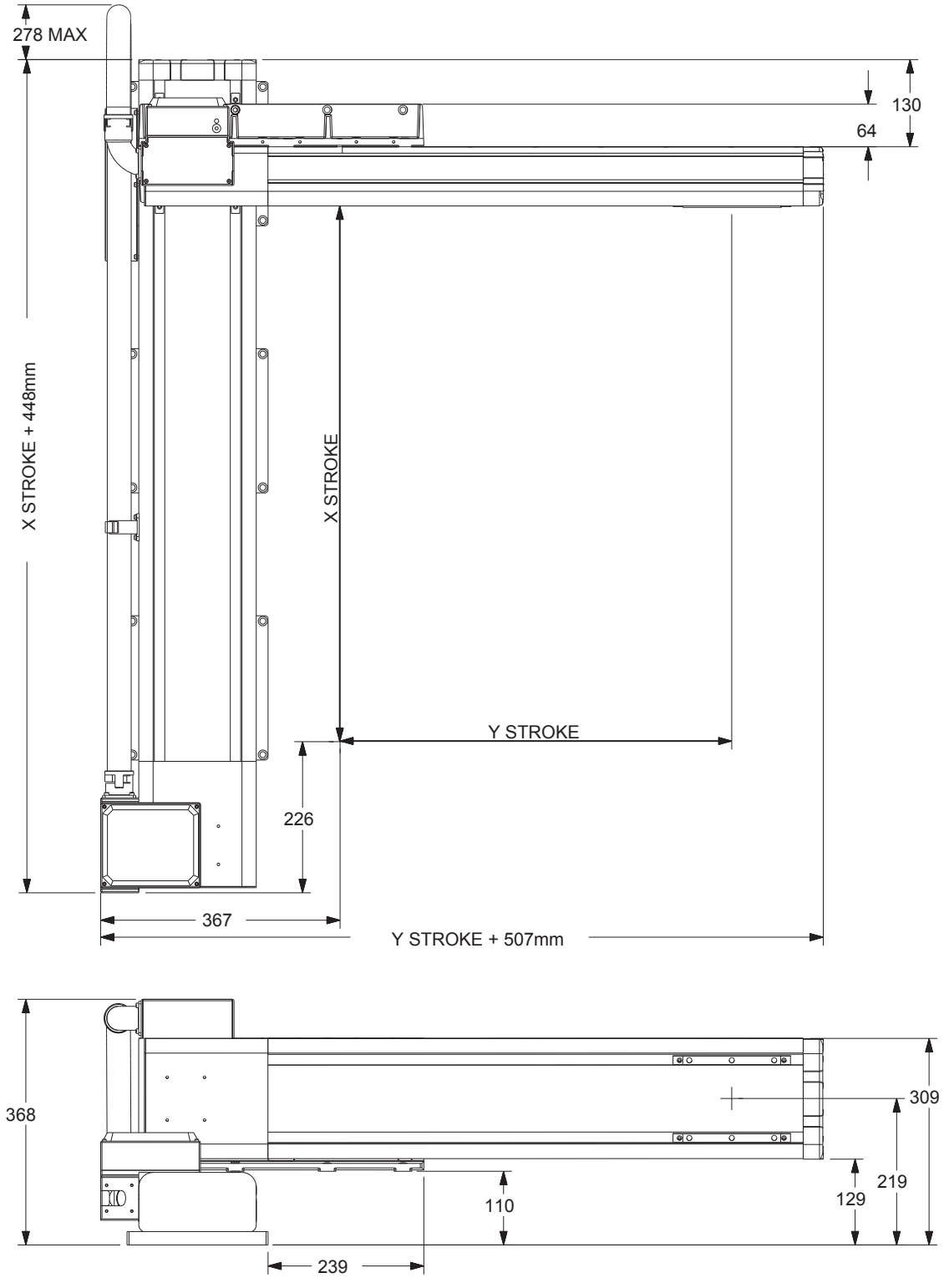


Figure 10-25. R-G(HH) Work Envelope

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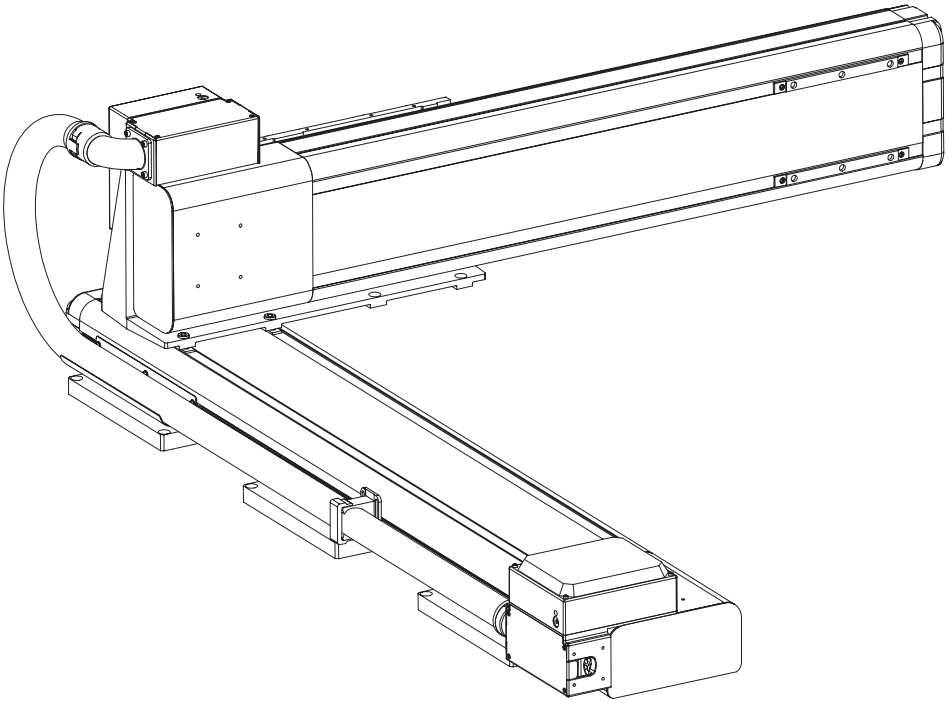


Figure 10-26. R-G(HH) Isometric View

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R-G(HM) Configuration

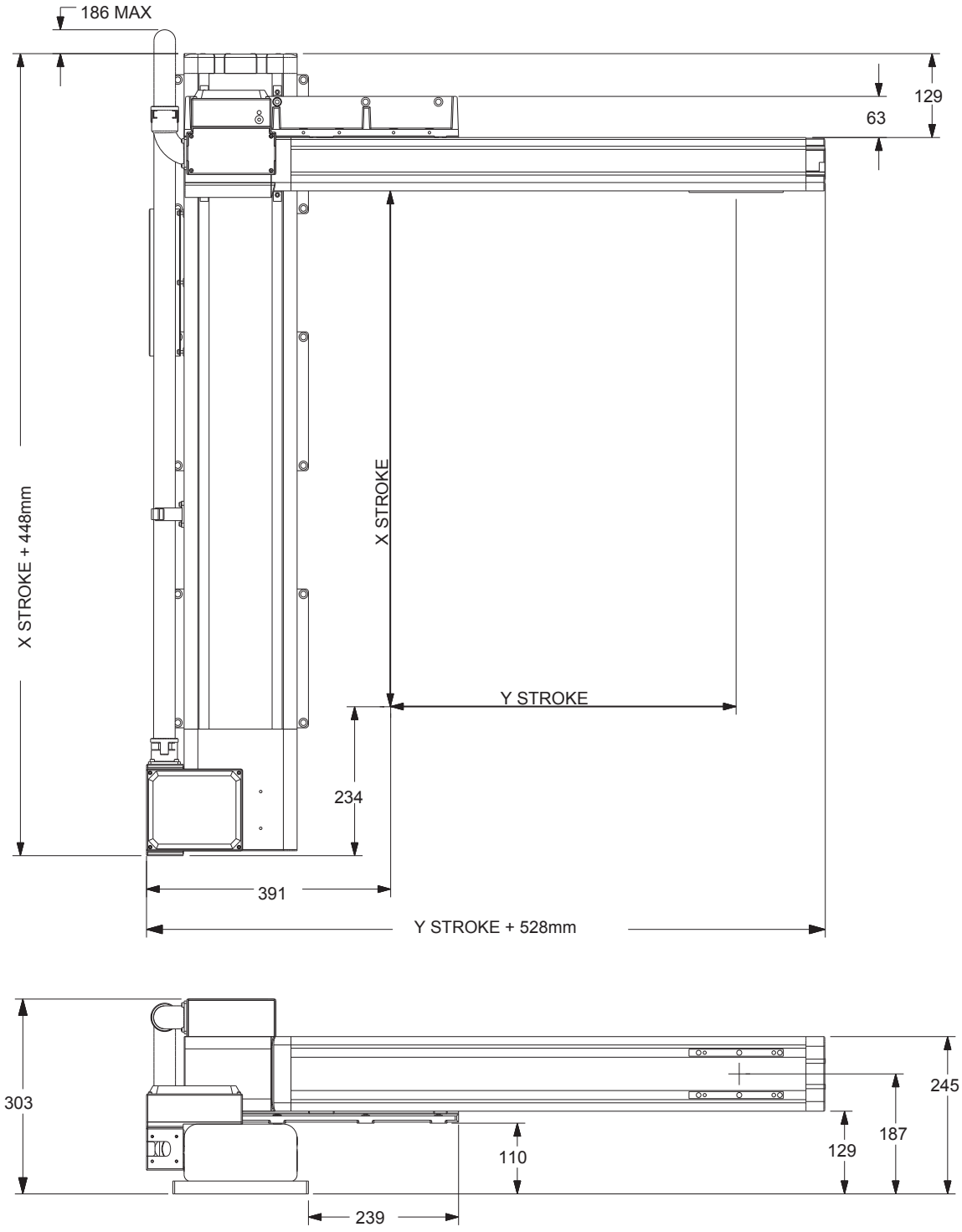


Figure 10-27. R-G(HM) Work Envelope

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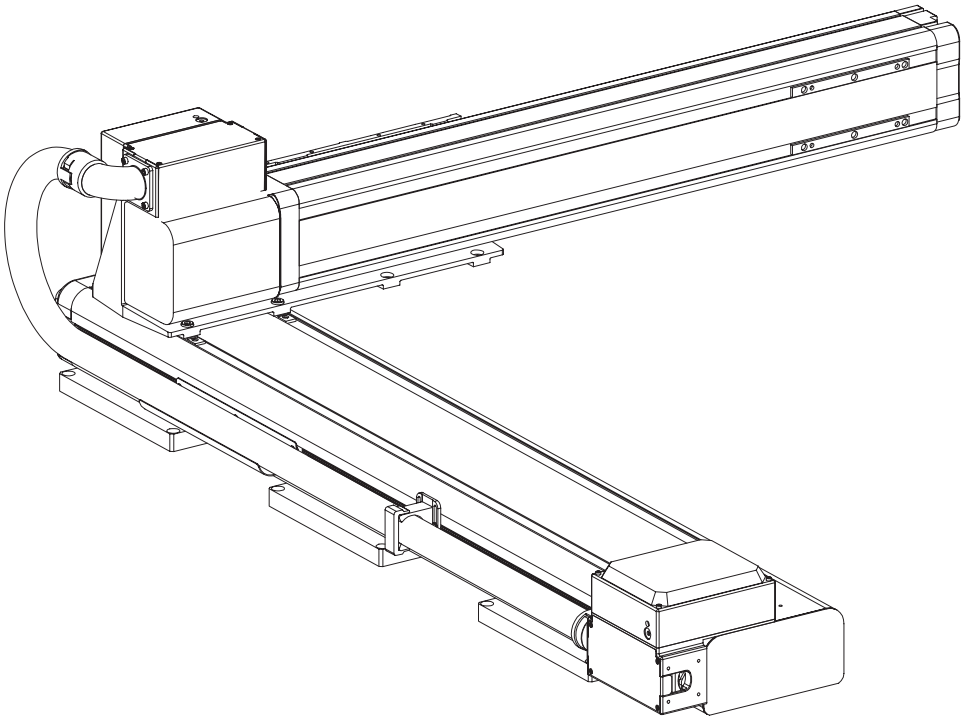


Figure 10-28. R-G(HM) Isometric View

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R-G(MSzr) Configuration

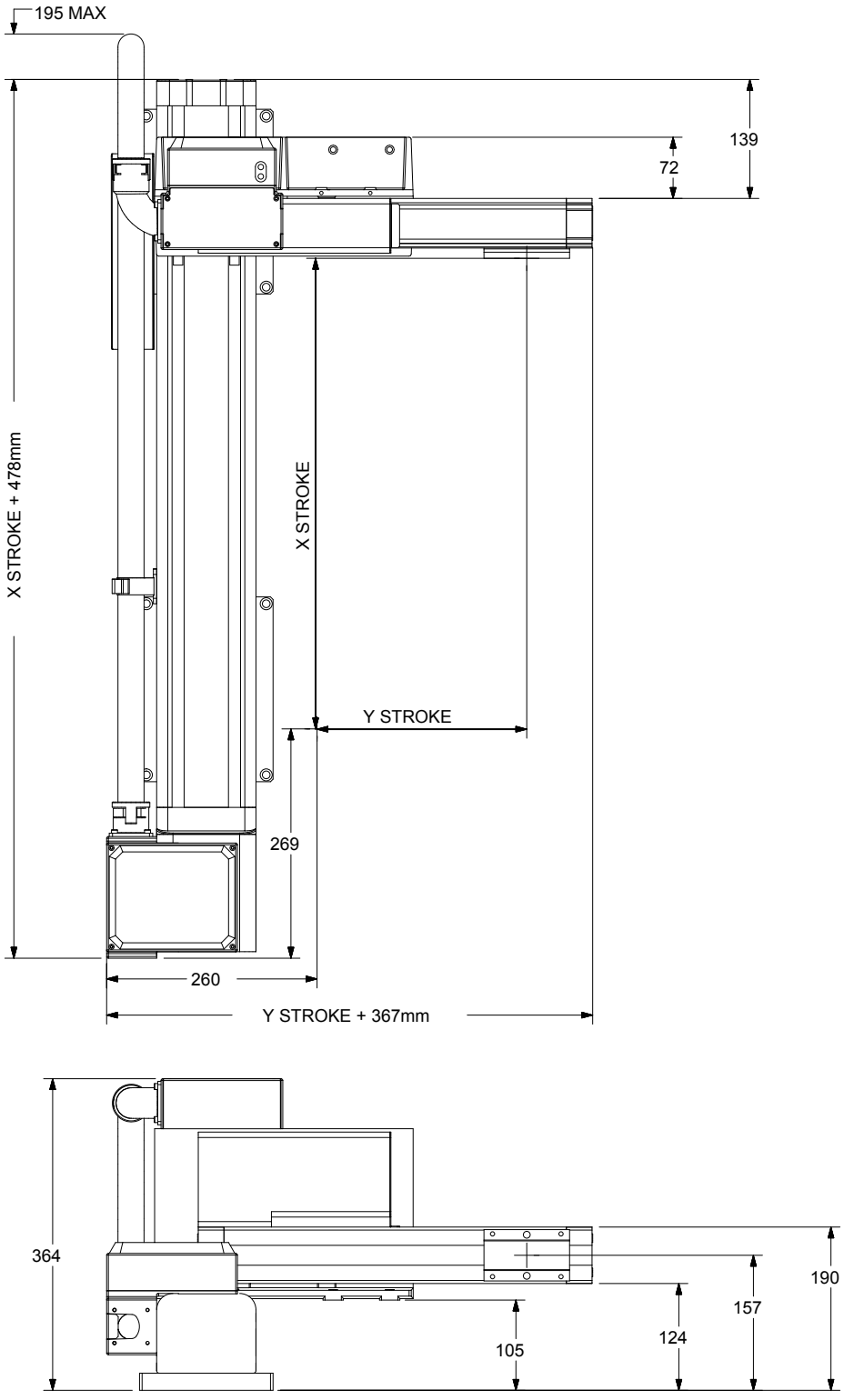


Figure 10-29. R-G(MSzr) Work Envelope

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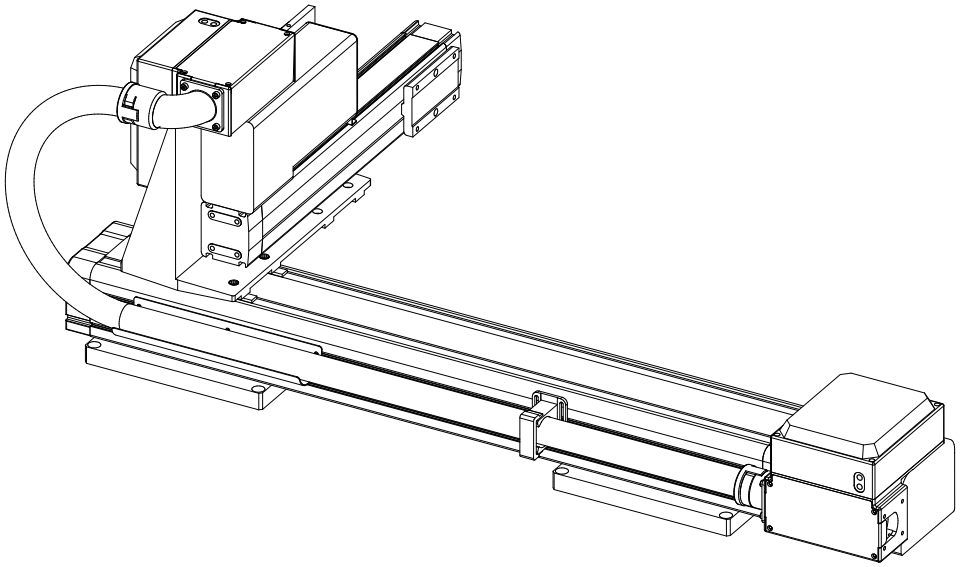
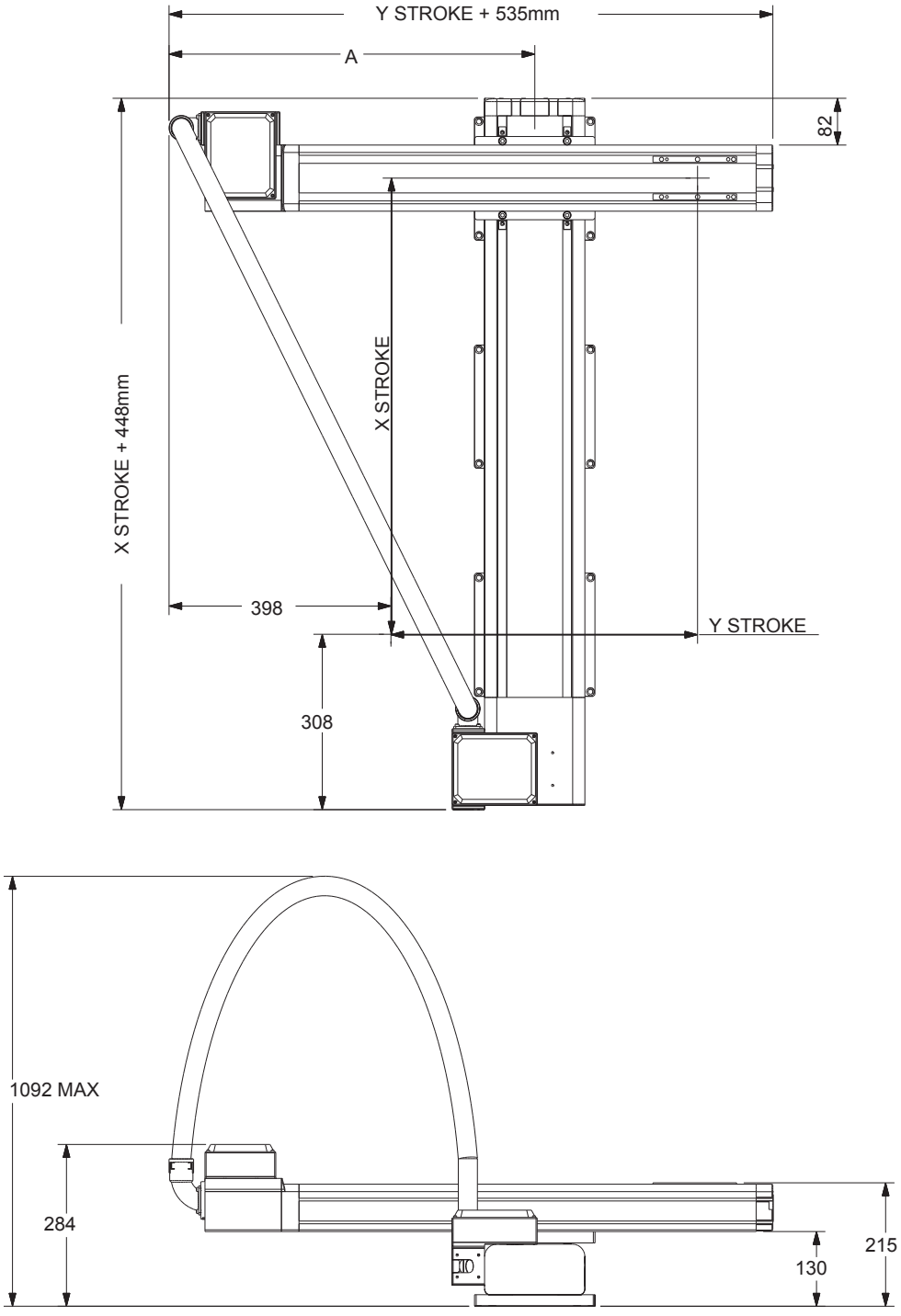


Figure 10-30. R-G(MSzr) Isometric View

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R-D(HM) Configuration



Ymm	A
250	508
350	558
450	608
550	658
750	758
950	858

Figure 10-31. R-D(HM) Work Envelope

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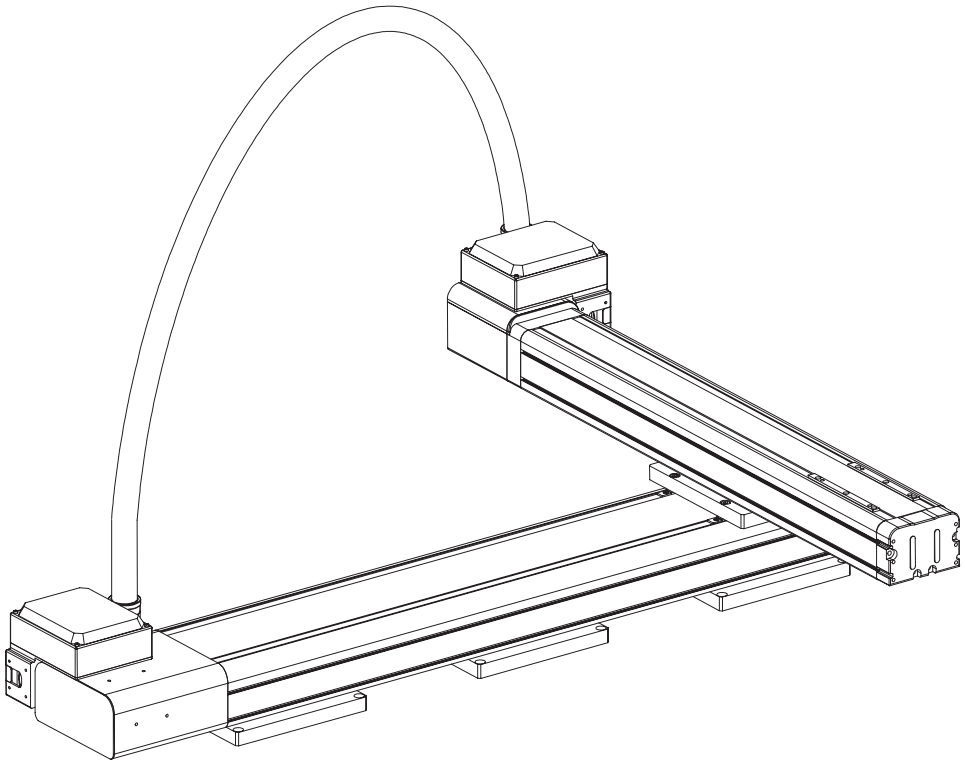
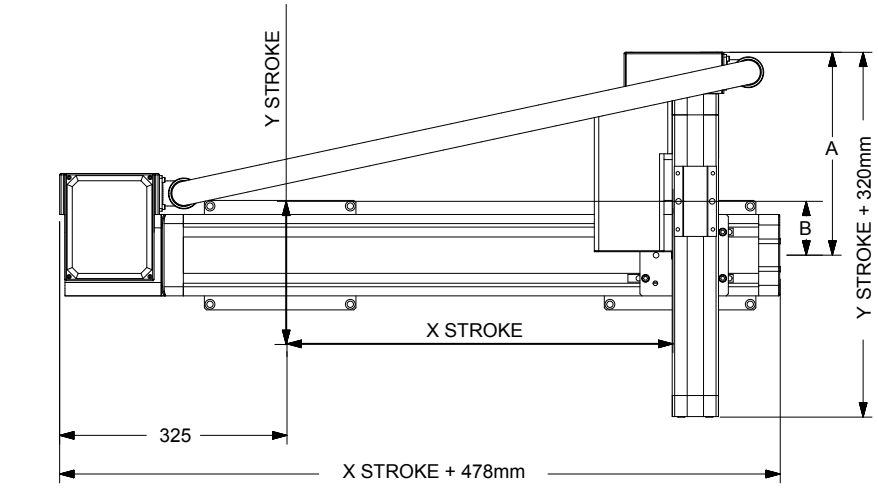


