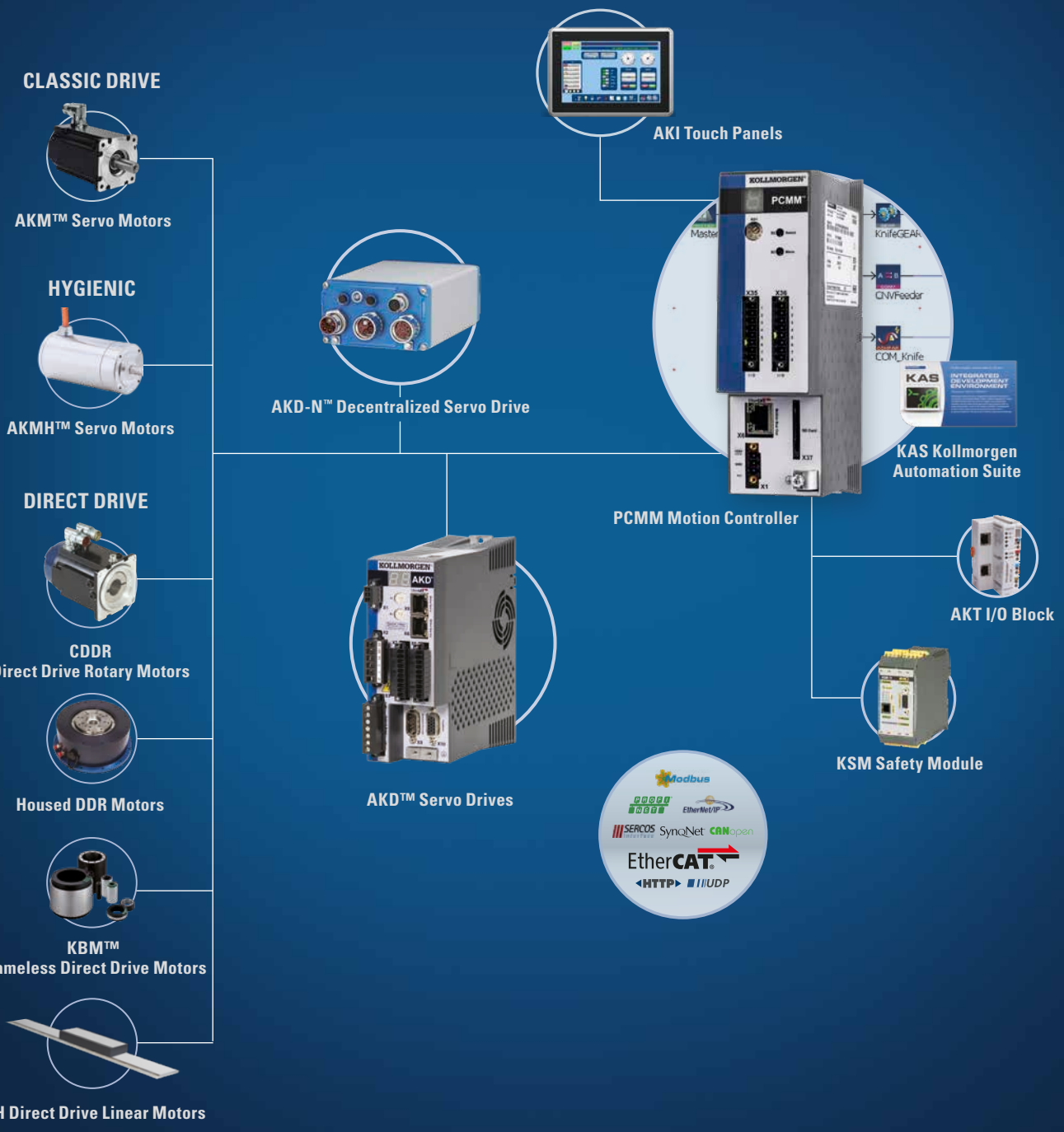
Kollmorgen
Automation and Motion Control



KOLLMORGEN®

Because Motion Matters™

Kollmorgen: Your partner. In Motion.

Every solution comes from a real understanding of the challenges facing machine designers and users.

Innovators consistently rate Kollmorgen as one of their best motion systems manufacturing partners. Whether you are looking for classic servo motors, direct-drive servo motors, stepper motors, drives & amplifiers, gearing, actuation, or CNC & multi-axis motion controllers, Kollmorgen is one of the few companies in the world whom actually design and manufacture all of these products.

Our customers are leaders in many industries such as Aerospace & Defense, Printing, Packaging & Converting, Food & Beverage Processing, Medical Imaging, Invitro Diagnostics & Laboratory Automation, Pharmaceutical Manufacturing, Material Forming and Cutting, Oil & Gas, and Robotics. Kollmorgen is also a leader in Warehouse Automation, including complete AGV systems, software, awareness and autonomy.

Our Automation Solutions can be found on Mars and in space, ships and submarines, O&G drilling and metrology, Surgical robots and laser eye surgery, even inside of artificial hearts. These are just a few applications that demand high-performance and high-quality while satisfying their specific needs.

Because motion matters, it's our focus: Motion can distinctly differentiate a machine and deliver a marketplace advantage by increasing its performance and dramatically improving overall equipment effectiveness (OEE).

High-performance motion can make your customer's machine more reliable and energy-efficient, enhance accuracy and improve operator safety. Motion also represents endless possibilities for innovation.

We've always understood this potential, and thus have kept motion at our core and in our Vison, Mission & Values, relentlessly developing products that offer precise control of torque, velocity and position accuracy in machines that rely on complex motion.

KOLLMORGEN®

Because Motion Matters™

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Removing the Barriers of Design, Sourcing, and Time

At Kollmorgen, we know that OEM engineers can achieve a lot more when obstacles aren't in the way. So, we clear obstacles in three important ways:

Integrating Standard and Custom Products

The optimal solution is often not clear-cut. Our application expertise allows us to modify standard products or develop totally custom solutions across our whole product portfolio so that designs can take flight.

Providing Motion Solutions, Not Just Components

As companies reduce their supplier base and have less engineering manpower, they need a total system supplier with a wide range of integrated solutions. Kollmorgen offers complete solutions as well as motion subsystems that combine programming software, engineering services and best-in-class motion components.

Global Footprint

With direct sales, engineering support, manufacturing facilities, and distributors spanning the Americas, Europe, Middle East, and Asia, we're close to OEMs worldwide. Our proximity helps speed delivery and lend support where and when they're needed.

Financial and Operational Stability

A key driver in the growth of all Kollmorgen divisions is the Business System, which relies on the principle of "kaizen" – or continuous improvement. Using world-class tools, cross-disciplinary teams of exceptional people evaluate processes and develop plans that result in superior performance.

Kollmorgen: Your partner. In Motion.

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Automation and Motion Control

Comprehensive Line of Products Offering Complete System Solutions

Kollmorgen's comprehensive line of control software and hardware, drives and motors enables you to complete your solutions with one supplier:

Whether you want a stand-alone controller or drive-resident, Kollmorgen's KAS can coordinate up to 128 axes, and synchronize the path of up to 32 axes per control engine. We offer standard languages according to IEC61131 -3, as well as C, C+, C++, C#, .NET, and our industry-leading graphical programming language, Pipe Network.

Our broad range of motor- and drive technologies and gearing and actuation products interface seamlessly with our KAS.

Diverse and Scalable Drive Solutions

Need more axes? Different motor types? Linear direct drives here, direct drives with no housing there? No problem! With the EtherCAT® system bus you can connect more AKD servo drives and add motors of all performance classes from the Kollmorgen product range.

Interfaces are frequently the bottleneck in system design. Not so with the Kollmorgen Automation Suite. With the IO Advanced Kollmorgen Terminals (AKT) and the EtherCAT® bus coupler, you possess a flexible interface system which meets all of your requirements.

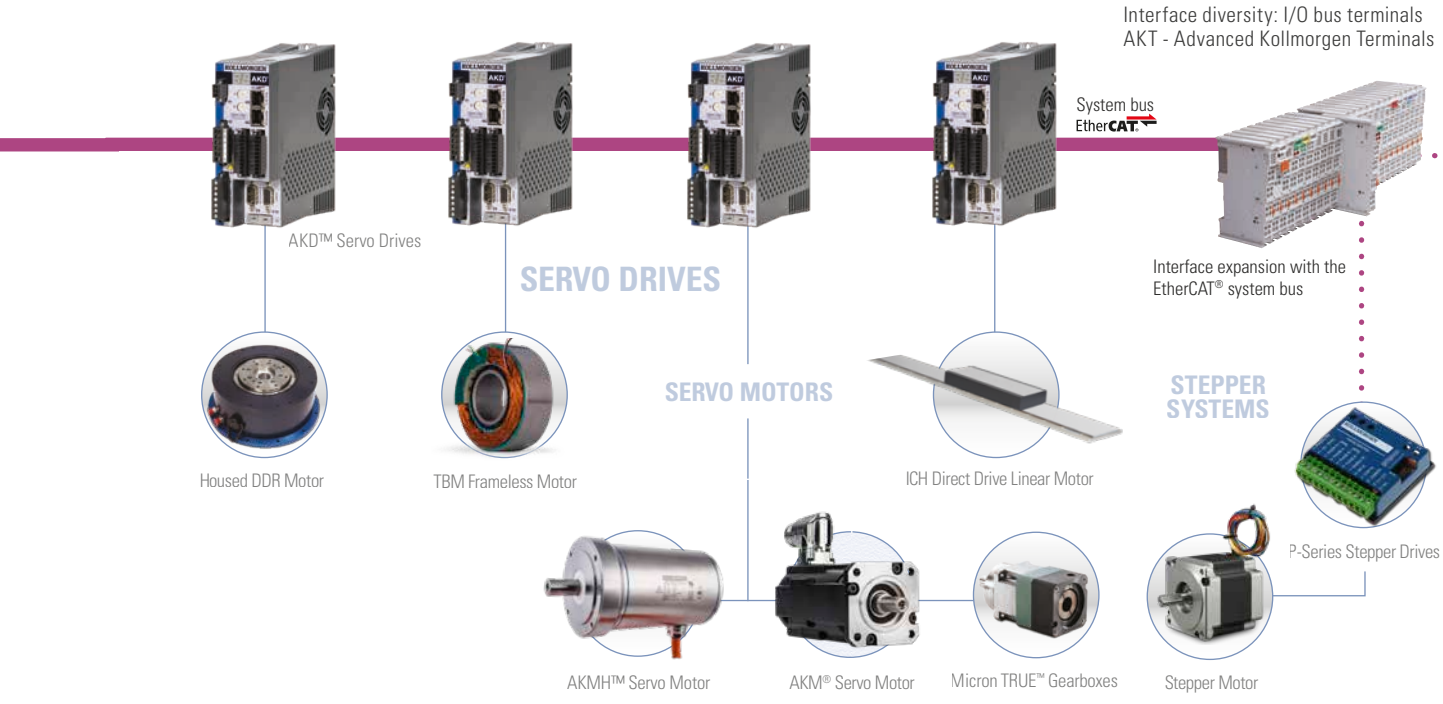
Control and monitor the processes on the machine with the AKI series touch panels. With the Kollmorgen Visualization Builder (KVB), you can program ergonomic user interfaces which guarantee safe handling and which display machine data clearly.

PCMM: Motion Control without expensive IPC

PCMM is a motion controller, which represents a genuine alternative to expensive and complex IPCs. These devices have an additional sequence control system for motion control and can coordinate up to 128 axles in sync. If cycle time of less than 250 µs is required in the course of continuous path control, thanks to its excellent processing performance, the PCMM is capable of processing up to 32 servo drive axles in a deterministic process.

The PCMM can be seamlessly integrated into the machine configuration by selecting communication via TCP/IP, Modbus TCP , Ethernet/IP or ProfiNet with simple settings in the software. For high-performance motion control and axle synchronization, the PCMM takes on the role of the EtherCAT Master. The digital inputs and outputs of the device support EtherCAT-based additions to the inputs and outputs, as well as the connection of other EtherCAT components.

Both the PLC and motion control are programmed in the standardized IEC 61131-3 languages and rounded off with an integrated Web server for remote maintenance and status queries. All devices settings and motion control programming are saved on an SD card, which represents a real advantage in terms of service



Kollmorgen Automation Suite™

Get to market faster while reducing costs with innovative drive solutions! The Kollmorgen Automation Suite supports you with harmonized software and hardware components. Whether it is a simple single-axis drive or a complex multi-axis drive system: With the Kollmorgen Automation Suite you quickly achieve comprehensive machine automation solutions.

The Kollmorgen Automation Suite is based on three pillars – the integrated development environment, the hardware (such as multi-axis controllers, interface and safety modules), and a broad portfolio of servo motors, as well as engineering support from Kollmorgen in the development of special drive solutions. The integrated development environment offers all the tools for PLC and drive programming, for the user interface display, and extensive offline test and debugging tools. All drive components communicate with each other via the fast EtherCAT system bus, and fieldbus protocols are available for connecting to higher-level systems. With Kollmorgen's wide range of servo motors – be they rotary or linear – you'll see incredible motion.

Do not make compromises when designing your drive and give us a call! There have been thousands of occasions where customer-specific modifications of existing products or new developments have turned a drive into the perfect drive. The Kollmorgen engineering team is highly capable of turning the seemingly impossible into reality.

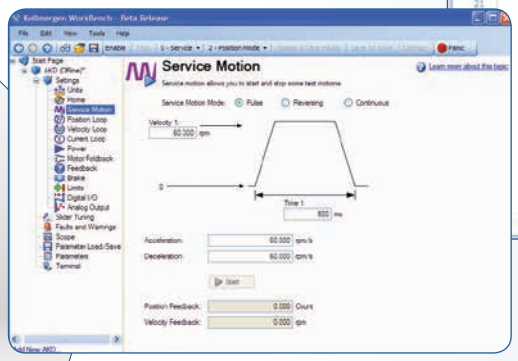
The Advantages of Kollmorgen Automation Suite™

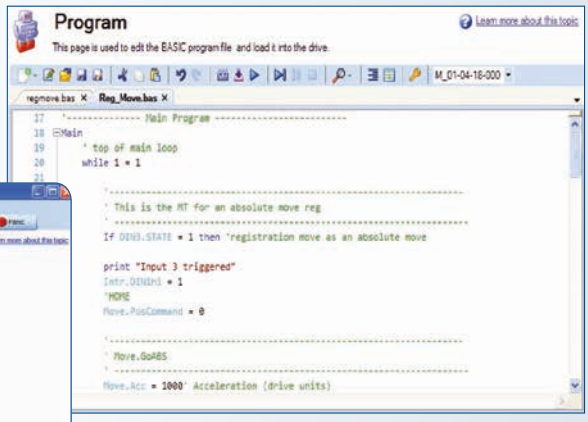
• High machine performance	• Up to 25% greater throughput • Up to 50% scrap reduction • Improved accuracy • Advanced drive technology for machines with outstanding performance
• Fast to market	• Up to 30% reduction in development time • Services available for program development, training, start-up, and support • Industry standard programming environment and industrial networks
• Enhanced ease-of-use and integration	• Single integrated programming environment for automation, drive technology, and all hardware • Drag-and-drop motion programming • Certified components that are tested to work together • Seamless integration and configuration of amplifiers for optimal set-up
• A demonstrated solution	• The result of many years of permanent optimization of programming and implementing automation and drive solutions • Provides the diverse experience of a great number of suppliers and platforms that form today's Kollmorgen • Used successfully for many years

Scalable Programmability

Kollmorgen delivers cutting-edge technology and performance with the AKD® servo drive and KAS controls platform. Whether your application requires a single axis or over 100 fully synchronized axes, Kollmorgen's intuitive software and tools scale to meet your needs. From simple analog torque control to the latest high-performance automation network, the AKD servo drive packs power and flexibility for virtually any application into one of the most compact footprints of any digital servo drive in the industry.

- Patented auto-tuning delivers optimized performance in seconds.
- 1.5MHz current loop and 16KHz velocity loops offers greater bandwidth and performance Optimized performance in seconds
- Greater throughput and accuracy
- Easy-to-use Graphical User Interface (GUI) for
- faster commissioning and troubleshooting
- Flexible and scalable to meet any application





- Controlled by analog torque-and-velocity commands
- Includes electronic gearing via X9 connector
- Includes access to 11 digital I/O and 2 analog I/O on base drive
- Includes 2 high-speed digital inputs
- Expandable to 31 digital I/O and 4 analog I/O

Motion Tasking ("P" Option)

- Adds simple point-and-click indexing to base drive
- Provides user with pre-programmed options
- Guides novice user through simplified steps to create indexing moves
- Network connectivity to EtherCAT®, CANopen®,
- Profinet®, Ethernet/IP™, TCP/IP, SynqNet and others
- MODBUS port for communication with HMI

BASIC Programmable 1.5 Axis Drive ("T" Option)

- Adds BASIC programmability to base AKD
- 4KHz programmable interrupt service routines
- Conditional statements, built-in math functions, user functions and subroutines
- Includes 2 high-speed digital inputs
- Same package size as base drive
- Expandable to 31 digital I/O and 4 analog I/O
- Optional integrated SD card for easy backup and drive cloning
- Includes electronic camming functionality

RANGE OF KOLLMORGEN AUTOMATION SUITE CAPABILITIES

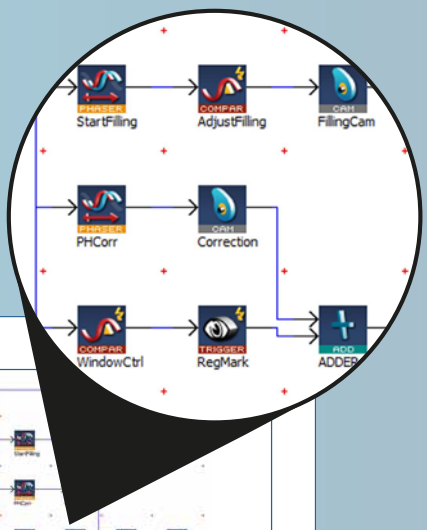
Programmable Drive Multi-Axis Master PDMM ("M" Option)

- Scalable solution for use as a single-axis drive with integrated programmable automation controller
- Choose from all five IEC 61131-3 languages for soft PLC process programming
- Program motion using your choice of PLCopen for motion or our innovative Pipe Network™
- 4KHz PLC scan rate and EtherCAT® updates
- Complete line of HMI panels with integrated software to simplify GUI development
- Exclusive function blocks, such as "wait," enable your program to act as a scanning or sequential language
- On-board I/O includes 17 digital (with 2 high speed inputs) and 2 analog
- Connects to AKT™ network I/O for nearly unlimited expandability

Seamlessly add additional axes and AKD PDMM serves as a high-performance multi-axis machine controller

- SD card for easy backup and system updates
- Integrated webserver for diagnostics and troubleshooting from any computer or mobile device
- Provide true synchronized-path control of up to 32 axes *
- Reduce cabinet size and wiring requirements with a single, compact package
- Easily manage remote I/O and the I/O of all attached drives via EtherCAT®
- Use industry standard PLCopen for motion, or step up to Kollmorgen's Pipe Network™ to program sophisticated camming and gearing applications in a matter of minutes

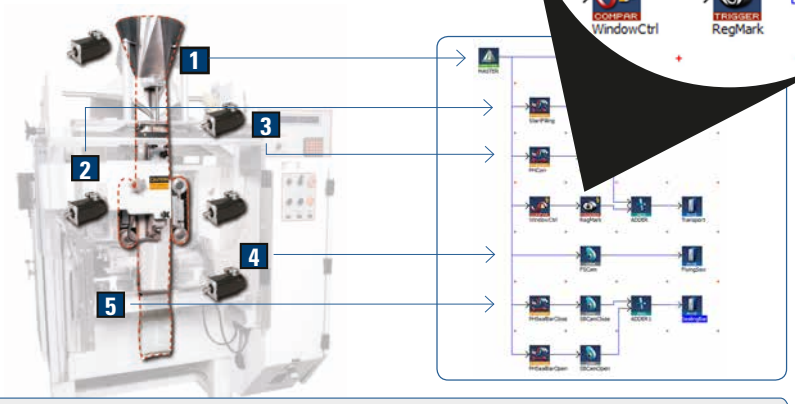
*Maximum axis count depends on motion/automation complexity and performance (8 axes nominal based on medium complexity at 4 kHz network update rate)



Pipe Network™

Kollmorgen Visual Motion Programming

- Accelerate development by programming tasks in hours that would otherwise take weeks
- Improved coding quality through visual programming and by using pre-built modules that have been thoroughly tested and optimized
- Easy knowledge transfer, replacing pages of complex code with easily understood graphical representations
- Available on PDMM controllers



Pipe Network provides a one-to-one translation of a mechanical system into a logical world as shown in the Vertical Form Fill and Seal machine above. Click and build your motion program in minutes, or contact Kollmorgen for examples of common machine architectures to further accelerate your development.

Programming

Multi-Axis Programming

Development

A fully integrated development environment (IDE) provides the tools you need to develop everything from PLC and motion programs to HMI and device setup – all in one place. It's easier to learn and use, eliminates the need for multiple programs and data stores, and helps you bring a higher-quality machine to market faster.

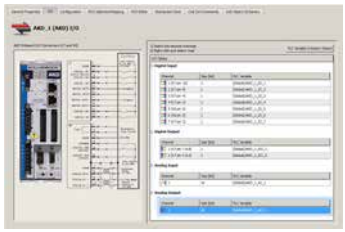
Integrated Development Environment (IDE)

- Our fully integrated programming environment incorporates standard IEC61131-3 compliant too
- Use our network configurator and predefined user blocks to streamline development and ensure programming quality.

Our IDE offers two powerful programming methods and a complete set of tools for simulating, testing and optimizing motion.

Embedded Motion

Choose PLCopen for motion if you already use this industry standard in your existing products, and want to continue using it within the Kollmorgen Automation Suite programming environment.

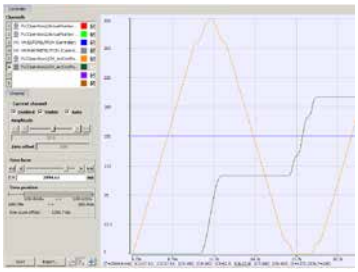


Embedded wiring diagrams and one-click IO variable mapping makes drive integration easy.

Pipe Network™
Kollmorgen Visual Motion Programming

· Choose Kollmorgen's exclusive Pipe Network™ for the quickest, easiest way to represent mechanical systems in software – using drag-and-drop tools to create an intuitive visual representation.

Integrated Tools



Scope motion parameters to fine-tune performance and synchronization, portrayed with up to eight channels and flexible mapping of variables.

One-click motion simulation using virtual axes alongside real axes for quick development and implementation.

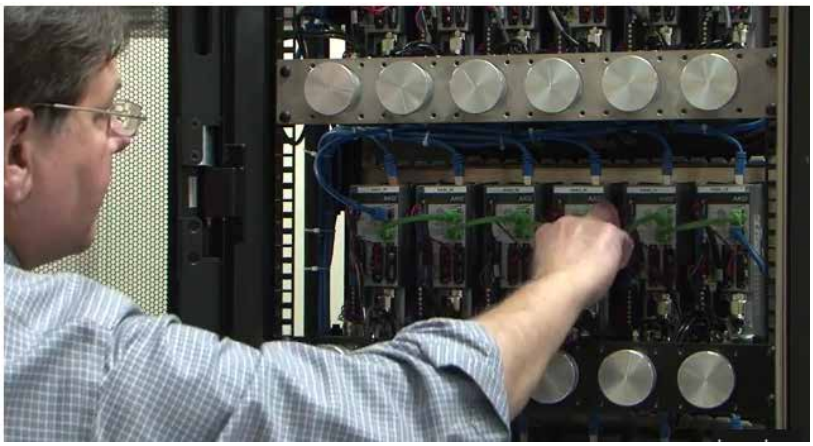
Complete motion system configuration from one location with embedded AKD Workbench allows configuration of all servo drives over EtherCat®.

Lifecycle

Kollmorgen is committed to helping you maximize the productivity and profitability of your machine across an extended lifecycle. Design and build today, with confidence for a full return on investment for years to come.

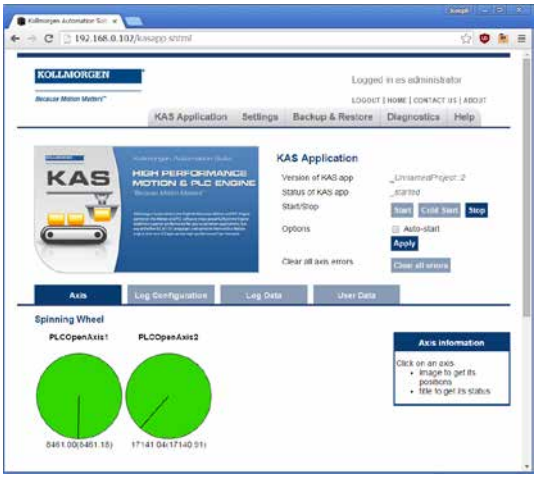
Continual Development Testing

Kollmorgen develops, tests, and continually validates all new products to ensure compatibility and performance, in the Kollmorgen ecosystem.



Maintenance Support Tools

Our tools give end-users the ability to remotely verify continuous operation and communicate issues effectively.



Built-in, mobile-ready webserver provides performance information with no software required

Software and Hardware Security

Password protection for source code and hardware connectivity provides security for both OEMs and end-users.

✓ Protect source code
✓ Protect network access

Software PLC

Easy-to-Use, Auto-Discover, Auto-Recognize, Auto-Configure, Scope, CAM, IEC 61131-3 PLC

- Kollmorgen Automation Suite™ offers a set of tools that is familiar to automation programs, but has enhancements like predefined motion blocks and visual diagnostics tools.

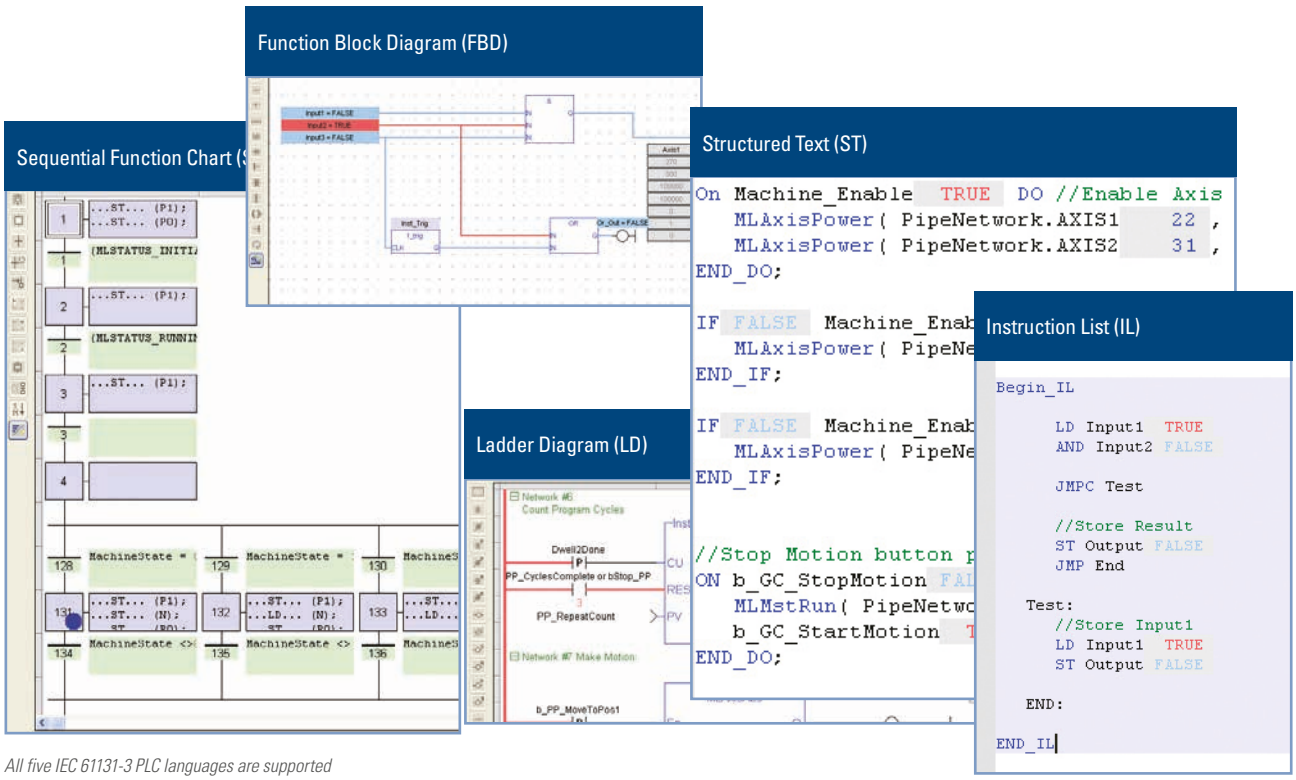
IEC 61131-3 Toolkit Features

- IEC-61131-3 engine
- Re-compile while running animated variables
- Industry and application Specific Function Blocks
- PID temperature control block
- Debugger Tools with Watch window
- 8-channel Real-Time Oscilliscope

- The environment for developing PLC programs has been created with an emphasis on speed. Recognize and configure motion control components to accelerate systems development. With auto-recognize and auto-configure features, testing efforts are reduced.

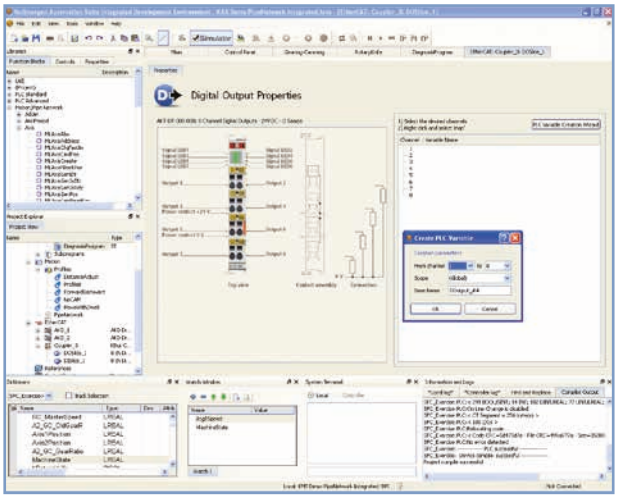
- Once an application or a function block has been created for a given application, the user can store this as a "user-defined function block" to promote reuse of tested software in subsequent projects to save time.

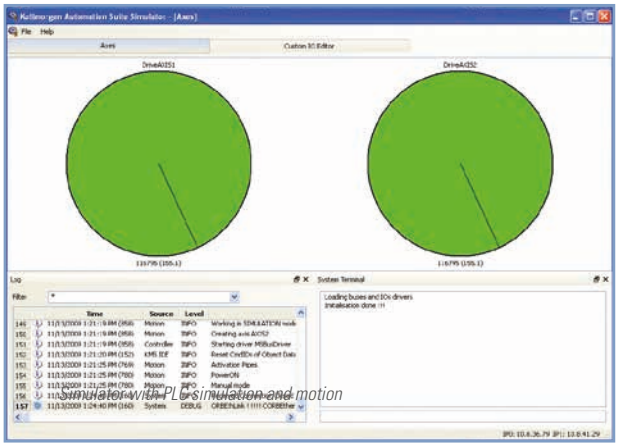
- Maintain your standards in corporate programming languages by using any of the IEC 61131-3 languages. In fact, enhance it further by mixing and matching languages to deliver the best solution for the application.



All five IEC 61131-3 PLC languages are supported

- Kollmorgen Automation Suite's integrated development environment (IDE) allows the developer to create solutions without having to connect a single device by using the offline simulator. Start creating systems before the first hardware component is delivered. Simply configure your system network in "offline development" mode and change the status of the devices one-by-one when you actually connect them.





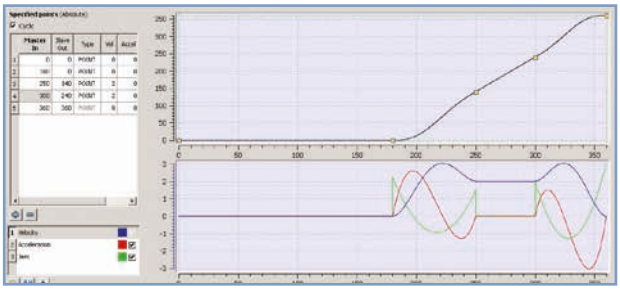
Automatic I/O variable creation with scope definitions

Adding bus couplers with I/Os onto a motion network topology

- Standard debugging features like "step into", "step over", etc. are available to troubleshoot programs. In addition, debug your code using the softoscilloscope and continuously plot up to 8 variables at network update rates – the display can also be configured to suit the scale that the developer desires.

- Our CAM editor lets you create complex CAM profiles using a graphical interface. When converting, it is also possible to import existing CAM profile points into the CAM editor to allow you to seamlessly reuse your existing profiles.

- CAM-on-the-Fly lets you change CAM profiles based on network inputs or changes in machine conditions.



Graphical environment for creating CAMs

Motion Programming

Our motion control solutions are backed by Kollmorgen's vast experience solving application-specific problems for the many industries we serve. Kollmorgen Automation Suite™ offers several advantages that have helped our customers accelerate the development of more precise, high-performance motion. For example:

Superior machine synchronization, with motion-optimized runtime engine and deterministic EtherCAT® network:

- IEEE1588 distributed clock correction
- Hardware-based synchronization
- PLC code execution at EtherCAT® update rate, eliminating process delay
- Low hardware latency

Flexible profile generation, allowing problem-solving through multiple methods branching out of standard pre-packaged tools:

- Pre-loaded and user-defined motion blocks optimized for specific industries and applications
- Configurable through Pipe Network™ and PLCopen for motion

Motion Capabilities

- Absolute and incremental moves
- Jerk-limited moves (S-curve)
- CAM profiles (static or with "on-the-fly" profile changes)
- Gearing (EtherCAT® synchronized)
- Multiple high-speed registration methods FPGA-based capture engine)
- Homing
- Tension control based motion
- Motion-based functional safety
- Superimposed moves
- Phase adjust
- Multi-axis interpolated motion

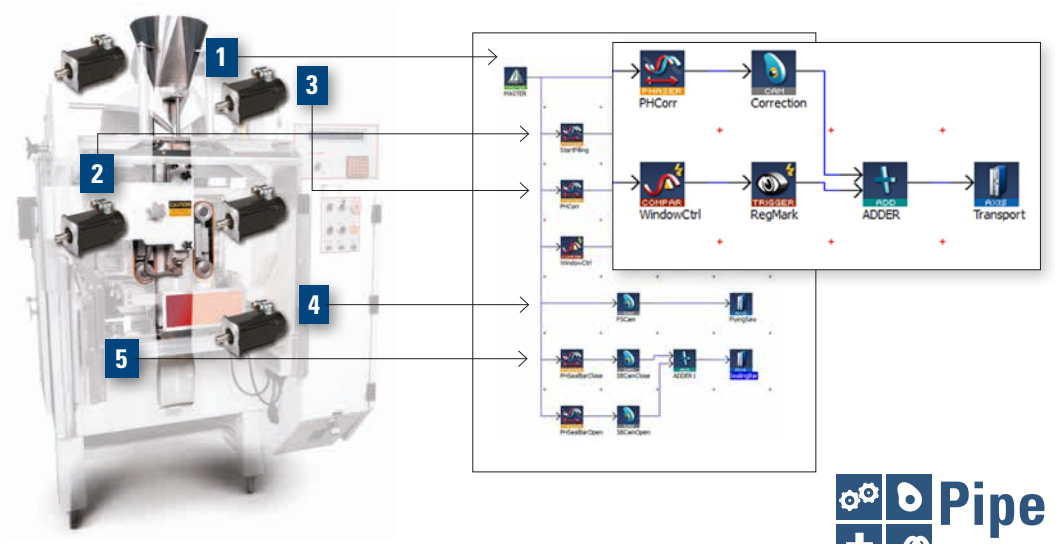
Program motion quickly and intuitively with our Pipe Network™ graphical programming language. Or choose the industry-standard PLCopen for motion to easily reuse your existing programming resources.

Pipe Network™ Visual Programming Environment

Our innovative Pipe Network™ programming environment provides a visual, drag-and-drop model of your machine's motion, including complex axis and cam relationships.

Program Tasks in Hours Instead of Weeks:

- Intuitive visual programming with a library of prebuilt modules.
- Easy knowledge transfer, replacing pages of complex code with easily understood graphical representations

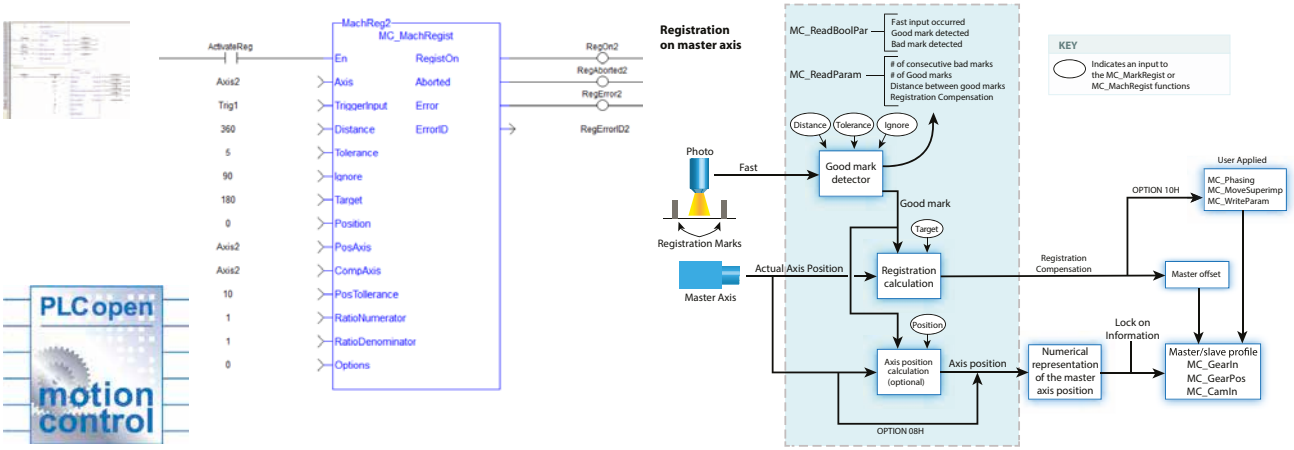


Pipe Network™ provides a one-to-one translation of mechanical systems into a logical world, so you can click and build your motion program in minutes – as shown in this example of a vertical form-fill-seal machine.

Pipe Network™
Kollmorgen Visual Motion Programming

PLCopen for Motion

The Kollmorgen Automation Suite™ IDE incorporates PLCopen for motion, a widely accepted open industry standard. In the example shown here, PLCopen for motion is used within the Kollmorgen Automation Suite IDE to precisely control axis position based on registration marks:



AKD® PDMM Drive-Resident Controller

Build Simpler and Better with Drive-Resident Machine and Motion Control

Extend your design options. Control as many as eight axes or more without the need for a PLC or PAC. Reduce cabinet space and wiring requirements. Program perfect machine and motion control for any project using a single, fully integrated programming environment. Build a better machine at a lower cost.

Our new addition to the AKD® drive family combines one servo axis, a master controller that supports multiple additional axes, and the full automation capability of Kollmorgen Automation Suite™ —all in a single, compact package.

Welcome to the AKD® PDMM programmable drive, multi-axis master.

Performance Specifications

120/240 V AC 1- and 3-Phase	Continuous Current (Arms)	Peak Current (Arms)	H (mm)	W (mm)	D (mm)
AKD-M00306-MCEC-0000	3	9	168	89	156
AKD-M00606-MCEC-0000	6	18	168	89	156
AKD-M01206-MCEC-0000	12	30	196	107	187
AKD-MO2406-MCEC-0000	24	48	248	96	228

240/400/480 V AC 3-Phase	Continuous Current (Arms)	Peak Current (Arms)	H (mm)	W (mm)	D (mm)
AKD-M00307-MCEC-0000	3	9	256	99	185
AKD-M00607-MCEC-0000	6	18	256	99	185
AKD-M01207-MCEC-0000	12	30	256	99	185
AKD-M02407-MCEC-0000	24	48	306	99	228
AKD-M04807-MCEC-0000	48	96	385	185	225

Features

- Kollmorgen Automation Suite™ provides fully integrated programming, testing, setup and commissioning
- Embedded web server utility simplifies service
- Control 32 axes or more* while reducing machine footprint
- EtherCAT® multi-axis master motion controller integrated with a standard AKD® drive axis
- Full IEC61131-3 soft PLC for machine control, with support for all 5 programming languages
- Choice of PLCopen for motion or Pipe Network™ for programming motion control
- 32 KB non-volatile memory stores machine data to eliminate scrap upon restart after power failure
- SD Card slot simplifies backup and commissioning, with no PC required
- On-board I/O includes 13 digital inputs, 4 digital outputs, 1 analog input, 1 analog output (expandable with AKT series of remote I/O)
- Works with Kollmorgen Visualization Builder for programming AKI human-machine interface panels

*Maximum axis count depends on motion/automation complexity and performance (8 axes nominal based on medium complexity at 4 kHz network update rate)

A Single, Scalable Development Suite

Kollmorgen Automation Suite™ simplifies and accelerates development through a unified system of software, hardware, and collaborative co-engineering. This scalable solution provides a fully integrated development environment for any application, whether you're programming a single axis of motion, a multi-axis AKD® PDMM system, or a PCMM-based system up to 64 axes or more. Kollmorgen Automation Suite has been proven to:

- Improve product throughput by up to 25% with industry-leading motion bandwidth
- Reduce scrap by up to 50% with world-class servo accuracy, seamless power-failure recovery and highly dynamic changeovers
- Increase precision for better quality, reduced waste and less downtime using EtherCAT®—the field bus with motion bus performance
- Enable more adaptable, sustainable and innovative machines that measurably improve marketability and profitability

A Single Family of Servo Drives

Kollmorgen AKD® servo drives deliver cutting-edge performance in a compact footprint. From basic torque-and-velocity applications, to indexing, to multi-axis programmable motion, these feature-rich drives offer:

- Plug-and-play compatibility with your servo motor
- All the advantages of Kollmorgen´s breadth of motor platforms including AKM®, CDDR®, and other direct-drive technologies
- The fastest velocity and position loop updates
- Full-frequency auto-tuning for perfect motion across the performance spectrum
- Real-time feedback from a wide variety of devices

Our Best Drive and Automation Solution in a Single Package

The AKD PDMM programmable drive, multi-axis master combines our AKD drive platform with the full feature set of Kollmorgen Automation Suite in a single package – providing complete machine and motion control for up to eight axes or more.
You need only one development suite and one drive family for all your projects. And you can rely on one source for allthe motion components and co-engineering expertise you need to build a better machine.
With AKD PDMM, the best in machine engineering has never been easier, faster or more cost-effective.

PCMM™ Stand-Alone Controller

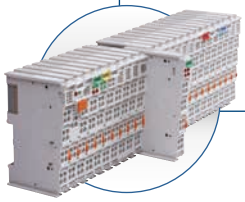
Powerful Motion Controller in Small and Simple Package

The PCMM programmable motion controller delivers the same features as the drive-integrate AKD®-PDMM controller, but in a stand-alone package that offers flexibility when used with AKD®-N/C decentralized drives and for machines where the benefits of an integrated drive and controller are not required.
Ideal for OEMs that want to reduce cabinet space and machine complexity without sacrificing performance, the PCMM delivers full PLC functionality, a high-performance motion control and EtherCAT® master in one small package that easily installs in any electrical panel. Plus, programming is made easy using KAS IDE which includes PipeNetwork™ visual programming, one-click simulation, and integrated configuration and diagnostic tools simplify machine development and help you get to market faster.

