Diamond Engineering
Automated Measurement Systems

Installation and Configuration Guide

FSM-5 Full Spherical Mount

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Diamond Engineering
Automated Measurement Systems

x100 Series - System Introduction

Overview

The FSM-5 Full Spherical Mount enables your x100 Series positioner to perform unobstructed, phase-centered, spherical measurements of small and medium-sized antennas. This guide will assist you with the installation of your FSM attachment onto your positioner as well as proper configuration of your DAMS Antenna Measurement Studio software.

When your FSM is fully installed and configured, the azimuth axis of your x100 Series positioner will be the elevation axis while the FSM mount will be the new azimuth axis.

Package Contents

- FSM-5 (DC to 40 GHz) Full Spherical Mount
- USB controller
- 24V power supply
- USB cable
- FSM control cable
- Hardware for mounting FSM to x100 Series mounting plates
- AUT mounting hardware
- Tools

FSM-5 Installation

Hardware Setup and Mounting

1. Unpack all parts and connect the power supply to the controller.
2. Ensure the x100 Series positioner is level and the circular mounting plate is attached.
3. Position the FSM onto the 24" plate ensuring the back of the FSM mount is opposite of the square metal plate on the x100 Series hub. *(See below)*
4. Fasten the FSM to plate in desired position using included hardware.
5. Connect blue SMA cable to top of x100 Series positioner.
6. Attach included cable from back of FSM mount to horizontal port located on controller box. *(See below)*

FSM Attachment
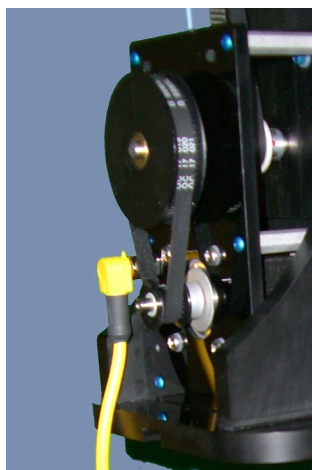
FSM Control Cable

Controller Interface

Mounting Configurations

FSM-5 Mounting Examples

To make proper spherical measurements, you must phase center the antenna over the rotation axis. The examples below show the various positions it can be configured in, and each configuration allows a range of movement with precise centering.
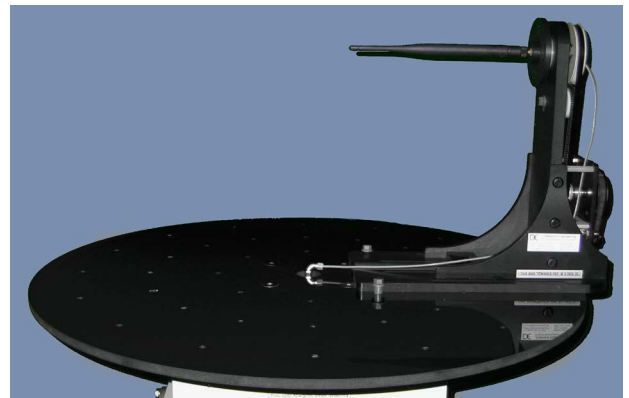

CENTER MOUNT
This configuration is shown using the T-shaped block in addition to the side flange bolts to secure the FSM to the plate. This position is ideal for very short antennas.

MID MOUNT
This configuration also uses the T-shaped block plus the side flange bolts to secure the FSM to the plate. This position provides a fairly wide centering range.

EDGE MOUNT
This configuration uses only the T-shaped block and requires the use of an SMA extension cable. For very tall antennas it may be necessary to use a support mechanism located opposite of the turntable.

Controller & Software Installation

Controller Installation (DAMS x100 Series)

1. Ensure the x100 positioner is already installed and connected.

2. Open device manager (Control Panel → System → Hardware Tab → Device Manager). Note which COM port the x100 positioner is currently configured on.

3. Connect the USB cable from the controller to the PC. The PC should find new hardware.

4. 🛑 **IMPORTANT:**   Do NOT check Windows update for latest drivers, and instead select "Not at this time", and then press "Next".

5. Choose a location for Windows to look for the driver and specify c:\dams\driver. (Windows will say the driver is not certified, this is OK), press "Next" and the installation should finish.

6. Windows will find new hardware again, and repeat steps 4 and 5.

7. Return to the device manager (step 2) and note the new COM port that has appeared.

Software Configuration (DAMS x100 Series)

⚠️ **NOTE:**   If you are upgrading your system, follow these instructions below before proceeding:

1. Start the DAMS Software and click "positioner settings"

2. Place a check mark in the "Full Spherical Mount" box , you will see a place to select a COM port appear in the x100 settings area, select the port you noted from device manager.

