

Janus Six Degree Of Freedom (6-DOF) Motion Platform

The Janus Motion Platform is a variant of the Stewart Table or Hexapod and can move in six degrees of freedom (pitch, roll, yaw, heave, surge and sway) as illustrated in Figure 1 below. It is the ideal tool for testing equipment designed to operate on a moving platform such as a boat, vehicle or aircraft.

PRINCIPLE: A turnkey hydraulic motion platform that can be installed indoors or outdoors (depending on the variant and application) and operated via a standard laptop or desktop PC.

DESCRIPTION: The Janus motion platform has many possible applications, as it can simulate the types of motion and forces found in real-world operating environments. One example is the motion experienced by equipment mounted on the deck of a vessel. Equipment intended for marine use may be mounted on the top frame of the platform to test its performance when subjected to the pitch, roll, yaw, heave, surge and sway motions expected during operation.

The top and bottom frames of the motion platform are connected by six hydraulic cylinders, each with an associated position sensor. The sensors monitor the extension of the cylinder rods and feed back the data to the position controller, ensuring that the movement demanded by the control system is accurately achieved.

The Janus Motion Platform is currently available in two variants, designed for different payload weights and size requirements; the larger 63 Series and the smaller 25 Series, however the design is readily scalable for other applications.

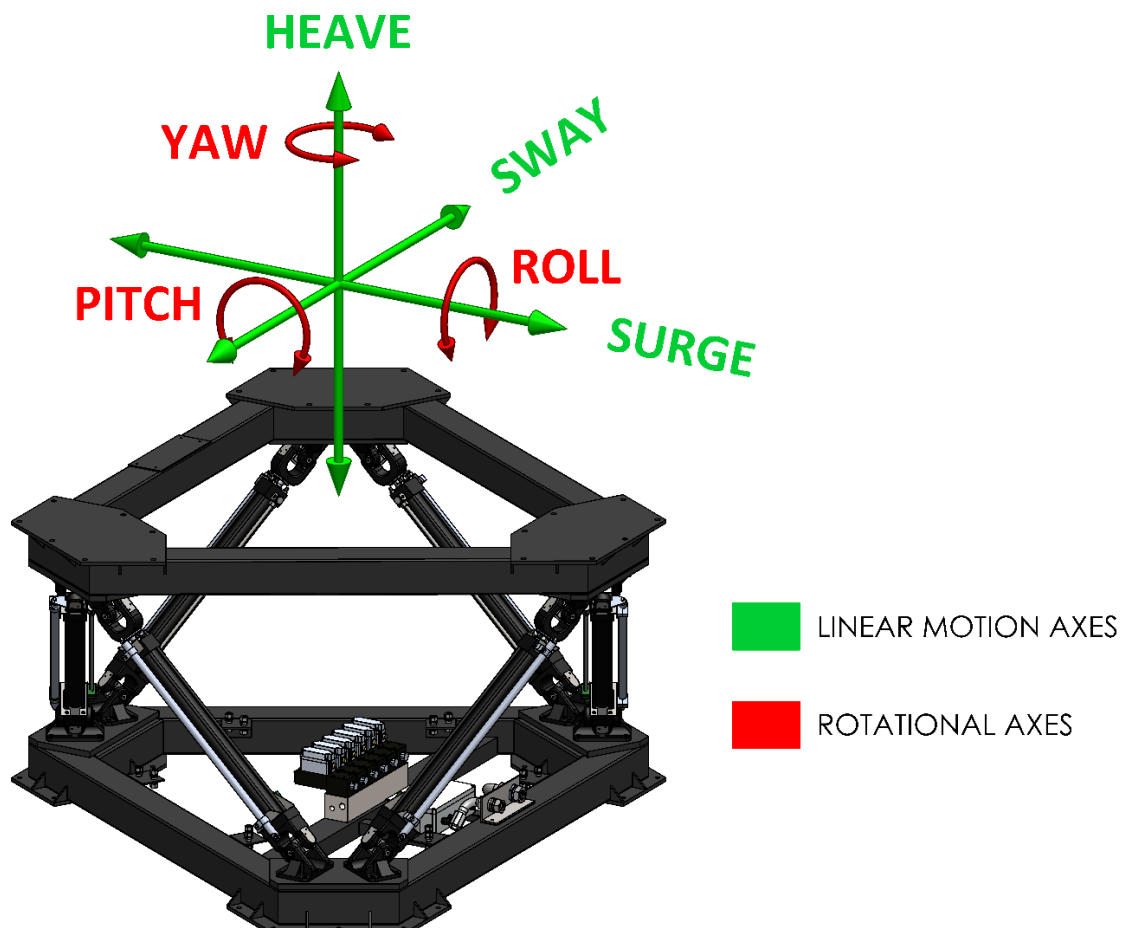


Figure 1: Janus Motion Platform, directions of movement

CONTROL:

The main system controller is an embedded computer running proprietary STL Research software, mounted in a cabinet along with I/O interface modules and a 24VDC power supply. The cabinet is free-standing to allow flexible positioning and is connected to the motion platform via an umbilical in protective ducting.