Part Number	Processor
AKC-PCM-MC-080-00N-00-000	800 MHz Standard Multi-axis Controller
AKC-PCM-M1-120-00N-00-000	1.2 GHz High Performance Multi-axis Controller

General Features and Specifications

Processor	Available with 1.2 GHz or 800 MHz CPU
Internal Memory	64 MB Flash memory for program storage
External Memory	Removable SD card (not included)
Input Power	24 V DC @ 1.25 A
Operating Temperature	0 °C - 40 °C
Sealing	IP20
Local I/O	6 digital inputs, 2 digital outputs
Motion Network	EtherCAT®, max 4 kHz update rate
PLC Programming	IEC-61131-3, support for all 5 languages
Motion Programming	PLCopen or PipeNetwork®
HMI Programming	KVB programming for AKI panels
Dimensions	174mm (H) x 46.6mm (W) x 111.5mm (D)
Certifications	CE / UL (planned)



I/O

PCMM™ Hardware Features

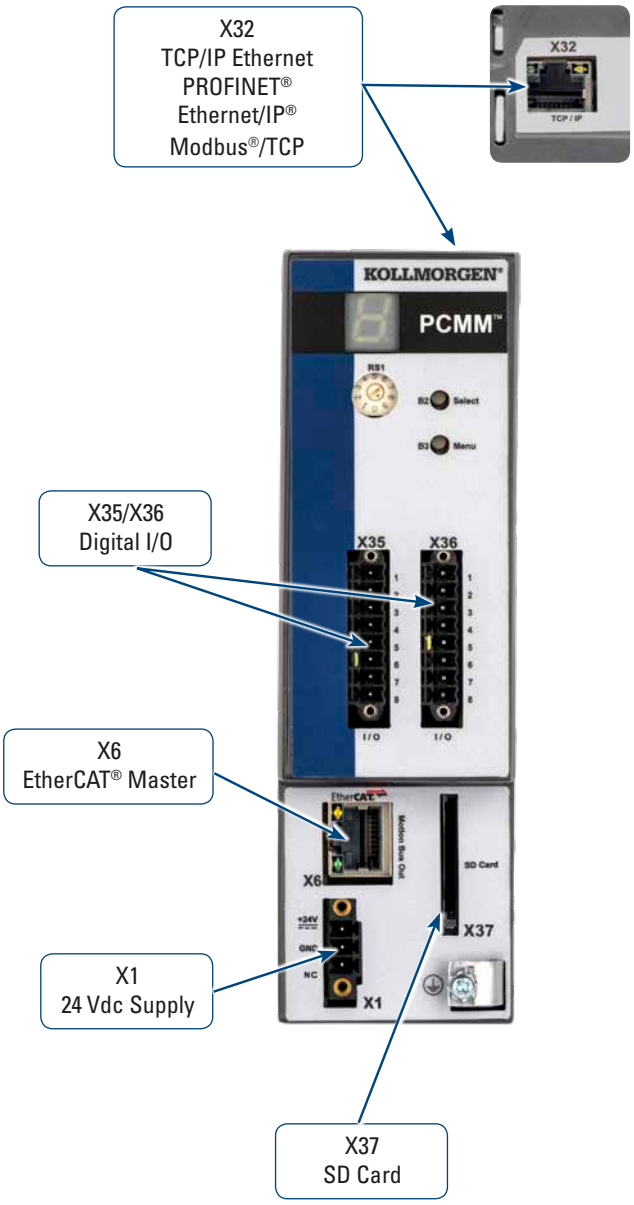
- Up to 1.2GHz CPU meets the performance requirements for a broad range of machines
- Control 1 to 32 or more axes with a single controller
- 100BaseT connection supporting TCP/IP, MODBUS®, EthernetIP®, Profinet® to host PLC, computer, or network to easily interface with most manufacturing systems
- Cycle times as low as 250 µs
- Alphanumeric display for fast diagnostics and system troubleshooting
- Removable SD memory card for simple backup/restore and file storage
- On-board digital I/O with support for expansion I/O via EtherCAT®
- Compact size reduces cabinet space and cost

PCMM™ Software Features

- IEC 61131-3 programmable automation and motion controller
- EtherCAT® master for high-performance motion and device synchronization
- PipeNetwork™ motion engine for visual programming
- Embedded RTOS for guaranteed performance and stability
- Integrated webserver for remote diagnostics and status checking
- Ideal design for modular machines and flexible manufacturing systems

PCMM™ System Integration

- Seamless integration with Kollmorgen's AKD® servo drives, AKM® rotary servo motors , AKI HMIs, and AKT fieldbus I/O modules for complete automation solution
- Network communication via OPC UA, MODBUS®, TCP/IP, UDP, and common fieldbus for fast integration into your machine or factory
- Intuitive EtherCAT® configuration tools built into KAS IDE simplifies network configuration
- Integrated Kollmorgen Workbench for rapid servo tuning and machine optimization




AKM® Servo Motor


AKD®-N Servo Drive


AKD® Servo Drive

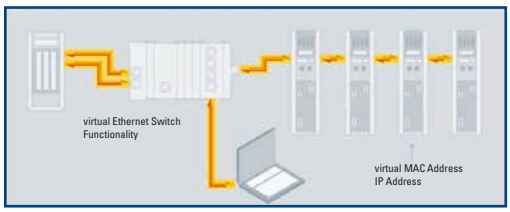

HMI

Real-time Motion Bus

EtherCAT®

EtherCAT® Real-time Bus for Motion and I/O Connectivity

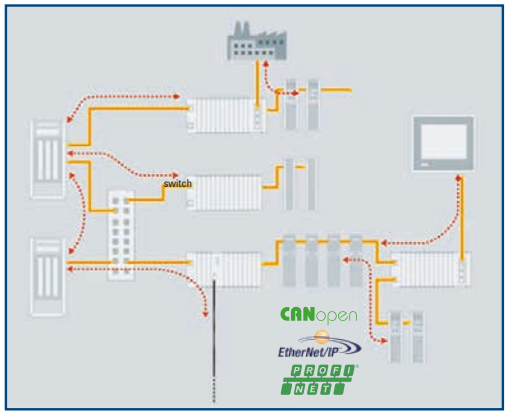
- Auto-recognition of Kollmorgen Automation Suite-compatible components
- Guaranteed real-time update cycle down to 250 microseconds.
- Supported by 2000+ member companies
- Standard Ethernet cabling = lower implementation cost
- Interoperability with other buses
- Wide availability of devices



Transparent for all Ethernet protocols

EtherCAT® Performance Overview

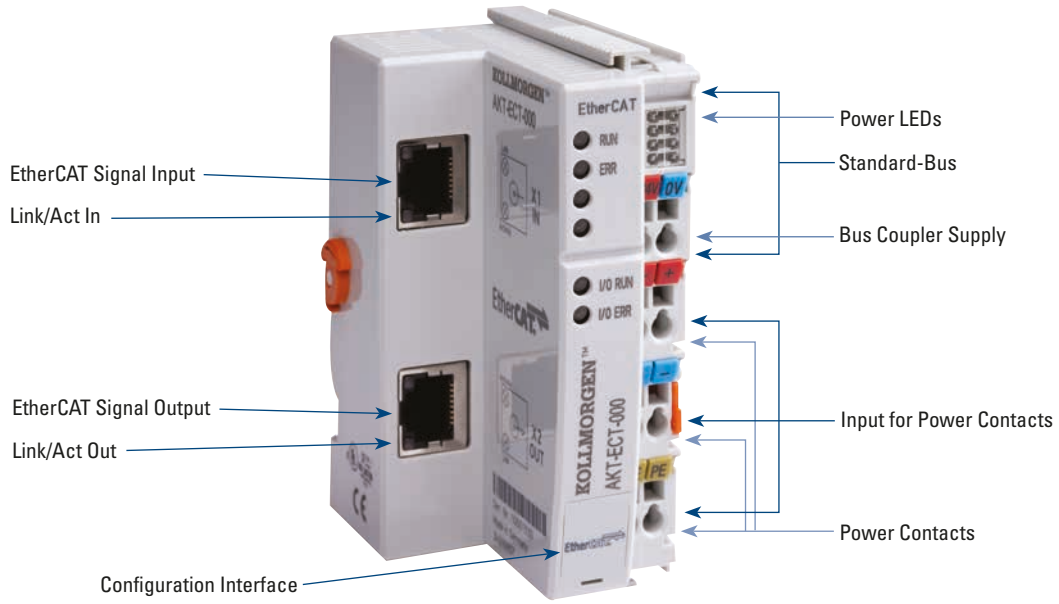
Process Data	Update Time
256 distributed digital I/O	11 µs = 0.01 ms
1000 distributed digital I/O	30 µs
200 analog I/O (16 bit)	50 µs – 20 kHz
100 Servo Axis, with 8 Bytes input and output data each	100 µs
1 Fieldbus Master-Gateway (1486 Bytes Input and 1486 Bytes Output Data)	150 µs



Versatile network architecture

Kollmorgen EtherCAT® Bus Coupler

See page 26 for models and configurations



Human Machine Interface (HMI)

Kollmorgen HMI Panels

With Kollmorgen HMI's visualization projects can be scaled for different size screens and performance demands without having to re-write code or learn different tools.

- Choose from 5", 7", and 12" displays
- IP65 protection class screen for easy cleaning
- Rugged Plastic or Aluminum Housing

AKI2G-CDA 5" and 7"

AKI2G-CDB 7" and 12"

AKI2G-CDA Series

5", 7" Touchscreen HMI

Our basic industrial HMI offers a high resolution touch-screen and modern design. The panel combine IP65 corrosion resistant plastic housing with the full version of Kollmorgen Visualization Builder, providing a cost-effective yet advanced HMI solution for small to medium applications. The basic AKI2G model is the obvious choice when requiring a cost-efficient, high value, reliable HMI panel.

AKI2G-CDB Series

7", 12" Touchscreen HMI

Our advanced AKI2G series HMIs offers a range of high performance industrial panels designed for demanding applications. All with high performance ARM Cortex-A9 processors, the latest screen technology and a wide range of connectivity options to cover all your automation needs. We recommend our advanced HMI with high-performance for all applications.

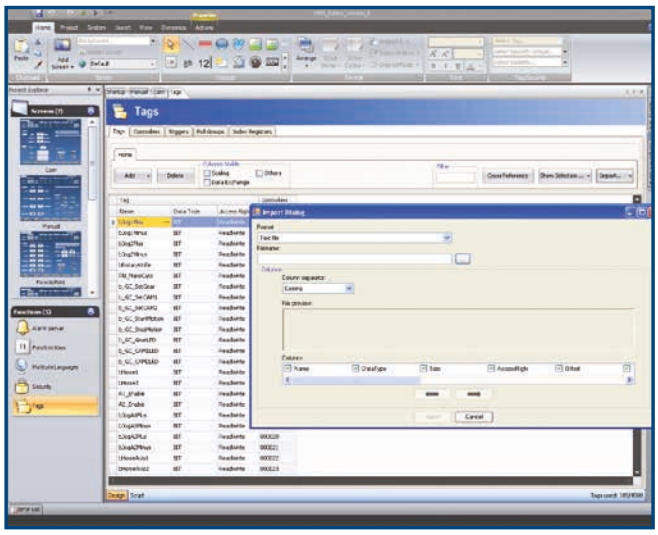
HMI Software Tools

Kollmorgen Automation Suite Visualization Builder™ HMI Software

Kollmorgen Automation Suite Visualization Builder operates from within the Kollmorgen Automation Suite integrated development environment making it quick and easy to create your HMI program and transfer it to the panel.

Features include

- Automatic mapping transfers PLC variables to HMI tags avoiding mistakes and saving time.
- Multi-screen navigation
- Trending/Data Logging
- Recipes
- Alarm management
- Drag and Drop programming
- Password Protection



HMI developer environment

Human Machine Interface (HMI)

AKI2G-CDA Series

Specifications	5 inch AKI2G-CDA-MOD-05T-000	7 inch AKI2G-CDA-MOD-07T-000
General Description		
Part number	630005105	630005205
Certifications		
General	CE, FCC, KCC	
Marine	–	
UL	UL 61010-2-201	
Mechanical		
Mechanical size	170 × 107 × 49 mm	196 × 146 × 52 mm
Touch type	Resistive	
Cut-out size	161 × 93 mm	186 × 136 mm
Weight	0.5 kg	0.7 kg
Housing material	Plastic (PC+ABS), Gray	
Power		
Input voltage	24 V DC (18 to 32 VDC) CE: The power supply must conform with the requirements according to IEC 60950 and IEC 61558-2-4. UL and cUL: The power supply must conform with the requirements for class II power supplies.	
Power consumption	6W	9.6W
Input fuse	Internal DC fuse	
System		
CPU	ARM9 400 MHz	
RAM	128 MB	
FLASH	256 MB, 200 MB free for application storage	
Display		
Size diagonal	5" diagonal	7" diagonal
Resolution	800 × 480 pixels	
Backlight	LED Backlight	
Backlight life time	20 000 hours	
Backlight brightness	300 cd/m²	400 cd/m²
Backlight dimming	Industrial Dimming	
Display type	TFT-LCD with LED backlight	
Display pixel error	Class I (ISO9241-307)	
Communication Serial		
Number of serial ports	2 Port 9pin DSUB	
Serial port 1	RS 232 (RTS/CTS)	
Serial port 2	RS422/485	
Serial port 3	RS 232	
Serial port 4	RS 485	
Ethernet Communication		
Number of ethernet ports	1	
Ethernet port 1	1 × 10/100 Base-T (shielded RJ45)	
Ethernet port 2	–	
Expansion interface		
Expansion port	No	
SD card	No	
USB	1 × USB 2.0 500mA	
Environmental		
Operating temperature	-10°C to +50°C	
Storage temperature	-20° to +60°C	
Shock	15g, half-sine, 11ms according to IEC60068-2-27	
Vibration	1g, according to IEC 60068-2-6, Test Fc	
Sealing front	IP65	
Sealing back	IP20	
Humidity	5% – 85% non-condensed	

AKI2G-CDB Series

Specifications	7 inch AKI2G-CDB-MOD-07T-000	12 inch AKI2G-CDB-MOD-12T-000
General Description		
Part number	630000205	640000205
Certifications		
General	CE, FCC, KCC	
Marine	DNV, KR, GL, LR, ABS, CCS	
UL	UL 61010-2-201	
Mechanical		
Mechanical size	204 × 143 × 50 mm	340 × 242 × 57 mm
Touch type	Resistive	
Cut-out size	189 × 128mm	324 × 226mm
Weight	0.8 kg	2.6 kg
Housing material	Powder-coated aluminum, Gray	
Power		
Input voltage	24 V DC (18 to 32 VDC) CE: The power supply must conform with the requirements according to IEC 60950 and IEC 61558-2-4. UL and cUL: The power supply must conform with the requirements for class II power supplies.	
Power consumption	14.4W	28.8W
Input fuse	Internal DC fuse	
System		
CPU	i.MX6Solo Single Cortex-A9 1.0GHz 512kBL2cache	i.MX6DualLite, Dual Cortex-A9 1.0GHz 512kBL2cache
RAM	512 MB	1 GB
FLASH	2GB SSD(eMMC), 1.5GB free for application storage	
Display		
Size diagonal	7" diagonal	12.1" diagonal
Resolution	800 × 480 pixels	
Backlight	LED Backlight	
Backlight life time	20 000 hours	50 000 hours
Backlight brightness	350 cd/m²	400 cd/m²
Backlight dimming	Industrial Dimming	
Display type	TFT-LCD with LED backlight	
Display pixel error	Class I (ISO9241-307)	
Communication Serial		
Number of serial ports	1 Port 9pin DSUB	
Serial port 1	RS 232 (RTS/CTS)	
Serial port 2	RS422/485	
Serial port 3	RS485 (only if COM 2 is RS485)	
Ethernet Communication		
Number of ethernet ports	1	2
Ethernet port 1	1 × 10/100 Base-T (shielded RJ45)	
Ethernet port 2	–	1 × 10/100 Base-T (shielded RJ45)
Expansion interface		
Expansion port	Yes, ciX expansion module	
SD card	SD and SDHC	
USB	1 × USB 2.0 500mA	2 × USB 2.0 500mA
Environmental		
Operating temperature	-10°C to +60°C	
Storage temperature	-20° to +70°C	
Shock	15g, half-sine, 11ms according to IEC60068-2-27	
Vibration	1g, according to IEC 60068-2-6, Test Fc	
Sealing front	IP65, NEMA 4X/12 and UL Type 4X/12	
Sealing back	IP20	
Humidity	5% – 85% non-condensed	

I/O Terminals

Advanced Kollmorgen Terminal (AKT)

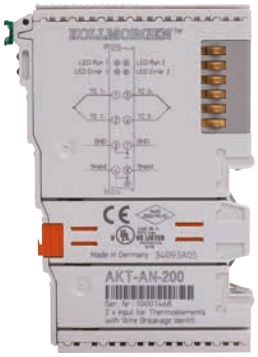
The Kollmorgen Automation Suite™ includes an array of I/O options for applications that need more I/O than can be provided by the onboard I/O of the drives or for applications that need specialized functionality such as thermocouple management through I/O. The DIN rail mount IP20 terminals simply slide together and connect to the system's EtherCAT® bus where they are auto-recognized for easy configuration.

Typical Bus Coupler

EtherCAT® bus coupler

Typical I/O Terminal

Front wiring view



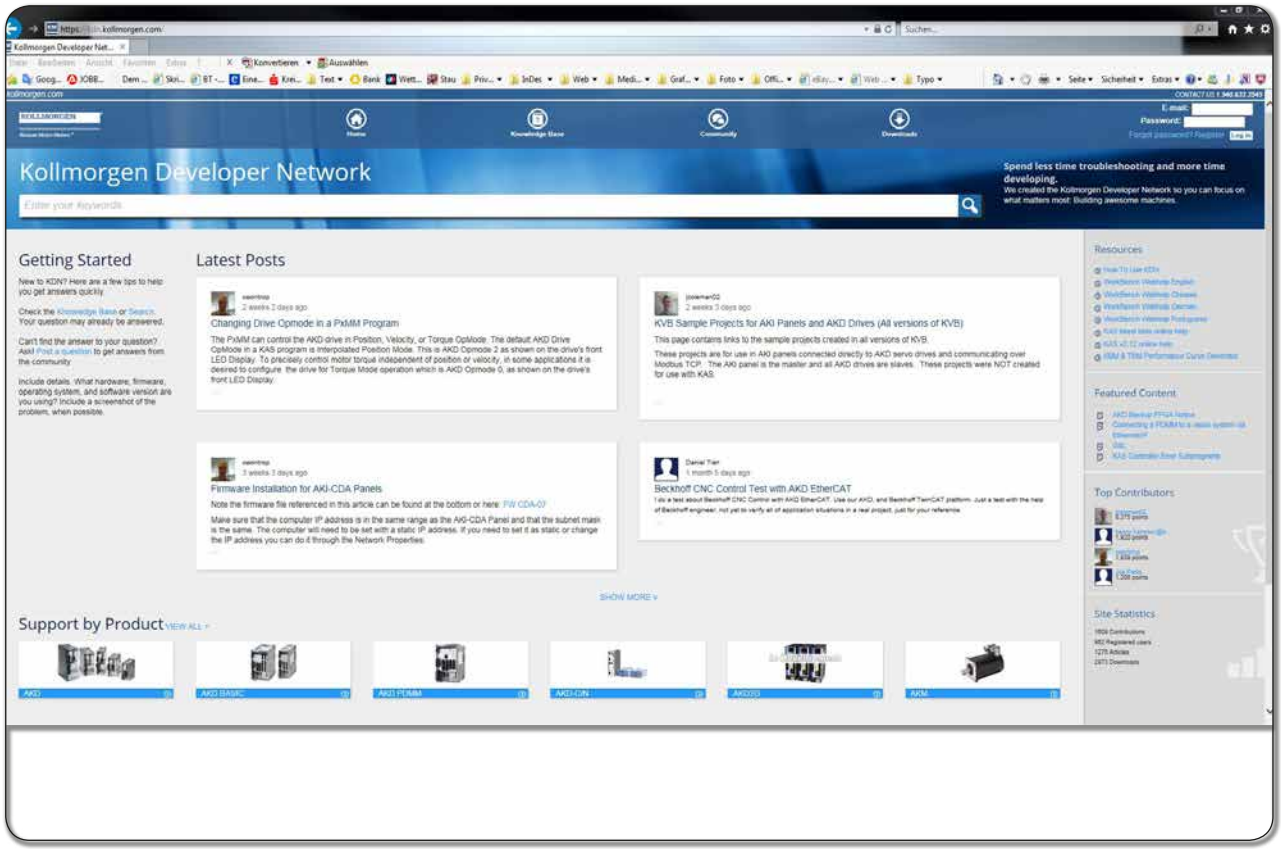
Side label view

Available Motion Bus Coupler Model	
AKT-ECT-000-000	EtherCAT® Bus Coupler
Available Analog Input Terminal Models	
AKT-AN-410-000	4 channel analog input module, 0-10 Vdc
AKT-AN-420-000	4 channel analog input module, 0-20 ma
AKT-AN-810-000	8 channel analog input module, 0-10 Vdc
AKT-AN-820-000	8 channel analog input module, 0-20 ma
AKT-AN-200-000	2 channel thermocouple input module
AKT-AN-400-000	4 channel thermocouple input module
Available Analog Output Terminal Models	
AKT-AT-220-000	2 channel analog output module, 0-20 ma
AKT-AT-410-000	4 channel analog output module, 0-10 Vdc
AKT-AT-420-000	4 channel analog output module, 0-20 ma
AKT-AT-810-000	8 channel analog output module, 0-10 Vdc
AKT-AT-820-000	8 channel analog output module, 0-20 ma
Available Digital Output Terminal Models	
AKT-DT-004-000	4 channel digital output module, 0.5A
AKT-DT-008-000	8 channel digital output module, 0.5A
AKT-DT-2RT-000	2 channel relay output module, 2.0A, N/O

Available Digital Input Terminal Models	
AKT-DN-004-000	4 channel digital input module, 3ms
AKT-DNH-004-000	4 channel digital input module, .2ms
AKT-DN-008-000	8 channel digital input module, 3ms
AKT-DNH-008-000	8 channel digital input module, .2ms
Available Specialty Terminal Models	
AKT-EM-000-000	End module
AKT-IM-000-000	Isolation module
AKT-PS-024-000	Bus feed terminal, 24 Vdc
AKT-PSF-024-000	Bus feed terminal, 24 Vdc, fused
Available Field Bus Coupler Models	
AKT-PRB-000-000	Profibus Bus Coupler
AKT-ENP-000-000	Ethernet/IP Bus Coupler
Stepper Driver	
AKT-SM-L15-000	Stepper Module, 24 Vdc, 1.5 A
AKT-SM-L50-000	Stepper Module, 50 Vdc, 5 A

Kollmorgen Developer Network

Kollmorgen Developer Network (KDN) is the central location for engineers to quickly get support on all Kollmorgen products, interact with and learn from the larger Kollmorgen user community, and receive expert instruction from Kollmorgen Applications Engineers and staff.



Ask a Question

Ask a question, or search and respond to existing questions. Provide an answer, or vote on the best answer. Leverage the global scope of Kollmorgen to get up to speed quickly.

Start a Discussion

Want to share a best practice, get feedback, or understand how others are solving similar problems? Start a new discussion, or join an active one, to share in the collabrative experience and knowledge of Kollmorgen product developers.

Propose a Feature

Have an idea for a new product, or feature? Submit it here. Customers speak and we listen. We know one size does not fit all. Our product is flexible, but sometimes differentiation requires a collaborative approach.

Latest Downloads

Keep up with our continually improving product, with access to the latest downloads.

AKD® Servo Drive

Our AKD series is a complete range of Ethernet-based servo drives that are fast, feature-rich, flexible and integrate quickly and easily into any application. AKD ensures plug-and-play commissioning for instant, seamless access to everything in your machine. And, no matter what your application demands, AKD offers industry-leading servo performance, communication options, and power levels, all in a smaller footprint.

This robust, technologically advanced family of drives delivers optimized performance when paired with our best-in-class components, producing higher quality results at greater speeds and more uptime. With Kollmorgen servo components, we can help you increase your machine's OEE by 50%.

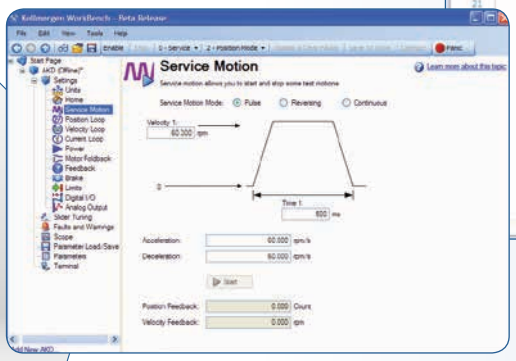
The Benefits of AKD Servo Drive

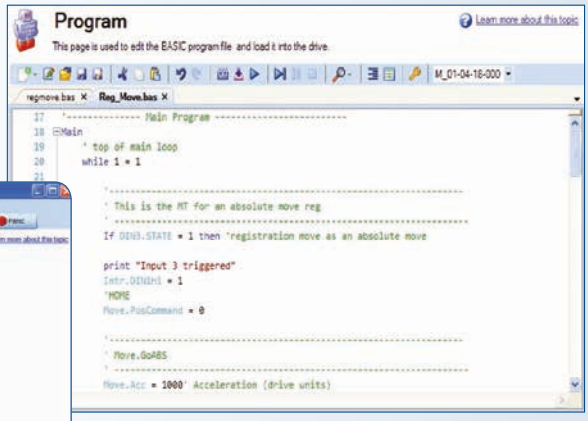
• Optimized Performance in Seconds	• Auto-tuning is one of the best and fastest in the industry • Automatically adjusts all gains, including observers • Immediate and adaptive response to dynamic loads • Precise control of all motor types • Compensation for stiff and compliant transmission and couplings
• Greater Throughput and Accuracy	• Up to 27-bit-resolution feedback yields unmatched precision and excellent repeatability • Very fast settling times result from a powerful dual processor system that executes industry-leading and patent pending servo algorithms with high resolution • Advanced servo techniques such as high-order observer and bi-quad filters yield industry-leading machine performance • Highest bandwidth torque-and-velocity loops. Fastest digital current loop in the market
• Easy-to-use Graphical User Interface (GUI) for Faster Commissioning and Troubleshooting	• Six-channel real-time software oscilloscope commissions and diagnoses quickly • Multi-function Bode Plot allows users to quickly evaluate performance • Auto-complete of programmable commands saves looking up parameter names • One-click capture and sharing of program plots and parameter settings allow you to send machine performance data instantly • Widest range of programming options in the industry
• Flexible and Scalable to Meet any Application	• 3 A_{rms} to 48 A_{rms} continuous current; 9 A_{rms} to 96 A_{rms} peak • Very high power density enables an extremely small package • True plug-and-play with all standard Kollmorgen servo motors and actuators • Supports a variety of single and multi-turn feedback devices—Smart Feedback Device (SFD), EnDat2.2, EnDat 2.1, BiSS, analog Sine/Cos encoder, incremental encoder, HIPERFACE®, and resolver • Single cable feedback with digital resolvers (SFD3) and HIPERFACE® DSL • Tightly integrated Ethernet motion buses without the need to add large hardware: EtherCAT®, SynqNet®, Modbus® TCP, EtherNet/IP™, PROFINET®, SERCOS® III, and CANopen® • Scalable programmability from base torque-and-velocity through multi-axis master

Scalable Programmability

Kollmorgen delivers cutting-edge technology and performance with the AKD® servo drive and KAS controls platform. Whether your application requires a single axis or over 100 fully synchronized axes, Kollmorgen's intuitive software and tools scale to meet your needs. From simple analog torque control to the latest high-performance automation network, the AKD servo drive packs power and flexibility for virtually any application into one of the most compact footprints of any digital servo drive in the industry.

- Patented auto-tuning delivers optimized performance in seconds.
- 1.5 MHz current loop and 16 kHz velocity loops offers greater bandwidth and performance Optimized performance in seconds
- Greater throughput and accuracy
- Easy-to-use Graphical User Interface (GUI) for
- faster commissioning and troubleshooting
- Flexible and scalable to meet any application





- Controlled by analog torque-and-velocity commands
- Includes electronic gearing via X9 connector
- Includes access to 11 digital I/O and 2 analog I/O on base drive
- Includes 2 high-speed digital inputs
- Expandable to 31 digital I/O and 4 analog I/O

Motion Tasking ("P" Option)

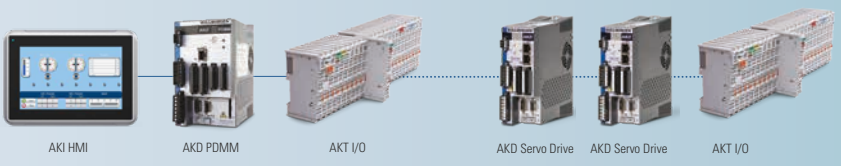
- Adds simple point-and-click indexing to base drive
- Provides user with pre-programmed options
- Guides novice user through simplified steps to create indexing moves
- Network connectivity to EtherCAT®, CANopen®,
- Profinet®, Ethernet/IP™, TCP/IP, SynqNet and others
- MODBUS port for communication with HMI

BASIC Programmable 1.5 Axis Drive ("T" Option)

- Adds BASIC programmability to base AKD
- 4 kHz programmable interrupt service routines
- Conditional statements, built-in math functions, user functions and subroutines
- Includes 2 high-speed digital inputs
- Same package size as base drive
- Expandable to 31 digital I/O and 4 analog I/O
- Optional integrated SD card for easy backup and drive cloning
- Includes electronic camming functionality

Basic Operation Single-Axis

RANGE OF KOLLMORGEN AUTOMATION SUITE CAPABILITIES



Programmable Drive Multi-Axis Master PDMM ("M" Option)

- Scalable solution for use as a single-axis drive with integrated programmable automation controller
- Choose from all five IEC 61131-3 languages for soft PLC process programming
- Program motion using your choice of PLCopen for motion or our innovative Pipe Network™
- 4 kHz PLC scan rate and EtherCAT® updates
- Complete line of HMI panels with integrated software to simplify GUI development
- Exclusive function blocks, such as "wait," enable your program to act as a scanning or sequential language
- On-board I/O includes 17 digital (with 2 high speed inputs) and 2 analog
- Connects to AKT™ network I/O for nearly unlimited expandability

Seamlessly add additional axes and AKD PDMM serves as a high-performance multi-axis machine controller

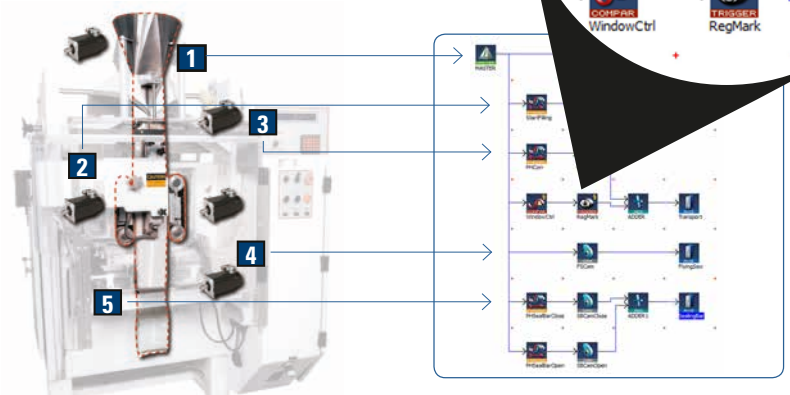
- SD card for easy backup and system updates
- Integrated webserver for diagnostics and troubleshooting from any computer or mobile device
- Provide true synchronized-path control of up to 32 axes*
- Reduce cabinet size and wiring requirements with a single, compact package
- Easily manage remote I/O and the I/O of all attached drives via EtherCAT®
- Use industry standard PLCopen for motion, or step up to Kollmorgen's Pipe Network™ to program sophisticated camming and gearing applications in a matter of minutes

*Maximum axis count depends on motion/automation complexity and performance (8 axes nominal based on medium complexity at 4 kHz network update rate)

Pipe Network™

Kollmorgen Visual Motion Programming

- Accelerate development by programming tasks in hours that would otherwise take weeks
- Improved coding quality through visual programming and by using pre-built modules that have been thoroughly tested and optimized
- Easy knowledge transfer, replacing pages of complex code with easily understood graphical representations
- Available on PDMM and PCMM controllers



Pipe Network provides a one-to-one translation of a mechanical system into a logical world as shown in the Vertical Form Fill and Seal machine above. Click and build your motion program in minutes, or contact Kollmorgen for examples of common machine architectures to further accelerate your development.

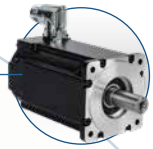
Programming

Multi-Axis Programming

AKD® Servo Drive

The AKD servo drive delivers cutting-edge technology and performance with one of the most compact footprints in the industry. These feature-rich drives provide a solution for nearly any application, from basic torque-and-velocity applications, to indexing, to multi-axis programmable motion with embedded Kollmorgen Automation Suite. The versatile AKD sets the standard for power density and performance.

AKMH™ Hygienic Stainless Steel Motors



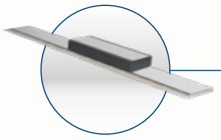
AKM® 2G Servo Motors

Frameless Brushless Direct Drive Motors

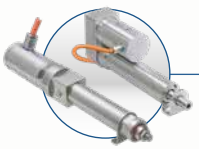
AKD®-N Decentralized Servo Drive

Cartridge DDR™ Motors

Housed DDR™ Motors



ICH Direct Drive Linear Motors



ERD Hygienic Stainless Steel Linear Actuators

Control of motors with AKD® PDMM programmable multi-axis master

AKD® Servo Drive

Best-in-Class Components

AKD works seamlessly with Kollmorgen motors and actuators – well-known for quality, reliability, and performance.

Industry-leading power density

General Specifications

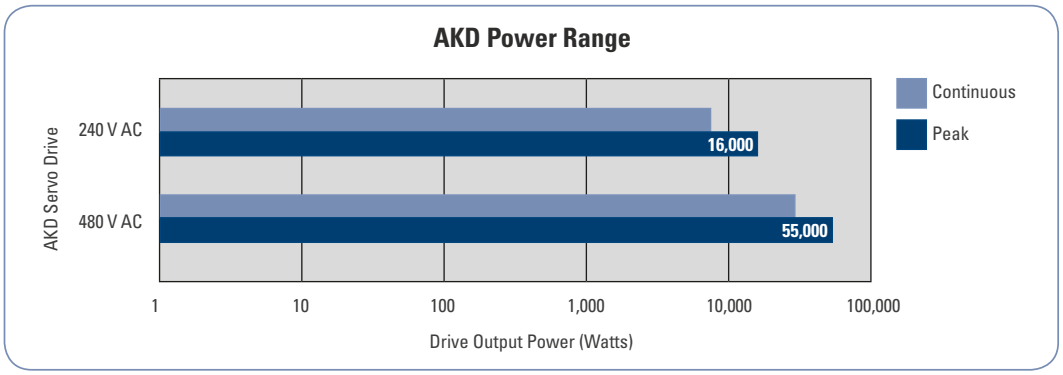
120 / 240 V AC 1 & 3 Phase (85 -265 V)	Continuous Current (A_{rms})	Peak Current (A_{rms})	Drive Continuous Output Power Capacity (Watts)	Internal Regen (Watts)	(Ohms)	Height mm	Width mm	Depth mm	Depth with Cable Bend Radius mm
AKD-■00306	3	9	1100	0	0	168	59	156	184
AKD-■00606	6	18	2000	0	0	168	59	156	184
AKD-■01206	12	30	4000	100	15	196	78	187	215
AKD-■02406	24	48	8000	200	8	248	100	228	265

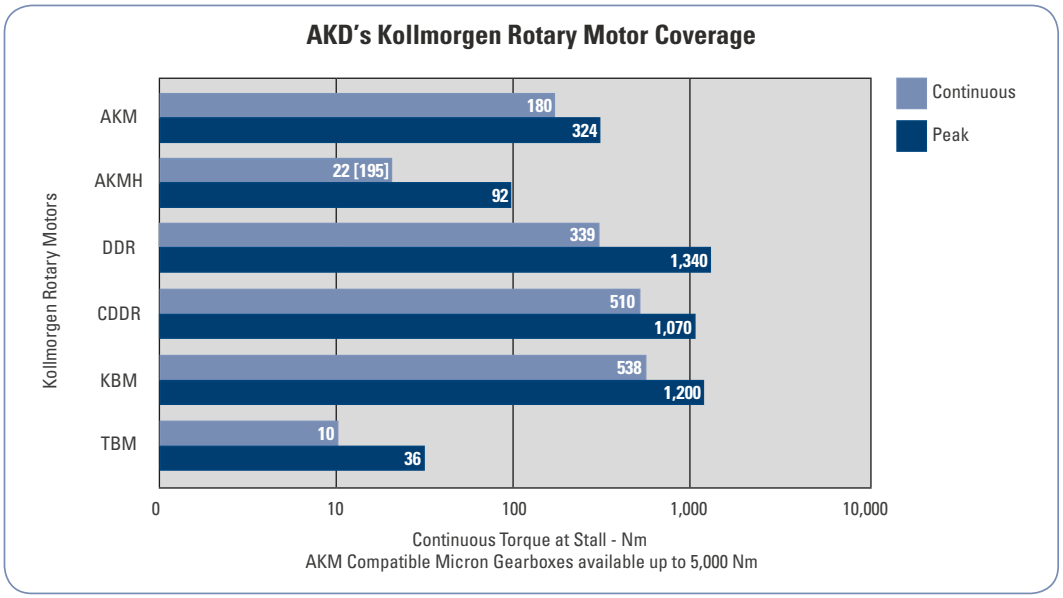
240/480 V AC 3 Phase (187-528 V)	Continuous Current (A_{rms})	Peak Current (A_{rms})	Drive Continuous Output Power Capacity (Watts)	Internal Regen (Watts)	(Ohms)	Height mm	Width mm	Depth mm	Depth with Cable Bend Radius mm
AKD-■00307	3	9	2000	100	33	256	70	185	221
AKD-■00607	6	18	4000	100	33	256	70	185	221
AKD-■01207	12	30	8000	100	33	256	70	185	221
AKD-■02407	24	48	16,000	200	23	306	105	228	264
AKD-■04807	48	96	35,000	–	–	385	185	225	260

AKD® Servo Drive

Range of Coverage

When you pair the AKD servo drive with any of our Kollmorgen motors or linear actuators, you'll achieve optimized performance. From 3 A_{rms} to 48 A_{rms} continuous current and 9 A_{rms} to 96 A_{rms} peak current, the feature-rich AKD provides a solution for nearly any application.





Feedback & I/O

AKD® servo drive is specifically designed with the versatility, communications, and power you need to expand machine performance and increase integration speeds. Motor set-up is plug-and-play and multiple Ethernet connectivity options provide both open and closed protocols. Online troubleshooting and data verification enable faster, bug-proof programming. And a broad power range in a smaller, compact design allows you to use these robust drives with a single interface while experiencing industry-leading, high-performance servo loops.

AKD Specifications

	Standard Drive	With I/O expansion *
Encoder Output or AUX Encoder Input	2.5 MHz Maximum line frequency	
Feedback	Smart Feedback Device (SFD), EnDat 2.2, EnDat 2.1, BiSS, analog Sine/Cos encoder, incremental encoder, HIPERFACE®, and resolver	
Logic supply	24 V DC	
Digital input (24 Vdc)	8 (1 dedicated to enable)	20 (1 dedicated to enable)
Digital output (24 Vdc)	3 (1 dedicated to fault relay)	13 (1 dedicated to fault relay)
Analog input (+/- 10 Vdc, 16-bit)	1	2
Analog output (+/- 10 Vdc, 16-bit)	1	2
Programmable inputs	7	19
Programmable outputs	2	12
Sink/Source inputs/outputs	Yes	Yes

Note: Only with AKD-T

AKD® Servo Drive

Ethernet Connectivity

- Ethernet-based AKD servo drive provides the user with multiple bus choices
- EtherCAT® (DSP402 protocol), Modbus® TCP, SynqNet®, EtherNet/IP™, PROFINET®, SERCOS III, and CANopen®
- No option cards are required

Industrial Design

- Rugged circuit design and compact enclosure for space-saving, modern appearance – minimizes electrical noise emission and susceptibility
- Full fault protection
- UL, cUL listed, and CE
- No external line filters needed (480 V AC units) for CE & UL compliance
- Removable screw terminal connectors for easy connections
- DC Bus sharing

Safe-Torque-Off (STO)

(IEC 61800 SIL2)

- Switches off the power stage to ensure personnel safety and prevents an unintended restart of the drive, even in fault condition
- Allows logic and communication to remain on during power stage shut down

Internal Regenerative Braking Resistor

(All powers except 120/240 V AC 3 A_{rms} and 6 A_{rms})

- Simplifies system components
- Saves overhead of managing external regeneration when internal regeneration is sufficient

Performance Servo Tuner (PST)

- Exclusive patent pending auto-tuner reaches optimized set-up in seconds
- Handles inertia mismatches up to 1000:1
- Industry leading bandwidth under compliant and stiff load conditions, no matter the mechanical bandwidth of the machine

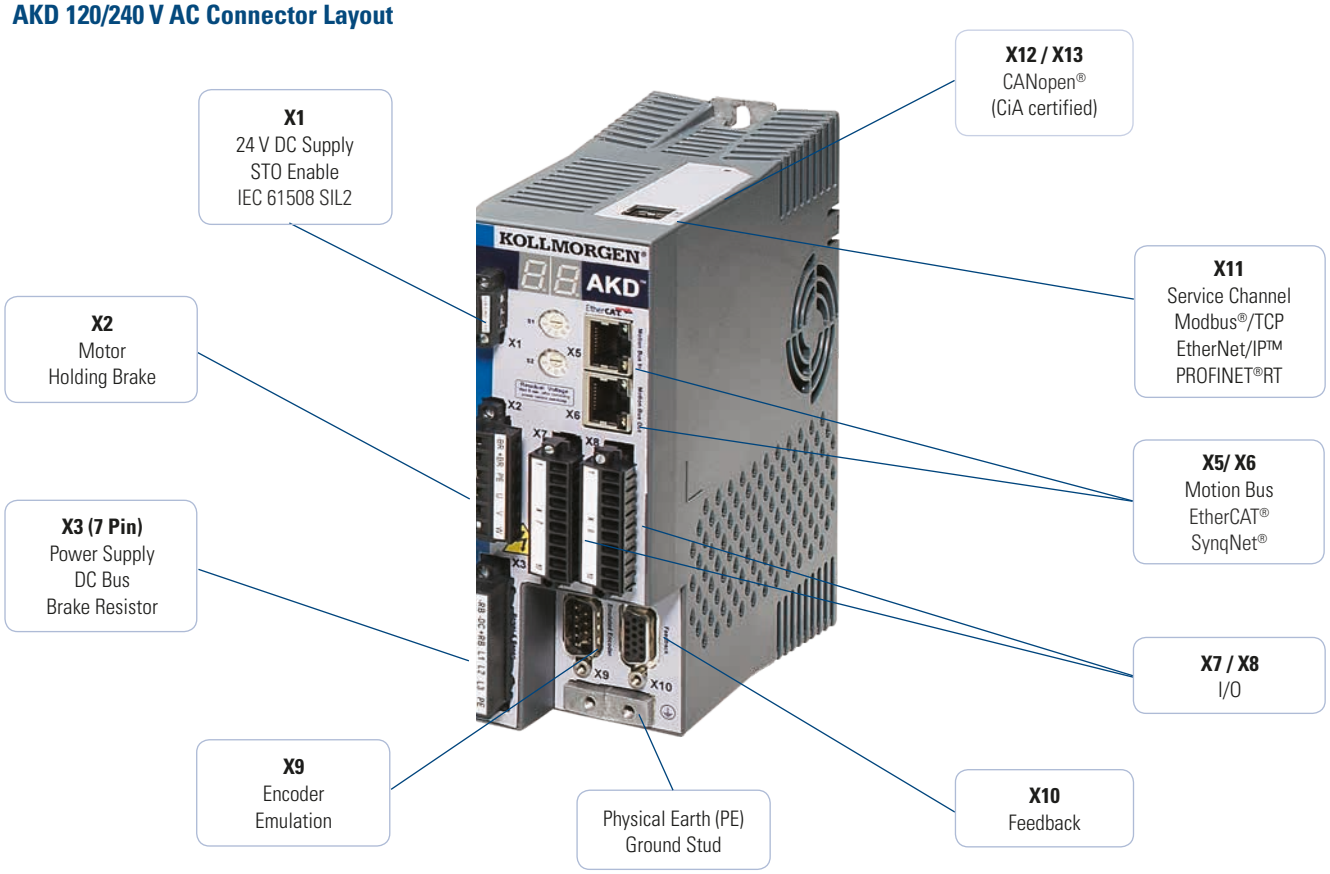
Plug-and-Play with Kollmorgen Motors and Actuators

- Electronic motor nameplates allow parameters to automatically load for fast commissioning
- Motion in seconds
- Custom motor parameters easily entered

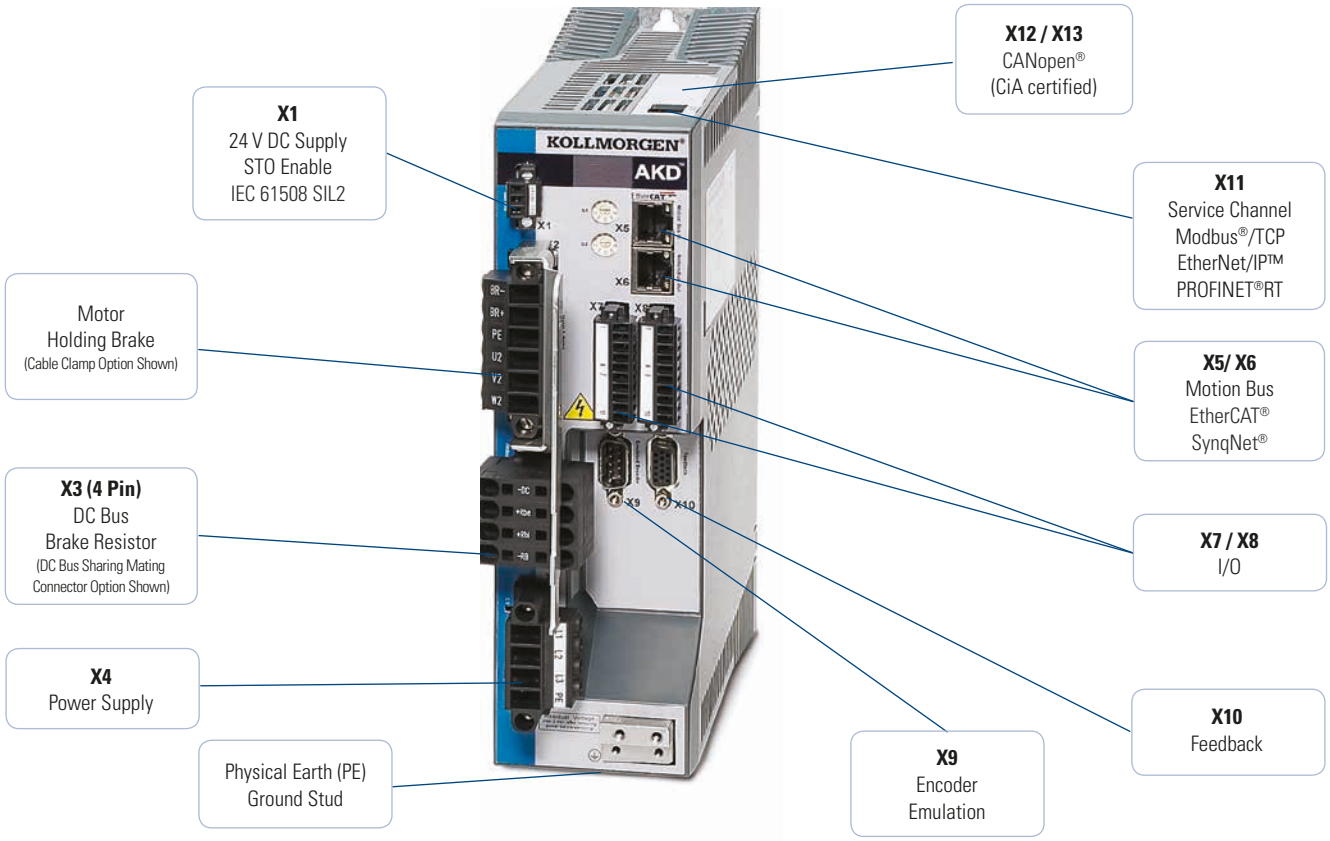
I/O (Base Drive)

- 8 digital inputs (1 dedicated to enable)
- 2 high-speed digital inputs (maximum time delay of 1.0 µs)
- 3 digital outputs (1 dedicated to fault relay)
- 1 analog input - 16 bit
- 1 analog output - 16 bit

AKD 120/240 V AC Connector Layout



AKD 240/480 V AC Connector Layout



AKD® BASIC Drives

High Performance Capabilities in an Integrated Drive/Control Solution

Add co-engineering to your toolbox. Save money, simplify your machine and customize performance to meet the specific needs of each customer or application – as needed, today or tomorrow.

