Kollmorgen Automation and Motion Solutions Catalog

Kollmorgen Automation Suite™

AKC™ Programmable Automation Controllers

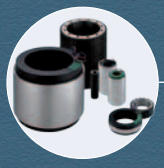
Micron™ Gearheads

AKM™ Servomotors

S700 Servo Drive

AKD™ Servo Drive

Cartridge Direct Drive Rotary™ Motors



KBM™ Frameless Direct Drive Motors

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

The ever-escalating demands of the marketplace mean increased pressure on machine designers and users at every turn. Time constraints. Demands for better performance. Having to think about the next-generation machine even before the current one is built. While expectations are enormous, budgets are not. Kollmorgen's innovative automation and motion solutions and broad range of quality products help engineers not only overcome these challenges but also build truly differentiated machines.

Because motion matters, it's our focus. Motion can distinctly differentiate a machine and deliver a marketplace advantage by improving its performance. This translates to overall increased efficiency on the factory floor. Perfectly deployed machine motion can make your customer's machine more reliable and 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, relentlessly developing products that offer precision control of speed, accuracy and position in machines that rely on complex motion.

KOLLMORGEN®

Because Motion Matters™

Removing the Barriers of Design, Sourcing, and Time
At Kollmorgen, we know that engineers can achieve a lot more when obstacles aren't in the way. So, we knock them down 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 innovative designs can take flight.

Providing Automation and 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 provides comprehensive solutions that combine programming software, engineering services, and best-in-class automation and motion components.

Global Footprint
With direct sales, engineering support, manufacturing facilities, and distributors across North America, Europe, the Middle East, and Asia, we're close to machine designers and users worldwide. Our proximity helps speed delivery and lend support where and when needed.

Financial and Operational Stability
Kollmorgen is part of Danaher Corporation, our $13B parent company. A key driver in the growth of all Danaher divisions is the Danaher Business System, which relies on the principle of "kaizen" – or continuous improvement. Cross-disciplinary teams of exceptional people use world-class tools to evaluate processes and develop plans that result in superior performance.

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Kollmorgen Automation Suite™

Kollmorgen's machine automation solution dramatically simplifies how you approach the many complex automation challenges of today's machines. We have put together an integrated system that encompasses three facets—the integrated development environment, engineering services, and our best-in-class automation and motion components—to help create a differentiated machine, get to market faster, and have the ease of collaborating with just one vendor.

Integrated Development Environment – Quickly and easily design, refine and troubleshoot all of a machine's automated solutions in this highly intuitive application featuring a single programming environment that provides great flexibility and control.

Engineering Services – A Kollmorgen representative establishes a collaborative, consultative relationship from the beginning by assessing needs and objectives. Then, an electronic sketch of a machine concept is generated using our System Designer drag-and-drop software, specifying all the necessary components including creation of a sample bill of materials. Field Engineers and Application Engineers constantly support the design and build phase as well as the factory installation phase to ensure that your needs are met from concept to production. Additional services are available that include start-up and troubleshooting assistance, development and on-site deployment and training.

Best-in-Class Automation and Motion Components – With Kollmorgen, there's security in knowing the necessary components that form the building blocks of a machine are always available. No one offers a wider range of standard, modified standard and custom products.

The Benefits of Kollmorgen Automation Suite

• Machine performance	• Up to 25% greater throughput • Up to 50% scrap reduction • Improved accuracy • Advanced motion to enable unique machine 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, motion and all hardware • Drag-and-drop motion programming • Certified components that are tested to work together • Seamless drive integration and configuration for optimal drive set-up
• A demonstrated solution	• The result of over 20 years of refining automation and motion programming and implementation • Combines the best of our experience across the multiple suppliers and platforms that form today's Kollmorgen • Kollmorgen Automation Suite has undergone over two years of field testing in customer applications

Kollmorgen Automation Suite

Kollmorgen Automation Suite is an integrated set of tools and components that help the Automation System Designer build high-performance machines.

- The customer solution is programmed using the integrated development environment. The resulting user application is deployed on the AKC™ Programmable Automation Controller (PAC). Ease-of-use features built into the product family ensure that the development process is accelerated.
- The AKC family has been created with an eye towards simplifying choices to the required level. And our extensive experience means that you receive the correct recommendations on the platform of choice.
- The AKC PAC communicates with Advanced Kollmorgen Drives™ (AKD™) and Advanced Kollmorgen Terminals (AKT™) I/O using the EtherCAT® motion bus. EtherCAT provides a real-time deterministic network for fast response and high performance.
- AKI™ Human Machine Interfaces (HMI) are connected to the AKC PAC using ModBus TCP for simple and reliable communication with quick and easy set-up.
- AKD drives can operate a wide range of Kollmorgen servomotors including the industry-leading AKM™ and unique solutions like the Cartridge Direct Drive Rotary™ motor. Micron™ TRUE Planetary™ gearheads are available to complete the system.
- All required motor/drive and network cables are available to ensure interoperability and fast time to an operating system.
- As a machine builder or an OEM, you can focus on machine performance and key customer requirements while Kollmorgen provides you with complementary intellectual value, expertise, and economies of scale with a streamlined product family.

Our certified components mean that the commissioning and start-up process is faster. Our new drive, the Advanced Kollmorgen Drive (AKD™), is integrated into the product line to deliver the next generation of servo technology. With the award-winning motor and drive component families integrated into the solution set, the customer receives significant reduction in start-up and commissioning effort due to the provided auto-recognize and auto-configure features.

Kollmorgen Automation Suite also comes with extensive engineering, support, and training services available. Our experience in creating and optimizing applications for performance means that you always create a solution that outperforms, to deliver higher productivity for your engineering teams and production machines.

Development Software with Available Integrated Human Machine Interface (HMI) Support and CAM Tools

Programmable Automation Controllers (PAC)


Integrated Touch Panel


Rack-Mount


Standard Housing


Integrated AKD Servo Amplifier

HMI, I/O, and System Cables


HMI


I/O

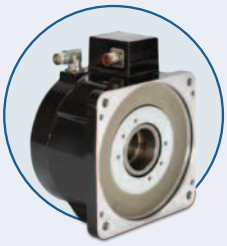

Motor and Feedback Cables


Network Cables

AKD Drives, Motors, and Gearheads


AKD™ Servo Drives


AKM Servomotors

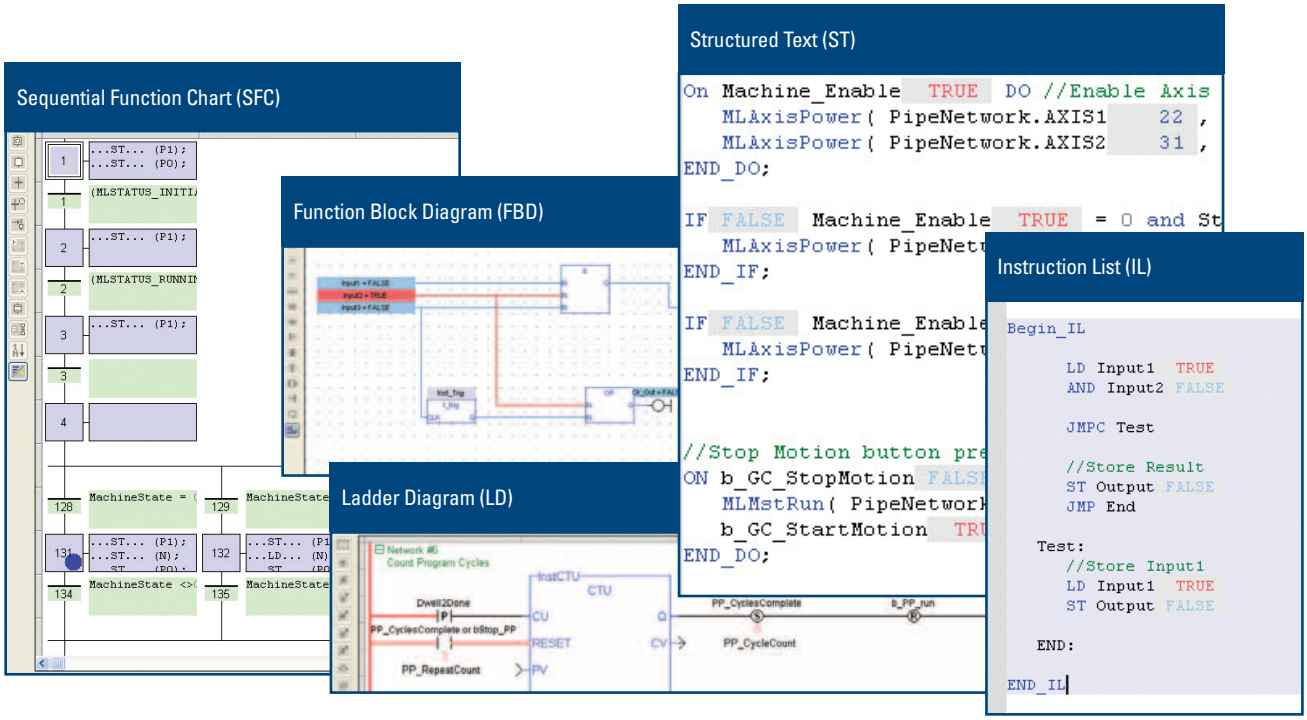

Cartridge Direct Drive Rotary Motors


Micron Gearheads

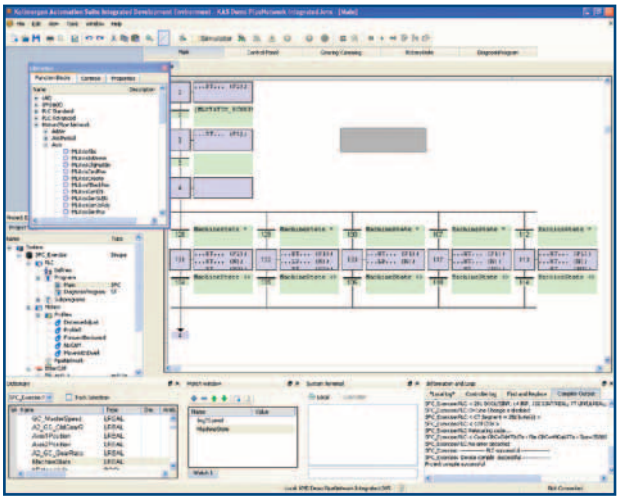
Software PLC

Easy-to-use, auto-discover, auto-recognize, auto-configure, scope, CAM, IEC 61131-3 PLC

- Kollmorgen Automation Suite offers an integrated set of tools that allow the automation systems programmer to achieve quality software results. This includes not only our motion control solution set, but also the industry standard IEC 61131-3 toolkit for PLC programming.
- The environment for developing PLC programs has been created to help the engineer realize solutions faster with recognize and configure motion control components that accelerate systems development. With auto-recognize and auto-configure features, testing efforts are also 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.
- Kollmorgen Automation Suite's integrated development environment allows the developer to create solutions without having to connect a single device by using the offline simulator. This lets you 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 when you actually connect them.
- Standard debugging features like step into, step over, etc. are available to troubleshoot programs. In addition, debugging support is available in the form of a soft oscilloscope into which several variables can be plugged in – the display can also be configured to suit the scale that the developer desires.
- Our excellent CAM editor lets you create complex cam profiles online using a "graphical" interface. It is also possible to import existing cam profile points into the CAM editor to allow you to seamlessly reuse your existing machine building experience.



