SIGMATEK

MOTION CONTROL SYSTEM

EN

CONTENTS

A fully integrated, harmonized drive concept increases the efficiency of your machine.

FLEXIBLE AND EFFICIENT DRIVE SOLUTIONS

Modern machines and systems demand more efficient drive technology with greater flexibility, higher precision and reliability. With the motion control system from SIGMATEK, a high performance, user-friendly and economic complete solution is provided that offers you a great deal of freedom when implementing your machine and system concepts.

All drive components interact perfectly and are fully integrated in the SIGMATEK control system. Even complex motion control tasks can be solved simply and flexibly. DIAS Drives, servo motors and planetary gears are tuned to the special demands. In combination with the engineering tool LASAL MOTION, highly dynamic, synchronized and reliable servo applications are provided from one source. The fast and nearly jitter-free system communication in hard real time is provided by the Ethernet-based VARAN bus.

FOR ANY APPLICATION

THE RIGHT DRIVE SYSTEM

Thanks to minimum controller cycle times of only 62.5 µs, the DIAS Drives from the series 100, 300 and 1000 provide excellent servo performance. The functions were limited to current, rotation speed and position control to avoid unnecessary overhead. A very attractive price/performance ratio is thereby achieved.

The design of all DIAS Drives are extraordinarily space-saving and fully integrated into the control system. The parameter and configuration data of the drives are centrally stored in the control. The initial start-up, service and exchange are thereby simplified.

DIAS DRIVES

DIAS DRIVES 100

If you need a modular drive system, the DIAS Drives 100 series is the right choice: Two different power modules, as well as axis modules for 1 or 2 servo drives are available. Per module, up to 8 axes are possible. The modules can be simply mounted on the carrier with a snap-lock mechanism.

DIAS DRIVES 300

The compact servo amplifiers of the DIAS Drives 300 series – with 1 to 3 drives in a single housing – are efficient "all-rounders". They are designed for multi-axis applications in the middle power range. Position latching is possible and an AutoScaling function integrated.

TYPE	MODULAR DRIVE SYSTEM	COMPACT DRIVE
Number of axes	1 – 8	1 – 3
Nominal voltage	115 – 480 V AC	230 – 480 V AC
Nominal power	2 – 3 kVA	14 kVA
Rated current	2 – 6 A	10 – 20 A
Peak current	6 – 15 A	20 – 40 A
Motors	Servo / linear / torque / asynchronous motor	Servo / linear / torque / asynchronous motor
Encoder systems	Resolver, EnDat, Hiperface, Sin/Cos, BiSS C, Sanyo Denki, Panasonic	Resolver, EnDat, Hiperface, Sin/Cos
Safety technology (SIL 3 according to EN 62061 and PL e according to ISO 13849-1/-2)	SS1, STO	SS1, STO
Dimensions W x H x D	60 x 155 x 152 mm per module	158 x 378 x 240 mm

DIAS DRIVES 1000

In this series, 6 drive controllers are packed into an extremely compact housing. The DIAS Drives 1000 are predestined for robot applications, as well as applications with coordinated axes with varying dynamics. In addition to the housing, the drive regulators also share a controller, DC-link and heat sink – this saves space and costs.

SERVO FUNCTIONALITY IN DIN RAIL FORMAT

With the DC 061/101 (resolver) and DC 062/102 axis modules (incremental encoder), full servo functionality is provided in DIN rail format. The power output stages are embedded in the S-DIAS control and I/O system, and provide 300 – 480 Watts of rated power, a 2-channel enable input for implementing STO, as well as a +24 V DC output for controlling a holding brake.

COMPACTLY CONTROL STEPPER MOTORS

The ST 151 and VST modules are power components for controlling 2-phase stepper motors. Up to 5 A of continuous current are possible with the ST 151 and VST 011, the VST 012 achieves 10 A of continuous current per motor. The power elements can be operated in full, half and micro steps. The ST 151 supports up to 64 and the VSTs up to 32 microsteps per full step. Additional features: Incremental encoder interface, 2 digital inputs and a 2-channel enable input for implementing an STO with the ST 151 and 4 digital in and outputs each with the VST 011 and VST 012.

	COMPACT DRIVE DIAS DRIVE 1000	SERVO MOTOR OUTPUT STAGES DC 061 & DC 062	DC 101 & DC 102	STEPPER MOTOR OUTPUT STAGES ST 151	VST 011 & VST 012
	6	1	1	1	1
	380 – 480 V AC	+48 V DC	+48 V DC	+18 – 55 V DC	+18 – 60 V DC
	14 kVA	288 W	480 W	-	-
	5 – 20 A	6 A	10 A	max. 5 A	max. 5 or 10 A
	10 – 40 A	15 A	20 A		
	Servo motors	Servo motors/BLDC	Servo motors/BLDC	Stepper motors	Stepper motors
	Resolver, EnDat, Hiperface DSL	Resolver/incremental encoder input	Resolver/incremental encoder input	Incremental encoder input	Incremental encoder input
	SBC, SS1, STO	STO	STO	STO	-
	212 x 585 x 217 mm	12.5 x 104 x 72 mm	25 x 104 x 72 mm	25 x 104 x 72 mm	26 x 151 x 121 mm

FULLY INTEGRATED
DYNAMIC, PRECISE, ECONOMIC

The drive technology at SIGMATEK is seamlessly integrated into the automation system. Motion and sequence control, Safety and visualization are combined on one platform. This simplifies programming and ensures clearly structured application software.

With the compact multi-axis devices of the DIAS Drives 300 and 1000 series, the modular system DIAS Drive 100 and the axis modules of the S-DIAS and VST series, your drive concept can be very flexibly adapted or scaled to the required number of axes. In addition to energy efficient servo motors, different motors such as linear, torque, asynchronous, brushless DC or stepper motors can be controlled according to the drive type.

Simple Initial Start-up

Since all parameter and configuration data of the servo amplifiers are stored centrally in the control, initial start-up and service are simple. When exchanging a drive, the parameters and configuration data are automatically reloaded.

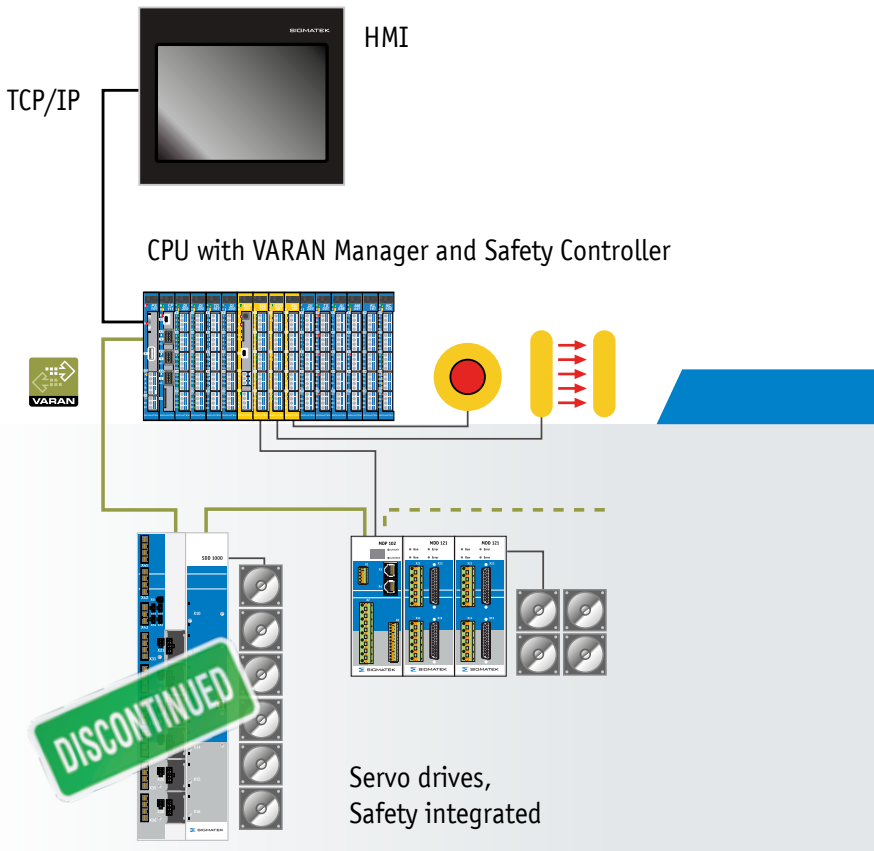
Economic

The functions of the DIAS Drives were intentionally reduced. With current, speed and position control, they concentrate on their actual tasks while the control takes over the application tasks. Redundant functions and expensive electronics in the drive are therewith eliminated. An intermediate circuit ensures energy savings.

Safety Functions Integrated

All DIAS Drives have the most essential Safety functions, such as Safe Torque Off (STO) and Safe Stop 1 (SS1) – in compliance with SIL 3 according to EN IEC 62061 and PL e according to EN ISO 13849-1/-2.

Simple integration into the Safety concept of the machine is thereby guaranteed. The DIAS Drives 1000 are additionally equipped with Safe Brake Control (SBC). With the servo amplifiers in disc format, STO is integrated in the module.



HOT FACTS

SEAMLESSLY INTEGRATED
in the control system – simplifies engineering and maintenance

HIGH FLEXIBILITY
modular systems and compact drives are available for selection

COMFORTABLE ENGINEERING
thanks to extensive libraries with pre-constructed motion templates

FUTURE PROOF WITH REAL-TIME ETHERNET
open system topology, highest reaction speeds

FAST START MOTION CONTROL

The software tool LASAL MOTION provides an extensive library with pre-defined motion components and templates. From simple one to complex multi-axis applications, motion control tasks can be comfortably implemented without programming. The selection includes motion control functions such as positioning, cam discs, contouring control with transformations for robot kinematics, interpolations and the synchronization of up to 9 axes in a space.

Efficient Tools

The engineering is simplified through efficient tools such as a real-time data analyzer, real-time trend recording, CAM designer and Motion Diagnostic View, for example. Initial start-up and diagnostic times are thereby drastically reduced.

PERFECT COMMUNICATION WITH THE ETHERNET BUS VARAN

The modern system structure is enabled by the hard real-time capable Ethernet bus VARAN, which is used for communication between the drives and control. The precision of the motion is also increased.

Through the short access times and high synchronicity reached with VARAN, implementing the control of complex tracked profiles with multiple axes in combination with a primary PLC is simple and economic. In addition, a significantly deeper integration of the drives into the control is achieved with the VARAN bus. Through the higher data transfer rate and broad bandwidth of the real-time Ethernet communication, it is possible to activate more drives in a shorter time.