Our new Kollmorgen AKD® BASIC drives add BASIC-programmable machine and motion control to the superior performance of our AKD drive platform. So engineers can quickly customize performance at the drive level without touching the PLC. In fact, for many applications you can avoid the expense, wiring and cabinet space of a PLC altogether.
Whether you rely on your own engineering expertise or Kollmorgen's, the base and Expanded I/O versions of our AKD BASIC drive give you the unprecedented machine and motion control flexibility in a compact, fully integrated drive package. It's one more example of our co-engineering mission to help you deliver exactly what your customers want – when they want it – in solutions that are more cost-effective to build, simpler in design and faster to market.

AKD BASIC Language Programmable Drive

In addition to the wide selection and key features of our proven AKD, the standard version of our AKD BASIC drive offers:

- **Programmable machine control built into the drive,** so you can engineer perfect axis-level performance without touching the machine controller. In fact, AKD BASIC can eliminate the need for a PLC in single and 1.5 axis applications – reducing wiring requirements, panel space, design complexity and cost.
- **High performance motion control built into the drive,** enabling increased speed for more complex moves in a simpler design with reduced wiring.
- **BASIC Language programming,** providing simple program flow control in a solution that's easy to learn, quick to master and universally accepted.
- **An integrated development environment,** allowing single-point programming, de-bugging, commissioning, tuning and management of your AKD BASIC drive from within AKD WorkBench. Our BASIC editor provides innovative features that speed development time and reduce coding errors.
- **Source code lockout with password protection,** freeing you to differentiate your product with drive-level control while safeguarding your intellectual property.

I/O Capabilities	Base Version	Expanded I/O Version
Digital Inputs	8	20
Digital Outputs	3	13
Analog Inputs	1	2
Analog Outputs	1	2

Expanded I/O AKD BASIC Programmable Drive

Building on the features of the AKD BASIC drive, we also offer an expanded I/O version that adds:

- **A total of 20 digital inputs, 13 digital outputs, 2 analog inputs and 2 analog outputs,** reducing or eliminating the need for remote I/O and its associated installation and wiring costs.
- **An SD memory card slot** for loading, and restoring programs and parameters, without the need for a PC.

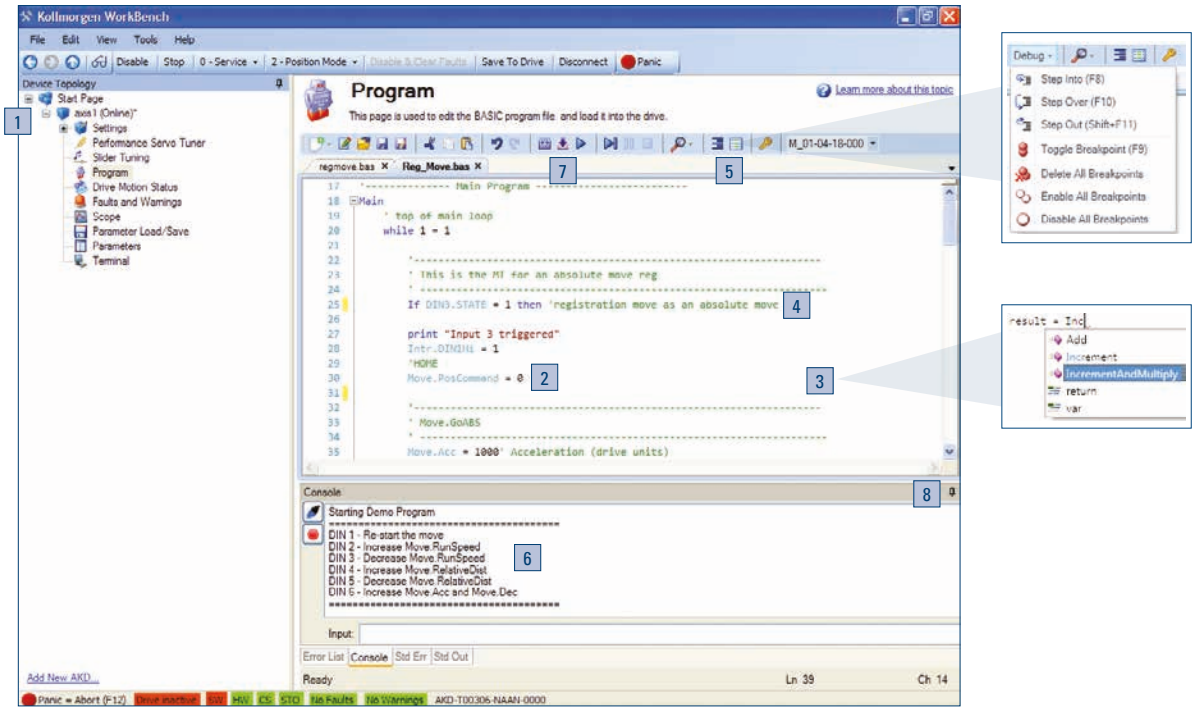
Development Tools that Speed Programming and Improve Quality

Co-engineering is a powerful tool. To make it easy for you to provide better solutions for your customers, we provide an innovative BASIC programming environment within Kollmorgen WorkBench. So there's only one software package to use for all of your drive setup, configuration, tuning and management tasks in addition to motion and machine control programming.

Pre-built code templates give your application a head-start, while automatic formatting, highlighting and other ease-of-use features increase programming speed and accuracy. Complete access to all programming capabilities and drive features within a single environment helps speed your development of complete, optimally engineered solutions.

Novice users will enjoy a short ramp-up time to productive coding, while experienced users will discover well-designed tools that take their programming skills to new levels of speed and quality.

1. Integrated axis setup
2. Code snippets simplify formatting
3. Auto-complete helps speed coding and reduce errors
4. Automatic color coding makes it easy to distinguish comments, parameters, print statements and other types of code
5. Full debugger accelerates development
6. Packaged program console provides instant program status
7. Menu-driven navigation provides intuitive look and feel
8. Window pinning maximizes workspace



AKD® PDMM Drive-Resident Controller

Build Simpler and Better with Drive-Resident Machine and Motion Control

Extend your design options. Control as many as eight axes or more without the need for a PLC or PAC. Reduce cabinet space and wiring requirements. Program perfect machine and motion control for any project using a single, fully integrated programming environment. Build a better machine at a lower cost.

Our new addition to the AKD® drive family combines one servo axis, a master controller that supports multiple additional axes, and the full automation capability of Kollmorgen Automation Suite™ —all in a single, compact package.

Welcome to the AKD® PDMM programmable drive, multi-axis master.

Performance Specifications

120/240 V AC 1- and 3-Phase	Continuous Current (Arms)	Peak Current (Arms)	H (mm)	W (mm)	D (mm)
AKD-M00306-MCEC-0000	3	9	168	89	156
AKD-M00606-MCEC-0000	6	18	168	89	156
AKD-M01206-MCEC-0000	12	30	196	107	187
AKD-MO2406-MCEC-0000	24	48	248	96	228

240/400/480 V AC 3-Phase	Continuous Current (Arms)	Peak Current (Arms)	H (mm)	W (mm)	D (mm)
AKD-M00307-MCEC-0000	3	9	256	99	185
AKD-M00607-MCEC-0000	6	18	256	99	185
AKD-M01207-MCEC-0000	12	30	256	99	185
AKD-M02407-MCEC-0000	24	48	306	99	228
AKD-M04807-MCEC-0000	48	96	385	185	225

Features

- Kollmorgen Automation Suite™ provides fully integrated programming, testing, setup and commissioning
- Embedded web server utility simplifies service
- Control 32 axes or more* while reducing machine footprint
- EtherCAT® multi-axis master motion controller integrated with a standard AKD® drive axis
- Full IEC61131-3 soft PLC for machine control, with support for all 5 programming languages
- Choice of PLCopen for motion or Pipe Network™ for programming motion control
- 32 KB non-volatile memory stores machine data to eliminate scrap upon restart after power failure
- SD Card slot simplifies backup and commissioning, with no PC required
- On-board I/O includes 13 digital inputs, 4 digital outputs, 1 analog input, 1 analog output (expandable with AKT series of remote I/O)
- Works with Kollmorgen Visualization Builder for programming AKI human-machine interface panels

*Maximum axis count depends on motion/automation complexity and performance (8 axes nominal based on medium complexity at 4 kHz network update rate)

A Single, Scalable Development Suite

Kollmorgen Automation Suite™ simplifies and accelerates development through a unified system of software, hardware, and collaborative co-engineering. This scalable solution provides a fully integrated development environment for any application, whether you're programming a single axis of motion, a multi-axis AKD® PDMM system, or a PCMM-based system up to 64 axes or more. Kollmorgen Automation Suite has been proven to:

- Improve product throughput by up to 25% with industry-leading motion bandwidth
- Reduce scrap by up to 50% with world-class servo accuracy, seamless power-failure recovery and highly dynamic changeovers
- Increase precision for better quality, reduced waste and less downtime using EtherCAT®—the field bus with motion bus performance
- Enable more adaptable, sustainable and innovative machines that measurably improve marketability and profitability

A Single Family of Servo Drives

Kollmorgen AKD® servo drives deliver cutting-edge performance in a compact footprint. From basic torque-and-velocity applications, to indexing, to multi-axis programmable motion, these feature-rich drives offer:

- Plug-and-play compatibility with your servo motor
- All the advantages of Kollmorgen´s breadth of motor platforms including AKM®, CDDR®, and other direct-drive technologies
- The fastest velocity and position loop updates
- Full-frequency auto-tuning for perfect motion across the performance spectrum
- Real-time feedback from a wide variety of devices

Our Best Drive and Automation Solution in a Single Package

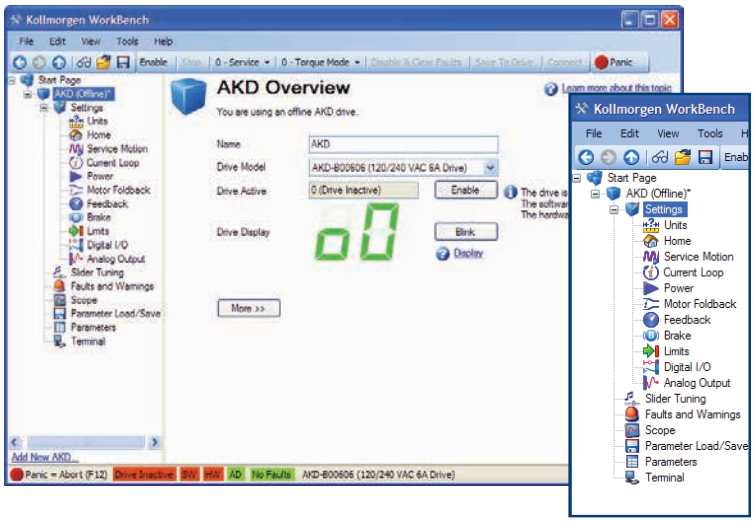
The AKD PDMM programmable drive, multi-axis master combines our AKD drive platform with the full feature set of Kollmorgen Automation Suite in a single package – providing complete machine and motion control for up to eight axes or more.
You need only one development suite and one drive family for all your projects. And you can rely on one source for allthe motion components and co-engineering expertise you need to build a better machine.
With AKD PDMM, the best in machine engineering has never been easier, faster or more cost-effective.

Kollmorgen Workbench

Our simple Graphical User Interface (GUI), Kollmorgen WorkBench, is designed to expedite and streamline the user's experience with the AKD® servo drive. From easy application selection and reduced math, to a sleek six-channel scope; the user interface is extremely easy to use. Kollmorgen WorkBench supports intuitive access to the exclusive Performance Servo Tuner (PST) available inside AKD. The patent pending PST makes auto-tuning the AKD high-performance servo drive with world-class Kollmorgen motors very simple.

User-Friendly Environment

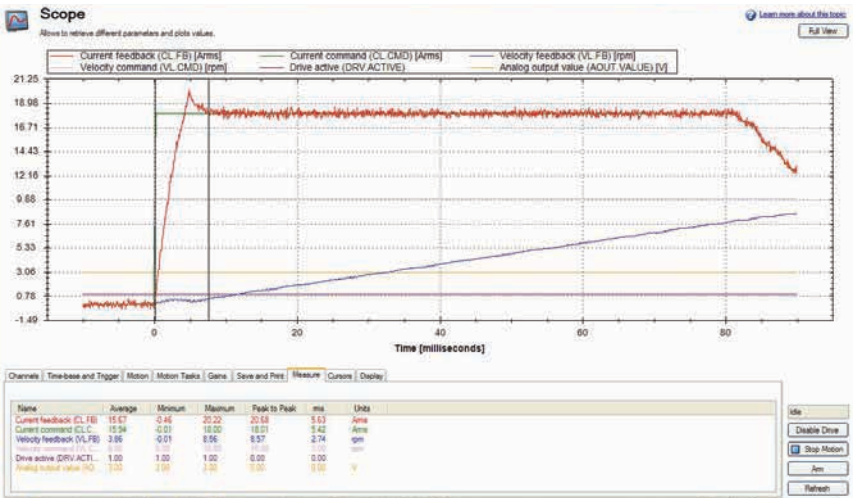
Logical flow, colorful icons and easy access simplify interactions with the AKD servo drive. The folder structure allows for instant identification and easy navigation.



Sleek Six-Channel "Real-Time" Software Oscilloscope

The easy-to-use AKD servo drive interface has a sleek digital oscilloscope that provides a comfortable environment for users to monitor performance. There are multiple options to share data in the format you prefer at the click of a button.

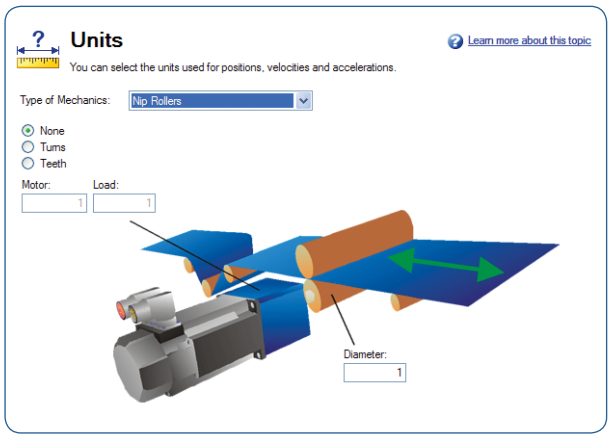
- Save as an image
- Load to an e-mail
- Print



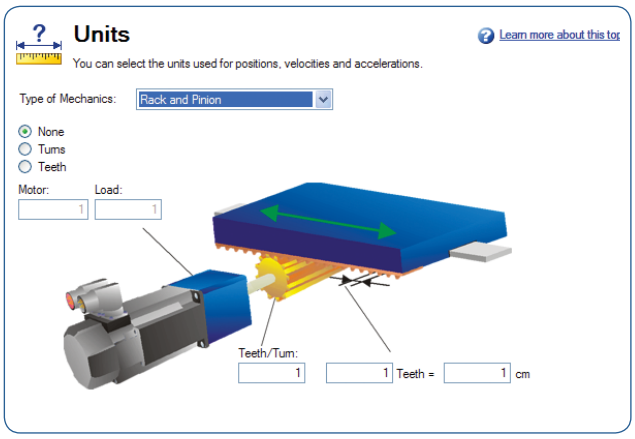
Application Selection

Simplifies set-up by allowing use of machine or application-based units. Nip roller and rack and pinion set-ups shown.

Nip Roller Application Selection

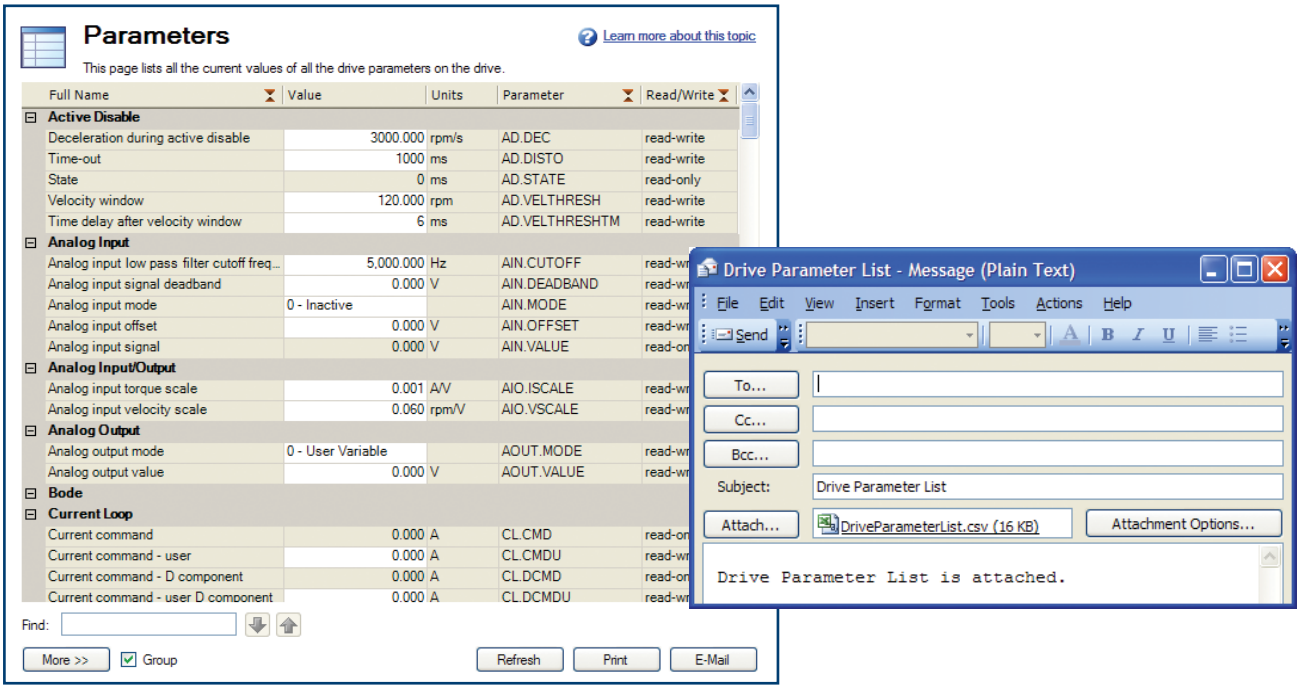


Rack and Pinion Application Selection



Data-Sharing

The ease-of-sharing continues in the parameters window. Kollmorgen WorkBench provides the user the easy options of printing or emailing the parameter values at the click of a button.



AKD®-N Decentralized Servo Drive

The new decentralized AKD-N servo drives from Kollmorgen can be placed in the immediate vicinity of the motor thanks to its robust, compact construction and protection class IP67, plug-in connections, excellent motor compatibility and high degree of integrated functionality. With the decentralized AKD-N servo drives, you can develop drive and automation architectures that are easily comprehensible, and integrate with the central AKD servo drives. Using EtherCAT® as a system bus, we reduce complexity further since the AKD-N can collect I/O signals on the axis and pass them on in bundled form.

Improved Overall Equipment Effectiveness (OEE)

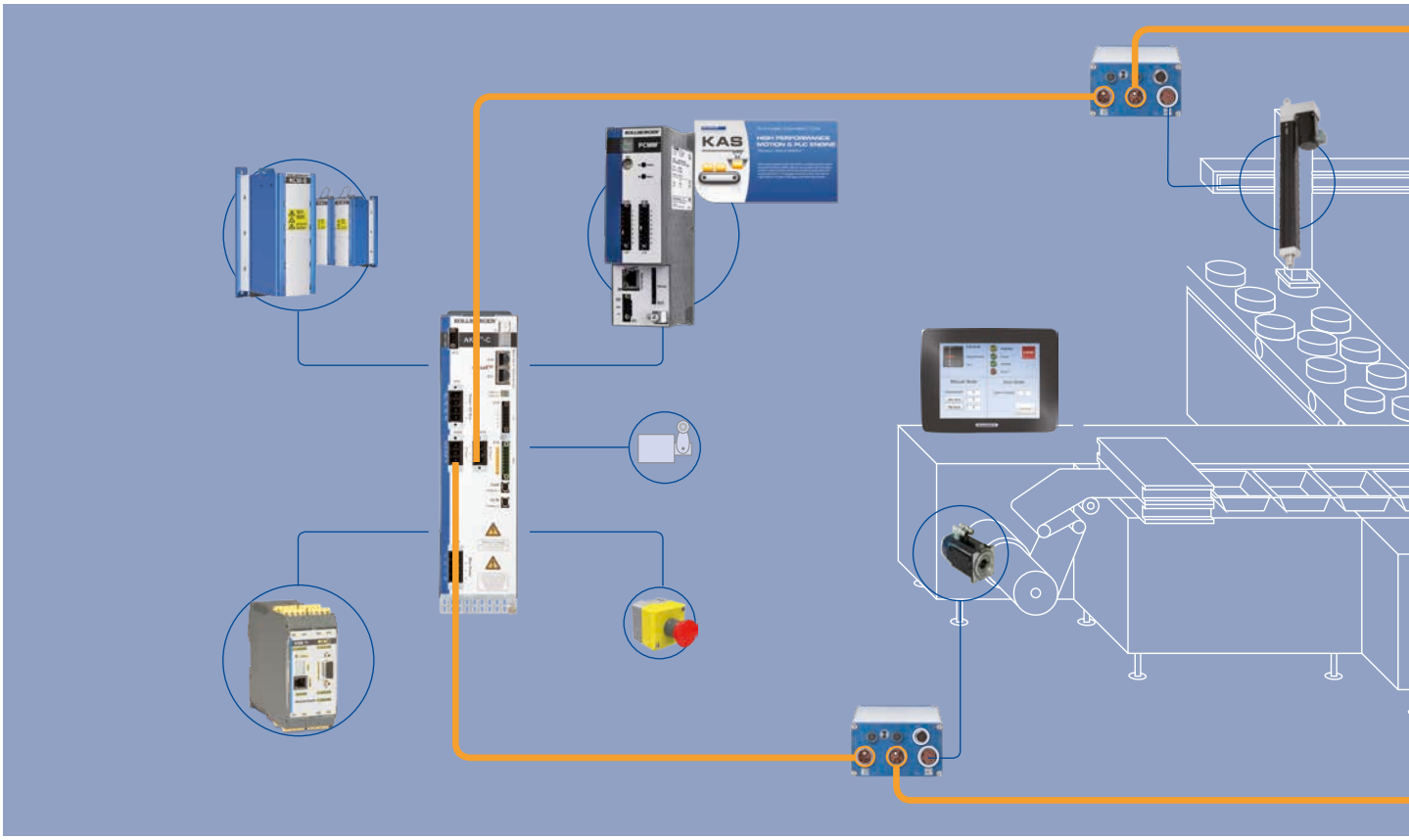
With AKD-N you increase the effectiveness beyond the entire life cycle of your machine (OEE, Overall Equipment Effectiveness). The design configuration and simple connection technology decrease the time for assembly, installation, and start-up. During the operating phase, the AKD-N plays a valuable part in energy savings due to the integrated DC connection. Further advantages in production are faster cleaning cycles, thanks to a higher protection class, as well as fewer cables in combination with a space-saving switch cabinet superstructure. Moreover, the assembly and connection technology increases the availability – and thereby productivity – because maintenance and service tasks are completed faster.

The Advantages of Decentralized Servo Drives

• Reduced costs	• Reduced cabling because DC and network, power supply, I/O level as well as safety (STO) run in one cable • Faster and simple assembly, even without special knowledge, through ready-made and tested cables • Lack of derating enables smaller motor and servo drive combinations compared to integrated system with the same output power
• Compacter machines	• Smaller and therefore more easily integrated switch cabinets • Servo drives in the immediate vicinity of the motor • Robust construction in Protection class IP67 makes protective enclosures superfluous
• Faster startup	• Plug connectors in IP67 for connection without tools • At only eleven millimeters, the thin hybrid cable can be laid in a space-saving manner – even in tight machine corners, thanks to a small bending radius • Simple connection of I/O systems or networks directly to the drive • Parameterization with the tools of the Kollmorgen WorkBench
• Higher machine effectiveness (OEE)	• Design supports fast and effective cleaning • High operating safety through robust construction • Precision through digital feedback • Everything at a glance: Status display on servo drive
• More flexibility in machine design	• Compatible with all motors from Kollmorgen with single-cable, or dual-cable, connection • Simple combination of central and decentralized controllers within the comprehensive AKD family • Faster modification and upgrade options through linear topology as well as I/O and network interfaces at the axis

AKD®-N Decentralized Servo Drives

Next gen design requires the perfect interplay of standardized drive and automation components. Selection of a functional, freely scalable solution ultimately ensures the highest degree of design freedom in building machines that operate efficiently without complexity.



Kollmorgen Automation Suite™

- Scalable automation solution for drive-dominant applications
- Graphic motion programming
- Compatible with IEC 61131-3 and PLCopen Motion Control

AKD-C Central Power Supply Module

- Power supply for up to 16 AKD-N
- Complete integration in the AKD family
- EtherCAT® Network
- 2 STO inputs SIL 2 / PLd
- 1 each digital input and output, 1 relay output

AKD-N Distributed Servo Amplifier

- Less cabling through single-cable solution
- Fast installation, simple assembly and connection
- IP65/IP67, UL design 4x
- Options: local EtherCAT® interface or local STO (SIL2 / PLd), connection for feedback systems

PCMM

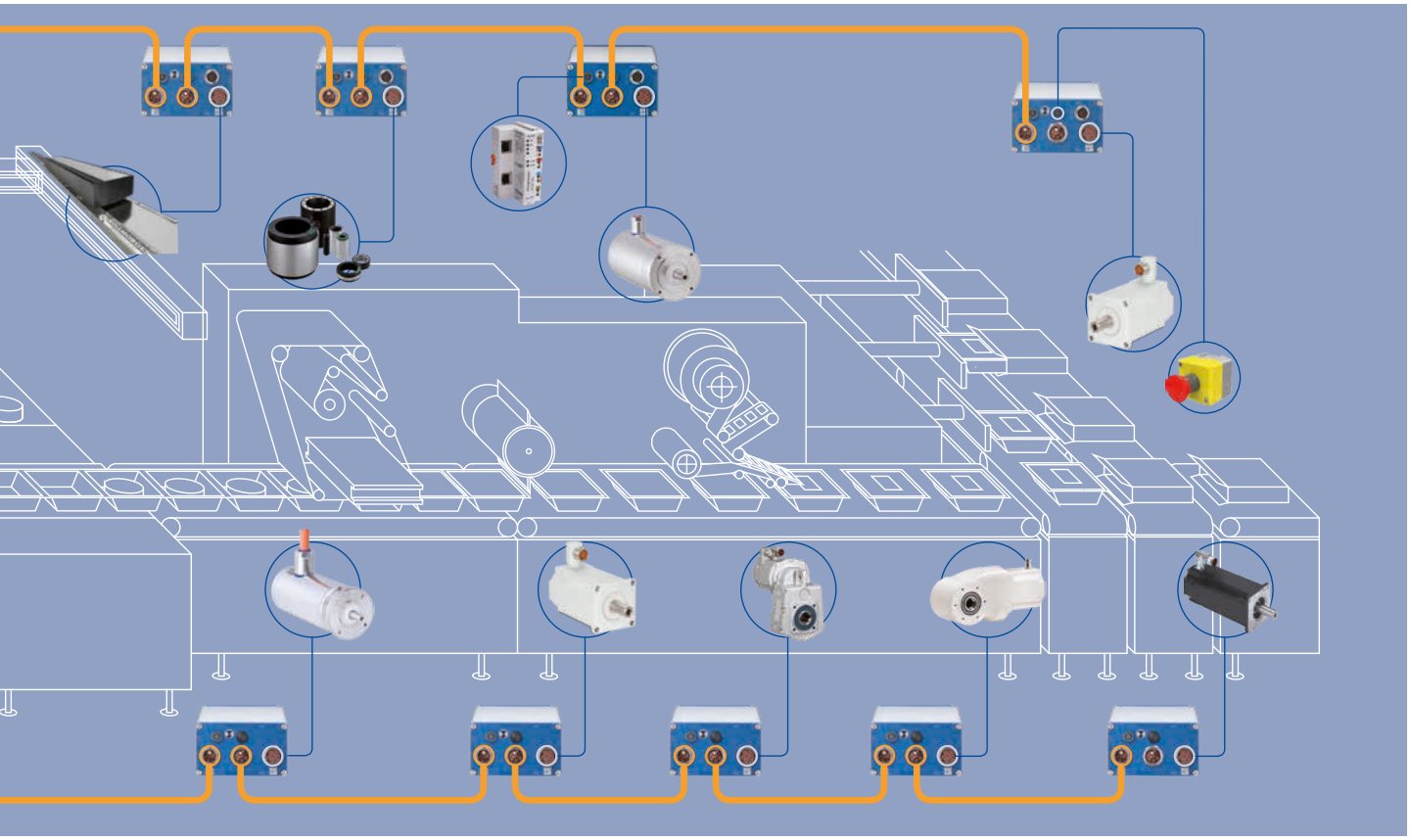
- High-performance motion controller
- Functional scope of the Kollmorgen Automation Suite™
- EtherCAT®, Profinet®, Ethernet/IP™ and Modbus® TCP standard

KCM Condenser Modules

- Reduces the energy costs and prevents downtime
- Simple implementation
- No harmonics in the power cables
- Scalable capacity

KSM safety controller

- Machine and motion safety in one device
- More than 200 verified safety functions
- Flexible – scalable from 1 to 12 secure axes
- High safety standard – Safety Level SIL 3 / PLe



AKM® Servo Motors
- High torque density
- High precision and dynamics
- Produced in Europe, US and Asia regions

AKM Washdown Servo Motors
- Applications with regular cleaning
- Housing coating is Ecolab®-certified

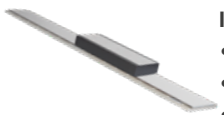
AKM Washdown Food Servo Motors
- For use in the food and beverage industry
- Protection class IP67, FDA compliant

AKMH™ Hygienic Stainless Steel Servo Motors
- For the highest hygienic requirements
- Protection class IP69K
- Fulfills EHEDG directive

AKM Food-Grade Gearmotors
- The highest hygienic requirements
- High efficiency
- Single-cable connection

Cartridge Direct Drive Rotary® DDR
- Direct load coupling without gears or belts
- High precision, low noise generation

KBM Direct Drives with No Housing
- Low weight, exceptionally compact
- Modular system



ICH Direct Drive Linear Motors
- High power density
- Large dynamics (>10g)
- Patented anti-cogging design

AKD®-N Decentralized Servo Drives

Our Way of Making Machines Simpler and More Efficient

- Advantage: Lower machine complexity
- Advantage: Greater freedom of design
- Advantage: Higher OEE (Overall Equipment Effectiveness)

Complete integration in the AKD family

Decentralized solution reduces effort and costs for switch cabinet

Startup with the Kollmorgen WorkBench

MotionBus (EtherCAT®) for connection to automation systems

Connection of external additional components

A single AKD-C supplies up to 16 AKD-N

Status LED for simple diagnosis

Simple connection of local I/O

Options like tertiary network and local STO offer maximal flexibility

IP67 / UL type 4x housing reduces cleaning times and makes special protective enclosures redundant.

Simple and fast attachment

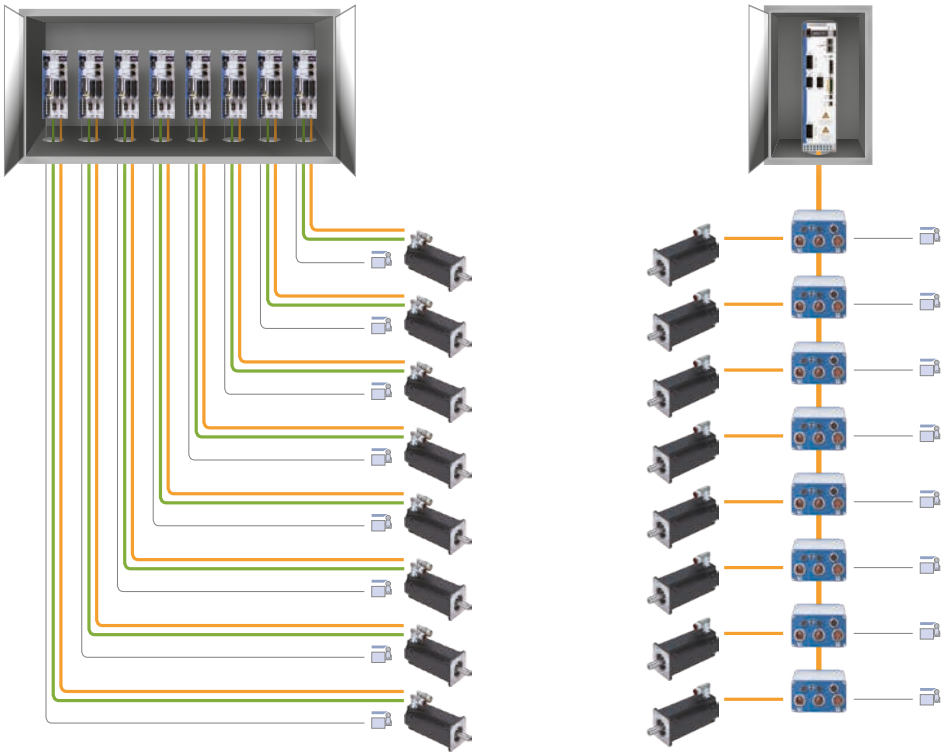
Compatible with all motors from Kollmorgen

A single cable with 11 mm diameter for DC bus, electrical supply, EtherCAT® network and STO reduces cabling outlay, increases the reliability and enables flexible machine design

Hybrid motor cable for simplified cabling, faster installation and higher reliability

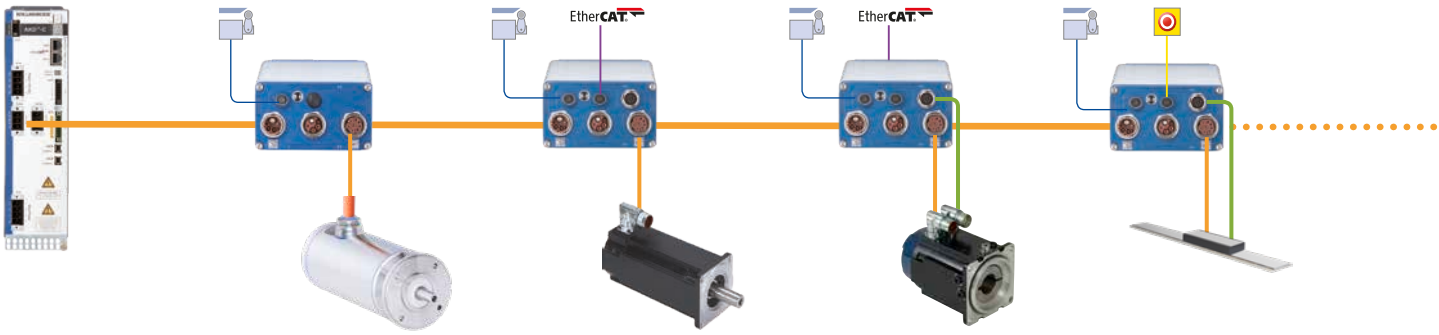
Why Lay 372 m of Cable when 42 m Will Suffice?

Imagine your machine includes eight axes each with a distance of three meters. The switch cabinet is 5 meters away and on each axis there is also a switch. With this thoroughly realistic example, that equates to a total of 372 meter of cable – with our AKD-N it would have been 42 meter. The decentralized servo technology of the AKD-N saves 330 meter here! That is cable that does not have to be purchased or laid and which does not require any space in the machine construction. We find that these are very good grounds for starting the comparison. We combine the AKD-N servo controllers and their power supply modules with pre-assembled and tested system cables – it doesn't get much simpler than this.



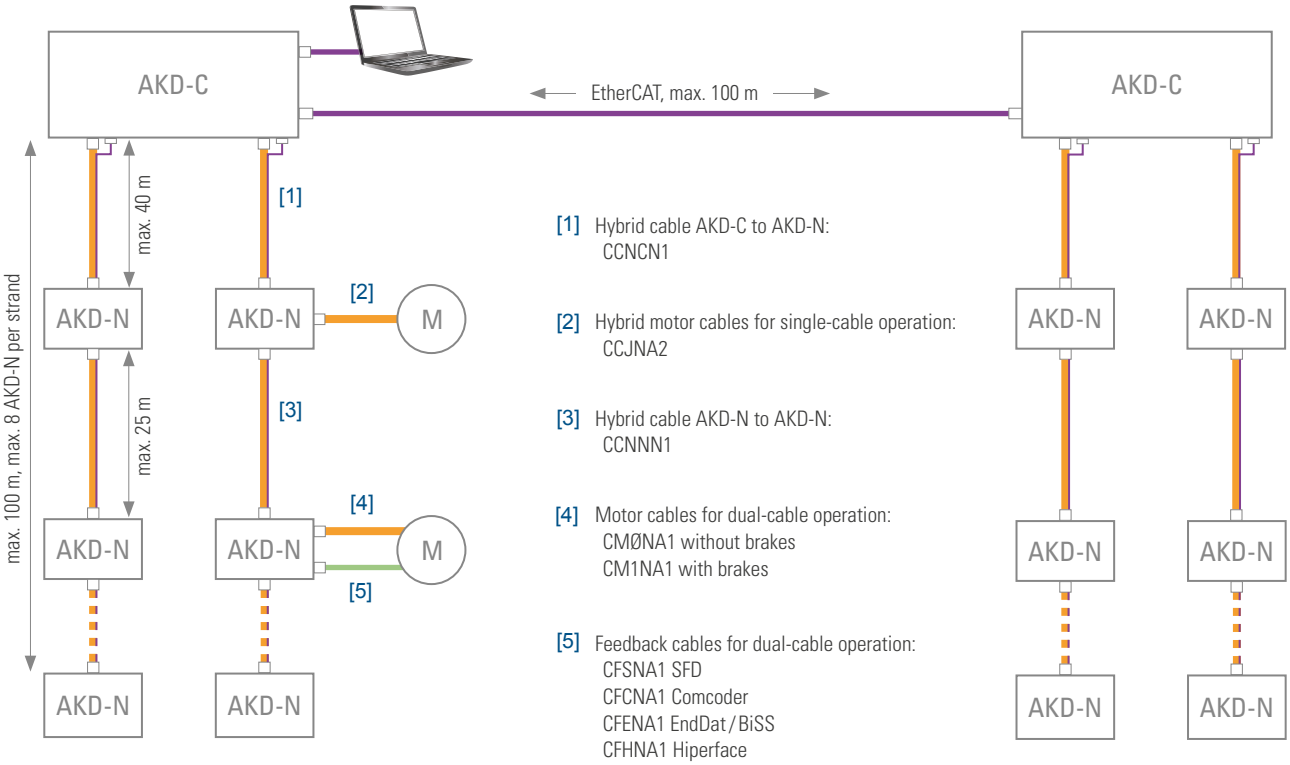
Regardless of which Motor: Plug and Play

Our AKD-N decentralized servo controllers work optimally with every motor. Within our Kollmorgen system, you can also thoroughly use all advantages of the single-cable connection technology individually.



AKD-N Decentralized Servo Drives

Technical Data and Topology



[1] Hybrid cable AKD-C to AKD-N:
CCNCN1

[2] Hybrid motor cables for single-cable operation:
CCJNA2

[3] Hybrid cable AKD-N to AKD-N:
CCNNN1

[4] Motor cables for dual-cable operation:
CMØNA1 without brakes
CM1NA1 with brakes

[5] Feedback cables for dual-cable operation:
CFSNA1 SFD
CFCNA1 Comcoder
CFENA1 EndDat / BiSS
CFHNA1 Hiperface

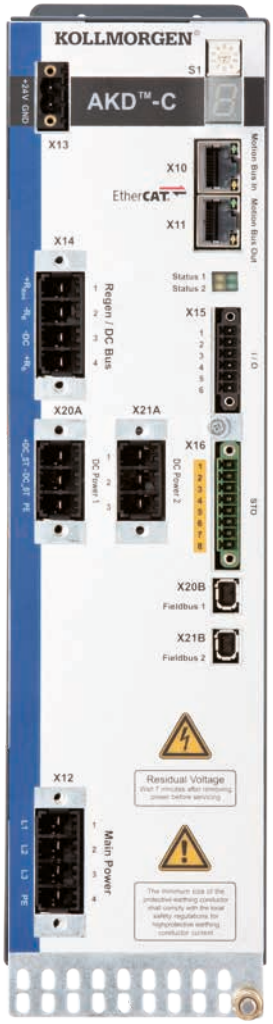
AKD-N Decentralized Servo Drives

Continuous current	3 A, 6 A, 12 A
Peak current	9 A, 18 A, 36 A
Continuous input power	1.5 kVA, 3 kVA, 6 kVA
Protection class	IP67
Digital inputs/outputs	3 digital inputs / 1 digital output
Safety function	STO SIL 2 (only AKD-N-DS)
Feedback systems Dual-cable (not with -DB)	SFD (digital resolver), BISS-C, Comcorder, hall sensor, Endat 2.1 and 2.2, Hiperface
Feedback systems Single-cable	SFD3 (digital resolver), Hiperface DSL
Communication	EtherCAT
Dimensions (W x H x D)	Housing: 3 A, 6 A: 130 x 75 x 201 (mm) 12 A: 130 x 75 x 252 (mm) With plugs 3A, 6 A: 130 x 75 x 247 (mm) 12 A: 130 x 75 x 297 (mm)

AKD-C Power Supply Module

Line voltage	400 / 480 V
Overall performance	10 kW
Intermediate circuit voltage	560 / 680 V DC
Output current	17 A (peak 34 A)
Protection class	IP20
Output strands	2, for up to 8 AKD-N apiece
Safety function	One STO Enable and STO Status apiece for each strand, SIL 2
Digital inputs/outputs	1 input, 1 output, 1 relay output
Communication	EtherCAT, TCP/IP service interface
Dimensions (W x H x D)	Housing (Front) 80 x 329 x 184 (mm) 80 x 329 x 231 (mm)

Connections and Controls



[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12]

[1] Network connection for service PC (TCP/IP) (on the top)

[2] Setting the IP address

[3] 24 V DC power supply

[4] Error and status displays

[5] Motion Bus I/O connections (EtherCAT)

[6] Status display of the local fieldbus

[7] Connection for external brake resistor and KCM buffer module

[8] I/O (1 each digital input and output, 1 relay output)

[9] DC outputs for connection of up to eight decentralized AKD-N servo drives apiece

[10] STO input, STO status output (one each per strand),

[11] Local fieldbus for communication with AKD-N

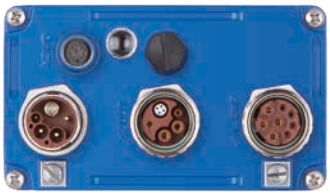
[12] Power connection 400 V / 480 V AC

Connection Options for AKD-N

AKD-N-	Single-cable technology	Separate feedback	Digital I/O	Tertiary fieldbus	Local STO
DB	✓	—	✓	—	—
DF	—	✓	✓	✓	—
DG	✓	—	✓	✓	—
DS	—	✓	✓	—	✓
DT	✓	—	✓	—	✓

AKD-N-DB

[4] [5]



[1] [2] [3]

[1] [2] Connections for hybrid cable

[3] Motor connection

AKD-N-DF, -DS

[4] [5] [6] [7]

[1] [2] [3]

[4] 3 digital inputs, 1 digital outputs

[5] Status/error display with LED

AKD-N-DG, -DT

[4] [5] [6]

[1] [2] [3]

[6] STO connection (-DS) / Tertiary fieldbus (-DF)

[7] Connection for feedback with dual-cable technology

S700 Servo Drives

Integrated safety functions contribute to increased machine availability and therefore increase productivity. The S700 models include a verified STO (Safe Torque Off) function as standard. The optional safety enhancement cards enable numerous safety functions such as "Safe Stop", "Safe Limited Speed", and "Safe Direction" for SIL2 or SIL3 applications.

All S700 servo drives use standardized, high-performance control technology. Rapid current, speed, and position control offers maximum performance and ensures that all axes are optimally synchronized at all times. Very quick and precise control allows for shorter work cycles and therefore considerable increases in productivity.

Specific application tasks and functions can be programmed with the integrated macro language (IEC 61131). The Macrostar development tool enables the implementation of expanded processes for individual axes.

Practical functions such as autotuning, Bode plots, and cogging suppression simplify optimization, both for applications with high dynamics and also those with high precision.

