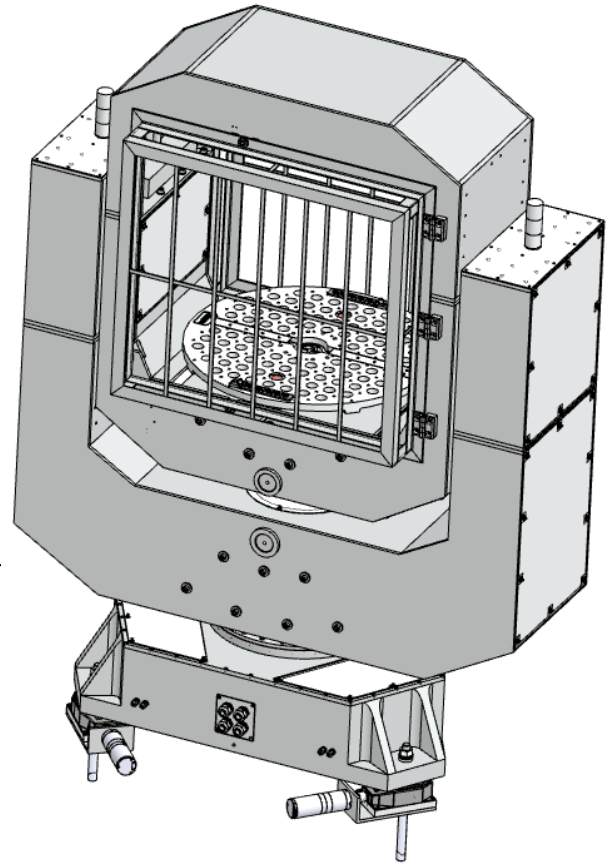


3-Axes Turntable

iTURN-3D1-HIL

Features

- Designed for HILS (hardware in the loop simulation) with extended angular rate and acceleration
- Multiturn continuous rotation in all three axes, fiber optical rotary joints for high speed data and electrical sliprings
- Positioning resolution of 0.02 arcsec and high rate accuracy
- CAN, Ethernet and RS422 command interface
- Output of axes position, velocity, encoder counts
- Automatic balancing capability (ABC) of middle axis as option available
- Automatic leveling capability (ALC) by electrical foot adjustmer
- Optional guard around fast rotating payload available
- Customized versions available on request; gyro stabilization available for usage in gimbal applications
- The device is also deliverable as iTURN-2D1-HIL (with frozen outer axis)
- Robust setup, high reliability, Made in Germany



Description

The iTURN-3D1-HIL is a dynamic motion simulator that offers an attractive price/performance ratio. It may be used e.g. for gyro / IMU verification at lab temperature as well as for in-process simulations or optronics testing or hardware-in-the-loop testing (HIL) of navigation systems. Angular positioning, precise uniform rotation and angular motion profiling are typical operational modes. All operations are commanded via RS422 / CAN / Ethernet by a host computer. The control software is being delivered with the instrument and allows the full access to the device.

Payloads are mounted on the table top platen. A pattern of threaded holes accept a variety of test loads. The payload can be protected by a guard as an option. The iTURN-3D1-HIL is equipped with both, electrical sliprings as well as fiber optical rotary joints (FORJ) to transmit also high-speed data to and from the payload via optical Ethernet with up to 1 GBit/s. Access is provided by shielded lines, terminated on the platen and the base by MIL-C-38999 Series III and optical connectors.

The iTURN-3D1-HIL is a high precision device, containing precision bearings, encoders and direct drive brushless torque motors. The high-resolution absolute encoders, the slip ring capsules, the amplifier/controller assemblies and power supply are located inside of the iTURN-3D1-HIL and thus, no additional space consuming external 19" rack is required. All components are interchangeable, facilitating repair and spare part supply management. The design allows that the orthogonality between the axes can be adjusted; mountings for a calibration prism are available on each axis to measure linearity and axis misalignment with an auto-collimator if desired at operator site.