HOT FACTS

MODULAR SYSTEM
1 - 8 axes per supply module

POWER RANGE
up to 3 kVA per system

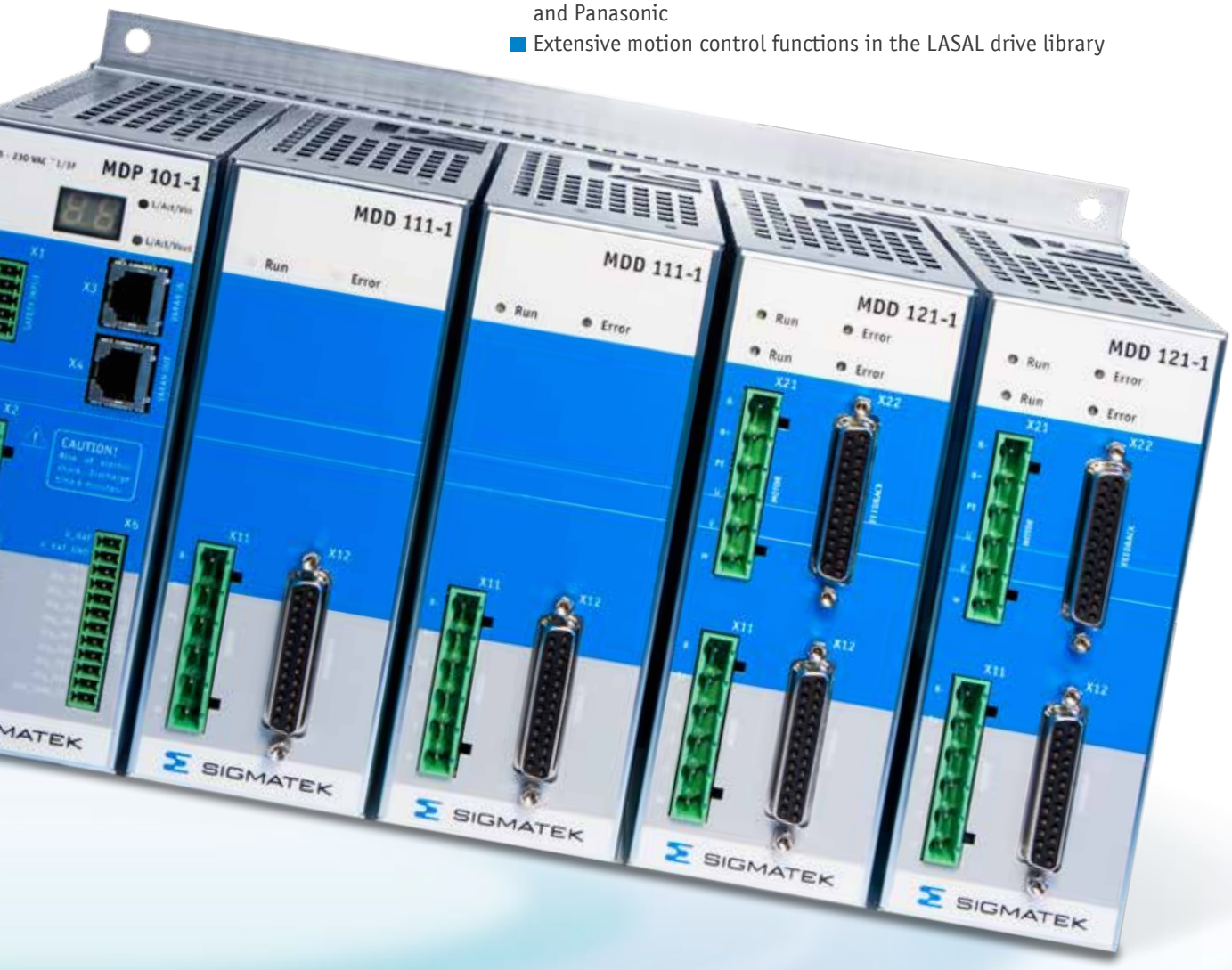
EASY MOUNTING
onto module carrier via snap-on technology

SAFETY FUNCTIONS
STO and SS1 integrated

DIAS DRIVES SERIES 100

THE MODULAR DRIVE SYSTEM

- Up to 8 axes per supply module
- Real-time Ethernet VARAN interface
- Minimal controller cycle times of only 62.5 µs
- Current, speed and position controller, including spline interpolation
- Regen resistor and power filter integrated
- Intermediate circuit accessible for the coupling of additional devices
- Safety functions Safe Torque Off (STO) and Safe Stop 1 (SS1) integrated (SIL 3, PL e, Cat. 4)
- Control of servo, linear, torque and asynchronous motors
- Encoder interfaces for Resolver, EnDat®, Hiperface®, Sin/Cos, BiSS C, Sanyo Denki and Panasonic
- Extensive motion control functions in the LASAL drive library



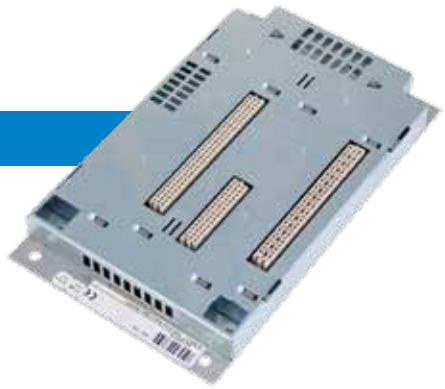
TECHNICAL DATA | SUPPLY MODULES

The MDP supply units are, as the head station of each DIAS Drive 100 axis network, the communication interface and responsible for the bus communication with the connected axis modules. Depending on the supply module and motor type used, the system must be operated with 1-phase 115 – 230 VAC (MDP 102-1) or 3-phase 210 – 480 VAC (MDP 101-1).

		MDP 101-1	MDP 102-1
CHARACTERISTICS			
Input voltage (symmetric against earth)	V_{AC}	3-phase 210 – 480 VAC	1-phase 115 – 230 V AC
Max. peak current with activation of the mains contact (limited by charging circuit)	A	3	2
Rated power in S1 mode	kVA	3	2
Rated DC-link voltage	V_{DC}	290 – 680	150 – 360
Over voltage threshold of the intermediate circuit voltage	V_{DC}	450 / 800 / 900	450
+24 V auxiliary voltage	V_{DC}	22 – 30	22 – 30
Additional +24 V supply voltage power	W	max. 50	max. 50
Max. leakage current	mA	30	30
Stop brake supply voltage +24 V-BR	V_{DC}	23 to 26 (depending on selected stop brake type)	23 to 26 (depending on selected stop brake type)
BRAKE SWITCH			
Capacitance of the intermediate circuit voltage	µF	135	540
G-VMAINS = 230 (RATED SUPPLY VOLTAGE = 230 V)			
Turn-on threshold	V_{DC}	420	420
Cut off threshold	V_{DC}	400	400
Over voltage cutoff	V_{DC}	450	450
Peak power of the internal ballast resistance (max. 1 s)	kW	5.3	5.3
G-VMAINS = 400 (RATED SUPPLY VOLTAGE = 400 V)			
Turn-on threshold	V_{DC}	730	-
Cut off threshold	V_{DC}	690	-
Over voltage cutoff	V_{DC}	800	-
Peak power of the internal ballast resistance (max. 1 s)	kW	21	-
G-VMAINS = 480 (RATED MAINS VOLTAGE = 480 V)			
Turn-on threshold	V_{DC}	850	-
Cut off threshold	V_{DC}	810	-
Over voltage cutoff	V_{DC}	900	-
Peak power of the internal ballast resistance (max. 1 s)	kW	27	-

		MDP 101-1	MDP 102-1
SAFETY INPUT			
Input voltage between ENABLE_H (+) and ENABLE_L (-)	V	typically 24 V to max. 30 V	
Signal level between ENABLE_H (+) and ENABLE_L (-)	V	low: ≤ +5, high ≥ +15	
Input current	mA	typically 10 mA at 24 V	
Input switching delay times	s	Turn-on delay circa. 0.02 s Turn-off delay at min. 0.5 s, max. 1 s	
Relay output (S1, S2)		No	
Switching power		max. 30 V DC, 42 V AC, 100 µA to max. 0.5 A	
DIGITAL INPUTS			
Input voltage Dig_IN1 to Dig_IN8	V	typically 24 V to max. 30 V	
Signal level	V	low: ≤ +5, high ≥ +15	
Input current	mA	typically 10 mA at 24 V	
Input switching delay times	ms	typically 0.1	
INTERNAL FUSE			
Auxiliary supply voltage +24 V (+24 V - BGND)		electronic fuse	
Stop brake supply 24 V-BR (24 V-BR - BGND)		electronic fuse	
Ballast resistance		electronic protection	
RESOLVER SPECIFICATIONS			
Exciter frequency F_{ex}	kHz	8	
Exciter voltage V_{Ref}	V_{RMS}	2.8	
Number of pins m		2, 4, 6, .., 32	
Resolver voltage $V_{sin/cos, max}$	V_{RMS}	1.9	
DIMENSIONS			
W x H x D (with plug)	mm	60 x 155 x 152 (195)	
Weight	kg	1.2	
ARTICLE NUMBER			
		09-403-101-1	09-403-102-1

MODULE CARRIER MDM 011 – 041



The MDM module carrier serves as a mount in the control cabinet for the individual modules of the MDD 100 servo drive system. Each module carrier consists of an aluminum carrier profile and a bus board for the electrical connection and communication between the axis and power modules. The module carrier is available for a power module and 1, 2, 3 or 4 axis modules.

	MDM 011	MDM 021	MDM 031	MDM 041
ARTICLE NUMBER	09-402-011	09-402-021	09-402-031	09-402-041

TECHNICAL DATA | AXIS MODULES

Axis modules for 1 or 2 servo drives are available. The modules are mounted on an MDM module carrier using a simple snap-lock mechanism. The assembly and installation are thereby significantly reduced.

		MDD 111-1	MDD 121-1
CHARACTERISTICS			
Max. stop brake current per axis	A_{DC}	1	1
Stop brake voltage drop from the 24 V-BR to the output	V_{DC}	max. 1 (at 1 A stop brake current)	max. 1 (at 1 A stop brake current)
Max. total continuous current of axes 1 and 2 (heat sink) at 230 V	A_{RMS}	-	6
Rated output current of axis 1 (rms +/-3 %) at 230 V	A_{RMS}	6	3, max. 5*
Rated output current of axis 2 (rms +/-3 %) at 230 V	A_{RMS}	-	3
Max. total continuous current of axis 1 and 2 (heat sink) at 400 V/480 V	A_{RMS}	-	4
Rated output current of axis 1 (rms +/-3 %) at 400 V/480 V	A_{RMS}	4	2, max. 3*
Rated output current of axes 2 (rms +/- 3 %) at 400 V/480 V	A_{RMS}	-	2
Max. total peak current of axes 1 and 2 at 230 V for a max. of 5 s	A_{RMS}	-	18
Peak output current of axis 1 for a max. of 5 s (rms +/-3 %) at 230 V	A_{RMS}	15	9, max. 15**
Peak output current of axis 2 for a max. of 5 s (rms +/-3 %) at 230 V	A_{RMS}	-	9
Max. total peak current of axes 1 and 2 at 400 V/480 V for a max. of 5 s	A_{RMS}	-	12
Peak output current of axis 1 for a max. of 5 s (rms +/-3 %) at 400 V/800 V	A_{RMS}	9	6, max. 9**
Peak output current of axis 2 for a max. of 5 s (rms +/-3 %) at 400 V/800 V	A_{RMS}	-	6
Power stage losses (multiply the average current of axis with the factor), without regen losses	W/A_{RMS}		10
Output frequency of the output stage	kHz		8
Intermediate circuit capacitance	µF		60
DIMENSIONS			
W x H x D (with plug)	mm	60 x 155 x 152 (195)	
Weight	kg	1.2	
ARTICLE NUMBER			
		09-404-111-1	09-404-121-1

*) The sum of both continuous currents of the axes is limited to the total continuous current, depending on axis 2
**) The sum of both peak currents of the axes is limited to the total peak current, depending on axis 2

HOT FACTS

COMPACT DRIVE
for 1 - 3 drives

MULTI-AXIS APPLICATIONS
in the mid-power range (14 kVA)