3. Press the "Save" button then press "QUIT" to exit and save your changes.

Software Upgrade

When upgrading an existing x100 installation with the FSM:

1. Make a backup of c:\dams before continuing.

2. Install the CD that was included with the FSM

3. Start the software and press the "import configuration" button to import your old configuration including license key.

4. If your old license was "Standard" press the "enter license key" button to enter the license key found on the White CD envelope that was shipped to you with the FSM, it should be a "Professional License"

5. Restart the DAMS software it should now be at the latest revision and show that a professional license key is in use.

Operating the FSM-5

Operation Instructions

As noted earlier in this guide, the FSM mount is now the azimuth axis of the measurement system and the turntable portion of the positioner is the elevation axis. General operation of the system is nearly identical to the standard x100 system. Any minor differences are described below:

90 Degree turntable offset
When the DAMS software is configured for the FSM mount, you will notice the x100 turntable's 0 position is now 90 degrees CW from the original 0 position. This is to allow the FSM to travel 90 degrees in both directions from the 0 degrees elevation. If the mounting of the FSM is correct, it will resemble the images at the bottom of this page.

Zeroing the Axis
x100 positioners have a static 0 deg. Point that does not change due to hardware limits, the FSM mount does NOT have limitations therefore you can press the "set zero position" in the software and the current FSM position will become 0 Degrees AZ.

Resolution
x100 positioners have accuracies of 0.10 degrees/measurement and 0.25 degrees/measurement. The FSM mount has a default resolution of 0.125 degrees/step. This can be enhanced to 0.0625 degrees/step by enabling half/stepping

FSM Position Examples

-90 Degrees Elevation   **0 Degrees Elevation**   **+90 Degrees Elevation**

The images above depict proper positioning of the system with the camera location as the reference antenna location.

Troubleshooting

1. Check all connections and ensure the controller and power supply are on.

2. Be sure you have the FSM selected, COM port set, and "Move and Measure" selected in the software.

3. Check to see that you have 2 DAMS related com ports showing in Device Manager

If you still cannot resolve the issue, please contact us.

x000 Series - System Introduction

Overview

The FSM-5 Full Spherical Mount enables your x000 series positioner to perform unobstructed, phase centered spherical measurements of small to medium sized antennas. This guide will cover the installation of the FSM onto your positioner and the configuration of the DAMS Antenna Measurement Studio software.

When the FSM is fully installed and configured the Turntable of your x000 positioner will be the Elevation axis and the FSM mount will be the new Azimuth Axis.

Package Contents

- FSM-5 DC-40 GHz. Full Spherical Mount
- Hardware for mounting FSM to x000 series mounting plates.
- ~~Turntable Support Struts~~   *(replaced by acrylic adapter plate)*
- Precision 90 deg. SMA elbow. (N/A) for 40GHz units
- AUT mounting hardware
- Precision tripod *(not shown)*
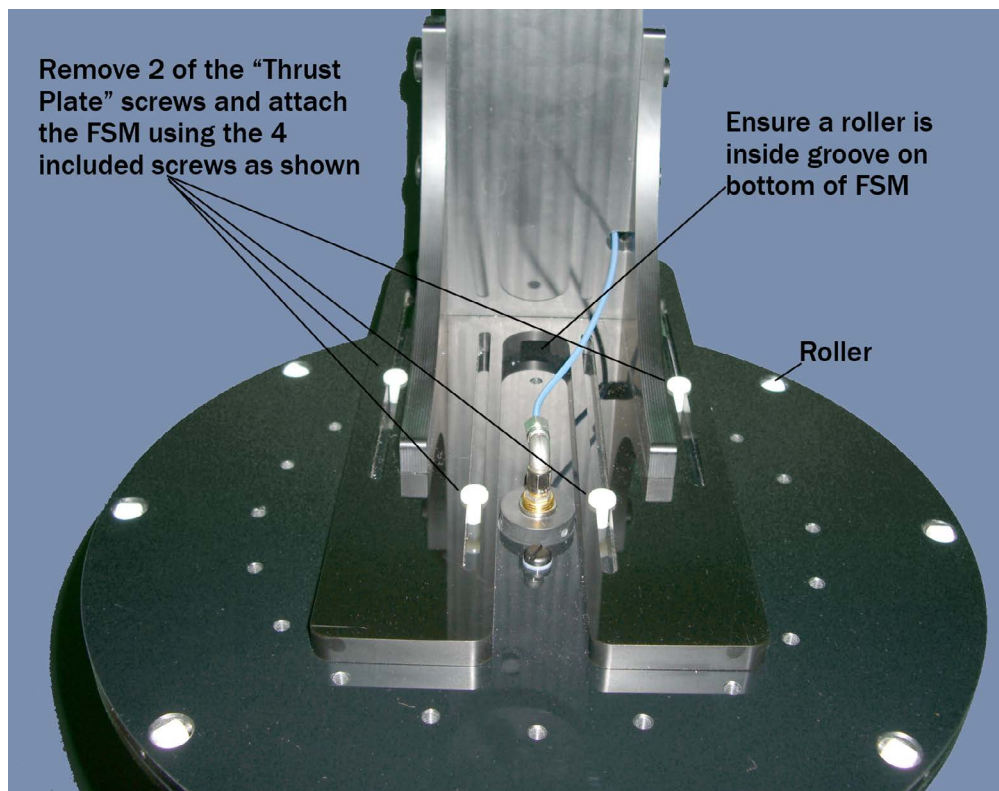- Tools *(not shown, only included with upgrade)*