Figure 10-32. R-D(HM) Isometric View

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R-D(MS) Configuration



Ymm	A	B
100	239	27
200	289	77
300	339	127
400	389	177
500	439	227

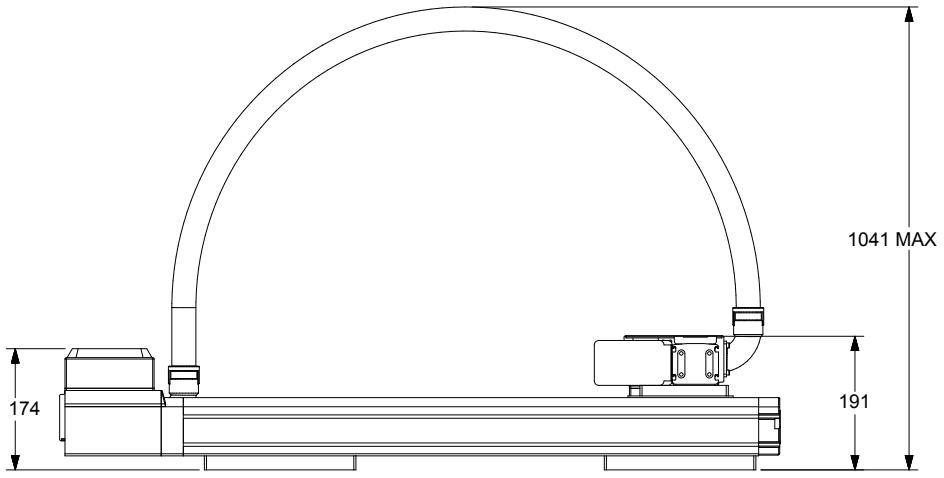


Figure 10-33. R-D(MSz) Work Envelope

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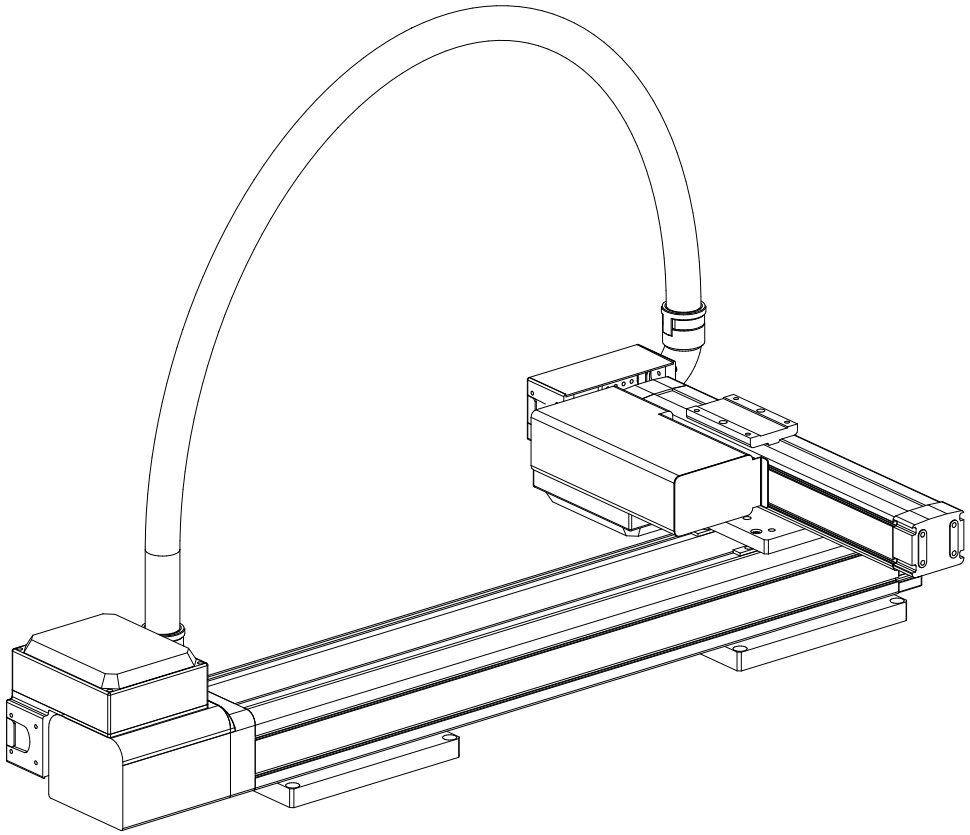


Figure 10-34. R-D(MSz) Isometric View

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R-X(HH) Configuration

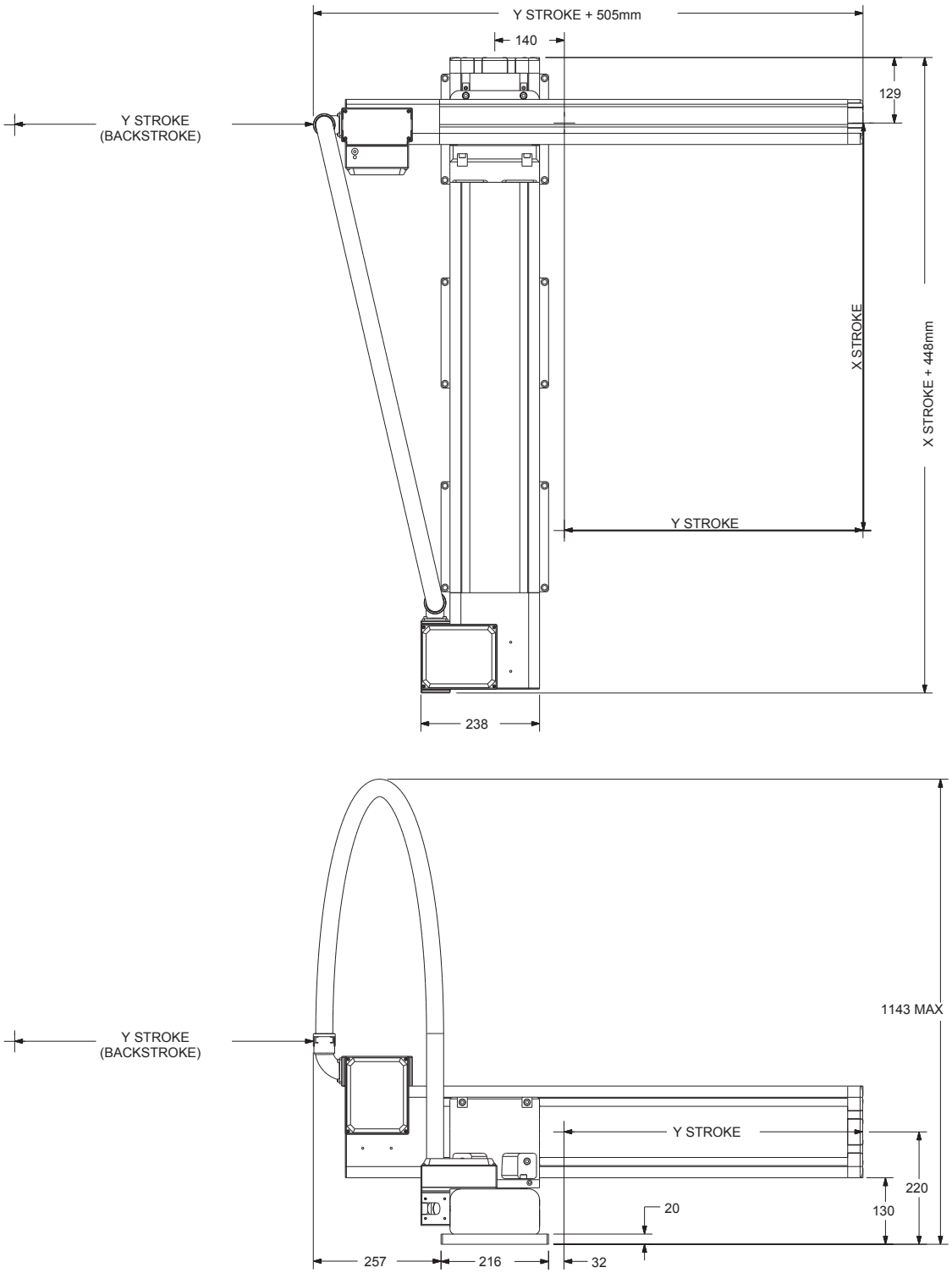


Figure 10-35. R-X-(HH) Work Envelope

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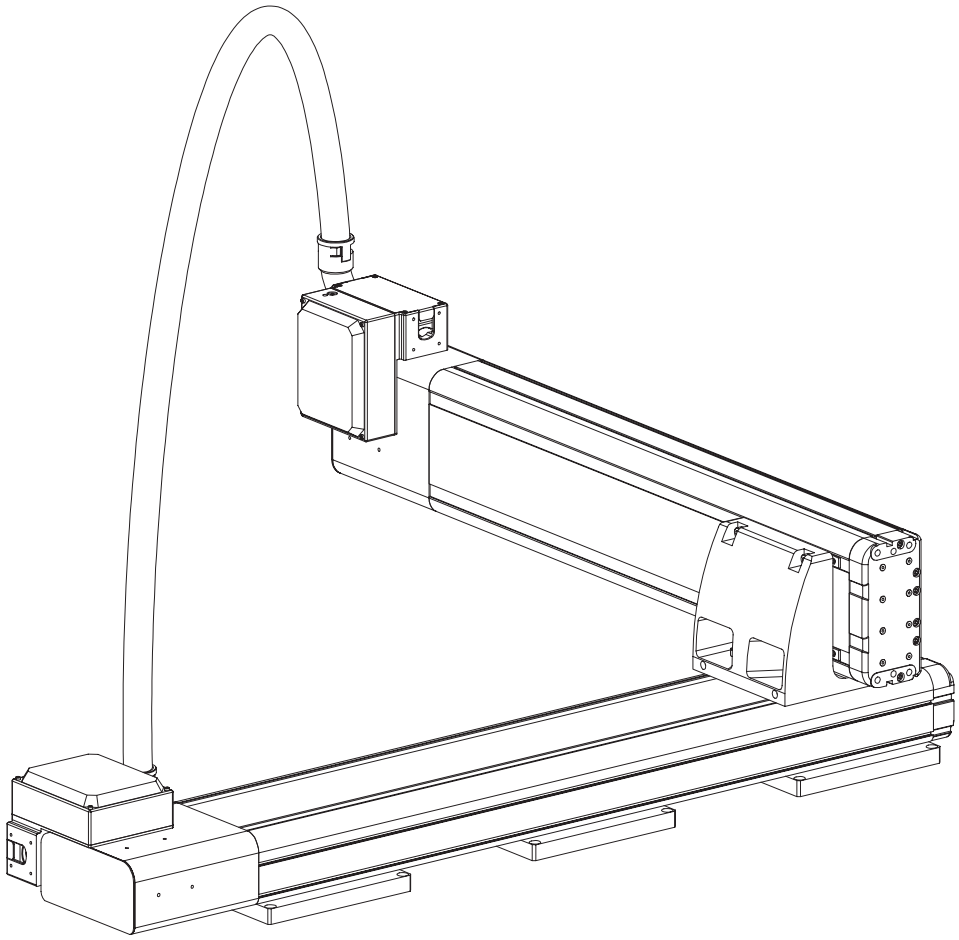


Figure 10-36. R-X-(HH) Isometric View

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R-X(HM) Configuration

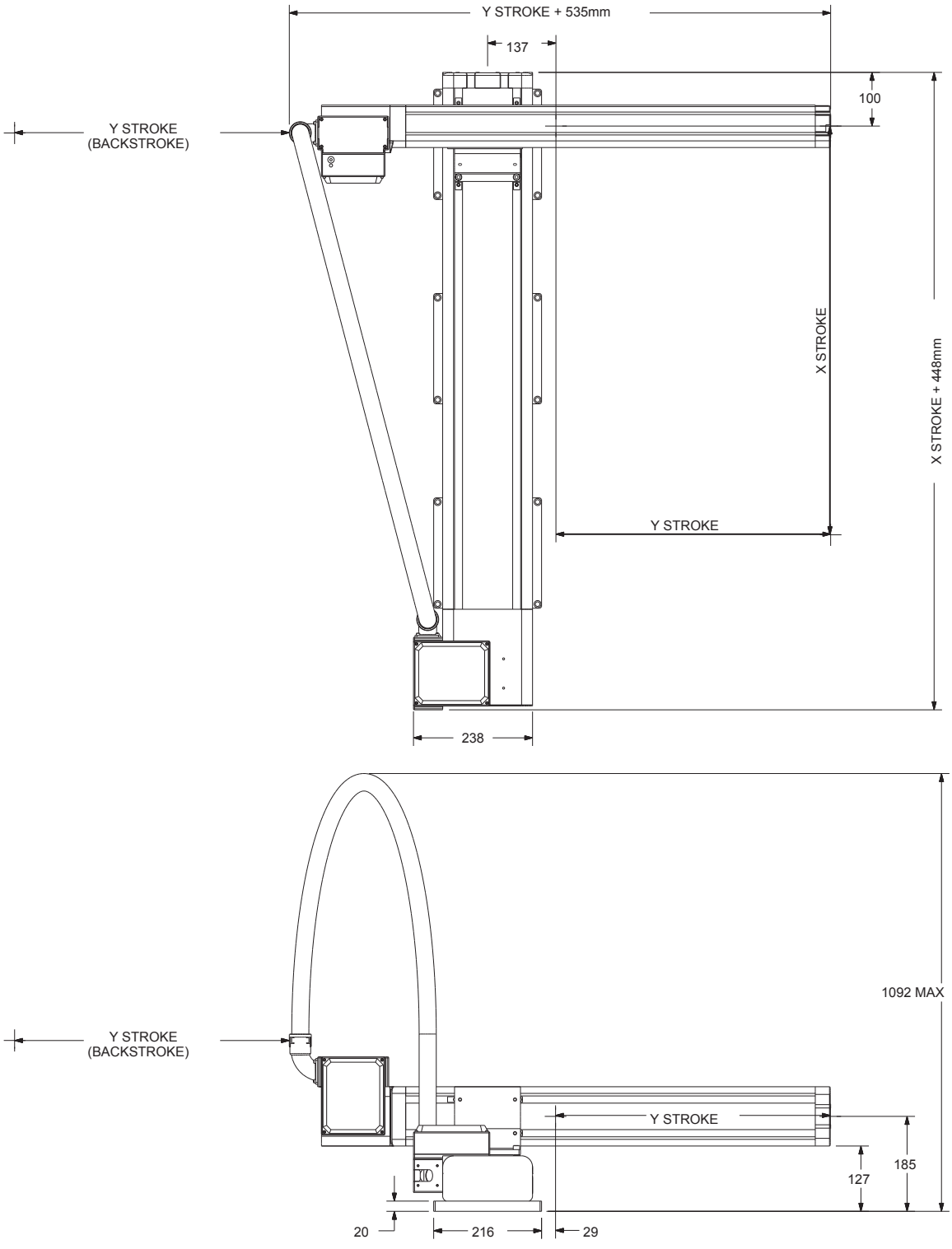


Figure 10-37. R-X-(HM) Work Envelope

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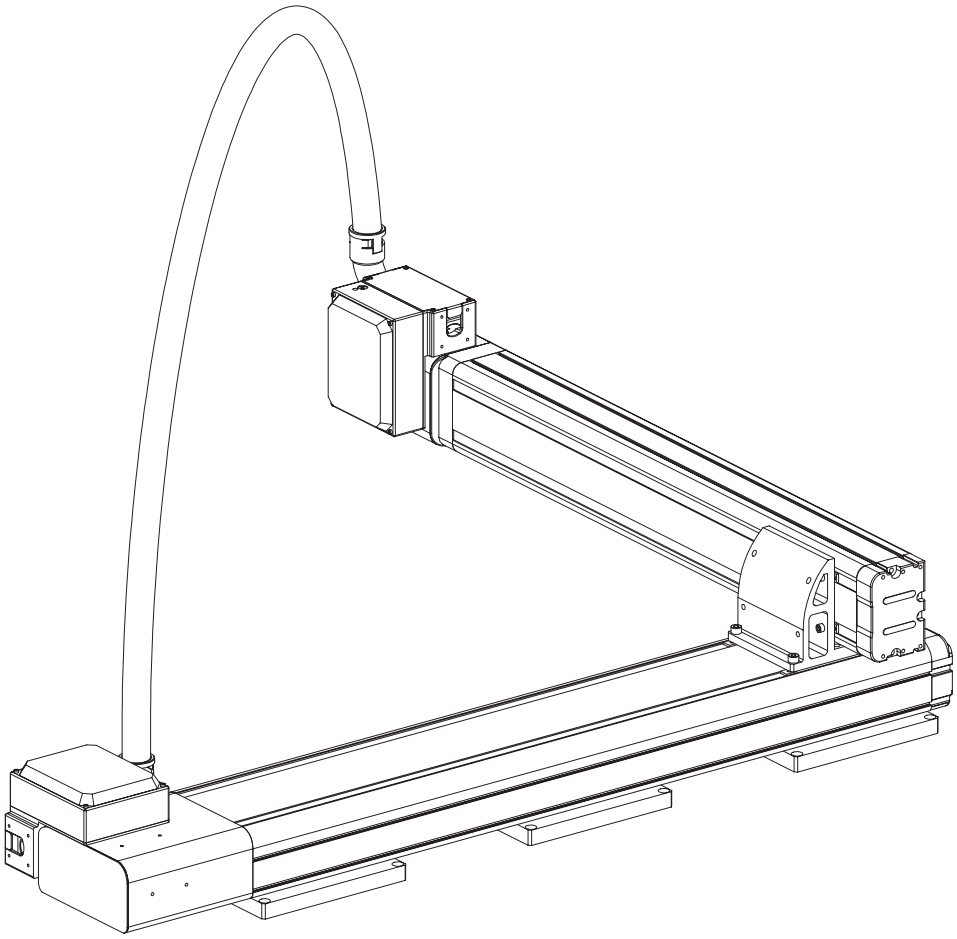
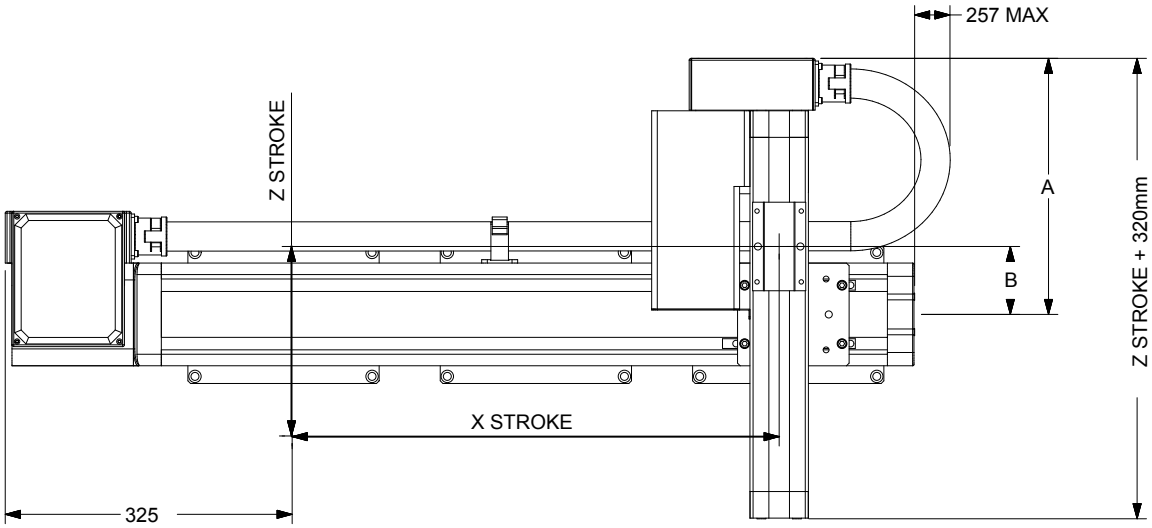


Figure 10-38. R-X(HM) Isometric View

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R-K(MSz) Configuration



Zmm	A	B
100	239	27
200	289	77
300	339	127
400	389	177
500	439	227

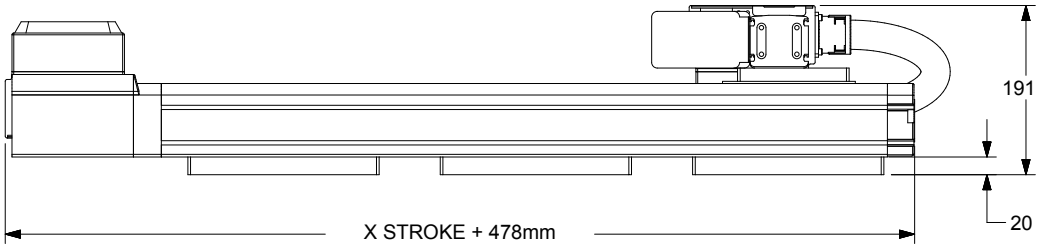


Figure 10-39. R-K(MSz) Work Envelope

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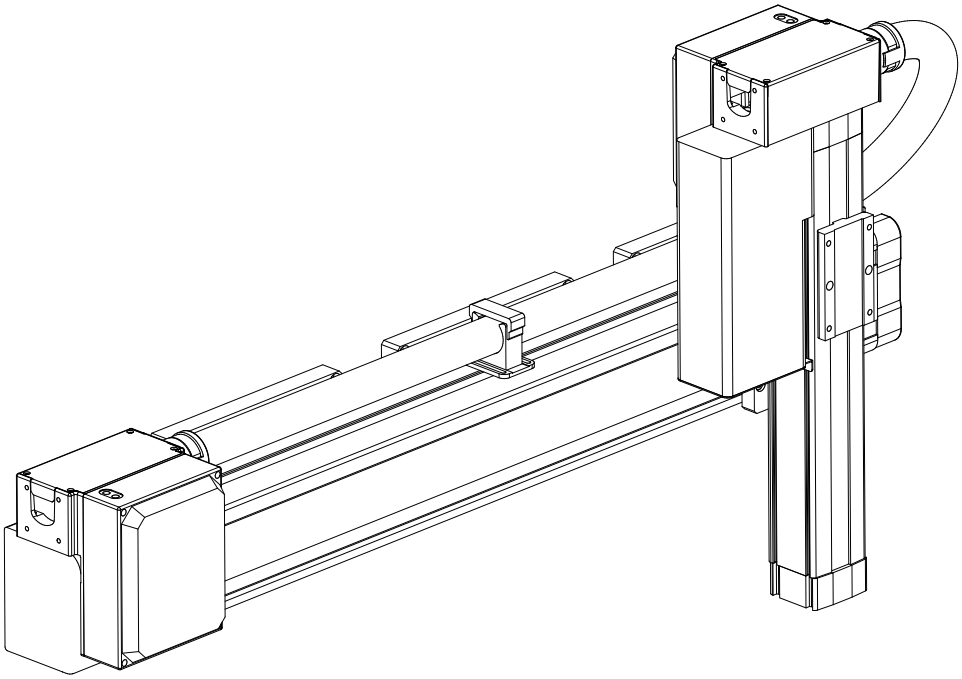