COLD PLATE
model with even more space-saving dimensions

SAFETY FUNCTIONS
STO and SS1 integrated

DIAS DRIVES SERIES 300

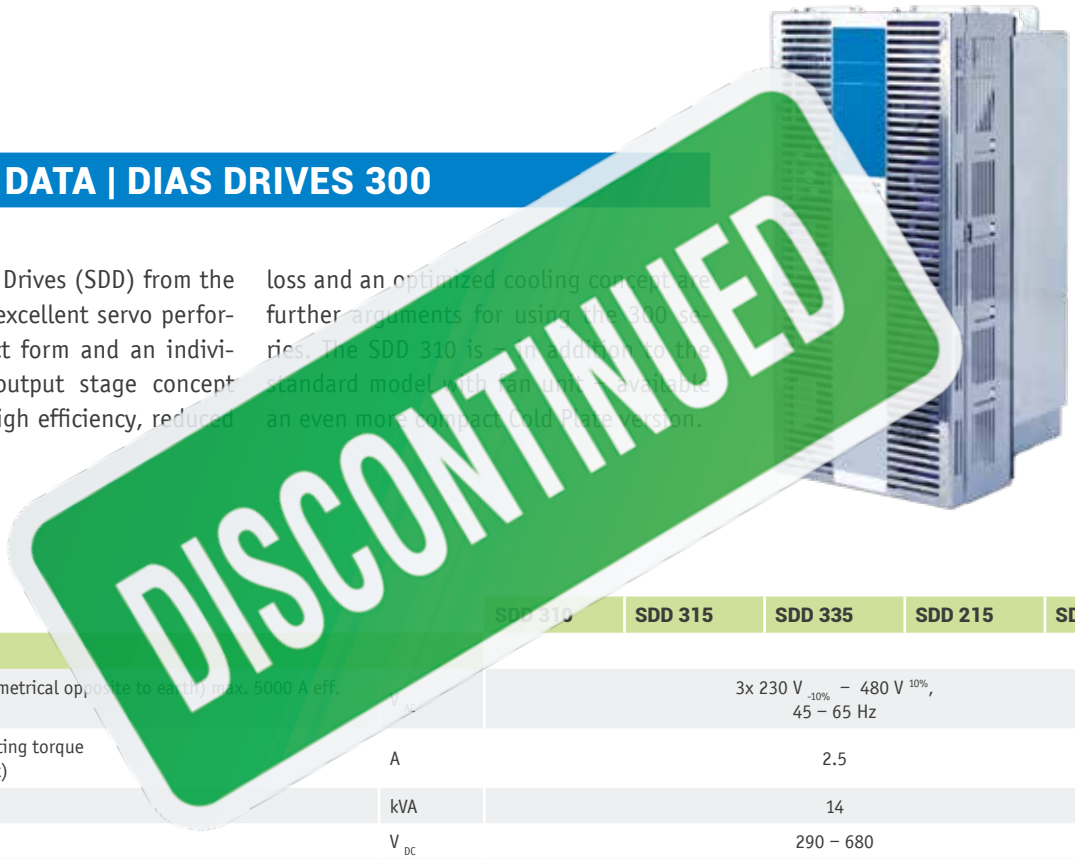
COMPACT ALL-ROUNDER

DISCONTINUED

- Compact drive for 1 - 3 servo axes
- Real-time Ethernet VARAN interface
- Minimal controller cycle times of only 62.5 µs
- Current, speed and position controller including spline interpolation
- Regen resistor and power filter integrated
- Intermediate circuit accessible for the coupling of additional devices
- Safety functions STO Safe Torque Off (STO) and Safe Stop 1 (SS1) integrated (SIL 3, PL e, Cat. 4)
- Control of servo, linear, torque and asynchronous motors
- Encoder interfaces for Resolver, EnDat®, Hiperface® and Sin/Cos
- Extensive motion control functions in the LASAL drive library

TECHNICAL DATA | DIAS DRIVES 300

The SIGMATEK DIAS Drives (SDD) from the 300 series provide excellent servo performance in a compact form and an individually adjustable output stage concept for servo motors. High efficiency, reduced loss and an optimized cooling concept are further arguments for using the 300 series. The SDD 310 is – in addition to the standard model with fan unit – available as an even more compact Cold Plate version.



		SDD 310	SDD 315	SDD 335	SDD 215	SDD 120
RATED VALUES						
Rated input voltage (symmetrical opposite to earth) max. 5000 A eff. (L1, L2, L3)	V_{AC}	3x 230 V $_{-10\%}$ – 480 V $^{10\%}$, 45 – 65 Hz				
Max. peak current in starting torque (limited by inrush current)	A	2.5				
Rated power in S1 mode	kVA	14				
Rated DC-link voltage	V_{DC}	290 – 680				
Over voltage protection - limit for the intermediate circuit	V_{DC}	450 – 900				
Additional voltage supply +24V	V_{DC}	22 – 30				
Additional +24 V supply voltage power	W	35	35	35	35	25
Stop brake supply voltage +24 V-BR	V_{DC}	25 – 27				
Max. holding brake current per Axis	A_{DC}	2				
Holding brake voltage drop from +24 V-BR load	V_{DC}	max.1 (at 2 A stop brake current)				
Rated current for axis 1 (eff. +/- 3 %)	A_{RMS}	10	10	10	10	20
Rated current for axis 2 (eff. +/- 3 %)	A_{RMS}	10	10	10	-	-
Rated current for axis 3 (eff. +/- 3 %)	A_{RMS}	10	15	15	15	-
Max. continuous sum current of all axis (heat sink)	A_{RMS}	20	20	20	20	-
Peak output current axis 1 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	20	20	20	40
Peak output current axis 2 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	20	30	-	-
Peak output current axis 3 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	30	35	30	-
Output stage loss	W/A_{RMS}	10				
Output frequency of the power output stage	kHz	8				
Max. leakage current	mA	15				

		SDD 310	SDD 315	SDD 335	SDD 215	SDD 120
BRAKE UNIT						
Capacitance of the intermediate circuit voltage	µF			700		
Internal regen resistor value	Ω					
External regen resistor	Ω	25 – 50	25	25	25 – 50	25
Rated power of the internal regen resistor	W			200		
G-VMAINS =230 (RATED SUPPLY VOLTAGE = 230 V)						
Start-up limit	V_{DC}			420		
Switch-off level	V_{DC}			400		
Over voltage protection	V_{DC}			450		
Max. rated power of the external regen resistor	W			50		
Peak power of the internal regen resistor (max.1 s)	kW			6.5		
G-VMAINS = 400 (RATED SUPPLY VOLTAGE = 400 V)						
Start-up limit	V_{DC}			730		
Switch-off level	V_{DC}			690		
Over voltage protection	V_{DC}			800		
Max. rated power of the external brake resistor	W			1200		
Peak power of the internal regen resistor (max.1 s)	kW			21		
G-VMAINS = 480 (RATED MAINS VOLTAGE = 480 V)						
Start-up limit	V_{DC}			850		
Switch-off level	V_{DC}			810		
Over voltage protection	V_{DC}			900		
Max. rated power of the external regen resistor	W			1500		
Peak power of the internal regen resistor (max.1 s)	kW			27		
INTERNAL FUSE						
24 V auxiliary supply voltage (+24 V to BGND)				electronic fuse		
Stop brake supply 24 V-BR (+24 V-BR to BGND)				electronic fuse		
Regen resistor				electronic protection		
RESOLVER SPECIFICATIONS						
Exciter frequency F_{err}	kHz			8		
Exciter voltage V_{Ref}	V_{RMS}			4		
Number of pins m				2, 4, 6, .., 32		
Resolver voltage $V_{sin/cos, max.}$	V_{RMS}			2.2		
DIMENSIONS WITH FAN UNIT						
W x H (with plug) x D	mm			158 x 378 (472) x 240		
Weight	kg			10		
DIMENSIONS WITH COLD PLATE (SDD 310-3 ONLY)						
W x H (with plug) x D	mm			152 x 428 (472) x 121.3		
Weight	kg			6.35		
ARTICLE NUMBER						
with fan unit		09-501-101-2	09-501-151-2	09-501-351	09-501-152-2	09-501-201-2
with Cold Plate		09-501-101-3	-	-	-	-

HOT FACTS

MORE THAN COMPACT
6 drives in one unit

ECONOMIC
one heat sink, one DC-link circuit

POWERFUL
5 to 20 A rated/ 10 to 40 A
peak current per axis

MORE SAFETY
SBC, STO, SS1 integrated

DIAS DRIVES SERIES 1000

SIX IN ONE STROKE

- 6 output stages per drive, which share the controller, DC-link and heat sink
- Real-time Ethernet VARAN interface
- Minimal controller cycle times of only 62.5 µs
- Current, speed and position controller, including spline interpolation
- Internal 24 V supply, which is provided by the DC-link and during power-down, supplies energy over a short period of time for a controlled shutdown
- Integrated power filter
- Safety functions Safe Brake Control (SBC), Safe Torque Off (STO) and Safe Stop 1 (SS1) integrated (CCL 3, PL e, Cat. 4)
- Control of servo motors
- Encoder interfaces for Resolver, EnDat®, Hiperface DSL®
- Extensive motion control functions in the LASAL drive library

TECHNICAL DATA | DIAS DRIVES 1000

With the DIAS Drives 1000, the term "compact multi-axis servo drive" is raised to a new level. Dynamics, precision and the price/performance ratio of this series convince. The SDD 1000 are designed for dynamic multi-axis applications, which are often seen for example, in handling and robotic applications. The fan-based concept and internal intermediate circuit system ensure efficient energy use or distribution. The energy generated while braking is used to power the other components.

DISCONTINUED

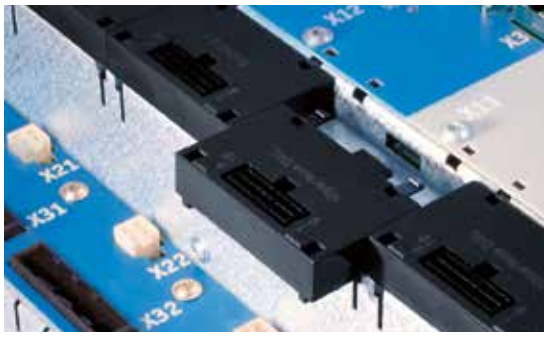
RATED VALUES		**SDD 1600-HHHDDD**	**SDD 1600-LLLHHH**
Rated input voltage (symmetrical opposite to earth, max. 5000 A eff. (1 sec.))	V_{AC}	3x 380 $V_{-10\%}$ - 480 $V^{10\%}$, 50-60 Hz	
Nominal power	kVA	14	
Rated DC-link voltage	V_{DC}	538	
Over voltage protection - limit for the intermediate circuit	V_{DC}	can be set via software	
Max. holding brake current per Axis	A_{DC}	2	
Rated current for axis 1 (eff. +/- 3 %)	A_{RMS}	10	20
Rated current for axis 2 (eff. +/- 3 %)	A_{RMS}	10	20
Rated current for axis 3 (eff. +/- 3 %)	A_{RMS}	10	20
Rated current for axis 4 (eff. +/- 3 %)	A_{RMS}	5	10
Rated current for axis 5 (eff. +/- 3 %)	A_{RMS}	5	10
Rated current for axis 6 (eff. +/- 3 %)	A_{RMS}	5	10
Max. continuous sum current of all axis	A_{RMS}	45	90
Peak output current axis 1 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	40
Peak output current axis 2 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	40
Peak output current axis 3 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	20	40
Peak output current axis 4 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	10	20
Peak output current axis 5 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	10	20
Peak output current axis 6 for a max. 5 s (eff. +/- 3 %)	A_{RMS}	10	20
Output frequency of the power output stage	kHz	8	
DC-link voltage U_{ZWK} axis 1 – 6	V	0-850	
Output power S per axis: 1 – 3	kVA	6	12
Output power S per axis: 4 – 6	kVA	3	6
ZWK capacity	µF	115	
Neutral point		grounded	
Capacitor charging current	A	< 15	
Capacitor charging time	sec	< 2	

		SDD 1600-HHHDDD	SDD 1600-LLLHHH
EXTERNAL BRAKE UNIT			
Brake output current	A	1.5	
Over current limit	A	5	
External regen resistor	Ω	25	
EXTERNAL CONNECTIONS			
Output DC2, 4 I_{MAX} (not short-circuit proof)	A	4	
Output DC3 I_{MAX} (Short-circuit proof)	A	2	
Maximum total current incl. brake	A	9	
EXTERNAL FAN (MODEL EBM-PAPST 8412 N/2G)			
Output power	W	1.8	
Maximum fan voltage	V	12	
INTERFACES			
VARAN		1x VARAN In, 1x VARAN Out	
DIMENSIONS			
(W x H x D)	mm	212 x 585 x 217	
Weight	kg	18.8	
ARTICLE NUMBER			
		09-620-1600-HHHDDD	09-620-1600-LLLHHH

DISCONTINUED

EXTERNALLY CONNECTIBLE ENCODER SYSTEMS

External plug-in encoder systems provide flexibility. Resolver, EnDat 2.1 and Hiperface DSL are currently available. The various feedback modules or new encoder variants can be easily added or exchanged. The used feedback system is recognized by the drive automatically.



ENCODER SYSTEMS	ARTICLE NUMBER
EnDat 2.1	09-621-031
Hiperface DSL	09-621-021
Resolver	09-621-011

SERVO MOTORS AKM

TECHNICAL DATA

The AKM synchronous servomotors are brushless rotary current motors with 3-phase windings for demanding servo applications. They contain permanent magnets in the rotor made of neodymium magnet material. Through the low inertial torque, the motors are highly dynamic and have very low cogging. The robust, compact motors with high power density are available in 7 sizes and fine graduations, whereby customization is possible. Motor and encoder cables are available in standard lengths of 5 m / 10 m / 15 m / 20 m.