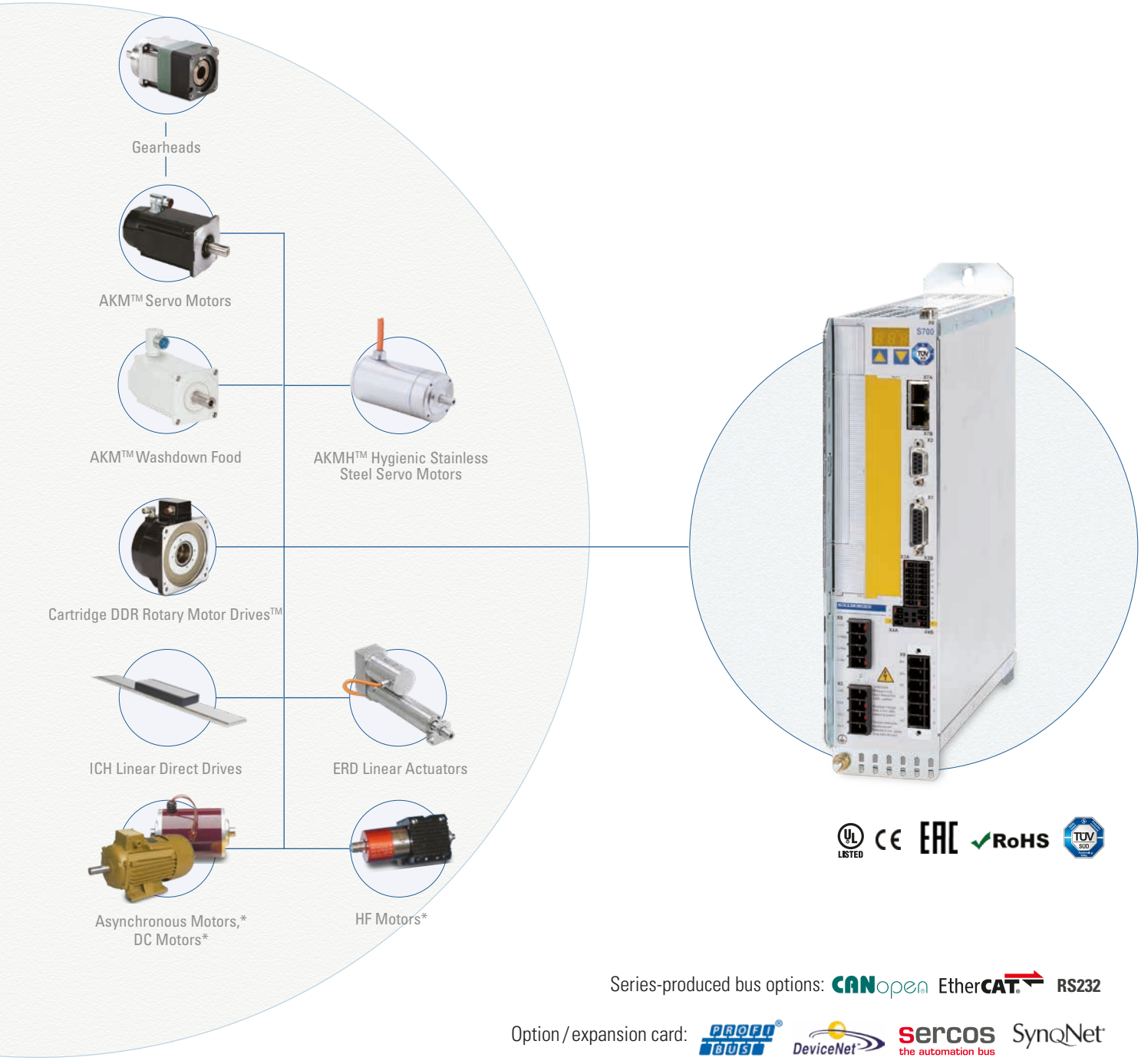
The Advantages of S700 Servo Drives

• Higher productivity	• Very quick current, speed, and position control increase machine cycle rates • SIL2 and SIL3 safety functions in accordance with IEC 61508 increase machine availability • Many reference run methods • 200 motion tasks can be saved • Integrated macro language for high-performing drive tasks
• A version for all applications	• Multi-interface • Multi-feedback • Synchronous servo motors • Direct drives, rotary and linear drives • Asynchronous motors • HF motors • DC motors
• Smaller switch cabinets	• Integrated EMC filters • Mains supply integrated • Brake resistor integrated for up to 24 A of nominal current • No mains choke usually necessary
• Faster start-up	• Memory card for parameter and firmware updates • All connections via connectors • Autotuning
• User-friendly	• Specific setup depending on the type of application • SI units calculator • Context-sensitive online help • Wiki system for technical background information

S700 Servo Drives

Universal with Optional Safety Functions

The S700 range of servo drives has been designed for universal use with synchronous servo motors, asynchronous motors, DC motors, HF motors, and rotary and linear direct drives. The S700 offers a function for suppressing cogging torques within defined traverse distances. This function has been specifically designed for applications with the toughest synchronism requirements. Even linear motors can be operated at extremely low speeds with a high degree of synchronous accuracy. For all application options, the DriveGUI setup software offers a wide range of tools for easy start-up.



Series-produced bus options: CANopen EtherCAT RS232

Option / expansion card: PROFIBUS DeviceNet sercos the automation bus SynQNet

*Third-party motor types

S700 series digital servo drives are available in rated current options of 1.5 A, 3 A, 6 A, 12 A, 24 A, 48 A, and 72 A. Customers can benefit from a consistent servo concept from a single source, which enables time and cost savings in project development, installation, and start-up. The finely staged scaling of the drive powers allow optimum adjustment to the requirements of each individual axis in the system, resulting in outstanding overall machine performance.

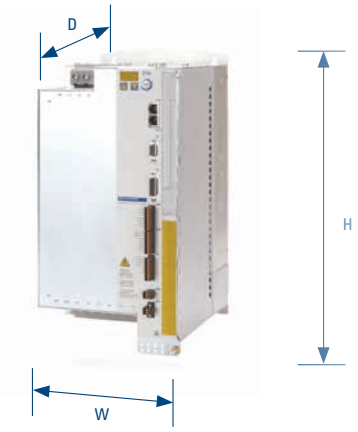
General Specifications

Rated data	DIM	S701	S703	S706	S712	S712S*	S724	S724S*	S748	S772
Rated line voltage	V AC	1 x 110 V to 230 V, 3 x 208 V -10% to 3 x 480 V +10%							3 x 208 V to 3 x 480 V	
Rated line power for S1 operation	kVA	1.1	2.2	4.5	9	9	18	18	35	50
Auxiliary supply	V DC	24								
Rated DC-link voltage	V DC	290 to 675								
Rated output current										
At 1 x 110 V	A_{rms}	1.5	3	6	7	7	10	10	It is also referred to as Commutation Alignment and Pole Locking.	It is also referred to as Commutation Alignment and Pole Locking.
At 3 x 110 V	A_{rms}	2.5	5	6	12	12	24	24	It is also referred to as Commutation Alignment and Pole Locking.	It is also referred to as Commutation Alignment and Pole Locking.
At 1 x 230 V	A_{rms}	1.5	3	6	8	8	11	11	It is also referred to as Commutation Alignment and Pole Locking.	It is also referred to as Commutation Alignment and Pole Locking.
At 3 x 230 V	A_{rms}	2	4	6	12	12	24	24	48	72
At 3 x 400 V	A_{rms}	1.5	3	6	12	12	24	24	48	72
At 3 x 480 V	A_{rms}	1.5	3	6	12	12	24	24	48	72
Peak output current	A_{rms}	4.5	9	18	24	30	48	72	96	140

* Higher peak current

S701 - 712

S724



S748/772

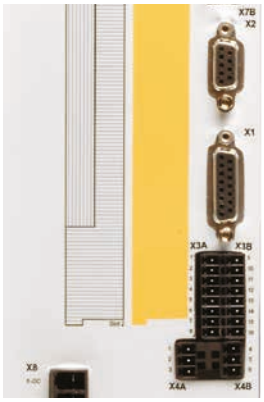
Dimensions (mm)

	DIM	S701	S703	S706	S712	S712S	S724	S724S	S748	S772
(H) Height incl. fan	mm	345					348		385	
(W) Width	mm	70					100		190	
(D) Depth incl. connector	mm	285							285	

S700 Servo Drives

Features

The S700 can read data from a wide range of feedback systems and evaluate three different systems in parallel. This ensures a high level of flexibility where integration the S700 into various applications is concerned. Control without a feedback system is also supported, e.g. in the case of asynchronous motors.



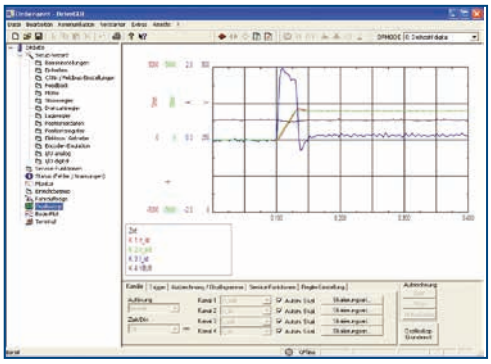
- 2 to 36-pin resolvers
- Incremental encoder (AquadB) 24 V
- Incremental encoder (AquadB) 24 V + hall-effect sensor
- Pulse / direction, 24 V

Optional: SSI absolute encoder pulse / direction 5 V

- SinCos encoder with BiSS
- SinCos encoder with EnDat 2.2, EnDat 2.1
- SinCos encoder with HIPERFACE
- SinCos encoder without data track
- SinCos encoder with hall-effect sensors
- Hall-effect sensor
- Digital Resolver SFD3 with HIPERFACE DSL
- Incremental encoder (AquadB) 5 V
- Incremental encoder (AquadB) 5 V + hall-effect sensor

Simple Configuration with DriveGUI Setup Software

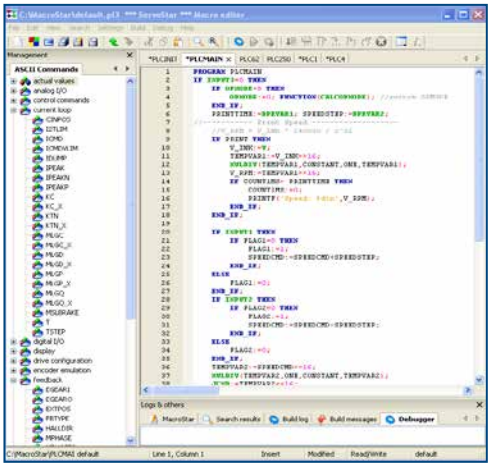
With the graphic-based DriveGUI setup tool, you have access to all the S700 functions and parameters. You can therefore quickly configure all S700 interfaces, select all connected devices (e.g. motor type, feedback system, fieldbus) and the autotuning functions can be launched. The four-channel oscilloscope and Bode plot function ensure optimum display of the autotuning results.



Integrated Macro Programming

The Macro Language forms part of the S700 firmware and enables independent, single-axis programmable positioning. Missing functions in the standard amplifier firmware can be programmed with IEC 61131 structured text. The MacroStardevelopment tool supports the quick programming of functions with integrated variables and command catalogs.

- 62.5 µs / 250 µs / 1 ms / 4 ms / 16 ms / IDLE / IRQ
- 128 kByte code memory
- 400 simple instructions every 62.5 µs
- CAN objects for multi-axis control



From a Drive to a Safe Drive: Safety Expansion Cards

The S700 safety concept is designed for level SIL3 or PL e. The use of standard hardware components enables flexible and cost-optimized solutions which can achieve a cost saving of up to 25% per axis due to the omission of customer-specific adjustments. Due to the secure processes, machine availability and, consequently, productivity increase by up to 20%.

The safety expansion cards equip the S700 with important safety functions that are activated by an external safety logic. The upgrade is very simple: The cards are simply inserted into the connector sockets provided on the S700 servo drive and then configured with the SafetyGUI configuration tool. Finished!

Extensive Safety Functions

Category	Function	S700	S700 + S1-2	S700 + S2-2
	Si level	SIL2/PL d	SIL3 / PL e	SIL2 / PL d
Safe stop functions	STO	✓	✓	✓
	SS1	—	✓	✓
	SS2	—	✓	✓
	SOS	—	✓	✓
Safe speed functions	SSR	—	✓	✓
	SLS	—	✓	✓
Safe direction functions	SDI	—	✓	✓
Safe brake control	SBC	—	✓	—
Safe position functions	SLI	—	✓	✓
	SLP	—	✓	—

Safety expansion card S2-2

Safety expansion card S1-2

Safety Solutions with the S700 Safety Concept

- Easy integration
- Flexible
- Maximum safety functionality
- Hardwired, compatible with almost every safe control system
- Ideal for upgrading existing safety solutions
- No external safety logic necessary
- Upgradeable option cards
- Extensive safety functions are included
- Very short response time thanks to direct access to the control electronics

Safe Motion

Why should a whole production line be brought to a standstill during user interventions when only one part of it is affected? Kollmorgen has put the idea of building drives with safe motion instead of safe standstill into practice with its Motion Safety solution that integrates the safety logic and monitoring within the drive. Without compromising on safety, drives utilizing or using Motion Safety achieve considerably higher productivity and offer more flexibility when adjusting to new requirements.

Kollmorgen offers safety expansion cards for installation in the S700 servo drive and the KSM compact and KSM modular safety control systems.

Make the Most of the Advantages of the Kollmorgen Motion Safety Strategy

• Higher productivity	• Motion Safety enables user interventions in running processes • Safe motion instead of safe deactivation • Risk-dependent triggering of safety functions
• Low system costs	• Optimal adjustment to requirements due to modular structure • Wide range of standard products • Safety control and drive monitoring in one device
• Flexible	• Modular concept and simple upgrade of existing drives • Seamless transition from hardwired to configurable safety logic
• Simple and fast implementation	• Important motion-related safety functions are integrated • Predefined safety function blocks • Intuitive tools for programming and parameterization in the field by the customer

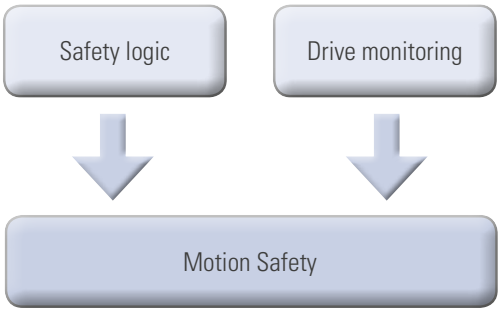
Safe Motion

Safety Logic and Drive Monitoring Integrated within the Drive

Motion Safety – innovative safety technology from Kollmorgen. Motion Safety means: safe processing of sensor and actuator signals, safe motion monitoring, and safe communication directly in the drive. The result: significantly higher productivity when compared to conventional safety technology thanks to safe drive solutions.

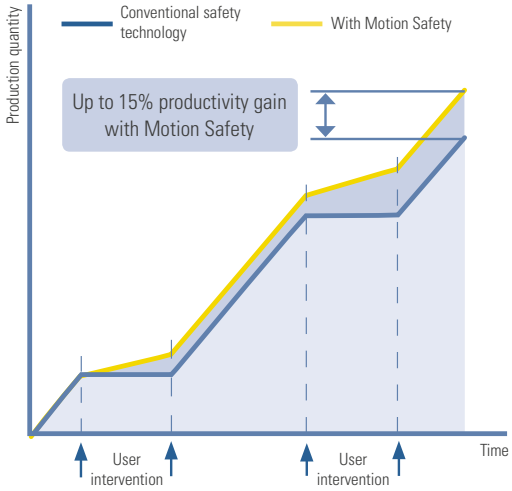
With Motion Safety: Safe Motion Instead of Safe Standstill

Motion Safety combines the safety logic and the drive monitoring in the drive. Conventional safety technology keeps the user away from areas with dangerous motion. By contrast, drives with Motion Safety work according to the safe motion principle and permit user interventions without interrupting the process. The safety logic in the drive controls motion sequences so that no danger can result from them and the process is not interrupted.



Productivity Gains with Motion Safety

Safety functions for areas with dangerous motion are activated when intervening in a running process. With intelligent safety functions, motion sequences are controlled so that each motion is safe. For example, this is performed through position monitoring and restricting the range of motion or by increasing the cycle times. Parts of the machine that do not constitute a risk to the user are not affected. The graph clearly shows the productivity gains when using Kollmorgen's Motion Safety technology.



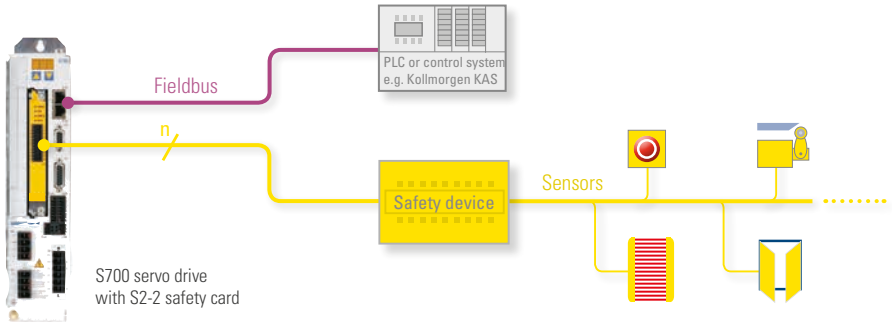
Kollmorgen – your Competent Partner for Safe Drive Solutions

As the leading manufacturer of electrical drive technology, Kollmorgen boasts extensive expertise gained from thousands of drive projects around the world. Safety logic, servo drives, motors, through to complete automation solutions – Kollmorgen supplies coordinated components for safe drive solutions, all from one source. Whether it is a standard implementation or a new development as part of a co-engineering project, make use of Kollmorgen's innovative capacity and experience for developing your safe drive.

Demanding Safety Solutions Realized efficiently

Safe Single-axis Drive with Minimum Response Time

S700 safety concept: The optional S1-2 S2-2 safety expansion cards equip the S700 servo drive with safety functions

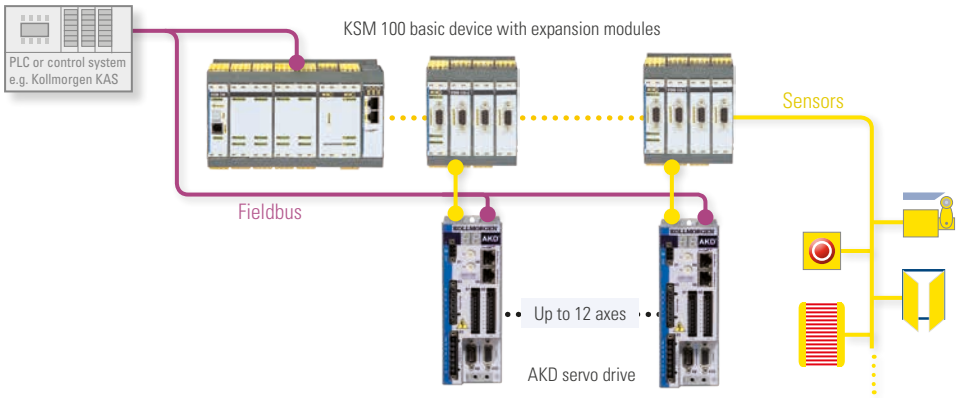


Compact, Simple Safety Solution for up to 2 Axes

KSM compact safety control system with AKD servo drive for drives with up to 2 axes and up to 32 secure I/O

High-Performance Safety Control System for Demanding Safety Requirements

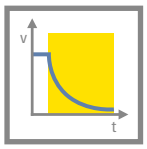
KSM modular: The modular safety control system for demanding, safe drives with up to 12 axes and up to 200 secure I/O



Safe Motion

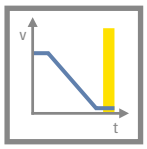
Extensive Safety Functions for Safe Motion

STO (Safe Torque Off)



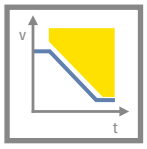
STO safely interrupts the power supply to the motor in the servo drive. The motor becomes torque-free.

SS1 (Safe Stop 1)



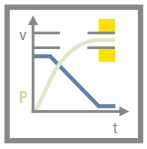
The drive is brought to a standstill by controlled braking. Then the power supply to the motor is safely interrupted and the motor becomes torque-free.

SS2 (Safe Stop 2)



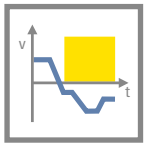
The drive is brought to a standstill by controlled braking and subsequently remains in controlled standstill. The control functions of the drive are maintained.

SOS (Safe Operating Stop)



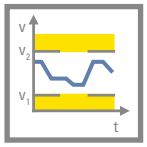
Monitors the stop position reached and triggers SS1 in the event of deviations beyond the specified limits. The control functions of the drive remain active.

SDI (Safe Direction)



The SDI function ensures that the drive can only move in a defined direction. In the event of an error, SS1 is triggered.

SSR (Safe Speed Range) 1

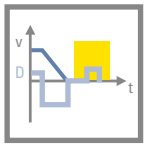


Monitors that the drive observes a defined speed limit. In the event of an error, SS1 is triggered.

SLS (Safe Limited Speed)

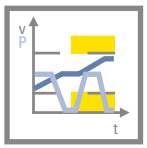
Monitors that the drive observes a defined speed limit. In the event of an error, SS1 is triggered.

SBC (Safe Brake Control), SBT



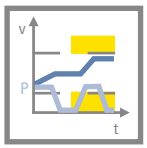
SBT (Safe Brake Test) (non-standardized)
Test function for external brakes and the internal motor holding brake

SLP (Safe Limited Position)



Monitors the absolute position of the drive. If the limit value is reached or the brake torque is too low to keep the drive within the limit value, SS1 is triggered.

SLI (Safe Limited Increments)

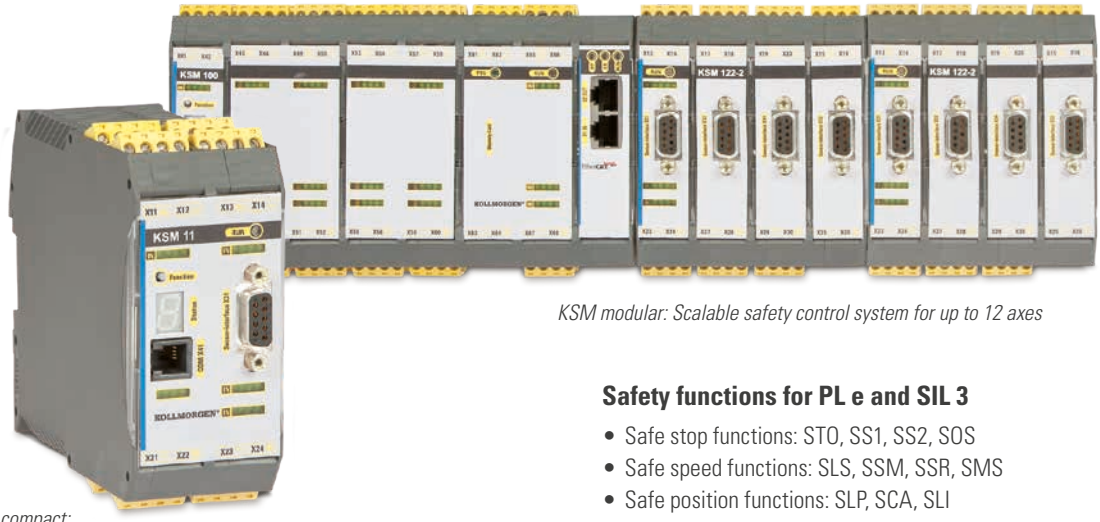


Monitors the relative position of the drive with respect to the current position when activating the SLI function. SS1 is triggered when the prescribed limit value is reached.

KSM Safety Control System

The Safety Chain for Motion from the Sensor to the Drive

Safe drive solutions with higher productivity: The KSM safety control system achieves SIL 3 / PL e and perfectly meets the requirements of modern safety concepts thanks to its modular structure. From safe dual-axis drives with just a few safe I/O through to a 12-axis drive with 100 or more safe I/O, in combination with AKD servo drives and Kollmorgen automation solutions, you can develop expandable, safe drives that offer more power and higher productivity with lower system costs.



KSM modular: Scalable safety control system for up to 12 axes

KSM compact:
single module for up to 2 axes

Safety functions for PL e and SIL 3

- Safe stop functions: STO, SS1, SS2, SOS
- Safe speed functions: SLS, SSM, SSR, SMS
- Safe position functions: SLP, SCA, SLI
- Safe direction functions: SDI
- Safe braking functions: SBC

KSM Compact Safety Control

With KSM compact you can turn a drive into a safe one in next to no time. Important safety and monitoring functions for motion and function blocks for the processing of sensor and actuator signals are already integrated.

- For 1 or 2 axes
- Up to 2 expansion modules
- Basic module with 16 safe inputs/outputs
- Expandable to up to 60 safe inputs/outputs
- 1 safe relay output, expandable
- 2 pulse and 2 message outputs
- Expandable to up to 6 pulse and 6 message outputs
- Up to 800 function blocks
- Space-saving, compact design

KSM Modular Safety Control System / Safety PLC

KSM modular is designed for drive solutions with complex safety functions and a large number of interfaces. With up to 3000 function blocks, KSM modular offers the functionality of a safety PLC.

- Up to 12 axes
- Up to 8 expansion modules
- Basic module with to up to 56 safe inputs/outputs
- Expandable to up to 200 safe inputs/outputs
- 1 safe relay output, expandable
- 2 pulse and up to 10 message outputs
- Expandable to up to 14 pulse and 22 message outputs
- Up to 3000 function blocks
- For applications with many interfaces

AKM® Servo Motors

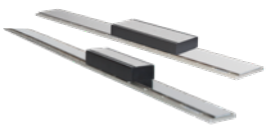
When you need precise position control, choose from Kollmorgen's broad portfolio of servo system components. Our unparalleled product line breadth provides great flexibility for any application. Whether it's any combination of motors and drives, cables, controller, electric cylinders or gearboxes, all components are plug-and-play for easy, seamless integration. These best-in-class servo systems can be matched with single-axis or multi-axis motion controllers for a system solution that's precise, reliable and durable.

The Advantages of AKM® Servo Motors

• With the same size, the AKM offers more power on the motor shaft than before • Amplifier and motor dimensions reduced • Lower system costs	• Optimized AKM and direct drive motor windings for the AKD servo drive
• Quicker start-up of all servo systems • Immediate and adaptive reaction to dynamic loads optimizes performance within seconds • Precise regulation of all motor types • Compensation for stiff and compatible gearboxes and clutches	• Start-up of amplifiers with plug-and-play detection for AKM and Cartridge DDR series motors
• More precise machines due to higher resolution and improved accuracy • With multi-turn absolute encoders: reduced cycle times and lower costs for sensors and cabling through the omission of conventional reference run methods	• New, cost-efficient multi-turn feedback option
• Machine design independent of motor size • Installation of motors in the tightest space	• Motors with the highest power densities in the whole industry
• Over 500,000 standard motor versions available in various mounting, connection, and feedback variants, as well as further options • Our flexible products deliver a perfectly suited solution to your application • Simplifies mechanical modifications and design adjustments or renders them totally superfluous	• AKM offers 28 housing and design length combinations, as well as 120 different standard windings for a single motor series
• AKM Washdown and AKM Washdown Food also offer maximum reliability and a long service life for the most demanding industrial applications	• IP67 option for AKM

Kollmorgen Servo Motor Overview

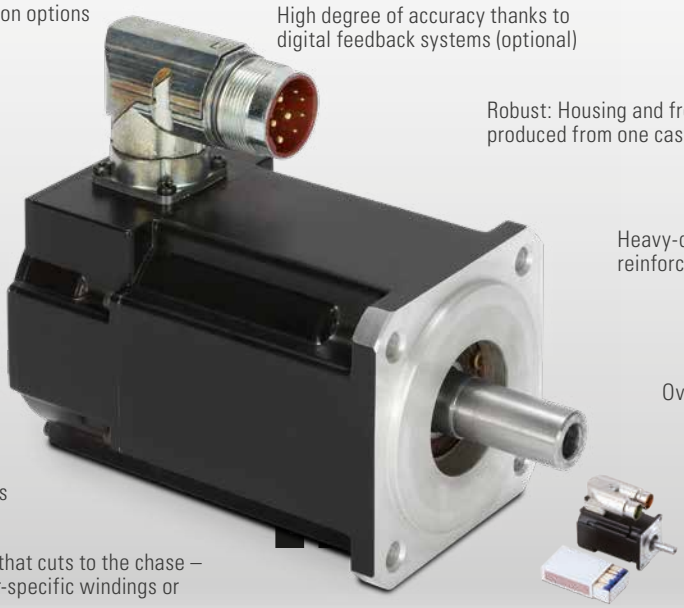
Kollmorgen offers a comprehensive range of servo motors including electric cylinders, rodless actuators, and precision tables to meet a wide range of application requirements. For actuator products not included in this catalog go to www.kollmorgen.com for information about other Kollmorgen linear positioning products.

	Model	Product Family	Applications
	AKM® Servo Motors	AKM	Designed with industry leading torque density and configurability. The AKM line includes more than 500,000 standard models to fit applications from general automation to applications that require IP67 sealing.
	AKMH IP69K Hygienic Motors	AKMH	The AKMH meets the food industry's strictest hygienic design criteria while being rugged enough to withstand the toughest of daily washdown regimens. Perfect for Food Processing, Primary Food Packaging, Pharmaceutical and Medical applications.
	Cartridge Direct Drive Servo Motors	CDDR	The CDDR is designed to provide the benefit of embedded frameless motor technology in an easy-to-integrate package. Perfect for applications in Printing, Packaging and Converting.
	Housed Direct Drive Servo Motors	HDDR	Housed DDR motors are designed for precise positioning of larger loads without the use of a mechanical transmission. Increasing OEE through the removal of belts and gearboxes that fail unexpectedly or require frequent maintenance.
	KBM Frameless Direct Drive Motors	KBM	With a wide variety of sizes and an extensive range of torque and speed options the KBM frameless direct drive motors are engineered to provide the high-performance, long life and simple installation that today's design engineers demand.
	TBM Frameless Direct Drive Motors	TBM	The Kollmorgen TBM frameless direct direct drive motors are designed for applications that require high power in a small, compact form factor with minimized weight and inertia. These motors provide the highest performance in applications such as robotic joints, medical robotics, sensor gimbals, guidance systems and other motion-critical applications.
	Direct Drive Linear Servo Motors	ICH	Ideal for applications requiring very low bearing friction, high acceleration of lighter loads, and for maximizing constant velocity, even at ultra low speeds.

Model	Product Family	Features
AKM Servo Motors	AKM	Designed to deliver precise motion and more power for your money. More than 500,000 standard configurations that include various feedback, connector, paint and sealing options.
AKMH IP69K Hygienic Motor	AKMH	The AKMH is designed to withstand the toughest of daily washdown regimens without the need for covers. The AKMH's hygienic design makes it easy to clean, keeping your machine running and protecting your brand. Designed with a single cable that combines power, feedback and an innovative venting feature that extends the life of the motor.
Cartridge Direct Drive Servo Motors	CDDR	The CDDR is a patented design that allows for this torque dense frameless motor to be installed on your machine in 5 minutes. The CDDR lowers your machines maintenance, increases your machines uptime and increase your machines peformance.
Housed Direct Drive Servo Motors	HDDR	Housed DDR motors are maintenance free and run more quietly and with better dynamics than systems that use gears, belts, cams or other mechanical transmission components.
KBM Frameless Direct Drive Motors	KBM	KBM motors cover a range of frameless motor solutions across a variety of applications. KBM is engineered to provide the high-performance, long life and simple installation that today's design engineers demand.
TBM Frameless Direct Drive Motors	TBM	Typical applications include robotic joints, weapon stations, sensor gimbals, sight systems, UAV propulsion and guidance, as well as many others.
Direct Drive Linear Servo Motors	ICH	Kollmorgen linear motors provide precise placement of product by directly coupling to your load and eliminating the backlash associated with high maintenance linear transmission components.

AKM® Brushless Servo Motor

The AKM® brushless servo motor stands alone in the marketplace in terms of flexibility and performance advantages. Kollmorgen's culture of continuous improvement has paid dividends again. The AKM servo motor's innovative design has been polished and optimized. With the new AKD amplifier, the distinguished AKM servo motor sets a new standard of refined servo performance, designed to deliver precise motion and more power for your money. Nowhere else will you find a more versatile and complete servo family to meet your needs and exceed your expectations.



Numerous feedback options such as the SFD3 digital resolver, single-turn and multi-turn absolute encoders and resolver

Numerous connection options

High degree of accuracy thanks to digital feedback systems (optional)

Robust: Housing and front flange produced from one casting

Heavy-duty shaft, optionally with reinforced bearings (only AKM8)

Over 500,000 standard configurations

Smaller and lighter motors due to high torque densities

Small but impressive:
AKM1 is one of the smallest servo motors on the market

Motor design that cuts to the chase – with customer-specific windings or modifications.

Worldwide availability and user support through the international Kollmorgen sales and support network

- 8 frame sizes from 40 to 260 mm
- 28 housing and design length combinations
- 117 standard windings for 120/240/400/480 V
- Winding options for low DC voltage
- Numerous flange and shaft options
- Minimal cogging and high degree of efficiency
- Extensive customization options with special windings and shafts

Power Range

AKM frame sizes 1 to 8, standstill torques of 0.16 to 180 Nm, speed range 1000 to 8000 rpm, voltages 75 V DC, 120, 240, 400, 480 V AC.

Application Criteria

Universally deployable, brushless servo motors for all positioning and motion tasks with normal and high requirements and with accuracy and speed in a torque range between 0.16 Nm and 180 Nm.

Feedback Systems and Connectivity

Standard with SFD3 and HIPERFACE DSL single-cable options. In addition, AKM supports dual-cable feedback options such as Resolver, Encoder, EnDAT, BiSS; Hiperface, Safe Feedback and Drive Cliq.

Protection Class

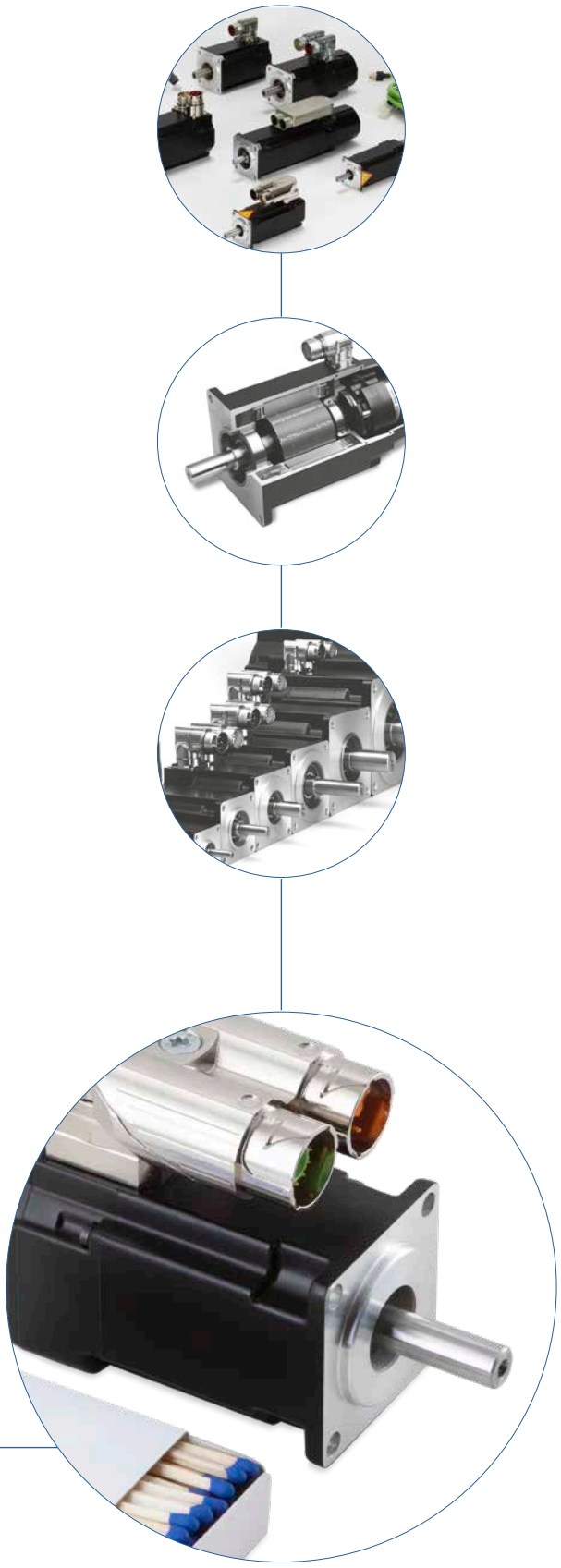
IP65 with optional Teflon® shaft seal, IP67 in the Washdown or Washdown Food version (page 51). Standard version IP40.

Smooth Running and Long Service Life

Very smooth running due to minimal cogging. The single-cast stator ensures high stability and improved heat dissipation from the motor. Front flange and motor housing are produced from a single cast. This ensures a high degree of sealing and strength and a long service life.

High Accuracy

AKM Motor		Single-turn absolute			Multi-turn absolute		
		Accuracy (arc-min)	Resolution (bits)	Motor key	Accuracy (arc-min)	Resolution (bits)	Motor key
Value line	AKM1	16	24	CA	–	–	–
	AKM2 - AKM3	9	24	CA	8	18	LB
	AKM4 - AKM8	9	24	CA	4.66	18	LB
Performance line	AKM1	7.2	9	GP	7.2	9	GR
	AKM2 - AKM4	1.0	20	DA	1.0	20	DB
	AKM5 - AKM8	0.333	20	DA	0.333	20	DB

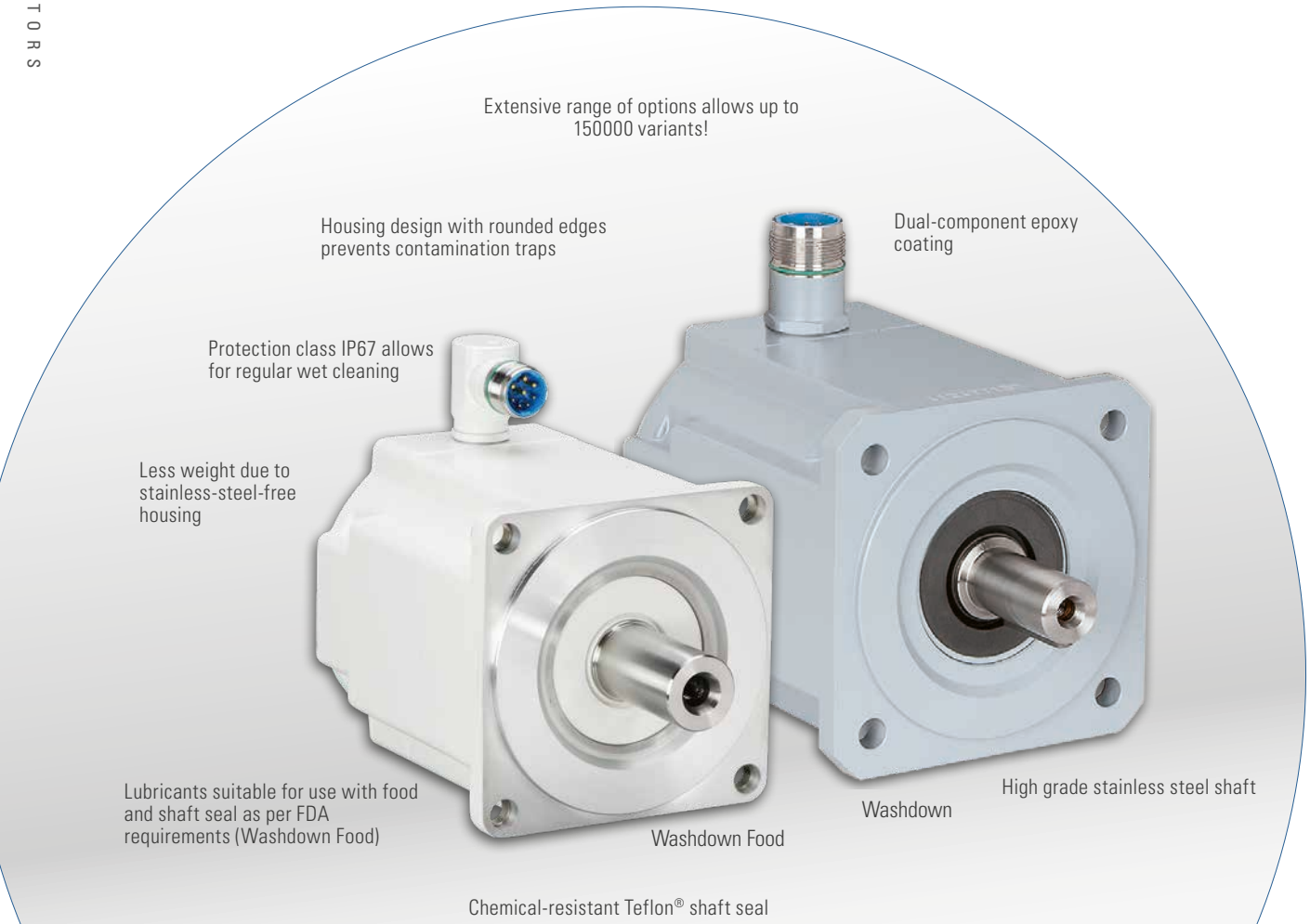


The AKM1 – one of the smallest servo motors on the market offers outstanding power density despite its compact design

AKM® Washdown and Washdown Food

Servo Motors suitable regular Washdown

More durable in washdown conditions than standard AKM motors, lighter and more cost-effective than stainless-steel servo motors: In many applications with demanding environmental requirements, the AKM Washdown and Washdown Food versions are good alternatives to costly stainless steel motors or expensive protective enclosures.



Specially for applications with demanding environmental requirements in the

- Packaging industry
- Pharmaceutical industry
- Food industry
- Beverage industry
- Laboratory automation
- Medical device technology

Power Range

AKM frame sizes 2 to 6 with standstill torques of 1 to 25 Nm, supply voltages of 75 to 480 V, large selection of different construction lengths, winding variants, as well as feedback systems and connection technologies.

Application Criteria

Designed for environments with acids, bases, or aggressive substances such as frequent cleaning with cleaning agents with pH values of between 2 and 12.

Housing Coating

The coating material of the AKM Washdown Food motors is resistant to acids and bases and aggressive substances and meets the global migration requirement of the FDA. The rounded and smooth surfaces prevent hazardous contamination traps and germ formation.

Seals and Bearings

Both Washdown versions meet the IP67 protection rating. The proven AKM PTFE shaft seal is used. For the AKM Washdown Food version, the shaft seal meets FDA requirements and only food-safe lubricants are used.

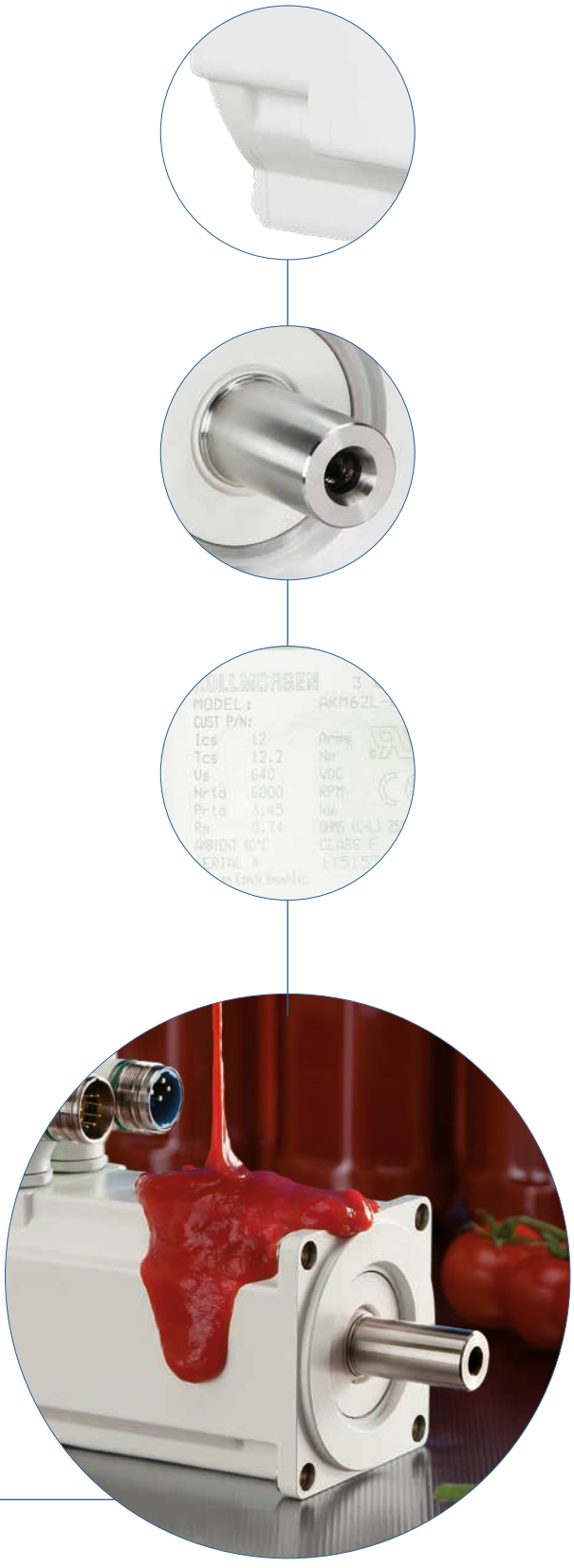
Connectors and Cables

Each in size 1 with special stainless steel design and smooth surface. Cables with special mating connectors are used from stainless steel or a material appropriate for maintaining food quality. The cables are clamped using a special clamping method.

International Standards

UL, CE, EAC, FDA*, RoHS

* Global migration requirement



Also proven in harsh environments: The AKM Washdown Food is resistant to most acids and bases, as well as aggressive substances.