Figure 10-40. R-K(MSz) Isometric View

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R-K(HMz) Configuration

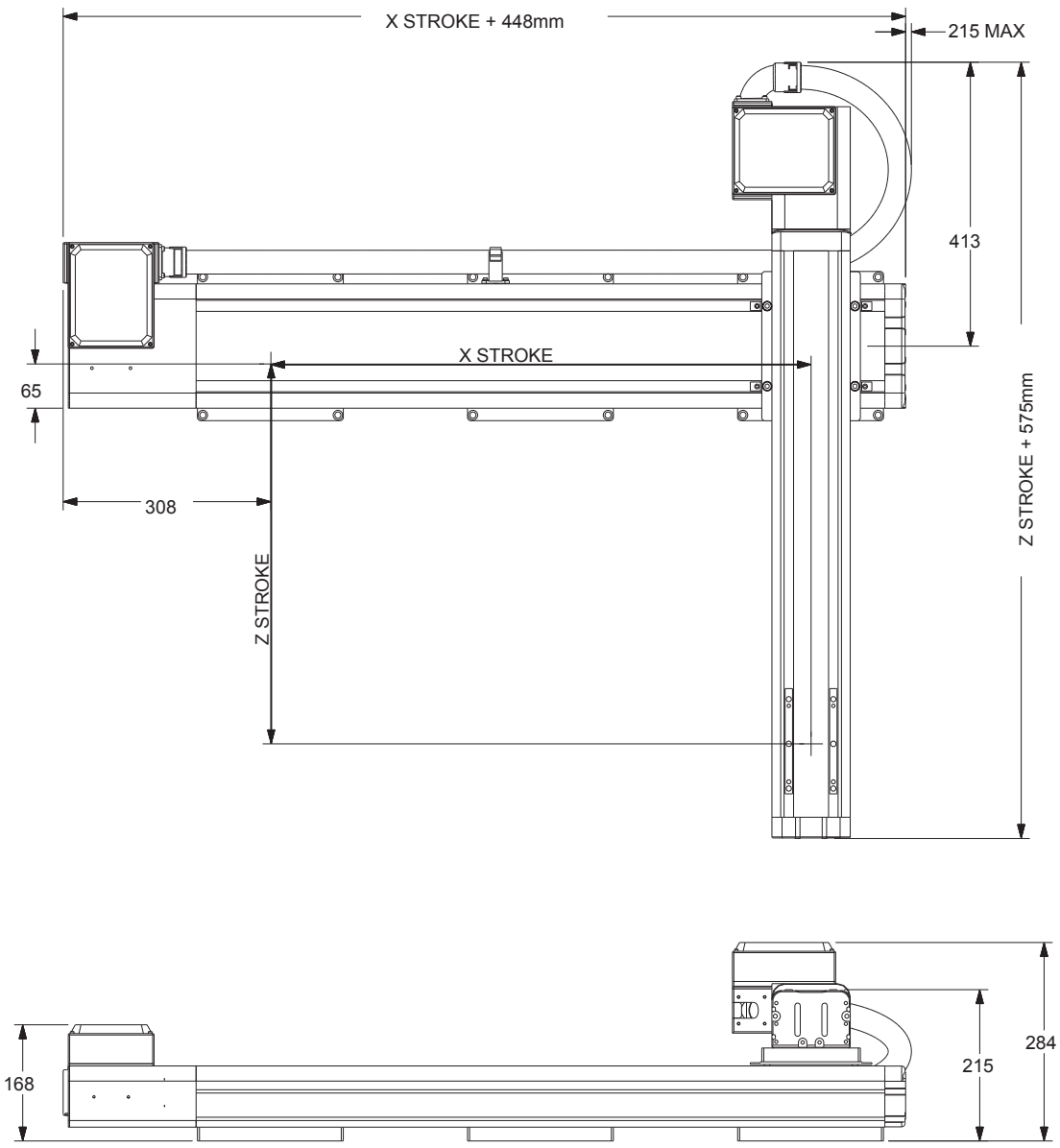


Figure 10-41. R-K(HMz) Work Envelope

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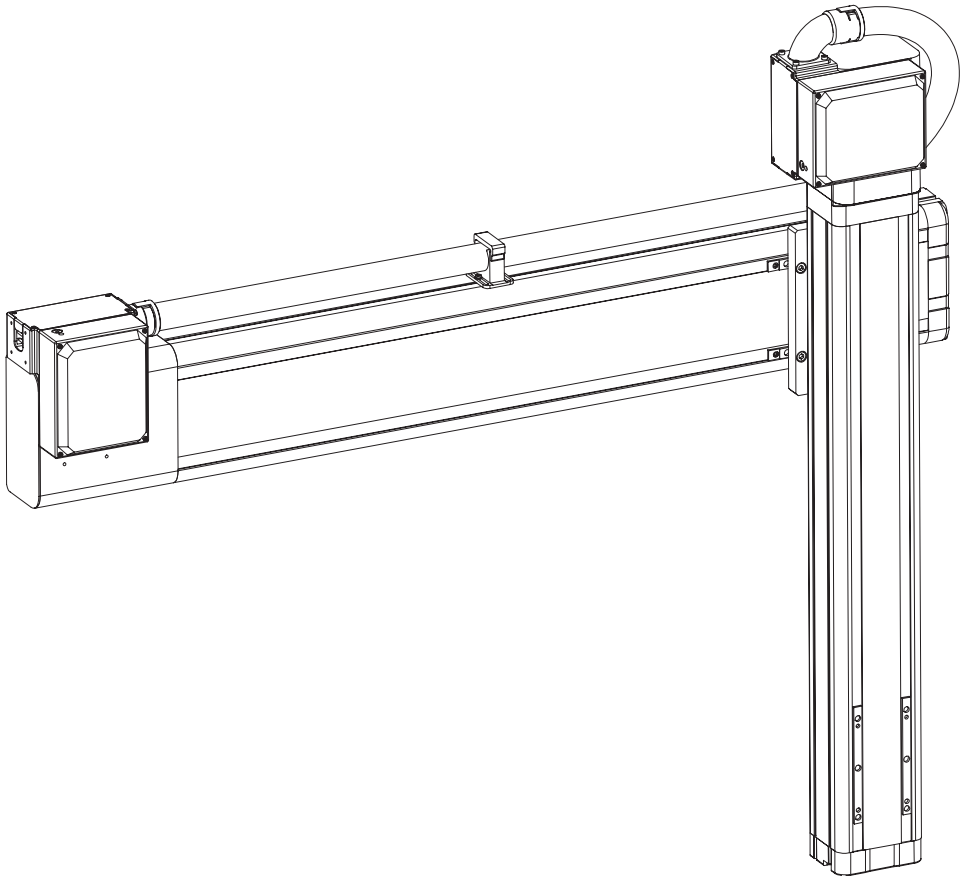


Figure 10-42. R-K(HMz) Isometric View

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R-Z(HMz) Configuration

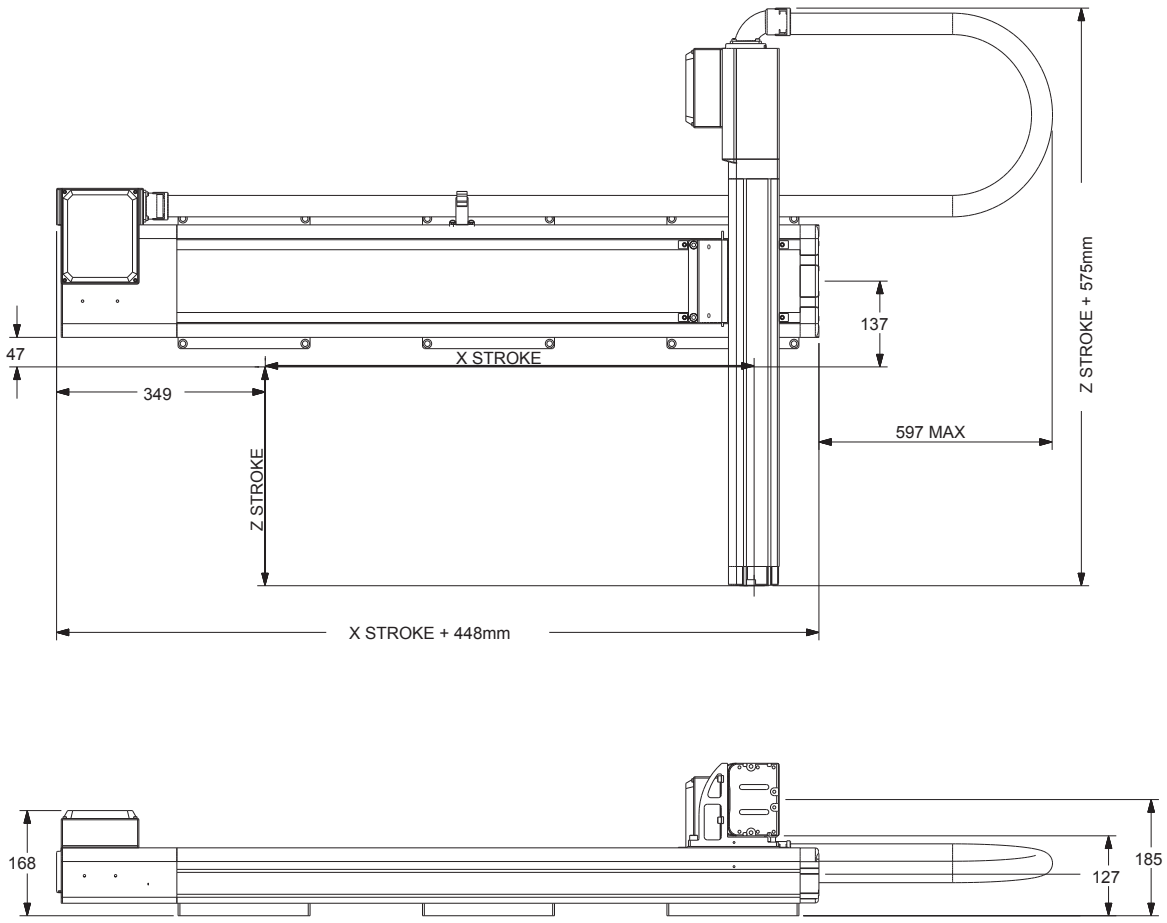


Figure 10-43. R-Z(HMz) Work Envelope

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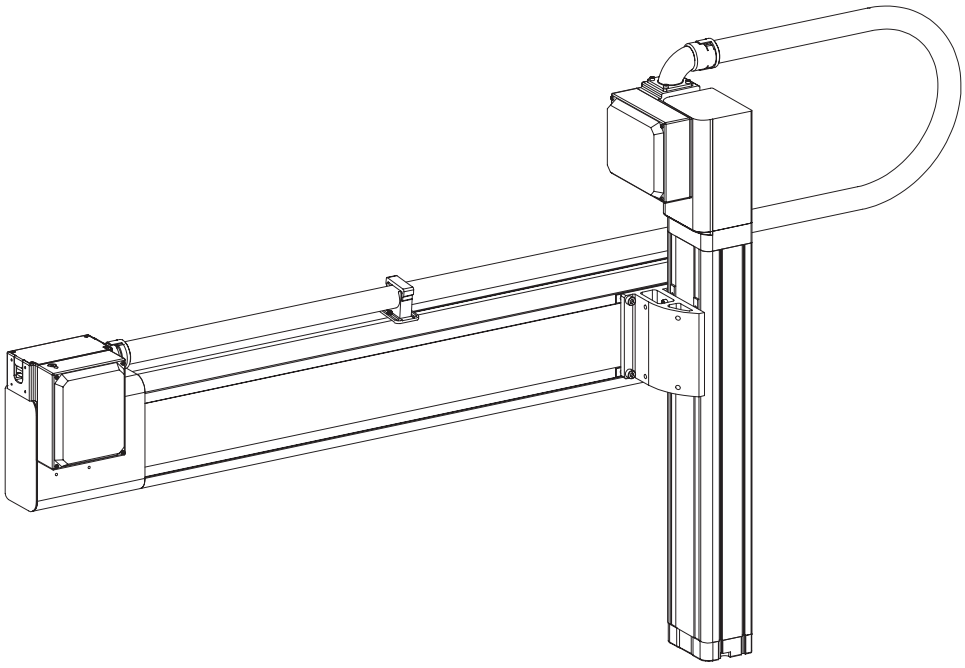


Figure 10-44. R-Z(HMz) Isometric View

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R-P(HHMz) Configuration

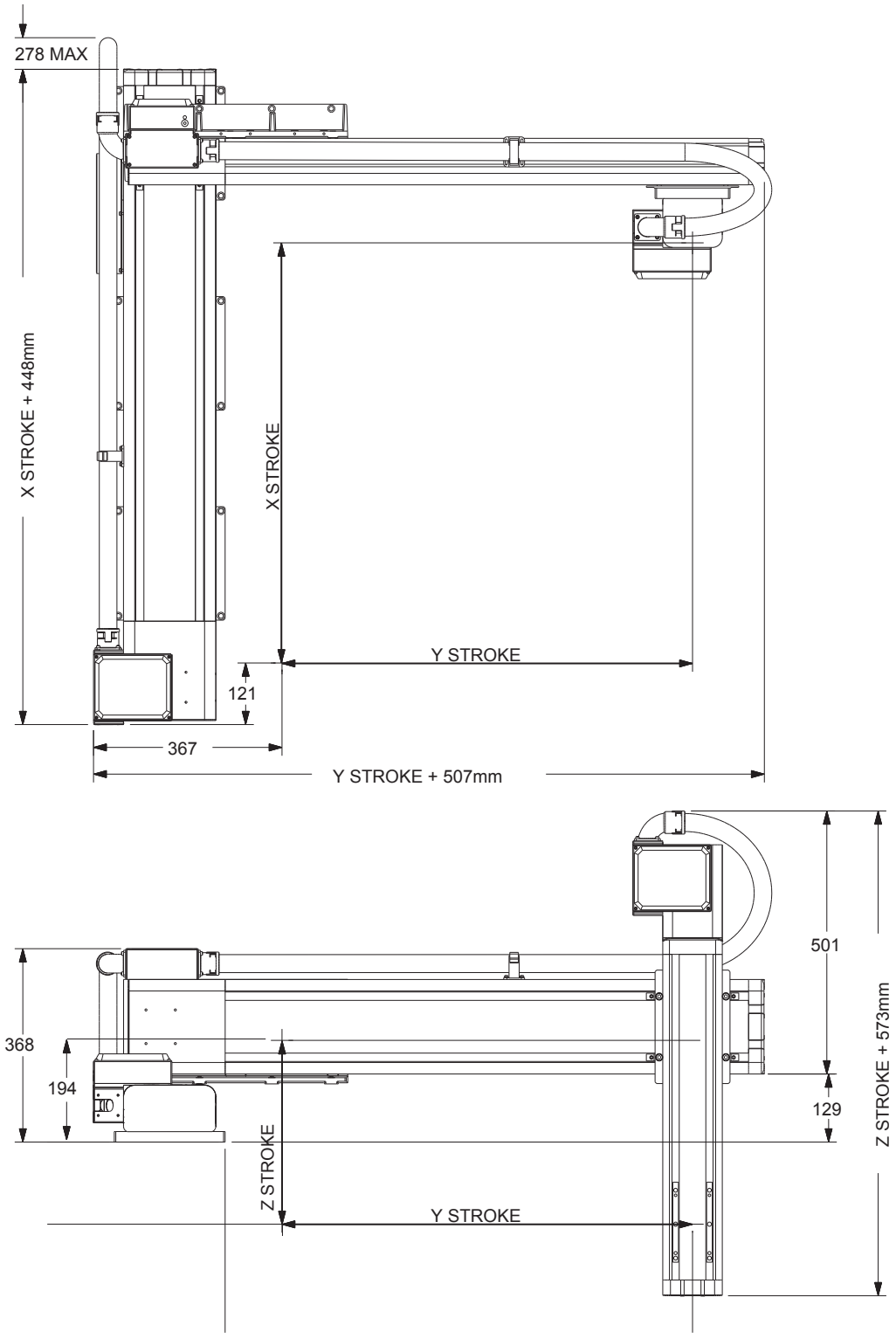


Figure 10-45. R-P(HHMz) Work Envelope

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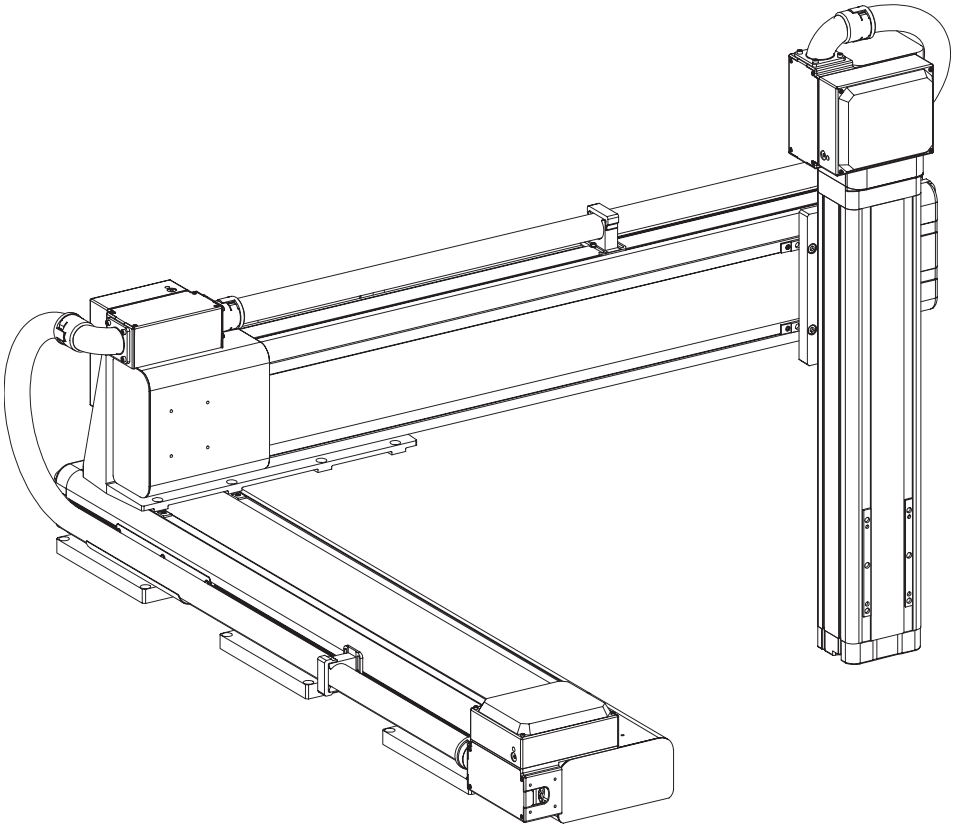


Figure 10-46. R-P(HHMz) Isometric View

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R-Pq(HHMz) Configuration

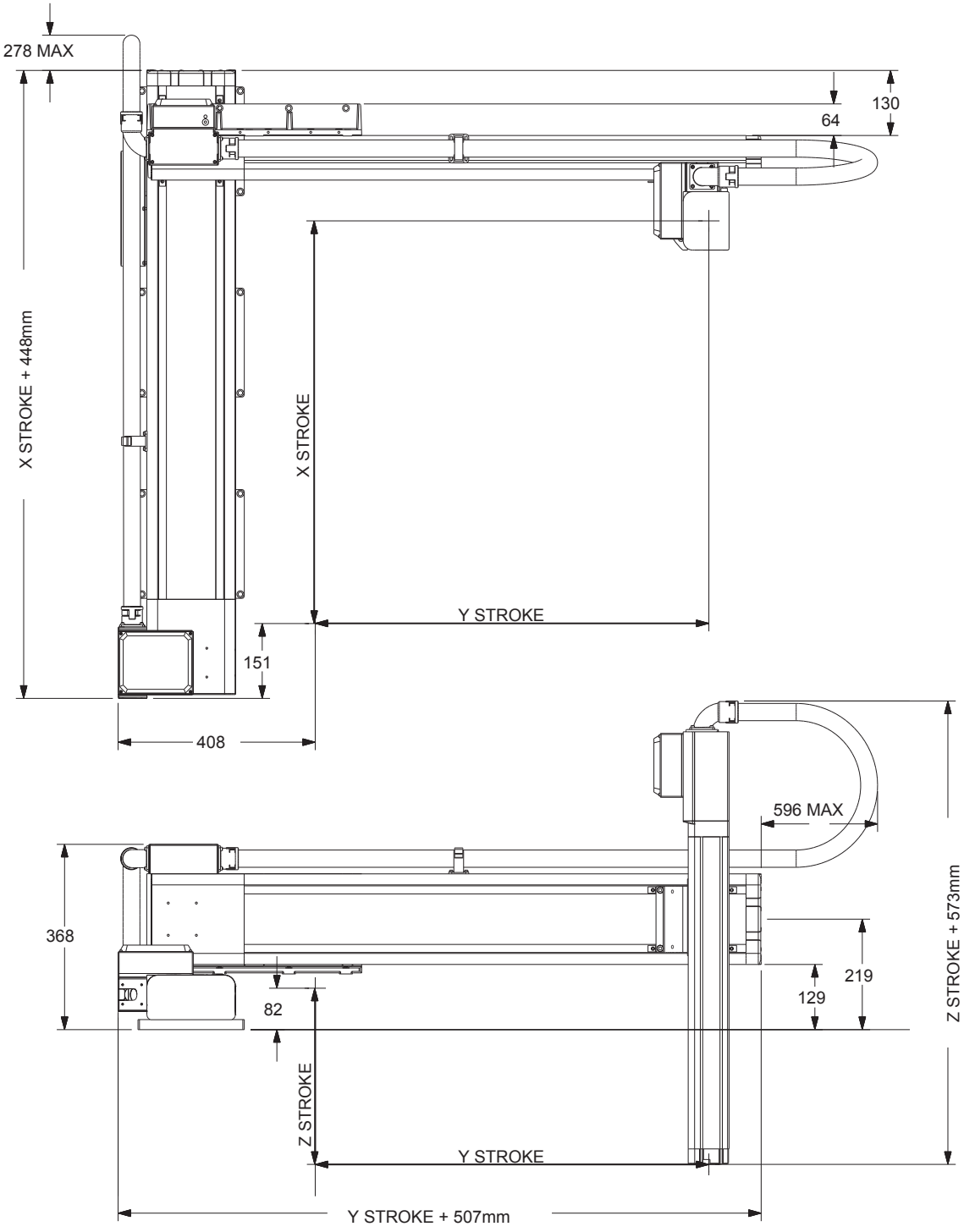


Figure 10-47. R-Pq(HHMz) Work Envelope

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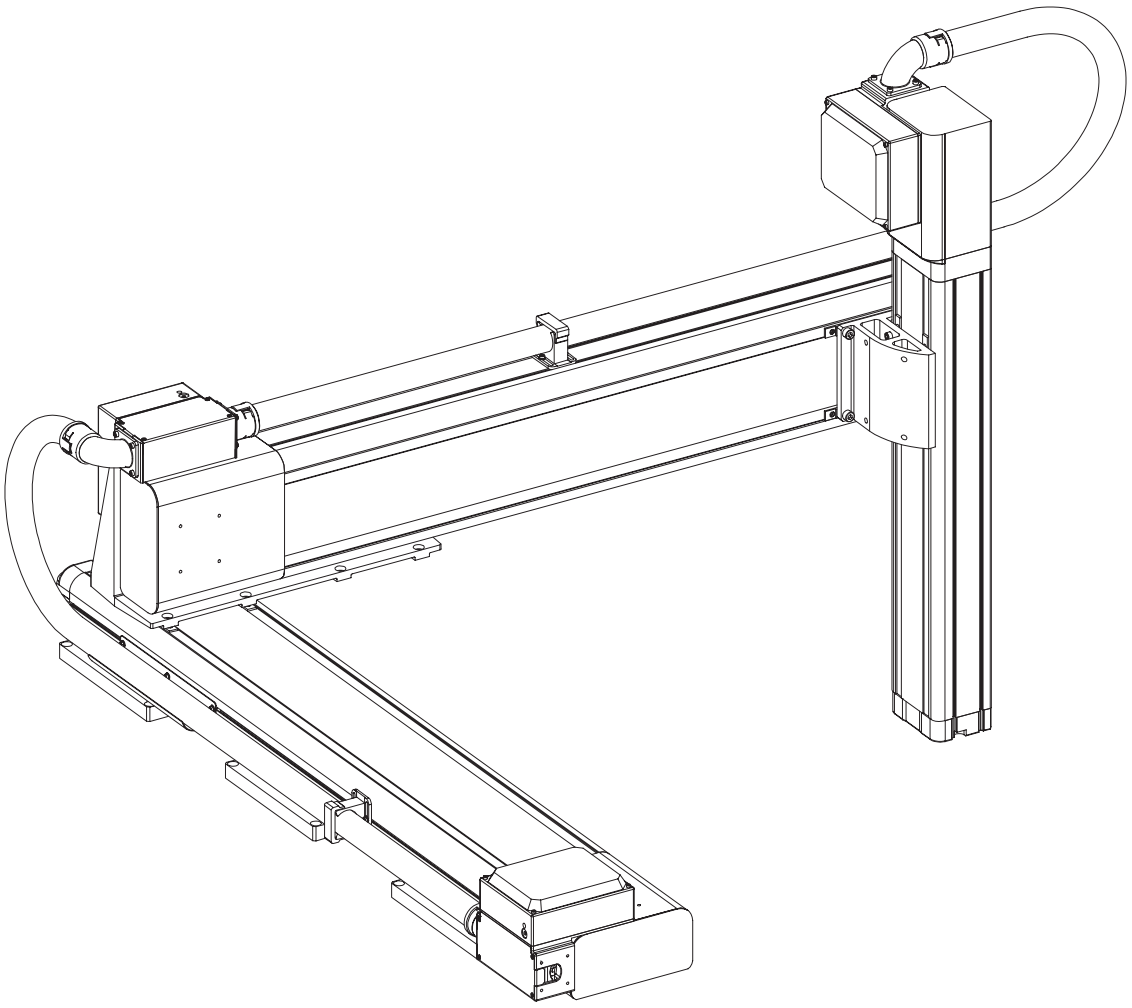
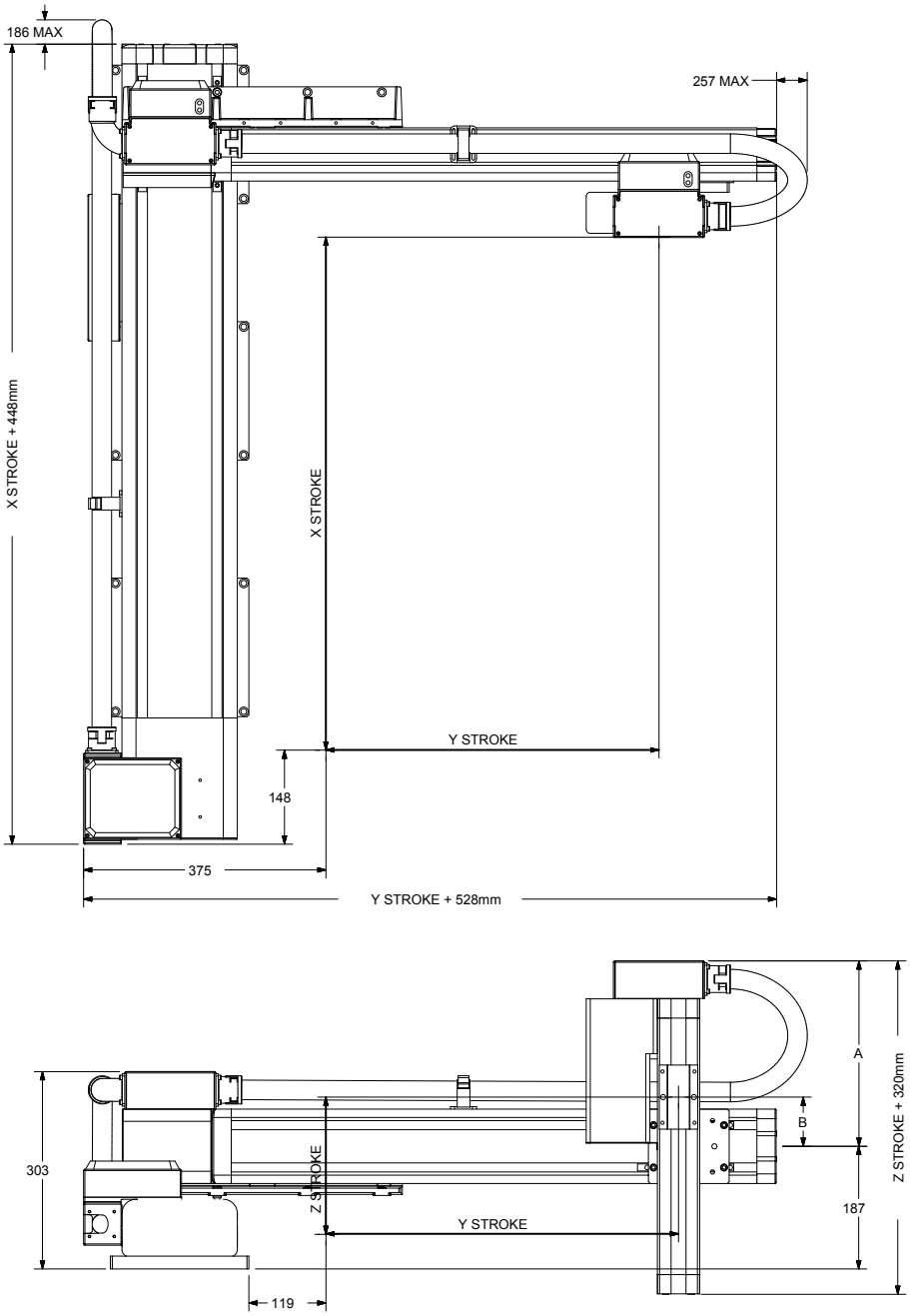