The user interface is accessed using a standard PC or laptop, and allows the motion platform to be controlled in the following modes:

- **Position Control (Static)** – Platform holds a fixed position and angle
- **Generate Sinusoidal Motion** – Continuous, smooth cyclic, multi-axis motion
- **Record motion** – Ability to record the motion of the platform for later playback
- **Playback Motion** – Replay of a recorded motion event or supplied motion data
- **Direct Actuator Control (Static)** – Individual actuators positioned as required
- **Generate Actuator Sinusoidal Motion** – Smooth cyclic motion of individual actuators

Pressurised oil is supplied to the hydraulic cylinders from a separate hydraulic power unit (HPU), via dedicated Digital Servo-proportional Valves with integrated position controllers. In this way, the extension of the cylinders may be precisely and independently controlled.

SPECIFICATIONS:

	25 Series	63 Series
Pitch	$\pm 27.0^\circ$	± 31.0
Roll	$\pm 20.0^\circ$	$\pm 25.4^\circ$
Yaw	$\pm 31.0^\circ$	$\pm 41.6^\circ$
Heave	$\pm 0.14\text{m}$	$\pm 0.42\text{m}$
Surge	$\pm 0.27\text{m}$	$\pm 0.88\text{m}$
Sway	$\pm 0.24\text{m}$	$\pm 0.76\text{m}$
Maximum Payload	1.0 Tonne*	8.0 Tonnes*
System Weight	110kg (approx.)	1.5 Tonnes

Normal permitted range for dynamic operation (for static positioning, the maximum displacements are slightly greater as the cylinders can be safely extended/retracted to their limits)

*Max payload is dependent on acceleration and range of movement required. If you have a requirement for a particular combination of motions, please contact us for more information



Figure 2: STL's Janus 63 Series Motion Platform

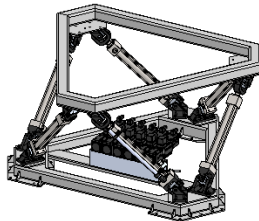


Figure 3: Janus 63 Series Motion Platform in operation

PRINCIPAL DIMENSIONS:

	25 Series	63 Series
Height	0.5m	1.5m
Width	1.0m	2.6m
Depth	1.0m	2.7m

25 Series



63 Series

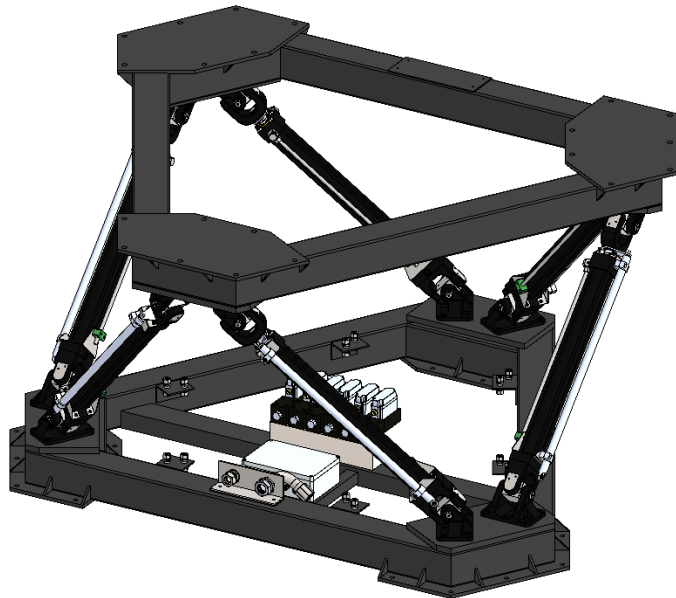


Figure 4: Size comparison: Janus 25 & 63 Series dimensions

FEATURES:

- The top and bottom frames of the motion platform can be fabricated to suit individual customer's mounting requirements
- Custom designed parts such as the universal joints, ensure low maintenance requirements and long service life
- The customisable design uses highly responsive proportional hydraulic valves, with their bodies, spools and operation profiles carefully selected to suit the customer defined motion requirements
- All exposed metallic surfaces are primed and painted (unless anodised, zinc-plated, stainless steel or similar), with options available to increased water resistance for outdoor use
- The Motion Platform User Interface is a standard PC or laptop connected to the embedded system controller via standard wired communication ports (e.g. Ethernet, USB or similar). Depending on the operating environment, it may be possible to connect wirelessly
- A laptop computer with Motion Platform User Interface software pre-installed is supplied with the system to allow plug-and-play operation
- Basic functions (e.g. Stop, Level, Stow, Reset) and indications (e.g. System On, System Healthy, System Fault) are accessed via a separate control panel which is connected to the Motion Platform by an umbilical

SAFETY:

Design for safety is a key principle and is achieved in the following ways:

- All Motion Platform controls are mounted remotely via an umbilical, so operators and staff can be kept at a safe distance from the platform while it is running
- The Motion Platform automatically monitors System Health and notifies of any faults
- The Main System Controller operating system has robust security features and is protected from tampering (or accidental changes) by appropriate cyber security techniques



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