FSM-5 Installation

Installation Instructions

🛑 **BEFORE YOU BEGIN:** Remove all cables and/or threaded rods from your x000 series positioner. *(A vertical actuator rod is only present if configured for azimuth tilt.)*

1. Disconnect all cables from your DAMS Positioner, and remove the tripod mounting plate from the bottom of the system.

2. Setup the wood tripod and extend the neck about 14"

3. Carefully thread the DAMS positioner onto the tripod.

4. Remove two of the Thrust Plate screws to Make room for the FSM Mount.

Remove 2 of the "Thrust Plate" screws and attach the FSM using the 4 included screws as shown

Ensure a roller is inside groove on bottom of FSM

Roller

5. Attach the FSM to the top of the DAMS positioner using the included screws as shown in the attached pictures. The mount is adjustable to allow you to "phase center" the antenna on the Elevation/Vertical Axis. See Mounting Configurations for examples.

6. Connect the black-striped cable to the FSM as shown in picture below.

FSM Control Cable

7. Connect the other end of the black-striped cable to the horizontal axis of the controller as shown below.

FSM Control Cable

Mounting Configurations

FSM-5 Mounting Examples

To make proper spherical measurements, you must phase center the antenna over the rotation axis. The examples below show the various positions it can be configured in, and each configuration allows a range of movement with precise centering.

⚠ **NOTE:** x100 Series is shown below, but the same principles apply to the x000 Series.

CENTER MOUNT
This configuration is shown using the T-shaped block in addition to the side flange bolts to secure the FSM to the plate. This position is ideal for very short antennas.

MID MOUNT
This configuration also uses the T-shaped block plus the side flange bolts to secure the FSM to the plate. This position provides a fairly wide centering range.
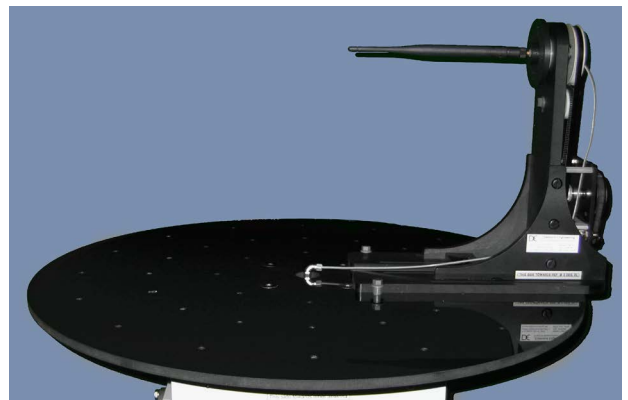
EDGE MOUNT
This configuration uses only the T-shaped block and requires the use of an SMA extension cable. For very tall antennas it may be necessary to use a support mechanism located opposite of the turntable.