Figure 10-48. R-Pq(HHMz) Isometric View

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R-P(HMSz) Configuration



Zmm	A	B
100	239	27
200	289	77
300	339	127
400	389	177
500	439	227

Figure 10-49. R-P(HMSz) Work Envelope

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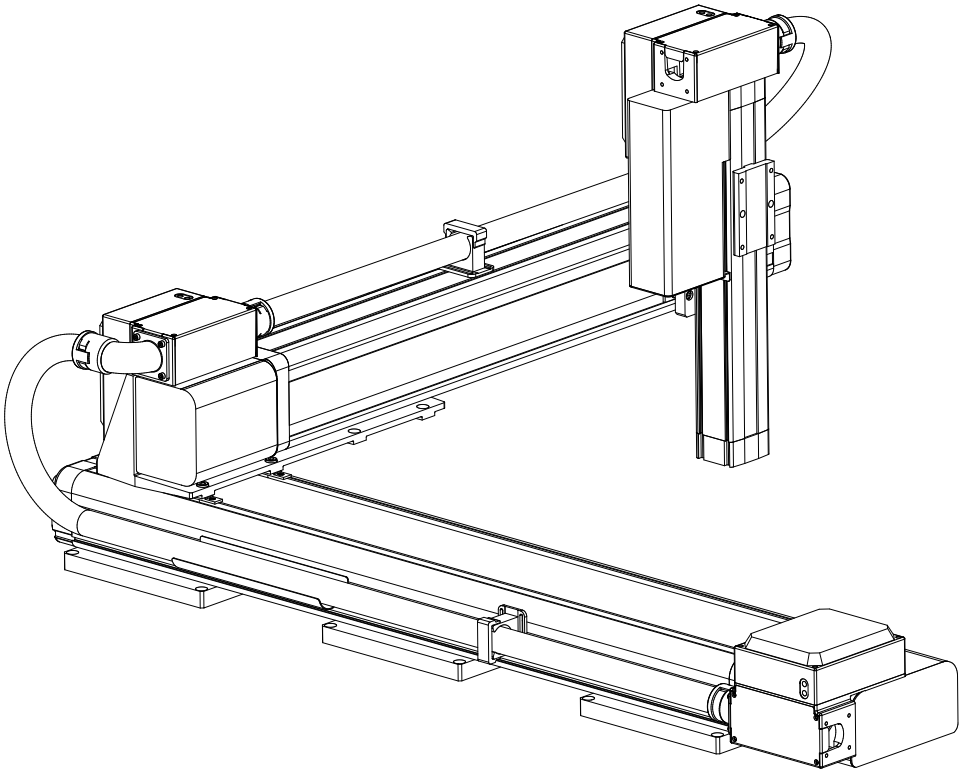


Figure 10-50. R-P(HMSz) Isometric View

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R-Pq(HMSz) Configuration

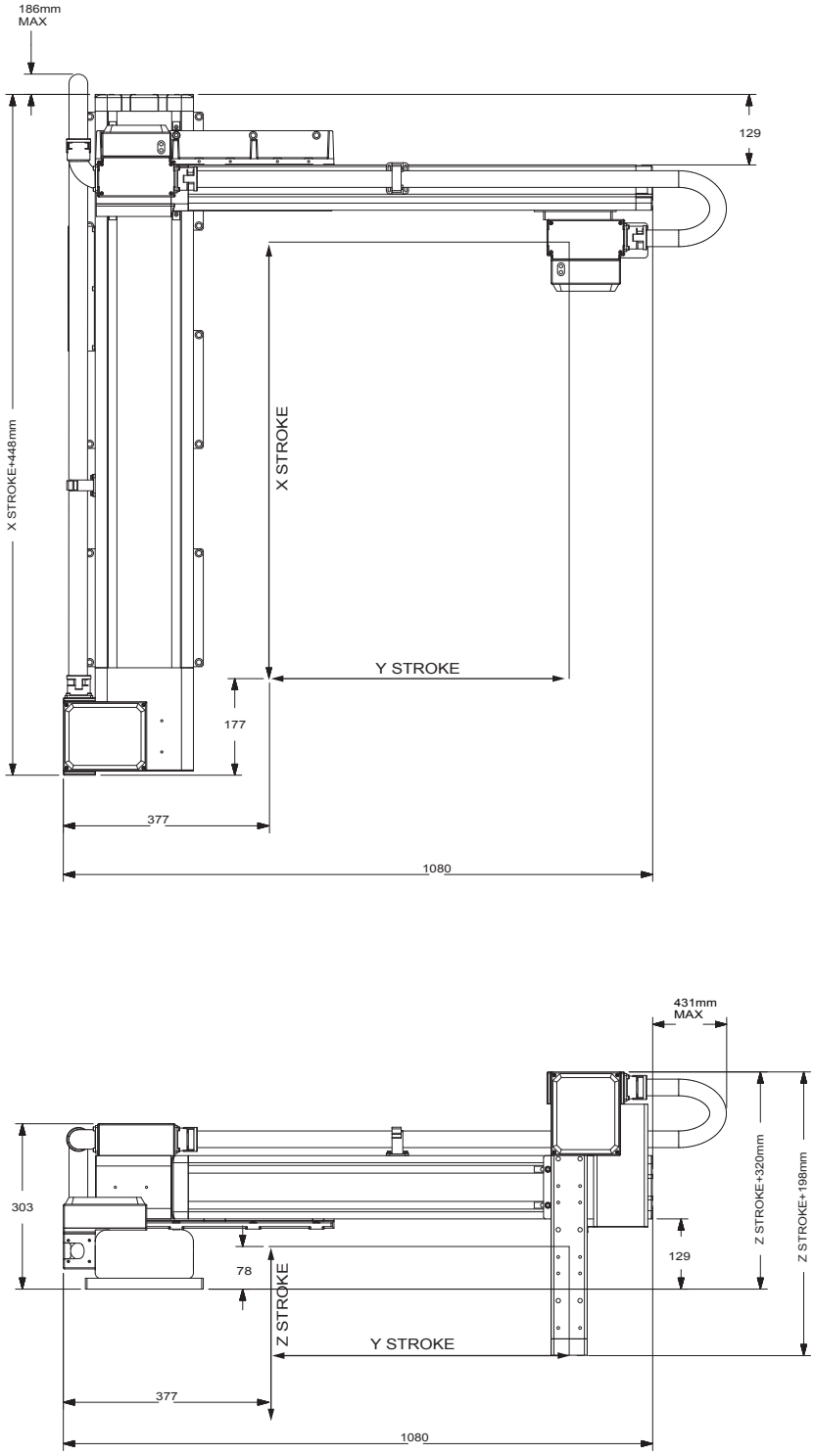


Figure 10-51. R-Pq(HMSz) Work Envelope

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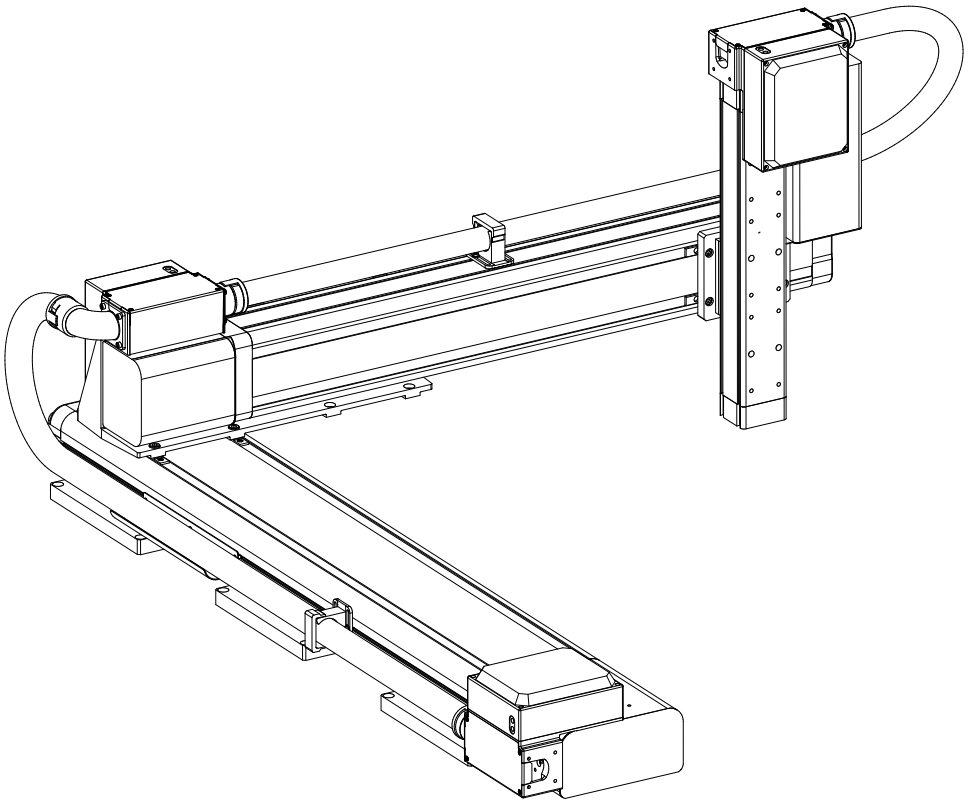


Figure 10-52. R-Pq(HMSz) Isometric View

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R-G(HMZT) Configuration

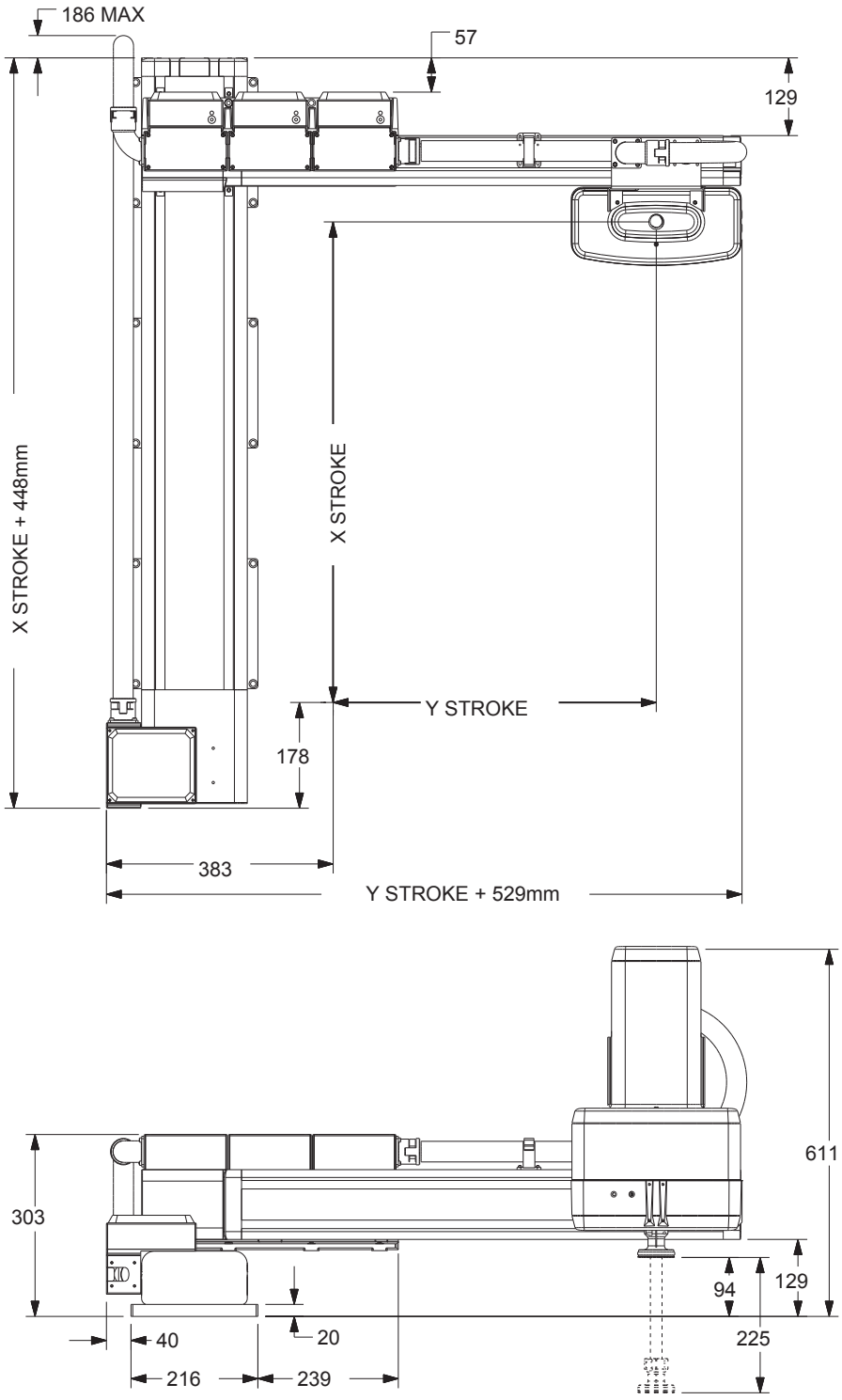


Figure 10-53. R-G(HMZT) Work Envelope

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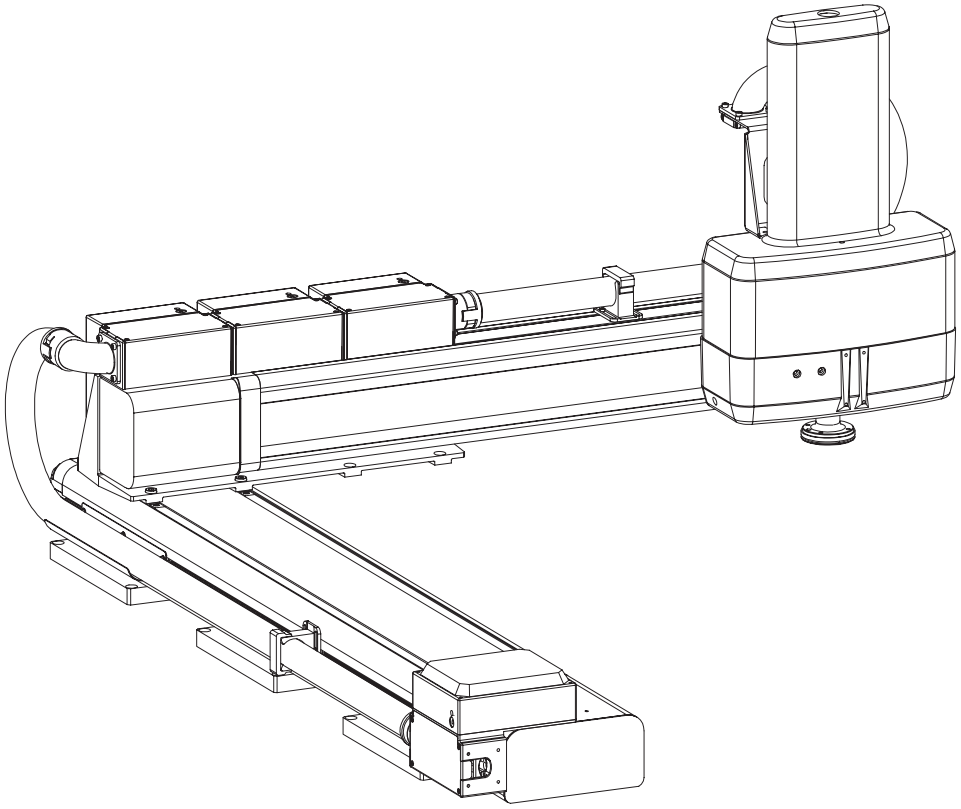
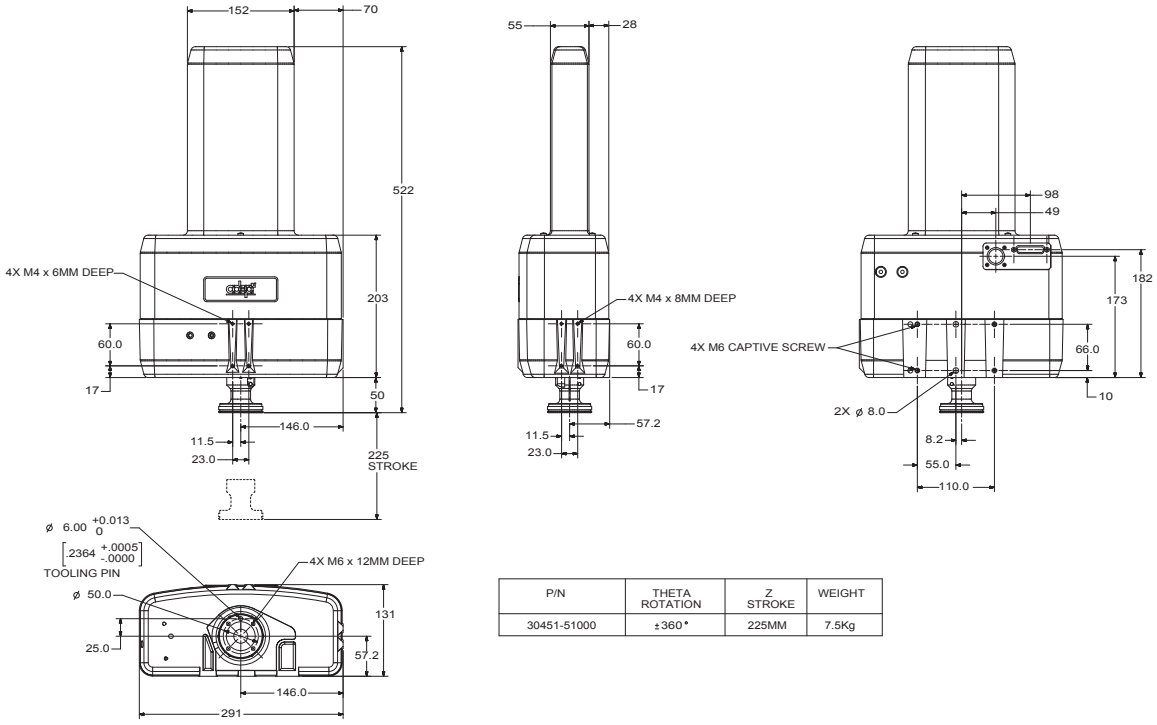


Figure 10-54. R-G(HMZT) Isometric View

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Z-Theta Module



P/N	THETA ROTATION	Z STROKE	WEIGHT
30451-51000	±360°	225MM	7.5Kg

Figure 10-55. Z-Theta Module Work Envelope

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V-G(HM) Configuration

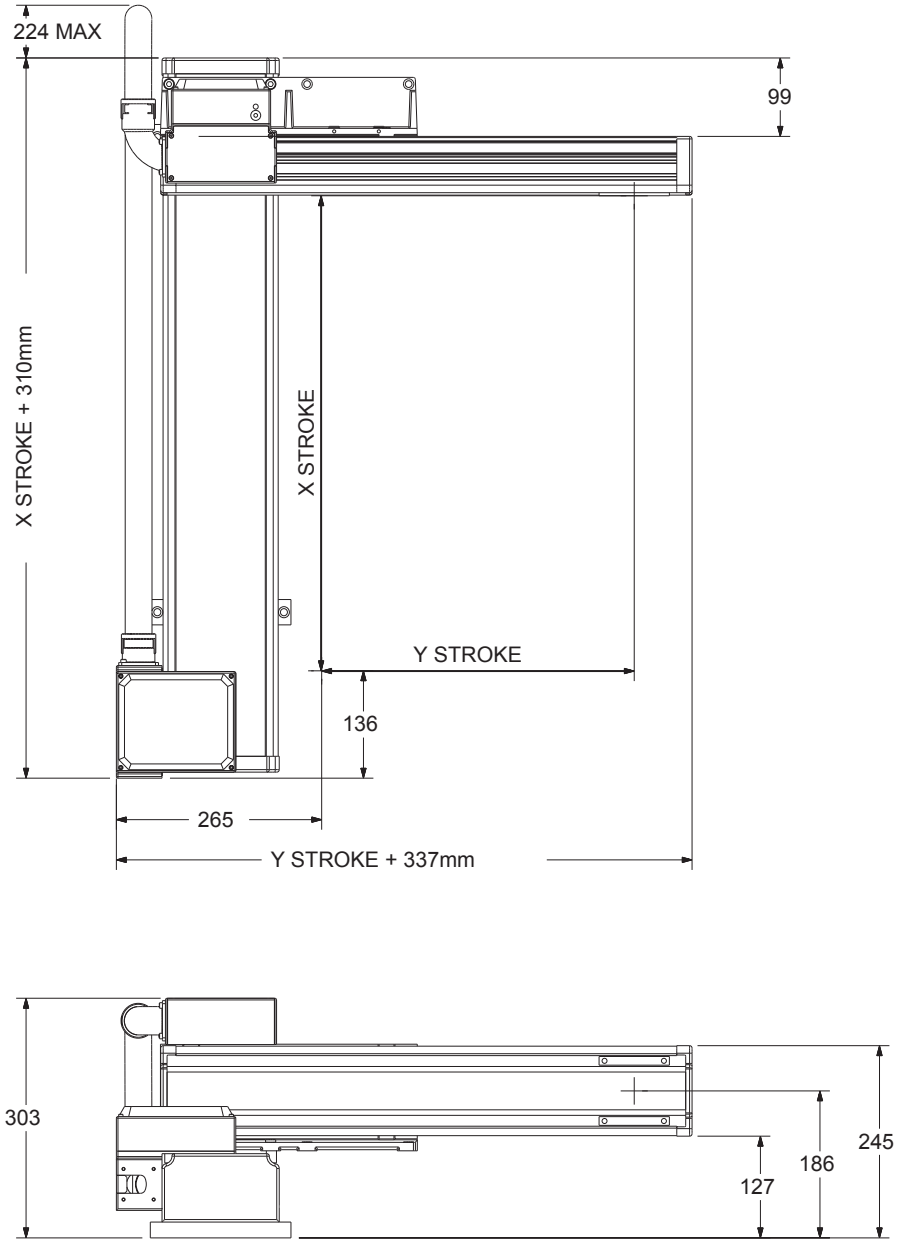


Figure 10-56. V-G(HM) Work Envelope

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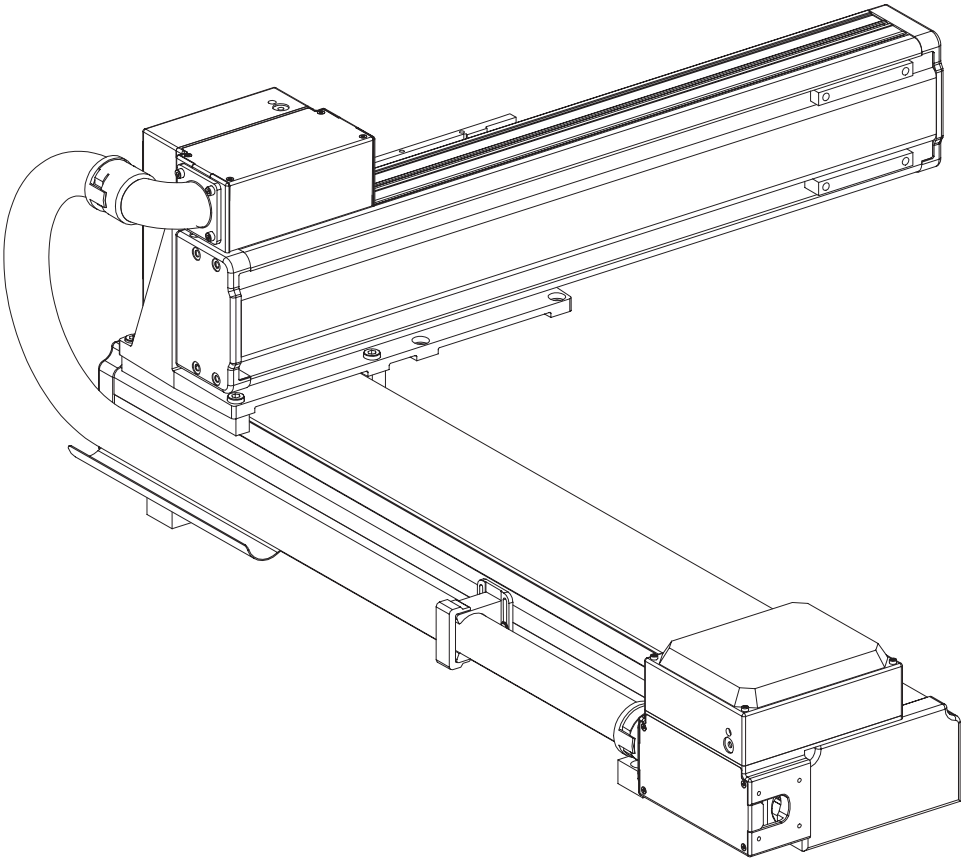