AKM® Servo Motors

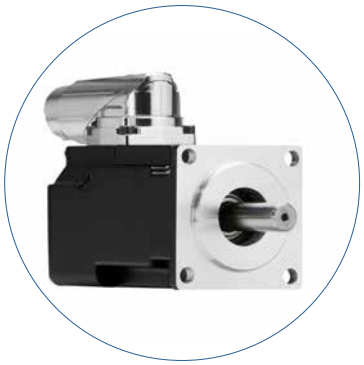
AKM, AKM Washdown, and AKM Washdown Food

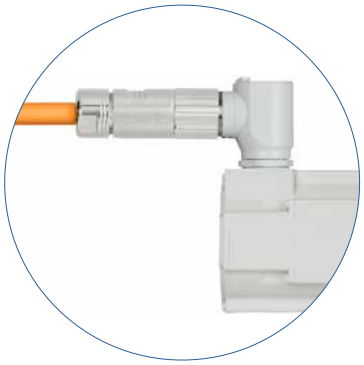
Performance Data

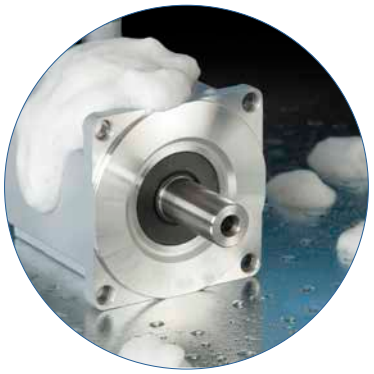
AKM Servo Motor	Flange size [mm]	Cont. Torque at Stall Tcs [Nm]	Continuous Current I_0 [A]	Peak Torque at stall Tps [Nm]	75 V DC			115 V			230 V			400 V			480 V			Inertia (Jm) [kg-cm²]	Weight [kg]
					Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]		
11B	40	0.18	1.16	0.61	–	–	–	4000	0.18	0.08	8000	0.17	0.14	–	–	–	–	–	–	0.017	0.35
11C	40	0.18	1.45	0.61	–	–	–	6000	0.18	0.11	–	–	–	–	–	–	–	–	–	0.017	0.35
11E	40	0.18	2.91	0.61	6000	0.18	0.11	–	–	–	–	–	–	–	–	–	–	–	–	0.017	0.35
12C	40	0.31	1.51	1.08	–	–	–	4000	0.30	0.13	8000	0.28	0.23	–	–	–	–	–	–	0.031	0.49
12E	40	0.31	2.72	1.08	3000	0.31	0.10	8000	0.28	0.23	–	–	–	–	–	–	–	–	–	0.031	0.49
13C	40	0.41	1.48	1.46	–	–	–	3000	0.41	0.13	8000	0.36	0.30	–	–	–	–	–	–	0.045	0.63
13D	40	0.40	2.40	1.44	2000	0.40	0.08	7000	0.36	0.27	–	–	–	–	–	–	–	–	–	0.045	0.63
21C	60	0.48	1.58	1.47	–	–	–	2500	0.46	0.12	8000	0.39	0.32	–	–	–	–	–	–	0.11	0.82
21E	60	0.50	3.11	1.49	2000	0.48	0.10	7000	0.41	0.30	–	–	–	–	–	–	–	–	–	0.11	0.82
21G	60	0.50	4.87	1.51	4000	0.46	0.19	–	–	–	–	–	–	–	–	–	–	–	–	0.11	0.82
22C	60	0.84	1.39	2.73	–	–	–	1000	0.83	0.09	3500	0.78	0.29	8000	0.68	0.57	8000	0.68	0.57	0.16	1.10
22E	60	0.87	2.73	2.76	1000	0.85	0.09	3500	0.81	0.30	8000	0.70	0.59	–	–	–	–	–	–	0.16	1.10
22G	60	0.88	4.82	2.79	2500	0.83	0.22	7000	0.74	0.54	–	–	–	–	–	–	–	–	–	0.16	1.10
23C	60	1.13	1.41	3.77	–	–	–	1000	1.11	0.12	2500	1.08	0.28	5500	0.99	0.57	7000	0.95	0.70	0.22	1.38
23D	60	1.16	2.19	3.84	–	–	–	1500	1.12	0.18	5000	1.03	0.54	8000	0.92	0.77	8000	0.92	0.77	0.22	1.38
23F	60	1.18	4.31	3.88	1500	1.15	0.18	4500	1.07	0.50	8000	0.94	0.79	–	–	–	–	–	–	0.22	1.38
24C	60	1.38	1.42	4.67	–	–	–	–	–	–	2000	1.32	0.28	4500	1.25	0.59	5500	1.22	0.70	0.27	1.66
24D	60	1.41	2.21	4.76	–	–	–	1500	1.36	0.21	4000	1.29	0.54	8000	1.11	0.93	8000	1.11	0.93	0.27	1.66
24F	60	1.42	3.89	4.82	1000	1.39	0.15	3000	1.33	0.42	8000	1.12	0.94	–	–	–	–	–	–	0.27	1.66
31C	80	1.15	1.37	3.88	–	–	–	–	–	–	2500	1.12	0.29	5000	1.00	0.52	6000	0.91	0.57	0.33	1.55
31E	80	1.20	2.99	4.00	750	1.19	0.09	2500	1.17	0.31	6000	0.95	0.60	–	–	–	–	–	–	0.33	1.55
31H	80	1.23	5.85	4.06	2000	1.20	0.25	6000	0.97	0.61	–	–	–	–	–	–	–	–	–	0.33	1.55
32C	80	2.00	1.44	6.92	–	–	–	–	–	–	1500	1.95	0.31	3000	1.86	0.58	3500	1.83	0.67	0.59	2.23
32D	80	2.04	2.23	7.10	–	–	–	1000	2.00	0.21	2500	1.93	0.51	5500	1.65	0.95	6000	1.58	0.99	0.59	2.23
32E	80	2.04	2.82	7.11	–	–	–	–	–	–	3500	1.87	0.69	7000	1.41	1.03	7000	1.22	1.02	0.59	2.23
32H	80	2.10	5.50	7.26	1200	2.06	0.26	3000	1.96	0.62	7000	1.45	1.06	–	–	–	–	–	–	0.59	2.23
33C	80	2.71	1.47	9.76	–	–	–	–	–	–	1000	2.64	0.28	2000	2.54	0.53	2500	2.50	0.65	0.85	2.9
33E	80	2.79	2.58	9.96	–	–	–	–	–	–	2000	2.62	0.55	4500	2.34	1.10	5000	2.27	1.19	0.85	2.9
33H	80	2.88	5.62	10.22	800	2.82	0.24	2500	2.66	0.70	5500	2.27	1.31	–	–	–	–	–	–	0.85	2.9
41C	90	1.95	1.46	6.12	–	–	–	–	–	–	1200	1.88	0.24	3000	1.77	0.56	3500	1.74	0.64	0.81	2.44
41E	90	2.02	2.85	6.28	–	–	–	1200	1.94	0.24	3000	1.82	0.57	6000	1.58	0.99	6000	1.58	0.99	0.81	2.44
41H	90	2.06	5.6	6.36	1000	1.99	0.21	3000	1.86	0.58	6000	1.62	1.02	–	–	–	–	–	–	0.81	2.44
42C	90	3.35	1.40	11.3	–	–	–	–	–	–	–	–	–	1500	3.10	0.49	2000	3.02	0.63	1.5	3.39
42E	90	3.42	2.74	11.3	–	–	–	–	–	–	1800	3.12	0.59	3500	2.81	2.35	4000	2.72	1.14	1.5	3.39
42G	90	3.53	4.80	11.5	–	–	–	–	–	–	3500	2.90	1.06	6000	2.35	1.48	6000	2.35	1.48	1.5	3.39
42J	90	3.56	8.4	11.6	–	–	–	3000	3.03	0.95	6000	2.36	1.50	–	–	–	–	–	–	1.5	3.39
43E	90	4.70	2.76	15.9	–	–	–	–	–	–	1500	4.24	0.67	2500	3.92	1.03	3000	3.76	1.18	2.1	4.35
43G	90	4.80	4.87	16.1	–	–	–	–	–	–	2500	4.00	1.05	5000	3.01	1.58	6000	2.57	1.61	2.1	4.35
43K	90	4.90	9.60	16.4	–	–	–	2500	4.08	1.07	6000	2.62	1.65	–	–	–	–	–	–	2.1	4.35
44E	90	5.76	2.90	19.9	–	–	–	–	–	–	1200	5.22	0.66	2000	4.80	1.01	2500	4.56	1.19	2.7	5.3
44G	90	5.88	5.00	20.3	–	–	–	–	–	–	2000	4.90	1.03	4000	3.76	1.57	5000	3.19	1.67	2.7	5.3
44J	90	6.00	8.80	20.4	–	–	–	–	–	–	4000	3.84	1.61	6000	2.75	1.73	6000	2.75	1.73	2.7	5.3
51E	115	4.70	2.75	11.6	–	–	–	–	–	–	1200	4.41	0.55	2500	3.98	1.04	3000	3.80	1.19	3.4	4.2
51G	115	4.75	4.84	11.7	–	–	–	–	–	–	2500	4.02	1.05	5000	2.62	1.37	6000	1.94	1.22	3.4	4.2
51H	115	4.79	6.00	11.7	–	–	–	–	–	–	3000	3.87	1.22	6000	1.95	1.23	6000	1.95	1.23	3.4	4.2
51K	115	4.90	9.40	11.9	–	–	–	2500	4.15	1.09	5500	2.35	1.35	–	–	–	–	–	–	3.4	4.2

Performance Data

AKM Servo Motor	Frame size [mm]	Cont. Torque at Stall Tcs [Nm]	Continuous Current I_0 [A]	Peak Torque at stall Tps [Nm]	230 V			400 V			480 V			Inertia (Jm) [kg·cm²]	Weight [kg]
					Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm]	Rated Power Prtd [kW]		
52E	115	8.34	2.99	21.3	–	–	–	1500	7.61	1.20	2000	7.28	1.52	6.2	5.8
52G	115	8.43	4.72	21.5	1200	7.69	1.21	2500	7.06	1.85	3000	6.66	2.09	6.2	5.8
52H	115	8.48	5.90	21.6	1800	7.53	1.42	3500	6.26	2.30	4000	5.77	2.42	6.2	5.8
52K	115	8.60	9.30	21.9	3000	6.80	2.14	5500	3.90	2.25	6000	3.25	2.04	6.2	5.8
52M	115	8.60	13.1	21.9	4500	5.20	2.45	–	–	–	–	–	–	6.2	5.8
53G	115	11.4	4.77	29.7	1000	10.7	1.12	2000	9.85	2.06	2400	9.50	2.39	9.1	7.4
53H	115	11.5	6.60	30.0	–	–	–	3000	8.63	2.77	3500	8.23	3.02	9.1	7.4
53K	115	11.6	9.40	30.3	2000	10.1	2.12	4000	7.65	3.20	4500	6.85	3.23	9.1	7.4
53M	115	11.4	13.4	29.7	3000	8.72	2.74	–	–	–	–	–	–	9.1	7.4
53P	115	11.4	19.1	29.8	5000	5.88	3.08	–	–	–	–	–	–	9.1	7.4
54G	115	14.3	5.00	38.0	–	–	–	1500	12.9	2.03	2000	12.3	2.57	12	9
54H	115	14.2	5.50	37.5	–	–	–	1500	12.6	2.38	2000	12.2	2.56	12	9
54K	115	14.4	9.7	38.4	1800	12.7	2.39	3500	10.0	3.68	4000	9.25	3.87	12	9
54L	115	14.1	12.5	37.5	2500	11.5	3.00	4500	8.13	3.83	–	–	–	12	9
54N	115	14.1	17.8	37.6	3500	9.85	3.61	–	–	–	–	–	–	12	9
62G	142	11.9	4.9	29.7	–	–	–	1800	10.4	1.96	2000	10.2	2.14	17	8.9
62K	142	12.2	9.6	30.2	2000	10.4	2.18	3500	9.00	3.30	4500	8.00	3.77	17	8.9
62M	142	12.2	13.4	30.2	3000	9.50	2.98	6000	5.70	3.58	6000	5.70	3.58	17	8.9
62P	142	12.3	18.8	30.3	4500	8.10	3.82	–	–	–	–	–	–	17	8.9
63G	142	16.5	4.5	42.1	–	–	–	1200	14.9	1.87	1500	14.6	2.29	24	11.1
63K	142	16.8	9.9	42.6	1500	14.9	2.34	3000	12.9	4.05	3500	12.0	4.40	24	11.1
63M	142	17.0	13.8	43.0	2000	14.3	2.99	4000	11.3	4.73	4500	10.5	4.95	24	11.1
63N	142	17.0	17.4	43.0	3000	13.0	4.08	5000	9.60	5.03	6000	7.00	4.40	24	11.1
64K	142	20.8	9.2	53.5	1200	18.8	2.36	2000	17.2	3.60	2500	16.3	4.27	32	13.3
64L	142	21.0	12.8	54.1	1500	18.4	2.89	3000	15.6	4.90	3500	14.4	5.28	32	13.3
64P	142	20.4	18.6	52.9	2500	16.0	4.19	4500	11.9	5.62	5500	9.00	5.18	32	13.3
64Q	142	20.0	20.7	53.2	3000	15.3	4.81	5000	10.7	6.45	6000	7.40	4.65	32	13.3
65K	142	24.8	9.8	64.5	1000	22.8	2.39	2000	20.2	4.23	2200	19.7	4.54	40	15.4
65M	142	25.0	13.6	65.2	1500	21.9	3.44	2500	19.2	5.03	3000	18.1	5.69	40	15.4
65N	142	24.3	17.8	63.7	2000	19.8	4.15	3500	16.0	5.86	4000	14.7	6.16	40	15.4
65P	142	24.5	19.8	64.1	2400	19.1	4.8	4000	14.9	6.24	5000	11.6	6.08	40	15.4
72K	180	29.7	9.3	79.4	–	–	–	1500	25.1	3.94	1800	24.0	4.52	65	19.7
72M	180	30.0	13.0	79.8	–	–	–	2000	23.6	4.94	2500	22.1	5.79	65	19.7
72P	180	29.4	18.7	78.5	1800	23.8	4.49	3000	20.1	6.31	3500	18.2	6.67	65	19.7
72Q	180	29.5	23.5	78.4	2000	23.2	4.89	4000	16.3	6.83	4500	14.1	6.65	65	19.7
73M	180	42.0	13.6	112	–	–	–	1500	33.8	5.31	1800	32.1	6.05	92	26.7
73P	180	41.6	19.5	111	1300	34.7	4.72	2400	28.5	7.16	2800	26.3	7.71	92	26.7
73Q	180	41.5	24.5	111	1500	33.4	5.25	3000	25.2	7.92	3500	22	8.07	92	26.7
74L	180	53.0	12.9	143	–	–	–	1200	43.5	5.47	1400	41.5	6.08	120	33.6
74P	180	52.5	18.5	142	–	–	–	1800	39.6	7.46	2000	35.9	7.52	120	33.6
74Q	180	52.2	26.1	141	1300	41.9	5.71	2500	31.5	8.25	3000	27.3	8.58	120	33.6
82T	260	75	48	210	–	–	–	2500	47.5	12.4	3000	38.0	11.9	172	49
83T	260	130	62	456	–	–	–	2200	70.0	16.1	2500	60.0	15.7	334	73
83V	260	130	91	304				3000	65	20.4	–	–	–	334	73
84T	260	180	67	668	–	–	–	1800	105	19.8	2000	93.0	19.5	495	97





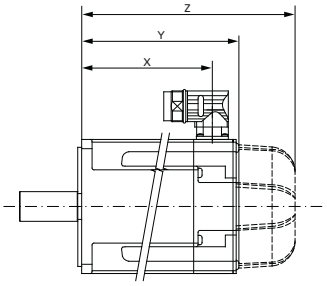


AKM® Brushless Servo Motor

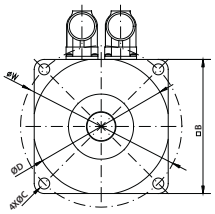
AKM, AKM Washdown, and AKM Washdown Food

Model with Power and Signal Connector

Dimensional drawing for AKM11 - AKM84



Measure Y: Without holding brake
Measure Z: With holding brake



All measurement specifications in mm Measure Y: Measurement without holding brake, Measure Z: Measurement with holding brake

Model	X	Resolvers		Comcoder		Biss/Endat		Hiperface		DriveCliq		Flange	Bolt circle	Bore diameter	Centering collar
		Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	□B	⌀W	⌀C	⌀D
AKM11	56.1	69.6	106.6	79.0	–	–	–	79	116	–	–	40	46	4.3	30
AKM12	75.1	88.6	125.6	98.0	–	–	–	98	135	–	–	40	46	4.3	30
AKM13	94.1	107.6	144.6	117.0	–	–	–	117	154	–	–	40	46	4.3	30
AKM21	76.1	95.4	129.5	95.4	129.5	95.4	129.5	113.4	147.1	–	–	58	63	4.8	40
AKM22	95.1	114.4	148.5	114.4	148.5	114.4	148.5	132.4	166.1	–	–	58	63 / 65 (1)	4.8	40
AKM23	114.1	133.4	167.5	133.4	167.5	133.4	167.5	151.4	185.1	–	–	58	63 / 65 (1)	4.8	40
AKM24	135.1	152.4	186.5	152.4	186.5	152.4	186.5	170.4	204.1	–	–	58	63 / 65 (1)	4.8	40
AKM31	87.9	109.8	141.3	109.8	141.3	109.8	141.3	125.3	159.3	–	–	70	75 / 85 (2)	5.8	60
AKM32	118.9	140.8	172.3	140.8	172.3	140.8	172.3	156.3	190.3	–	–	70	75 / 85 (2)	5.8	60
AKM33	149.9	171.8	203.3	171.8	203.3	171.8	203.3	187.3	221.3	–	–	70	75 / 85 (2)	5.8	60
AKM41	96.4	118.8	152.3	118.8	152.3	118.8	152.3	136.8	170.3	152.3	170.3	84	90 / 100 (3)	7	60 / 80 (3)
AKM42	125.5	147.8	181.3	147.8	181.3	147.8	181.3	165.8	199.3	181.3	199.3	84	90 / 100 (3)	7	60 / 80 (3)
AKM43	154.4	176.8	210.3	176.8	210.3	176.8	210.3	194.8	228.3	210.3	228.3	84	90 / 100 (3)	7	60 / 80 (3)
AKM44	183.4	205.8	239.3	205.8	239.3	205.8	239.3	223.8	257.3	239.3	257.3	84	90 / 100 (3)	7	60 / 80 (3)
AKM51	105.3	127.5	172.5	127.5	172.5	145.0	189.0	145.0	189.0	146.0	189.0	108	115 / 130 (4)	7	95 / 110 (4)
AKM52	136.3	158.5	203.5	158.5	203.5	177.0	220.0	177.0	220.0	177.0	220.0	108	115 / 130 (4)	7	95 / 110 (4)
AKM53	167.3	189.5	234.5	189.5	234.5	208.0	251.0	208.0	251.0	208.0	251.0	108	115 / 130 (4)	7	95 / 110 (4)
AKM54	198.3	220.5	265.5	220.5	265.5	239.0	282.0	239.0	282.0	239.0	282.0	108	115 / 130 (4)	7	95 / 110 (4)
AKM62	130.5	153.7	200.7	153.7	200.7	172.2	219.7	172.2	219.7	172.2	219.7	138	165	11	130
AKM63	155.5	178.7	225.7	178.7	225.7	197.2	244.7	197.2	244.7	197.2	244.7	138	165	11	130
AKM64	180.5	203.7	250.7	203.7	250.7	222.2	269.7	222.2	269.7	222.2	269.7	138	165	11	130
AKM65	205.5	228.7	275.7	228.7	275.7	247.2	294.7	247.2	294.7	247.2	294.7	138	165	11	130
AKM72	164.5	192.5	234.5	192.5	234.5	192.5	234.5	192.5	234.5	201.7	253.3	188	215	13,5	180
AKM73	198.5	226.5	268.5	226.5	268.5	235.7	287.3	235.7	287.3	235.7	287.3	188	215	13,5	180
AKM74	232.5	260.5	302.5	260.5	302.5	269.7	321.3	269.7	321.3	269.7	321.3	188	215	13,5	180
AKM82	170	267	333	267	333	267	333	267	333	–	–	260	300	18.5	250
AKM83	250.5	347.5	413.5	347.5	413.5	347.5	413.5	347.5	413.5	–	–	260	300	18.5	250
AKM84	331	428	494	428	494	428	494	428	494	–	–	260	300	18.5	250

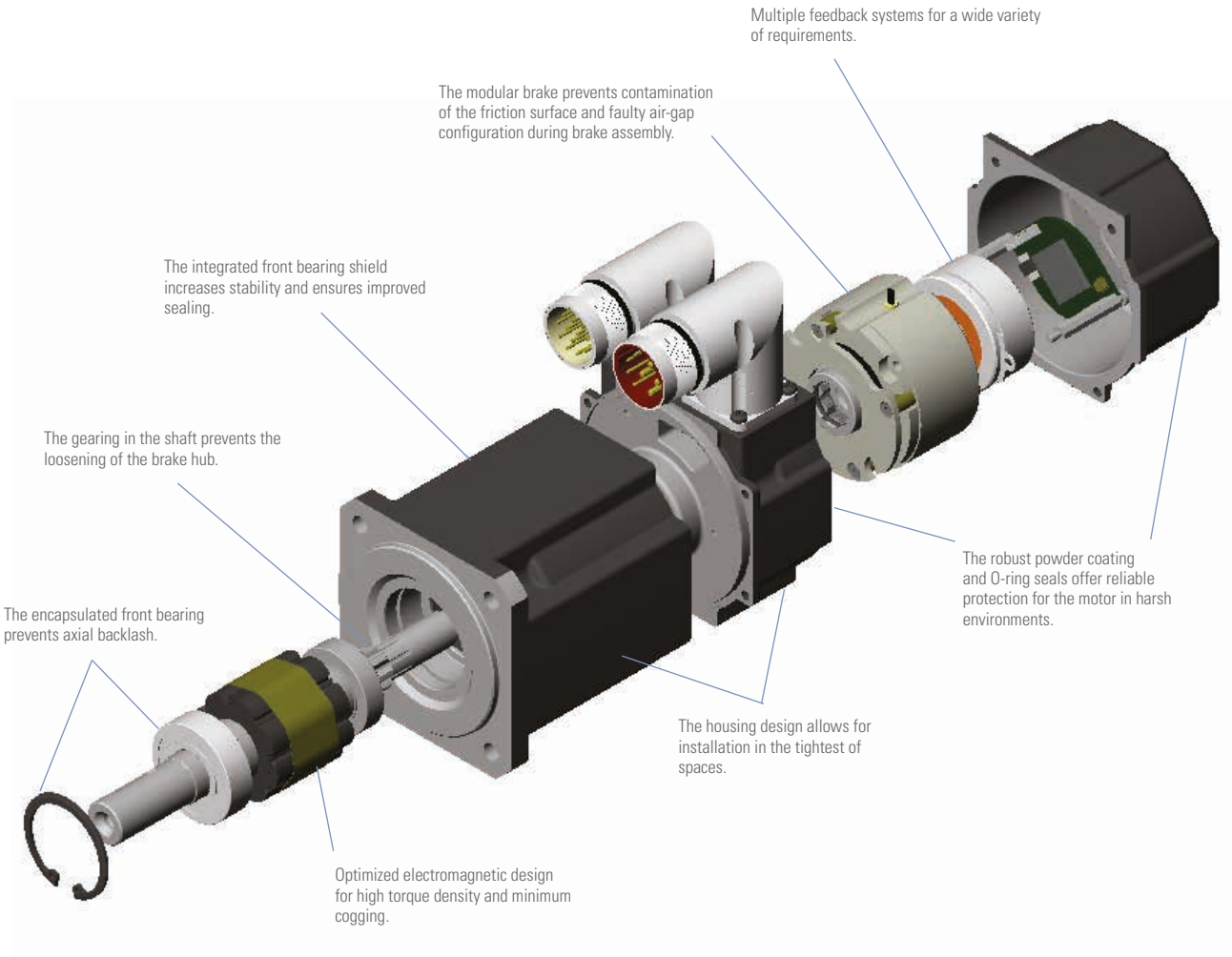
(1) ∅W = 63 mm AKM2xx-Ax
∅W = 65 mm AKM2xx-Dx

(2) ∅W = 75 mm AKM3xx-Ax
∅W = 85 mm AKM3xx-Cx

(3) ∅W = 100 mm, ∅V = 80 mm AKM4xx-Ax
∅W = 90 mm, ∅V = 60 mm AKM4xx-Cx

(4) ∅W = 130 mm ∅V = 110 mm AKM5xx-Ax
∅W = 115 mm ∅V = 95 mm AKM5xx-Ax

The Design Features of AKM in the 3D Model



AKMH™ Hygienic Stainless Steel Servo Motors

For more than 70 years, Kollmorgen has been developing special motors for use in difficult environments. For example, the remotely controlled submarine vehicle called the Jason Jr. discovered the wreck of the Titanic with the help of Kollmorgen motors developed especially for this purpose.

Reduced recall risk. In the food production industry extremely strict hygiene regulations apply so that public health is not compromised. The stainless-steel AKMH servo motors meet the most demanding requirements in relation to hygiene standards and reduce the risk of product contamination and costly recalls.

Faster cleaning and reduced maintenance times. The stainless steel AKMH servo motors are designed to protection class IP69K and satisfy the requirements of the EHEDG and 3A hygiene regulations. Only materials are used that are FDA-approved and suitable for use with food. These characteristics of the AKMH series enable quick, hygienic cleaning, reduce maintenance times, and therefore increase the overall equipment effectiveness of your production line.

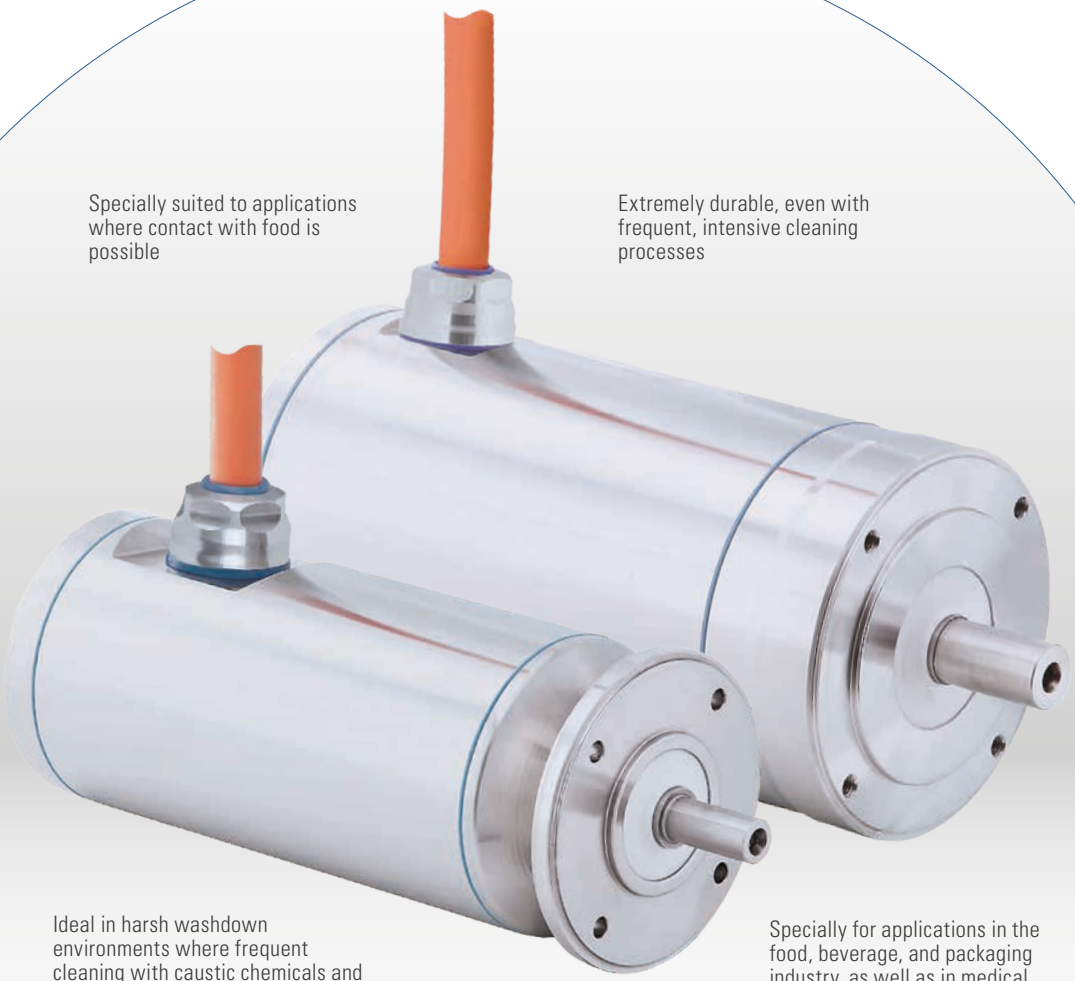
The bottom line. The stainless steel AKMH series of motors has been designed for hygienic machine applications. The large product range with 19 standard motor frame sizes, multiple standard windings, and numerous connection, brake, and cable options makes it easier to choose a motor that satisfies the requirements of the highest standards in the food, beverage, and pharmaceutical industries.

The Advantages of AKMH Hygienic Stainless Steel Servo Motors

Increase in Overall Equipment Effectiveness (OEE)	
Faster and environmentally friendly cleaning	• Open, hygienic machine design without protective housings • Considerably lower consumption of cleaning agents; less dirty water
No machine downtimes as a result of cleaning or corrosion	• Protection class IP69K for motor housing, cable gland, and shaft seal • Designed for regular high-pressure and high-temperature cleaning • Cable and sealing components are resistant to common cleaning agents • No corrosion inside the motor: Pressure compensation through the cable prevents moisture in the motor
Lower operating costs	• Higher machine availability due to quicker cleaning • Faster cleaning reduces the consumption of cleaning agents and energy • High energy efficiency due to motor / servo drive combination with a high degree of efficiency
Higher throughput	• Quick and precise drives in combination with the AKD servo drives • Process monitoring and optimization with Kollmorgen's software tools
Lower risk of recalls	
Hygiene-optimized housing design	• Housing is 1.4404 stainless steel 316L with smooth surface prevents the build-up of pathogens • Fluids drained with vertical installation thanks to convex cover • No place for pathagens to hide - no nooks and crannies in housing design • Thanks to a laser annealed nameplate, the surface finish is undisturbed
Use of approved hygienic components	• Bearing lubrication and shaft seals FDA-approved • Observance of the EHEDG and 3A Sanitary Certificate hygienic regulations
Hygienic cable technology	• Silicon tubing option provides an FDA-approved cable option suitable for use with food • Low cabling costs due to single-cable technology - no need for expensive stainless steel conduit • Non absorbant cabling prevent pathogens from hiding in the cable jacket material
Reduced development times and design freedom	
Ideal motor design	• Large selection of standard motors allowing customers to optimize their motor selection • 19 frame sizes, flange and shaft measurements as per IEC and NEMA • Continuous torques up to 22 Nm, peak torques up to 92 Nm • Speeds up to 8000 rpm^{-1} • SFD3 and Hiperface DSL digital feedback systems • Brake and cable options
Simple start-up and parameterization	• Plug-and-play connection with pre-assembled connectable cables, no screw connections • Simple machine architecture due to single-cable and decentralized connection technology • Digital nameplate for quick start-up • Software tools for parameterization and drive monitoring
Low energy consumption	• High efficiency due to permanent magnet technology • 20% less derating due to special motor design
Kollmorgen support	• Kollmorgen's global support team has wealth of industry knowledge to help optimize your machine
Co-engineering	• Kollmorgen welcomes customization to help optimize your motor/drive solution

AKMH Hygienic Stainless Steel Servo Motors

The new stainless steel AKMH motors have been designed for hygienic machine applications in wet areas with food contact in accordance with the EHEDG regulations and they comply with 3A, USDA and NFS hygiene standards. Shorter cleaning times and high reliability ensure noticeably greater overall equipment effectiveness.



Specially suited to applications where contact with food is possible

Extremely durable, even with frequent, intensive cleaning processes

Ideal in harsh washdown environments where frequent cleaning with caustic chemicals and high pressure water are required.

Specially for applications in the food, beverage, and packaging industry, as well as in medical devices

Higher Productivity Due to Quicker Cleaning

- Ideal for machines with an open design
- No costly protective equipment; no hidden spaces to trap pathogens
- Quick, easy, yet safe cleaning

Reduced Recall Risk

- Lubricants and seals meet FDA standards.
- Round, stainless steel housing with a roughness of < 0.8 µm and the design of all edges with radii of R1.5 prevent dirt deposits

Higher Machine Uptime

- IP69K: Motor is protected for water pressures up to 100 Bar
- Cable is directly mounted to motor; no connectors to fail or trap pathogens
- Single-cable technology with digital feedback (SFD3 or HIPERFACE® DSL digital resolvers); less cabling to clean

Outstanding Efficiency Thanks to Novel Motor Design

- Torque derating under 20%
- High speeds of up to 8000 RPM offer more flexibility for gearbox attachment and higher productivity due to higher output speeds with the same torque
- AKMH2 is the most compact hygienic servo motor on the market

Optimized Motion Thanks to 19 Frame Sizes

- 5 sizes each with 4 rotor lengths and winding options for perfect adaptation to servo drives
- Two housing shapes for front and flange mounting

One Source for Your Complete Automation Solution

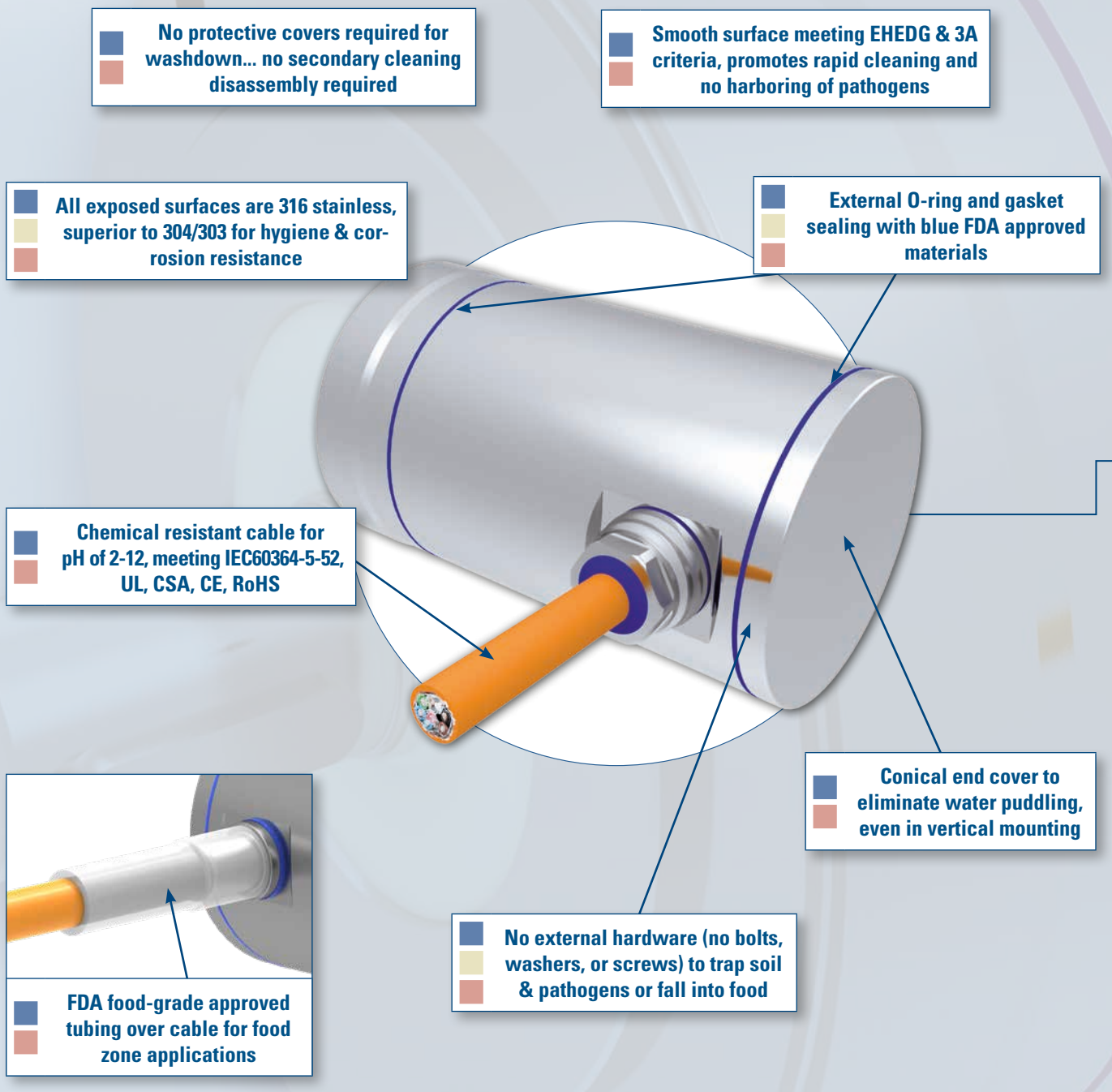
- The Kollmorgen Automation Suite provides all the tools for motion and PLC programming and for drive management in operation
- AKD-PDMM multi-axis controller: The 3-in-1 solution combines servo drive, motion controller, and PLC in one device

Thanks to the open machine design without protective housings, machines can also be cleaned quickly and safely using high-pressure and high-temperature processes.

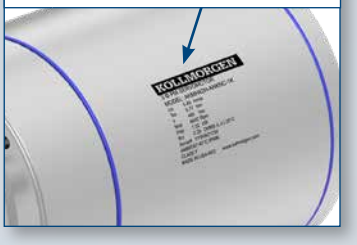
AKMH™ Design Features

The key benefits of AKMH clean design features:

- Reduces risk of food recall
- Increases reliability in wash-down application
- Reduces cleaning time: higher OEE



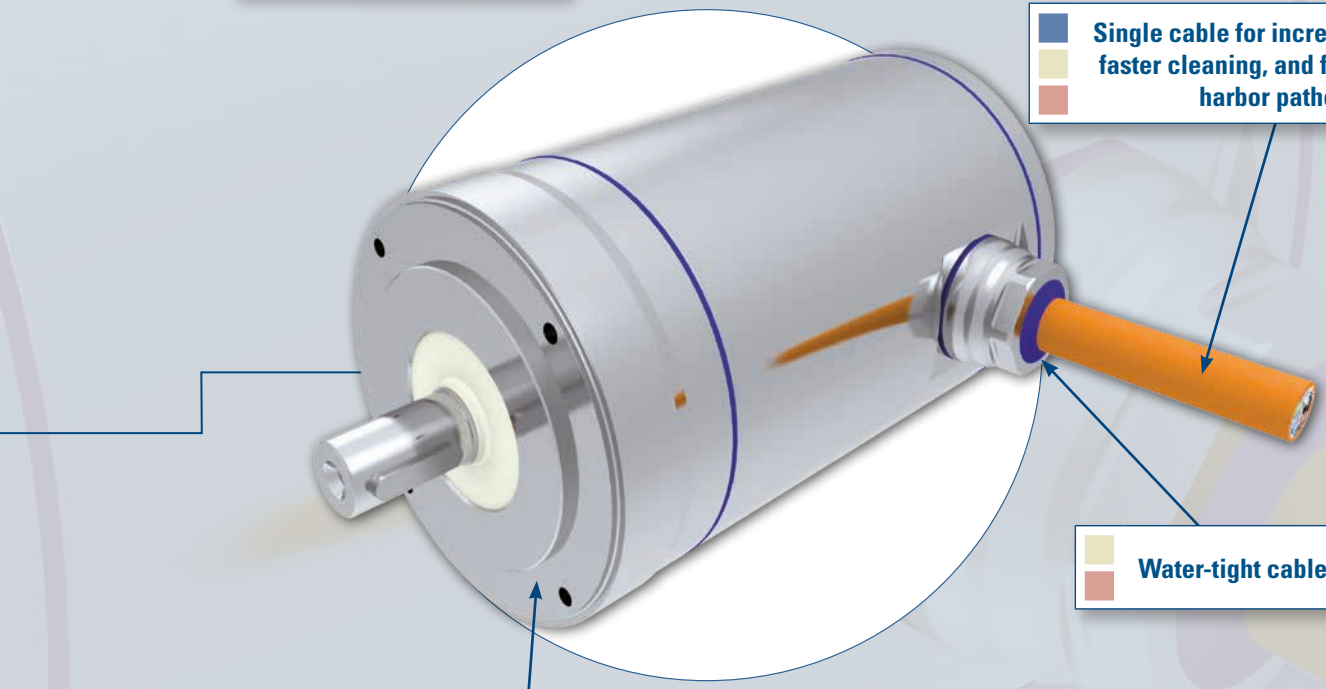
Hygienic marking method eliminates harboring of pathogens



Unique design technique to eliminate condensation

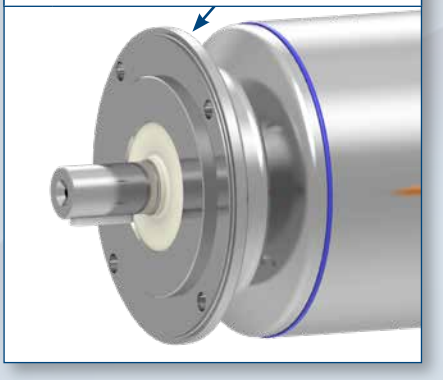
Dual cable option for use with 3rd party drives

Single cable for increased reliability, faster cleaning, and fewer places to harbor pathogens

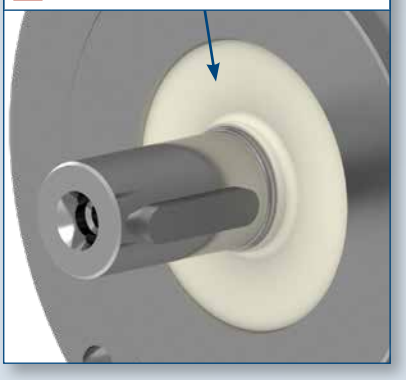


Water-tight cable exit

Face Mount for most hygienic design, Flange Mount option for easy mounting



Hygienic, IP69K shaft seal, special shaft treatment for long life



AKMH Hygienic Stainless Steel Servo Motors

Performance Data

AKMH Servo Motor	Cont. Torque at Stall Tcs [Nm] ①②③	Continuous Current I_0 [A] ①②③	Peak Torque at stall Tps [Nm] ①②③	160 V DC			320 V DC V			560 V DC			640 V DC			Inertia (Jm) [kg·cm²]	Weight [kg]
				Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated power P_n [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③		
21C	0.31	1.37	1.76	2500	0.33	0.09	8000	0.22	0.18	8000	0.21	0.18	8000	0.21	0.18	0.11	3.6
21E	0.36	2.67	1.81	7000	0.26	0.19	–	–	–	–	–	–	–	–	–	0.11	3.6
21G	0.37	4.10	1.60	–	–	–	–	–	–	–	–	–	–	–	–	0.11	3.6
22C	0.61	1.19	3.16	1000	0.63	0.07	3500	0.60	0.22	8000	0.41	0.34	8000	0.40	0.34	0.16	4.1
22E	0.65	2.32	3.23	3500	0.61	0.22	8000	0.60	0.22	–	–	–	–	–	–	0.16	4.1
22G	0.64	3.98	3.27	7000	0.47	0.34	–	–	–	–	–	–	–	–	–	0.16	4.1
23D	0.83	1.88	4.37	1500	0.87	0.14	5000	0.73	0.38	8000	0.49	0.41	8000	0.46	0.39	0.22	4.6
23E	0.90	2.39	4.43	2500	0.86	0.23	6500	0.66	0.45	–	–	–	–	–	–	0.22	4.6
23F	0.88	3.63	4.46	4500	0.78	0.37	8000	0.48	0.40	–	–	–	–	–	–	0.22	4.6
24D	1.10	1.96	5.35	1500	1.10	0.17	4000	0.97	0.41	8000	0.52	0.44	8000	0.47	0.39	0.27	5.1
24E	1.15	2.52	5.36	2000	1.10	0.23	5500	0.88	0.51	–	–	–	–	–	–	0.27	5.1
24F	1.12	3.42	5.39	3000	1.04	0.33	8000	0.53	0.44	–	–	–	–	–	–	0.27	5.1
31C	0.91	1.24	3.76	–	–	–	2500	0.86	0.23	5000	0.72	0.38	6000	0.5	0.41	0.33	4.1
31E	0.96	2.64	3.88	2500	0.91	0.24	6000	0.68	0.43	–	–	–	–	–	–	0.33	4.1
31H	0.99	5.04	3.95	6000	0.71	0.45	–	–	–	–	–	–	–	–	–	0.33	4.1
32C	1.68	1.30	6.92	–	–	–	1500	1.62	0.25	3000	1.47	0.46	3500	1.41	0.52	0.59	5.0
32E	1.69	2.49	7.06	–	–	–	3500	1.53	0.53	7000	0.71	0.52	8000	0.22	0.18	0.59	5.0
32H	1.77	4.81	7.21	3000	1.61	0.51	7000	0.71	0.52	–	–	–	–	–	–	0.59	5.0
33C	2.46	1.37	9.94	–	–	–	1000	2.42	0.25	2000	2.29	0.48	2500	2.22	0.58	0.85	5.9
33E	2.51	2.34	10.19	–	–	–	2000	2.38	0.50	4500	1.85	0.87	5000	1.68	0.88	0.85	5.9
33H	2.60	5.00	10.43	2500	2.41	0.63	5500	1.56	0.90	–	–	–	–	–	–	0.85	5.9
41C	1.77	1.46	5.75	–	–	–	1500	1.73	0.27	3000	1.61	0.51	3500	1.56	0.57	0.81	6.1
41E	1.75	2.73	5.84	1500	1.77	0.28	3000	1.64	0.52	6000	1.26	0.79	6000	1.22	0.77	0.81	6.1
41H	1.83	5.34	5.92	3000	1.71	0.54	6000	1.29	0.81	–	–	–	–	–	–	0.81	6.1
42C	3.15	1.41	10.62	–	–	–	–	–	–	1500	3.02	0.47	2000	2.94	0.62	1.45	7.4
42E	3.12	2.64	10.79	–	–	–	2000	2.97	0.62	3500	2.60	0.95	4000	2.43	1.02	1.45	7.4
42H	3.15	5.64	11.04	2000	3.15	0.66	4500	2.40	1.13	6000	0.82	0.52	6000	0.46	0.29	1.45	7.4
42J	3.37	8.11	11.08	3000	3.02	0.95	6000	1.27	0.80	–	–	–	–	–	–	1.45	7.4
43E	4.38	2.61	15.50	–	–	–	1500	4.25	0.67	2500	3.89	1.02	3000	3.65	1.15	2.09	8.8
43H	4.55	5.22	15.65	–	–	–	3000	3.94	1.24	6000	0,12	0.08	6000	0.82	0.47	2.09	8.8
43L	4.02	9.92	15.58	3000	3.48	1.09	5500	0.45	0.26	–	–	–	–	–	–	2.09	8.8
44E	5.41	2.70	19.77	–	–	–	1000	5.29	0.55	2000	4.83	1.01	2500	4.56	1.19	2.73	10.2
44H	5.40	5.23	19.73	–	–	–	2500	4.72	1.24	5000	1.96	1.03	5000	1.27	0.66	2.73	10.2
44K	5.42	9.41	19.75	2000	4.96	1.04	5000	1.83	0.96	–	–	–	–	–	–	2.73	10.2
51E	3.92	2.61	10.09	–	–	–	1500	3.83	0.60	2500	3.58	0.94	3000	3.44	1.08	3.42	8.9
51H	3.80	5.45	10.17	–	–	–	3000	3.44	1.08	5500	2.20	1.27	5500	2.05	1.18	3.42	8.9
51L	3.89	10.58	10.33	3000	3.54	1.11	5500	2.16	1.24	–	–	–	–	–	–	3.42	8.9