All five IEC 61131-3-PLC languages are supported

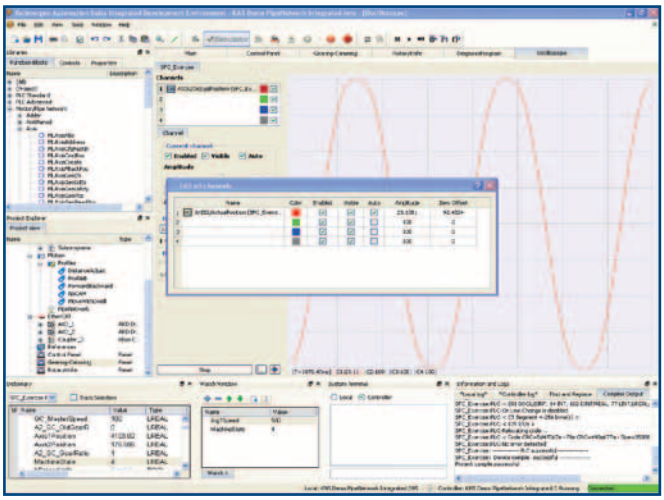


Customizable environment for docking/undocking and floating panels on the screen

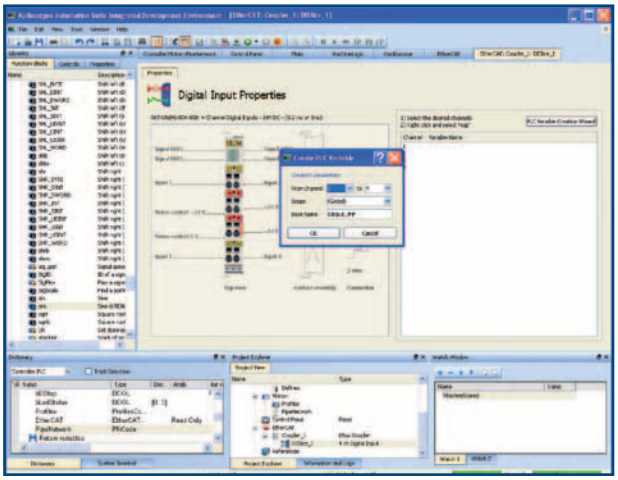
Watch window to closely monitor special variables

Filter information and log messages to focus on the essentials

Ability to customize the environment and set parameters across the environment

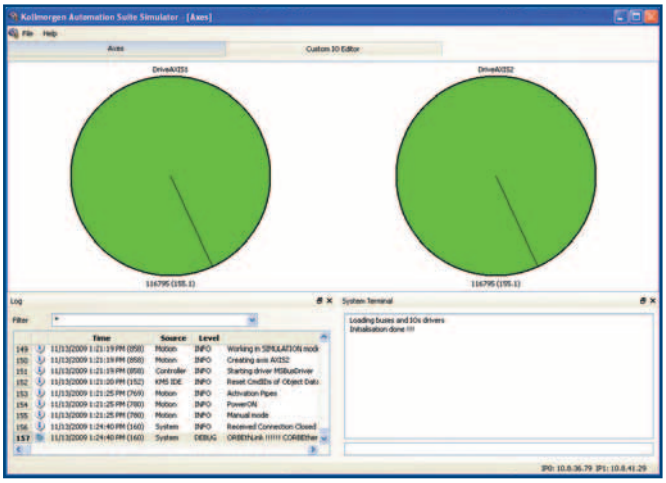


Built-in soft oscilloscope

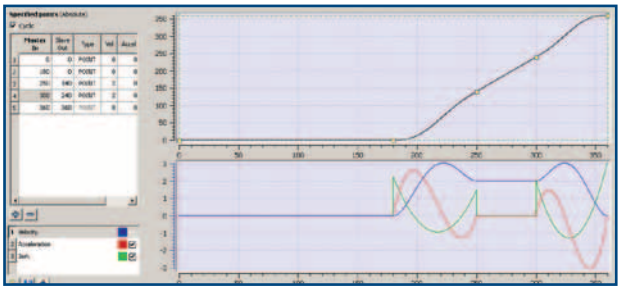


Automatic I/O variable creation with scope definitions

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



Simulator with PLC simulation and motion



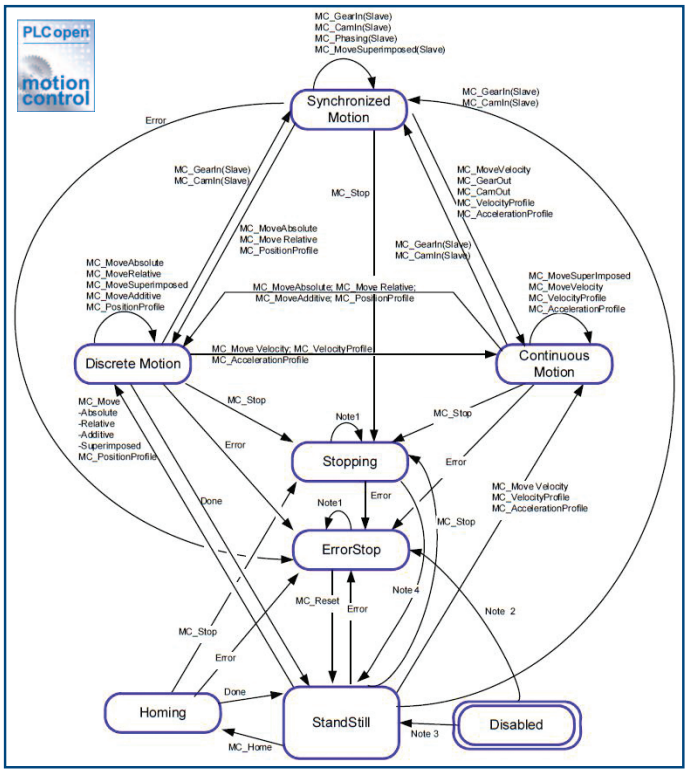
Graphical CAM environment for creating cams

Motion Programming

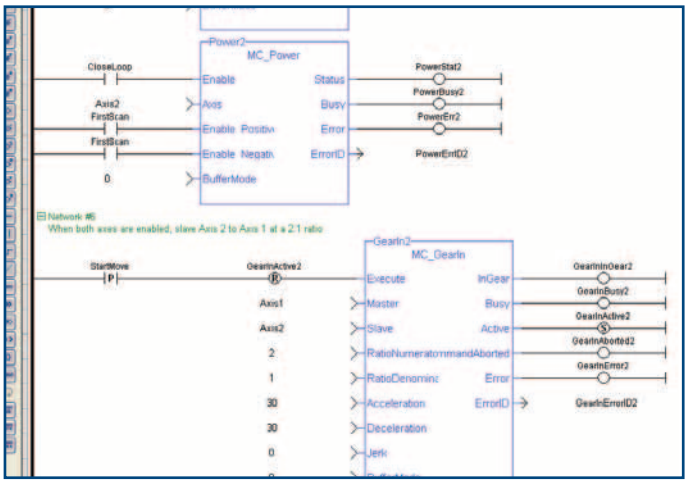
Our solution offering in motion control is backed by vast experience solving customer problems in the industry. We recognize that customers may want standard solutions for reuse of existing knowledge and resource bases or may want custom solutions that offer differentiation. To this end, we offer two motion control programming solutions.

PLCopen

With Kollmorgen Automation Suite, you can program systems using the industry standard PLCopen. It is an open standard (www.plcopen.org) with wide acceptance. Also, it is an industry standard that is vendor and product independent. PLCopen provides a framework to build industry-specific motion blocks.



PLCopen State Diagram



PLCopen example program code

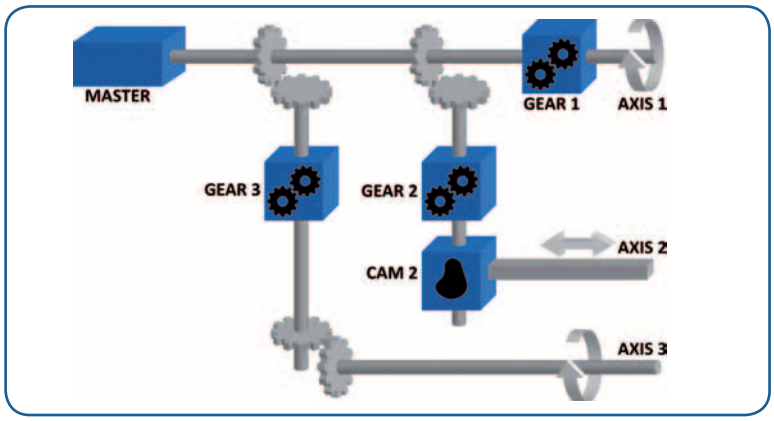
Pipe Network™

Graphical programming using the Pipe Network is a Kollmorgen innovation from many years of experience and it has been fine-tuned to deliver exceptional performance to motion-centric applications. Motion control building blocks have been converted into drag-and-drop icons that can be used to create motion control solutions. Since it is a graphical programming environment, systems are developed faster, with improved quality, increased self-documentation of system topology, and easier maintenance since a picture conveys the architecture and the relationships between the different axes of a system more effectively. Since it has been in operation for many years, the building blocks have been optimized to deliver higher performance than other solutions in the marketplace.

The solution has a demonstrated record of increased Overall Equipment Effectiveness (OEE), increased productivity, higher accuracy, and scrap reduction.

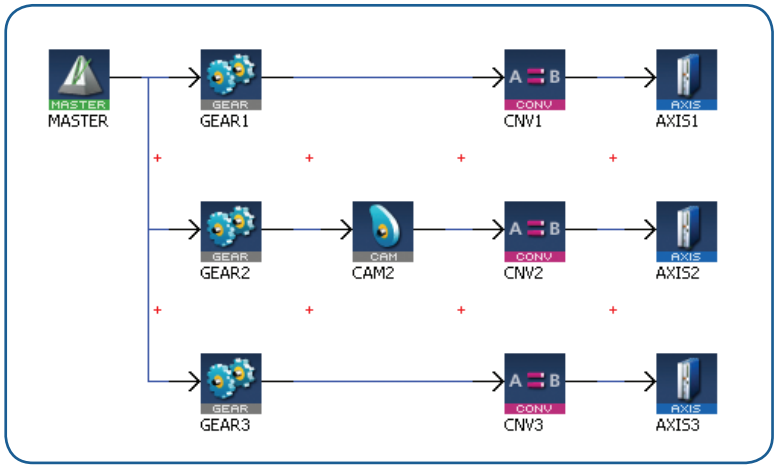
Mechanical System

- Main drive moves mechanical system
- Speeds and movements are adapted with mechanical elements, like gear boxes and cam discs



Pipe Concept

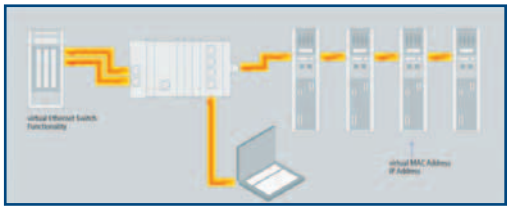
- Main drive is replaced by a virtual master
- Mechanical elements are copied by logical blocks with the same function
- One-to-one replacement of the mechanical system



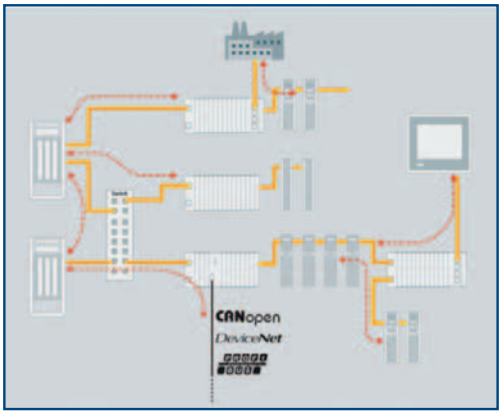
Real-time Motion Bus

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

- Real-time Ethernet-based motion bus
- Widely-accepted open standard
- Standard Ethernet cabling = lower implementation cost
- High bandwidth utilization for high performance
- Interoperability with other buses
- Wide availability of devices
- Auto-recognition of Kollmorgen Automation Suite-compatible components



Transparent for all Ethernet protocols



Versatile network architecture

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)	50µs ‹ › 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

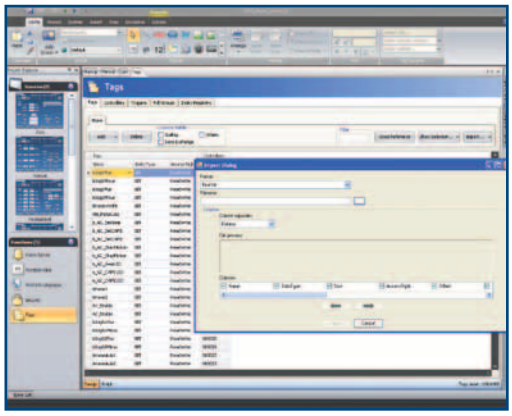
EtherCAT performance overview

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 target hardware (either a touch panel PAC or standalone HMI panel).

