IDAM
INA Drives & Mechatronics

X/Y Positioning Systems based on Planar Motor Technology

SCHAEFFLER
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The Perfect Drive for Every Application.

INA – Drives & Mechatronics GmbH & Co. KG, a member of the Schaeffler Group, is a specialist in linear and rotary direct drives. To complement these products, we also offer directly driven positioning systems and all the necessary controllers and mechatronic assemblies.
In addition to standard products, IDAM also develops and produces customised drive solutions.
In modern machines and equipment, direct drives are increasingly replacing standard drive solutions because of ever-stricter requirements for dynamics, precision and cost-effectiveness.
Directly linking the motor and the moving mass increases the dynamic and static rigidity, enabling high-performance positioning movements.

Direct drives are low wearing. This allows maintenance and operating costs to be reduced whilst also increasing availability.
For more than 20 years, teams at IDAM have been developing and producing direct drives and complex drive systems for the following sectors: machine tools and production machinery, automation, productronics/semicon, measuring technology and medical engineering.
Models and simulations are integrated into the development process for direct drives and positioning systems, making the process more efficient.
IDAM has a cutting-edge quality management system. At IDAM, quality management is a dynamic process that is checked daily and continuously improved. IDAM is certified to DIN EN ISO 9001:2008.

ZERTIFIKAT ◆ CERTIFICATE ◆

TÜV SÜD Management Service

CERTIFICATE
ISO 9001:2008

EMAS
VERIFIED ENVIRONMENTAL MANAGEMENT
DE-158-00016

INTECHNICA
FUTURE SECURE BUSINESS GROWTH
Certificate
ISO 14001

IDAM uses specially developed tools to develop and design the motors, including tools for mechanical and thermal simulation. This produces results that our customers can use to optimise their subsequent designs.

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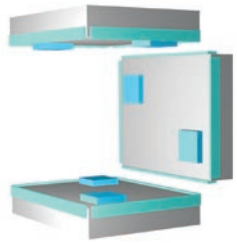
Planar Motors

Features, benefits, applications

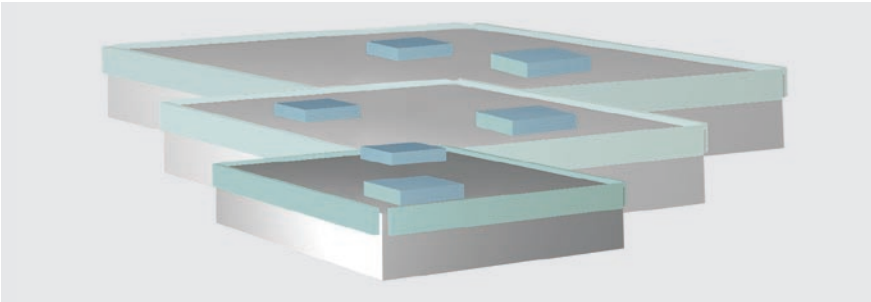
Features

Planar motors with air bearings consist of a structured stator plate, on which one or more orthogonally aligned forcer modules move.
Motors and measuring systems are ideally combined in the same plane.



Benefits

- Easy construction of X/Y motion systems
- Motion range and number of forcers scalable
- Low height as all axes are in one plane
- Free choice of installation position in space
- Can be combined with other axes
- Wear-free air bearings
- Use of state of the art, standardised control technology
- Lightweight construction thanks to use of compound materials (140 kg/m^2)
- Excellent accuracy in terms of parallelism, flatness and positioning across entire motion range
- High dynamics (2 m/s, 33 m/s^2) and short settling times
- Twist correction (Phi) of forcers possible
- High speed consistency



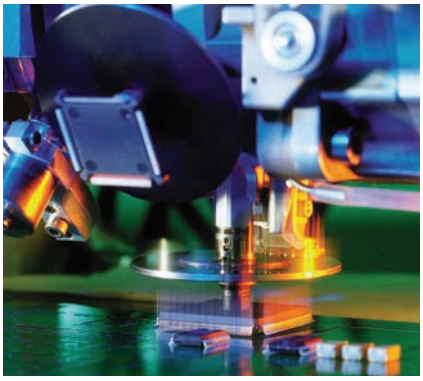
Planar stator: Scalable to a maximum size of 1500 x 1000 mm