Figure 10-57. V-G(HM) Isometric View

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V-D(HM) Configuration

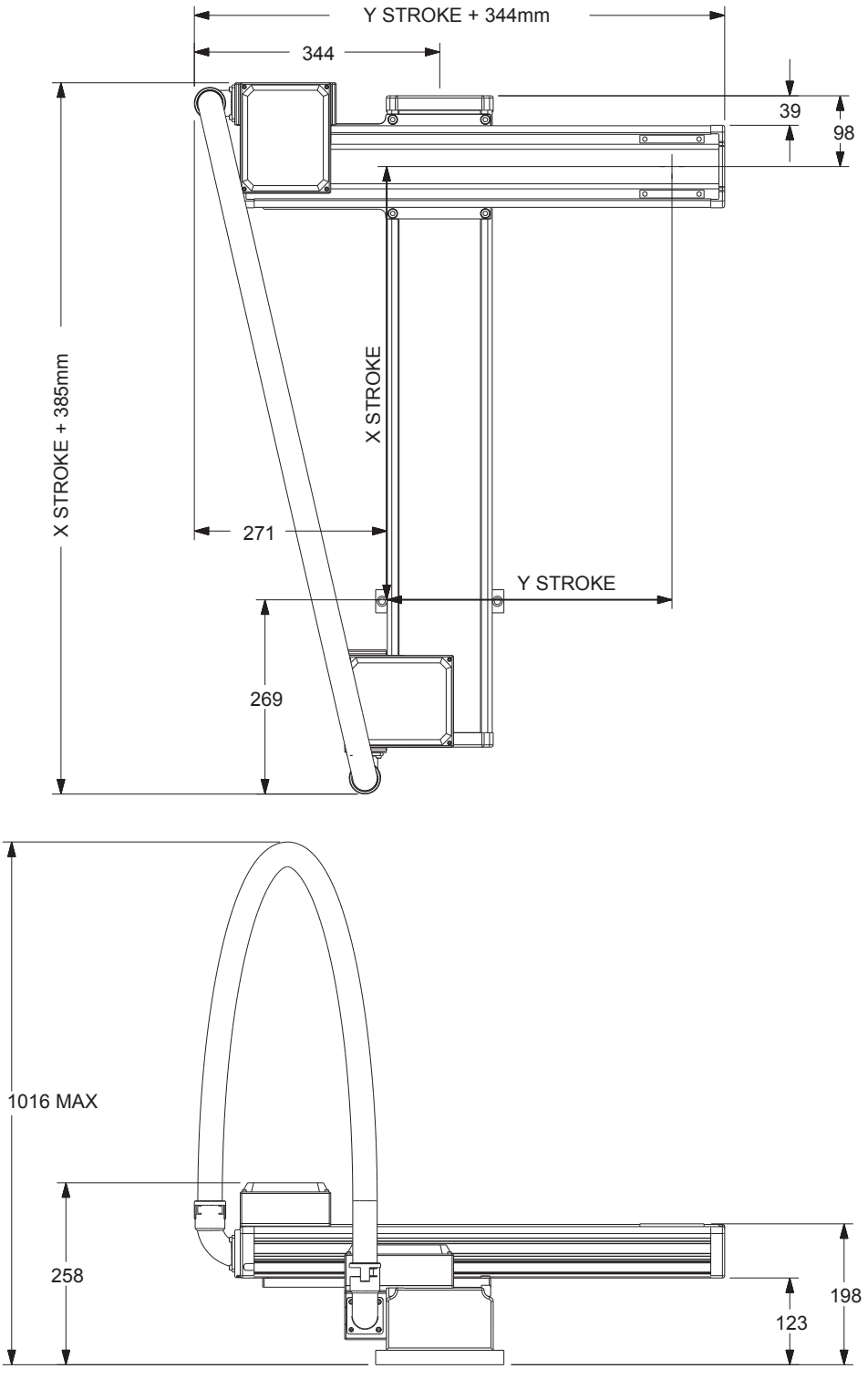


Figure 10-58. V-D(HM) Work Envelope

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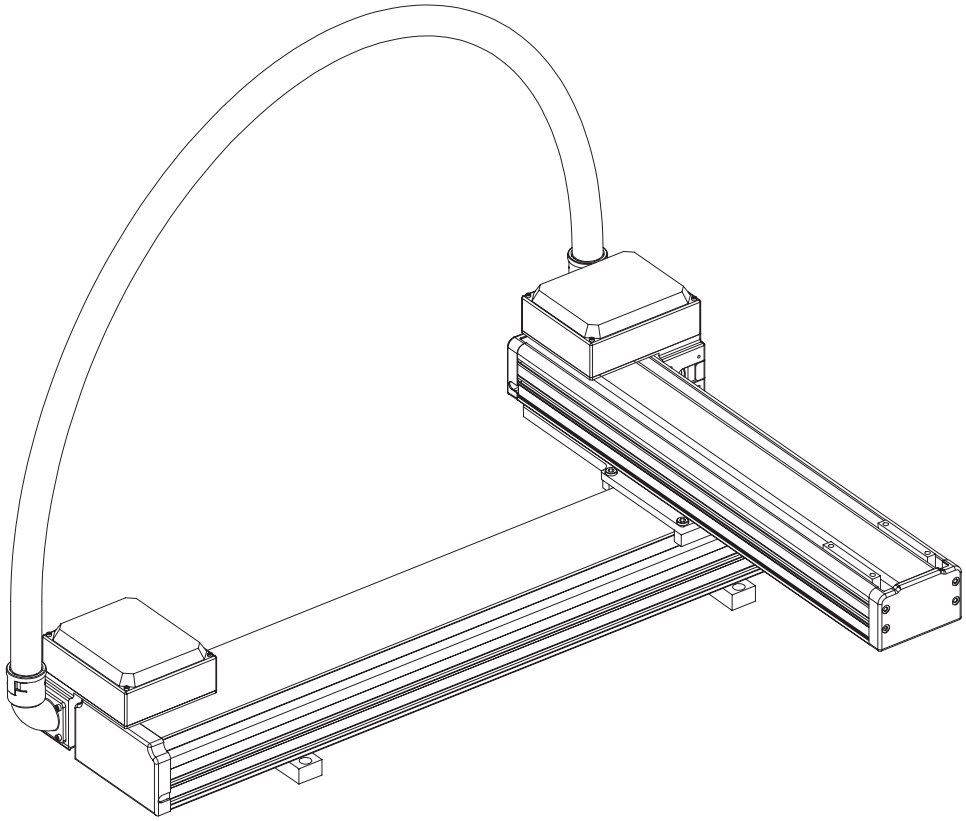
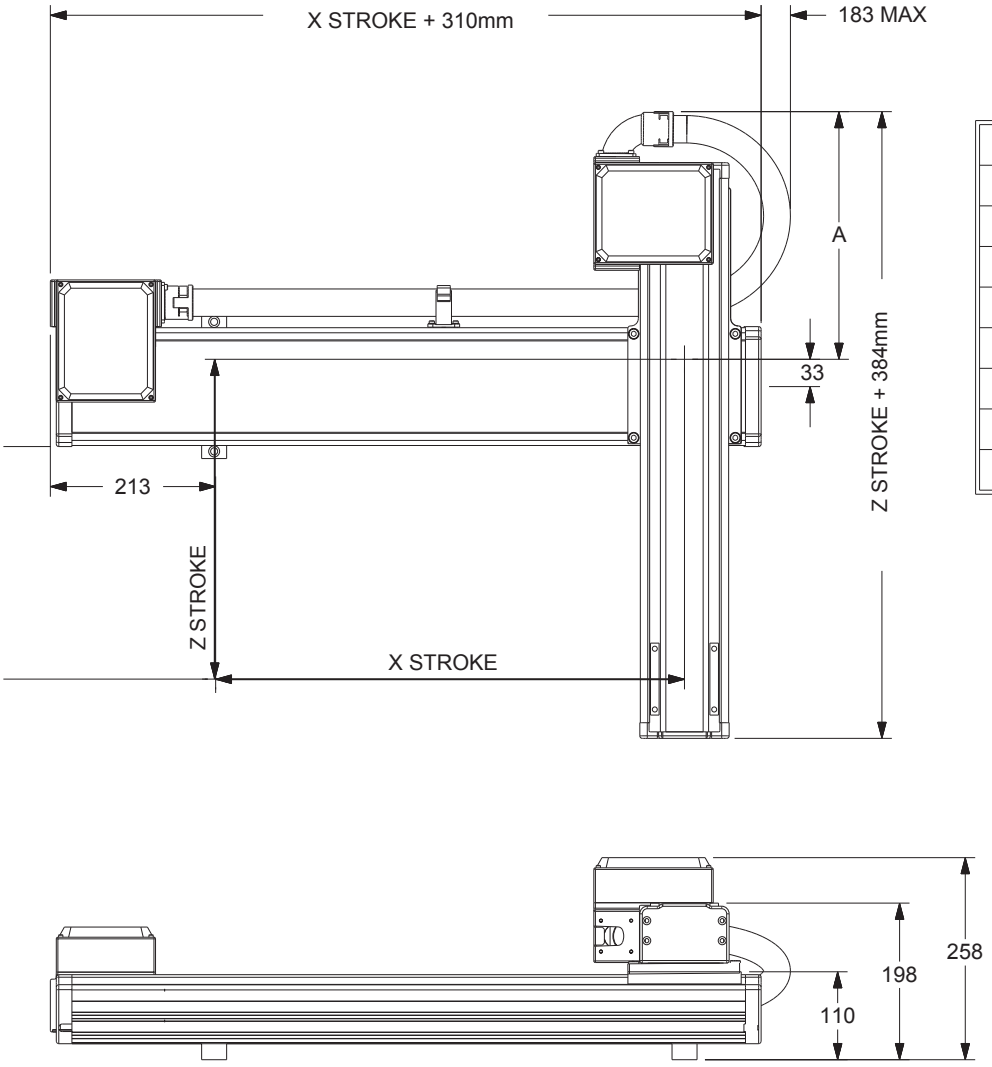


Figure 10-59. V-D(HM) Isometric View

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V-K(HMz) Configuration



Zmm	A
100	365
200	375
300	289
400	289
500	289
600	289
700	289
800	289

Figure 10-60. V-K(HMz) Work Envelope

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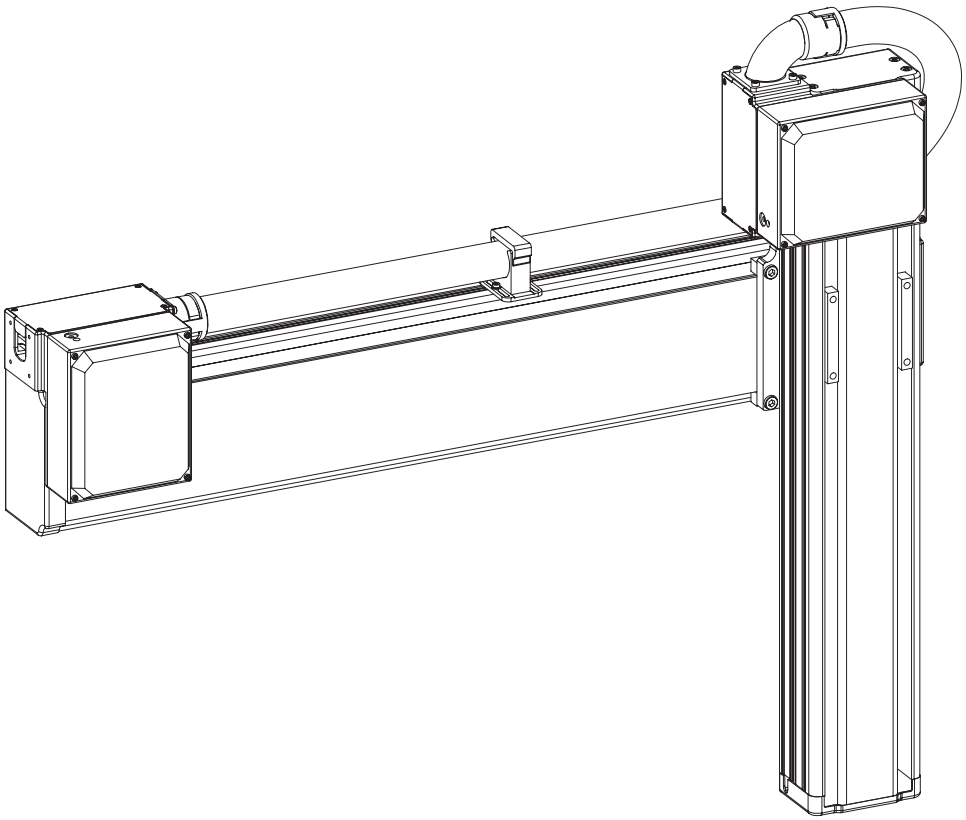


Figure 10-61. V-K(HMz) Isometric View

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V-L(HzM) Configuration

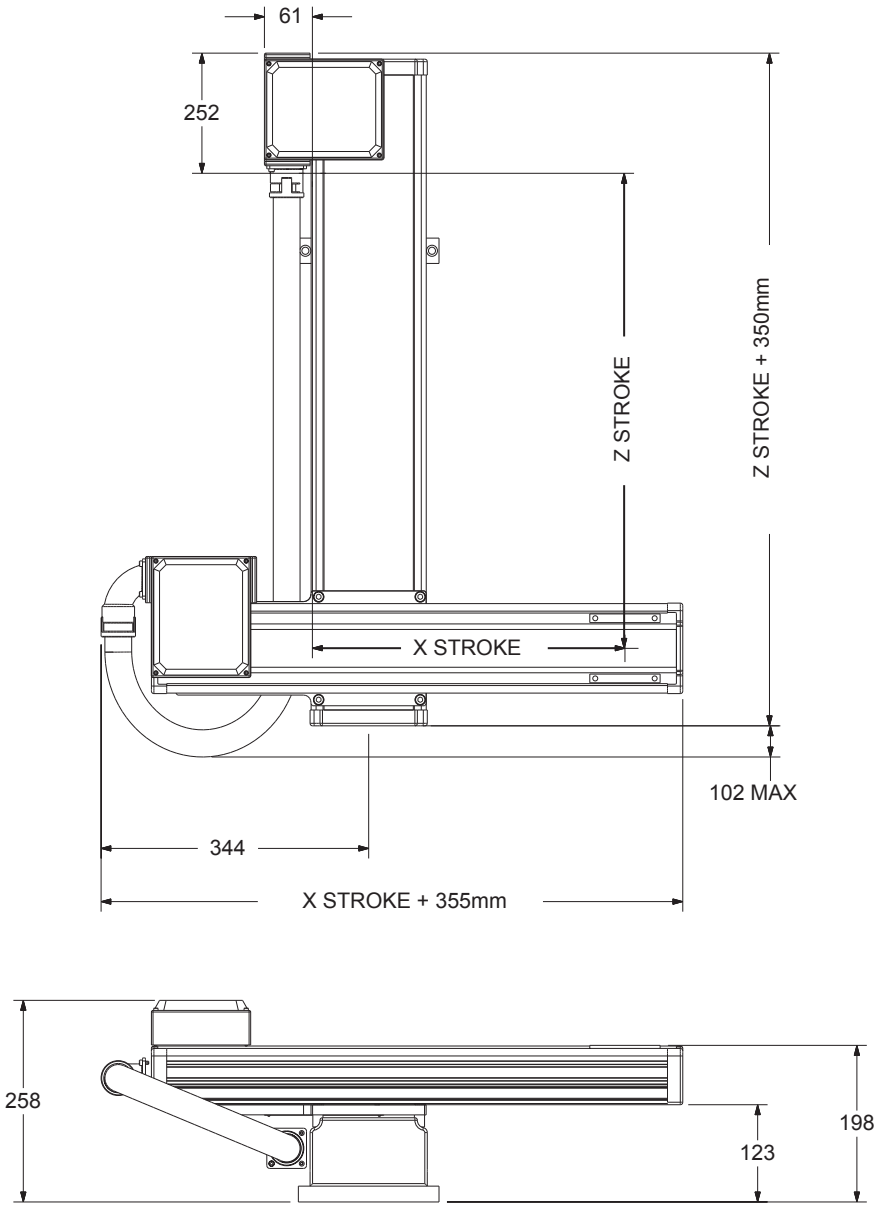


Figure 10-62. V-L(HzM) Work Envelope

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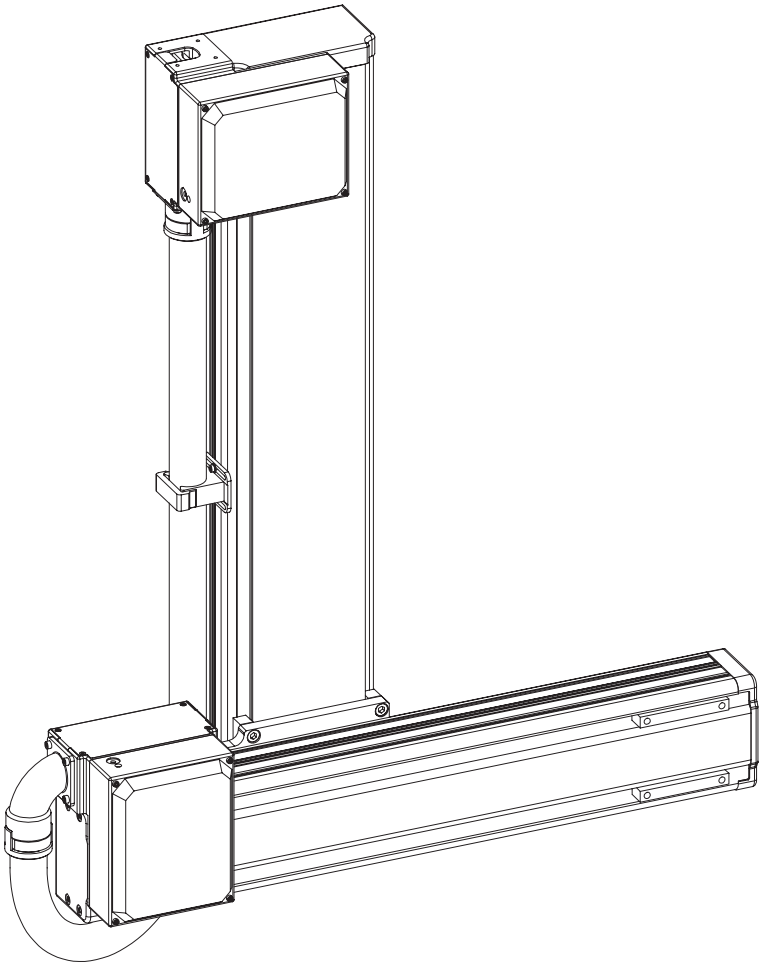
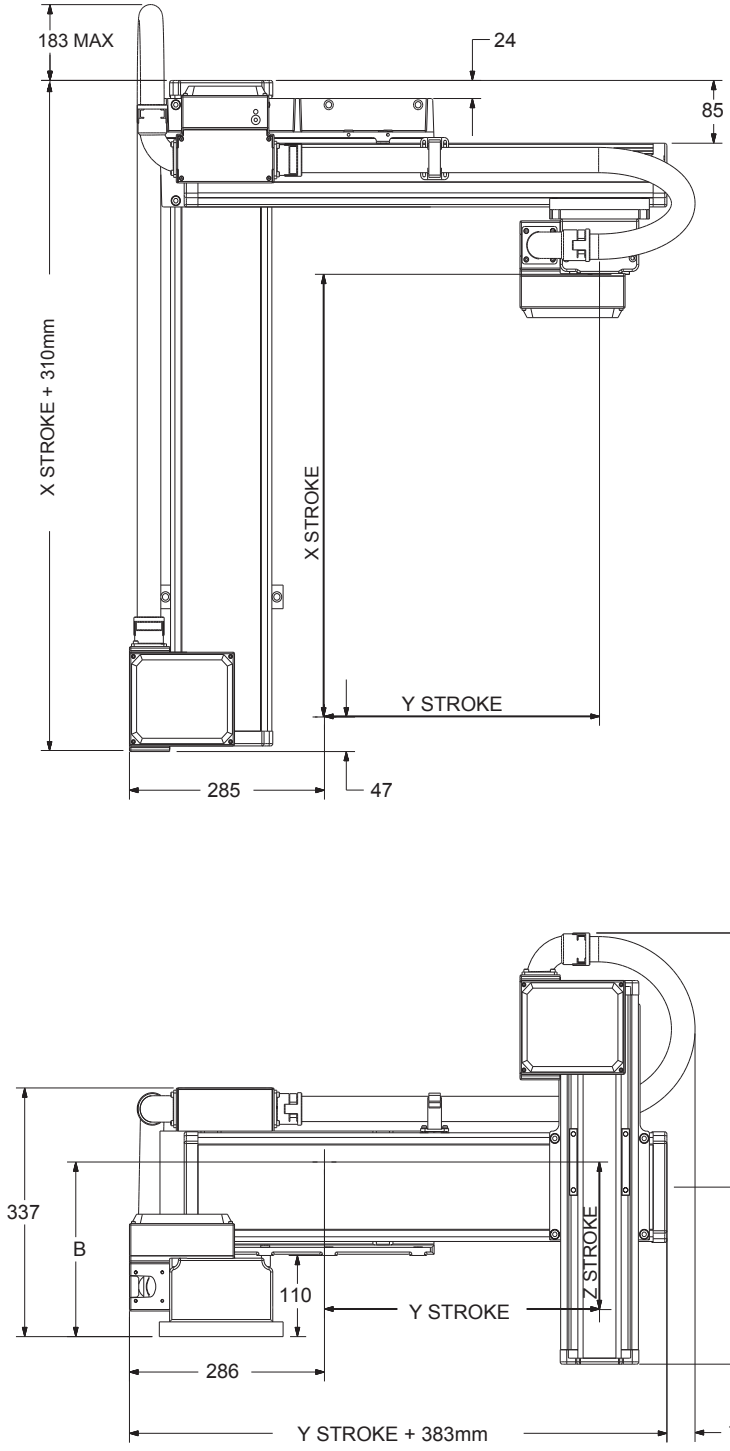


Figure 10-63. V-L(HzM) Isometric View

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V-P(HHMz) Configuration



Zmm	A	B
100	358	251
200	408	301
300	344	237
400	344	237
500	344	237
600	344	237
700	344	237
800	344	237

Figure 10-64. V-P(HHMz) Work Envelope

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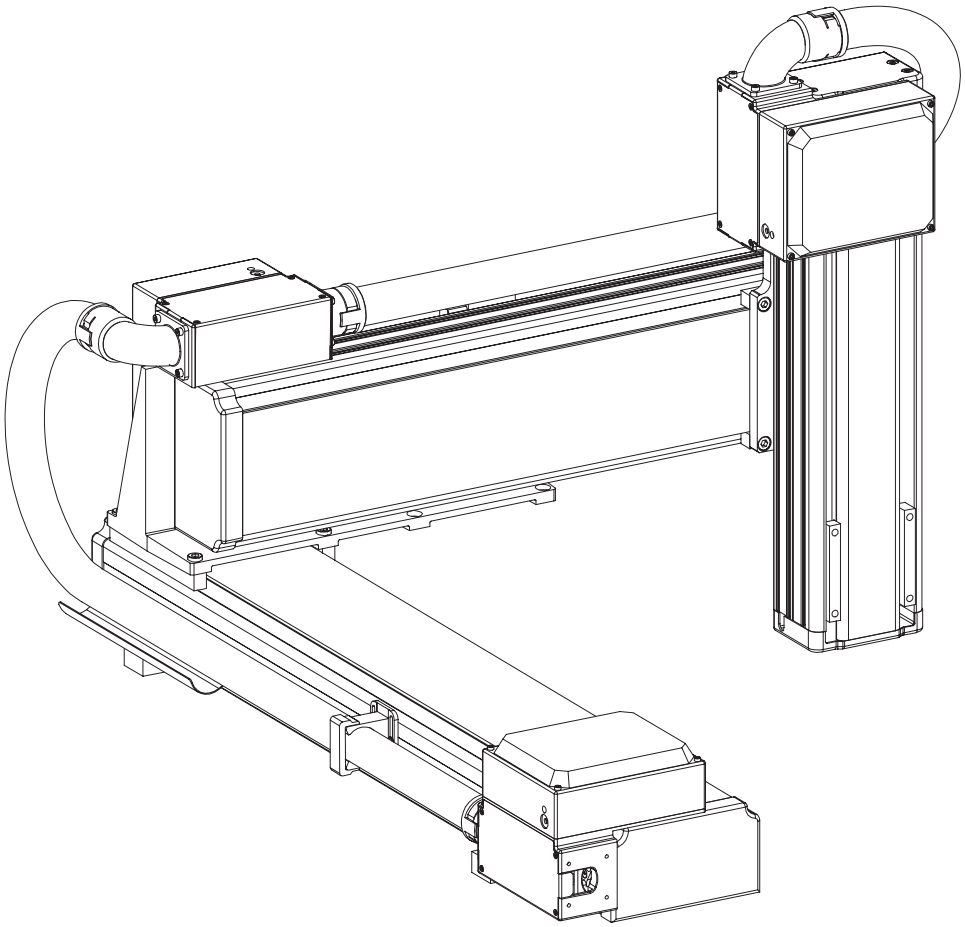


Figure 10-65. V-P(HHMz) Isometric View

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10.4 Brackets Drawings

This section contains dimension and isometric drawings of the SmartModule mounting plates and combining brackets.