① Motor winding excess temperature, ΔT = 100 K with ambient temperature = 40°C

②All specifications refer to sinusoidal supply

③ Rated data with reference flange (aluminum, dims (mm): AKMH2, AKMH3, AKMH4: 254 x 254 x 6.35 AKMH5: 305 x 305 x 12.7 AKMH6: 457 x 457 x 12.7)

Performance Data

AKMH Servo Motor	Cont. Torque at Stall Tcs [Nm] ①②③	Continuous Current I_0 [A] ①②③	Peak Torque at stall Tps [Nm] ①②③	160 V DC			320 V DC V			560 V DC			640 V DC			Inertia [Jm] [kg-cm²]	Weight [kg]
				Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated power P_n [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③	Rated Speed Nrtd [RPM]	Rated Torque Trtd [Nm] ①②③	Rated Power Prtd [kW] ①②③		
52E	6.69	2.68	18.79	–	–	–	–	–	–	1500	6.41	1.01	2000	6.22	1.30	6.22	11.1
52H	6.72	5.17	19.01	–	–	–	1500	6.54	1.03	3500	5.22	1.91	4000	4.54	1.90	6.22	11.1
52L	6.66	9.87	19.30	–	–	–	3500	5.30	1.94	4500	2.46	1.16	4500	1.27	0.60	6.22	11.1
52M	6.70	11.15	19.20	–	–	–	4500	3.76	1.77	–	–	–	–	–	–	6.22	11.1
53H	9.45	5.92	26.74	–	–	–	–	–	–	3000	6.82	2.14	3500	5.88	2.16	9.12	13.4
53L	8.99	10.09	26.95	–	–	–	3000	6.83	2.15	3500	3.62	1.33	3500	2.29	0.84	9.12	13.4
53P	8.30	15.66	26.56	–	–	–	3500	3.66	1.34	–	–	–	–	–	–	9.12	13.4
54H	13.21	5.30	35.62	–	–	–	1000	12.88	1.35	2000	11.45	2.40	2000	11.26	2.36	11.90	15.7
54L	12.10	11.29	35.65	–	–	–	2500	9.74	2.55	3000	6.76	2.12	–	–	–	11.90	15.7
54P	11.83	16.58	36.08	–	–	–	3000	7.19	2.26	–	–	–	–	–	–	11.90	15.7
62H	10.6	5.32	32.24	–	–	–	1000	10.14	1.06	2000	9.15	1.92	2000	9.07	1.90	16.90	19.6
62L	10.10	11.05	33.03	–	–	–	2500	8.33	2.18	4000	3.77	1.58	4000	2.94	1.23	16.90	19.6
62M	10.30	12.53	33.13	–	–	–	3000	7.82	2.46	4000	3.22	1.35	4000	2.07	0.87	16.90	19.6
63H	14.60	5.42	44.73	–	–	–	–	–	–	1500	13.30	2.09	2000	12.61	2.64	24.20	23.1
63L	14.10	10.23	45.29	–	–	–	2000	12.47	2.61	3000	9.81	3.08	3500	7.64	2.80	24.20	23.1
63M	14.20	12.59	46.02	–	–	–	2000	12.47	2.61	4000	4.76	1.99	4000	3.04	1.27	24.20	23.1
64K	18.00	8.74	55.79	–	–	–	1000	17.34	1.82	2000	15.40	3.23	2500	14.19	3.71	31.60	26.7
64L	17.90	11.87	56.46	–	–	–	1500	16.57	2.60	3000	12.19	3.83	3500	9.29	3.40	31.60	26.7
65K	21.4	9.33	65.87	–	–	–	1000	20.65	2.16	2000	18.40	3.85	2500	17.00	4.45	40.00	30.2
65L	21.50	11.44	66.72	–	–	–	1500	20.01	3.14	2500	16.97	4.44	3000	14.68	4.61	40.00	30.2
65M	21.10	12.57	66.63	–	–	–	1500	19.64	3.09	3000	14.63	4.60	3000	13.78	4.33	40.00	30.2

① Motor winding excess temperature, ΔT = 100 K with ambient temperature = 40°C

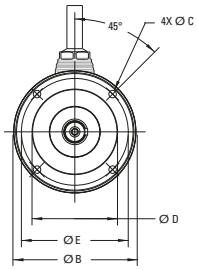
② All specifications refer to sinusoidal supply

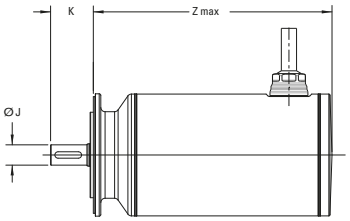
③ Rated data with reference flange (aluminum, dims (mm): AKMH2, AKMH3, AKMH4: 254 x 254 x 6.35 AKMH5: 305 x 305 x 12.7 AKMH6: 457 x 457 x 12.7)

Flange / Shaft Combinations

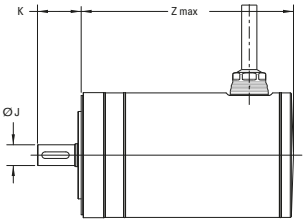
Mounting	Flange	Flange	Flange	Flange	Front	Front	Front	Front	Front	Front	Flange	Flange	Front	Front	Flange
Standard	IEC	IEC	NEMA	NEMA	IEC	IEC	NEMA	NEMA	NEMA	NEMA	IEC	IEC	IEC	IEC	NEMA
Shaft	Closed Keyway	Smooth	Open Keyway	Smooth	Closed Keyway	Smooth	Open Keyway	Smooth	Open Keyway	Smooth	Closed Keyway	Smooth	Closed Keyway	Smooth	Open Keyway
AKMH 2x	●	●	–	●	●	●	–	●	–	–	–	–	–	–	–
AKMH 3x	●	●	–	●	●	–	–	–	–	–	–	–	–	–	–
AKMH 4x	●	●	●	●	●	●	●	●	●	●	–	–	–	–	●
AKMH 5x	●	●	●	●	●	●	●	●	●	●	●	●	●	●	–
AKMH 6x	●	●	–	–	●	●	●	●	●	●	–	–	–	–	–

AKMH Hygienic Stainless Steel Servo Motors

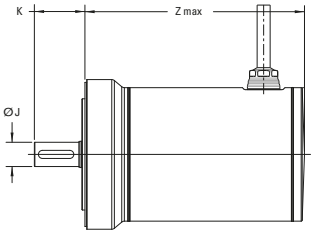




AKMH flange mounting

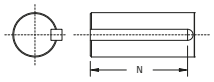


AKMH front mounting

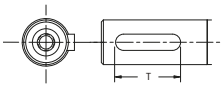


Only AKMH5x front mounting

Open keyway (BK, CN, DK versions)



Closed keyway (AC, BN, GC, HC versions)



Dimensions (mm)

Model	Z max. SFD3 digital resolver		Z max. Hiperface DSL		Flange
	without brake	with brake	without brake	with brake	ØB
AKMH21	167.2	201.2	180.2	214.2	79
AKMH22	186.2	220.2	199.2	233.2	79
AKMH23	205.2	239.2	218.2	252.2	79
AKMH24	224.2	258.2	237.2	271.2	79
AKMH31	166.5	198.0	182.5	214.0	89
AKMH32	197.5	229.0	213.5	245.0	89
AKMH33	228.5	260.0	244.5	276.0	89
AKMH41	166.7	201.0	182.7	217.0	113
AKMH42	195.7	230.0	211.7	246.0	113
AKMH43	224.7	259.0	240.7	275.0	113
AKMH44	253.7	288.0	269.7	304.0	113
AKMH51	187.4	229.4	198.4	240.4	148
AKMH52	218.4	260.4	229.4	271.4	148
AKMH53	249.4	291.4	260.4	302.4	148
AKMH54	280.4	322.4	291.4	333.4	148
AKMH61	209.9	256.5	220.9	267.5	186
AKMH62	234.9	281.5	245.9	292.5	186
AKMH63	259.9	306.5	270.9	317.5	186
AKMH64	284.9	331.5	295.9	342.5	186

Dimensions (mm)

AKMH XX-		AC	AN	BK	BN	CC	CN	DK	DN	EK	EN	GC	GN	HC	HN	LK
Mounting		Flange		Flange		Front	Front	Front	Front	Front	Front	Flange	Flange	Front	Front	Flange
Standard		IEC		NEMA		IEC	IEC	NEMA	NEMA	NEMA	NEMA	IEC	IEC	IEC	IEC	NEMA
Shaft		Closed Keyway	Smooth	Open Keyway	Smooth	Closed Keyway	Smooth	Open Keyway	Smooth	Open Keyway	Smooth	Closed Keyway	Smooth	Closed Keyway	Smooth	Open Keyway
AKMH 2x	Ø C	4.80		–	5.10	M4 x 0.7 x 8.0		–	UNF10-32	–		–		–		–
	Ø D	40		–	38.10	40		–	38.1	–		–		–		–
	Ø E	63		–	66.68	63		–	66.68	–		–		–		–
	Ø J	11		–	9.524	11		–	9.524	–		–		–		–
	K	30		–	31.8	30.0		–	31.8	–		–		–		–
	N/T	T = 16	NA	–	NA	T = 16	NA	–	NA	–		–		–		–
AKMH 3x	Ø C	5.80		–		M5 x 0.8 x 10.0		–		–		–		–		–
	Ø D	60		–		60		–		–		–		–		–
	Ø E	75		–		75		–		–		–		–		–
	Ø J	14		–		14		–		–		–		–		–
	K	30		–		30.0		–		–		–		–		–
	N/T	T = 16	NA	–		T = 16	NA	–		–		–		–		–
AKMH 4x	Ø C	7.0		6.91		M6 x 1 x 12		UNC 1/4 - 20 x 12.3		M6 x 1 x 12		–		–		UNC 3/8 - 16 x 19.1
	Ø D	80		73.025		80		73.025	73	80		–		–		114.30
	Ø E	100		98.43		100		98.43		100		–		–		149.23
	Ø J	19		15.875		19		15.875		16		–		–		15.862
	K	40.0		52.40		40.0		52.40		52.40		–		–		50.8
	N/T	T = 25	NA	N = 34.93	NA	T = 25	NA	N = 34.93	NA	N = 30.00	NA	–		–		T = 25
AKMH 5x	Ø C	9		8.33		M8 x 1.25 x 16.0		UNC 3/8 - 16 x 19.05		M8 x 1.25 x 16.0		9		M8 x 1.25 x 16.0		–
	Ø D	110		55.560		110		55.563		110		95		95		–
	Ø E	130		125.73		130		125.73		130		115		115		–
	Ø J	24		19.05		24		19.05		24		24		24		–
	K	50.0		57.15		50.0		57.15		50.0		50.0		50.0		–
	D	T = 36	NA	N = 38.1	NA	T = 36	NA	N = 38.1	NA	N = 36.00	NA	T = 36	NA	T = 36	N = 38.1	–
AKMH 6x	Ø C	11.00		–		M10 x 1.5 x 20.0		UNC 3/8 - 16 x 19.05		M10 x 1.5 x 20.0		–		–		–
	Ø D	130		–		130		114.3		130		–		–		–
	Ø E	165.0		–		165.0		149.23		165.0		–		–		–
	Ø J	32		–		32		28.580		28		–		–		–
	K	58		–		58		69.9		60.0		–		–		–
	D	40	NA	–		T = 40	NA	N = 38.10	NA	N = 45.00	NA	–		–		–

ERD
Hygienic Stainless Steel Linear Actuators

Reduce cleaning times without compromising on performance and space. Kollmorgen combines a stainless-steel AKMH motor with a linear actuator into a hygienic linear drive that is ready-for-installation: ideal for applications such as lifting units, dosing units or format adjustments in the packaging, food processing, and pharmaceutical industries. Extremely compact linear actuators can be supplied as in-line or reverse units in various motor/spindle combinations.

The Advantages of ERD Stainless Steel Linear Actuators

• Substantially improved Overall Equipment Effectiveness (OEE)	• Fast cleaning thanks to open machine design without protective housings • High degree of reliability with regular high-pressure and high-temperature cleaning • Higher throughput thanks to quick and precise motion control with AKD • Process monitoring and optimization with Kollmorgen's software tools • 20% less derating due to special motor design
• High degree of product safety with significantly reduced risk of recalls	• Complies with USDA, 3A, NSF hygiene regulations • Hygienic housing design with stainless steel for safe cleaning • Single-cable technology with FDA-approved, sheathing suitable for use with food (optional)
• Simple machine design and quick start-up	• Plug-and-play connection with pre-assembled, connectable cables • Robust version in IP69K with high power density and overload capacity • Control with the AKD, AKD-PDMM, and AKD-N servo drives • Extensive software tools for parameterization and drive monitoring • Simple drive design with the Kollmorgen Automation Suite

ERD Hygienic Stainless Steel Linear Actuators

Simply More Freedom in Hygienic Machine Design

Four frame sizes with variable feeds up to 600 mm, central or decentralized connection technology, encoder and brake options, as well as seamless integration in all Kollmorgen automation solutions – A wide range of options for building perfectly adapted hygienic linear drives. With Kollmorgen, the machines become even simpler. With the IP69K version you can achieve an open machine construction without protective housings, and with single-cable technology cabling costs are halved. Simple and more freedom!

AKMH hygienic stainless steel motor with FDA-approved bearing lubrication and shaft seal.

Single-cable solution halves cabling costs and simplifies machine design.

Increased reliability due to protection class IP69K.

No condensation inside the motor thanks to an innovative pressure compensation concept.

Improved hygiene: The extremely smooth stainless steel surface prevents germ formation.

Faster cleaning thanks to open machine design without protective housings.

Stainless steel linear actuator in a reverse design

High power density and overload capacity.

Applications:

- Lifting units
- Dosing units
- Format adjustments

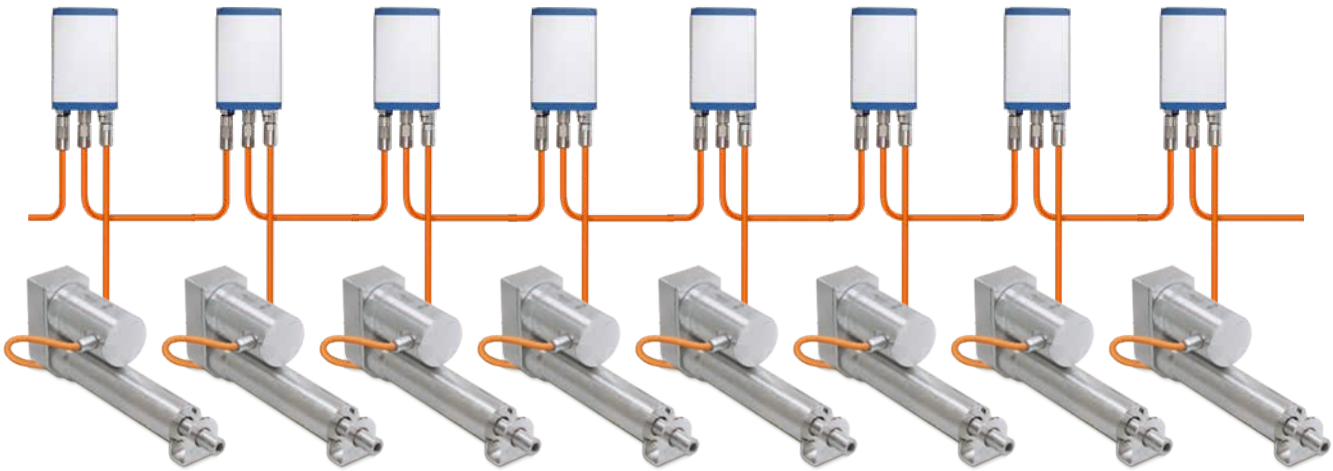
Stainless steel linear actuator in an in-line version.

Highest Product Safety and Overall Equipment Effectiveness

- Hygienic housing design prevents germ formation and contamination traps
- Quick and simple cleaning thanks to open machine design without protective housings
- High degree of reliability even with frequent high-pressure and high-temperature cleaning thanks to stainless steel housing in IP69K
- Single-cable connection halves cabling costs and improves hygiene
- High degree of product safety in accordance with USDA, 3A, and NSF requirements ensured

Performance Data

Stainless steel linear actuator		AKMH2/ERD15	AKMH3/ERD20	AKMH4/ERD25	AKMH5/ERD30
Protection class / hygiene standards		IP69k / USDA, 3A, NSF			
Connection technology / servo drive		Single-cable technology / AKD (central) or AKD-N (decentralized)			
Encoder options		Digital resolver SFD3, Hiperface DSL			
Motor diameter	mm	74.0	85.0	113.0	132.0
Actuator diameter	mm	42	52	89	89
Feed (max)	mm	600	600	600	600
Feed speed (max)	mm/s	1016	495	1448	813
Feed force	kN	0.89	2.224	14.679	20.017



Linear Direct Drives

High throughput, high precision, and maintenance-free: Linear direct drives from Kollmorgen set the standard for performance and effectiveness. These are brushless 3-phase servo motors with no housing and an iron core impress due to their high power density and extremely quiet running. The motor design ensures minimum cogging values that result in motion profiles with low fluctuation in terms of power and speed.

The Advantages of Linear Direct Drives

• Maintenance-free, greater accuracy and higher bandwidth	• Even speed profile and low noise development • Backlash-free power transmission • Power transmission without mechanical components such as couplings, toothed belts, etc. • No gearheads, no screws, no lubrication • High machine reliability
• Large range of motor sizes with various power ranges for universal application in all linear drives	• Increase in performance of the overall system • Compact drive solution with low installation height • Can be used with all Kollmorgen motors and servo drives in mixed rotary/linear drives • Acceleration of up to 10 G under real-life conditions
• Simple design with powerful permanent magnets	• Higher bandwidth and quicker response than drives with ball screw or toothed belt drives. • Quick positioning of heavy loads with peak forces of up to 12700 N • Low noise development, fewer parts, and low overall operating costs • More compact machine design

ICH Linear Direct Drives

Powerful Precision – As Much As You Want

Increase productivity and reduce operating costs – with the ICH linear motors from Kollmorgen you considerably improve overall equipment effectiveness. Cross the costs for maintenance work out of your calculations! Linear direct drives from Kollmorgen increase throughput compared with other drive systems by up to 40% and enable smaller, lighter machines with high energy efficiency due to their compact design.

ICH Linear Direct Drives

- Maintenance-free iron-core linear motors with high power density
- Direct power transmission without mechanical components
- Special motor design ensures very quiet running
- Feed force of 405 N to 12726 N (peak) and 175 N to 5341 N (continuous operation)
- Optional digital hall effect sensors
- Compatible with all servo drives and safety and energy-saving modules
- Comprehensive development support from the Kollmorgen support team

Wide Range of Speed – from µm/s to km/h

Slower than 1 µm/s or faster than 5 m/s – the ICH linear motors from Kollmorgen move the load at all speeds precisely and with extremely low speed variations.

High System Dynamics Over 10 G

ICH linear motors are distinguished by their quick and powerful acceleration. The larger motors typically achieve values between 3 G and 5 G; smaller motors more than 10 G. The primary limiting factor is the machine's management system.

Low Power Fluctuation and High Synchronization

Iron-core linear motors boast high power density, but also a certain degree of cogging depending on the system. The motor design from Kollmorgen reduces cogging to a minimum. The ICH linear motors thus impress with their high power density with low power fluctuation and precise synchronization.

Precise Positioning to Fractions of a µm

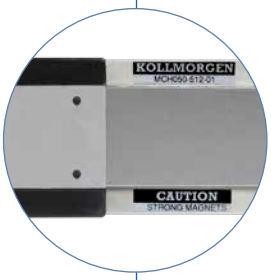
Positioning accuracy is limited by the resolution of the feedback system. In combination with the AKD servo drives from Kollmorgen you can develop linear drives that position quickly and precisely.

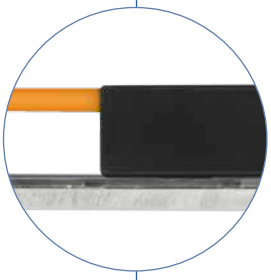
Unlimited Travel

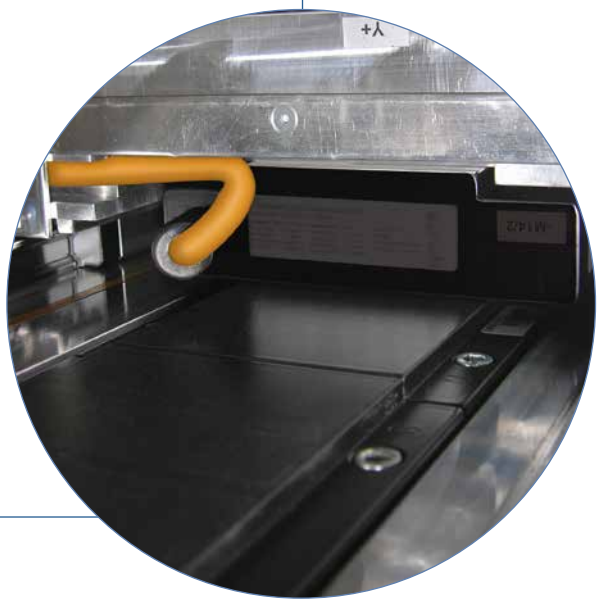
The secondary parts can be supplied in lengths 64, 128, 256, and 512 mm and can be combined into travel distances as long as you wish.

Simple Drive Design with Few Parts

Drives with linear motors with no housing require fewer parts and are considerably simpler in structure than rotary motors. The ICH linear motors from Kollmorgen merely require an air gap of 0.9 mm. Moreover, no critical adjustments are necessary.







ICH Linear Direct Drives

Feedback System

All brushless motors require a feedback system for the commutation. Kollmorgen offers digital hall effect sensors which are used in the same way as with rotary servo motors from the servo drive to the commutation. In applications with particularly demanding synchronization requirements, digital hall effect sensors are used and the servo drive supplies sinusoidal currents.

For exact position determination, linear encoders – whose signals are simultaneously used for the commutation – are frequently employed. The signals of the hall effect sensors can be used during the start phase in addition to the commutation.

Options

- Hall effect sensors (digital)
- Thermal overload protection PTC+KTY
- Different cable options

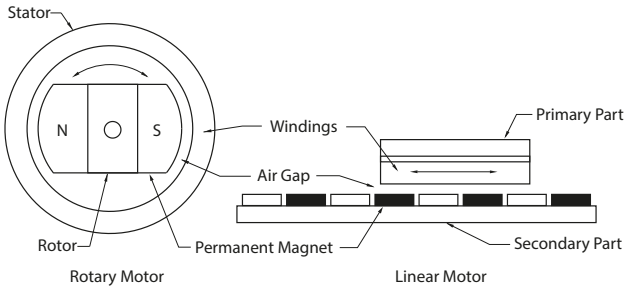
Applications Lurking Everywhere!

The ICH linear motors can be used in almost all motion tasks in many industries:

- Machine tools:
  Tool positioning for drilling, milling, grinding, and laser cutting
- Semi-conductor industry:
  Handling, checking and separating wafers, wire bonding, TAB, ion implantation, lithography
- Textile industry:
  Tufting machines
- Metrology:
  Coordinate measuring devices
- Assembly production:
  Placement machinery, screen prints, glue dispensers, drilling and checking printed circuits
- Medical devices:
  Patient positioning systems
- Preform injection molding machinery
- Plasma cutting machinery
- Flight simulators
- Acceleration slides, catapults

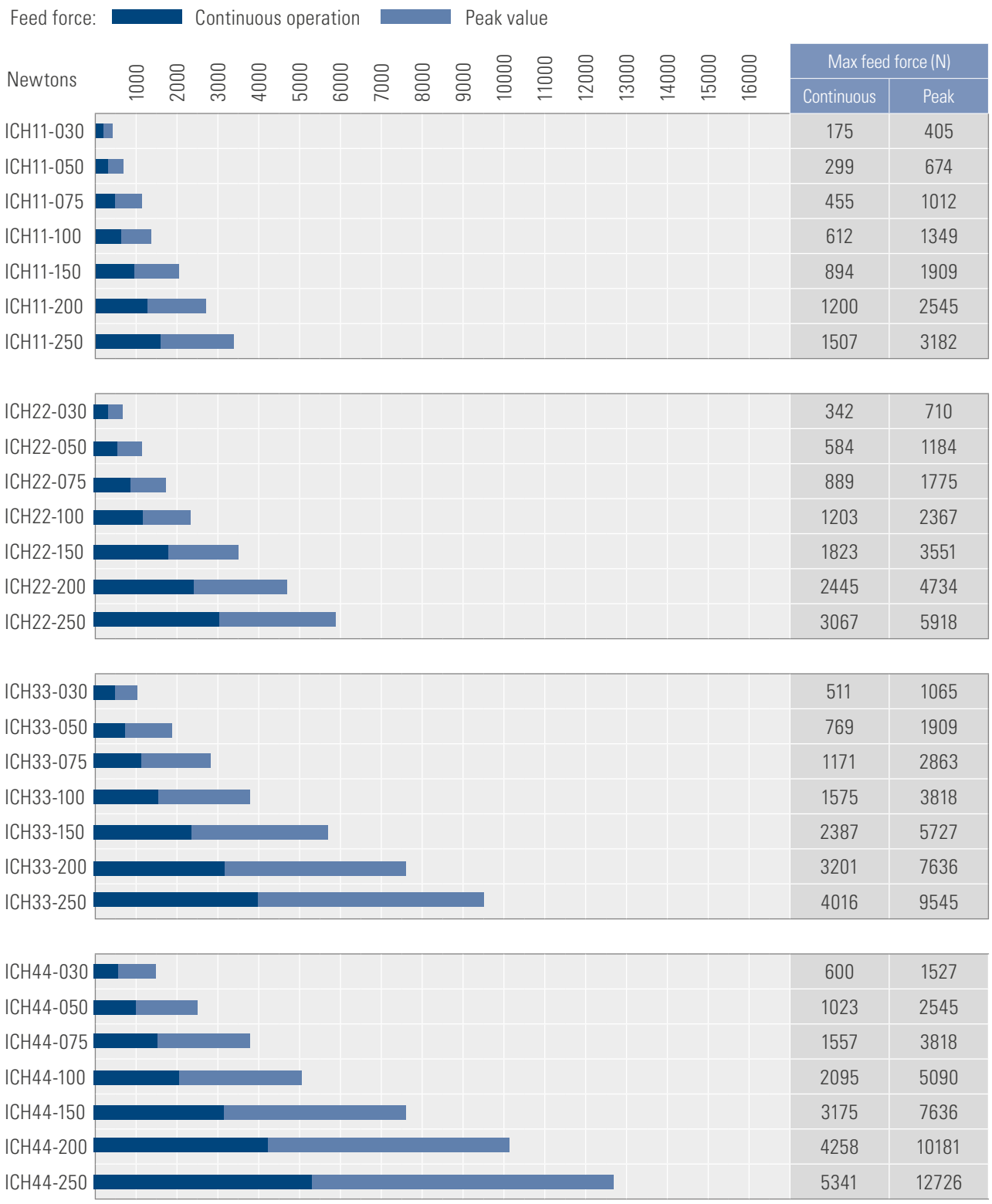
Functional Principle

Linear motors function according to the same principle as conventional rotary motors. Rotor and stator are rolled out flat and are no longer connected together mechanically. They then form the two components "primary part" (stator, coil part) and "secondary part" (rotor, magnet section). The load is coupled directly to the moving part – usually the primary part – while the secondary part is fixed to the machine as a magnet guide. However, in special applications the primary part may be fixed while the secondary part moves. The functional principle remains the same.



ICH Linear Direct Drives

ICH Series Performance Overview



	Max feed force (N)	
	Continuous	Peak
ICH11-030	175	405
ICH11-050	299	674
ICH11-075	455	1012
ICH11-100	612	1349
ICH11-150	894	1909
ICH11-200	1200	2545
ICH11-250	1507	3182
ICH22-030	342	710
ICH22-050	584	1184
ICH22-075	889	1775
ICH22-100	1203	2367
ICH22-150	1823	3551
ICH22-200	2445	4734
ICH22-250	3067	5918
ICH33-030	511	1065
ICH33-050	769	1909
ICH33-075	1171	2863
ICH33-100	1575	3818
ICH33-150	2387	5727
ICH33-200	3201	7636
ICH33-250	4016	9545
ICH44-030	600	1527
ICH44-050	1023	2545
ICH44-075	1557	3818
ICH44-100	2095	5090
ICH44-150	3175	7636
ICH44-200	4258	10181
ICH44-250	5341	12726

ICH Linear Direct Drives

Iron-core Linear Motors

Performance Data

Model	Winding [2]	Feed force [N]		Current [A]		Weight primary part [kg]	Secondary part type	Weight secondary part [kg/m]
		Peak	Continuous [1]	Peak	Continuous			
ICH11-030	A1	405	175	8,9	2,9	2.5	MCH-030	5.4
	A5			15.5	5.0			
ICH11-050	A1	674	299	8.9	2,9	3.5	MCH-050	7.6
	A5			15.5	5.1			
ICH11-075	A1	1012	455	8.9	3,0	4.8	MCH-075	10.4
	A5			15,2	5.2			
ICH11-100	A1	1349	612	8.9	3,0	5.2	MCH-100	13.2
	A5			15.3	5.2			
ICH11-150	A1	1909	894	17.9	6.1	8.6	MCH-150	18.8
	A5			26.5	9.0			
ICH11-200	A1	2545	1200	30.6	5.2	11.2	MCH-200	24.4
	A5			26.5	9.0			
ICH11-250	A1	3182	1507	15,3	5.2	13.8	MCH-250	30.0
	A5			26.5	9.1			
ICH22-030	A1	710	342	8.9	2.8	4.9	MCH-030	5.4
	A5			15.5	4.9			
ICH22-050	A1	1184	584	8.9	2,9	6.8	MCH-050	7.6
	A5			15.5	5.0			
ICH22-075	A1	1775	889	17.9	5.9	9.3	MCH-075	10.4
	A5			30,9	10.2			
ICH22-100	A1	2367	1203	30.6	10.2	11.8	MCH-100	13.2
	A5			53.0	17.0			
ICH22-150	A1	3551	1823	30.6	10.4	16.8	MCH-150	18.8
	A5			53.0	17.9			
ICH22-200	A1	4734	2445	30.6	10.4	21.7	MCH-200	24.4
	A5			53.0	18.0			
ICH22-250	A1	5918	3067	30.6	10.5	26.7	MCH-250	30.0
	A5			53.0	18.1			
ICH33-030	A1	1065	511	8.9	2.8	7.2	MCH-030	5.4
	A5			15.5	4.9			
ICH33-050	A1	1909	769	30.6	8.8	10.2	MCH-050	7.6
	A5			53.0	15.2			
ICH33-075	A1	2863	1171	30.6	8.9	13.8	MCH-075	10.4
	A5			53.0	15.5			
ICH33-100	A1	3818	1575	30.6	9.0	17.5	MCH-100	13.2
	A5			53.0	15.6			
ICH33-150	A1	5727	2387	30.6	9.1	24.9	MCH-150	18.8
	A5			53.0	15.8			
ICH33-200	A1	7636	3201	45.9	13.8	32.2	MCH-200	24.4
	A5			79.5	23.8			
ICH33-250	A1	9545	4016	45.9	13.8	39.7	MCH-250	30.0
	A5			79.5	23.9			
ICH44-030	A1	1527	600	15.3	4.3	9.6	MCH-030	5.4
	A5			26,5	7.4			
ICH44-050	A1	2545	1023	15.3	4.4	13.5	MCH-050	7.6
	A5			26,5	7.6			
ICH44-075	A1	3818	1557	30.6	8.9	18.3	MCH-075	10.4
	A5			53.0	15.4			
ICH44-100	A1	5090	2095	30.6	9.0	23.2	MCH-100	13.2
	A5			53.0	15.6			
ICH44-150	A1	7636	3175	61.2	18.2	33.1	MCH-150	18.8
	A5			106.0	31.5			
ICH44-200	A1	10181	4258	61.2	18.3	42.8	MCH-200	24.4
	A5			106.0	31.7			
ICH44-250	A1	12726	5341	61.2	18.4	52.6	MCH-250	30.0
	A5			106.0	31.8			

1) Continuous feed force with maximum winding temperature 2) Other windings are possible – please ask us about them

ICH Coil Assembly Dimensions

Type	A [mm]	B [mm]	C [mm]
ICH xx-030	60	58.6 ±0.1	16
ICH xx-050	80	58.6 ±0.1	36
ICH xx-075	105	58.6 ±0.1	32
ICH xx-100	130	58.6 ±0.1	36
ICH xx-150	180	60.6 ±0.1	32
ICH xx-200	230	60.6 ±0.1	36
ICH xx-250	280	62.6 ±0.1	32

MCH Magnet Way Dimensions

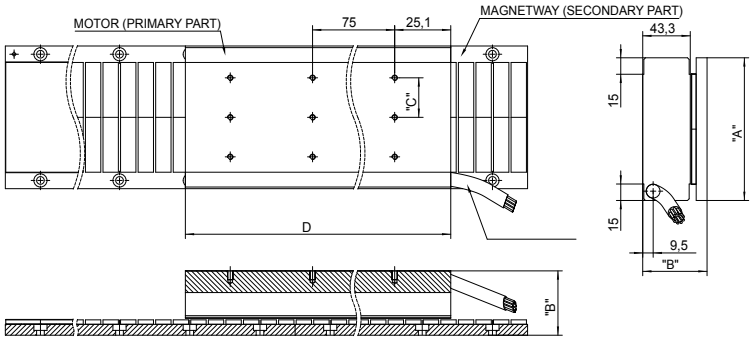
Type	F [mm]	G [mm]	H [mm]
MCH030-XXX-01	60	10	14.4
MCH050-XXX-01	80	10	14.4
MCH075-XXX-01	105	10	14.4
MCH100-XXX-01	130	10	14.4
MCH-150-XXX-01	180	12	16.4
MCH200-XXX-01	230	12	16.4
MXH250-XXX-01	280	14	18.4

Primary Part Length

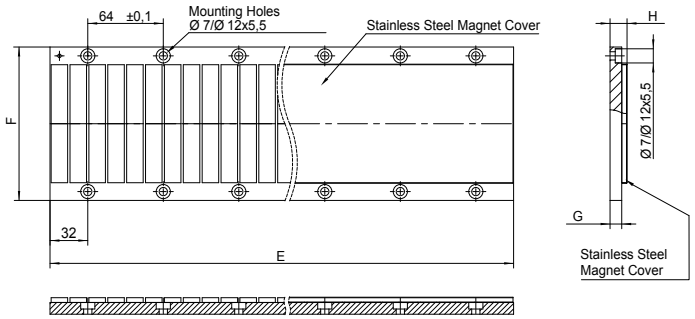
Type	D [mm]
ICH11-xxx	190
ICH22-xxx	365
ICH33-xxx	542
ICH44-xxx	718

Secondary Part Length

Type	E [mm]
MCHXXX-064-01	64
MCHXXX-128-01	128
MCHXXX-256-01	256
MCHXXX-512-01	512



Primary and secondary part assembly



Secondary part per segment

Rotary Direct Drives

Kollmorgen offers a comprehensive selection of direct drives in different sizes and performance ranges. Direct drives are characterized by their high precision, reliability, and above all being maintenance-free.Mechanical components for power transmission such as belts or gearheads are not necessary – you just need the motor and bolts for mounting.

The Cartridge DDR™ (Cartridge Direct Drive Rotary) drives combine the performance advantages of direct drives with no housing with the simple installation and the handling advantages of conventionally housed motors. By contrast the KBM™ series direct drives with no housing can be perfectly tailored to the application thanks to a unique construction kit principle.

All drives can be combined with AKD or ADK PDMM series servo drives, and the powerful Kollmorgen Automation Suite development environment is available for application programming.

Regardless which drive technology you decide on, Kollmorgen provides right solution and optimum support during the development phase.

The Advantages of Rotary Direct Drives

• Superb performance data	• Maximum torque density thanks to innovative, electromagnetic design minimizes the motor's spatial requirements. • Extremely quiet running with low cogging values and low harmonic distortion (THD) • Wide speed range and high acceleration values
• Reliable and safe operation through careful construction	• Doubly secured magnet mounting on the rotor of the high-speed models through bonding and additional Kevlar® tape overlay • 155°C-approved internal winding temperature and thermistor overtemperature protection guarantee safe continuous operation in demanding applications • Insulation materials with UL approval facilitate the certification of higher-level assemblies • All materials are RoHS-compliant
• Configurable design reduces the time-to-solution to a minimum	• KBM series offers 14 frame sizes with several design lengths • Cartridge DDR series offers 5 frame sizes with several design lengths • Standard sensor feedback with hall effect sensors • Insulation types for high and low voltage • Several winding options with customer-specific windings upon request • Changes to the mechanical connection are easy to perform

Cartridge DDR Rotary Direct Drives

High Performance in Small Spaces

Less spatial requirements and huge performance benefits: Compared to conventional servo motors, the Cartridge DDR motors offer a power density of up to 50% higher, yet are just as easy to install as housing motors. The rotor of the Cartridge DDR motor rests on the machine's bearings and is connected to the machine shaft through an innovative clamp coupling. Mechanical components for power transmission which limit performance and reliability and increase operating costs are omitted completely.

Advantages of the Cartridge DDR Motors

- Quick assembly within 5 minutes
- Direct power transmission without mechanical components reduces operating and maintenance costs
- Low cogging and thus smooth running at low speeds
- The backlash-free design improves the system's response characteristics

Performance Overview

- 5 frame sizes from 108 to 350 mm
- 17 different lengths and 52 standard windings
- Continuous torques of 4.57 Nm to 510 Nm
- Speeds up to 2500 rpm
- Integrated, high-resolution sinus encoder (optional)

The Cartridge DDR™ Advantage – Press Feed Machine

Consider how Cartridge DDR technology improves a Press Feed machine:

Reduced Assembly Time

The assembly time for the original mechanical transmission system was 4 hours. In contrast, the Cartridge DDR motor is installed in less than 5 minutes, resulting in a significant cost savings in labor.

Reduced Parts Count

The original mechanical transmission system comprises 2 bracket pieces, 12 bolts, 2 pulleys, 2 set screws, 2 keys, a timing belt, a housing to protect operators from the timing belt, a tension system for the timing belt, and motor/gearbox. With the Cartridge DDR system, this is all replaced by the motor and 4 mounting bolts, resulting in fewer parts to maintain and cost savings.

Improved Accuracy

The best planetary gearboxes have a backlash between 1 and 2 arc-minutes. Over the life of the gearbox, the backlash will increase. The Cartridge DDR system has an absolute accuracy of 26 arc-seconds and a repeatability of 0.7 arc-seconds. The Press Feed machine with the Cartridge DDR has a feed accuracy of +/- 0.0127 mm where the Press Feed machine with the mechanical transmission has a feed accuracy of 0.051 inch. Therefore, there was an overall four times improvement in machine accuracy with the Cartridge DDR system.

Increased Throughput

The cycle rate of the Cartridge DDR system is two times better than the mechanical transmission. This results in an increase in throughput of 100 percent.

Improved Reliability and Simplified Maintenance

The Cartridge DDR system eliminates parts that wear, change over time, or fail. Gearboxes are prone to wear, and backlash increases over time. Belts and pulleys stretch and require maintenance to maintain proper belt tension. By eliminating these components, the Cartridge DDR system delivers greater system reliability.

Press Feed Example

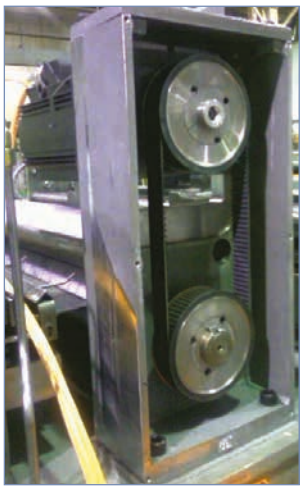
Gearboxes have a finite life span, especially in a demanding cyclic application such as a Press Feed. On this machine, the gearbox must be replaced every 10,000 hours and the belt must be tensioned every 2,000 hours. By contrast, the Cartridge DDR motor has no wear components and requires no maintenance thus simplifying the maintenance schedule for the machine, including operating costs.

Reduced Audible Noise

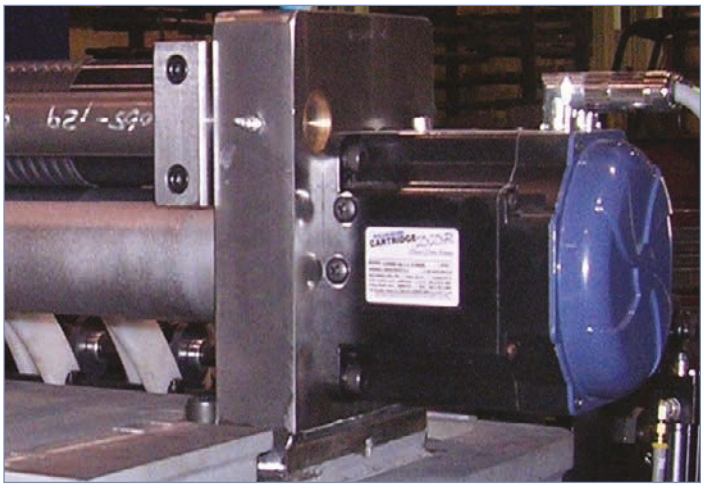
The Cartridge DDR system has as much as a 20 dB reduction in noise compared to a mechanical transmission servo system. This can dramatically reduce the overall noise level of the machine. A quieter machine gives the perception of quality. This is rightfully so as the noise emitted by gears and belts is caused by the wearing of the parts.

Total Reduced Cost

A Cartridge DDR motor typically costs 20 percent more than a comparable motor/gearbox combination. However, the elimination of parts and assembly time typically results in a lower total cost for the Cartridge DDR solution.



Press feed machine built with a conventional servo motor, gearbox, belt and pulleys.



Same machine with a Cartridge DDR motor installed. Here, the shaft of the driven roll is extended into the Cartridge DDR motor and the motor applies torque directly to the driven roll.