Lightweight stator

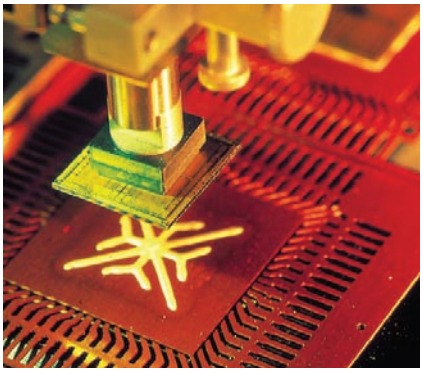
Applications

Particularly suitable for efficient implementation of applications in:

- Automation
- Micro-assembly
- Laser technology
- Laboratory technology
- Pressure applications
- Measuring and testing applications



Circuit board assembly



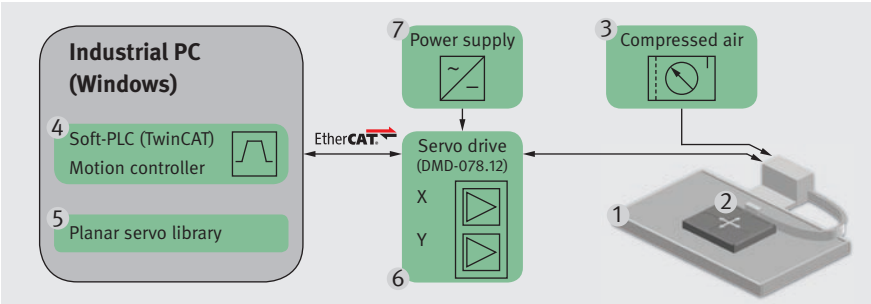
Die bonding

System Description

Basic configuration, PLC library, servo drive

Basic configuration

1. Planar stator
2. Planar forcer
3. Compressed air
4. IPC with Soft-PLC TwinCAT
5. Planar servo library
6. Servo drive, type: DMD-078.12
7. Power supply



IDAM®Servo Control E – PLC library

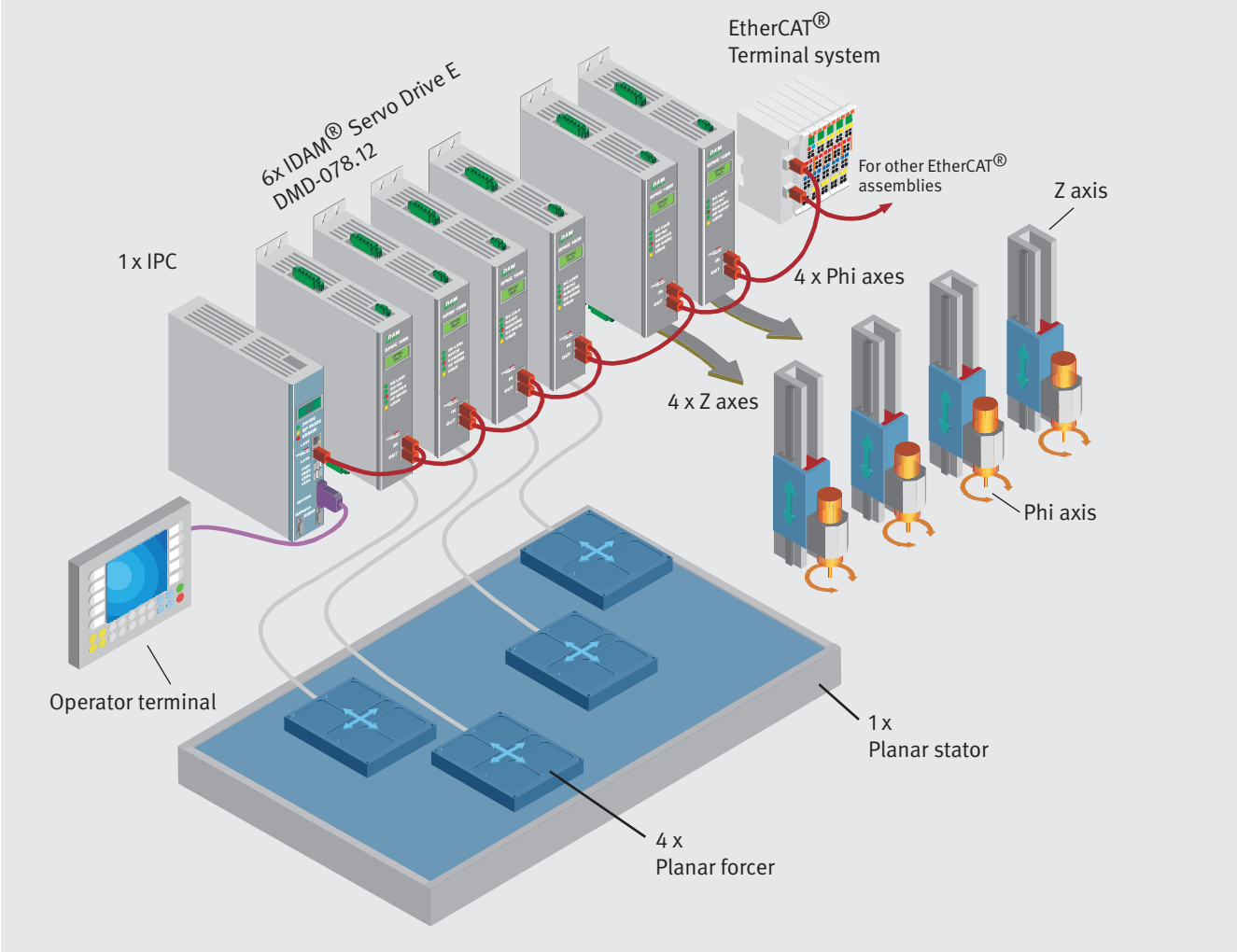
- PLC library for control of IDAM® servo planar forcer, with three independent closed loop axes (X, Y, Phi)
- User-friendly configuration using Soft-PLC TwinCAT system manager
- Easy programming using PLC programming environment in all languages in compliance with IEC61131-3
- Graphical development environment including scope function for easy commissioning and service
- Automatic calibration mode
- CANopen software interface (CiA-402)