Controller & Software Installation

Controller Installation

The controller should already be configured and working right out of the box. If it is not, please see the regular users manual.
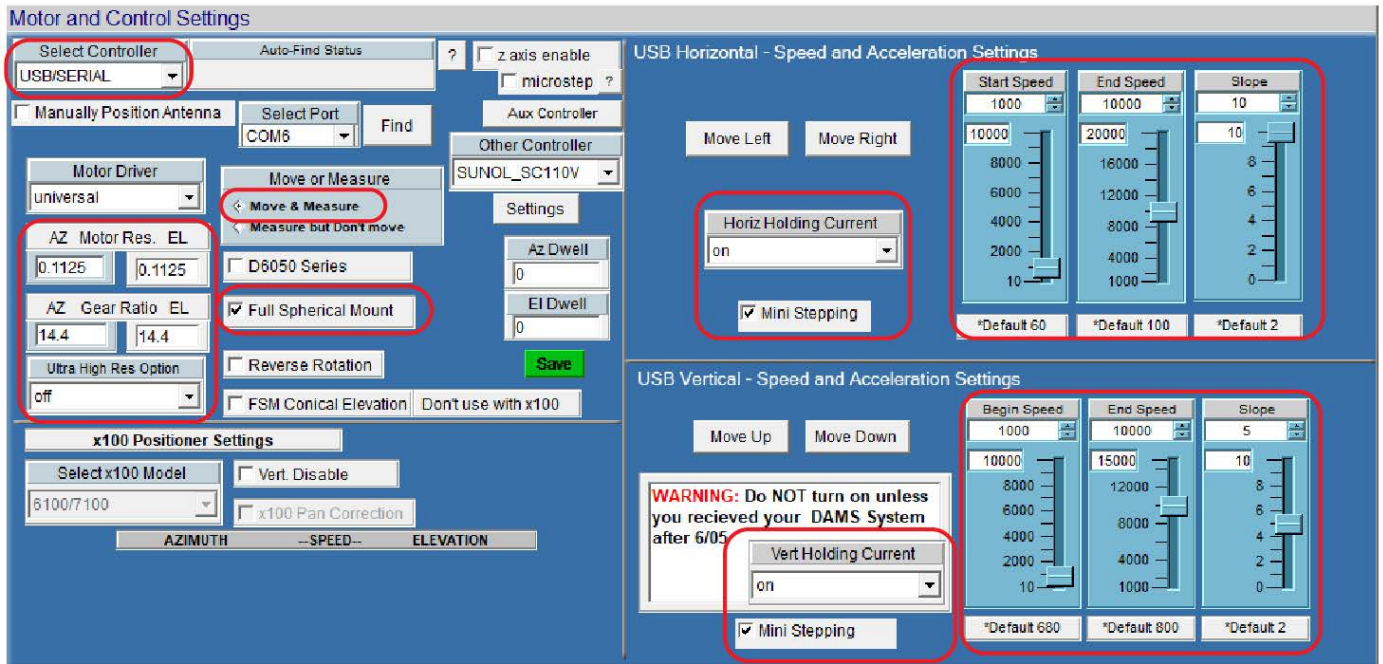
Software Configuration

⚠️ **NOTE:** If upgrading your system, please follow the instructions below before continuing.

1. Launch the DAMS Software and click "positioner settings"
2. Place a checkmark in the "Full Spherical Mount" box
3. **Enter all circled settings as shown in image below**
4. Press the green "Save" to exit positioner settings window.
5. Now being back at the main window, click the "QUIT" button to save changes and exit.
5. Restart the software. It should now show a picture of your positioner with the FSM attachment.

Software Upgrade

When upgrading an existing x000 installation with the FSM:

1. Make a backup of C:\DAMS
2. Insert the CD that was included with the FSM
3. Start the software and press the "import configuration" button (which also imports license key).
4. If your old license was "Standard", press the "enter license key" button to enter the license key found on the white CD envelope included with the FSM. This should be a "Professional License."
5. Restart the DAMS software. It should now be updated to the latest revision while showing a professional license key is now in use.

Operating the FSM-5

Operation Instructions

As noted earlier in this guide, the FSM mount is now the azimuth axis of the measurement system and the turntable portion of the positioner is the elevation axis. General operation of the system is nearly identical to the standard x000 system. Any minor differences are described below:

90 Degree turntable offset
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Zeroing the Axis
x000 series positioners do not have internal position tracking, to zero the positioner either manually move the positioner with the controller off or use the JOG buttons in the software to set the positioner to its 0 position, once this has been done press the "set as zero" to set the current position as 0,0 in the software.

Resolution
x000 positioners have accuracies of 0.125 degrees/measurement and 0.0625 degrees/measurement. The FSM mount has a default resolution of 0.125 degrees/step (but can be increased to 0.0625 degrees/step possible by enabling half-stepping).

FSM Position Examples

| -90 Degrees Elevation | 0 Degrees Elevation | +90 Degrees Elevation |

The images above depict proper positioning of the system with the camera location as the reference antenna location. *(x100 positioner shown)*

Troubleshooting

1. Check all connections and ensure the controller and power supply are on.

2. Be sure you have the FSM selected, COM port set, and "Move and Measure" selected in the software.

3. Check to see that you have 2 DAMS related com ports showing in Device Manager

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