R-H Mounting Plate

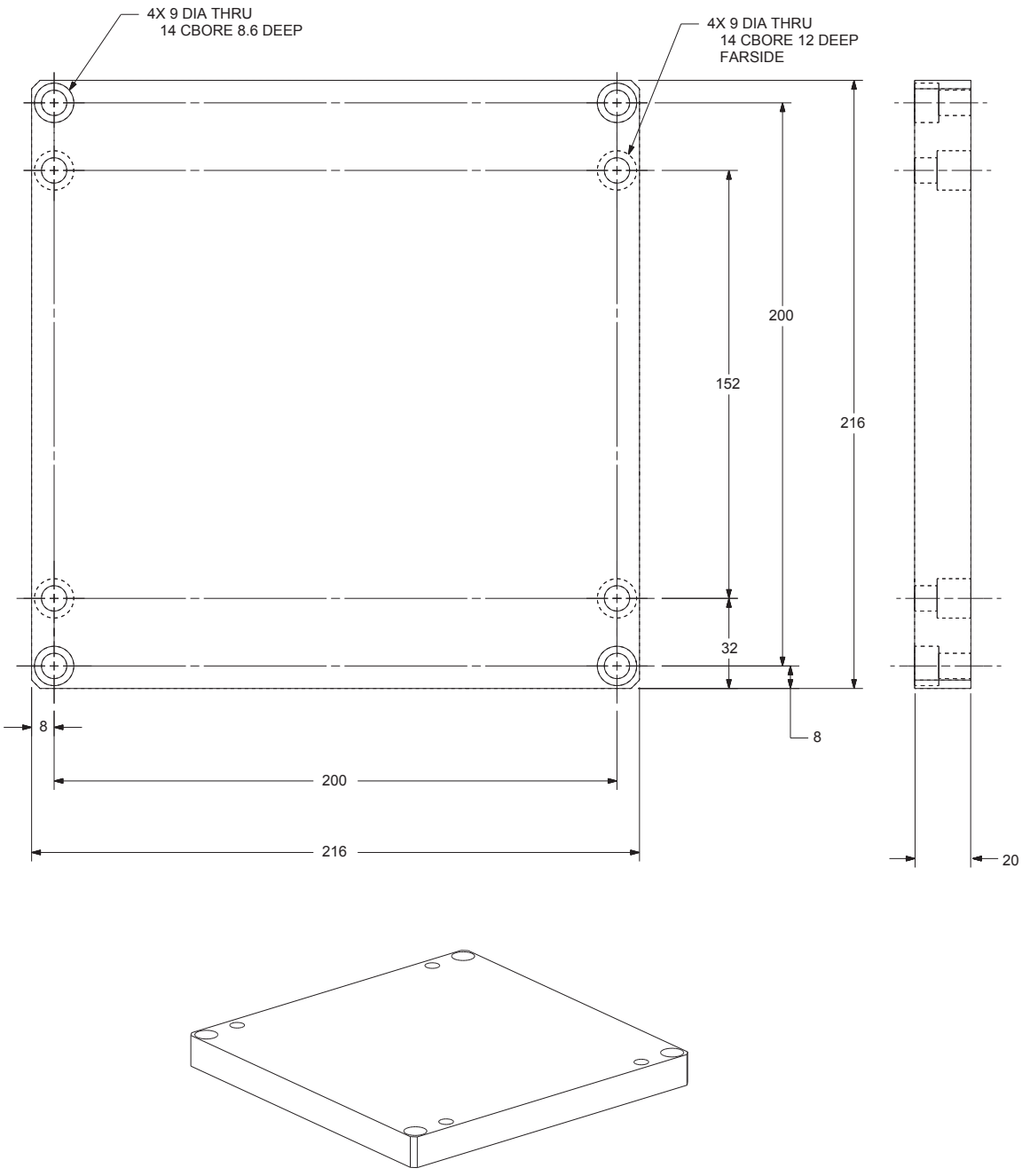


Figure 10-66. R-H Mounting Plate, P/N 90400-01100

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R-M Mounting Plate

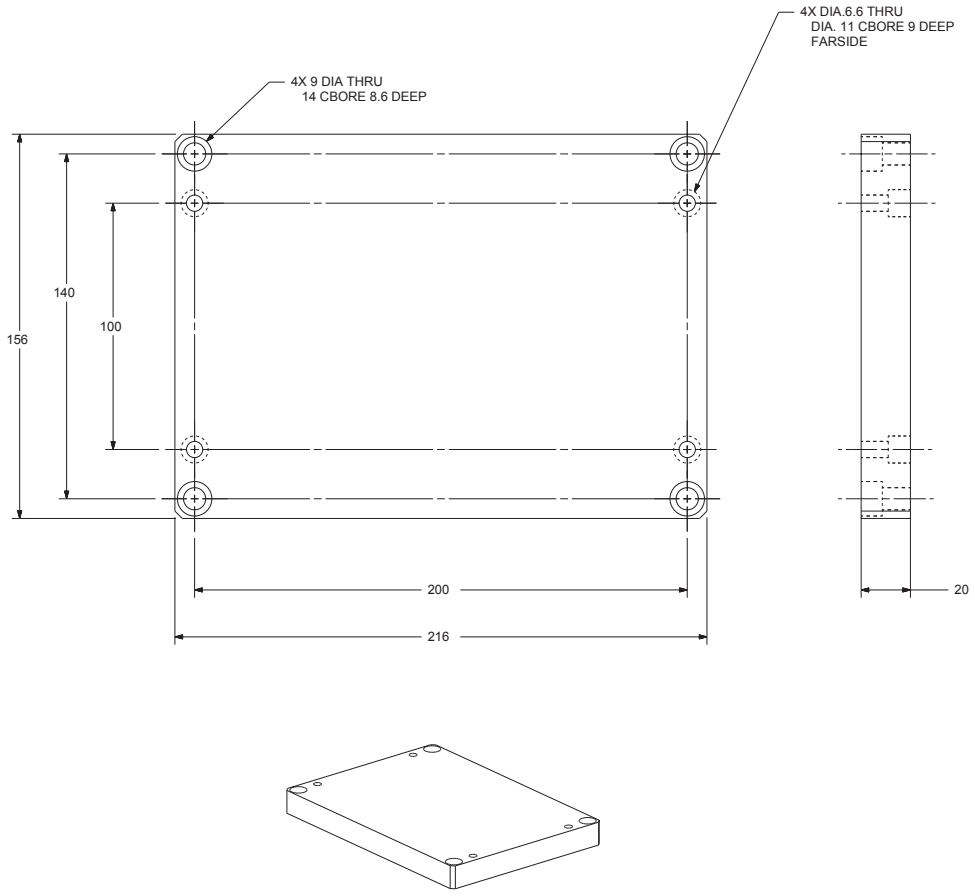


Figure 10-67. R-M Mounting Plate, P/N 90400-01200

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R-Sz Mounting Plate

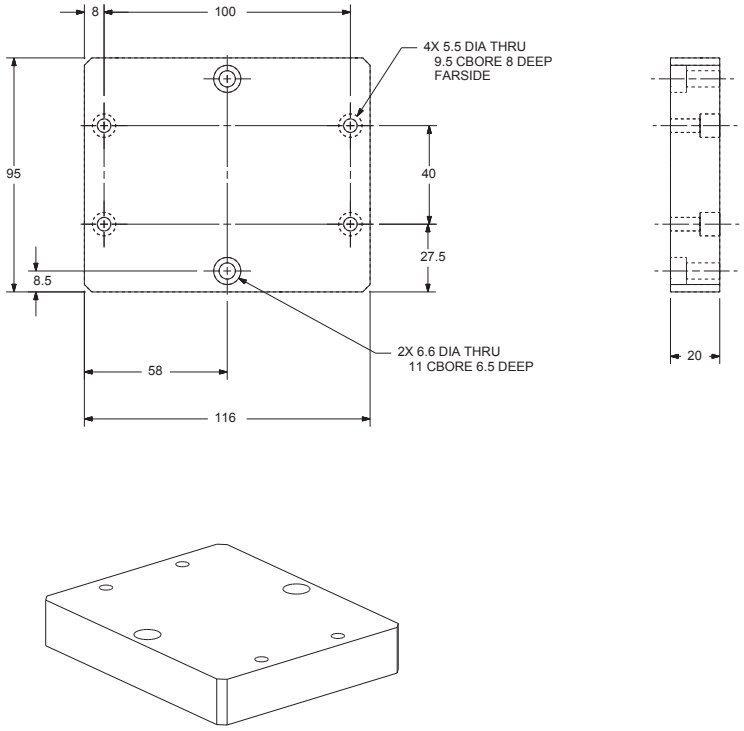


Figure 10-68. R-Sz Mounting Plate, P/N 90400-01300

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V-H Mounting Plate

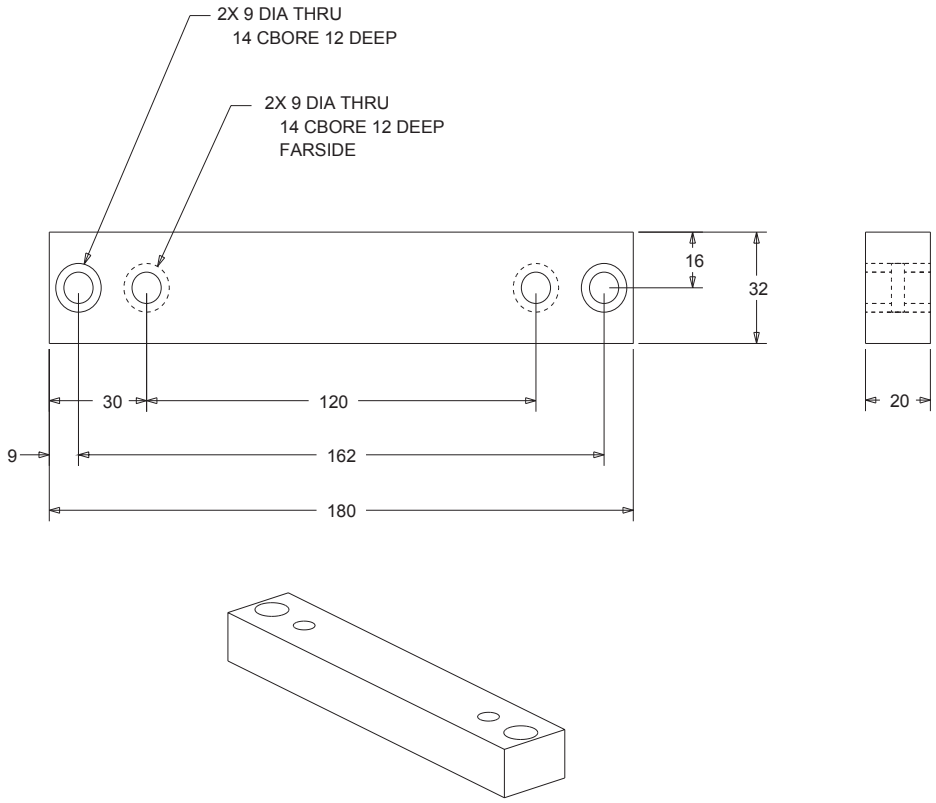


Figure 10-69. V-H Mounting Plate, P/N 90404-07100

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V-M Mounting Plate

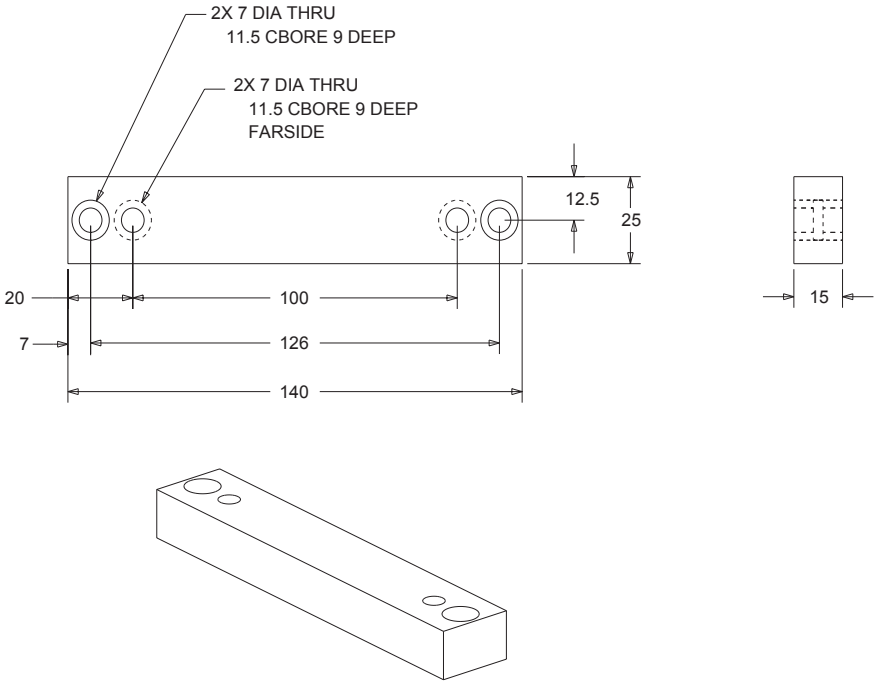


Figure 10-70. V-M Mounting Plate, P/N 90404-07200

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R-GHH Combining Bracket

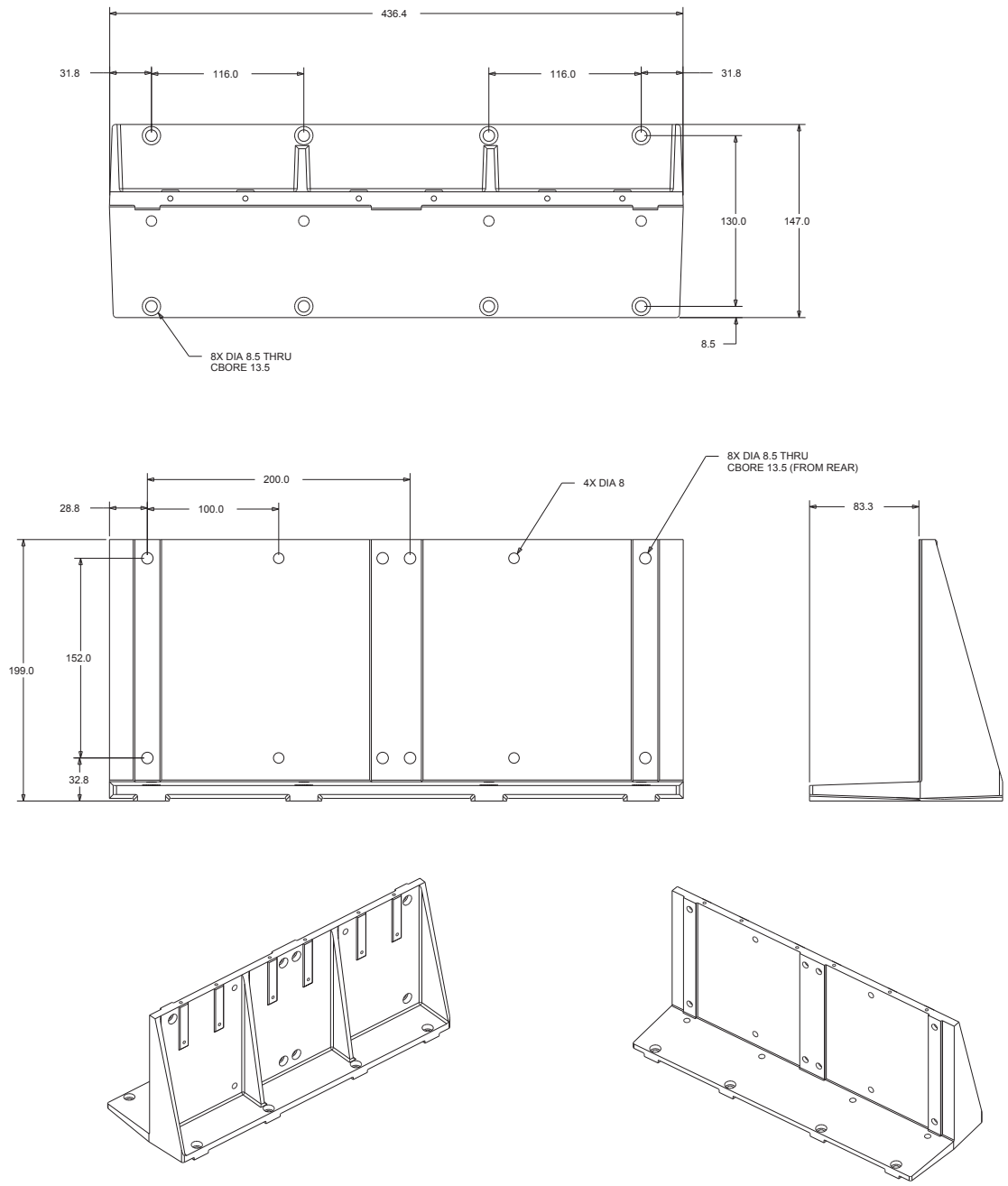


Figure 10-71. R-GHH Combining Bracket, P/N 40405-05000

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R-GHM Combining Bracket

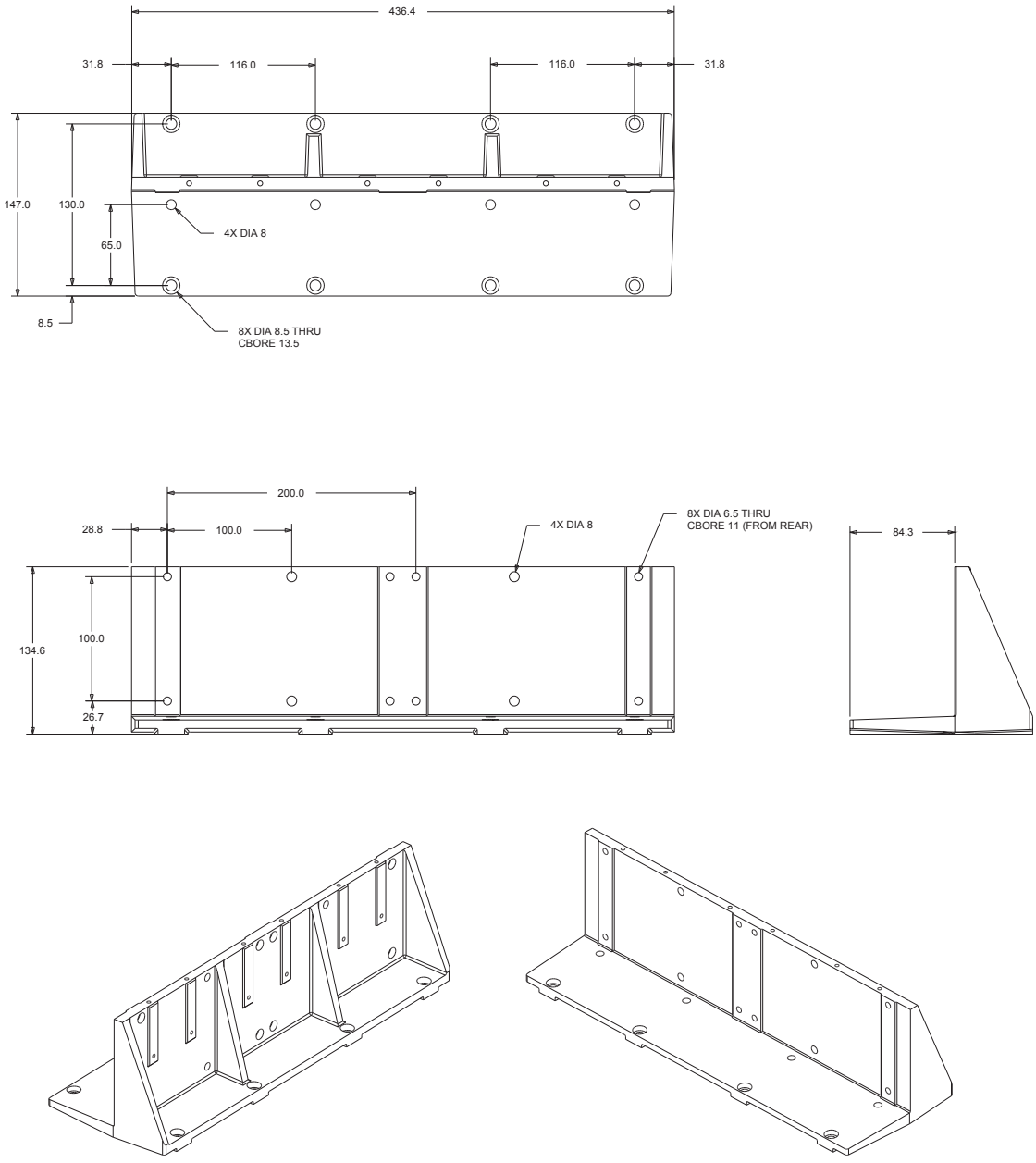


Figure 10-72. R-GHM Combining Bracket, P/N 40405-05002

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R-GMS Combining Bracket

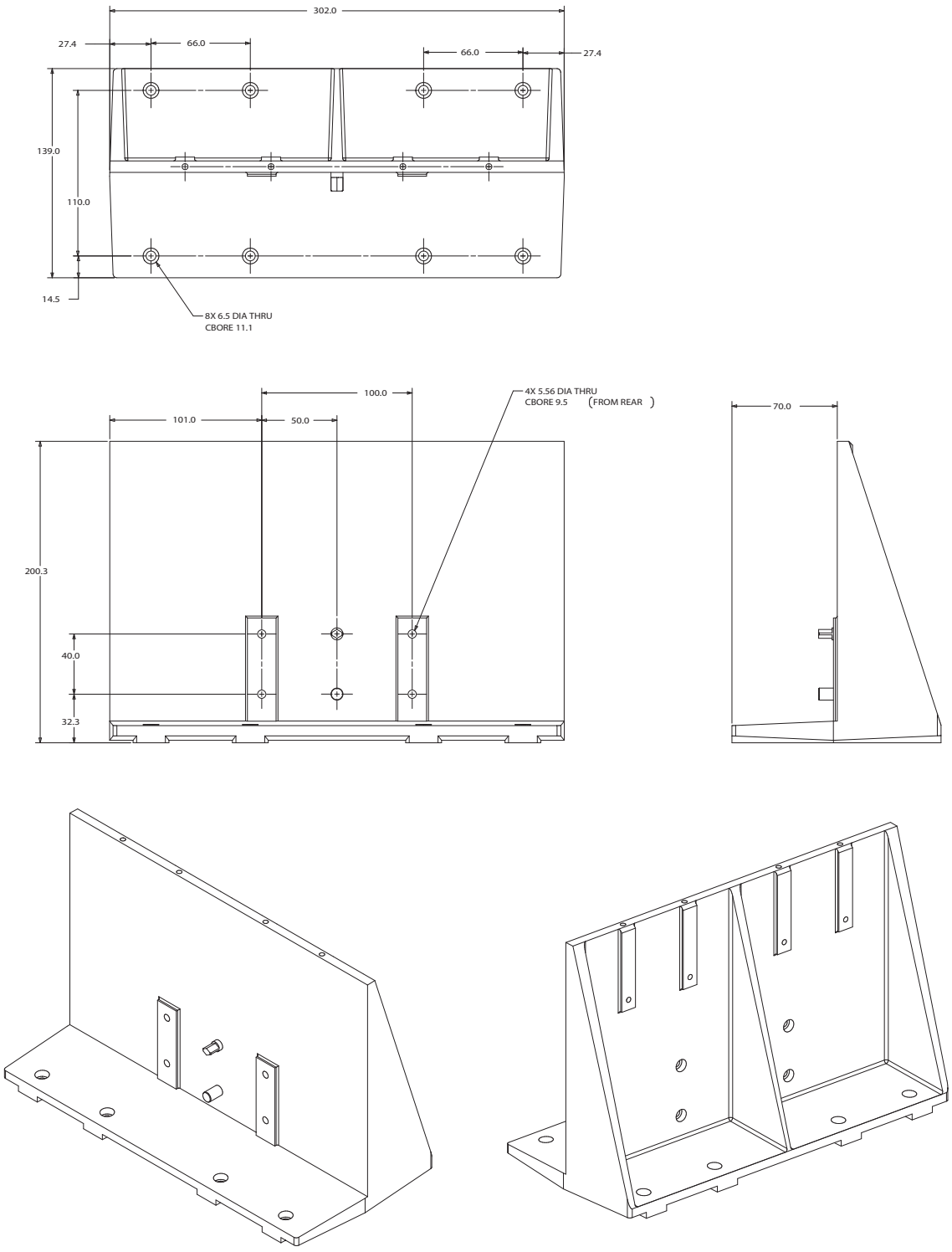


Figure 10-73. R-GMS Combining Bracket, P/N 40405-05020

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R-DHM Combining Bracket

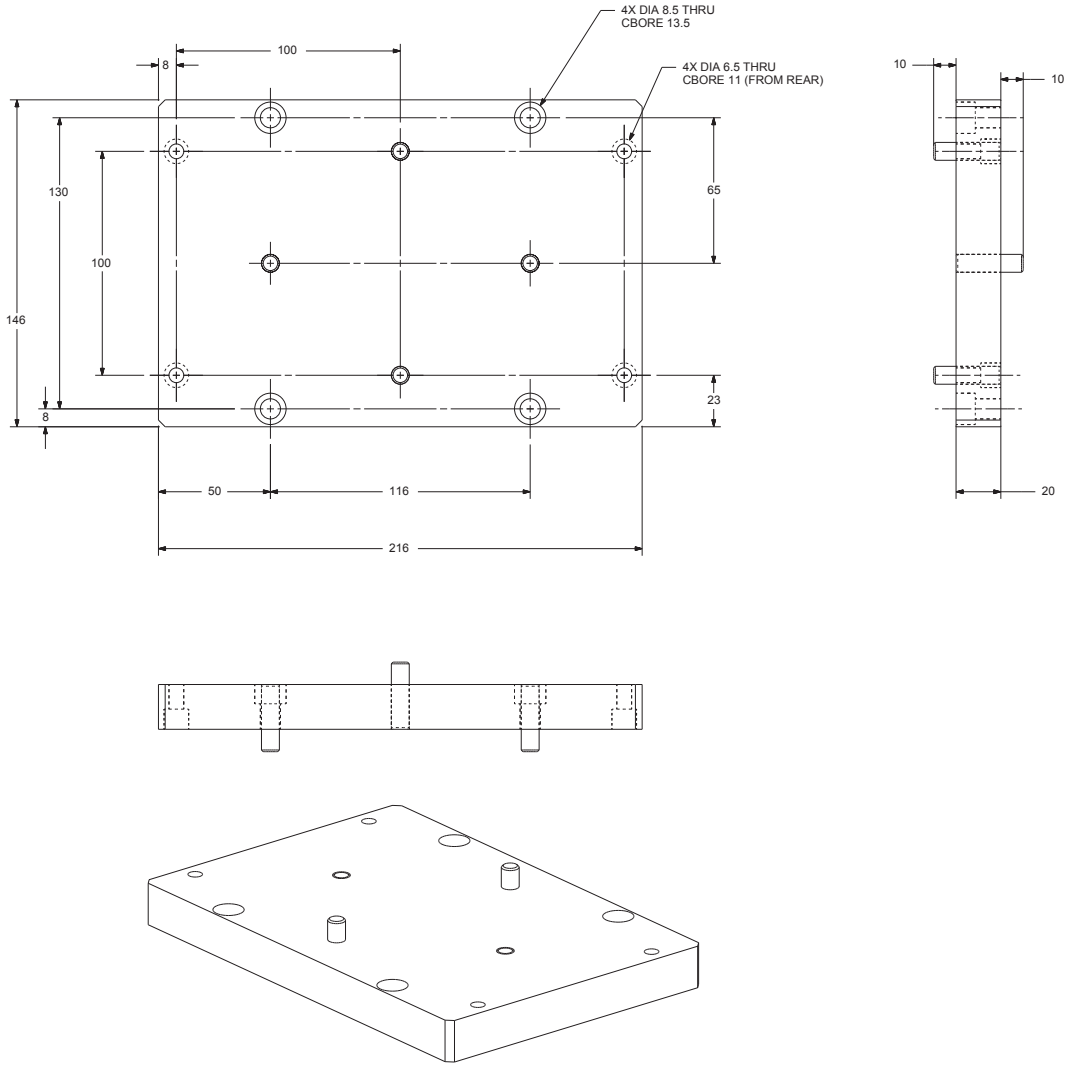


Figure 10-74. R-DHM Combining Bracket, P/N 90400-05004

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R-DMS Combining Bracket

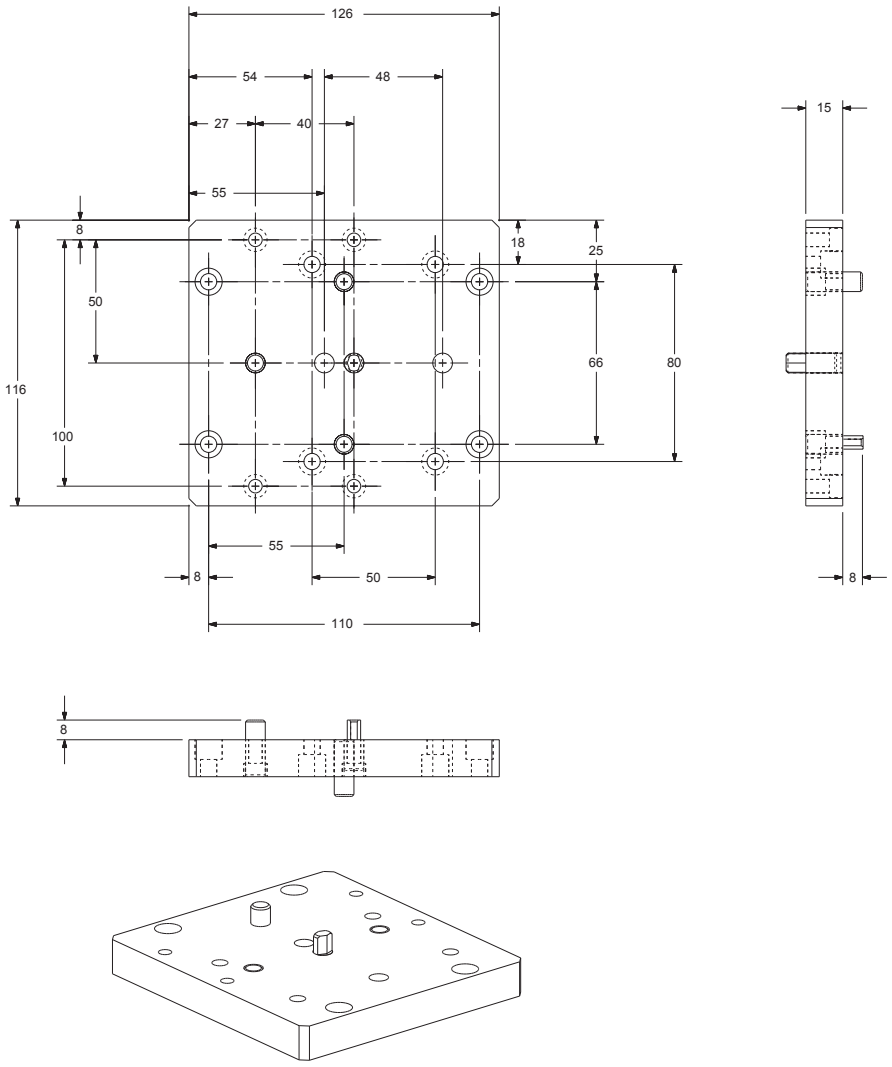


Figure 10-75. R-DMS Combining Bracket, P/N 90400-05006

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R-XHH Combining Bracket

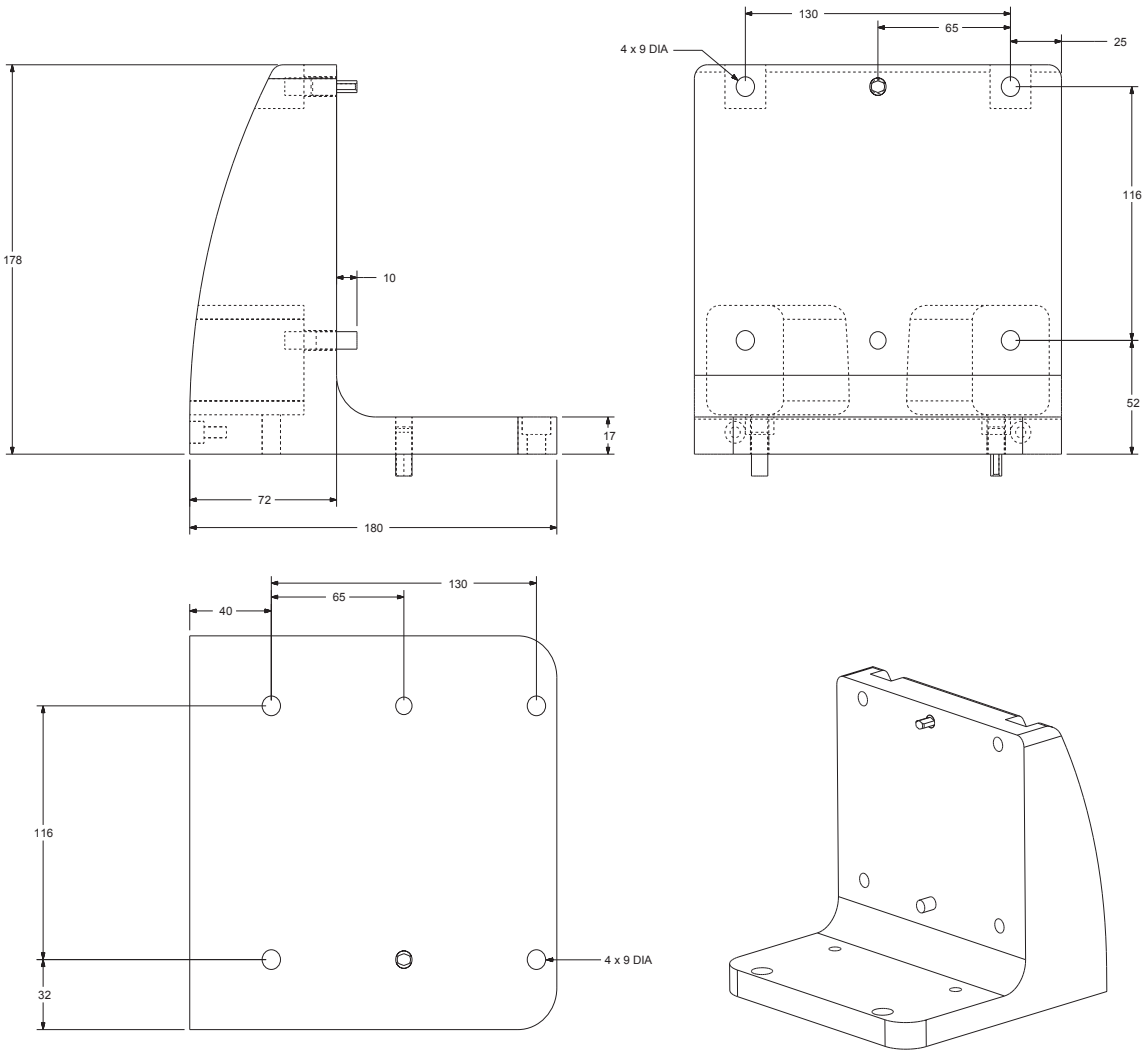


Figure 10-76. R-XHH Combining Bracket, P/N 90400-05008

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R-XHM Combining Bracket

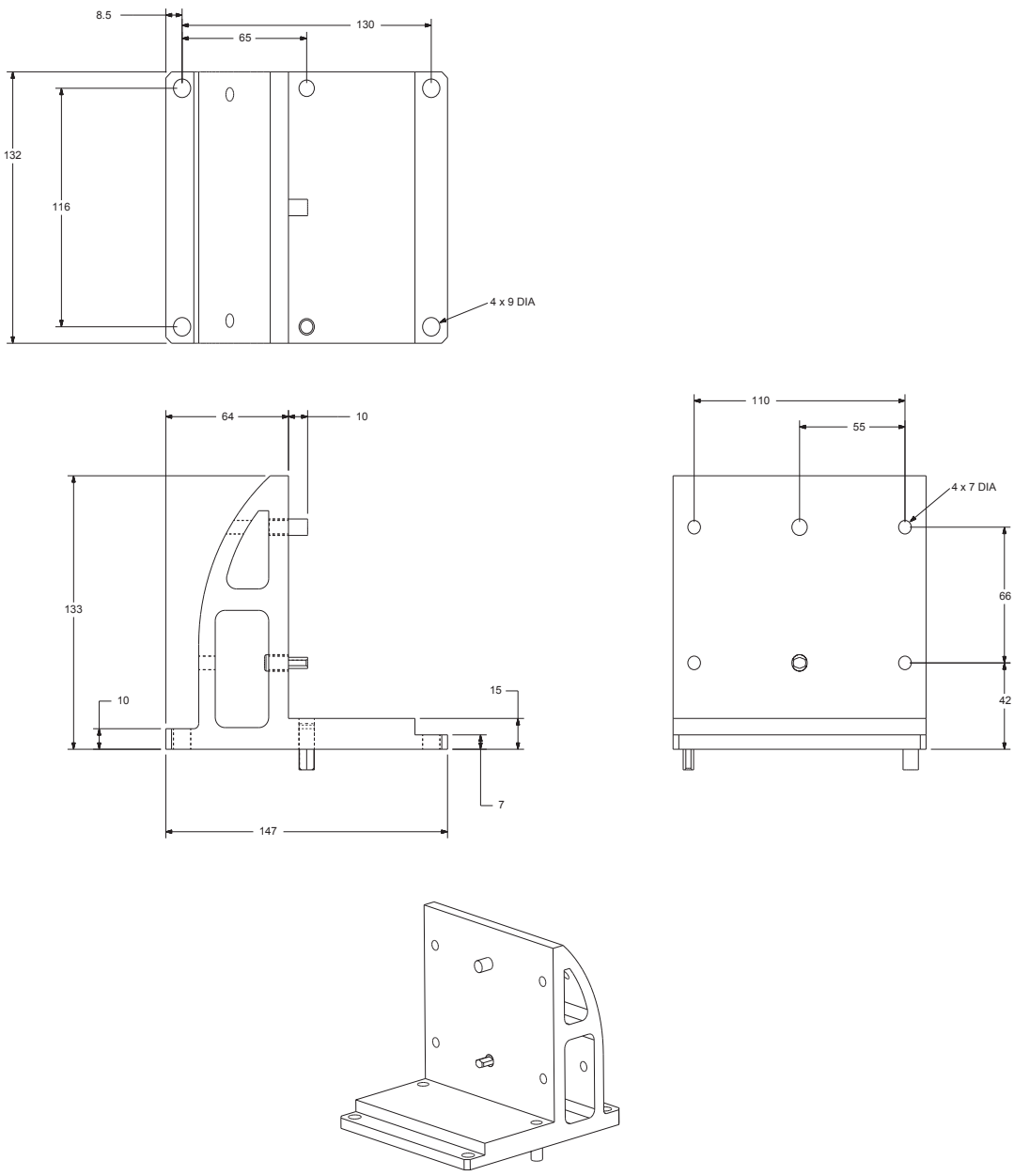


Figure 10-77. R-XHM Combining Bracket, P/N 90400-05009

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V-GHH Combining Bracket

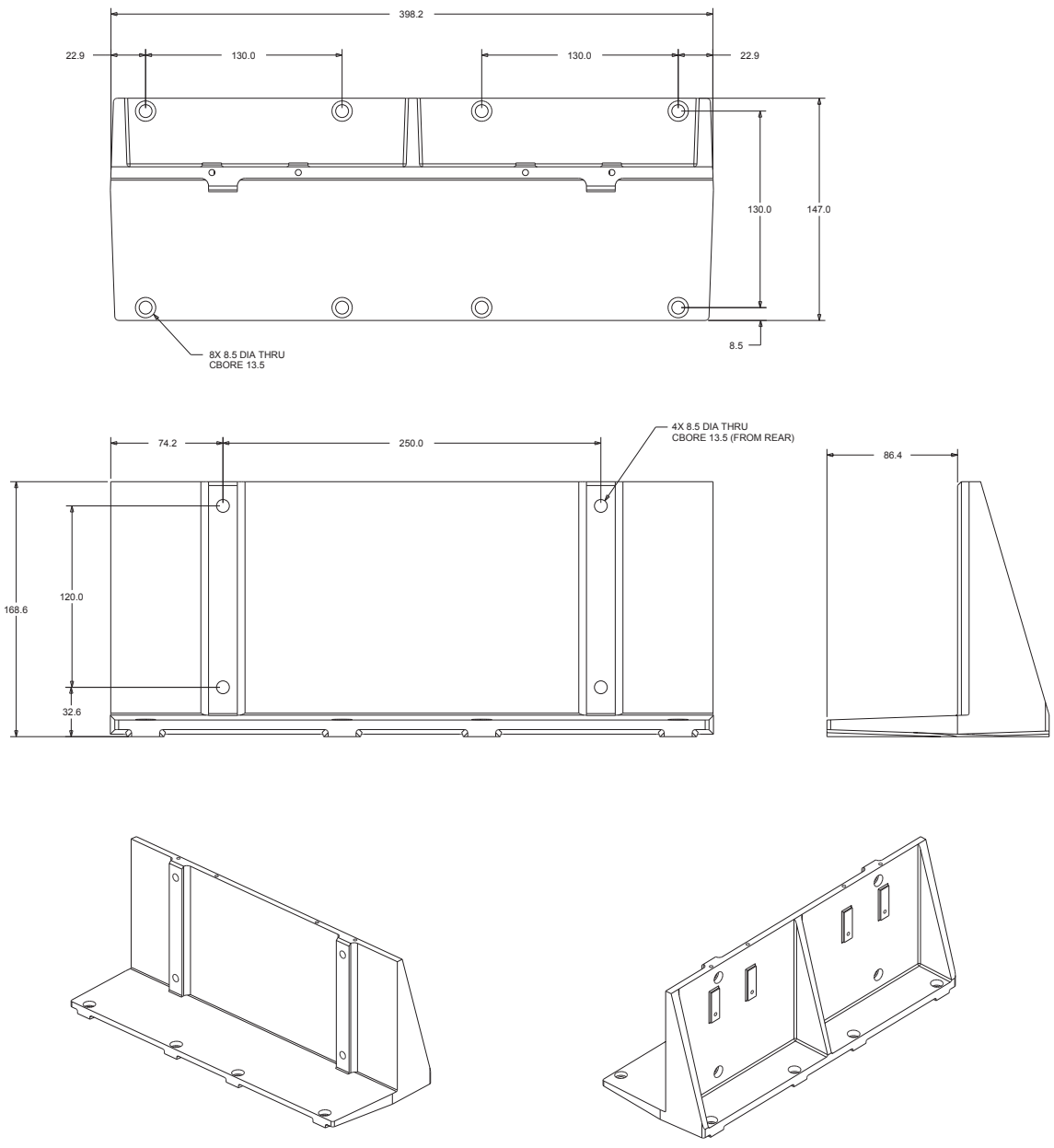


Figure 10-78. V-GHH Combining Bracket, P/N 40404-07000

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V-GHM Combining Bracket

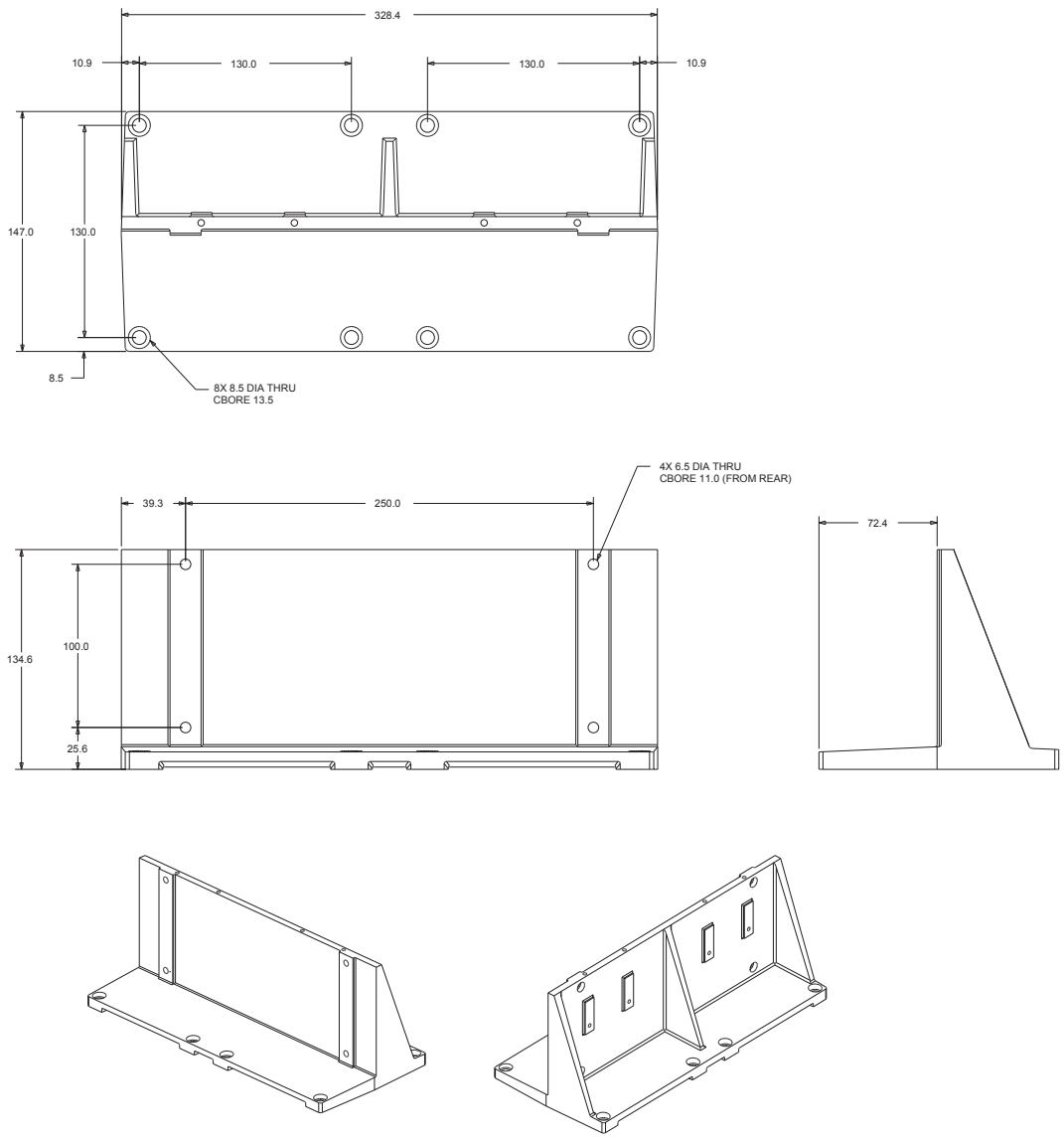


Figure 10-79. V-GHM Combining Bracket, P/N 40404-07001

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V-DHM Combining Bracket

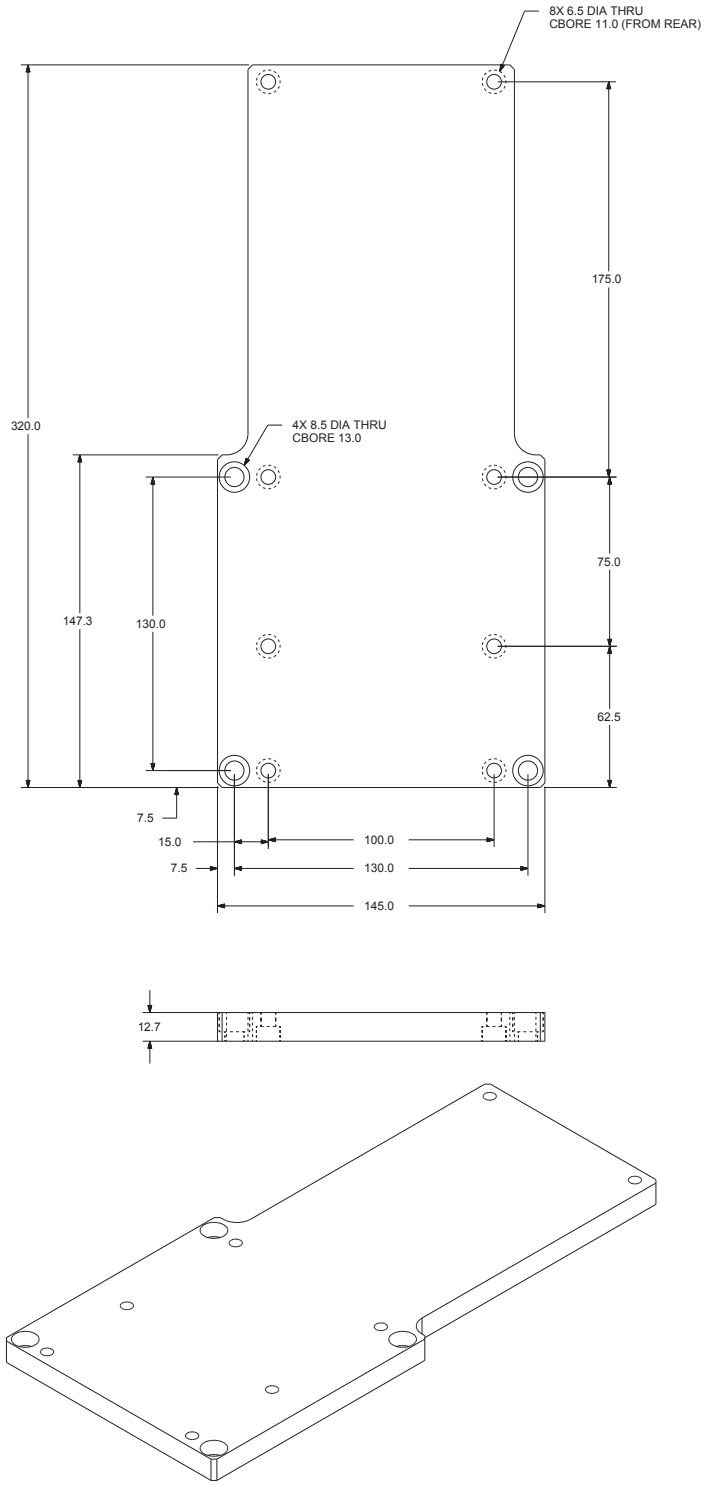


Figure 10-80. V-DHM Combining Bracket, P/N 40404-07002