Servo drive, type: DMD-078.12

- Optimised for controlling of planar forcers
- Configurable for 8 single phase motors, 4 two phase motors or 4 three phase motors
- Rated current: 7 A_{rms} per phase
- DC link voltage up to 120 V_{DC}
- Field bus: EtherCAT®
- Encoder inputs for Hall sensors and optical sensors (sin/cos, 1 V_{pp}) for position measurement
- 8 freely configurable digital inputs or outputs

System Description
System configuration

System configuration (example)



Example with 4x planar forcers, 4x multi-axis systems (4x Z axes and 4x Phi axes), 6x DMD-078.12 and 1x IPC as motion controller

Technical Data

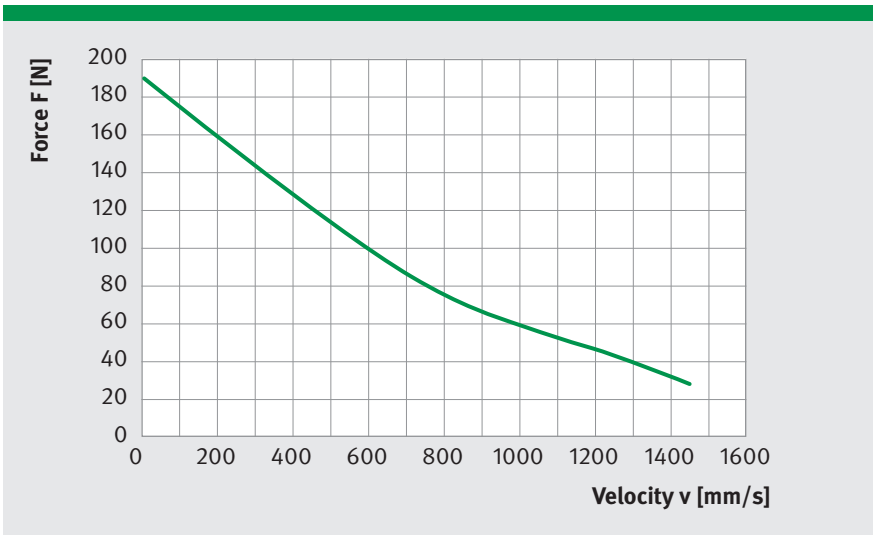
X/Y positioning system	Symbol	Unit	Value
System			
Maximum stroke: X axis		mm	1264 (1286*)
Maximum stroke: Y axis		mm	786 (764*)
Maximum velocity: X axis	v_{max}	m/s	2
Maximum velocity: Y axis	v_{max}	m/s	2
Pitch	T_Z	mm	1
Measuring system, magnetic			3 x sin/cos, 1 V_{pp}
Absolute accuracy: X axis		µm	±8
Absolute accuracy: Y axis		µm	±8
Repeat accuracy: X axis		µm	±1
Repeat accuracy: Y axis		µm	±1
Working air pressure	p	bar	4
Working air gap	$h_{min} - h_{max}$	µm	8 – 12
Planar forcer: XDDS-236-214-S-E-S-PRIM			
Dimensions	L x W x H	mm	236 x 214 x 33
Force	F_H	N	130 ± 10%
Mass	m	kg	3.9
Rated current	I_s	A	6
Planar stator: XDDS-L1-L2-X-SEK			
Maximum stator length	L1	mm	1500
Maximum stator width	L2	mm	1000
Flatness		µm	On request
Mass/surface area		kg/m^2	140
Height	H1	mm	86 at L1 and L2 < 700
			116 at L1 or L2 ≥ 700