- Choose application variables (tags) to be used by the Kollmorgen Automation Suite Visualization Builder; a file is automatically created
- Import file (tags) into your HMI project



HMI Developer Environment

Features include

- Multi-screen navigation
- Trending
- Recipes
- Alarm management
- Internal variables
- Multiple text – change of control based on input value
- Function keys
- Security

Programmable Automation Controllers (PAC)

Advanced Kollmorgen Controllers (AKC)

AKC™ Programmable Automation Controllers are powerful and robust industrial computers with pre-installed software components designed especially for rugged use in close proximity to machinery. Available in models with integrated high-resolution touch panels, in standard (screenless box format), or rack mount (screenless) formats and with a variety of CPU and memory choices. All models are equipped with reliable compact flash drives for application and program storage. They are fully equipped and ready for operation right out of the box for faster time to market.

Integrated touch panel

- Built-in high-performance motion and PLC engine running in a real-time operating system (RTOS) for reliable performance.
- Panel PACs offer all of the power and design features of our standard PACs with the addition of your choice of a 10", 15", or 17" integrated display. Combined with Kollmorgen Visualizer RT in your choice of 250, 2000 or 4000 tag runtime licenses, the Panel PAC provides a complete integrated solution with high resolution HMI in one package.

AKC-PNC-D1 high-performance

Technical data	AKC-PNC-D1-224-150-00-000	AKC-PNC-D1-224-170-00-000
Display	15.0" TFT	17.0" TFT
Resolution	1024 × 768	1280 × 1024
Brightness	250 cd / m²	250 cd / m²
Touch screen	Resistive analog	
Weight	ca. 8.9 kg	ca. 10.8 kg
Dimensions (H×W×D)	354 × 450 × 163 mm	399 × 461 × 168 mm
Processor	Intel® Core™ 2 Duo 1.86 GHz	
RAM	2 GB	
Compact flash	4 GB	
NVRAM	128 k	
I/O standard	5x USB (1x front, 4x rear side), 1x LAN 10 / 100, 1x LAN 100 / 1000, 2x RS232, 1x DVI-I	
Free slots	2x PCI	
Power supply	24 V DC	
Cooling	Fanless	
EMC	US:FCC47 CFR PART15; Class A level, CE:EN61000-6-2; EN55022 / A (CISPR22)	
Certifications	CE, FCC, cULus	
Protection class	IP65 front (NEMA 250 Type 12 and 13)	
Altitude	Operating: 10,000 ft (3,048 m), Storage: 15,000 ft (4,622 m)	
Shock DIN EN 60068-2-27	Operating: 15 g 11 ms duration / Storage: 30 G, 11 ms duration (half-sinus)	
Vibration DIN EN 60068-2-6	Operating: 10-500 Hz: 1 G / 3 axis / Storage: 10-500 Hz: 2 G / 3 axis	
Temperature / Humidity	Operating: 0°C to +50° / 20 to 85% non condensing / Storage: -20°C to +60° / 5 to 95% non condensing	
MTBF	> 40,000 h (excluding the backlight tube)	
RoHS compliant	Yes	

Programmable Automation Controllers (PAC)

AKC-PNC-C1 Enhanced Performance

Technical Data	AKC-PNC-C1-224-100-00-000	AKC-PNC-C1-224-150-00-000
Display	10.0" TFT	15.0" TFT
Resolution	800 × 600	1024 × 768
Brightness	350cd / m²	250cd / m²
Touch Screen	Resistive analog	
Weight	ca. 7.9 kg	ca. 8.9 kg
Dimensions (H×W×D)	312 × 380 × 163 mm	354 × 450 × 163 mm
Processor	Celeron® 1.2 GHz	
RAM	2 GB	
Compact Flash	4 GB	
NVRAM	128 k	
I/O Standard	5x USB (1x front, 4x rear side), 1x LAN 10/100, 1x LAN 100/1000, 2x RS232, 1x DVI-I	
Free Slots	2x PCI	
Power Supply	24 V DC	
Cooling	Fanless	
EMC	US:FCC47 CFR PART15; Class A level, CE:EN61000-6-2; EN55022/A (CISPR22)	
Certifications	CE, FCC, cULus	
Protection Class	IP65 front (NEMA 250 Type 12 and 13)	
Altitude	Operating: 10000 ft (3048 m), Storage: 15000 ft (4622 m)	
Shock DIN EN 60068-2-27	Operating: 15 G, 11 ms duration / Storage: 30 G, 11 ms duration (half-sinus)	
Vibration DIN EN 60068-2-6	Operating: 10 ... 500 Hz: 1G / 3 axis / Storage: 10 ... 500 Hz: 2G / 3 axis	
Temperature / Humidity	Operating: 0 °C ... +50 °C / 20% ... 85% non condensing / Storage: -20 °C ... +60 °C / 5% ... 95% non condensing	
MTBF	> 40000 h (excluding the Backlight Tube)	
RoHS compliant	Yes	

Standard PAC

- Standard style PACs offer the flexibility of separating your HMI display from the controller unit. A variety of CPU choices along with substantial built-in RAM and NVRAM provide the right solution for your application.
- Our high-performance box PAC can be mated to a 19" rack mount unit to provide a rack mount PAC for those who prefer this configuration.

AKC-PLC-C1 and AKC-RMC-D2 High-Performance (no display)

Technical Data	AKC-PLC-C1-224-00N-00-000	AKC-PLC-D2-224-00N-00-000	AKC-RMC-D2-224-00N-00-000
Construction	Heavy Duty Steel		
Mounting	Wall Mount, Desktop	Wall Mount, Desktop	Rack Mount
Control Panel Switch	Power on		
CPU	Intel® Celeron® 1.2 GHz	Intel® Dual Core 2.26 GHz	Intel® Dual Core 2.26 GHz
RAM	2 GB		
NVRAM	128 k		
Compact Flash	4 GB		
I/O Standard	2x USB 2.0, 2-4x RS232, 1x LPT, 2x PS/2		
Ethernet	1x LAN 10/100, 1x LAN 10/100/1000		
Expansion Slots	2x PCI		
Power Supply	24 V DC		
Cooling	Fanless cooling		
Certifications	CE, FCC A, cULus		
Shock IEC60068-2-27	Operating:15 G, 11ms / Storage: 30 G, 11 ms duration		
Vibration IEC 60068-2-6	Operating: 10 ... 500 Hz, 1 G / 3 axis / Storage: 10 ... 500 Hz: 2 G / 3 axis		
Temperature / Humidity	Operating: 0 °C to +50 °C / 20% to 85% non condensing / Storage: -20 °C to +60 °C / 5% to 95% non condensing		
MTBF	> 40000 h		
RoHS compliant	Yes		

Human Machine Interface (HMI)

Advanced Kollmorgen Interfaces (AKI™)

Kollmorgen Automation Suite's combination of easy-to-use, high-performance HMI development software and industrial grade HMI panels gives your machine unparalleled visualization capabilities. Great-looking displays that are easy to develop and implement in a rugged and reliable touch screen package.

Integrated Ethernet connectivity and program development from within the Kollmorgen Automation Suite software environment provides seamless set-up and operation.

HMI

Typical AKI HMI Panel

Front View

Rear View

Primary Connector View

Access Panel View

AKI-CDT-MOD-04T

Hardware	
Display	TFT-LCD. 320 x 240 pixels, 64,000 colors. LED backlight lifetime at the ambient temperature of +25 ° C: >10,000 h.
Screen Size / Active display, W x H	3.5" / 70.1 x 52.6 mm
Front / Rear seal	IP 66 / IP 20
Touchscreen material	Touch screen: Polyester on glass, 1 million finger touch operations. Overlay: Autotex F157 / F207
Reverse side material	Powder-coated aluminum
Processor / RAM	312 MHz RISC CPU (Intel XScale) / 64 MB
Flash memory	32 MB with 12 MB for applications and fonts
Real-time clock	±20 ppm + error because of ambient temperature. Total maximum error: 1 min/month at 25 °C Temperature coefficient: -0.034 ±0.006 ppm/°C
Power consumption at rated voltage	Normal: 0.15 A, Maximum: 0.35 A
Fuse	Internal fuse, 2.0 AT, 5 x 20 mm
Power supply	+24 V DC (20 ... 30 V DC). 3-pin jack connection block. 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.
Operating temperature	Vertical installation: 0 °C ... +50 °C Horizontal installation: 0 °C ... +40 °C
Storage temperature	-20 °C ... +70 °C
Relative operating humidity	5% ... 85 % non-condensing
Certificates and Approvals	
CE approvals	Noise tested according to EN61000-6-3 emission and EN61000-6-2 immunity.
UL, cUL approvals (when product or packing is marked)	UL 1604 Class I, Div 2 / UL 508 / UL 50 4x indoor use only
DNV	Yes
NEMA	4x indoor use only
Germanischer Lloyd	Yes
Communication	
Serial port RS422/RS485	25-pin D-sub contact, female with standard locking screws 4-40 UNC
Serial port RS232C	9-pin D-sub contact, male with standard locking screws 4-40 UNC.
Ethernet	10/100 Mbit/s. Shielded RJ 45
USB	Host type A (USB 1.1), max. output current 500 mA
Field buses (expansion modules)	Profibus DP slave
Dimensions	
Front panel, W x H x D	155.8 x 119 x 6 mm
Cut out dimensions	139 x 105 mm
Mounting depth	57 mm (157 mm including clearance)
Weight	0.6 kg

Human Machine Interface (HMI)

AKI-CDT-MOD-06T

Hardware	
Display	TFT-LCD. 320 x 240 pixels, 64,000 colors. LED backlight lifetime at the ambient temperature of 25 °C: >20,000 h.
Screen Size / Active display, W x H	5.7" / 115.2 x 86.4 mm
Front / Rear seal	IP 66 / IP 20
Touchscreen material	Touch screen: Polyester on glass, 1 million finger touch operations. Overlay: Autotex F157/ F207
Reverse side material	Powder-coated aluminum
Processor / RAM	312 MHz RISC CPU (Intel XScale) / 64 MB
Flash memory	32 MB with 12 MB for applications and fonts
Real-time clock	±20 ppm + error because of ambient temperature. Total maximum error: 1 min/month at 25 °C Temperature coefficient: -0.034 ±0.006 ppm/°C
Power consumption at rated voltage	Normal: 0.25 A, Maximum: 0.45 A
Fuse	Internal fuse, 2.0 AT, 5 x 20 mm
Power supply	+24 V DC (20 ... 30 V DC). 3-pin jack connection block. 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.
Operating temperature	Vertical installation: 0 °C ... +50 °C Horizontal installation: 0 °C ... +40 °C
Storage temperature	-20 °C ... +70 °C
Relative operating humidity	5% - 85 % non-condensing
Certificates and Approvals	
CE approvals	Noise tested according to EN61000-6-3 emission and EN61000-6-2 immunity.
UL, cUL approvals (when product or packing is marked)	UL 1604 Class I, Div 2 / UL 508 / UL 50 4x indoor use only
DNV	Yes
NEMA	4x indoor use only
Germanischer Lloyd	Yes
Communication	
Serial port RS422/RS485	25-pin D-sub contact, female with standard locking screws 4-40 UNC.
Serial port RS232C	9-pin D-sub contact, male with standard locking screws 4-40 UNC.
Ethernet	10/100 Mbit/s. Shielded RJ 45
USB	Host type A (USB 1.1), max. output current 500 mA
Field buses (expansion modules)	Profibus DP slave
Dimensions	
Front panel, W x H x D	202 x 152 x 6 mm
Cut out dimensions	180 x 130 mm
Weight	0.9 kg