STANDARD CONFIGURATION

- Smooth wave
- IP65 protection
- 2-pin resolver
- Sensors in the stator windings for temperature monitoring
- UL-conforming configuration

OPTIONS

- Feather key
- Holding brake (AKM 2 - 7)
- Shaft ring seal (IP67)
- Rotatable connector
- Various sensor systems

AKM LOW VOLTAGE

For our S-DIAS DC modules, AKM low voltage servo motors are available for the voltage ranges 24 V and 48 V. Further information on request.

MOTOR	MOTOR – DATA											BRAKE – DATA			DRIVE	
	Motor standstill torque	Rated torque	Peak torque	Nominal rotation speed	Nominal power	Standstill current	Rated current	Peak current	Torque constant	Rotor inertial torque	Motor weight	Holding torque	Inertial torque of the holding brake	Holding brake weight	Rated voltage 230 V	Rated voltage 400 V
	M_0 (Nm)	M_n (Nm)	M_{0max} (Nm)	n_n (min^{-1})	P_n (kW)	I_0 (A)	IN (A)	I_{max} (A)	KT (Nm/A)	J ($kgcm^2$)	m (kg)	M_{br} (Nm)	J_{br} ($Kgcm^2$)	m_{br} (kg)		
AKM1																
AKM11B	0.18	0.17	0.61	8000	0.14	1.16	1.06	4.6	0.16	0.017	0.35	-	-	-	X	
AKM12C	0.31	0.28	1.08	8000	0.23	1.51	1.33	6	0.21	0.031	0.49	-	-	-	X	
AKM13C	0.41	0.36	1.46	8000	0.30	1.48	1.29	5.9	0.28	0.045	0.63	-	-	-	X	
AKM2																
AKM21C	0.48	0.39	1.47	8000	0.32	1.58	1.30	6.3	0.30	0.11	0.82	1.42	0.011	0.27	X	
AKM22C	0.84	0.78	2.73	3500	0.29	1.39	1.28	5.6	0.61	0.16	1.1	1.42	0.011	0.27	X	
AKM22C	0.84	0.68	2.73	8000	0.57	1.39	1.11	5.6	0.61	0.16	1.1	1.42	0.011	0.27		X
AKM22E	0.87	0.70	2.76	8000	0.59	2.73	2.19	11	0.32	0.16	1.1	1.42	0.011	0.27	X	
AKM23C	1.13	1.08	3.77	2500	0.28	1.41	1.35	5.6	0.80	0.22	1.38	1.42	0.011	0.27	X	
AKM23C	1.13	0.99	3.77	5500	0.57	1.41	1.24	5.6	0.80	0.22	1.38	1.42	0.011	0.27		X
AKM23D	1.16	1.03	3.84	5000	0.54	2.19	1.98	8.8	0.52	0.22	1.38	1.42	0.011	0.27	X	
AKM23D	1.16	0.92	3.84	8000	0.77	2.19	1.77	8.8	0.52	0.22	1.38	1.42	0.011	0.27		X
AKM23F	1.18	0.94	3.88	8000	0.79	4.31	3.48	17.2	0.27	0.22	1.38	1.42	0.011	0.27	X	

MOTOR	MOTOR – DATA											BRAKE – DATA			DRIVE	
	Motor standstill torque	Rated torque	Peak torque	Nominal rotation speed	Nominal power	Standstill current	Rated current	Peak current	Torque constant	Rotor inertial torque	Motor weight	Holding torque	Inertial torque of the holding brake	Holding brake weight	Rated voltage 230 V	Rated voltage 400 V
	M_0 (Nm)	M_n (Nm)	M_{0max} (Nm)	n_n (min^{-1})	P_n (kW)	I_0 (A)	IN (A)	I_{max} (A)	KT (Nm/A)	J ($kgcm^2$)	m (kg)	M_{br} (Nm)	J_{br} ($Kgcm^2$)	m_{br} (kg)		
AKM24C	1.38	1.32	4.67	2000	0.28	1.42	1.36	5.7	0.97	0.27	1.66	1.42	0.011	0.27	X	
AKM24C	1.38	1.25	4.67	4500	0.59	1.42	1.29	5.7	0.97	0.27	1.66	1.42	0.011	0.27		X
AKM24D	1.41	1.29	4.76	4000	0.54	2.21	2.05	8.8	0.63	0.27	1.66	1.42	0.011	0.27	X	
AKM24D	1.41	1.11	4.76	8000	0.93	2.21	1.76	8.8	0.63	0.27	1.66	1.42	0.011	0.27		X
AKM24F	1.42	1.12	4.82	8000	0.94	3.89	3.11	15.6	0.36	0.27	1.66	1.42	0.011	0.27	X	
AKM3																
AKM31C	1.15	1.12	3.88	2500	0.29	1.37	1.32	5.5	0.85	0.33	1.55	2.5	0.011	0.35	X	
AKM31C	1.15	1.0	3.88	5000	0.52	1.37	1.18	5.5	0.85	0.33	1.55	2.5	0.011	0.35		X
AKM31E	1.20	0.95	4.0	6000	0.60	2.99	2.32	12	0.41	0.33	1.55	2.5	0.011	0.35	X	
AKM32C	2.0	1.95	6.92	1500	0.31	1.44	1.39	5.8	1.40	0.59	2.23	2.5	0.011	0.35	X	
AKM32C	2.0	1.86	6.92	3000	0.58	1.44	1.33	5.8	1.40	0.59	2.23	2.5	0.011	0.35		X
AKM32D	2.04	1.93	7.1	2500	0.51	2.23	2.10	8.9	0.92	0.59	2.23	2.5	0.011	0.35	X	
AKM32D	2.04	1.65	7.1	5500	0.95	2.23	1.79	8.9	0.92	0.59	2.23	2.5	0.011	0.35		X
AKM32E	2.04	1.87	7.11	3500	0.69	2.82	2.56	11.3	0.73	0.59	2.23	2.5	0.011	0.35	X	
AKM32E	2.04	1.41	7.11	7000	1.03	2.82	1.93	11.3	0.73	0.59	2.23	2.5	0.011	0.35		X
AKM32H	2.10	1.45	7.26	7000	1.06	5.50	3.72	22	0.39	0.59	2.23	2.5	0.011	0.35	X	
AKM33C	2.71	2.64	9.76	1000	0.28	1.47	1.42	5.9	1.86	0.85	2.9	2.5	0.011	0.35	X	
AKM33C	2.71	2.54	9.76	2000	0.53	1.47	1.37	5.9	1.86	0.85	2.9	2.5	0.011	0.35		X
AKM33E	2.79	2.62	9.96	2000	0.55	2.58	2.38	10.3	1.10	0.85	2.9	2.5	0.011	0.35	X	
AKM33E	2.79	2.34	9.96	4500	1.10	2.58	2.13	10.3	1.10	0.85	2.9	2.5	0.011	0.35		X
AKM33H	2.88	2.27	10.22	5500	1.31	5.62	4.37	22.5	0.52	0.85	2.9	2.5	0.011	0.35	X	
AKM4																
AKM41C	1.95	1.88	6.12	1200	0.24	1.46	1.40	5.8	1.34	0.81	2.44	6	0.068	0.63	X	
AKM41C	1.95	1.77	6.12	3000	0.56	1.46	1.32	5.8	1.34	0.81	2.44	6	0.068	0.63		X
AKM41E	2.02	1.82	6.28	3000	0.57	2.85	2.56	11.4	0.71	0.81	2.44	6	0.068	0.63	X	
AKM41E	2.02	1.58	6.28	6000	0.99	2.85	2.23	11.4	0.71	0.81	2.44	6	0.068	0.63		X
AKM41H	2.06	1.62	6.36	6000	1.02	5.60	4.38	22.4	0.37	0.81	2.44	6	0.068	0.63	X	
AKM42C	3.35	3.10	11.3	1500	0.49	1.40	1.29	5.6	2.40	1.5	3.39	6	0.068	0.63		X
AKM42E	3.42	3.12	11.3	1800	0.59	2.74	2.48	11	1.26	1.5	3.39	6	0.068	0.63	X	
AKM42E	3.42	2.81	11.3	3500	1.03	2.74	2.23	11	1.26	1.5	3.39	6	0.068	0.63		X
AKM42G	3.53	2.90	11.5	3500	1.06	4.80	3.92	19.2	0.74	1.5	3.39	6	0.068	0.63	X	
AKM42G	3.53	2.35	11.5	6000	1.48	4.80	3.18	19.2	0.74	1.5	3.39	6	0.068	0.63		X
AKM42J	3.56	2.38	11.6	6000	1.5	8.4	5.53	33.6	0.43	1.5	3.39	6	0.068	0.63	X	
AKM43E	4.70	4.24	15.9	1500	0.67	2.76	2.47	11	1.72	2.1	4.35	6	0.068	0.63	X	
AKM43E	4.70	3.92	15.9	2500	1.03	2.76	2.28	11	1.72	2.1	4.35	6	0.068	0.63		X
AKM43G	4.80	4.00	16.1	2500	1.05	4.87	4.04	19.5	0.99	2.1	4.35	6	0.068	0.63	X	
AKM43G	4.80	3.01	16.1	5000	1.58	4.87	3.04	19.5	0.99	2.1	4.35	6	0.068	0.63		X
AKM43K	4.9	2.62	16.4	6000	1.65	9.6	5.04	38.4	0.52	2.1	4.35	6	0.068	0.63	X	
AKM44E	5.76	5.22	19.9	1200	0.66	2.90	2.55	11.4	2.04	2.7	5.30	6	0.068	0.63	X	
AKM44E	5.76	4.80	19.9	2000	1.01	2.90	2.35	11.4	2.04	2.7	5.30	6	0.068	0.63		X
AKM44G	5.88	4.90	20.3	2000	1.03	5.0	4.12	20	1.19	2.7	5.30	6	0.068	0.63	X	
AKM44G	5.88	3.76	20.3	4000	1.57	5.0	3.16	20	1.19	2.7	5.30	6	0.068	0.63		X
AKM44J	6.00	2.75	20.4	6000	1.73	8.80	3.99	35.2	0.69	2.7	5.30	6	0.068	0.63		X