* Forcer alignment: Forcer rotated by 90°

Technical Data

X/Y positioning system	Symbol	Unit	Value
Controller			
			Servo drive, type: DMD-078.12 IPC with Soft-PLC TwinCAT Planar servo library Power supply

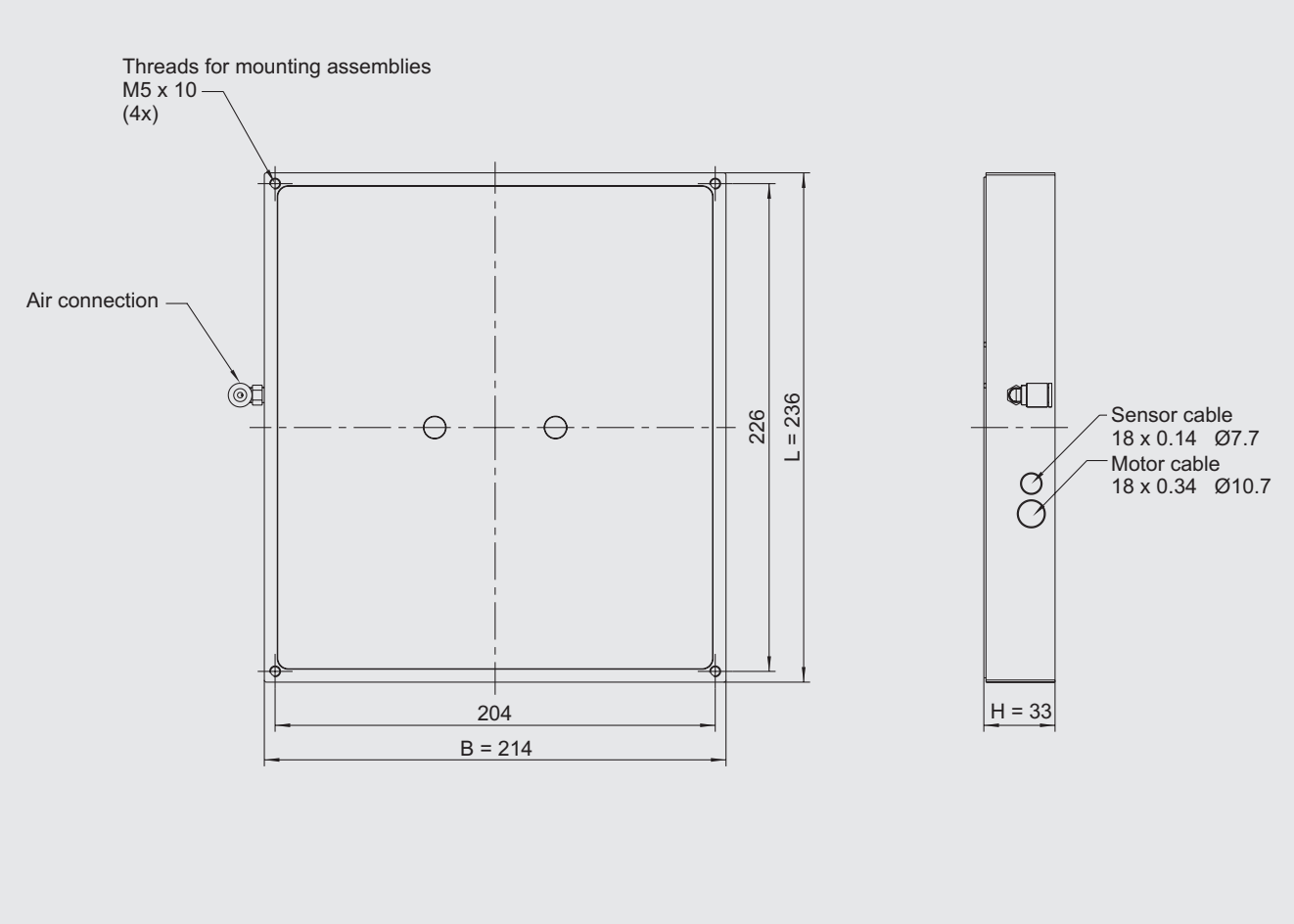
Maximum motor force depending on speed at phase current
$I = 12\ A_{peak}$