AKI-CDT-MOD-10T

Hardware	
Display	TFT-LCD. 800 x 600 pixels, 64,000 colors. CCFL backlight lifetime at the ambient temperature of 25 °C: >50,000 h.
Screen Size / Active display, W x H	10.4" / 211.2 x 158.4 mm
Front / Rear seal	IP 66 / IP 20
Touchscreen material	Touch screen: Polyester on glass, 1 million finger touch operations. Overlay: Autotex F157/ F207
Reverse side material	Powder-coated aluminum
Processor / RAM	416 MHz RISC CPU (Intel XScale) / 64 MB
Flash memory	32 MB with 12 MB for applications and fonts
Real-time clock	±20 ppm + error because of ambient temperature. Total maximum error: 1 min/month at 25 °C Temperature coefficient: -0.034 ±0.006 ppm/°C
Power consumption at rated voltage	Normal: 0.5 A, Maximum: 1.0 A
Fuse	Internal fuse, 2.0 AT, 5 x 20 mm
Power supply	+24 V DC (20 ... 30 V DC). 3-pin jack connection block. 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.
Operating temperature	Vertical installation: 0 °C ... +50 °C Horizontal installation: 0 °C ... +40 °C
Storage temperature	-20 °C ... +70 °C
Relative operating humidity	5% ... 85 % non-condensing
Certificates and Approvals	
CE approvals	Noise tested according to EN61000-6-4 emission and EN61000-6-2 immunity.
UL, cUL approvals (when product or packing is marked)	UL 1604 Class I, Div 2 / UL 508 / UL 50 4x indoor use only
DNV	Yes
NEMA	4x indoor use only
Germanischer Lloyd	Yes
Communication	
Serial port RS422/RS485	25-pin D-sub contact, female with standard locking screws 4-40 UNC.
Serial port RS232C	9-pin D-sub contact, male with standard locking screws 4-40 UNC.
Ethernet	10/100 Mbit/s. Shielded RJ 45
USB	Host type A (USB 1.1), max. output current 500 mA Device type B (USB 1.1)
Field buses (expansion modules)	Profibus DP slave
Dimensions	
Front panel, W x H x D	302 x 228 x 6 mm
Cut out dimensions	265 x 206 mm
Mounting depth	58 mm (158 mm including clearance)
Weight	2.1 kg

Human Machine Interface (HMI)

AKI-CDT-MOD-15T

Hardware	
Display	TFT-LCD. 1024 x 768 pixels, 64,000 colors. CCFL backlight lifetime at the ambient temperature of 25 °C: >35,000 h.
Screen Size / Active display, W x H	15.0" / 304.1 x 228.1 mm
Front / Rear seal	IP 66 / IP 20
Touchscreen material	Touch screen: Polyester on glass, 1 million finger touch operations. Overlay: Autotex F157/ F207.
Reverse side material	Powder-coated aluminum
Processor / RAM	416 MHz RISC CPU (Intel XScale) / 64 MB
Flash memory	32 MB with 12 MB for applications and fonts
Real-time clock	±20 ppm + error because of ambient temperature. Total maximum error: 1 min/month at 25 °C Temperature coefficient: -0.034 ±0.006 ppm/°C
Power consumption at rated voltage	Normal: 1.2 A, Maximum: 1.7 A
Fuse	Internal fuse, 3.15 AT, 5 x 20 mm
Power supply	+24 V DC (20 ... 30 V DC). 3-pin jack connection block. 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.
Operating temperature	Vertical installation: 0 °C ... +50 °C Horizontal installation: 0 °C ... +40 °C
Storage temperature	-20 °C ... +70 °C
Relative operating humidity	5 - 85 % non-condensed
Certificates and Approvals	
CE approvals	Noise tested according to EN61000-6-4 emission and EN61000-6-2 immunity.
UL, cUL approvals (when product or packing is marked)	UL 1604 Class I, Div 2 / UL 508 / UL 50 4x indoor use only
DNV	Yes
NEMA	4x indoor use only
Germanischer Lloyd	Yes
Communication	
Serial port RS422/RS485	25-pin D-sub contact, female with standard locking screws 4-40 UNC.
Serial port RS232C	9-pin D-sub contact, male with standard locking screws 4-40 UNC.
Ethernet	10/100 Mbit/s. Shielded RJ 45
USB	Host type A (USB 1.1), max. output current 500 mA Device type B (USB 1.1)
Field buses (expansion modules)	Profibus DP slave
Dimensions	
Front panel, W x H x D	398 x 304 x 6 mm
Cut out dimensions	356 x 279 mm
Mounting depth	60 mm (160 mm including clearance)
Weight	

USB-Ethernet HMI Cable

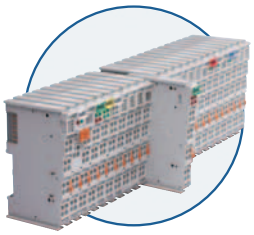
AKI-CBL-000-U09 is a USB 2.0-to-fast-Ethernet converter. It converts a standard USB host port on a PC to a standard network adapter (network card). To enable project transfer, etc. between an operator terminal with built-in Ethernet RJ45 port and a PC using the USB port connect the AKI-CBL-000-U09 adapter.

I/O Terminals

Advanced Kollmorgen Terminals (AKT)

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.

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 V DC
AKT-AN-420-000	4 Channel Analog Input Module, 0-20 mA
AKT-AN-810-000	8 Channel Analog Input Module, 0-10 V DC
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 V DC
AKT-AT-420-000	4 Channel Analog Output Module, 0-20 mA
AKT-AT-810-000	8 Channel Analog Output Module, 0-10 V DC
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, 3 ms
AKT-DNH-004-000	4 Channel Digital Input Module, 0.2 ms
AKT-DN-008-000	8 Channel Digital Input Module, 3 ms
AKT-DNH-008-000	8 Channel Digital Input Module, 0.2 ms
Available Specialty Terminal Models	
AKT-EM-000-000	End Module
AKT-IM-000-000	Isolation Module
AKT-PS-024-000	Bus Feed Terminal, 24 V DC
AKT-PSF-024-000	Bus Feed Terminal, 24 V DC, Fused



I/O

Typical Bus Coupler

EtherCAT Bus Coupler

Typical I/O Terminal

Front wiring view

Side label view

Services

Application Development, Start-up, Troubleshooting, and Training

The Kollmorgen Automation Suite portfolio offers extensive application development services and solutions development for the customer. Some of the key areas in which application engineering services are available include:

- Development and on-site deployment with IEC 61131-3, Pipe Network, PLCopen, HMI, and motion control for standard motion and complex synchronized motion across many axes
- Knowledge transfer to help you maintain systems
- Help to reduce manpower investment for the initial efforts of machine building
- Ability to help you integrate your machine to the factory floor or your data to your ERP systems

These are available to our customers to leverage our experience, when necessary, with developing solutions. Start-up and troubleshooting services are available to ensure the rapid commissioning of new systems and to resolve unexpected issues that may arise with a new or established installation.

In addition, Kollmorgen offers wide-ranging training in many areas related to motion control and automation. Training can be offered either onsite or offsite and with specialized demo kits to help the trainee see motion in action during the training program to get real-time feedback on the training material learned. The courses can be completed using a web training program online or in a classroom setting. Either way, the trainee can have access to a training kit with a Programmable Automation Controller, AKD drives, I/O, and AKM motors in a single compact unit.

Courses are available in the IEC 61131-3 languages, PLC solution architecture, HMI solution development, and motion control. Custom training courses are offered to suit the specific needs of a given organization and can be put together on request.

Advanced Systems Creation

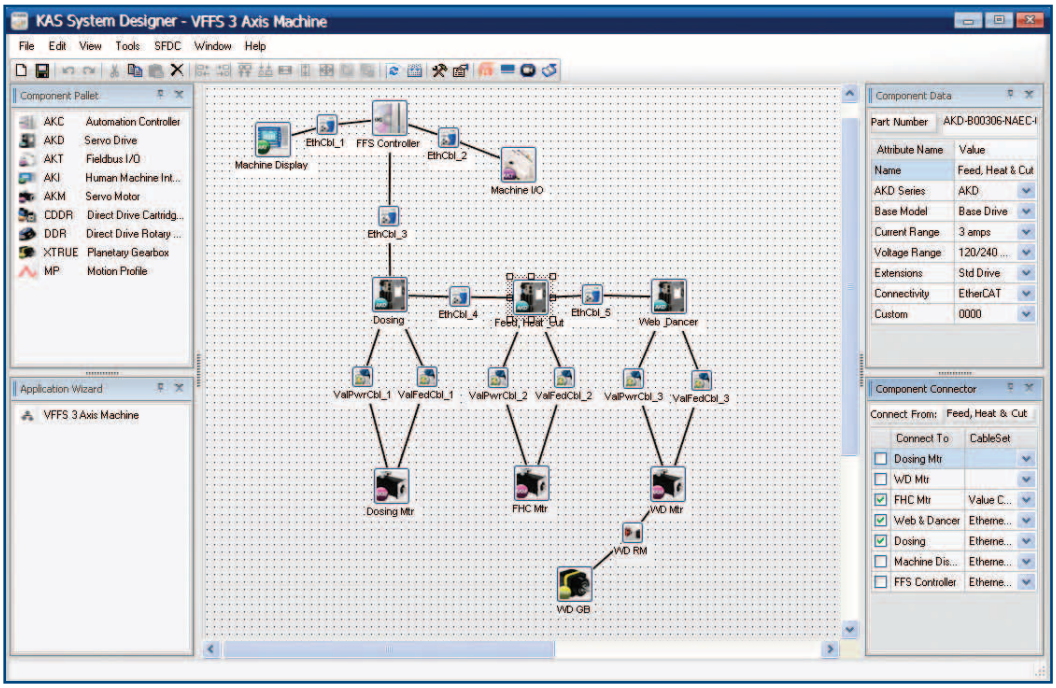
Creating Your System with our Sales Representative

Our sales representatives bring more to the process of developing your unique system solution than just years of automation and motion control experience. Our new Kollmorgen System Designer Tool lets them sit down with you and design the outline of your system on the spot.

- The System Designer Tool contains a complete portfolio of Kollmorgen Automation Suite products, from PACs to control the system right down to the cables that connect the system elements together. Because the components are pre-certified for system application your choices are always validated to create known systems where the components have been designed to work together in an optimal fashion.
- Simply diagram the system by dragging and dropping components onto an application palette. Connect these components using cables that are certified in the system. It is almost impossible to make a wrong connection.
- Once the parts and part numbers have been selected, the sales representative can generate a bill of materials for your review and even generate a standardized proposal for your system.
- The focus of work activities is not on the drawing process but capturing your requirements effectively to develop the right automation and motion control system architecture.

System Designer Tool

- Template application wizard
- All Kollmorgen Automation Suite-enabled components
- Part number selection
- System interconnections



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 overall effectiveness by 50%.

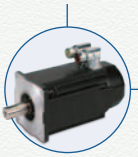
* Patents pending.

The advantages for you	Key features
• Higher machine speed/throughput	• Feedback with maximum resolution (up to 27 bit) • Torque and speed control with high bandwidth – The quickest digital torque control on the market: 0.67 µs • Multi function Bode plot simplifies the evaluation and optimization of drive and machine performance • Patented, powerful autotuning algorithms • Enhanced servo technology enables excellent machine performance • High-resolution analog input (digital --> analog)
• Less rejects, better quality	• Two powerful processors enable quick settling time
• Quicker exchange, increased availability	• "Real time" software oscilloscope with six channels for quick startup and diagnostics • Automatic completion of programmable commands saves searching for parameter names • The recording and transmission of program plots and parameter settings with a mouse click enables the immediate transfer of machine performance data • Powerful and user-friendly user interface • Robust and reliable quality
• Reduced time-to-market	• Supports a great number of single-turn and multi-turn feedback systems – Digital resolvers (SFD), EnDat2.2, EnDat2.1, BiSS, analog sin/cos encoders, incremental encoders, HIPERFACE® and resolvers • Integrated motion bus systems EtherCAT®, SynqNet®, PROFINET®, Ethernet/IP® and CANopen® • For operating rotary and linear motors • Wide range of programming options • Compatible with many front end controllers • Exceptional power density

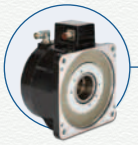
AKD Servo Drive

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.

