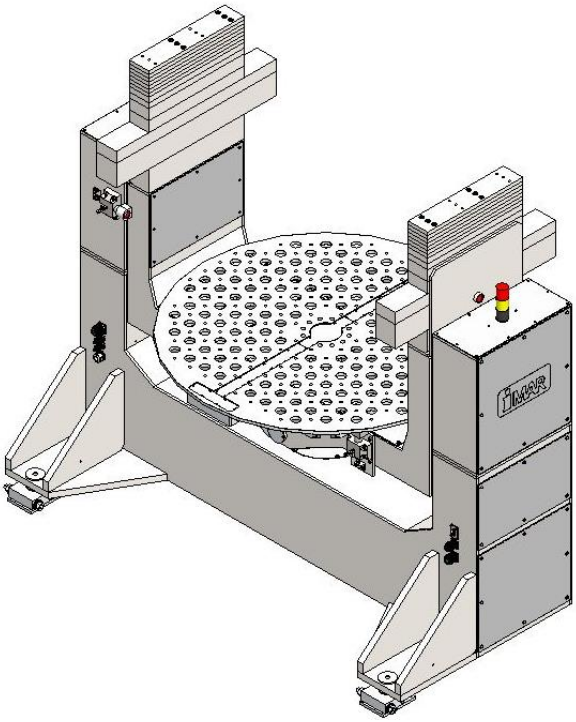
2-Axes Turntable

iTURN-2D1 / -HIL



Features

- Designed for standard operation and 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 adjustment.
- 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-3D1-HIL (with additional inner axis)
- Robust setup, high reliability, Made in Germany

Description

The iTURN-2D1 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-2D1 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-2D1 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-2D1 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-2D1-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-2D1 to certain unbalance of the payload) or the optional automatic leveling by a semi-automatic foot adjustment to compensate even smallest attitude changes of the foundat

Specification Summary iTURN-2D1 and iTURN-2D1-HIL

General Configuration	Payload mounting table	diameter 1130 diameter
	size of payload	diameter 950 mm
	payload mass	80 kg nominal (balanced) , up to 100 kg with reduced dynamics
	Lines to UUT	Electrical: 36 lines, each 2 A / 36 V DC, 6 lines, each 15 A Optical: 1 FORJ, 1 GBit/s Ethernet (option: 3 FORJ) or customized
	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[2]**
Rate	±50 deg/s	±50 deg/s	
Rate stability (over 360°)	better 0.000'5 %	better 0.000'5 %	
Rate resolution	< 0.000'01 deg/s	< 0.000'01 deg/s	
Acceleration (@ nom. load)[1]	50 deg/s²	50 deg/s²	
Torque[1]	approx. 120 Nm	approx. 120 Nm	
Bandwidth (-3dB) [1)]	> 20 Hz	> 20 Hz	

1) payload dependent; small signal excitation

Positioning	Resolution	0.02 arcsec	0.02 arcsec
	Accuracy	better 2 arcsec	better 2 arcsec
	Repeatability	better 1 arcsec	better 1 arcsec
	Angular freedom	continuous	continuous
	Wobble / Orthogonality	< 5 / 3 arcsec	< 5 / 3 arcsec

Environment and Supply	Temperature and Humidity:	Air conditioned dry laboratory environment (10… 40 °C), +/- 2 K stability;
	Power Supply:	3 x 400 V AC (up to 2 kW under full dynamic load)
Size and Weight	W / D / H:	approx. 1834 / 1251 / 1683 mm
	Weight:	approx. 1400 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-2D1 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 uf up to 20 Nm can be compensated automatically.

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

Note 3: The iTURN-2D1-HIL is not designed to be operated within a temperature chamber.
The iTURN-2D1-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

[1] higher, also custom specific values available for „-HIL" version to provide higher dynamics