



# Magazine for Automation Technology



*Modular Multi-axis Servo System  
with High Power Density*

## Multiple Axes in Super Compact Packaging



Titelbild: Sigmatek GmbH & Co. KG





## Modular Multi-axis Servo System with High Power Density

# Multiple Axes in Super Compact Packaging

**With the new DIAS drive generation MDD 2000, the automation manufacturer SIGMATEK introduces a highly flexible multi-axis servo system in a space-saving design that is set to define standards in terms of power density.**

**W**ith the development of production machines today, efficiency and flexibility set the tone. A key factor here is the drive technology and its simple integration into the machine process. According to a current market study on the use of servo drives in German machine manufacturing, an average of roughly eight servo drives per machine is used – tendency rising. The MDD 2000 drives from SIGMATEK are designed for dynamic multi-axis applications, such as those frequently found in series machine manufacturing. During the development of the new drive generation, the provider focused on implementing a very flexible system with high

power density that provides room for individualization and custom-fit drive concepts. The DIAS drives of the new series combine dynamics and precision with very compact dimensions, simple connection technology and numerous Safety functions. In size 1 with a power output of 8.5 kVA, the 3-axis unit measures only 75 x 240 x 219 mm including supply and power filter.

### Clever Connection Mechanics

A backplane was deliberately omitted from the design, making it unnecessary to keep options available. In the combined MDP 2000 supply and axis module, up to three axes are integrated. This module can be used as a stand-alone compact drive or expanded with any number of MDD 2000 modules to form a multi-axis network. The assembly is modular in a toolkit system with clever connection mechanics. The machine builder can choose between one-, two- and three-axis modules in different



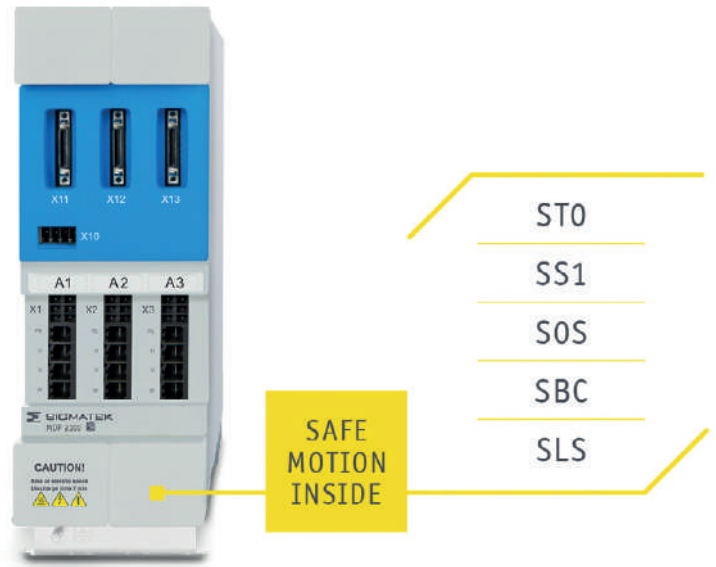
power classes or sizes. All modules can be quickly connected with a DCB "DC Connection Block" and BCB "Bus Connection Block" – complex single wiring for current, DC-link coupling and real-time Ethernet communication is eliminated, which shortens installation time.

## Flexible Complete System

The modular servo system is operated in single- or three-phase with 380-480 VAC. A power filter and brake resistor are also integrated into the compact drive modules. For the market launch, the MDD 2000 series drives are available in two sizes: MDD 2100 and MDD 2200. The height and depth of the modules are identical, only the width varies. Size 1 measures 75 mm in width, 240 mm in height and 219 mm in depth. It also provides a connected load of up to 8.5 kVA per combined supply or axis module. Currently, these are available with 3x 5 A rated current and a 15 A peak current. Depending on the number of axes, up to 10 A of rated current and a 25 A peak current will be possible with this size in the future. The supply or axis module in size 2 is 150 mm wide and manages outputs up to 17.25 kVA. For the market launch, the 3-axis module is available with 3x 10 A of rated current and a peak current of 30 A. In this size, depending on the number of axes, up to 20 A rated current and a 45 A peak current are planned. Size 3 will follow as the MDD 2300 next year. Here, again only the width will change. Within the dimensions of 225 x 240 x 219 mm, the power supply and one to three axes are integrated which can be expanded with modules as desired. As the first module, a three-axis unit with 3x 20 A rated current and 3x 60 A peak current is used. All series provide an overload factor of up to 300 percent.

## Compact and Modular

The modularity allows the machine builder to optimally integrate drive technology into the machine construction. With a depth just under 219 mm, the S-DIAS MDD 2000 drive system fits in small 300 mm deep control cabinets that are often installed directly under the machine. "When it comes to power density, we are currently leading the industry with the new generation of drives and we are proud of that", says Managing Director Alexander Melkus. "We put more power and modern controller performance in an even more compact package, plus new Safety functions, a fast, toolless module connection and single-cable technology." The DIAS drives of the MDD 2000 series come standard with air cooling. The fan can be exchanged externally and without tools. Optional, the drives are planned in a cold-plate version or as a feed-through variant. To reduce



▶ The DIAS drives of the MDD 2000 series have numerous integrated Safety functions in compliance with SIL3 or PL e.

the loss or heat dissipation in the motor's holding brake, a brake voltage reduction can be configured.