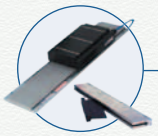
Micron™ Gearheads



AKM™ Servomotors



Cartridge Direct Drive Rotary™ Motors



Direct drive linear motors

KBM™ Frameless Direct Drive Motors

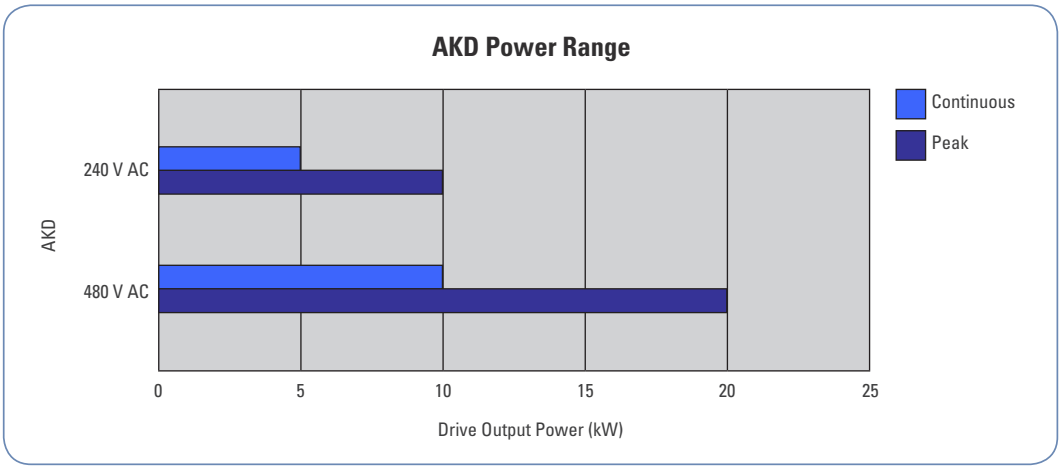
Best-in-Class Components

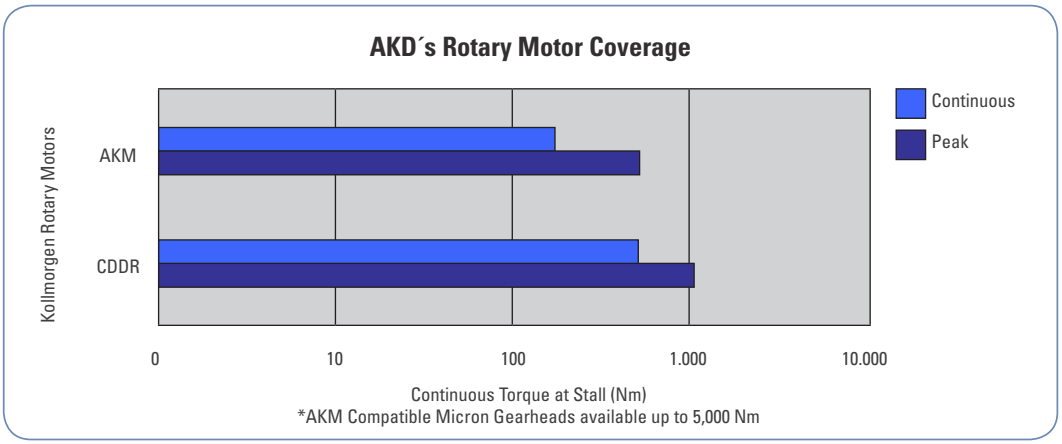
AKD works seamlessly with Kollmorgen motors – well-known for quality, reliability, and performance.

EtherCAT CANopen PROFINET SynqNet EtherNet/IP

AKD Range of Coverage

When you pair the AKD Servo Drive with any of our Kollmorgen motors, you'll achieve optimized performance. From 3 to 24 A_{rms} continuous current and 9 to 48 A_{rms} peak current, the feature-rich AKD provides a solution for nearly any application.





AKD Servo Drive

AKD 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 trouble-shooting 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.

Performance Specifications

Servo Loop	Update Rate	Bandwidth (Max)
Current Loop	1.5 MHz (0.67 µs)	5.0 kHz
Velocity Loop	16 kHz (62.5 µs)	1.6 kHz
Position Loop	4 kHz (250 µs)	0.8 kHz

Inputs/Outputs		
Digital Input Events	16 kHz (62.5 µs) Update Rate	
Encoder Output or AUX Encoder Input	2.5 MHz Maximum Frequency	
Feedback	Digital Resolver (SFD), EnDat2.2, EnDat2.1, BiSS, analog sin/cos encoder, incremental encoder, HIPERFACE®, and resolver	
Logic Supply	24 V DC	
	Base Drive	With I/O Expansion*
Digital Input (24 V DC)	8 (1 dedicated to enable)	20 (1 dedicated to enable)
Digital Output (24 V DC)	3 (1 dedicated to fault relay)	13 (1 dedicated to fault relay)
Analog Input (±10 V DC, 16-bit)	1	2
Analog Output (±10 V DC, 16-bit)	1	2
Programmable Inputs	7	19
Programmable Outputs	2	12
Sink/Source Inputs/Outputs	Yes	Yes

* AKD-T only

AKD Servo Drive

General Specifications

120 / 240 V AC 1-ph / 3-ph (85 -265 V)	Continuous Current (A_{rms})	Peak Current (A_{rms})	Drive Continuous Output Power (kW)	Internal Regen (watts)	(ohms)	Height (mm)	Width (mm)	Depth (mm)	Depth with Cable Bend Radius (mm)
AKD-■00306	3	9	1.1	–	–	168	59	153	185
AKD-■00606	6	18	2.0	–	–	168	59	153	185
AKD-■01206	12	30	4.0	100	15	196	78	187	max. 215
AKD-■02406	24	48	8.0	200	8	238	100	228	max. 265

480 V AC 3-ph (187 -528 V)	Continuous Current (A_{rms})	Peak Current (A_{rms})	Drive Continuous Output Power (kW)	Internal Regen (kW)	(ohms)	Height (mm)	Width (mm)	Depth (mm)	Depth with Cable Bend Radius (mm)
AKD-■00307	3	9	2.0	0.1	33	256	70	185	max. 225
AKD-■00607	6	18	4.0	0.1	33	256	70	185	max. 225
AKD-■01207	12	30	8.0	0.1	33	256	70	185	max. 225
AKD-■02407	24	48	16.0	0.2	23	306	105	228	max. 265

AKD Functionality

Ethernet Connectivity

- The Ethernet-based AKD range offers the user a choice of several bus systems:
- EtherCAT® (DSP402 protocol), Modbus/TCP, SynqNet®, PROFINET RT® and EtherNet/IP®
- No option cards necessary

Standard Bus System

- EtherCat®
- CANopen®

Industrial Design

- Robustly wired circuits and a compact housing for a modern, space-saving design – Increased immunity against electrical interference and minimized emission of electrical disturbances.
- Full fault protection
- UL, cUL and CE approval
- No external mains filters required for CE and UL conformance (480 V AC units)
- Simple connections through screwable plug terminals
- Common use of the DC bus possible

Safe Torque Off (STO)

(IEC 61508 SIL2 certified)

- Switches the power stage off to ensure the safety of personnel and to prevent an unwanted restart of the amplifier – Even during faults.
- Allows for the maintenance of logic functions and communication during power stage deactivation.

Internal Dynamic Brake Resistor

(all models except 120/240 V AC 3 A_{eff} and 6 A_{eff})

- Simple system components
- No costs for external brake resistors if the internal brakes suffice

Autotuning

- Optimized performance through automatic, guided or manual optimization
- Balances moment of inertia mismatches of up to 1,000:1
- Exceptional bandwidth under normal and heavy-load conditions – Irrespective of the mechanical bandwidth of the machine

Plug-and-Play Compatible with the Kollmorgen Motor

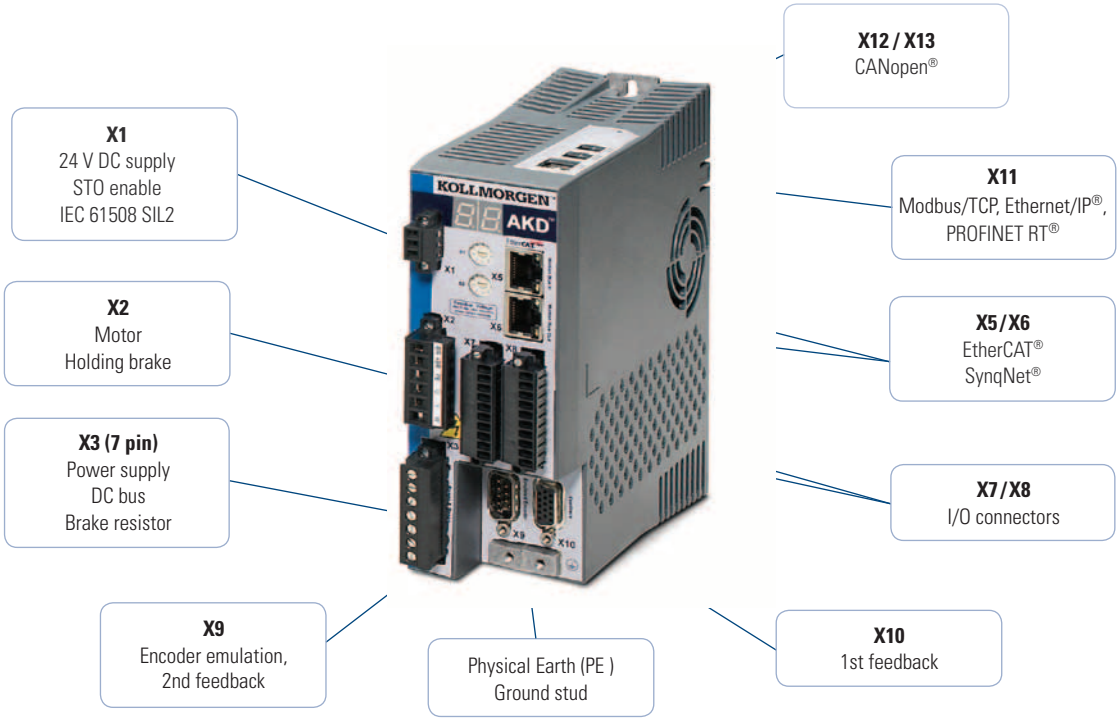
- Electronic rating plates enable the automatic loading of parameters for quick startup
- Programming of movement profiles within seconds
- Simple input of customer-specific parameters

I/O (base amplifier)