Cartridge DDR Rotary Direct Drives

240 Vac Performance Data

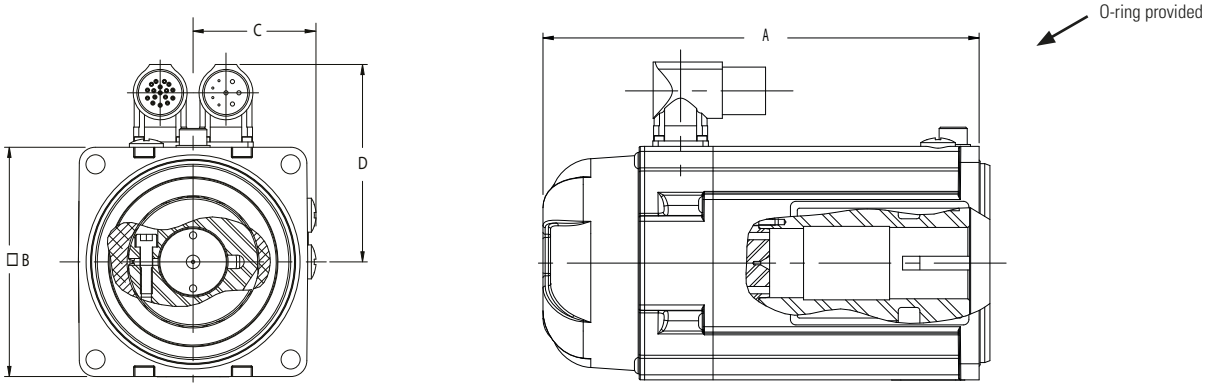
Cartridge DDR Motor	Servo Drive	Frame Size	Continuous Torque	Peak Torque	Maximum Speed	Weight	Inertia (Jm)
		mm	Nm	Nm	RPM	kg	kg-cm²
C041A	AKD-X00306	108	4.57	12.3	1750	4.08	5.86
C041B	AKD-X00606	108	4.52	12.2	2500	4.08	5.86
C042A	AKD-X00606	108	8.25	22.2	1700	5.67	8.87
C042B	AKD-X01206	108	8.45	22.8	2500	5.67	8.87
C043A	AKD-X00606	108	11.1	30.0	1250	7.26	11.9
C043B	AKD-X01206	108	11.2	30.2	2500	7.26	11.9
C044A	AKD-X00606	108	13.9	37.4	1050	8.84	14.9
C044B	AKD-X01206	108	14.1	37.9	2150	8.84	14.9
C051A	AKD-X00606	138	11.7	30.2	1200	8.39	27.4
C051B	AKD-X01206	138	11.9	30.6	2450	8.39	27.4
C052C	AKD-X00606	138	19.0	43.1	950	10.7	35.9
C052D	AKD-X01206	138	16.5	42.3	2050	10.7	35.9
C053A	AKD-X01206	138	21.0	54.1	1350	13.2	44.3
C053B	AKD-X02406	138	20.2	50.1	2500	13.2	44.3
C054A	AKD-X01206	138	24.9	63.8	1200	15.4	52.8
C054B	AKD-X02406	138	23.8	61.2	2500	15.4	52.8
C061A	AKD-X01206	188	33.8	86.8	900	18.6	94.1
C061B	AKD-X02406	188	32.6	75.6	1950	18.6	94.1
C062C	AKD-X01206	188	48.4	117	700	23.6	126
C062B	AKD-X02406	188	44.6	102	1400	23.6	126
C063C	AKD-X01206	188	61.8	157	550	29.0	157
C063B	AKD-X02406	188	59.0	136	1050	29.0	157
C091A	AKD-X02406	246	50.2	120	600	27.7	280
C092C	AKD-X02406	246	102	231	450	41.3	470
C093C	AKD-X02406	246	139	317	350	54.4	660
C131C	AKD-X02406	350	189	395	250	63.5	1240
C132C	AKD-X02406	350	362	818	120	101	2250
C133C	AKD-X02406	350	499	1070	100	132	3020

400/480 Vac Systems Performance Data

Cartridge DDR Motor	Servo Drive	Frame Size	Continuous Torque	Peak Torque	Maximum Speed		Weight	Inertia (Jm)
		mm	Nm	Nm	RPM		kg	kg-cm²
					400 Vac	480 Vac		
CH041A	AKD-X00307	108	4.56	11.3	2500	2500	4.08	5.86
CH042A	AKD-X00607	108	8.26	19.0	2500	2500	5.67	8.87
CH043A	AKD-X00607	108	11.1	25.3	2250	2500	7.26	11.9
CH044A	AKD-X00607	108	13.9	31.6	1850	2250	8.84	14.9
CH051A	AKD-X00607	138	11.7	28.0	2100	2500	8.39	27.4
CH052C	AKD-X00607	138	16.9	43.1	1750	2100	10.7	35.9
CH053A	AKD-X01207	138	21.0	54.1	2350	2500	13.2	44.3
CH054A	AKD-X01207	138	24.9	63.8	2100	2500	15.4	52.8
CH061A	AKD-X01207	188	33.8	86.8	1600	1900	18.6	94.1
CH062C	AKD-X01207	188	48.4	117	1250	1550	23.6	126
CH063C	AKD-X01207	188	61.8	157	950	1150	29.0	157
CH063B	AKD-X02407	188	59.0	136	1850	2200	29.0	157
CH091A	AKD-X02407	246	50.2	120	1200	1500	27.7	280
CH092C	AKD-X02407	246	102	231	800	1000	41.3	470
CH093C	AKD-X02407	246	139	317	700	800	54.4	660
CH131C	AKD-X02407	350	189	395	500	600	63.5	1240
CH131B	AKD-X04807	350	190	396	800	1000	63.5	1240
CH132C	AKD-X02407	350	362	818	250	300	101	2250
CH132B	AKD-X04807	350	361	759	400	500	101	2250
CH133C	AKD-X02407	350	499	1070	200	250	132	3020
CH133B	AKD-X04807	350	510	1016	350	400	132	3020

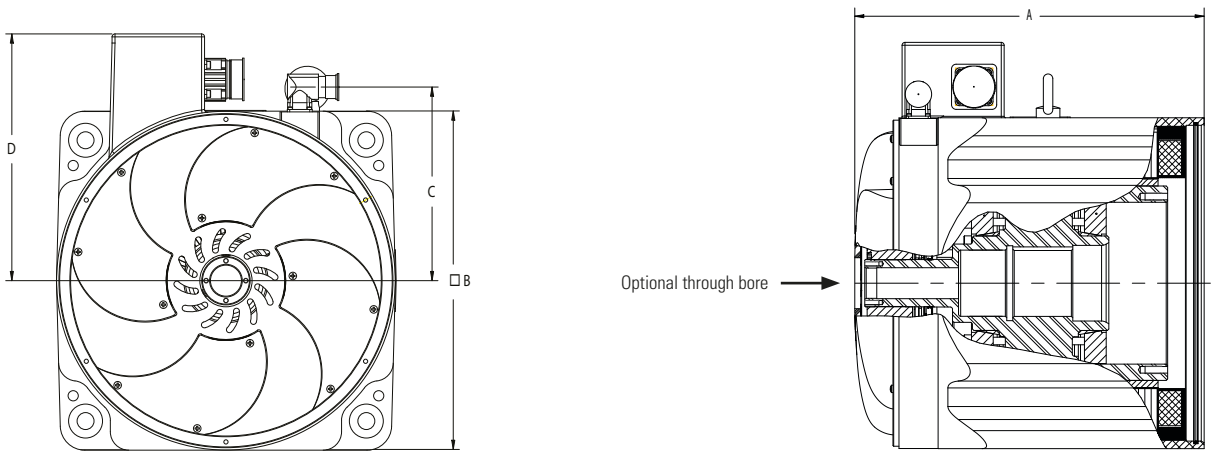
Cartridge DDR C04, C05 and C06 Dimensions

Cartridge DDR Motor	A mm	B mm	C mm	D mm
C(H)041	171	108	59	93
C(H)042	202	108	59	93
C(H)043	233	108	59	93
C(H)044	264	108	59	93
C(H)051	195	138	76	108
C(H)052	220	138	76	108
C(H)053	245	138	76	108
C(H)054	270	138	76	108
C(H)061	226	188	99	133
C(H)062	260	188	99	133
C(H)063	294	188	99	133



Cartridge DDR C09 and C13 Dimensions

Cartridge DDR Motor	A mm	B mm	C mm	D mm
C(H)091	204	246	149	182
C(H)092	253	246	149	182
C(H)093	302	246	149	182
C(H)131	231	350	200	256
C(H)132	301	350	200	256
C(H)133	370	350	200	256



Housed Direct Drive Rotary (DDR) Motor

Housed DDR motors are multi-pole (16 to 32) hollow shaft motors with their own bearings and high-resolution encoder system. They are coupled directly to the load and enable very precise and repeatable systems. Housed DDR motors are maintenance free and run more quietly and with better dynamics than systems that use gears, belts, cams or other mechanical transmission components.

Housed DDR Features

- 4 frame sizes
- Robust cross-roller bearing
- Dual bearing option
- IP67 option
- Continuous torque range: 5.8 Nm (4.3 lb-ft) to 339 Nm (250 lb-ft)
- Optimized torque output with high-pole count efficient electromagnetic design
- Integrated high-resolution sine-encoder
- 134,217,728 counts per rev resolution, 27 bits
- Feedback accuracy: +/- 26 arc-sec
- Repeatability better than 1 arc second

Housed DDR Motor Advantage

Consider how a Housed DDR motor improved a medical manufacturing machine.

Product is located at the steel pins on the outside of the machine's turret as shown. The 115 kg load wheel has an inertia of 20 kg-m^2. There are 96 steel pins for an index angle of 3.5 degrees to move. **The move is accomplished in less than 100 ms.**

Housed DDR Benefits

- Transmission elements such as couplings, toothed belts, spindles, and other fitted components can be eliminated
- Mechanical design is made much simpler
- Power transmission without backlash
- More compact machinery assemblies
- Increased performance for the entire system

Realized Housed DDR Motor Benefits

The Direct Drive Advantage

The following improvements were observed compared to the previous design that used a mechanical indexer:

Improved Repeatability

The Housed DDR motor demonstrated a repeatability better than 1 arc-second which was substantially better than the mechanical indexer.

No Degradation

Direct drive system performance, accuracy and repeatability do not degrade over time as they do with a mechanical indexer. With a mechanical indexer, as parts wear over time, the accuracy and repeatability degrade.

Immediate Stop

The direct drive system can immediately stop if there is a process error. The mechanical indexer required several cycles to stop which could cause tooling and machine damage.

Greatly Reduced Audible Noise

With the mechanical indexer, the noise was at a level such that two people would have to yell to hear each other. By contrast, if you turned your back to the Housed DDR motor, you could barely detect that it was running.

Easy Profile Change

Motion parameters such as index angle, speed, acceleration, and dwell are very simple to change with the Housed DDR motor. The mechanical indexer does not support flexible motion profiles.

Better Value

The Housed DDR motor is attractively priced compared to the mechanical indexer it replaced. When the other advantages listed above are also considered, the Housed DDR motor was the obvious choice.

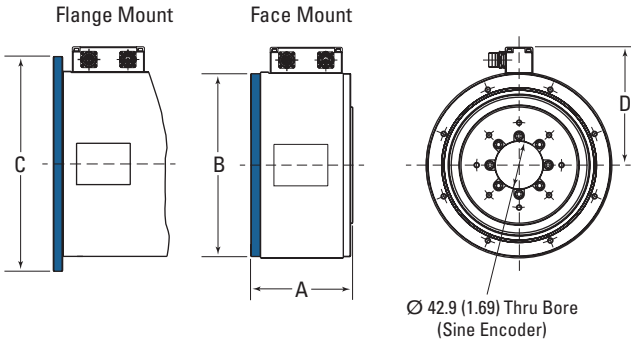
Housed DDR Performance Data and Dimensions

240 V AC Performance Data

Housed DDR Motor	AKD Servo Drive	Frame Size mm	Continuous Torque Nm	Peak Torque Nm	Maximum Speed [RPM]	Weight kg	Inertia (Jm) kg•cm²
D061	AKD-X00606	175	5.3	16.9	500	9.4	61
D062	AKD-X00606	175	9.8	33.5	500	11.3	71
D063	AKD-X00606	175	17.7	64.4	500	13.8	86
D081	AKD-X00606	217	15.9	45.0	500	17.9	144
D082	AKD-X00606	217	25.9	92.2	300	21.5	194
D083	AKD-X00606	217	50.4	160	250	28.8	301
D101	AKD-X00606	280	34.6	129	300	31.5	693
D102	AKD-X00606	280	63.4	227	200	43.8	992
D103	AKD-X01206	280	115	501	120	60.8	1750
D141	AKD-X01206	362	108	367	200	59.4	1630
D142	AKD-X01206	362	183	519	120	86.6	2740
D143	AKD-X02406	362	339	1340	60	146	5420

400/480 V AC Performance Data

Housed DDR Motor	AKD Servo Drive	Frame Size mm	Continuous Torque Nm	Peak Torque Nm	Maximum Speed RPM	Weight kg	Inertia (Jm) kg•cm²
DH061	AKD-X00607	175	5.3	16.9	800	9.4	61
DH062	AKD-X00607	175	9.8	33.5	800	11.3	71
DH063	AKD-X00607	175	17.7	64.4	800	13.8	86
DH081	AKD-X00607	217	15.9	45.0	500	17.9	144
DH082	AKD-X00607	217	25.9	92.2	500	21.5	194
DH083	AKD-X00607	217	50.4	160	500	28.8	301
DH101	AKD-X00607	280	34.6	129	300	31.5	693
DH102	AKD-X00607	280	63.4	227	300	43.8	992
DH103	AKD-X01207	280	115	501	250	60.8	1750
DH141	AKD-X01207	362	108	367	300	59.4	1630
DH142	AKD-X01207	362	183	519	300	86.6	2740
DH143	AKD-X02407	362	339	1340	120	146.0	5420



Dimensions

DDR	A mm	B mm	C mm	D mm
D[H]061	130	175	220	126
D[H]062	140	175	220	126
D[H]063	164	175	220	126
D[H]081	145	217	260	147
D[H]082	165	217	260	147
D[H]083	206	217	260	147
D[H]101	153	280	330	181
D[H]102	185	280	330	181
D[H]103	248	280	330	181
D[H]141	153	362	406	218
D[H]142	217	362	406	218
D[H]143	344	362	406	218

KBM Series Frameless Brushless Motor

The KBM frameless motor series is our newest direct drive technology.

KBM frameless brushless motor models are engineered to provide the high-performance, long life and simple installation that today's design engineers demand. Optional latching digital Hall effect sensors are pre-aligned and factory installed with added axial rotor length to achieve proper triggering. Choice of insulation allows operation over a wide range of line input voltage. Our detailed selection guide provides a variety of pre-engineered options and configurations that are currently available.

Custom Application Solutions

For customized features, contact Kollmorgen to help us understand exactly what you need and how we can further optimize any KBM or engineer a new custom motor solution for the unique requirements of your application. We are experts in providing optimized solutions such as special winding configurations, tailored mounting features, diameter and stack length dimensional adjustments, or material variations.

The Benefits of KBM Frameless Motors

• Industry-Leading Frameless Motor Performance	• Advanced electromagnetic designs deliver maximum torque density which minimizes required motor space envelope • Extremely smooth rotation with minimal cogging and low total harmonic distortion (THD) • Broad operating speed range and rapid acceleration
• Quality Construction Ensures Reliability and Safe Operation	• Redundant magnet attachment to rotor on high-speed models – adhesive bonding and high-strength banding • 155°C motor winding temperature rating with integral thermistor allows continuous safe operation for demanding applications • Designed with UL-recommended insulation systems to simplify system regulatory approval • RoHS compliant material selection • Compliant with Harmonized Type C Standards EN60034- 1:2010 (rotating electrical machines) and where appropriate in accordance to the Low Voltage Directive 2014/35/EC
• Highly Configurable Design Minimizes Time to Solution	• 14 frame sizes with multiple stack lengths • Standard sensor feedback using Hall effect sensors • Standard high and low voltage insulation • Multiple standard windings with custom windings available upon request • Mechanical interface changes easily accommodated

KBM Series Overview

Quality Construction

- Fully encapsulated stator windings
- 155°C internal winding temperature continuous capability
- PTC thermistor (avalanche-type) overload protection
- High performance magnets
- Fail-safe bands over rotor magnets
- RoHS compliant

Available Options

(No engineering fees apply)

Sensor Feedback (KBMS models)

Latching digital hall effect sensors are pre-aligned and factory installed on the lead end of the stator. Wiring instructions and electrical timing diagrams are included in this selection guide. KBMS models include added axial rotor length to achieve proper sensor triggering.

Insulation System

S (standard) – acceptable for applications up to 240 V AC drive amplifier supply.
H (high voltage) – required for applications >240 V AC and up to 480 V AC drive amplifier supply.

Allowed Modifications

(Engineering fees apply)

Consult Kollmorgen Customer Support for guidance or to obtain a quotation. Unit price increase may apply, depending upon extent of modification.)

Special Windings

Motor windings may be optimized to provide desired speed and torque performance according to the unique voltage and current requirements of a customer's application. Kollmorgen engineers must confirm electrical feasibility and manufacturability of each special winding arrangement prior to quotation.

Special Rotor Hub Dimensions

Rotor hubs may be provided with special customer-designated hole patterns, mounting features or smaller inner bore diameters. Standard KBM(S) models shown within this selection guide include the largest available inner rotor bore diameter.

Rotor Hub Material

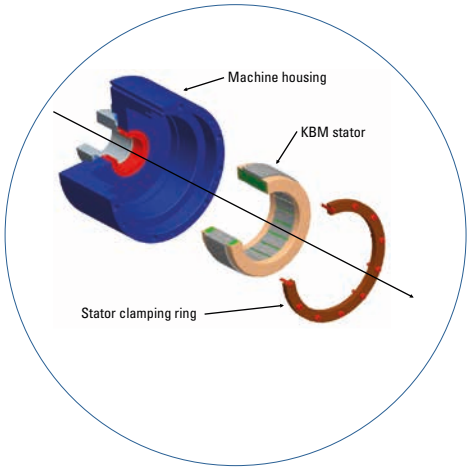
Standard configuration KBM(S) rotor hubs are constructed from non-plated cold rolled steel. If special plating, coating, cleaning or alternate material is desired, Kollmorgen engineers must confirm feasibility and pricing adjustment prior to quotation.

Stator Sleeve Material

Standard configuration KBM(S)-10, 14, 17, 25, 35, 45, 163 and 260 size stators are designed with uncoated aluminum sleeves around the stator lamination stack. If special coating or plating is desired for the aluminum stator sleeve, Kollmorgen engineers must confirm feasibility and pricing adjustment prior to quotation. Stator sleeves are only utilized for the sizes listed above.

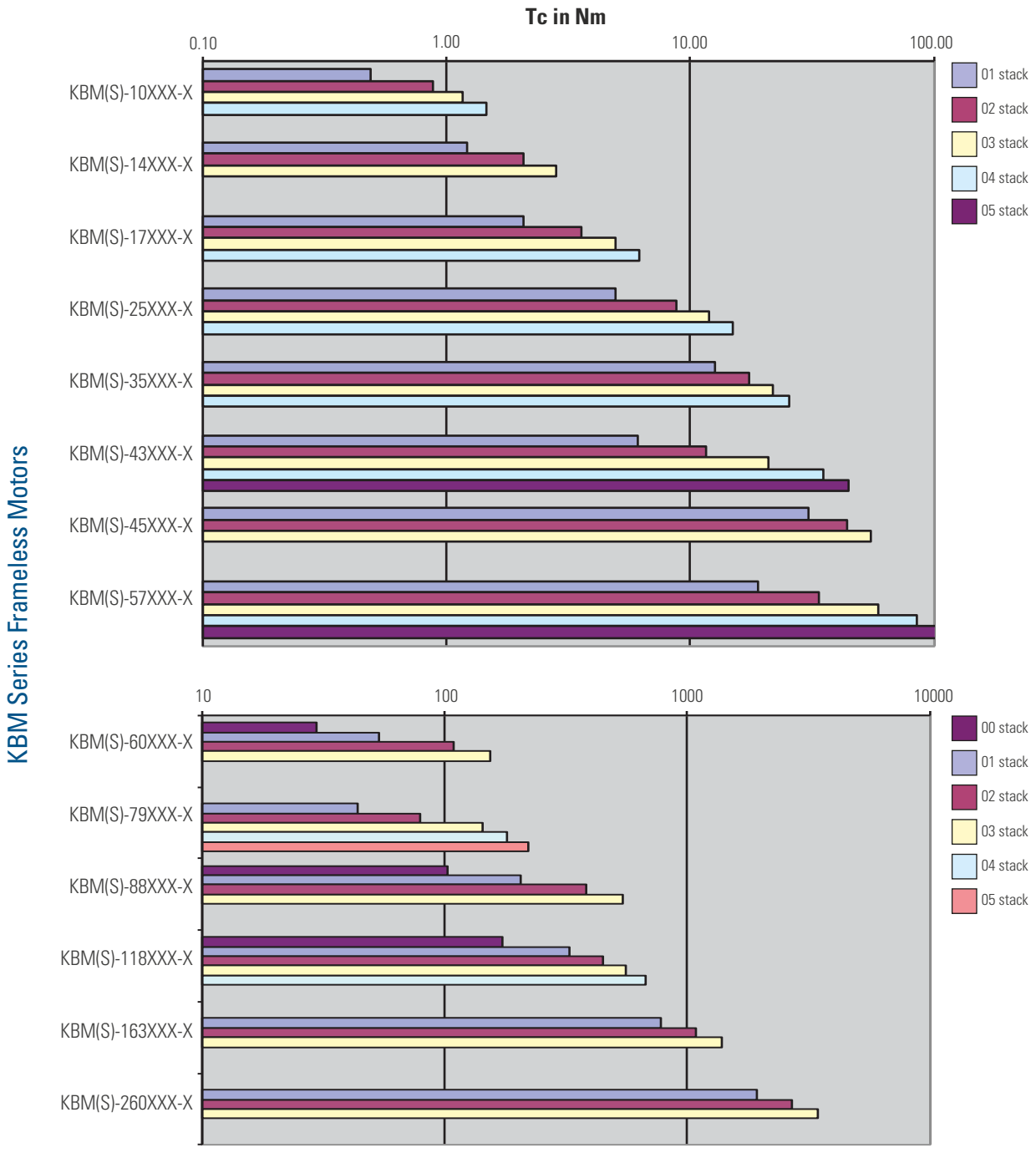
Agency UL Information

KBM(S) motors are designed to facilitate UL certification in the customer's higher-level assembly. Stator insulation systems are constructed entirely from agency-approved materials and are designed in full compliance with agency creepage and clearance dimensional guidelines. Dielectric strength between winding circuit and grounded metal stator surface is tested at agency-specified voltage level. Because a frameless motor's compliance with agency requirements is dependent upon correct installation and proper design of the surrounding enclosure by the user, KBM(S) series products are not formally labeled or agency-approved at the frameless motor level.



KBM(S) Continuous Torque Overview

Select from our wide variety of sizes and torque ranges to suit your application needs.



For more detailed information please visit: http://www.kollmorgen.com/en-gb/products/motors/direct-drive/kbm-series-frameless/

KBM Frameless Direct Drives

Performance Data

KBM(S)-	Continuous standstill torque[1] [Nm]	Continuous standstill current [A]	Peak standstill moment [2] [Nm]	Peak current [A]	Rated speed [rpm^{-1}]	Rated power[1),3)] [W]	Weight KBM/KBMS [kg]	Moment of inertia KBM/KBMS [kg•m²]
10H01-A	0.487	1.73	1.17	4.33	15200	550	0.379 / 0.425	4.92E-6 / 1.03E-5
10H01-B	0.509	3.37	1.19	8.70	18500	600	0.379 / 0.425	4.92E-6 / 1.03E-5
10H01-C	0.492	5.21	1.23	13.8	18600	575	0.379 / 0.425	4.92E-6 / 1.03E-5
10H02-A	0.876	1.53	2.33	4.33	11000	740	0.658 / 0.703	1.03E-5 / 1.49E-5
10H02-B	0.899	3.00	2.48	8.65	15200	785	0.658 / 0.703	1.03E-5 / 1.49E-5
10H02-C	0.868	5.14	2.24	15.5	17000	710	0.658 / 0.703	1.03E-5 / 1.49E-5
10H03-A	1.16	1.54	3.46	4.86	8500	780	0.943 / 0.990	1.55E-5 / 2.02E-5
10H03-B	1.16	2.40	3.53	7.73	14300	740	0.943 / 0.990	1.55E-5 / 2.02E-5
10H03-C	1.19	3.10	3.58	9.72	14500	725	0.943 / 0.990	1.55E-5 / 2.02E-5
10H03-D	1.18	4.66	3.69	15.5	13000	850	0.943 / 0.990	1.55E-5 / 2.02E-5
10H04-A	1.45	1.60	4.66	5.46	7050	820	1.22 / 1.26	2.01E-5 / 2.55E-5
10H04-B	1.41	2.40	4.75	8.70	11500	860	1.22 / 1.26	2.01E-5 / 2.55E-5
10H04-C	1.44	3.10	4.80	10.9	12000	835	1.22 / 1.26	2.01E-5 / 2.55E-5
10H04-D	1.41	4.21	4.91	15.5	9500	910	1.22 / 1.26	2.01E-5 / 2.55E-5
14H01-A	1.22	1.53	3.28	4.32	7950	735	0.898 / 1.00	2.41E-5 / 3.36E-5
14H01-B	1.25	3.25	3.43	9.63	12000	700	0.898 / 1.00	2.41E-5 / 3.36E-5
14H01-C	1.21	6.25	3.59	19.4	13500	915	0.898 / 1.00	2.41E-5 / 3.36E-5
14H02-A	2.08	1.59	6.67	5.39	4900	845	1.59 / 1.68	4.88E-5 / 5.56E-5
14H02-B	2.08	2.42	6.83	8.57	7700	1000	1.59 / 1.68	4.88E-5 / 5.56E-5
14H02-C	2.11	3.10	6.98	10.9	10250 / 8000	585 / 1000	1.59 / 1.68	4.88E-5 / 5.56E-5
14H02-D	2.17	5.97	7.31	21.8	8900	975	1.59 / 1.68	4.88E-5 / 5.56E-5
14H03-A	2.82	1.64	10.1	6.12	3600	875	2.98 / 3.08	7.31E-5 / 8.81E-5
14H03-B	2.87	2.81	10.5	10.9	6500 / 5225	1215 / 1175	2.98 / 3.08	7.31E-5 / 8.81E-5
14H03-C	2.92	6.04	10.5	24.5	6600	1230	2.98 / 3.08	7.31E-5 / 8.81E-5
17H01-A	2.08	1.65	5.95	5.45	4650	810	1.05 / 1.16	5.12E-5 / 8.62E-5
17H01-B	2.06	3.11	6.14	10.9	9600 / 8125	715 / 955	1.05 / 1.16	5.12E-5 / 8.62E-5
17H01-C	2.07	6.10	6.35	21.8	9050	855	1.05 / 1.16	5.12E-5 / 8.62E-5
17H02-A	3.58	1.59	12.2	6.08	2600	835	1.87 / 1.97	9.45E-5 / 1.28E-4
17H02-B	3.52	3.00	12.3	12.2	5450	1270	1.87 / 1.97	9.45E-5 / 1.28E-4
17H02-C	3.57	5.27	12.7	21.9	7560	790	1.87 / 1.97	9.45E-5 / 1.28E-4
17H02-D	3.58	6.25	12.8	24.5	5600	1290	1.87 / 1.97	9.45E-5 / 1.28E-4
17H03-A	4.89	3.06	18.5	13.8	3950	1440	2.65 / 2.76	1.42E-4 / 1.75E-4
17H03-B	4.90	5.32	18.8	24.4	6500	890	2.65 / 2.76	1.42E-4 / 1.75E-4
17H03-C	5.00	6.14	18.8	27.2	6480	965	2.65 / 2.76	1.42E-4 / 1.75E-4
17H03-D	5.00	10.4	19.0	48.0	6100	1275	2.65 / 2.76	1.42E-4 / 1.75E-4
17H04-A	6.20	3.26	23.7	14.5	3350	1520	3.62 / 3.72	2.03E-4 / 2.40E-4
17H04-B	6.12	5.53	23.7	25.0	5700	1075	3.62 / 3.72	2.03E-4 / 2.40E-4
17H04-C	5.90	6.20	23.7	28.1	5775	975	3.62 / 3.72	2.03E-4 / 2.40E-4
17H04-D	5.90	9.56	24.0	44.0	5000	1550	3.62 / 3.72	2.03E-4 / 2.40E-4
25H01-A	4.90	3.10	14.4	10.9	3800	1110	1.79 / 2.02	2.66E-4 / 4.34E-4
25H01-B	4.96	5.34	14.6	19.3	4900	730	1.79 / 2.02	2.66E-4 / 4.34E-4
25H01-C	4.85	6.45	15.0	27.6	4225	1025	1.79 / 2.02	2.66E-4 / 4.34E-4
25H01-D	4.75	7,95	14.9	34.3	4000	1100	1.79 / 2.02	2.66E-4 / 4.34E-4
25H02-A	8.70	3.33	29.4	13.9	2300	1765	3.27 / 3.50	5.15E-4 / 6.78E-4
25H02-B	8.75	5.18	29.7	22.0	4000	2545	3.27 / 3.50	5.15E-4 / 6.78E-4
25H02-C	8.75	6.50	29.7	27.8	5000	2535	3.27 / 3.50	5.15E-4 / 6.78E-4
25H02-D	8.62	8.00	29.8	35.1	6000	1790	3.27 / 3.50	5.15E-4 / 6.78E-4
25H02-E	8.85	10.20	29.8	43.3	6000	1850	3.27 / 3.50	5.15E-4 / 6.78E-4
25H03-A	11.6	5.30	42.2	23.9	2900	2700	4.72 / 4.90	7.66E-4 / 9.31E-4
25H03-B	11.9	7.27	42.3	33.0	4150	2890	4.72 / 4.90	7.66E-4 / 9.31E-4
25H03-C	11.9	8.20	42.4	37.0	4725	2585	4.72 / 4.90	7.66E-4 / 9.31E-4
25H03-D	11.9	10.2	42.6	47.0	2700	2605	4.72 / 4.90	7.66E-4 / 9.31E-4
25H04-A	14.8	5.50	54.4	25.0	2400	2865	6.17 / 6.35	1.02E-3 / 1.18E-3
25H04-B	14.9	6.25	53.8	27.5	2700	3090	6.17 / 6.35	1.02E-3 / 1.18E-3
25H04-C	15.0	8.70	54.4	38.5	3850	3255	6.17 / 6.35	1.02E-3 / 1.18E-3
25H04-D	14.9	10.7	54.8	48.5	4700	1990	6.17 / 6.35	1.02E-3 / 1.18E-3
25H04-E	14.6	13.8	53.8	62.5	4700	1940	6.17 / 6.35	1.02E-3 / 1.18E-3

1) Winding temperature = 155°C in continuous standstill and rated power and as per the power curves 2) With winding temperature at 25°C 3) With ambient temperature at 25°C

Performance Data

KBM(S)-	Continuous standstill torque[1] [Nm]	Continuous standstill current [A]	Peak standstill moment [2] [Nm]	Peak current [A]	Rated speed [rpm^{-1}]	Rated power[1),3)] [W]	Weight KBM/KBMS [kg]	Moment of inertia KBM/KBMS [kg•m^2]
35H01-A	12.6	5.41	40.9	21.9	2700	2970	4.68/5.17	1.52E-3/2.17E-3
35H01-B	12.7	6.10	40.8	24.5	2900	3100	4.68/5.17	1.52E-3/2.17E-3
35H01-C	12.4	8.32	41.1	34.7	4200	3885	4.68/5.17	1.52E-3/2.17E-3
35H01-D	12.7	10.6	41.2	43.5	5800	3750	4.68/5.17	1.52E-3/2.17E-3
35H01-E	12.2	12.9	41.1	55.4	6125	3200	4.68/5.17	1.52E-3/2.17E-3
35H02-A	17.3	4.97	58.8	22.5	1750	2750	6.76/7.21	2.28E-3/2.94E-3
35H02-B	17.6	6.30	58.8	28.0	2200	3415	6.76/7.21	2.28E-3/2.94E-3
35H02-C	17.5	8.70	59.2	39.2	3200	4395	6.76/7.21	2.28E-3/2.94E-3
35H02-D	17.5	10.9	59.4	49.5	4300	4750	6.76/7.21	2.28E-3/2.94E-3
35H02-E	17.1	12.1	59.4	55.4	3765	4610	6.76/7.21	2.28E-3/2.94E-3
35H03-A	21.8	10.2	76.1	46.1	3100	5025	8.80/9.34	3.04E-3/3.70E-3
35H03-B	21.7	14.0	76.6	64.0	4800	5160	8.80/9.34	3.04E-3/3.70E-3
35H03-C	20.7	20.2	75.2	93.1	5000	2985	8.80/9.34	3.04E-3/3.70E-3
35H03-D	20.0	21.5	75.7	104	3400	4735	8.80/9.34	3.04E-3/3.70E-3
35H04-A	25.6	10.9	92.3	49.0	2800	5400	10.9/11.3	3.81E-3/4.46E-3
35H04-B	25.9	13.3	93.0	61.0	3400	5750	10.9/11.3	3.81E-3/4.46E-3
35H04-C	25.3	14.7	93.0	68.0	4150	4870	10.9/11.3	3.81E-3/4.46E-3
35H04-D	24.7	19.2	91.5	89.0	4250	4500	10.9/11.3	3.81E-3/4.46E-3
43H01-A	6.11	5.10	18.0	18.0	4750	1230	2.26/2.66	1.94E-3/2.85E-3
43H01-B	6.24	8.60	18.0	32.2	4750	1230	2.26/2.66	1.94E-3/2.85E-3
43H01-C	6.11	18.4	18.0	64.6	4750	1230	2.26/2.66	1.94E-3/2.85E-3
43H02-A	11.6	5.10	34.6	18.0	3000	2160	3.49/3.89	2.85E-3/3.73E-3
43H02-B	11.6	18.3	34.6	64.6	2650	2160	3.49/3.89	2.85E-3/3.73E-3
43H02-C	11.9	6.10	34.6	22.8	3000	2160	3.49/3.89	2.85E-3/3.73E-3
43H02-D	11.9	10.2	34,6	36,2	3000	2160	3.49/3.89	2.85E-3/3.73E-3
43H03-A	21.0	4.78	64.5	18.0	1500	2520	5.96/6.35	4.75E-3/5.69E-3
43H03-B	20.7	13.8	64.5	51.2	2275	2875	5.96/6.35	4.75E-3/5.69E-3
43H03-C	20.9	5.73	64.5	22.8	1500	2520	5.96/6.35	4.75E-3/5.69E-3
43H03-D	20.9	19.2	64.5	72.5	1500	2520	5.96/6.35	4.75E-3/5.69E-3
43H04-A	35.1	4.78	113	18.0	830	2600	8.85/9.25	6.44E-3/6.85E-3
43H04-B	35.1	5.60	113	22.8	830	2600	8.85/9.25	6.44E-3/6.85E-3
43H04-C	35.1	9.20	113	36,2	830	2600	8.85/9.25	6.44E-3/6.85E-3
43H05-A	44.2	4.50	153	18.0	620	3500	11.80/12.20	8.54E-3/9.44E-3
43H05-B	44.2	4.50	153	22.8	620	2550	11.80/12.20	8.54E-3/9.44E-3
43H05-C	44.2	4.50	153	36,2	620	2500	11.80/12.20	8.54E-3/9.44E-3
45H01-A	30.7	10.2	119	46.5	2100	5200	12.2/13.2	6.10E-3/8.35E-3
45H01-B	30.2	12.5	119	57.5	2650	5750	12.2/13.2	6.10E-3/8.35E-3
45H01-C	31.3	14.3	119	65.0	3100	6045	12.2/13.2	6.10E-3/8.35E-3
45H01-D	29.7	20.2	118	93.5	3700	4930	17.5/18.5	9.22E-3/1.15E-2
45H02-A	43.7	13.3	170	60,5	1950	6655	17.5/18.5	9.22E-3/1.15E-2
45H02-B	43.5	14.9	171	68.0	2350	7200	17.5/18.5	9.22E-3/1.15E-2
45H02-C	41.9	21.1	168	97.2	3500/2830	4525/6500	23.1/24.2	1.22E-2/1.45E-2
45H03-A	54.6	14.1	218	64.5	1700	7270	23.1/24.2	1.22E-2/1.45E-2
45H02-B	53.0	19.9	215	92.5	2600/2050	7580/7670	23.1/24.2	1.22E-2/1.45E-2
57H01-A	18.8	5.68	60.0	23.4	2050	2310	4.54/5.31	6.56E-3/9.49E-3
57H01-B	18.8	6.90	60.0	27.9	2050	2310	4.54/5.31	6.56E-3/9.49E-3
57H01-C	18.8	11.4	60.0	47.0	2050	2310	4.54/5.31	6.56E-3/9.49E-3
57H02-A	33.5	5.23	115	23.4	1015	2660	7.89/8.62	1.18E-2/1.49E-2
57H02-B	33.5	6.24	115	27.9	1015	2660	7.89/8.62	1.18E-2/1.49E-2
57H02-C	33.5	11.0	115	47.0	1015	2660	7.89/8.62	1.18E-2/1.49E-2
57H03-A	60.0	5.47	2108	26.1	580	3000	14.5/15.4	2.21E-2/2.52E-2
57H03-B	60.0	6.70	218	32.9	580	3000	14.5/15.4	2.21E-2/2.52E-2
57H03-C	60.0	11.0	218	52.4	580	3000	14.5/15.4	2.21E-2/2.52E-2
57H04-A	85.3	5.20	332	26.1	375	2880	22.0/22.9	3.44E-2/3.78E-2
57H04-B	85.3	6.50	332	32.9	375	2880	22.0/22.9	3.44E-2/3.78E-2
57H04-C	85.3	10.6	332	52.4	375	2880	22.0/22.9	3.44E-2/3.78E-2

1) Winding temperature = 155°C in continuous standstill and rated power and as per the power curves 2) With winding temperature at 25°C 3) With ambient temperature at 25°C

KBM Frameless Direct Drives

Performance Data

KBM(S)-	Continuous standstill torque[1] [Nm]	Continuous standstill current [A]	Peak standstill moment [2] [Nm]	Peak current [A]	Rated speed [rpm^{-1}]	Rated power[1),3)] [W]	Weight KBM/KBMS [kg]	Moment of inertia KBM/KBMS [kg•m²]
57H05-A	109	5.00	441	26.1	265	2675	29.2/30.1	4.58E-2/4.91E-2
57H05-B	109	6.20	441	32.9	265	2675	29.2/30.1	4.58E-2/4.91E-2
57H05-C	109	10.0	441	52.4	265	2675	29.2/30.1	4.58E-2/4.91E-2
60H00-A	29.4	13.7	69.1	40.0	1700	2960	8.30/10.4	9.53E-3/1.88E-2
60H00-B	29.4	16.8	69.1	50.4	1700	2960	8.30/10.4	9.53E-3/1.88E-2
60H00-C	29.4	22.5	69.1	63.6	1700	2960	8.30/10.4	9.53E-3/1.88E-2
60H01-A	53.9	13.7	127	40.0	1600	4165	13.2/15.3	1.63E-2/2.56E-2
60H01-B	53.9	16.9	127	50.4	1600	4165	13.2/15.3	1.63E-2/2.56E-2
60H01-C	53.9	22.7	127	78.0	1600	4165	13.2/15.3	1.63E-2/2.56E-2
60H02-A	108	16.3	243	50.4	885	6985	25.2/27.9	3.17E-2/4.20E-2
60H02-B	108	19.6	243	60.4	885	6985	25.2/27.9	3.17E-2/4.20E-2
60H03-A	154	18.6	393	63.3	720	8350	37.2/39.8	4.75E-2 /5.29E-2
60H03-B	154	24.0	393	76.8	730	8420	37.2/39.8	4.75E-2 /5.29E-2
79H01-A	43.5	4.95	152	20,8	730	2585	9.21/10.7	3.25E-2/4.45E-2
79H01-B	43.5	6.00	152	25.3	730	2585	9.21/10.7	3.25E-2/4.45E-2
79H01-C	43.5	10.0	152	41,7	730	2585	9.21/10.7	3.25E-2/4.45E-2
79H02-A	79.6	5.40	319	26.1	430	2920	16.9/18.4	5.97E-2/7.15E-2
79H02-B	79.6	6.50	319	31.4	430	2920	16.9/18.4	5.97E-2/7.15E-2
79H02-C	79.6	11.0	319	52.4	430	2920	16.9/18.4	5.97E-2/7.15E-2
79H03-A	143	6.76	637	36.7	300	3750	32.1/33.5	0.114/0.125
79H03-B	143	8.00	637	46.3	300	3750	32.1/33.5	0.114/0.125
79H03-C	143	13.2	637	73.7	290	3640	32.1/33.5	0.114/0.125
79H04-A	180	6.60	858	36.7	215	3540	44.0/45.3	0.152/0.164
79H04-B	180	7.80	858	46.3	215	3540	44.0/45.3	0.152/0.164
79H04-C	180	12.8	858	73.7	215	3540	44.0/45.3	0.152/0.164
79H05-A	222	6.30	1075	36.7	165	3330	54.9/56.2	0.191/0.202
79H05-B	222	7.50	1075	46.3	165	3330	54.9/56.2	0.191/0.202
79H05-C	222	12.1	1075	73.7	165	3330	54.9/56.2	0.191/0.202
88H00-A	102	17.0	197	40.0	1000	5460	15.7/21.0	5.26E-2/0.103
88H00-B	102	20.5	197	48.3	1000	5460	15.7/21.0	5.26E-2/0.103
88H00-C	102	34.0	197	80.2	1000	5460	15.7/21.0	5.26E-2/0.103
88H01-A	205	17,1	390	40.0	520	8250	37.6/42.6	9.84E-2/0.146
88H01-B	209	32.1	390	75.4	940	6600	37.6/42.6	9.84E-2/0.146
88H01-C	205	7.50	390	17.8	205	3870	37.6/42.6	9.84E-2/0.146
88H01-D	207	40.2	390	94.7	940	6600	37.6/42.6	9.84E-2/0.146
88H02-A	385	15.1	789	40.0	235	7950	72.6/77.6	0.198/0.247
88H02-B	385	32.1	789	75.4	550	13430	72.6/77.6	0.198/0.247
88H02-C	385	37.9	789	89.0	550	13430	72.6/77.6	0.198/0.247
88H03-A	538	18.2	1200	53.1	225	10450	106/111	0.298/0.315
88H03-B	545	35.5	1200	106	425	16000	106/111	0.298/0.315
88H03-C	545	45.2	1200	134	425	16000	106/111	0.298/0.315
118H00-A	172	21.6	498	67.0	830	7780	18.9/21.2	0.129/0.176
118H00-B	172	27.0	498	84.0	830	7780	18.9/21.2	0.129/0.176
118H00-C	172	40.2	498	135	830	7780	18.9/21.2	0.129/0.176
118H01-A	325	43.7	994	151	785	9000	37.1/39.2	0.267/0.315
118H01-B	325	76.5	994	265	785	9000	37.1/39.2	0.267/0.315
118H02-A	446	47.0	1451	171	710	10350	53.4/56.2	0.396/0.403
118H02-B	446	57.0	1451	206	710	10350	53.4/56.2	0.396/0.403
118H02-C	446	94.5	1255	343	710	10350	53.4/56.2	0.396/0.403
118H03-A	560	44.0	1932	171	535	17000	71.7/73.9	0.542/0591
118H03-B	560	54.0	1932	206	535	17000	71.7/73.9	0.542/0591
118H03-C	560	89.5	1661	343	535	17000	71.7/73.9	0.542/0591
118H04-A	672	42.8	2400	171	420	19850	88.5/90.7	0.648/0.698
118H04-B	672	51.5	2400	206	420	19850	88.5/90.7	0.648/0.698
118H04-C	672	86.0	2068	343	420	19850	88.5/90.7	0.648/0.698

1) Winding temperature = 155°C in continuous standstill and rated power and as per the power curves 2) With winding temperature at 25°C 3) With ambient temperature at 25°C

Performance Data

KBM(S)-	Continuous standstill torque[1] [Nm]	Continuous standstill current [A]	Peak standstill moment [2] [Nm]	Peak current [A]	Rated speed [rpm^{-1}]	Rated power[1),3)] [W]	Weight KBM/KBMS [kg]	Moment of inertia KBM/KBMS [kg•m^2]
163H01-A	764	41.5	1966	140	375	17300	90.7/96.2	1.06/1.23
163H01-B	764	47.0	1966	158	350	17400	90.7/96.2	1.06/1.23
163H01-C	764	74.5	1966	253	335	17300	90.7/96.2	1.06/1.23
163H02-A	1084	39.5	2915	140	245	20100	131/136	1.57/1.72
163H02-B	1084	44.0	2915	158	225	19120	131/136	1.57/1.72
163H02-C	1084	73.0	2915	253	215	18065	131/136	1.57/1.72
163H03-A	1329	38.6	3932	140	180	20100	161/166	1.68/1.83
163H03-B	1329	44.0	3932	157	165	18810	161/166	1.68/1.83
163H03-C	1329	70.0	3932	253	160	17420	161/166	1.68/1.83
260H01-A	1932	33.1	6494	147	105	18500	170/177	4.88/5.45
260H01-B	1932	39.0	6494	171	100	17675	170/177	4.88/5.45
260H01-C	1932	58.0	6494	257	90	16100	170/177	4.88/5.45
260H02-A	2706	31.0	9742	147	68	17150	249/257	7.19/7.86
260H02-B	2706	36.5	9742	171	65	16400	249/257	7.19/7.86
260H02-C	2706	54.5	9742	257	58	14715	249/257	7.19/7.86
260H03-A	3445	29.5	12812	147	50	16200	329/336	9.56/10.2
260H03-B	3445	34.5	12812	171	48	15570	329/336	9.56/10.2
260H03-C	3445	52.0	12812	262	42	13710	329/336	9.56 / 10.2

1) Winding temperature = 155°C in continuous standstill and rated power and as per the power curves 2) With winding temperature at 25°C 3) With ambient temperature at 25°C

Dimensional drawings

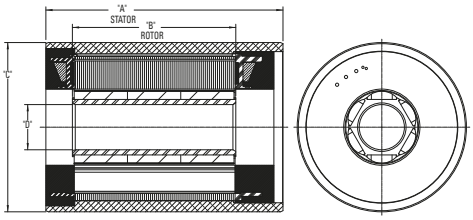


Image 1: KBM 10,14,17,25,35,45

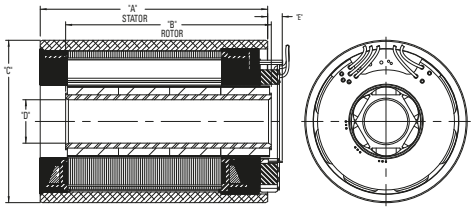


Image 2: KBMS 10,14,17,25,35,45

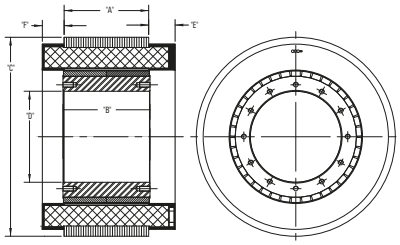


Image 3: KBM 43,57,60,88

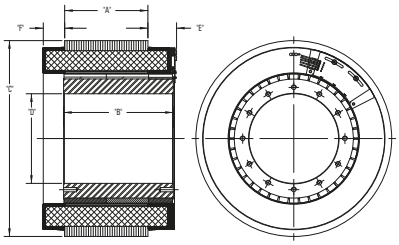


Image 4: KBMS 43,57,60,88

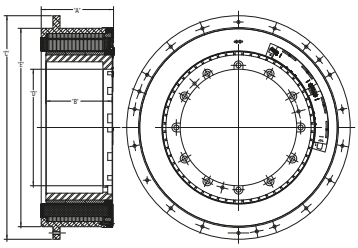


Image 5: KBM 79,118,163,260

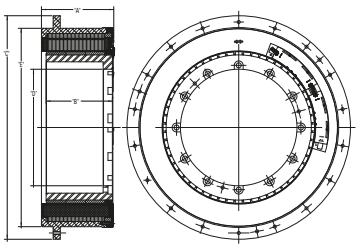


Image 6: KBMS 79,118,163,260

KBM Frameless Direct Drives

Dimensions (mm)

KBM(S)-	A	B (KBM)	B (KBMS)	C	D	E (KBM)	E (KBMS)	F	Dimensional drawing
10H01	46.00	20.14	38.17	59.97	16.01	–	5.75	–	Image 1/2
10H02	65.00	39.02	57.05						
10H03	84.00	57.89	75.92						
10H04	103.00	76.77	94.80						
14H01	58.00	32.16	50.19	74.97	20.01	–	5.75	–	Image 1/2
14H02	89.00	63.04	81.08						
14H03	120.00	93.93	111.96						
17H01	57.80	30.15	49.07	84.93	30.01	–	5.75	–	Image 1/2
17H02	86.30	59.03	77.95						
17H03	115.80	87.91	106.83						
17H04	144.80	116.79	135.71						
25H01	62.70	32.16	51.97	109.97	50.01	–	5.75	–	Image 1/2
25H02	93.70	63.05	82.86						
25H03	124.70	93.93	113.74						
25H04	155.70	124.82	144.63						
35H01	83.74	51.00	71.83	139.97	65.01	–	5.75	–	Image 1/2
35H02	108.74	75.87	96.70						
35H03	133.74	100.74	121.56						
35H04	158.74	125.60	146.43						
43H01	11.43	18.54	30.35	159.78	76.28	20.32	12.32	12.32	Image 3/4
43H02	22.86	29.97	41.78						
43H03	45.72	52.83	64.64						
43H04	80.26	87.38	99.19						
43H05	108.97	116.08	127.89						
45H01	107.06	69.04	92.41	189.96	85.02	–	5.75	–	Image 1/2
45H02	141.06	102.92	126.29						
45H03	175.05	136.81	160.17						
57H01	20.32	25.40	38.23	202.90	104.17	12.32	20.32	12.32	Image 3/4
57H02	40.64	45.72	58.54						
57H03	81.79	88.36	99.44						
57H04	123.82	129.16	141.98						
57H05	166.37	171.70	184.53						
60H00	26.62	29.39	57.53	229.85	105.05	30.48	33.65	25.15	Image 3/4
60H01	48.11	50.88	78.99						
60H02	97.71	100.48	128.78						
60H03	147.32	150.09	178.31						
79H01	31.75	38.10	52.07	259.63	152.43	13.34	21.20	13.34	Image 5/6
79H02	63.50	69.85	83.82						
79H03	127.00	133.35	147.07						
79H04	170.94	177.29	191.26						
79H05	214.89	221.49	235.46						
88H00	33.66	36.37	71.37	331.46	155.01	37.59	40.64	27.43	Image 3/4
88H01	67.56	70.36	105.41						
88H02	136.65	139.44	174.63						
88H03	205.74	208.53	243.84						
118H00	50.80	50.71	72.39	361.11	225.04	21.59	26.03	22.23	Image 5/6
118H01	101.60	104.14	123.83						
118H02	152.40	155.58	175.26						
118H03	203.20	207.26	226.70						
118H04	254.00	258.69	278.13						
163H01	142.54	106.93	126.24	605.00	315.50	537.08	537.08	–	Image 5/6
163H02	193.34	160.02	179.32						
163H03	244.14	213.11	232.41						
260H01	172.62	132.08	156.21	850.00	557.85	781.81	781.81	–	Image 5/6
260H02	237.39	196.85	220.98						
260H03	302.16	261.62	285.75						

Notes

TBM Series Frameless Motors

The TBM frameless motor is a new series of direct drive torque motors designed for applications that require high power in a small, compact form factor with minimized weight and inertia.