## More Safety Integrated

In addition to the Safety functions Safe Torque Off (STO) and Safe Stop 1 (SS1), the MDD 2000 series includes Safe Operating Stop (SOS), the brake function Safe Brake Control (SBC) and the speed function Safely Limited Speed (SLS). The Safety functions integrated into the drive can be used in applications up to SIL3, PL e or Cat 4. In the MDD series, Safety-relevant drive functions are flexibly implemented. The controller enable through the central Safety control can be hard-wired via the six integrated enable inputs as usual or now, over VARAN real-time Ethernet. The parameters for the Safety functions can be defined in the Safety controller. The defined parameters are then monitored in the drive.

## Less Wiring

The MDD 2000 multi-axis servo system has a standard Hiperface DSL digital motor feedback interface. The single-cable solution for power and feedback signals eliminates the encoder line and therewith, clutter in the control cabinet or machine and saves time with the initial start-up.

Alexander Melkus, Managing Director at SIGMATEK

» *When it comes to power density, we are currently leading the industry with the new generation of drives and we are proud of that.*





► The multi-axis system can be quickly expanded without tools using the bridging units DCB "DC Connection Block" and BCB "Bus Connection Block".

In addition to the single-cable solution, various encoder types are supported: EnDat 2.1 and 2.2, Hiperface, Resolver, Sin/Cos, TTL, BiSS-C, SanyoDenki or Tamagawa.

### Strong Servo Performance

The position is set in the control and is then sent to the drive via the real-time capable VARAN bus. Very short controller cycle times (62.5 µs) give the DIAS drives excellent servo performance. To achieve an attractive price/performance ratio and avoid unnecessary overhead, the functionality of the drives is consciously limited to current, speed and position control. The positioning and control algorithm are run by the controller integrated into the drive, which also communicates with the primary control system and ensures fast data traffic. The six integrated digital capture inputs enable saving the position in the µs range. The three 2-channel safe 24 V inputs can be configured specifically for the application.

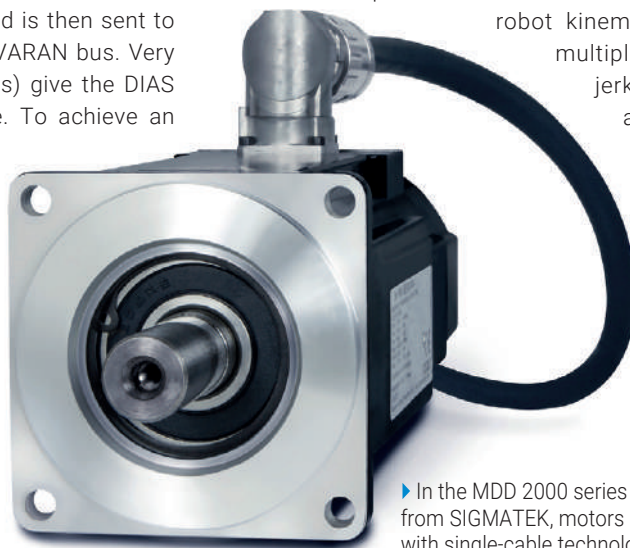
### Quick Start: Autotuning

An integrated autotuning function simplifies the initial start-up. The engineering suite LASAL provides an appropriate tool for this purpose. As soon as the user defines a

nominal and maximum current, as well as a permitted process area and the drive is available with a connected motor, the automatic motor optimization can be started. In addition to the control parameter calculation, the bode plot and step responses are visible to the user. The dynamics of current regulators, as well as speed controllers, can be adjusted as needed. In the internal data analyzer of the DIAS drives, data can be recorded with scan rates of 62.5 µs and displayed in the software tool online. Since the configuration parameters are centrally managed in the control system, configuring the drive components individually is unnecessary. When exchanging a servo drive, the parameters are loaded automatically. The initial start-up times are thereby reduced and errors avoided.

### Large Drive Library

SIGMATEK's engineering suite LASAL unifies object-oriented programming (according to IEC61131-3) with graphic representation and provides packages for all disciplines of automation. For drive technology, LASAL Motion has an extensive library with predefined function blocks that simplify and shorten creating applications enormously. The broad spectrum includes simple 1-axis, as well as multi-axis applications, predefined robot and CNC packages, various robot kinematics, synchronization of multiple axes within a space, jerk-limited motion profiles as well as dynamic Safety zone and workpiece speed monitoring. The seamless integration of control, visualization, motion control and Safety in one engineering platform leads to improved synchronization of process and motion operations in the machine. Production speed, precision and product quality are thereby increased. ■



► In the MDD 2000 series from SIGMATEK, motors with single-cable technology and Hiperface DSL encoders are standard.

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Ingrid Traintinger  
Manager Marketing Communication  
Sigmatek GmbH & Co KG  
www.sigmatek-automation.com