MOTOR	MOTOR – DATA											BRAKE – DATA			DRIVE	
	Motor standstill torque	Rated torque	Peak torque	Nominal rotation speed	Nominal power	Standstill current	Rated current	Peak current	Torque constant	Rotor inertial torque	Motor weight	Holding torque	Inertial torque of the holding brake	Holding brake weight	Rated voltage 230 V	Rated voltage 400 V
	M_0 (Nm)	M_n (Nm)	M_{0max} (Nm)	n_n (min^{-1})	P_n (kW)	I_0 (A)	IN (A)	I_{max} (A)	KT (Nm/A)	J ($kgcm^2$)	m (kg)	M_{br} (Nm)	J_{br} ($Kgcm^2$)	m_{br} (kg)		
AKM5																
AKM51E	4.70	4.41	11.6	1200	0.55	2.75	2.56	8.2	1.72	3.4	4.2	14.5	0.173	1.1	X	
AKM51E	4.70	3.98	11.6	2500	1.04	2.75	2.31	8.2	1.72	3.4	4.2	14.5	0.173	1.1		X
AKM51G	4.75	4.02	11.7	2500	1.05	4.84	4.07	14.5	0.99	3.4	4.2	14.5	0.173	1.1	X	
AKM51G	4.75	2.62	11.7	5000	1.37	4.84	2.65	14.5	0.99	3.4	4.2	14.5	0.173	1.1		X
AKM51H	4.79	3.87	11.7	3000	1.22	6	4.84	18	0.8	3.4	4.2	14.5	0.173	1.1	X	
AKM51H	4.79	1.95	11.7	6000	1.23	6	2.44	18	0.8	3.4	4.2	14.5	0.173	1.1		X
AKM51K	4.9	2.35	11.9	5500	1.35	9.4	4.52	28.2	0.52	3.4	4.2	14.5	0.173	1.1	X	
AKM52E	8.34	7.61	21.3	1500	1.20	2.99	2.73	9	2.79	6.2	5.8	14.5	0.173	1.1		X
AKM52G	8.43	7.69	21.5	1500	1.21	4.72	4.30	14.2	1.79	6.2	5.8	14.5	0.173	1.1	X	
AKM52G	8.43	7.06	21.5	2500	1.85	4.72	3.94	14.2	1.79	6.2	5.8	14.5	0.173	1.1		X
AKM52H	8.48	7.53	21.6	1800	1.42	5.9	5.22	17.7	1.44	6.2	5.8	14.5	0.173	1.1	X	
AKM52H	8.48	6.26	21.6	3500	2.3	5.9	4.35	17.7	1.44	6.2	5.8	14.5	0.173	1.1		X
AKM52K	8.60	3.90	21.9	5500	2.25	9.3	4.19	27.9	0.93	6.2	5.8	14.5	0.173	1.1		X
AKM52L	8.67	6.40	30.1	3500	2.35	11.6	8.53	58	0.75	6.2	5.8	14.5	0.173	1.1	X	
AKM52L	8.67	3.27	30.1	6000	2.06	11.6	4.36	58	0.75	6.2	5.8	14.5	0.173	1.1		X
AKM52M	8.6	5.2	21.9	4500	2.45	13.1	7.88	39.4	0.66	6.2	5.8	14.5	0.173	1.1	X	
AKM53G	11.4	10.7	29.7	1000	1.12	4.77	4.48	14.3	2.39	9.1	7.4	14.5	0.173	1.1	X	
AKM53G	11.4	9.85	29.7	2000	2.06	4.77	4.12	14.3	2.39	9.1	7.4	14.5	0.173	1.1		X
AKM53H	11.5	8.83	30.0	3000	2.77	6.6	5.05	19.8	1.75	9.1	7.4	14.5	0.173	1.1		X
AKM53K	11.6	7.65	30.3	4000	3.20	9.4	6.17	28.2	1.24	9.1	7.4	14.5	0.173	1.1		X
AKM53M	11.4	8.72	29.7	3000	2.74	13.4	10.26	40.2	0.85	9.1	7.4	14.5	0.173	1.1		X
AKM53P	11.4	5.88	29.8	5000	3.08	19.1	9.8	57.4	0,6	9.1	7.4	14.5	0.173	1.1		X
AKM54G	14.3	12.9	38.0	1500	2.03	5.0	4.48	15	2.88	12	9	14.5	0.173	1.1		X
AKM54H	14.2	12.6	37.5	1500	2.38	5.5	4.9	16.5	2.57	12	9	14.5	0.173	1.1		X
AKM54K	14.4	10.0	38.4	3500	3.68	9.7	6.73	29.2	1.50	12	9	14.5	0.173	1.1		X
AKM54L	14.1	8.13	37.5	4500	3.83	12.5	7.19	37.5	1.13	12	9	14.5	0.173	1.1		X
AKM54N	14.1	9.85	37.6	3500	3.61	17.8	12.31	53.4	0.8	12	9	14.5	0.173	1.1	X	
AKM6																
AKM62G	11.9	10.4	29.7	1800	1.96	4.9	4.33	14.7	2.47	17	8.9	25	0.61	2		X
AKM62K	12.2	9.00	30.2	3500	3.30	9.6	7.04	28.8	1.28	17	8.9	25	0.61	2		X
AKM62M	12.2	5.70	30.2	6000	3.58	13.4	6.31	40.3	0.91	17	8.9	25	0.61	2		X
AKM62P	12.3	8.1	30.3	4500	3.82	18.8	12.27	56.4	0.66	17	8.9	25	0.61	2	X	
AKM63G	16.5	14.9	42.1	1200	1.87	4.5	4.14	13.5	3.70	24	11.1	25	0.61	2		X
AKM63K	16.8	12.9	42.6	3000	4.05	9.9	7.54	29.7	1.71	24	11.1	25	0.61	2		X
AKM63M	17.0	11.3	43.0	4000	4.73	13.8	9.11	41.4	1.24	24	11.1	25	0.61	2		X
AKM63N	17.0	9.60	43.0	5000	5.03	17.4	9.80	52.2	0.98	24	11.1	25	0.61	2		X
AKM64K	20.8	17.2	53.5	2000	3.60	9.2	7.54	27.6	2.28	32	13.3	25	0.61	2		X
AKM64L	21.0	15.6	54.1	3000	4.90	12.8	9.40	38.4	1.66	32	13.3	25	0.61	2		X
AKM64P	20.4	11.9	52.9	4500	5.61	18.6	10.82	55.9	1.10	32	13.3	25	0.61	2		X
AKM64Q	20	15.3	53.2	3000	4.81	20.7	15.3	62.1	1	32	13.3	25	0.61	2	X	
AKM64Q	20	10.7	53.2	5000	6.45	20.7	10.7	62.1	1	32	13.3	25	0.61	2		X
AKM65K	24.8	20.2	64.5	2000	4.23	9.8	7.95	29.1	2.54	40	15.4	25	0.61	2		X

MOTOR	MOTOR – DATA											BRAKE – DATA			DRIVE	
	Motor standstill torque	Rated torque	Peak torque	Nominal rotation speed	Nominal power	Standstill current	Rated current	Peak current	Torque constant	Rotor inertial torque	Motor weight	Holding torque	Inertial torque of the holding brake	Holding brake weight	Rated voltage 230 V	Rated voltage 400 V
	M_0 (Nm)	M_n (Nm)	M_{0max} (Nm)	n_n (min^{-1})	P_n (kW)	I_0 (A)	IN (A)	I_{max} (A)	KT (Nm/A)	J (kgcm²)	m (kg)	M_{br} (Nm)	J_{br} (Kgcm²)	m_{br} (kg)		
AKM65M	25.0	19.2	65.2	2500	5.03	13.6	10.38	40.8	1.85	40	15.4	25	0.61	2		X
AKM65N	24.3	16.0	63.7	3500	5.86	17.8	11.59	53.4	1.38	40	15.4	25	0.61	2		X
AKM65P	24.5	19.1	64.1	2400	4.8	19.8	14.69	59.3	1.3	40	15.4	25	0.61	2	X	
AKM65P	24.5	14.9	64.1	4000	6.24	19.8	11.46	59.3	1.3	40	15.4	25	0.61	2		X
AKM7																
AKM72K	29.7	25.1	79.4	1500	3.94	9.3	7.77	27.9	3.23	65	19.7	53	1.64	2.1		X
AKM72M	30.0	23.6	79.8	2000	4.94	13.0	10.13	39.0	2.33	65	19.7	53	1.64	2.1		X
AKM72P	29.4	20.1	78.5	3000	6.31	18.7	12.72	56.1	1.58	65	19.7	53	1.64	2.1		X
AKM72Q	29.5	23.2	78.4	2000	4.86	23.5	17.85	70.5	1.3	65	19.7	53	1.64	2.1	X	
AKM72Q	29.5	16.3	78.4	4000	6.83	23.5	12.54	70.5	1.3	65	19.7	53	1.64	2.1		X
AKM73M	42.0	33.8	112	1500	5.31	13.6	10.90	40.8	3.10	92	26.7	53	1.64	2.1		X
AKM73P	41.6	28.5	111	2400	7.16	19.5	13.38	58.6	2.13	92	26.7	53	1.64	2.1		X
AKM73Q	41.5	33.4	111	1500	5.25	24.5	19.65	73.5	1.7	92	26.7	53	1.64	2.1	X	
AKM73Q	41.5	25.2	111	3000	7.92	24.5	14.82	73.5	1.7	92	26.7	53	1.64	2.1		X
AKM74L	53.0	43.5	143	1200	5.47	12.9	10.99	38.7	4.14	120	33.6	53	1.64	2.1		X
AKM74P	52.5	39.6	142	1800	7.46	18.5	13.24	55.5	2.84	120	33.6	53	1.64	2.1		X
AKM74Q	52.2	41.9	141	1300	5.71	26.1	20.95	78.3	2	120	33.6	53	1.64	2.1	X	
AKM74Q	52.2	31.5	141	2500	8.25	26.1	15.75	78.3	2	120	33.6	53	1.64	2.1		X

AKM 4 4 J-AN C N GB BO

Flange size:
1 40 mm
2 58 mm
3 70 mm
4 84 mm
5 108 mm
6 138 mm
7 188 mm

Rotor length:
1
2
3
4
5

Winding type:
A ... Z
S special

Flange:
A IEC
B NEMA
C alternative IEC standard
D other standard
G alternative IEC standard
H alternative IEC standard
R IEC with tolerance R

Shaft:
C feather key groove
K open feather key groove
N smooth shaft
S special

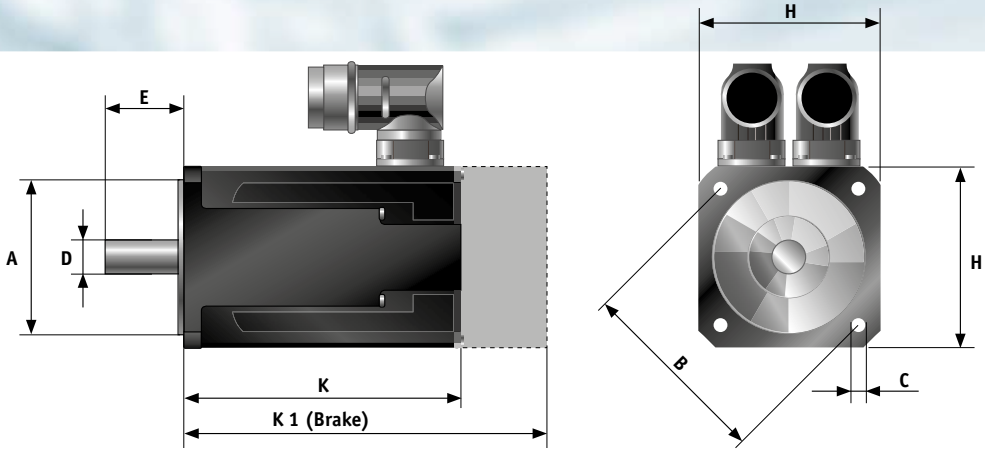
Shaft sealing:
B0 standard
B1 with shaft sealing
xx special

Feedback unit:
DA EnDat 2.1 (AKM2...7) ENC-1113/1313 (Single Turn opt.)
DB EnDat 2.1 (AKM2...7) EQN-1125/1325 (Multi Turn opt.)
LA EnDat 2.1 (AKM2...7) ECI-1118/1319 (Single Turn ind.)
LB EnDat 2.1 (AKM2...7) EQI-1130/1331 (Multi Turn ind.)
GA Hiperface SKS36 (Single Turn opt.)
GB Hiperface (AKM2...7) SKM36 (Multi Turn opt.)
GD Hiperface (AKM1) SEL34 (Multi Turn kap.)
R resolver (Single Turn ind.)
S special

Brake:
2 24 V holding brake
N without brake
S special

Connections:
B angled connector, rotable (AKM2)
C 0.5 m shielded cable with IP65 connector, (AKM1/2) angled connector, rotable (AKM3...7)
Y y-tec plug IP65 (AKM1)
S special

Example Servo Motor AKM 4 4 J-AN C N GB B0:
Motortype AKM 44J, flange according to IEC standard, smooth shaft, rotable connectors, without brake, multiturn encoder SKM36