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Gantry Support Bracket, R-M

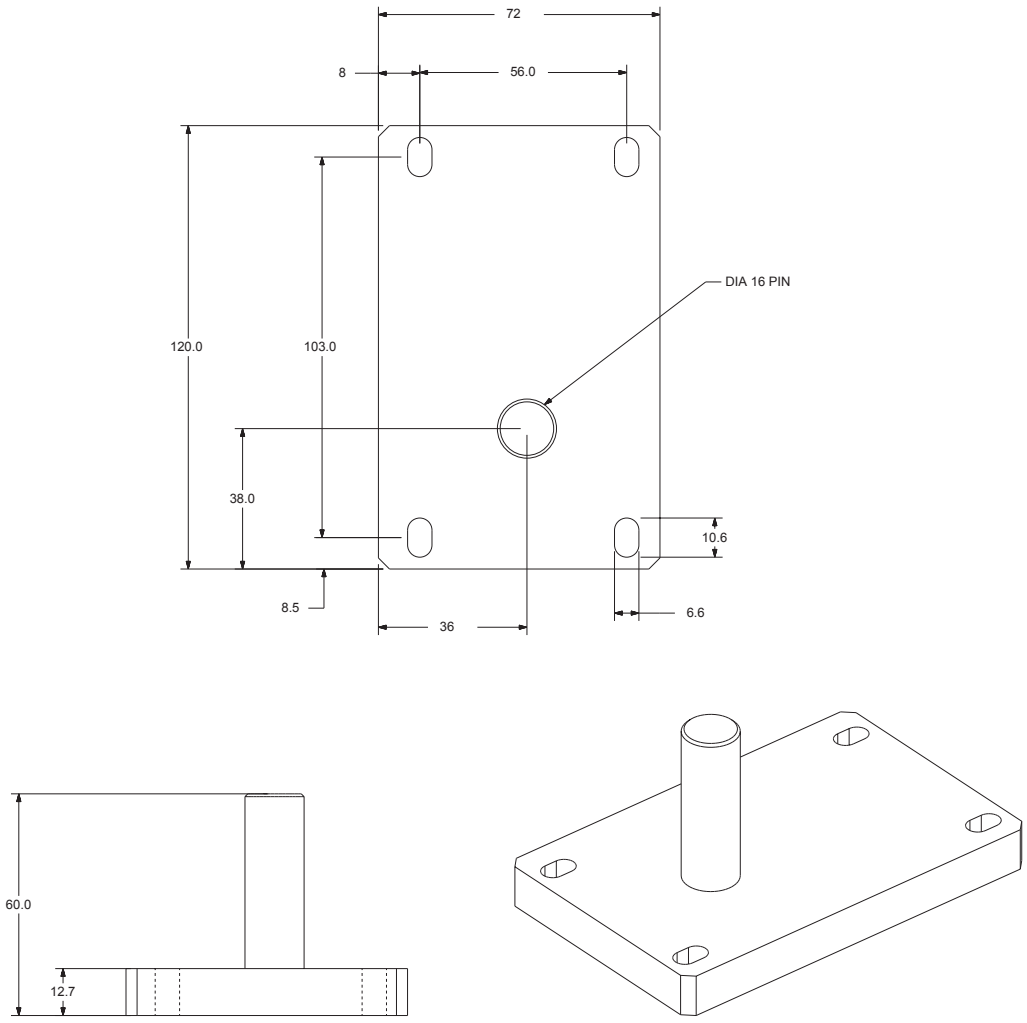


Figure 10-81. Gantry Support Bracket, R-M, P/N 40405-04100

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Gantry Support Bracket, R-H

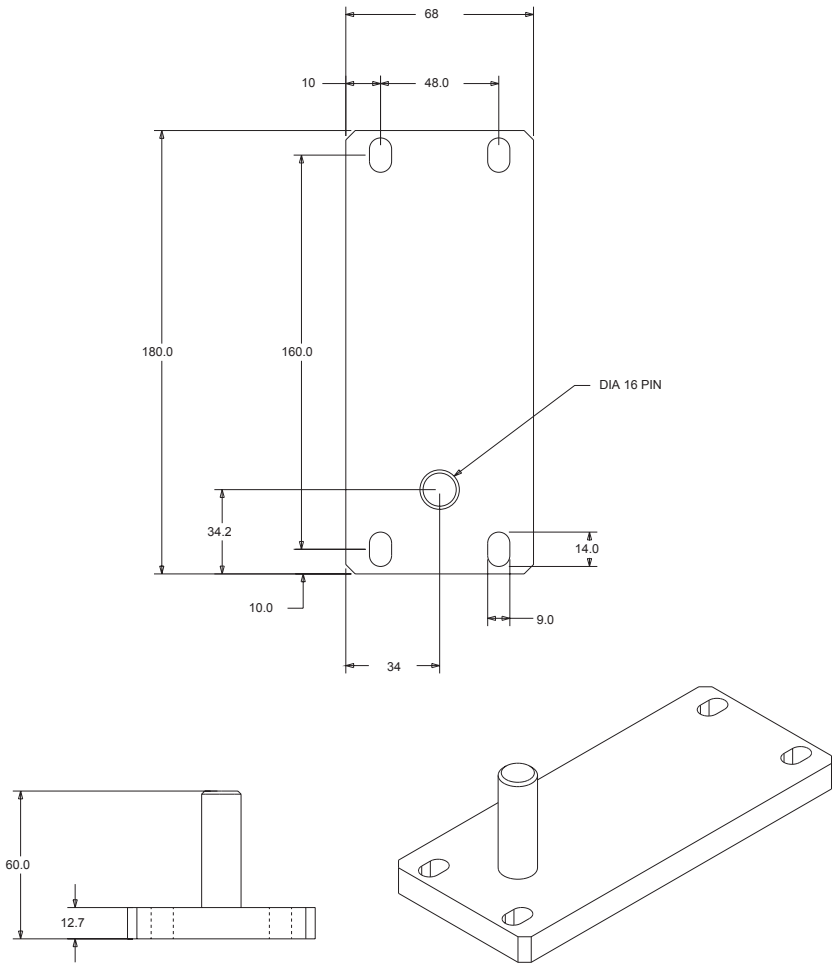


Figure 10-82. Gantry Support Bracket, R-H, P/N 40405-04200

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Configuration Options A

A.1 Introduction

This appendix describes how to use some of the configuration options available for the Adept SmartModules systems, including how to change from a "right-hand" configuration to a "left-hand" configuration.

Mounting Screw Torque Specifications

When mounting screws used to install modules, mounting plates, and other components, apply the amount of torque specified in **Table 3-1 on page 43** and **Table 3-2 on page 44**.

A.2 Changing Configuration Orientations

Most R-Series and V-Series SmartModules can be installed in either "right-hand" or "left-hand" configurations. In a right-hand configuration, the second module (typically the Y-axis) extends out to the right of the base module (typically the X-axis); in a left-hand configuration, the second module extends to the left of the base module see **Figure A-1**.

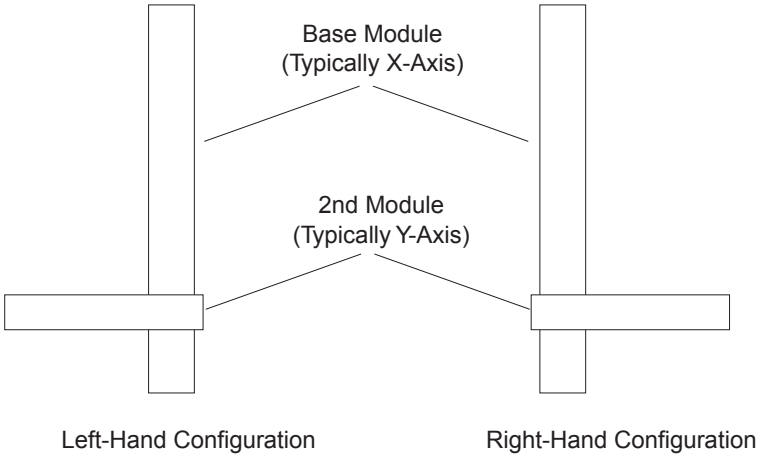


Figure A-1. Right-Hand/Left-Hand Configurations

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Typically, the instructions in this manual describe how to create right-hand configurations. The basic steps for creating a left-hand configuration are:

- Move the module cables to the other side of the module (by default, the cables are on the side for right-hand configuration).
- If the configuration requires the installation of alignment pins, install the alignment pins for a left-hand configuration.
- Assemble the components for a left-hand configuration.

Moving Module Cables to Other Side of Module

In some cases, it might be necessary to move the module cables from their original position to the opposite side of the module (to change the orientation of the system, for example). Perform the steps below to move the module cables to the other side.

1. Remove the screws (four or six, depending on the module type) on the motor end of the module.
2. Remove the cover over the cable exit hole on the other side of the module.
3. Re-route the cables inside the module to the exit hole on the other side of the module.
4. Place the cover over the exit hole from which the cables previously exited.