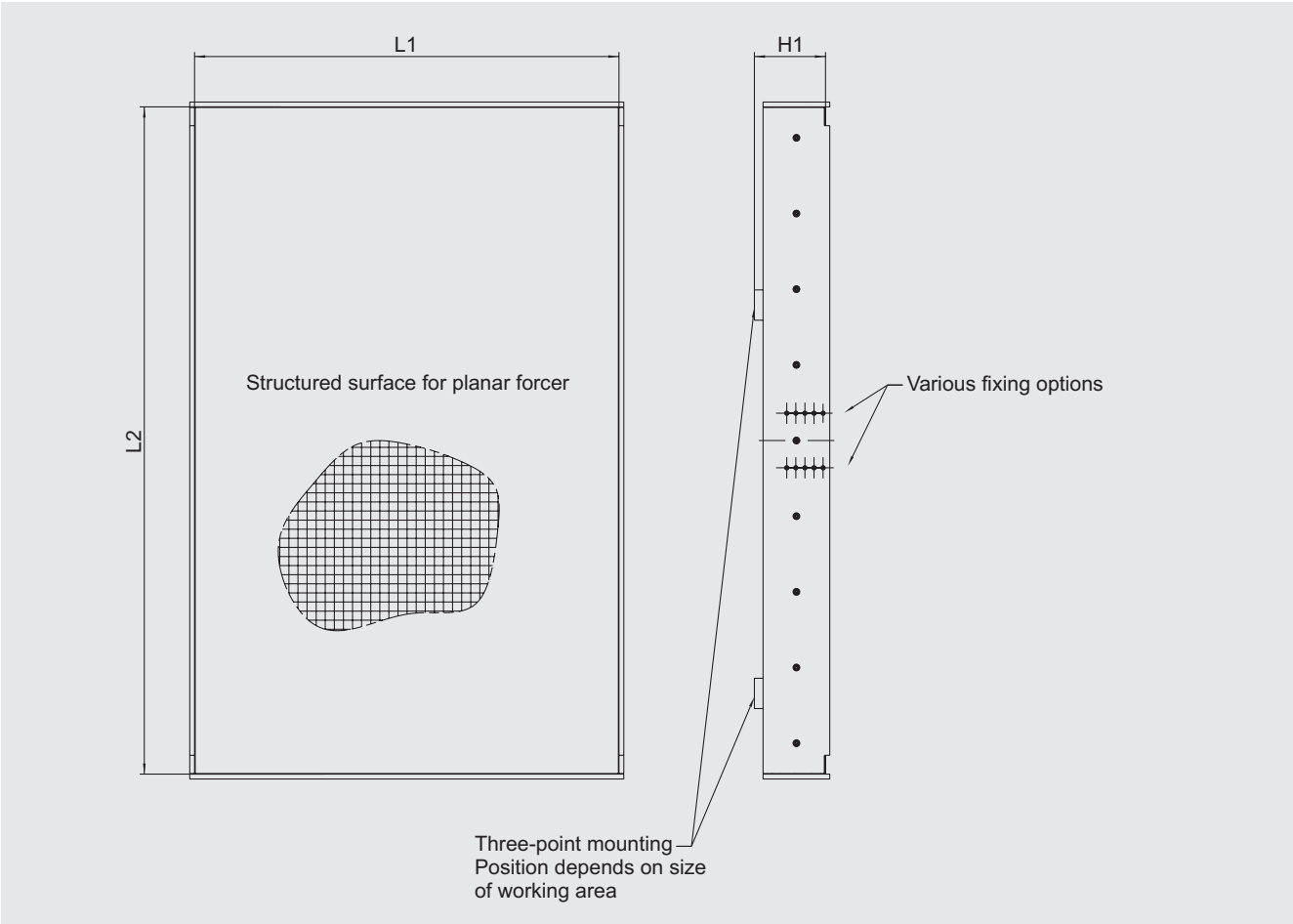
Force vs. velocity

Technical Drawing

Planar forcer



Technical Drawing
Planar stator



IDAM planar stators are produced in a hybrid steel and foamed aluminium construction. This results in a low stator weight with optimum rigidity. The benefits compared to a pure steel construction lie in cost reductions due to ease of assembly and low handling and transport costs.

Example:

Stator size: 850 mm x 850 mm

- Mass with conventional steel construction 275 kg
- Mass with hybrid construction 100 kg

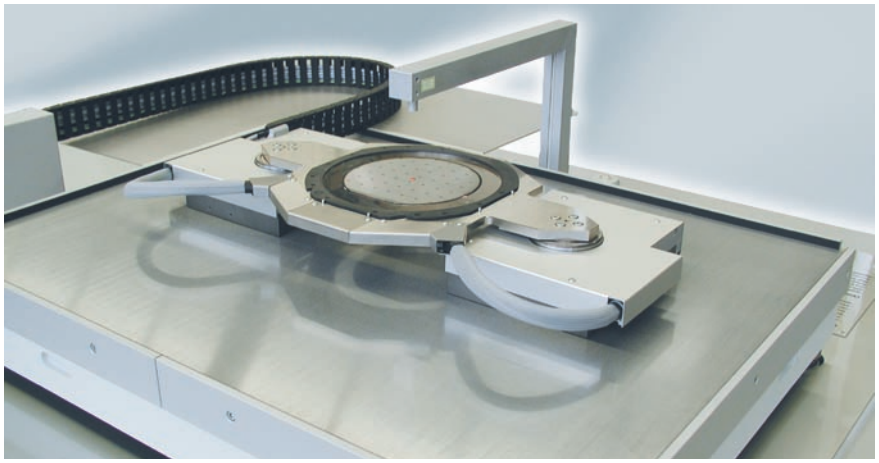
The mass reduction is approx. 60%.

The height H1 depends on the dimensions L1 and L2.