MECHANICAL DIMENSIONS										
Motor Type	A	B	C	D	E	H (IEC)	K (Resolver)	K1 (Resolver)	K (Hiperface)	K1 (Hiperface)
AKM1										
AKM11	30h7	46	4.3	8h7	25	40	69.6	106.6	79	116
AKM12	30h7	46	4.3	8h7	25	40	88.6	125.6	98	135
AKM13	30h7	46	4.3	8h7	25	40	107.6	144.6	117	154
AKM1 WITH Y-TEC CONNECTOR										
AKM11	30h7	46	4.3	8h7	25	40	79	116	87.5	124.5
AKM12	30h7	46	4.3	8h7	25	40	98	135	107.5	144.5
AKM13	30h7	46	4.3	8h7	25	40	117	154	126.5	163.5
AKM2										
AKM21	40j6	63	4.8	9k6	20	58	95.4	129.5	113.4	147.1
AKM22	40j6	63	4.8	9k6	20	58	114.4	148.5	132.4	166.1
AKM23	40j6	63	4.8	9k6	20	58	133.4	167.5	151.4	185.1
AKM24	40j6	63	4.8	9k6	20	58	152.4	186.5	170.4	204.1
AKM3										
AKM31	60j6	75	5.8	14k6	30	70	109.8	141.3	125.3	159.3
AKM32	60j6	75	5.8	14k6	30	70	140.8	172.3	156.3	190.3
AKM33	60j6	75	5.8	14k6	30	70	171.8	203.3	187.3	221.3
AKM4										
AKM41	80j6	100	7	19k6	40	84	118.8	152.3	136.8	170.3
AKM42	80j6	100	7	19k6	40	84	147.8	181.3	165.8	199.3
AKM43	80j6	100	7	19k6	40	84	176.8	210.3	194.8	228.3
AKM44	80j6	100	7	19k6	40	84	205.8	239.3	223.8	257.3
AKM5										
AKM51	110j6	130	9	24k6	50	108	127.5	172.5	146	189
AKM52	110j6	130	9	24k6	50	108	158.5	203.5	177	220
AKM53	110j6	130	9	24k6	50	108	189.5	234.5	208	251
AKM54	110j6	130	9	24k6	50	108	220.5	265.5	239	282
AKM6										
AKM62	130j6	165	11	32k6	58	138	153.7	200.7	172.2	219.7
AKM63	130j6	165	11	32k6	58	138	178.7	225.7	197.2	244.7
AKM64	130j6	165	11	32k6	58	138	203.7	250.7	222.2	269.7
AKM65	130j6	165	11	32k6	58	138	228.7	275.7	247.2	294.7
AKM7										
AKM72	180j6	215	13.5	38k6	80	188	192.5	234.5	201.7	253.3
AKM73	180j6	215	13.5	38k6	80	188	226.5	268.8	235.7	287.3
AKM74	180j6	215	13.5	38k6	80	188	260.5	302.5	269.7	321.3

PLANETARY GEARS PEII SERIES

TECHNICAL DATA

The servo motors can be combined into compact coaxially constructed drive units using the economic planetary gears from the PEII series. The housing of the low-backlash PEII gears is made of powder-coated steel, the drive shaft with feather key is also made of steel, drive flange and motor adapter plate are made of anodized aluminum. Versatile combination possibilities and precision translation stages enable the optimal adaptation to your specific application.

Additional series are available by request - such as stainless steel, angled gears, high drive torque, smaller backlash classes and food grease lubrication.

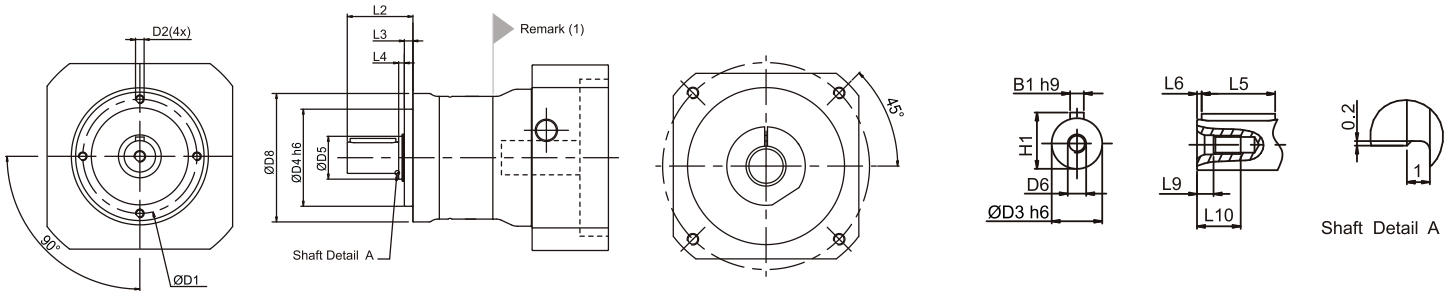
STANDARD CONFIGURATION

- Straight toothing
- Geometric 50/70/90/120/155 flange size
- Backlash up to < 10 angular minutes
- IP65
- High torsional stiffness and low running noise
- Efficiency ≥ 94 – 97 %
- Life-time lubrication

	Gears transmission	Stages	Rated torque	Emergency stop Torque	Max. acceleration torque allowed	Backlash	Torsional stiffness	Rated rotation speed	Max. drive rotation speed	Operating noise	Mass inertial torque	Weight	Shaft diameter
	i		T_{2N} (Nm)	T_{2NOT} (Nm)	T_{2B} (Nm)	Δφ2 (arcmin)	C2 (Nm/arcmin)	n_{1N} (rpm)	n_{1B} (rpm)	LPA (dB)	J (kg.cm²)	kg	Ø(A) (mm)
PEII 050													
	3	1	16	48	28.8	≤ 8	0.9	4500	8000	≤ 60	0.1 – 0.2	0.7	8 - 14
	4	1	16	48	28.8	≤ 8	0.9	4500	8000	≤ 60	0.1 – 0.2	0.7	8 - 14
	5	1	15	45	27	≤ 8	0.9	4500	8000	≤ 60	0.1 – 0.2	0.7	8 - 14
	7	1	12	36	21.6	≤ 8	0.9	4500	8000	≤ 60	0.1 – 0.2	0.7	8 - 14
	10	1	10	30	18	≤ 8	0.9	4500	8000	≤ 60	0.1 – 0.2	0.7	8 - 14
	15	2	15	45	27	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	16	2	16	48	28.8	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	20	2	16	48	28.8	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	25	2	15	45	27	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	30	2	15	45	27	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	35	2	12	36	21.6	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	40	2	16	48	28.8	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	50	2	15	45	27	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	70	2	12	36	21.6	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14
	100	2	10	30	18	≤ 10	0.9	4500	8000	≤ 60	0.1 – 0.2	0.9	8 - 14

	Gear translation	Stages	Rated torque	Emergency stop Torque	Max. acceleration torque allowed	Backlash	Torsional stiffness	Rated rotation speed	Max. drive rotation speed	Operating noise	Mass inertial torque	Weight	Shaft diameter
	i		T_{2N} (Nm)	T_{2NOT} (Nm)	T_{2B} (Nm)	$\Delta\varphi 2$ (arcmin)	C2 (Nm/arcmin)	n_{1N} (rpm)	n_{1B} (rpm)	LPA (dB)	J ($kg.cm^2$)	kg	Ø(A) (mm)
PEII 070													
	3	1	42	126	75.6	≤ 7	2.2	4000	6000	≤ 62	0.1 – 1.53	1.9	8 - 19
	4	1	42	126	75.6	≤ 7	2.2	4000	6000	≤ 62	0.1 – 1.53	1.9	8 – 19
	5	1	40	120	72	≤ 7	2.2	4000	6000	≤ 62	0.1 – 1.53	1.9	8 – 19
	7	1	35	105	63	≤ 7	2.2	4000	6000	≤ 62	0.1 – 1.53	1.9	8 – 19
	10	1	27	81	48.6	≤ 7	2.2	4000	6000	≤ 62	0.1 – 1.53	1.9	8 – 19
	15	2	40	120	72	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	16	2	42	126	75.6	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	20	2	42	126	75.6	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	25	2	40	120	72	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	30	2	40	120	72	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	35	2	35	105	63	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	40	2	43	129	77.4	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	50	2	40	120	72	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	70	2	35	105	63	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
	100	2	27	81	48.6	≤ 9	2.2	4000	6000	≤ 62	0.1 – 1.53	2.3	8 – 19
PEII 090													
	3	1	110	330	198	≤ 6	8	3600	6000	≤ 64	0.2 – 2.68	3.4	14 – 28
	4	1	113	339	203.4	≤ 6	8	3600	6000	≤ 64	0.2 – 2.68	3.4	14 – 28
	5	1	118	354	212.4	≤ 6	8	3600	6000	≤ 64	0.2 – 2.68	3.4	14 – 28
	7	1	96	288	172.8	≤ 6	8	3600	6000	≤ 64	0.2 – 2.68	3.4	14 – 28
	10	1	68	204	122.4	≤ 6	8	3600	6000	≤ 64	0.2 – 2.68	3.4	14 – 28
	15	2	109	327	196.2	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	16	2	116	348	208.8	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	20	2	116	348	208.8	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	25	2	123	369	221.4	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	30	2	108	324	194.4	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	35	2	100	300	180	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	40	2	117	351	210.6	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	50	2	123	369	221.4	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	70	2	100	300	180	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
	100	2	70	210	126	≤ 8	8	3600	6000	≤ 64	0.2 – 2.68	4.3	14 – 28
PEII 120													
	3	1	217	651	390.6	≤ 6	12	3600	4800	≤ 66	1.6 – 14	11.8	19 – 38
	4	1	223	669	401.4	≤ 6	12	3600	4800	≤ 66	1.6 – 14	11.8	19 – 38
	5	1	220	660	396	≤ 6	12	3600	4800	≤ 66	1.6 – 14	11.8	19 – 38
	7	1	198	594	356.4	≤ 6	12	3600	4800	≤ 66	1.6 – 14	11.8	19 – 38
	10	1	155	465	279	≤ 6	12	3600	4800	≤ 66	1.6 – 14	11.8	19 – 38
	15	2	213	639	383.4	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	16	2	228	684	410.4	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	20	2	230	690	414	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	25	2	228	684	410.4	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	30	2	212	636	381.6	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	35	2	206	618	370.8	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	40	2	232	696	417.6	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	50	2	228	684	410.4	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	70	2	206	618	370.8	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38
	100	2	162	486	291.6	≤ 8	12	3600	4800	≤ 66	1.6 – 14	13.8	19 – 38

	Gear translation	Stages	Rated torque	Emergency stop Torque	Max. acceleration torque allowed	Backlash	Torsional stiffness	Rated rotation speed	Max. drive rotation speed	Operating noise	Mass inertial torque	Weight	Shaft diameter
	i		T_{2N} (Nm)	T_{2NOT} (Nm)	T_{2B} (Nm)	$\Delta\varphi 2$ (arcmin)	C2 (Nm/arcmin)	n_{1N} (rpm)	n_{1B} (rpm)	LPA (dB)	J ($kg.cm^2$)	kg	Ø(A) (mm)
PEII 155													
	3	1	430	1290	774	≤ 6	16	2500	3600	≤ 68	2.23 – 24.5	16.5	24 – 42
	4	1	440	1320	792	≤ 6	16	2500	3600	≤ 68	2.23 – 24.5	16.5	24 – 42
	5	1	435	1305	783	≤ 6	16	2500	3600	≤ 68	2.23 – 24.5	16.5	24 – 42
	7	1	366	1098	658.8	≤ 6	16	2500	3600	≤ 68	2.23 – 24.5	16.5	24 – 42
	10	1	295	885	531	≤ 6	16	2500	3600	≤ 68	2.23 – 24.5	16.5	24 – 42
	15	2	424	1272	763.2	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	16	2	452	1356	813.6	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	20	2	454	1362	817.2	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	25	2	450	1350	810	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	30	2	422	1266	759.6	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	35	2	382	1146	687.6	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	40	2	459	1377	826.2	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	50	2	450	1350	810	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	70	2	382	1146	687.6	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38
	100	2	308	924	554.4	≤ 8	16	2500	3600	≤ 68	1.69 – 14.2	20.1	19 – 38