Typical applications include robotic joints, weapon stations, sensor gimbals, sight systems, UAV propulsion and guidance, as well as many others.

TBM(S) Product Features

- 3 frame sizes ranging from 60mm up to 129mm
- 3 stacks lengths per frame
- 2 standard winding options per frame
- Latching Hall Effects (pre-aligned / factory installed)
- Low Cogging designs
- Stainless Steel Yokes for maximum corrosion protection
- RoHS Compliant
- Banded Rotors
- Laser Marked Armatures

For non-standard requests Kollmorgen provides a variety of standard options and configurations.

If higher levels of customization are required, contact Kollmorgen to help us understand exactly what you need.

TBM(S) Specifications Overview

Specifications

Model	Diameter (mm)	Continuous Stall Torque T_c* (Nm)	Continuous Current I_c (A)	Peak Stall Torque T_p* (Nm)	Peak Current I_p (A)	Design Voltage (V DC)	Rated Speed (Umin^{-1})	Weight W_t* (kg)	Inertia* (J_m) (kg•m^2)
TBM(S)-6013-A	60,30	0,415	5,51	1,39	19	48	4000	0,221	1,41E-05
TBM(S)-6013-B	60,30	0,390	8,30	1,23	27	24	3540	0,221	1,41E-05
TBM(S)-6025-A	60,30	0,727	5,58	2,82	21	48	2630	0,398	2,52E-05
TBM(S)-6025-B	60,30	0,694	9,33	2,56	34	24	2250	0,398	2,52E-05
TBM(S)-6051-A	60,30	1,080	6,54	5,08	30	48	2065	0,571	4,75E-05
TBM(S)-6051-B	60,30	0,925	9,33	3,53	34	24	1600	0,571	4,75E-05
TBM(S)-7615-A	75,92	0,939	10,50	3,04	36	48	3930	0,435	3,04E-05
TBM(S)-7615-B	75,92	0,918	14,30	2,22	36	24	2560	0,435	3,04E-05
TBM(S)-7631-A	75,92	1,650	10,90	5,37	36	48	2300	0,738	5,64E-05
TBM(S)-7631-B	75,92	1,640	13,00	4,60	36	24	1210	0,738	5,64E-05
TBM(S)-7646-A	75,92	2,180	11,80	6,74	36	48	1850	1,079	8,19E-05
TBM(S)-7646-B	75,92	2,130	14,40	5,51	36	24	1025	1,079	8,19E-05
TBM(S)-12913-A	128,88	2,870	12,50	11,00	57	100	2490	1,320	2,71E-04
TBM(S)-12913-B	128,88	2,890	20,80	7,36	57	48	2505	1,320	2,71E-04
TBM(S)-12941-A	128,88	8,300	17,00	27,10	57	100	1520	3,170	7,21E-04
TBM(S)-12941-B	128,88	7,660	18,30	24,40	57	48	580	3,170	7,21E-04
TBM(S)-12995-A	128,88	10,400	16,30	36,20	57	100	1190	4,050	9,37E-04
TBM(S)-12995-B	128,88	9,880	18,10	31,00	57	48	625	4,050	9,37E-04

* Notes:

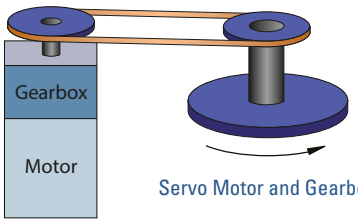
1) Continuous Stall Torque assumes ambient temperature of 25 °C

2) Inertia and weight assume max thru-bore

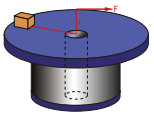
3) Some peak and continuous torques may be limited by lead wire

Direct Drive Rotary Motors

Conventional servo systems commonly have a mechanical transmission which can consist of gears, gearboxes, belts/pulleys or cams connected between the motor and the load. With Direct Drive Rotary Motors, the mechanical transmission is eliminated and the motor is coupled directly to the load.



Servo Motor and Gearbox


Direct Drive Motor

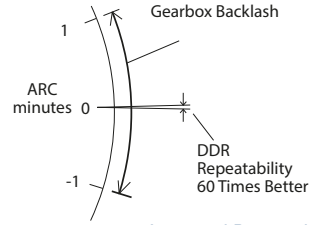
Why Use Direct Drive Rotary Motors?

Increased Accuracy and Repeatability

A "precision" planetary gearbox could have a backlash of 1 arc-minute. This can result in the load moving by 1 arc-minute with an absolutely stationary drive motor. Kollmorgen's standard direct drive rotary (DDR™) servo motors have repeatability better than 1 arc-second. Therefore, a direct drive motor can hold a position 60 times better than a conventional motor/gearbox.

The increased accuracy of direct drive rotary motors results in a higher quality product out of the machine:

- Print registration is more accurate
- Cut or feed lengths can be held more precisely
- Coordination with other machine axes is more accurate
- Indexing location is more exact
- Tuning issues due to backlash are eliminated

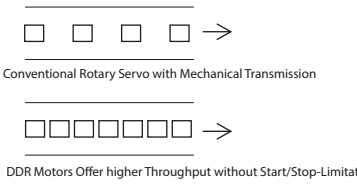


Improved Repeatability

Higher Bandwidth

Mechanical transmission components impose a limit on how fast a machine can start and stop and also extend the required settling time. These factors limit the possible throughput of a machine.

Direct drive rotary motors remove these limitations and allows for much faster start/stop cycles and also provide greatly reduced settling time. This will allow a greater throughput from the machine Users of direct drive systems have reported up to a 2X increase in throughput.



Increased Throughput

Improved Reliability and Zero Maintenance

Gears, belts, and other mechanical transmission parts break. By eliminating these parts and using DDR™ motors, the reliability of the machine is improved. Gearboxes require periodic lubrication and/or replacement in aggressive start/stop applications. Belts require periodic tightening. There are no time-wear components in a direct drive motor and consequently they require zero maintenance.

Fewer Parts

With direct drive motors, all you need is the motor and the mounting bolts. This often replaces many parts including brackets, guards, belts, pulleys, tensioners, couplings, and bolts, resulting in:

- Fewer parts on the BOM. Less parts to purchase, schedule, inventory and control, and less parts to assemble.
- Assembly time of the servo drops from several hours with the mechanical transmission to several minutes with the DDR™.
- Reduced cost. Although a direct drive motor may carry a small price-premium compared to a motor/gearbox with the same torque, consider that there is an overall cost reduction when eliminating the parts and labor of all the extra components required in a servo system with mechanical transmission.

No Inertia Matching

Servo systems with mechanical transmissions require inertia matching that limits the reflected load inertia at 5 to 10 times the motor inertia. If this limitation is not met, the system becomes difficult to control due to instability issues. Inertia matching limitations of mechanical transmission systems often force machine designers to use a larger motor than would otherwise be required just to satisfy the inertia matching requirement.

Such sizing conventions are not required with direct drive rotary motors. Since the motor is directly connected to the load, the inertia of the motor and the load become a common inertia. Therefore, no inertia matching is required when using DDR. DDR applications have run with inertia ratios greater than 11,000:1.

Reduced Audible Noise

Machines with DDR motors have audible noise levels as low as 20 dB less than the same machine with a mechanical transmission.

Which DDR™ Product is Right for Your Application?

Kollmorgen's 50 years of electromagnetic and electromechanical design experience combined with our quality and service, allowed us to refine and expand DDR™ motors into three product categories for easy installation, use, and short lead times: Frameless DDR, Housed DDR, and the Cartridge DDR. This allows you to select the right DDR solution for your application.

DDR Applications

Format	Where Used
Frameless DDR	Application where size and weight must be absolutely minimized
Housed DDR	Applications where the load rides on the motor's bearings such as indexing or rate tables
Cartridge DDR	Any application with existing bearings

Frameless DDR

Frameless motors include a rotor and stator as separate components which are integrated into, ride on the bearings of, and become a part of the driven load. Frameless motors offer the most compact and lightweight DDR solution available. The KBM™ and TBM series are Kollmorgen's latest Frameless DDR products. The KBM provides excellent torque/volume with the use of a proprietary neodymium-iron magnet rotor structure and skewed armature assembly. The KBM series is the first UL recognized parts set available on the market. This provides OEMs with the benefits of UL component ratings for easier agency approval on their machines. The TBM frameless motor is a new series of direct drive torque motors designed for applications that require high power in a small, compact form factor with minimized weight and inertia.

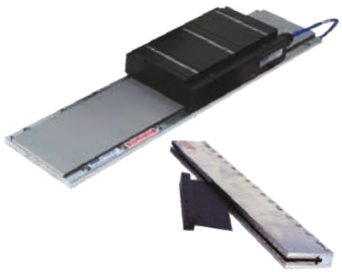
Cartridge DDR

This motor is the first in the industry to combine the space-saving and performance advantages of Frameless DDR motors with the ease of installation of a full-frame motor. Consisting of a rotor, stator, and factory-aligned high-resolution feedback device, the motor uses the machine's bearings to support the rotor. An innovative compression coupling engages the rotor to the load and the frame of the motor mounts to the machine with a bolt circle and pilot diameter just like a conventional servo motor, saving space and design time and simplifying the overall system.

Housed DDR

The Housed DDR is a housed motor assembly featuring a factory aligned high-resolution feedback device and precision bearings, allowing it to function as the core of rotary indexing and rate table applications. The system can also be used as a flexible indexer, providing programmable, rapid indexing far exceeding the throughput and accuracy of conventional mechanical or variable reluctance indexers.

Need a Solution for Linear Motion Applications?



Direct Drive Linear (DDL) Motor

Directly coupling a linear motor to the driven load offers many advantages, including eliminating all mechanical transmissions, such as ball/lead screws, rack & pinions, belts/pulleys, and eliminating gearboxes. This in turn also eliminates backlash and compliance, and other problems associated with these mechanical transmissions.

DDR Applications

Format	Where Used
Ironless (IL) Series	Applications requiring zero cogging or high acceleration of low mass loads
Ironcore (ICH) Series	Applications requiring highest thrust forces for their size
Water-cooled (IC) Series	Applications requiring the highest possible force

KCM Energy Storage Device

Sustainable drive design and protection of man and machine at failures are important design goals at Kollmorgen. The KCM energy storage modules achieve great effects with little effort: KCM-S reduces operating costs and protects the environment through the recovery of braking energy, especially in applications with many short start-stop cycles. KCM-P bridges short power failures and eliminates machine downtime and costly restarting or ensures that the machine is brought to a defined state after a power failure. Connection and commissioning are simple - simply connect to the DC-link, no adjustment is needed. Save money and enjoy protection immediately!

Benefits	Features
• Reduces operating costs	• Energy savings through intelligent energy feedback • No machine stop at short power failures
• Higher safety	• Controlled braking after power failures • Protection of man and machine through controlled standstill
• Easy commisioning	• Easy connection to the DC link with two cables • No adjustment needed, ready for use immediately • No circuit feedback • Nearly unlimited capacity thanks to expansion modules

KCM-S Dynamic Storage Device

Using Braking Energy Efficiently

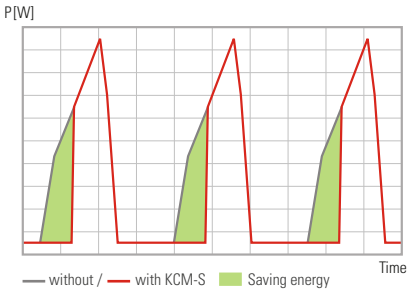
Costs are lowered and resources are spared - this isn't a contradiction. With Kollmorgen's dynamic storage module KCM-S, you use the released brake energy and save your budget and the environment. Installation is extremely simple: the KCM-S is simply connected parallel to the intermediate circuit. Ready. No need for alignment or control elements. For higher outputs, the expansion modules KCM-E are available. Your drive is always green with KCM-S.

Saving Energy with Intelligent Energy Feedback

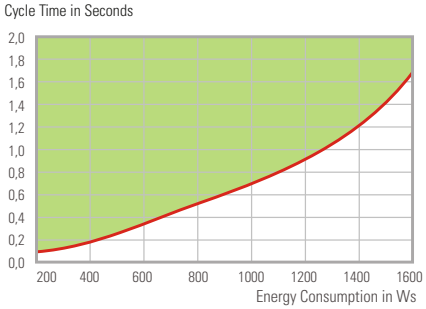
- High level of energy savings, particularly in applications with short cycle times
- Easy connection to the DC-link
- Easy commissioning - ready for use right away, no need for alignment or control elements
- Nearly unlimited power output range thanks to the expansion modules

Higher Efficiency and Lower Operational Costs

The active dynamic braking energy storage device KCM-S will only be energized and charged when the brake is applied on the drive. As there is no connection to the mains supply on the input side, circuit feedback is ruled out.
KCM-S automatically calculates the value of the use-voltage UKCM. Energy that would lead to an increase in voltage higher than this threshold value will be stored in the KCM-S buffer module. If the voltage in the intermediate circuit falls below the threshold value, the KCM-S pumps energy back which would be pulled from the network without KCM-S. At this point energy is saved. If the level of energy falls below the dynamic set charging voltage, KCM-S switches itself off and waits for the next instance of braking, when the capacitor is loaded once again. The shorter the cycle time, the more efficiently KCM-S works.



Saving Energy with KCM-S



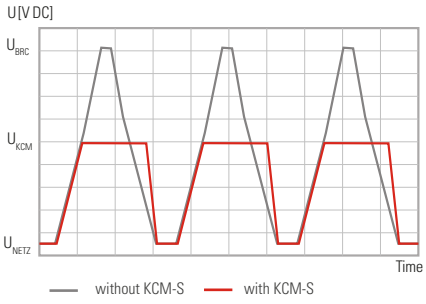
Energy Hub-/Cycle Time Diagram
at 40 °C ambient temperature

For High Energy Requirements: Expansion Modules KCM-E

The expansion module KCM-E increases the capacity by 2000 Ws or 4000 Ws in each case. Several expansion modules can easily be connected to each other via the reverse polarity protected connection cable provided.

KCM-S is simply connected to the DC-link. An internal PTC brake resistor safely absorbs energy peaks.

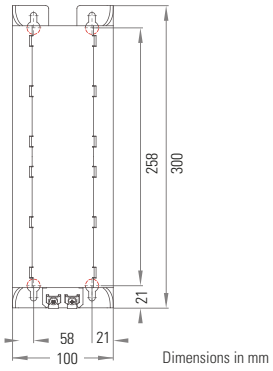
In order to increase the total capacity, the expansion modules KCM-E are simply connected in parallel. A discharge resistor is integrated.



Voltage Curve in the DC-Link

Performance Data

	KCM-S	KCM-E20	KMC-E40
Electrical storage capacity	1600 Ws	2000 Ws	4000 Ws
Continuous voltage of the DC-link circuit	max. 850 V DC		
Peak voltage of the DC-link circuit	max. 950 V DC (30 s in 6 minutes)		
Maximum output	18 kW	18 kW	18 kW
Protection type	IP20		
Dimensions H x W x D	300 x 100 x 201 (mm)		
Weight	6,9 kg	4,1 kg	6,2 kg



Dimensions in mm

KCM-P Static Energy Storage Device

The Power Insurance for Your Machine

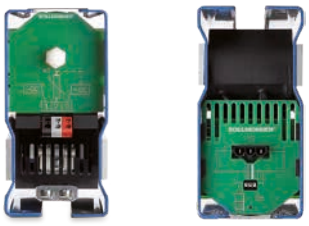
A stable power supply is the basis for the safe operation of machines, for high productivity and first-class quality. The Kollmorgen static energy storage device KCM-P bridges temporary power failures or provides the drive with energy for controlled run down in the defined operating stop. Minimal downtime and protection of the machine and the workpiece from damage: KCM-P is the back-up energy for single and multi-axis drives.

KCM-P: The static energy store reduces downtimes and increases productivity

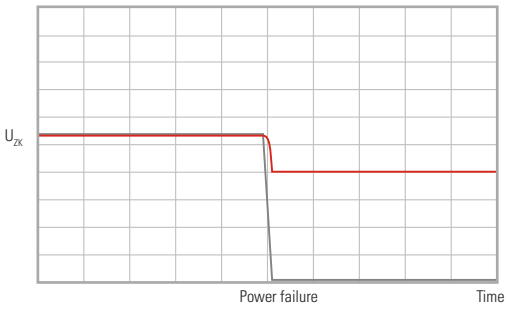
- Secures productivity through uninterrupted operation during short-term power failures
- The machine restarts quickly: KCM-P provides the drive with energy after a power failure until the machine has reached a defined state after stop.
- Easy system integration: A power failure signal is emitted on the digital interface for evaluation by the machine control
- Easy connection to the DC-link with two cables.
- Easy commissioning - ready for use right away, no need for alignment or control elements
- The smooth loading routine doesn't strain the converter and doesn't generate any circuit feedback
- Nearly unlimited power output range due to cascadable expansion modules

The Energy Reserve Ensures Safe Operation

The static energy storage device KCM-P expands the capacity of the converter in the DC-link. It holds a certain amount of energy that keeps the voltage on the DClink to an operational level for a defined amount of time during power failures.
After switching on the converter the energy store is charged in a controlled manner by a loading routine and is ready for use after around 8 seconds. The smooth loading routine does not strain the converter's charging connection and does not generate any negative circuit feedback.
During power failures, the digital interface emits a signal for evaluation and introducing more measures by the machine control.



KCM-P is simply connected in parallel to the DC-link of the converter. During power failures, a signal is emitted on the digital interface for evaluation by the machine control.



Voltage on the DC-Link During Power Failure

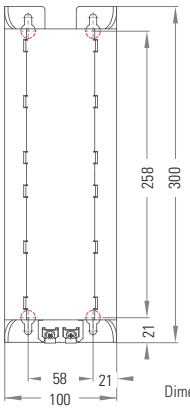
The energy reserves can increase almost unlimitedly with the expansion modules KCM-E. A discharge resistor is integrated into every module. The connection is made to connectors on the top side of the module using the cable protected against polarity reversal that is supplied.

For High Energy Requirements: Expansion Modules KCM-E

The expansion module KCM-E is connected parallel to KCM-P, and increases the capacity by 2000 Ws or 4000 Ws in each case. Several expansion modules can easily be connected to each other via the reverse polarity protected connection cable provided.

Performance Data

	KCM-P	KCM-E20	KMC-E40
Electrical storage capacity	2000 Ws	2000 Ws	4000 s
Continuous voltage of the DC-link circuit	max. 850 V DC		
Peak voltage of the DC-link circuit	max. 950 V DC (30 s in 6 minutes)		
Inception voltage from the factory	470 V DC		
Maximum output	18 kW	18 kW	18 kW
Protection type	IP20		
Dimensions H x W x D	300 x 100 x 201 (mm)		
Weight	6,9 kg	4,1 kg	6,2 kg



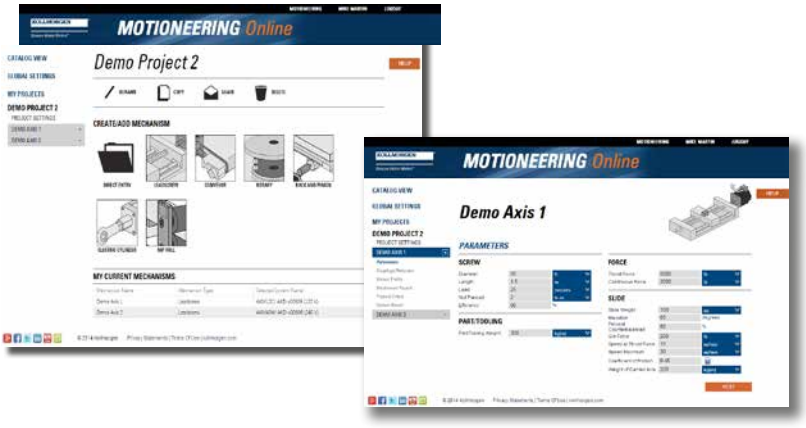
Dimensions in mm

MOTIONEERING® Online

MOTIONEERING® Online – Kollmorgen has revamped, modernized and put online one of the most respected applications sizing programs of the last 20 years. You now can access this application sizing and selection tool wherever you have access to the internet. MOTIONEERING Online is just a start of a series of releases that will empower you to optimize solutions for your toughest applications. Sizing frameless motors and drive systems has never been easier. Using a mechanism project concept for collecting and saving multiple axes of load information, MOTIONEERING® Online can automatically calculate application results and compare against a catalog of systems - recommending the most optimized set of Kollmorgen system solutions available.
Versatile units-of-measure selection options for mechanism and motion profile data-entry, with the ability to convert data into other available units, makes this a convenient international tool. A user-friendly Help file teaches program functions and algorithms used to provide results.

Mechanism Projects

- Direct drive entry, lead screw, conveyor
- Rack and pinion, nip rolls
- Direct Drive Rotary
- Electric Cylinder
- Direct data entry



Solution Set Search Screen

- Color-coded indication of system's ability to meet application requirements
- Review system components specifications
- Save, print, or create a pdf application report
- Evaluate system performance curve with application points

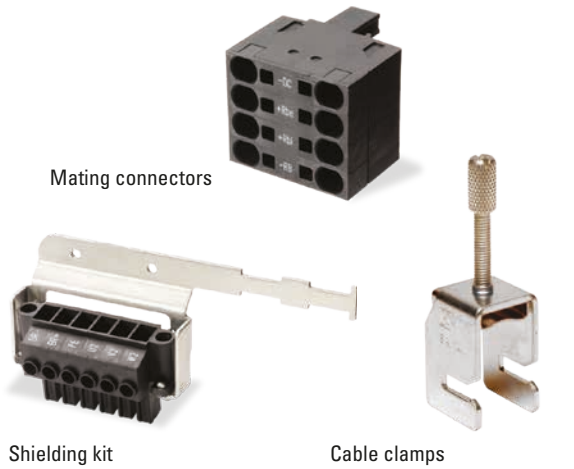
MOTIONEERING® Online Features:

- Inertia Calculator - lets you build up inertia based on odd shapes by additive or subtractive methods
- Custom Motion Profile - easy to add entire segments or copy segments to repeat
- Environmental Factor - takes into account your ambient temperature
- Project by Project Units - You can tailor your units on a project by project basis, or use the global units settings

MOTIONEERING Online Supported Browsers

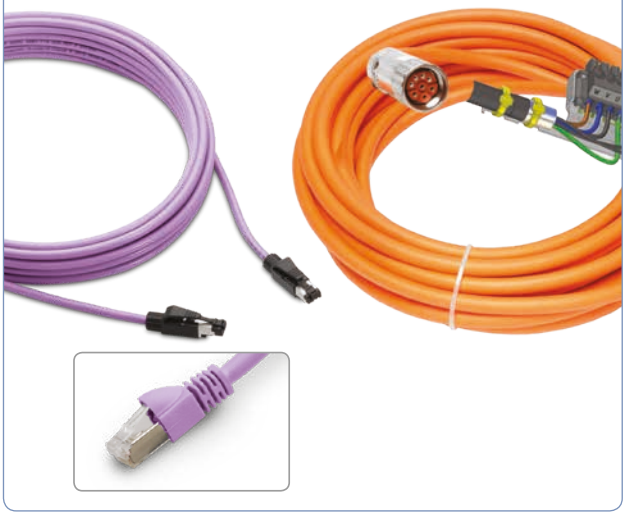
- IE, Chrome, Firefox, Safari

Accessories



Mating Connectors and Shielding Kit

Kollmorgen's servo drives are equipped with screwable mating connectors. Alternative connectors for common DC, bus, and mains ports are also available. We offer shielding kits for our flexible cables for use in environments with strong interference.

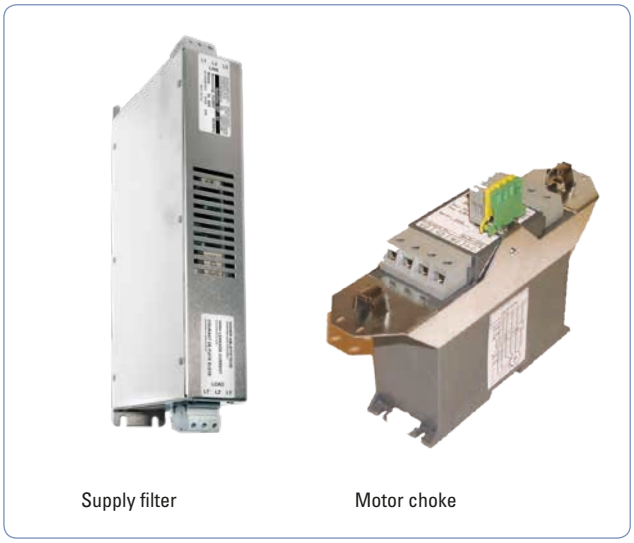


Connection Cables

Shielded PUR industrial cable with RJ45 connections for demanding industrial environments with increased requirements for EMC, durability, and service life. The motor connection and feedback cable are designed as shielded PUR industrial cables with CE and UL approval that are capable of being towed.

Braking Resistors

Braking resistors with up to 6000 Watt of power are available in numerous sizes and form factors. The impedance of the braking resistors is tailored to the Kollmorgen servo drives.



Chokes and Filters

Mains filters increase reliability and extend the service life of the machine in environments with unstable power supplies. Motor chokes reduce radiated disturbances.

You can find additional information on our accessories at www.kollmorgen.com

Model Nomenclature

AKD / AKD-N SERVO DRIVE

AKD – B 003 06 – NB AN – 0000

AKD Series

Version

B = Base drive
C = Central power supply for AKD-N (Requires CB Extention)
N = Decentralized drive (Requires DB, DF, or DS Extention)
P = Position indexer (motion tasking)
T = AKD BASIC Language Programmable drive (Requires IC or NB Extention)
M = Multi-axis Master Drive (Requires MC Extension option, and EC Connectivity option)

Current Rating

003 = 3 A
006 = 6 A
010 = 10 kW (for AKD-C, this field refers to power.)
012 = 12 A
024 = 24 A
048 = 48 A

Voltage

06 = 120 / 240 V AC 1Ø/3Ø (24 Amp Drive: 240 V AC 3Ø only)
07 = 240 / 480 V AC 3Ø (Version C: 07 = 400 / 480 V AC 3Ø - Version N: 07 = 560/680 V DC)

Extension

CB = without extention (AKD-C version only)
DB = hybrid motor cable (AKD-N version only)
DF = additional EtherCAT® port + feedback connector (AKD-N version only)
DS = local STO + feedback connector (AKD-N version only)
IC = Expanded I/O version and SD card slot (AKD-T version only)
NB = Without extensions

Connectivity*

	Drive Version Availability
AN = Analog command	B, P, T
CN = CANopen®	P
EC = EtherCAT®	C, M, N, P
EI = EtherNet/IP™	P
PN - PROFINET®	P
SQ = SynqNet®	B

*Motion Tasking is included as a free upgrade with CN, EC, EI and PN

Variants

0000 = Standard

AKD – C 010 07 – CB EC – E000

AKD Series

Version

C Central Power Supply IP20

Power Class

010 10 kW (17 kW @ 570 V DC)
020 20 kW (34 kW @ 570 V DC) (available in 2016)

Voltage Class

07 400 to 480 V AC, 3-ph

Customization

x000 Standard (x = language)

Connection Option

EC EtherCAT

Expansions

CB No expansion

AKD – N 003 07 – DB EC – E000

AKD Series

Version

N Near servo drive IP65/67

Current Class

003 3 Arms
006 6 Arms
012 12 Arms

Voltage Class

07 700 V DC

Customization

x000 Standard (x = language)

Connection Option

EC EtherCAT

Expansions

DB Hybrid motor cable
DF Feedback connector and tertiary fieldbus
DG Hybrid motor cable and tertiary fieldbus
DS Feedback connector and individual STO
DT Hybrid motor cable and individual STO

Note: Options in blue type refer to standard products.

Model Nomenclature

S700 SERVO DRIVE

S7 06 0 2 – EI F2 PM – NA

S700 Series

Rated Current

01	1.5 Aeff
03	3 Aeff
06	6 Aeff
12	12 Aeff
24	24 Aeff
48	48 Aeff
72	72 Aeff

Rated Voltage

0	**208 V to 480 V**
6	110 V to 230 V

Electrical Options

2	**Standard**
S	Expanded peak current

Expansion Cards Slot 1

NA	**No expansion card**
DN	DEVICENET
PB	PROFIBUS
SE	SERCOS 2
SN	SYNQNET
EI	I/O extension

Expansion Cards Slot 2

NA	**No expansion card**
F2	Fan control
PM	Pos I/O
PA	Pos I/O monitor

Expansion Cards Slot 3

NA	**No expansion card**
F2	Fan control
PM	Pos I/O
PA	Pos I/O monitor
S1	Safety card SIL 3
S2	Safety card SIL 2

Firmware Options

NA	**None, (EtherCat and CANopen)**

NOTES

Model Nomenclature

AKM® BRUSHLESS SERVO MOTOR

AKM® Brushless Servo Motor

AKM 6 2 P – A N C N DA 00

AKM Series

Flange Size

1	40 mm
2	58 mm
3	70 mm
4	84 mm
5	108 mm
6	138 mm
7	188 mm
8	260 mm

Rotor Length

1
2
3
4
5

Winding Type

A to Z

S	Special

Flange

A	**IEC with tolerance N**
B	NEMA
C	Alternative IEC standard
D	Other standard
G	Alternative IEC standard
H	Alternative IEC standard
R	IEC with tolerance R
M, T	Reinforced bearing AKM8
W	Flange coating for Washdown, IEC
S	Special

Version

00	**Standard motor without shaft seal**
01	With shaft seal
0W	Washdown
0F	Washdown Food
xx	Special

Feedback Device

For all options see following page

S	Special

Brake

2	24 V holding brake
N	**Without brake**
S	Special

Connections

For all options see following page

S	Special

Shaft

C	Keyway
K	Open keyway
N	**Smooth shaft**
S	Special

Feedback Unit Options

Code	Description	Type	Remarks	Lines per Revolution	Number of Revolutions	Usable with Drives
1-	Comcorder	EPC 15T	Single-turn, optical	1024	1	All
2-	Comcorder	EPC 15T	Single-turn, optical	2048	1	All
AA	BiSS B Encoder	AD34/AD58	Single-turn, optical	2048	1	All
AB	BiSS B Encoder	AD34/AD58	Multi-turn, optical	2048	4096	All
C-	SFD Smart Feedback Device	Size 10/15/21	Single-turn, inductive, 4-pole	11 Bit	1	AKD
CA	SFD3 Smart Feedback Device	Size 10/15/21	Single-turn, inductive, 2-pole	11 Bit	1	AKD, S700
DA	EnDAT 2.1 Encoder	ECN 1113/1313	Single-turn. optical	512/2048 (*1)	1	All
DB	EnDAT 2.1 Encoder	EQN 1125/1325	Multi-turn, optical	512/2048 (*1)	4096	All
LA	EnDAT 2.1 Encoder	ECI 1118/1319	Single-turn, inductive	16/32 (*2)	1	All
LB	EnDAT 2.1 Encoder	ECI 1130/1331	Multi-turn, inductive	16/32 (*2)	4096	All
MA	Drive-CliQ Enocder	ECN1324S	Safety Single-turn, optical	24 Bit	1	Siemens
MB	Drive-CliQ Encoder	EQN1336S	Safety Multi-turn, optical	24 Bit	4096	Siemens
GA	HIPERFACE Encoder	SKS36	Single-turn, optical	128	1	Sx
GB	HIPERFACE Encoder	SKM36	Multi-turn, optical	128	4096	Sx
GC	HIPERFACE Encoder	SEK34	Single-turn, capacitive	16	1	Sx
GD	HIPERFACE Encoder	SEL34	Multi-turn, capacitive	16	4096	Sx
GE	HIPERFACE DSL-Encoder	EKS36	Single-turn, optical	18 Bit	1	AKD, S700
GF	HIPERFACE DSL-Encoder	EKM36	Multi-turn, optical	18 Bit + 12 Bit	4096	AKD, S700
GJ	HIPERFACE Encoder	SKS36	Single-turn, optical	128	1	AKD
GK	HIPERFACE Encoder	SKM36	Multi-turn, optical	128	4096	AKD
GM	Safe HIPERFACE Encoder	SKS36S	Safety, wie GJ, SIL2, PL d, CAT 3	128 (*3)	1	AKD
GN	Safe HIPERFACE Encoder	SKM36S	Saftey, wie GK, SIL2, PL d, CAT 3	128 (*3)	4096	AKD
GP	HIPERFACE Encoder	SEK34	Single-turn, capacitive	16	1	AKD
GR	HIPERFACE Encoder	SEL34	Multi-turn, capacitive	16	4096	AKD
R-	Resolver	Size 10/15/21	Single-turn, inductive	2-pole	1	All

*1: x/y data for AKM2-4/AKM5-8

*2: x/y data for AKM2-3/AKM4-8

*3: Certificates for safety feedbacks: see Kollmorgen Developer Network (Approvals) or Kollmorgen website.

Model Nomenclature

AKMH BRUSHLESS SERVO MOTOR

AKMH 4 2 E – AN K N CA 1 K

AKMH Series
AKMH Hygienic Stainless Steel Washdown Motor

Motor Frame Size
2, 3, 4, 5, 6

Rotor Stack Length
1, 2, 3, 4, 5

Winding Type
A, B, C, D, etc.
S = Special

Mount
A = Flange mounting IEC
B, E = Flange mounting NEMA
C = Face mounting IEC
D = Face mounting NEMA
L = NEMA 56 face mount

Shaft
C = Closed keyway
K = Open keyway
N = Smooth shaft

Mount-Shaft Availability

Base Model	Mount-Shaft									
	AC	AN	BK	BN	CC	CN	DK	DN	EK	EN	LK
AKMH2x	•	•		•	•	•		•			
AKMH3x	•	•		•	•						
AKMH4x	•	•	•	•	•	•	•	•	•	•	•
AKMH5x	•	•	•	•	•	•	•	•	•	•	
AKMH6x	•	•			•	•	•	•	•	•	

Note: LK mount requires 2 weeks additional lead time for the first product order.
Note: Ex mounts are only available if Rx feedback devices are selected.

Cable Connection
B = Cable with IP67 Speedtec connector
G = Cable with IP67 Speedtec connector in silicone tube
K = Pre-assembled cable for connection to AKD
L = Dual-cable version with open cable ends
M = Dual-cable version with open cable ends in silicone tube
R = Dual cable with IP67 non-stainless steel, non-hygienic, vented connector with air pressure compensation
T = Pre-assembled cable in silicone tube for connection to AKD
V = Cable with IP69 Speedtec connector
W = Cable with IP69 Speedtec connector in silicone tube

Seal
K = IP69K shaft seal

Cable Length
1 to F (1 to 15 meters)

Brake❶
2 = 24 V DC holding brake
N = No brake
S = Special

Feedback Device❶❷
C- = SFD2
CA = Smart Feedback Device (SFD3)
DA = EnDAT 2.1 single-turn, optical
DB = EnDAT 2.1 multi-turn, optical
GA = Hiperface SKS36 single-turn
GB = Hiperface SKM36 multi-turn
GE = Hiperface DSL encoder single-turn
GF = Hiperface DSL encoder multi-turn
RA = Single-turn absolute HIPERFACE SRS50-S21 encoder
RB = Multi-turn absolute HIPERFACE SRM-S21 encoder)
RC = single-turn absolute HIPERFACE SRS50-K21 encoder
RD = multi-turn absolute HIPERFACE SRM50-K21 encoder
LA = EnDAT 2.1 single-turn, inductive
LB = EnDAT 2.1 multi-turn, inductive
R = Resolver
2- = Comcoder 2048 incr./rev

Feedback and Connection Availability

Feedback Device	Cable Connection								
	K	T	B	G	V	W	L	M	R
C-, CA	•	•	•	•	•	•			
GE, GF	•	•	•	•	•	•			
2-, R-			•	•	•	•	•	•	
DA, DB			•	•	•	•	•	•	
GA, GB			•	•	•	•	•	•	
LA, LB			•	•	•	•	•	•	
RA, RB							•		•
RC, RD							•		•

❶ C- feedback is not available with brake.
❷ Rx feedback device options are mapped for connection to third-party servo drives

+ ERD 25 BNM05 SM150 LMI - 0

ERD Series

Motor/Actuator Combination and Actuator Size

15	AKMH2 with ERD15
20	AKMH3 with ERD20
25	AKMH4 with ERD25
30	AKMH5 with ERD30

Ball Nut Lead

BNM05	5 mm
BNM10	10 mm

Version

0	Foot Mount FM2
1	Front flange mount FFG
2	Trunnion mount TRR
3	Rear clevis mountPCD
S	Special

Actuator Type

LMI	Motor in-line
RP1	Motor reverse (transmission ratio 1:1)

Feed

SM150	150 mm (configurable in 10 mm steps from 150 mm to 600 mm)

Model Nomenclature

CARTRIDGE DDR MOTOR

C 09 1 A - 1 1 - 1 1 0 5 S - xxx

Product Family
- C = 230 Volt
- CH = 400/480 Volt

Frame Size Field
- 04 = 4.25" Sq. Housing
- 05 = 5.43" Sq. Housing
- 06 = 7.40" Sq. Housing
- 09 = 9.68" Sq. Housing
- 13 = 13.78" Sq. Housing

Stack Length Field
- 1 = Short Stack
- 2 = Mid Stack
- 3 = Long Stack
- 4 = Extra Long Stack
- (04 and 05 frame sizes only)

Winding Letter Field
- A = Standard Winding
- B = High-Speed Winding (C04x, C05x, C06x, C13x)
- C = Standard Winding (C052, C062, C063, C092, C093, C13x)
- D = High-Speed Winding (C052 only)

Mounting Option Field
- 1 = Std. Flange Mount

Connector Option Field
- 1 = Side Connector Option (09 and 13 frame sizes only)
- 2 = Rear Connector Option (09 and 13 frame sizes only)
- 3 = 90° Rotatable Connectors (04, 05 and 06 frame sizes only)

Shaft Field
- 1 = Hollow with Compression Coupling and Key (09 and 13 frame sizes only)
- 2 = Solid with Compression Coupling and Key (09 and 13 frame sizes only)
- 3 = Solid with Split Ring Coupling and no Key (04, 05, and 06 frame sizes only)

Feedback Option Field
- 1 = EnDat single turn absolute sine encoder (2048 line)
- 3 = BiSS single turn absolute since encoder (2048 line)
- 4 = BiSS multi-turn absolute since encoder (2048 line)
- 5 = EnDat Multi-turn absolute since encoder (2048 line)

Bearing Option Field
- 0 = No Bearing Design
- (Standard - Integral Shipping Clamp Provided)

Unit Seal Option Field
- 5 = Sealed
- (Shaft Option "1" - IP64 Rating when customer seals interface side)
- (Shaft Option "2" or "3" - IP65 Rating when customer seals interface side)

Agency Certification Option Field
- Blank = UL/CE Certification
- S = Non-UL

Sequential number for specials
- (Unique description within a frame size)

Model Nomenclature

HOUSED DDR MOTOR

DH 08 1 M - 1 2 - 1 3 1 0 - xxx

Direct Drive Series
- D = 115/230 VAC winding
- DH = 400/480 VAC winding

Motor Frame Size
- 06 = 6.93" O.D.
- 08 = 8.60" O.D.
- 10 = 11.19" O.D.
- 14 = 14.25" O.D.

Rotor Stack Length
- 1 = Short stack
- 2 = Mid stack
- 3 = Long stack

Winding Type
- A = Std. w/ resolver1
- M = Std. w/ sine encoder

Mounting Option
- 1 = Face mount
- 2 = Flange mount

Designated for Specials

Unit Seal
- 0 = Non-sealed unit
- 5 = IP652 - length increase
- 7 = IP672 - length increase

Bearing Option
- 1 = Single bearing design
- 2 = Dual bearing design3

Feedback Device
- 2 = Resolver ("A" Winding Type)1
- 3 = Sine Encoder ("M" Winding Type)

Shaft Option
- 1= Straight thru bore w/ face coupling

Connector Type
- 2 = Straight
- 3 = 90°, rotatable

Notes:

1. Not available on D14x & DH14x.
2. Encoder sealed motors have increased length. See outline drawing.
3. Standard on D143 & DH143 models.
4. Options shown in bold blue text are considered standard.

Model Nomenclature

KBM FRAMELESS MOTOR

KBM(S) - 25 H 01 - A XX

Product Family

KBM = Frameless motor

KBMS = Frameless motor with sensors

Motor Frame Size (Armature I.D.)

10	57
14	60
17	79
25	88
35	118
43	163
45	260

Insulation Ratings

H = High voltage insulation (>240 V AC)
S = Low voltage insulation (≤ 240 V AC)
Note: H insulation is standard option for frame sizes 10, 14, 17, 25, 35 and 45

Sequential Number for Available Modifications

Winding Options

(A, B, C, etc...)

Stack Length Specifier

00 = 0
01 = 1
02 = 2
03 = 3
04 = 4
05 = 5

KBM Frameless Motor

KBM(S) - 25 H 01 - A XX

Product Family

KBM = Frameless motor

KBMS = Frameless motor with sensors

Motor Frame Size (Armature I.D.)

10	57
14	60
17	79
25	88
35	118
43	163
45	260

Insulation Ratings

H = High voltage insulation (>240 Vac), S = Low-Voltage insulation (≤ 240 Vac)
Note: H insulation is standard option for frame sizes 10, 14, 17, 25, 35 and 45.

Sequential Number for Available Modifications

Winding Options

(A, B, C, etc...)

Stack Length Specifier

00 = 0
01 = 1
02 = 2
03 = 3
04 = 4
05 = 5

Model Nomenclature

TBM FRAMELESS MOTOR

TBM(S) - 6013 - A00

Product Family

TBM = Frameless motor

TBMS = Frameless motor with Hall sensors

Motor Frame Size (Armature Outer Diameter)

60

76

129

Stack Length Specifier

Winding Options

A, B

Sequential Number for Available Modifications

Model Nomenclature

ICH LINEAR DIRECT DRIVES

ICH 22 - 050 - A1 - TY - C1 - 0

ICH Series
Iron **C**ore **H**igh Voltage

Design Length Identifier
11, 22, 33, 44

Coil Width
030, 050, 075, 100
150, 200, 250

Winding
A1, A5

Thermal Protection
TY PTC and KTY
(Standard)

Reserved for Customizations
00, 01, 02, etc.

Cable Options

Open ends

C1	400 mm
C2	200 mm
C3	100 mm
C4	1200 mm

With connected connector

P1	400 mm
P2	200 mm
P3	100 mm
P4	1200 mm

ICH LINEAR DIRECT DRIVES - HALL SENSORS

(Order code for hall sensors when ordered seperatly)

HD - Y - Px

Hall-Option
HD = Digital

Winding Phase Connection
Y = Y (Star) Winding
D = Δ (Triangle) Winding

Cable Options
Px - Cable with Sub-D connector
P1 = 400 mm
P2 = 200 mm
P3 = 100 mm
P4 = 1200 mm

MCH MAGNETIC WAY

MCH 050 - 512 - 01

Magentic Way Type

MCH	Ironcore

Magnet Way Width

030	30 mm
050	50 mm
075	75 mm
100	100 mm
150	150 mm
200	200 mm
250	250 mm

Reserved for Customization
00, 01, 02, etc.

Magnet Assembly Way Length

064	64 mm
128	128 mm
256	256 mm
512	512 mm

NOTES

About Kollmorgen

Kollmorgen is a leading provider of drive systems and components for machine engineering. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.

For assistance with your application needs, visit www.kollmorgen.com for a global contact list.

- Application Centers
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