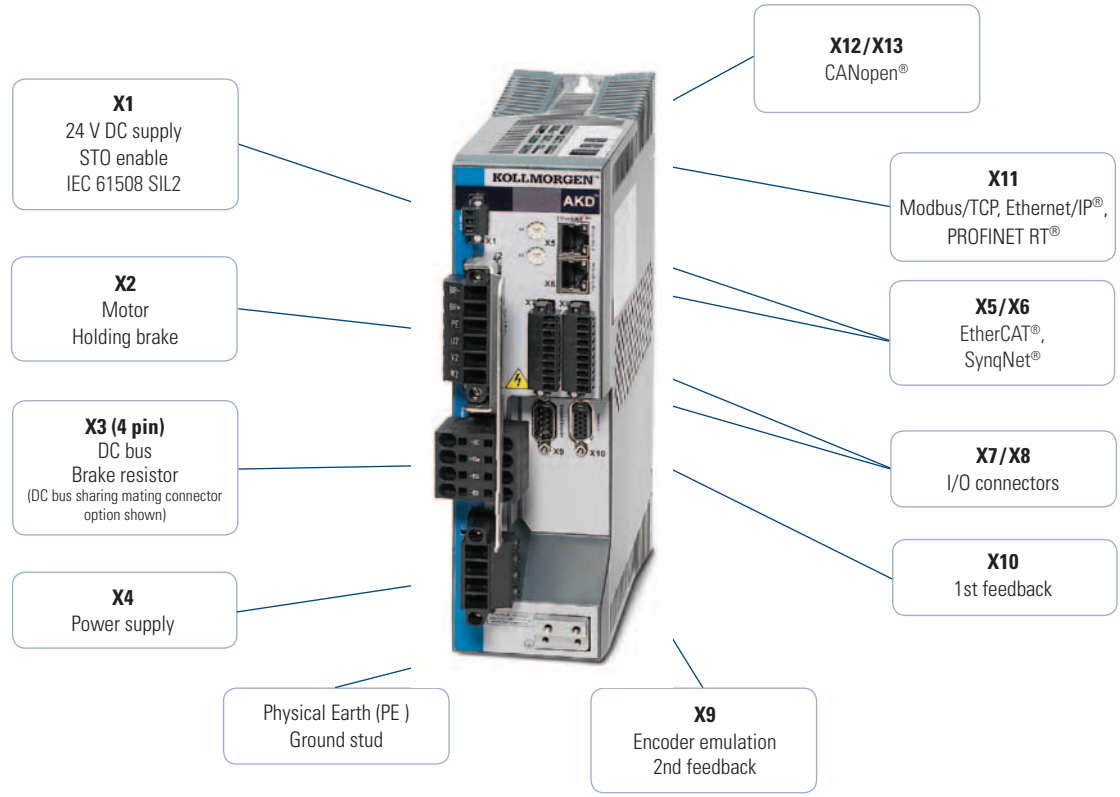
- 8 digital inputs (1 controller enable)
- 2 digital high-speed inputs (maximum time delay of 1.0 µs)
- 3 digital outputs (1 fault signal relay)
- 1 analog input – 16 bit
- 1 analog output – 16 bit

AKD Connector Layout

AKD 120/240 V AC – Connector Layout



AKD 480 V AC – Connector Layout

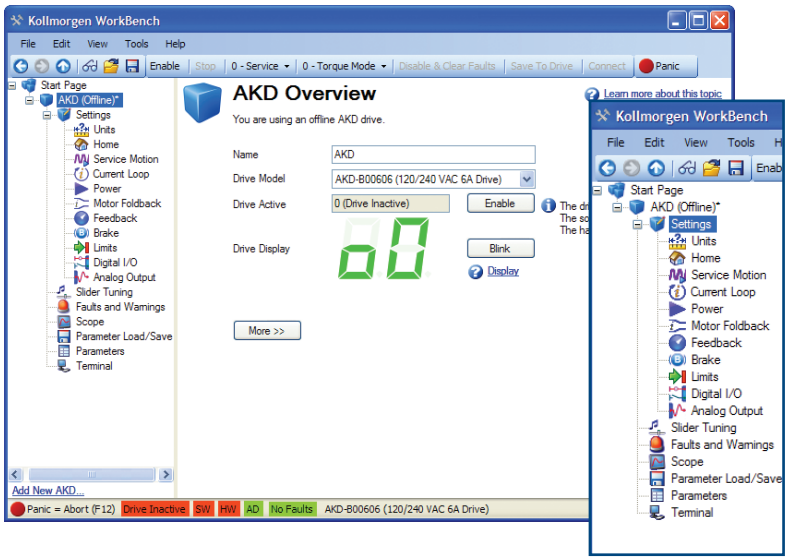


Kollmorgen WorkBench

Our simple Graphical User Interface (GUI), Kollmorgen WorkBench, is designed to expedite and streamline the user's experience with AKD. From easy application selection and reduced math, to a sleek six-channel scope; the user interface is extremely easy to use. Kollmorgen WorkBench also makes auto-tuning the AKD with Kollmorgen motors very easy.

User-Friendly Environment

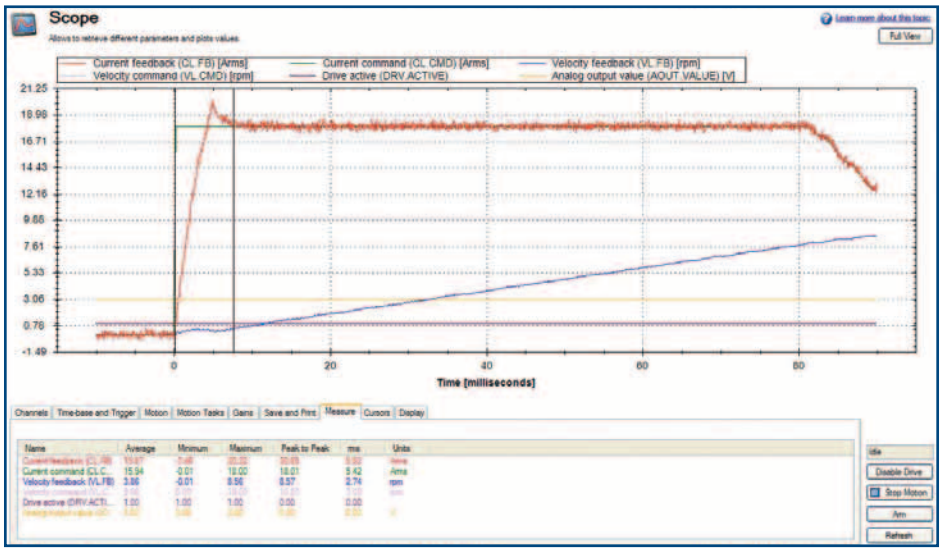
Logical flow, colorful icons and easy access simplify interactions with AKD. The folder structure allows for instant identification and easy navigation.



Six-Channel "Real-Time" Software Oscilloscope

The easy-to-use AKD interface has a 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.

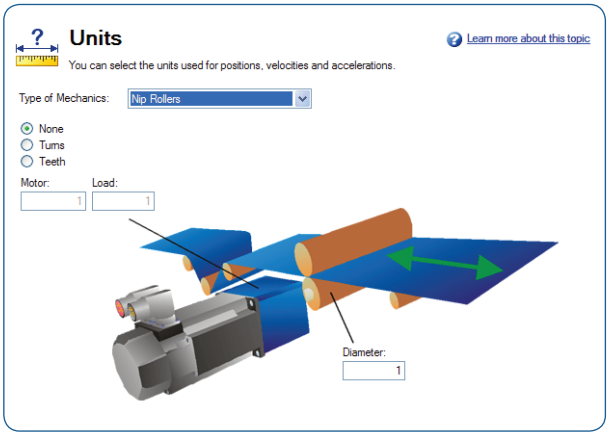
- Save as an image
- Send as an e-mail
- Print



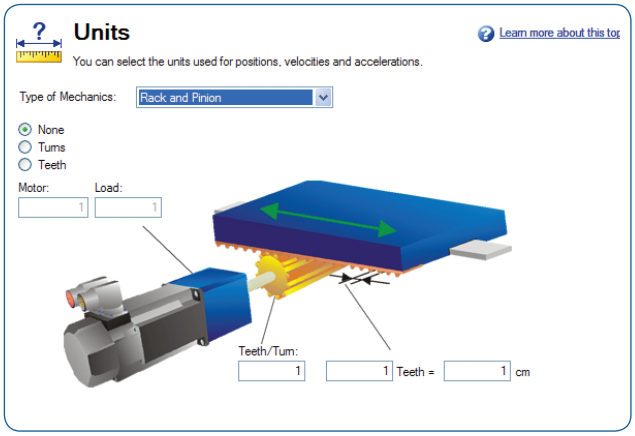
Application Selection

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

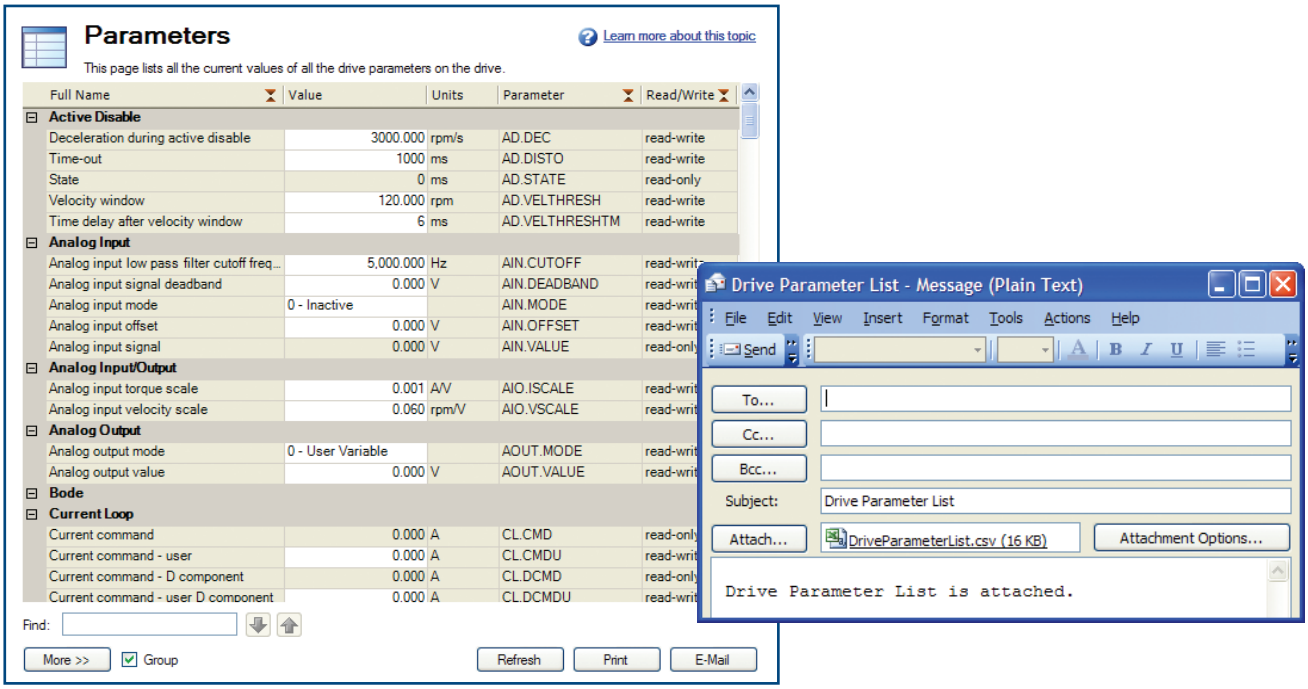


Rack and Pinion Application Selection



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.

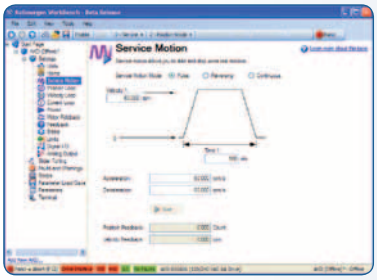


Scalable Programming

The AKD servo amplifier delivers innovative technology and performance in extremely compact sizes. The AKD is flexible enough for all areas of application. Whether it's just a single axis – such as an analog control for speed and torque – or 128 axes with a fully programmable, synchronized drive: AKD is the answer.

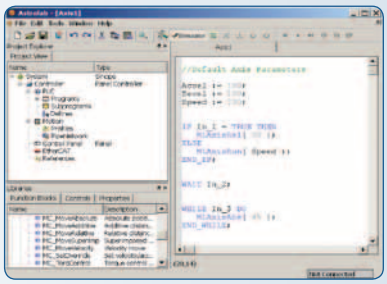
The Advantages For You

- Optimized performance
- Higher throughput and improved precision
- User-friendly graphical user interface for quicker startups and error searches
- Flexibility and scalability for every area of application



AKD with Drive Functions (AKD-P).