H1 = 86 mm at L1 and L2 ‹ 700 mm

H1 = 116 mm at L1 or L2 ≥ 700 mm

Applications



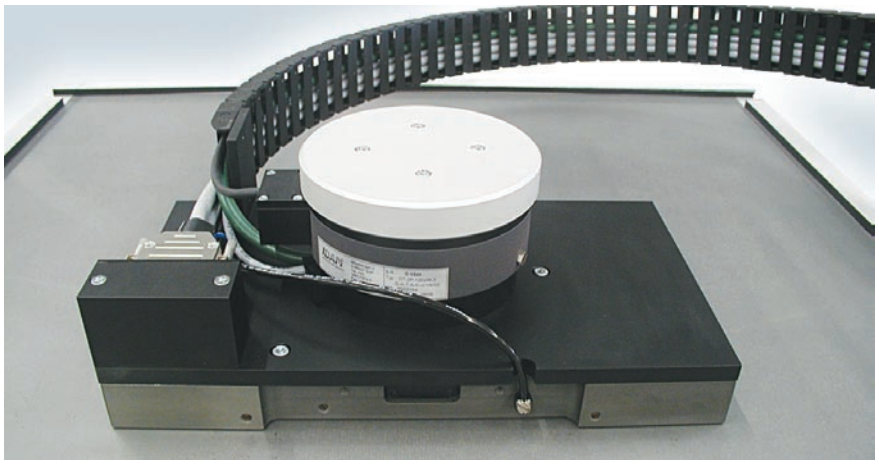
Open frame planar table for wafer positioning

Combination of two forcers for implementing movements in X, Y and Phi

Miniaturised modular production platform

Suitable for micro-assembly in flexible small series production.

The forcer motors transport and position the product holders to the individually exchangeable production modules on the sides of the planar stator.



Planar forcers can be extended with other drive axes

For this application: Extension with rotary direct drive system

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