The system is designed to be used in open-loop (rate and position table application) as well as closed loop (HIL) applications with high bandwidth and very low latency / jitter communication and control. Compared to other standard hydraulic systems which are known for HIL applications, the bandwidth of the fully electrical iTURN-3D1-HIL clearly exceeds their performance. Besides it's outstanding accuracy and high robustness, it needs much less maintenance, which are likewise main features of our iTURN-series of systems for applications in missile seekers and aircraft AHRS testing devices. Further unique features of the iMAR design are the automatic balancing capability (ABC) on the middle axis (adapts the iTURN-3D1 to certain unbalance of the payload) or the automatic leveling by a semi-automatic foot adjustment to compensate even smallest attitude changes of the foundation.



Specification Summary iTURN-3D1-HIL (custom specific on request)

General Configuration	Payload nominal	approx. 660 diameter x 580 mm height cylinder; 30 kg nominal, up to 60 kg with reduced dynamics		
	Lines to UUT	Electrical:	12 lines, each 2 A / 36 V DC, 3 lines AC (L,N,PE) 15 A	
		Optical:	1 FORJ, 1 GBit/s Ethernet (option: 3 FORJ)	
	Mounting platen	M6 threads with heli-coils, spacing all 50 x 50 mm, aluminum hard anodized		
	Platen flatness	< ± 0.05 mm		
	Axis orthogonality	< ± 3 arcsec between consecutive axes		
	Axis wobble	< ± 5 arcsec		
Dynamics (at nominal load) ³		Inner Axis	Middle Axis	Outer Axis ¹
	Rate	±2'000 deg/s	±1'000 deg/s	±500 deg/s
	Rate stability (over 360°)	better 0.000'5 %	better 0.000'5 %	better 0.000'5 %
	Rate resolution	< 0.000'01 deg/s	< 0.000'01 deg/s	< 0.000'01 deg/s
	Acceleration (@ nom. load)	1'200 deg/s ²	185 deg/s ²	100 deg/s ²
	Torque	approx. 130 Nm	approx. 260 Nm	approx. 327 Nm
	Bandwidth (-3dB) ¹⁾	> 50 Hz	> 20 Hz	> 15 Hz
	1) payload dependent; small signal excitation			
Positioning	Resolution	0.02 arcsec	0.02 arcsec	0.02 arcsec
	Accuracy	better 2 arcsec	better 2 arcsec	better 2 arcsec
	Repeatability	better 1 arcsec	better 1 arcsec	better 1 arcsec
	Angular freedom	continuous	continuous	continuous
	Wobble / Orthogonality	< 5 / 3 arcsec	< 5 / 3 arcsec	< 5 / 3 arcsec
Environment and Supply	Temperature and Humidity:	Air conditioned dry laboratory environment (15... 30 °C), +/- 2 K stability;		
	Power Supply:	400 V AC (up to 12 kW under full dynamic load)		
Size and Weight	Diameter and Height:	approx. 1520 mm diameter, approx. 1920 m height Foot mounting area: Ø 1200 mm x 320 mm		
	Weight:	approx. 1600 kg		
Command-SW iTURN-CMD	CAN - Bus:	up to 1 kHz position and rate updates on all axes		
	Ethernet:	position and rate updates on all axes up to 1 kHz		
	RS422:	position and velocity via UART interface		
	SW-Interface:	SDK available to integrate the iTURN-3D1 into user application		

Note 1: All specification data are valid for operating a well-balanced payload. If the optional Automatic Balancing Capability (ABC) feature is installed, an unbalance on the middle axes up to 20 Nm can be compensated automatically.

Note 2: Several options are available, e.g. gyro stabilization for operating the iTURN-3D1-HIL on a moving platform as a stabilized gimbal to operate e.g. scientific instruments on high seas.

Note 3: The iTURN-3D1-HIL is not designed to be operated within a temperature chamber.
The iTURN-3D1-HIL can be equipped with additional features (e.g. a removable 3D Helmholtz coil on the inner tabletop to determine the behavior of a Device under Test under magnetic field impact)

Note 4: Customized versions can be provided on request, regarding payload size and weight, dynamics, number of optical lines (FORJ), environment etc. Please contact our sales engineers for details.

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² Outer Axis not supported in version iTURN-2D1-HIL (two axes turntable)

³ All axes can be operated simultaneously even with highest angular acceleration and highest angular rate