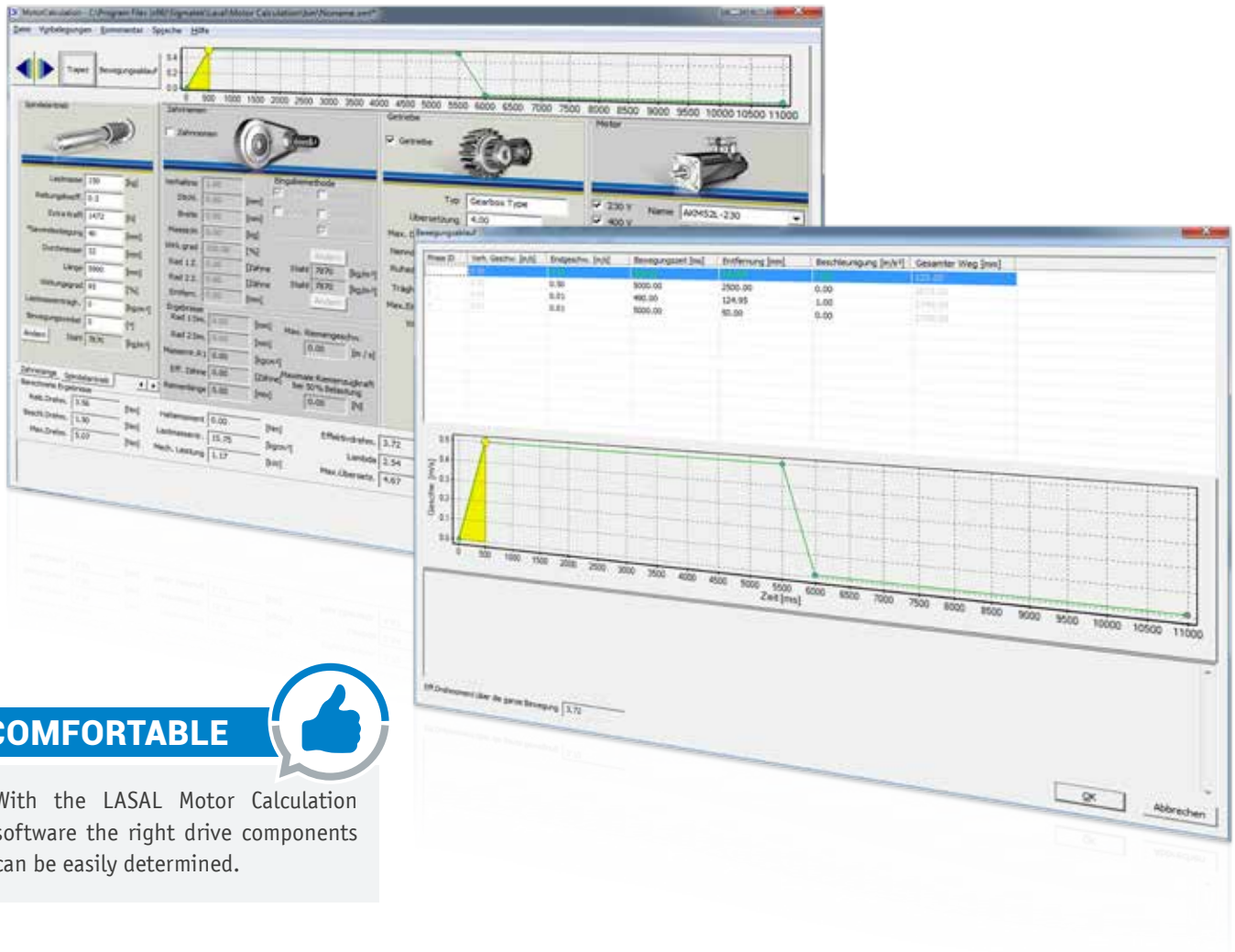
MECHANICAL DIMENSIONS										
DIMENSION	**PEII 050**		**PEII 070**		**PEII 090**		**PEII 120**		**PEII 155**	
	1-STAGE	**2-STAGE**	**1-STAGE**	**2-STAGE**	**1-STAGE**	**2-STAGE**	**1-STAGE**	**2-STAGE**	**1-STAGE**	**2-STAGE**
D1	44		62		80		108		140	
D2	M4X9		M5X10		M6X12		M8X15		M10X18	
D3h6	12		16		22		32		40	
D4h6	35		52		68		90		120	
D5	17		22		30		40		55	
D6	M4X0.7P		M5X0.8P		M8X1.25P		M12X1.75P		M16X2P	
D8	50		70		90		120		155	
L2	24.5		36		46		70		97	
L3	4		4.5		6		7		9.5	
L4	2.5		3.5		4		5		5.5	
L5	14		25		32		50		70	
L6	2		2		2		4		6	
L9	4.5		4.8		7.2		10		12	
L10	10		12.5		19		28		36	
B1h9	4		5		6		10		12	
H1	13.5		18		24.5		35		43	

DRIVE DESIGN MADE EASY

LASAL MOTOR CALCULATION SOFTWARE

For any application, the following applies: With an optimized drive concept, the efficiency of the machine and the energy efficiency in particular, can be increased.

Important thereby is the need-based dimensioning and the professional configuration of drives, motors and gears. The all-in-one engineering tool LASAL supports you in the configuration with the comfortable LASAL Motor Calculation software. Based on user-definable speed profiles (speed, acceleration, distance or motion time) and mechanical data (weight, diameter, mass, ratios), the optimal drive can be specified for the respective application.



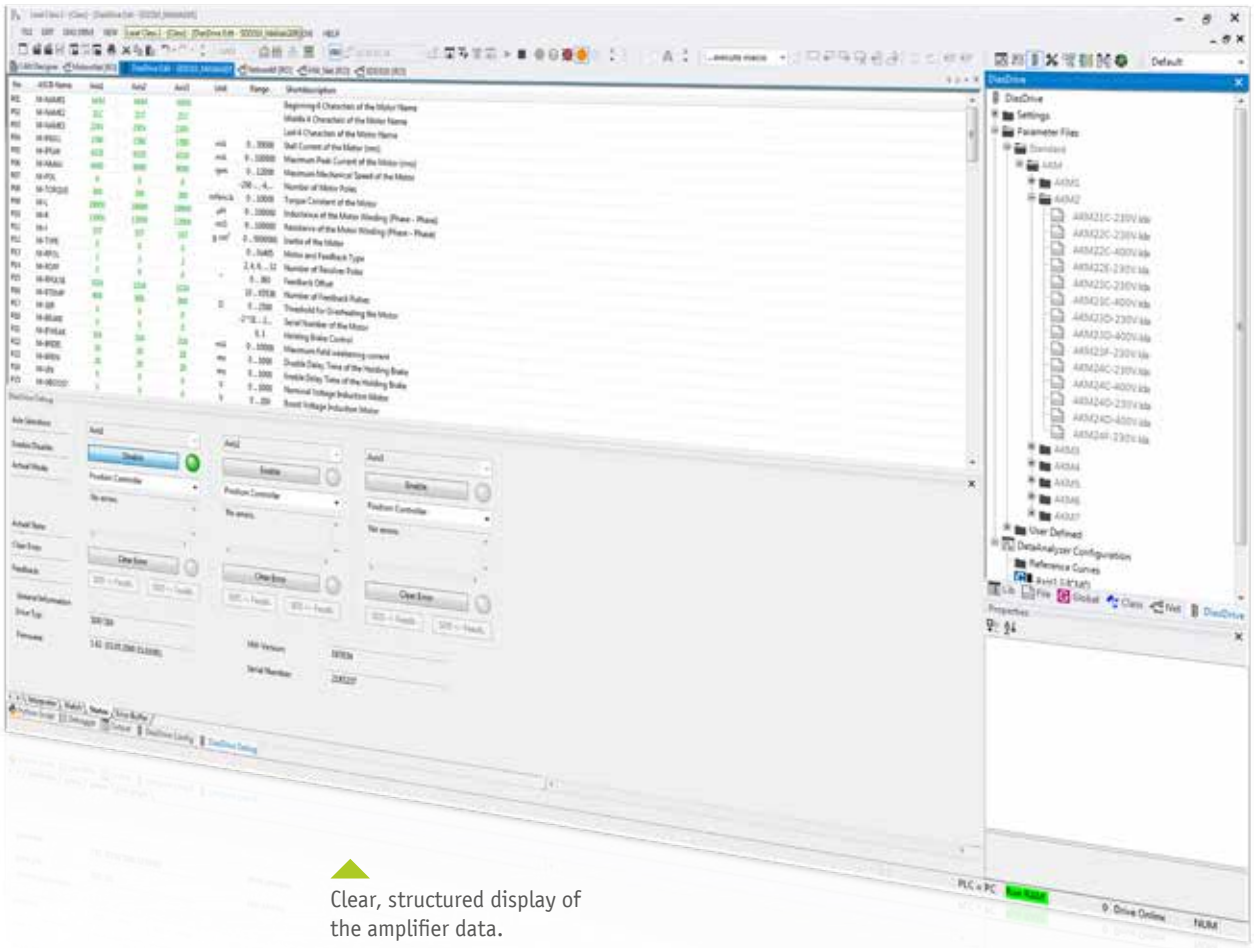
COMFORTABLE

With the LASAL Motor Calculation software the right drive components can be easily determined.

LASAL AND LASAL MOTION

SIMPLE INTEGRATION OF DRIVE TECHNOLOGY

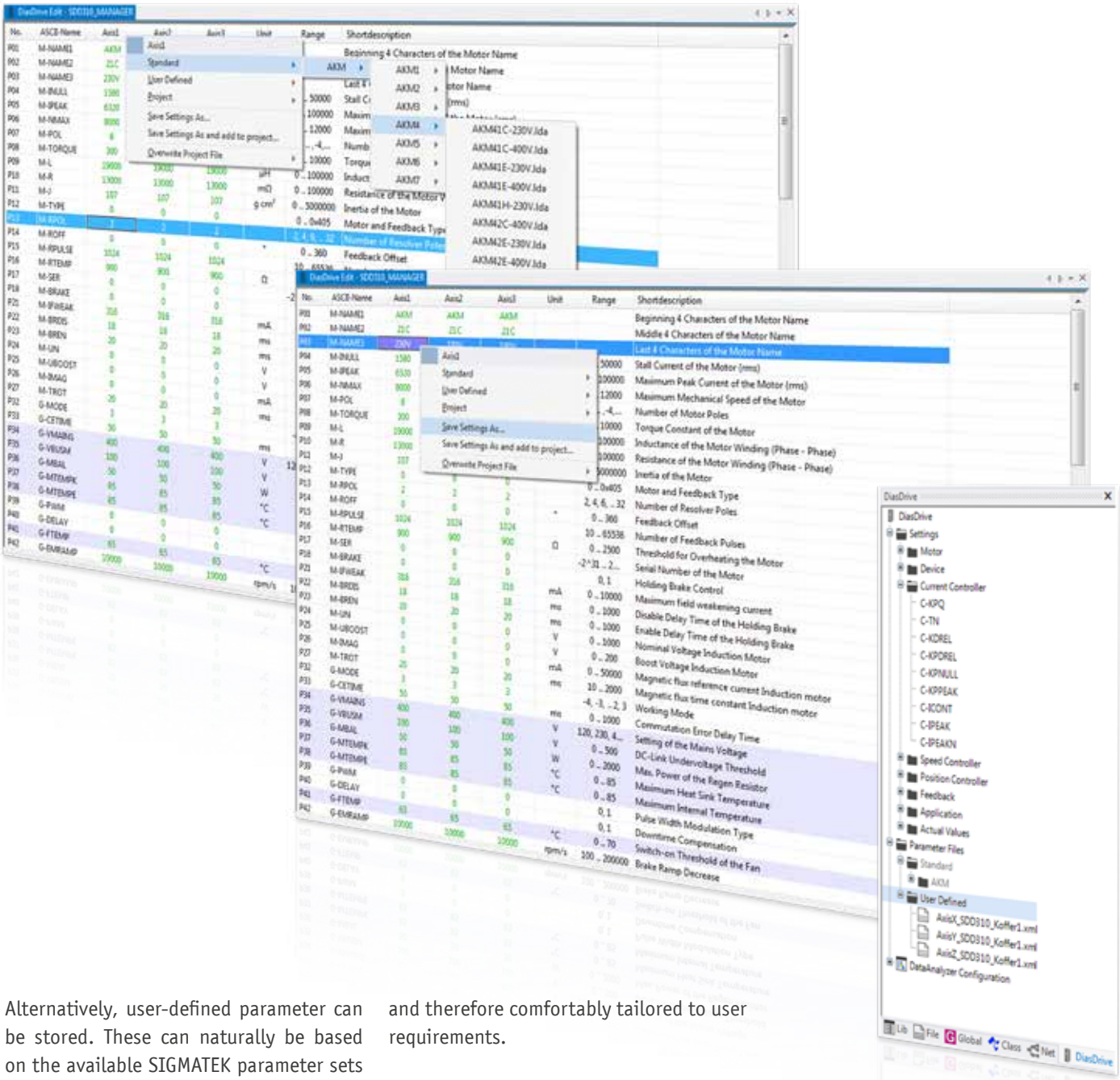
LASAL is the all-in-one engineering tool from SIGMATEK and makes a significant contribution to the fast and easy integration into the control system. The initial start-up or parameterizing software for the DIAS Drives is completely integrated into LASAL, no additional software is needed.