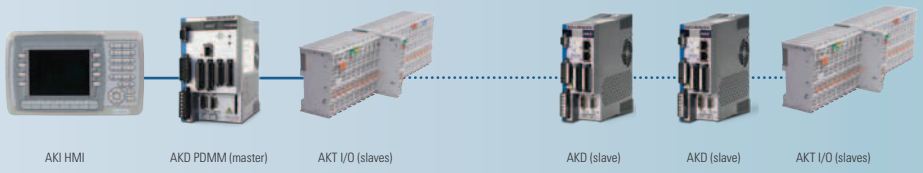
- Simple indexing using 'Point and Click'.
- Preprogrammed options.
- Guides inexperienced users through simplified steps to create indexing movements.
- 11 digital I/O and 2 analog I/O.
- 2 digital high-speed inputs.



AKD BASIC
Programmable 1.5-Axis Drive (AKD-T)

- Expansion of the basis AKD to a simplified programming language similar to Basic.
- Conditional instructions, mathematical functions, user functions and subroutines.
- Access to 11 digital I/O and 2 analog I/O, can be expanded to 31 digital I/O and 4 analog I/O.
- 2 digital high-speed inputs

KOLLMORGEN AUTOMATION SUITE FUNCTION BANDWIDTHS



AKD PDMM as an independent single-axis drive with integrated motion control and soft PLC (AKD-M).

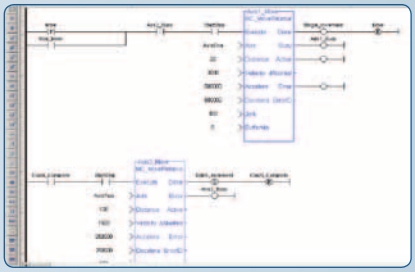
- Offers all the options of the Kollmorgen Automation Suite – A complete, scalable programming environment.
- Supports all five IEC 61131-3 languages (structured text, functional module language, ladder diagram, instruction list, sequential function chart) for the process programming (soft PLC).
- Drive programming with PLCopen or the innovative Kollmorgen Pipe Network™
- With function blocks such as "wait", the program behaves like a scanning or sequential language.
- 17 digital I/O (of which 2 are high-speed inputs) and 2 analog I/O.
- Control of the AKT™ additional I/O enables almost limitless expansion.

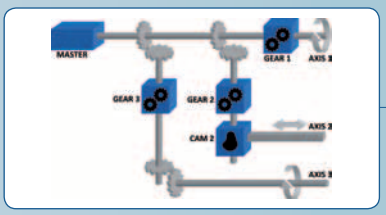
Seamless integration of additional axes enhances the AKD PDMM to become a powerful, multi-axis machine control system.

- Synchronized contour control of up to 8 axes.
- Reduced spatial requirements and simpler connection through motion and machine control in a single housing.
- Simple management of the remote I/O and the I/O of all connected drive controllers using EtherCAT.
- PLCopen for the programming of movements and Pipe Network™ – Programming of mature applications for cams and gearheads within minutes
- Each additional AKD expands the system by 11 digital I/O, 2 analog I/O and 2 digital high-speed inputs

Programmable automation control (PAC) with the Kollmorgen Automation Suite

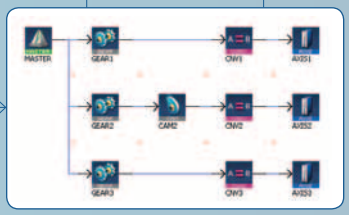
- Control of up to 128 axes with a PAC and an EtherCAT-capable AKD base.
- A full, scalable development environment for all programming tasks, from simple single-axis drives to multiple-axis PDMM systems through to 128-axis systems based on PAC.
- The programming of complex cam functions or electronic gearheads with the Pipe Network or PLCopen for general motion programming.
- 11 digital I/O, 2 digital high-speed inputs and 2 analog I/O per axis.





IEC 61131-3 with five languages for process programming (soft PLC)

Select between PLCopen and the Pipe Network from Kollmorgen for the programming of drive tasks.



The Pipe Network™ visualizes a mechanical system in the form of function blocks

ing for one axis

Programming for several axes

The AKD™ PDMM

Servo Amplifier With Integrated Motion Controller

Create more options for yourself during construction. Control eight or more axes without being dependent on a PLC or an additional motion controller. Save space in the switching cabinet and minimize wiring costs. Use a common development environment for your various applications and benefit from the compatibility and flexibility of the Kollmorgen Automation Suite. Increase machine performance and simultaneously cut costs.

We present the AKD™ PDMM (Programmable Drive Multi Master)

The AKD™ PDMM offers full PLC and motion functionality for one or more synchronized servo amplifiers using the powerful, integrated control system with the Kollmorgen Automation Suite™ automation software.

Technical data

120/240 V AC 1 and 3 phase	Continuous current (A_{rms})	Peak current (A_{rms})	H (mm)	B (mm)	T (mm)
AKD-M00306-MCEC-D000	3	9	168	89	156
AKD-M00606-MCEC-D000	6	18	168	89	156
AKD-M01206-MCEC-D000	12	30	196	107	187
240/400/480 V AC 3 phase					
AKM-M00307-MCEC-D000	3	9	256	99	185
AKM-M00607-MCEC-D000	6	18	256	99	185
AKM-M01207-MCEC-D000	12	30	256	99	185

Properties

- The Kollmorgen Automation Suite™ is a comprehensive piece of automation software which offers not only programming tools but also effective startup tools.
- Synchronization of eight or more axes without additional controls or additional motion controllers.
- Real time-capable control with EtherCAT Master integrated in an AKD servo amplifier.
- Programming interface as per IEC61131-3 with full support of the five programming languages.
- Reduced development times during drive programming with the Pipe Network™, the intuitive, graphical programming language, or alternatively with PLCopen.
- 128kB of non-volatile memory for the safe storage of important machine and process data.
- SD card plug slot for backing up and restoring application software, firmware and control parameters without a PC.
- Local digital and analog inputs and outputs: 13 digital inputs, four digital outputs, an analog input and an analog output (expandable using AKT series EtherCat bus terminals).
- Direct connection of the operating device through the integrated Kollmorgen Visualization Builder (KVB) HMI software and full support of the Kollmorgen AKI series operating devices.
- A central connection for the PLC, HMI, motion control, servo amplifier and CAM designer.
- Shorter startup times due to error detection using simulation during application development.
- Simple integration into available automation architectures with optional Ethernet/IP, ProfiNet or Modbus TCP interfaces.
- Web server integrated into the user interface, no additional software costs.

The Kollmorgen Automation Suite™

Scalable development user interface

The Kollmorgen Automation Suite™ simplifies and accelerates development using a standardized software and hardware system. This scalable automation solution offers a fully integrated development environment for every application – From a single drive to multiple drives with AKD PDMM™ or a PAC-based system with up to 128 axes.
The Kollmorgen Automation Suite is proven in achieving:

- An increase in product throughput with industry-leading drive performance by up to 25%.
- A reduction in rejects by up to 50% thanks to first-class precision; smooth restarts after a stop or fault and due to direct, highly dynamic process adjustments.
- Increased precision for improved quality, less rejects and shorter downtimes due to the quick and high-performance EtherCAT real time bus.
- More flexible, more sustainable and more innovative machines with measurably higher marketability and profitability.

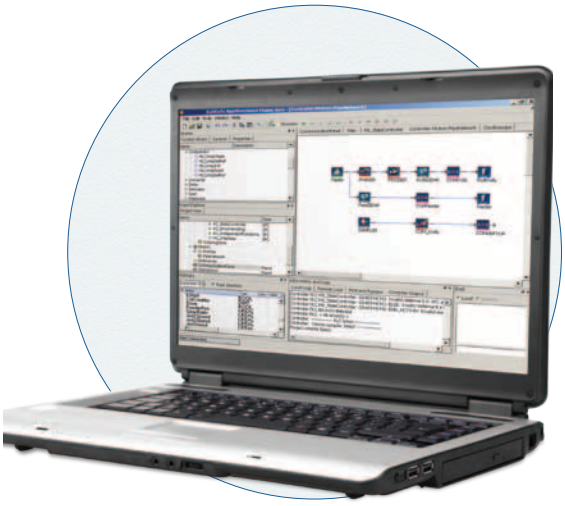
A comprehensive family of products

Kollmorgen AKD™ Servo amplifiers deliver the latest in high-performing technology and compact designs. From simple torque and acceleration applications to positioning applications, right through to fully-synchronized multi-axis movements, these servo amplifiers equipped with numerous, extensive functions offer:

- Plug&Play compatibility with our AKM servo motors
- All the advantages of the wide-ranging selection of motor platforms from Kollmorgen, such as AKM™, CDDR™ and other direct drive technologies.
- Extremely quick speed and position control loops
- Patented autotuning with frequency analysis for the perfect drive with the highest bandwidth.
- Real time data acquisition from all servo drives and many other devices.

Our best amplifier and automation solution in one package.

The programmable AKD PDMM™ combines one AKD servo axis amplifier and a master controller based on the Kollmorgen Automation Suite automation software. It supports eight or more additional AKD axes in a single, compact package providing full PLC and synchronized motion functionality.
The two-in-one servo amplifier solution offers unbeatable advantages for motion and machine control. You can rely on a single source for all drive components and a common experience on which you can depend on for building a better machine.
With the AKD PDMM, peak performance in machine development and automation is made simpler, quicker and more cost-effective than ever before.



S700 Servo Amplifiers

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 expansion cards enable numerous safety functions such as "Safe Stop", "Safe Limited Speed" and "Safe Direction" for SIL2 or SIL3 applications.

All S700 servo amplifiers use a standardized type of 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 shorter work cycles and therefore potentially considerable increases in productivity.

Specific application tasks and functions can be programmed with the integrated macro language (IEC61131). The Macrostar development tool enables the implementation of expanded processes for individual axes.

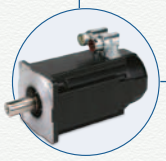
Practical functions such as autotuning, Bode plots and cogging suppression simplify optimization, both for applications with high dynamics and also those with high precision.

The advantages for you	Key features
• Higher productivity	• Very quick current, speed and position control increase machine cycle rates • SIL2 and SIL3 safety functions based on IEC 61508 increase machine availability • Many reference run methods • 200 motion tasks can be saved • Integrated macro language for high-performing drive tasks
• A design for all applications	• Multi-interface • Multi-feedback • Synchronous servo motors • Direct drives, rotary and linear drives • Asynchronous motors • HF motors • DC motors
• Smaller switchgear cabinets	• Integrated EMC filters • Mains supply integrated • Brake resistor integrated for up to 24 A of nominal current • No mains choke usually necessary
• Faster startup	• 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

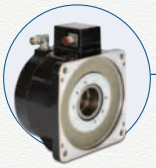
S700 Servo Drive

S700 servo drives can control rotary synchronous servomotors, induction machines, HF motors, DC motors as well as rotary and linear direct drive motors. The S700 offers a function for suppressing cogging torque 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 setup software provides comprehensive resources and methodologies.

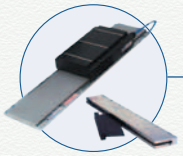
Micron™ Gearheads



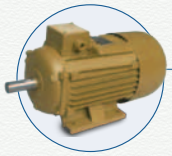
AKM™ Servomotors



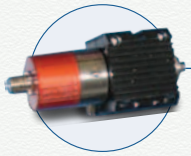
Cartridge Direct Drive Rotary™ Motors



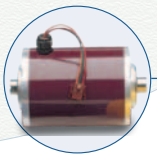
Direct Drive Linear Motors



Induction Machines*



HF Motors*



DC Motors*

*Third party motor types

Best-in-Class Components

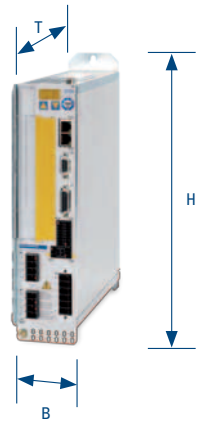
S700 works seamlessly with Kollmorgen motors – well-known for quality, reliability, and performance.