5. Replace the module end cap and the screws. Tighten the screws.

Installing Alignment Pins for Left-Hand Configurations

Certain configurations, such as the R-G(HH), R-G(HM), R-P(HHMz) R-Pq(HHMz), R-P(HMSz), and R-Pq(HMSz), provide user-installed alignment pins to facilitate installation. Typically, the instructions in this manual describe how to install the alignment pins to create a right-hand configuration. To create a left-hand configuration, simply install the alignment pins on the other side (see the system-specific section in this manual for instructions on installing alignment pins). The illustrations below show how to install the alignment pins on an R-GHH combining bracket to create a left-hand configuration.

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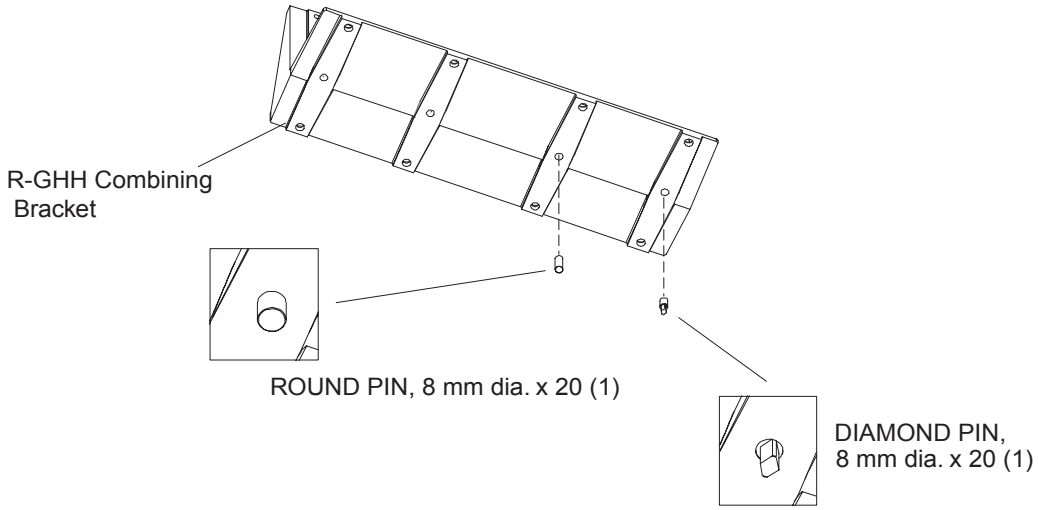


Figure A-2. Installing Alignment Pins on R-GHH Bracket Bottom for Left-Hand Configuration

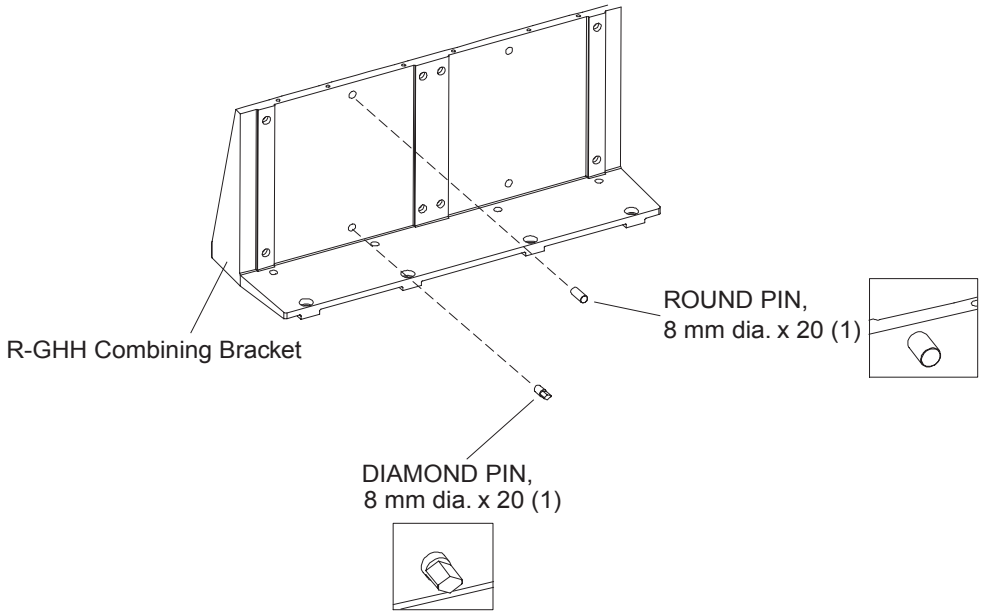


Figure A-3. Installing Alignment Pins on R-GHH Bracket Side for Left-Hand Configuration

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Assembling Components for a Left-Hand Configuration

As an example of how to assemble the components for a left-hand configuration, look at **Figure A-4**, which shows a right-hand R-X(HM) configuration and the instructions below.

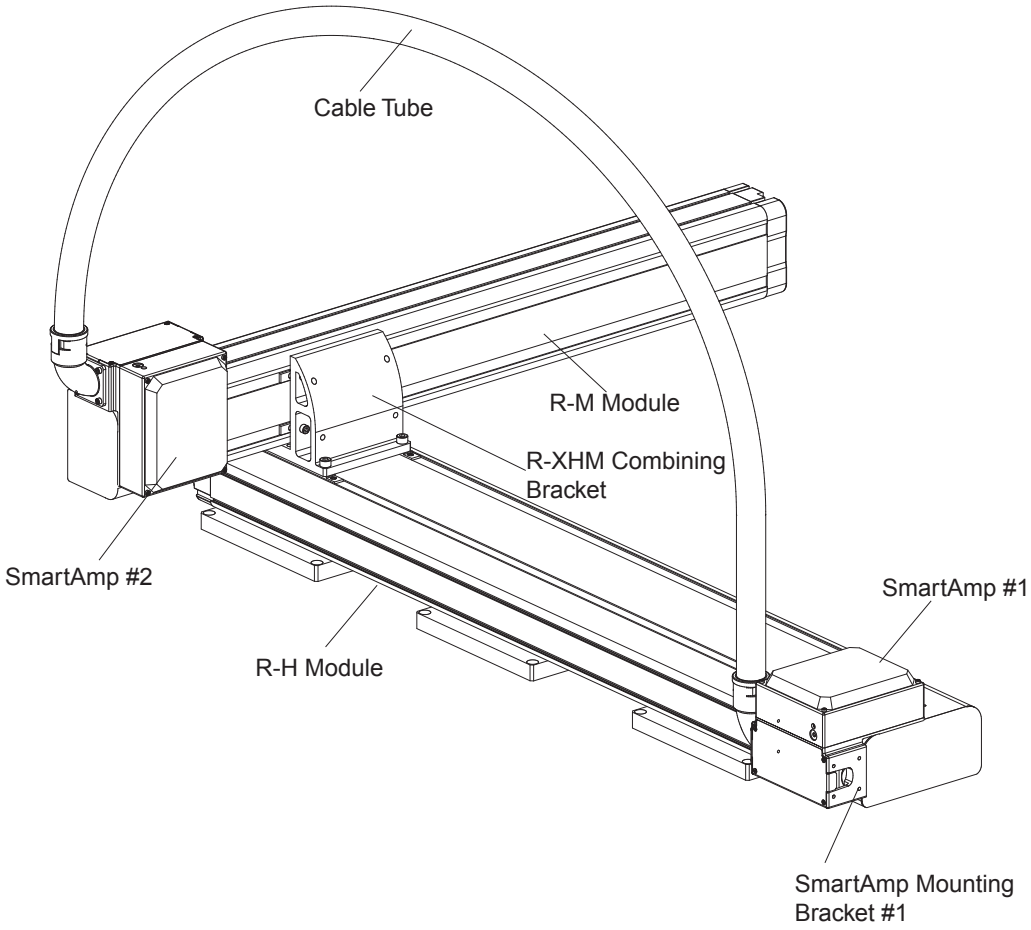


Figure A-4. R-X(HM): Right-Hand Configuration

To create a left-hand configuration, do the following:

1. Move the module cables on the R-H module to the other side (on the right); move the module cables for the R-M module to the other side (on the bottom). (See **Figure A-4** for reference.)
2. Mount SmartAmp mounting bracket #1 and Smartamp #1 on the right side of the R-H module as shown in **Figure A-5 on page 467**.
3. Mount the R-XHM combining bracket in the same position as shown in **Figure A-5 on page 467**.
4. Rotate the R-M module 180 degrees and mount it on the R-XHM combining bracket as shown in **Figure A-5 on page 467**.
5. Install the screws to secure the R-XHM combining bracket to the R-M module's slider.

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6. In this configuration, the R-M module's motor is on the right side. Therefore, mount SmartAmp mounting bracket #2 and SmartAmp #2 on the right side. as shown in **Figure A-5**.
7. Complete the rest of the installation as described in **section 4.11 on page 170**.

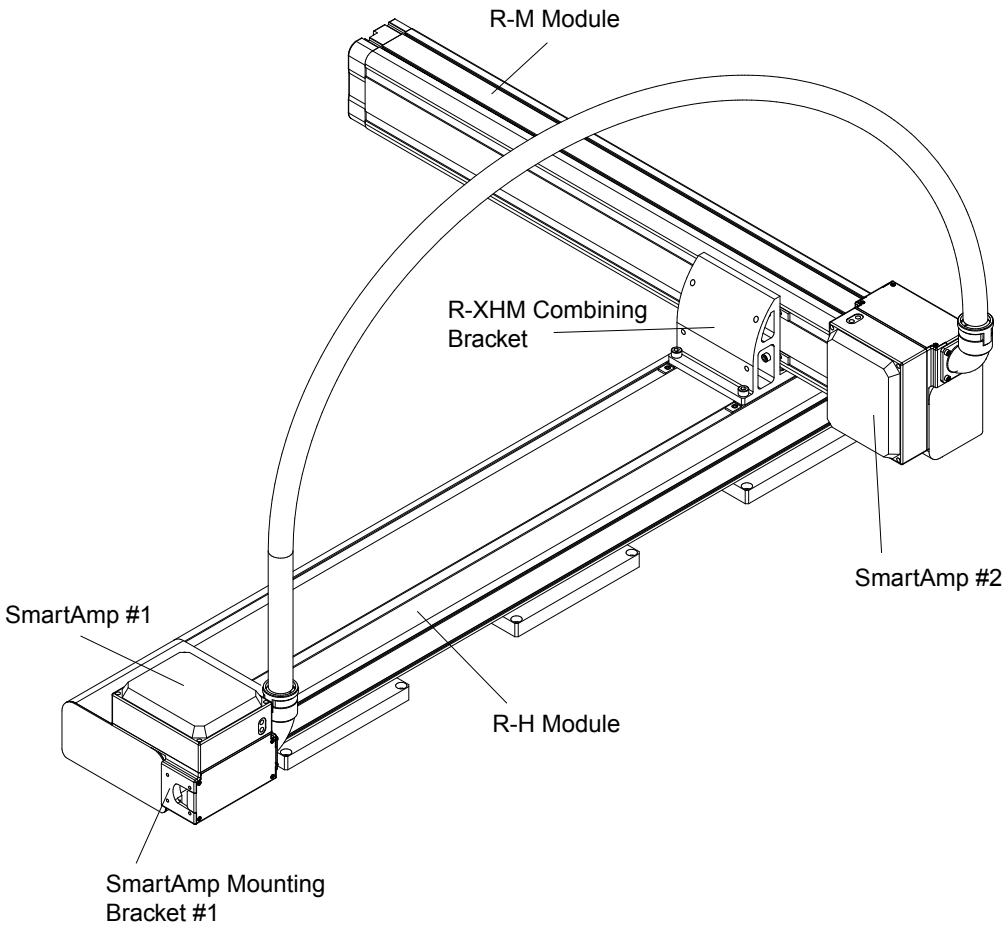


Figure A-5. R-X(HM): Left-Hand Configuration

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