Clear, structured display of the amplifier data.

PARAMETER SETS AVAILABLE FOR ALL SIGMATEK MOTORS

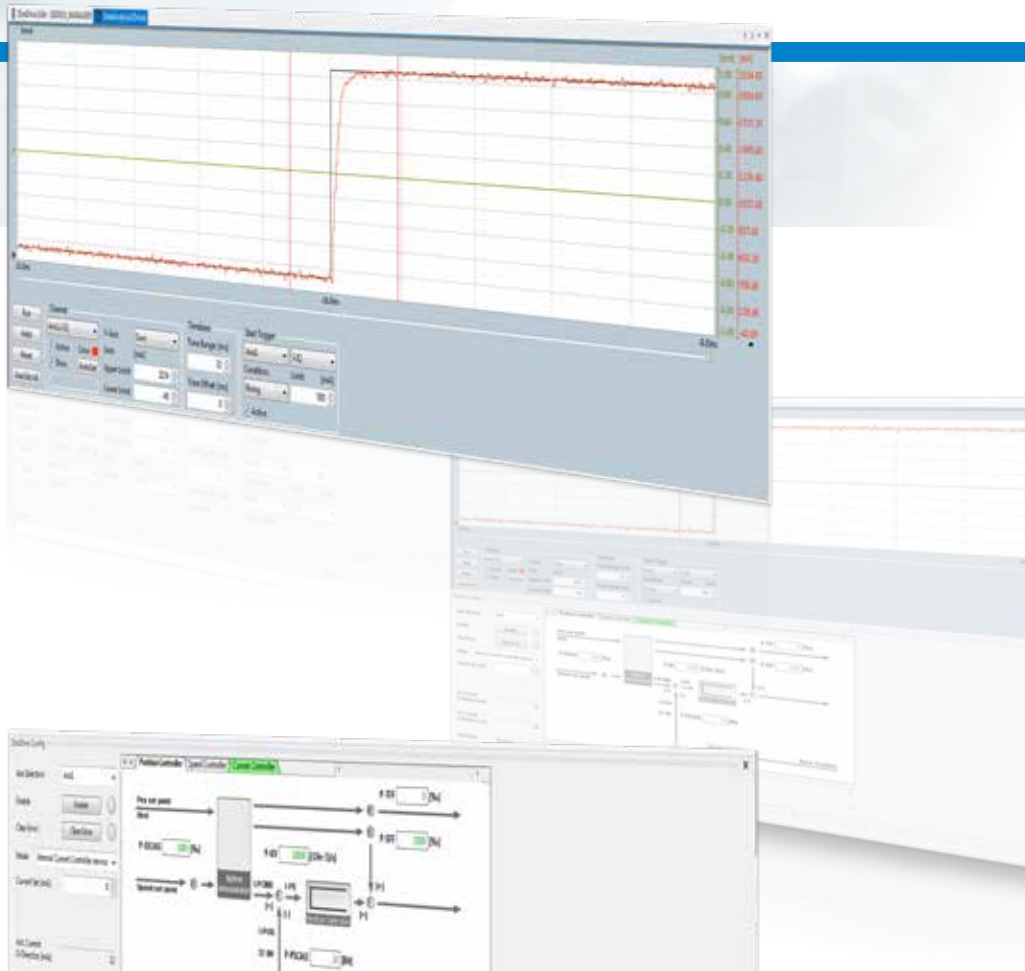
Parameter sets for SIGMATEK motors are already available. The user simply has to adjust the system-specific data and does not have to worry about the motor parameters. All the parameters can be stored in the control, which guarantees that the drive always has the correct data. An exchange of the drive is therewith easily and without a software tool possible.



Alternatively, user-defined parameter can be stored. These can naturally be based on the available SIGMATEK parameter sets and therefore comfortably tailored to user requirements.

INTERNAL DATA ANALYZER

The DIAS Drives have an internal data analyzer that can record data with a scan rate of 62.5 µs. These data are recorded in the converter in real-time and then displayed through the software tool. Optimizing the controllers and displaying the data analyzer can be done in the same screen view.

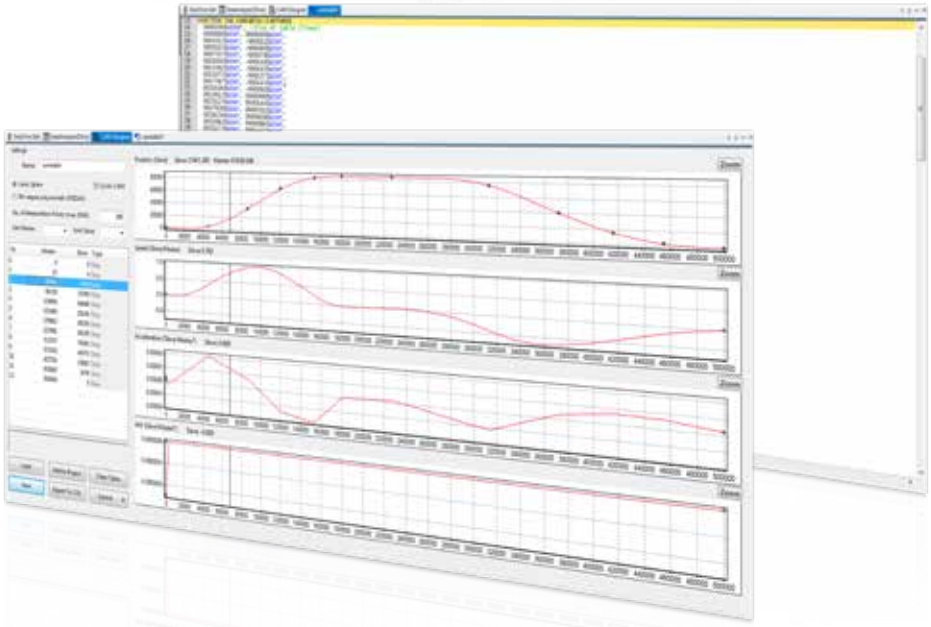


GRAPHIC REPRESENTATION OF THE INITIAL CONTROLLER START-UP

Current, speed and position control are graphically displayed in the software, which ensures a clear overview at any time. All respective control parameters are visible at a glance and can be individually customized.

CAM DESIGNER: COUPLE CAM DISCS

With the CAM designer cam disc couplings can be easily calculated and displayed. Interpolation points are defined for calculations. Based on this, position, speed, acceleration and jerk curves can be displayed. The selection of various interpolation types enables an exact adaptation to the requirements of the specific application.



LASAL MOTION FLEXIBLE MOTION DESIGN

The LASAL MOTION package simplifies all drive technology tasks. Complex axis control and regulation tasks can also be comfortably implemented.

A large motion library is available to the user: Functions such as absolute, relative and endless positioning, CNC functions and several reference types are provided.

In addition, a selection of motion control and technology modules are also available.

Examples are coordinated movements such as synchronization with up to 9 axes in a space, circular interpolation, cam disks, flying saw or cam gear. This ensures a further reduction in programming and testing.

SIMULATION

Whether synchronization of axes in a space, CNC code or complex robot kinematics – all motion functions can be easily simulated.

MOTION DIAGNOSTIC VIEW

With the Motion Diagnostic View, initial start-up and diagnosis of the drive components are also reduced significantly: The axes can be comfortable parameterized and started and commands quickly sent – even troubleshooting is simple. The graphic representation provides additional comfort and clarity.

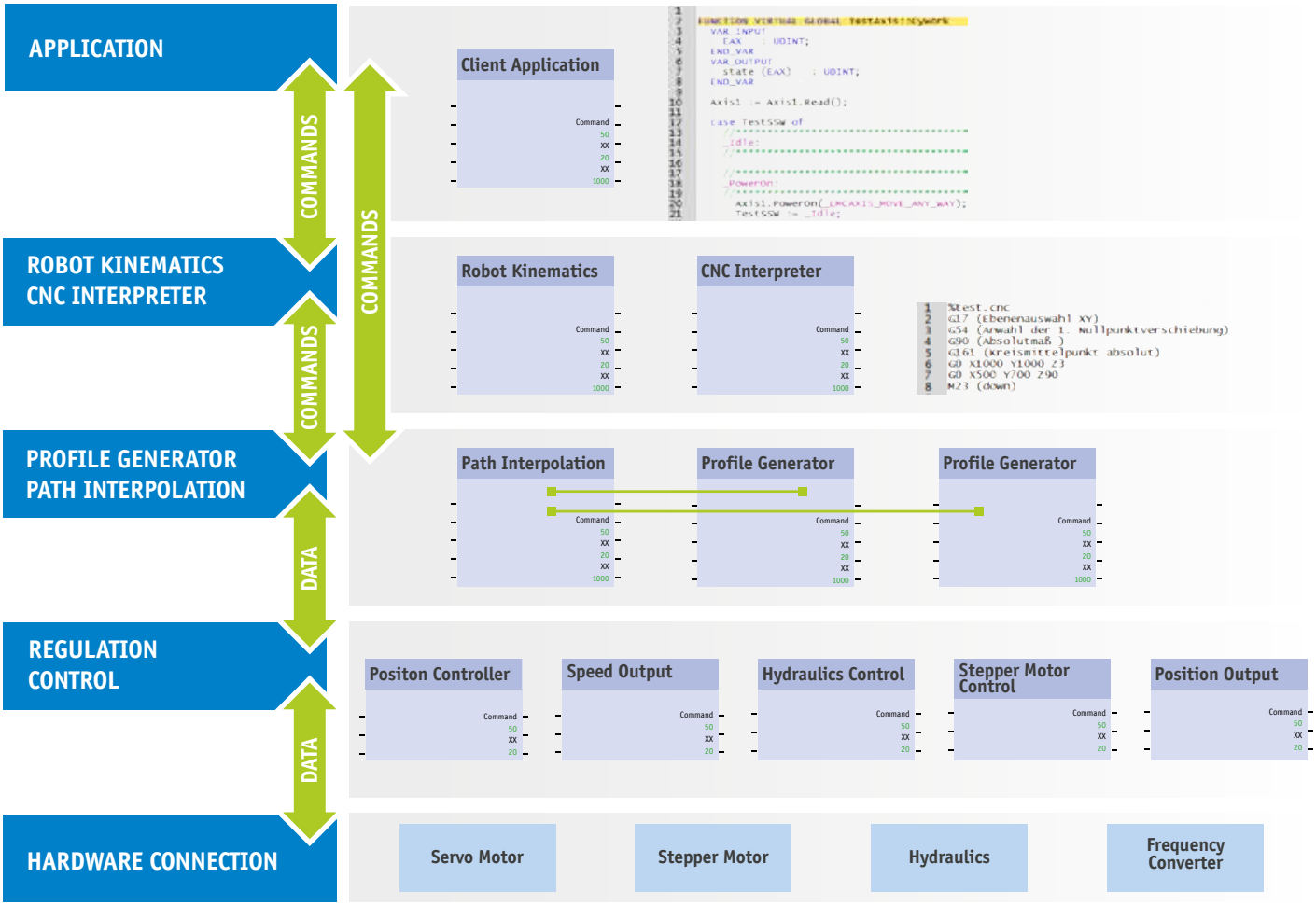
MODULAR CONSTRUCTION OF THE MOTION SOFTWARE

Object-oriented engineering with LASAL provides the user with the highest modularity. The motion control components and templates can also be combined as desired, whereby the implementation of various motion requirements of the application can be easily realized.

The modular construction of the software allows hardware-independent motion control. For the customer application, it is therefore irrelevant whether a hydraulic axis, servo motor or similar is operated. The instruction call is always the same.

During development of LASAL MOTION, a great deal of attention was given to ease of use and efficient axis commands. Several axes can therefore be synchronized with just one command call. Synchronization can be achieved through speed, position, position offset, with gearing or virtual axis.

The motion control is independent of the used hardware.



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