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 startup. The finely staged scaling of drive power levels allow optimum adjustment to the requirements of each individual axes of a system, resulting in outstanding overall machine performance.

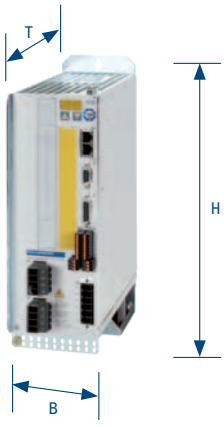
General Specifications

Rated Data	DIM	S701	S703	S706	S712	S712*	S724	S724*	S748	S772
Rated line voltage	V AC	1 x 110 V ... 230 V -10%, 3 x 208 V -10% … 3 x 480 V +10%							3 x 208 V ... 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 ... 675								
Rated output current (rms value)										
At 1 x 110 V	A_{rms}	1.5	3	6	7	7	10	10	-	-
At 3 x 110 V	A_{rms}	2.5	5	6	12	12	24	24	-	-
At 1 x 230 V	A_{rms}	1.5	3	6	8	8	11	11	-	-
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 (rms value)	A_{rms}	4.5	9	18	24	30	48	72	96	140

*Higher peak current



S701 - 712



S724

S748/772

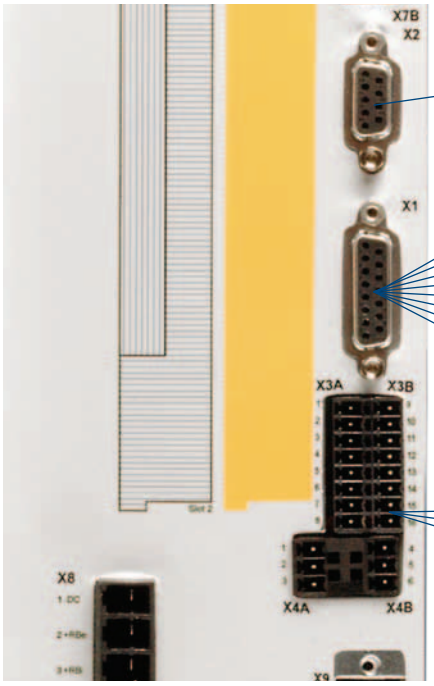
Dimensions

	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 Drive

Multi Feedback

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



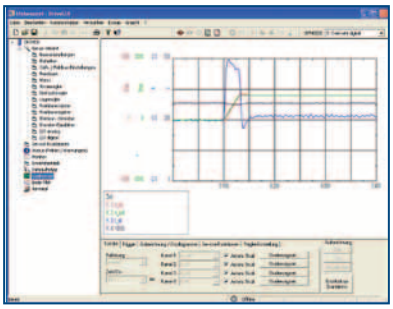
- 2 to 36-pole resolvers
- SinCos encoder with BiSS
- SinCos encoder with EnDat 2.2, EnDat 2.1
- SinCos encoder with HIPERFACE
- SinCos encoder without data track
- SinCos encoder + Hall-effect sensor
- Hall-effect sensor
- Incremental encoder (AquadB) 5 V
- Incremental encoder (AquadB) 5 V + Hall-effect sensor
- Incremental encoder (AquadB) 24 V
- Incremental encoder (AquadB) 24 V + Hall-effect sensor
- Pulse/direction 24 V

SSI absolute encoder
Pulse/direction 5 V

Drive GUI Setup Software

To facilitate initial setup of the S700, we provide graphics-based Windows® software that offers access to all S700 parameters and functions.

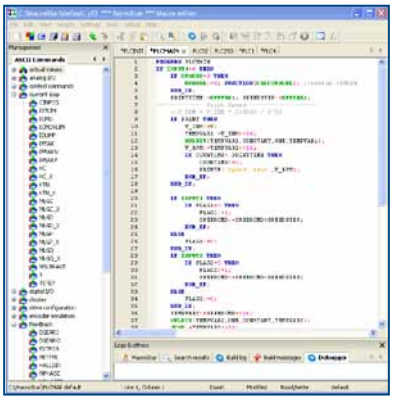
All S700 interfaces can be configured, any connected devices (e.g. motor type, feedback system, fieldbus) can be selected and the Autotuning functions can be launched. A four-channel oscilloscope and Bode Plot ensure optimum display of the auto-tuning results. Specialists are able to address all existing parameters via an integrated terminal window.



Macro Programming

The Macro Language is a firmware part of the S700 servo drives. It provides stand-alone, single-axis programmable positioning capability. Missing functions in the standard drive firmware can be programmed with IEC 61131 structured text. The MacroStar development tool assists with included variables and commands to catalog the fast programming of functions.

- 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



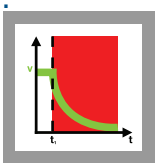
Safety Functions

Safety Expansion Card

Safe torque off (STO) up to SIL3 is integrated as standard. In order to attain maximum productivity with the amplifier, safe operator intervention must also be possible when the motor is switched on (e.g. for holding loads or decelerating machines). For this reason, the S700 is equipped with a plug slot for a safety expansion card which supports extended functions with SIL2 and SIL3.

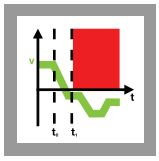
SIL2 and SIL3 safety cards offer the following functions:

:



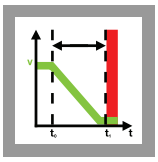
STO (Safe Torque Off)

With the STO function, the power supply in the servo amplifier is safely interrupted and the motor becomes torque-free.



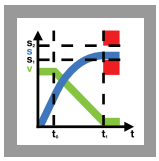
SDI (Safe Direction)

"Safe Direction" ensures that the drive only moves in a defined direction. In the event of an error, SS1 is triggered.



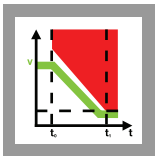
SS1 (Safe Stop 1)

With the"Safe Stop 1" (SS1) function, the drive is brought to a standstill by controlled braking and then the power supply to the motor is safely interrupted. The drive cannot generate any torque at a standstill and, therefore, no dangerous movements.



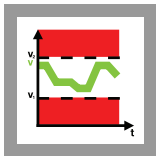
SOS (Safe Operating Stop)

The "Safe Operating Stop" function monitors the stop position reached and monitors any deviation between this position and a defined area. The control functions of the drive are fully maintained during this time. In the event of an error, SS1 is triggered.



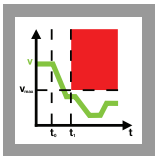
SS2 (Safe Stop 2)

For "Safe Stop 2", the drive is stopped by controlled braking and subsequently remains in controlled standstill. The control functions of the drive are maintained. Through two-channel monitoring, dangerous movements of the drive due to faults occurring are prevented.



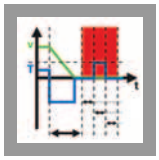
SSR (Safe Speed Range) 1

With the "Safe Speed Range" safety function, the current speed of the drive is monitored for maximum and minimum permitted limit values. In the event of an error, SS1 is triggered.



SLS (Safely Limited Speed)

The function "Safely Limited Speed" monitors the drive maintaining a defined speed limit. In the event of an error, SS1 is triggered.



SBC (Safe Brake Control)

The "Safe Brake Control" function is used for controlling the external brakes

SBT (Safe Brake Test)

The "Safe Brake test" safety function is used for testing the external mechanical brakes and the internal motor holding brake (a non standardized function).

Images: Pilz, www.pilz.com

Bus Options

Standard

CANopen EtherCAT RS232

Options / extension cards

PROFIBUS DeviceNet sercos the automation bus SynqNet

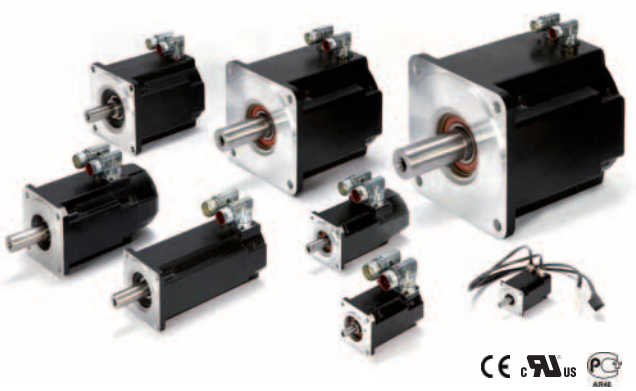
AKM Servomotor

When you need precise position control, choose from Kollmorgen's broad portfolio of AKM servomotors components. Our unparalleled product line breadth provides great flexibility for any application. Whether it's any combination of motors and drives, cables, controller, or gearheads, all components provide 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 for you	Key features
• With the same size unit, the AKM offers up to 47% 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 amplifier
• Quicker startup of all servo systems • Direct and adaptive responses to dynamic loads optimizes the performance within seconds • Precise regulation of all motor types • Compensation for stiff and compatible gearheads and clutches	• Startup of amplifiers with plug-and-play detection for AKM and Cartridge 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 homing and datum reference methods	• New, cost-efficient multi-turn feedback option
• Machine design independent of the motor size • Installation of motors in the most limited of space	• Motors with the highest power densities in the whole industry
• Over 500,000 standard motor designs available in various mounting, connection and feedback variants, as well as further options • Our flexible products deliver the perfect fitting solution for your application • Simplifies mechanical modifications and constructional adjustments or makes them totally superfluous	• AKM offers 28 housing and design length combinations and 120 different standard windings for an individual motor series
• AKM Washdown and AKM Washdown Food also offer maximum reliability and a long life span for the most demanding industrial applications	• The new IP67 option for AKM

AKM Servomotor

The AKM™ brushless servomotor stands alone in the marketplace in terms of flexibility and performance advantages. Kollmorgen's culture of continuous improvement has paid dividends again. The AKM servomotor's innovative design has been polished and optimized.
With the new AKD drive, the venerable AKM servomotor 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.



Features

- 8 frame sizes (40 to 250 mm)
- 28 frame-stack length combinations
- Multiple windings for low-voltage, 120/240/400/480 V AC operation
- Flexible flange mount and shaft options
- Industry leading low-cogging design, contributing to extreme smoothness
- Wide feedback options for high-performance and precision or rugged environment
- Unmatched customization – special windings, special shafts, and much more

The AKM1 – In spite of its compact design, one of the smallest servo motors on the market provides exceptional power density

AKD with AKM Plug-and-Play Feedback

These feedback devices include electronic motor nameplates allowing plug-and-play commissioning, eliminating the need for drive parameter set-up and servo loop tuning in most applications.

Performance Data

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	C	–	–	–
	AKM2 - AKM3	9	24	C	8	20	LB
	AKM4 - AKM8	9	24	C	4,66	20	LB
Performance Line	AKM1	7,2	9	GC	7,2	9	GD
	AKM2 - AKM4	1,0	20	DA	1,0	20	DB
	AKM5 - AKM8	0,333	20	DA	0,333	20	DB

AKM Washdown Servo Motors

New AKM synchronous servo motors suitable for food industry applications, based on AKM sizes 2 to 6. These AKM series motors are equipped with a highly effective 2-component protective coating. With their IP67 sealing design and the use of foodsafe lubricants in conformance with the FDA, these motors are especially suited for applications that are subject to strict hygiene regulations where contaminate or germ formation and corrosion are to be avoided and, which require regular machine cleaning. These features also make the AKM washdown servo motors perfectly suited to other target markets, such as the packaging industry.

Features

Performance Data

Based on AKM sizes 2 to 6 with static torques of 1 Nm to 25 Nm, supply voltages of 75 V to 480 V, different lengths and winding variants and with different feedback systems and connection technologies.

Application Criteria

Resistance to chemicals, in particular cleaning agents, with pH values of between 2 and 12 and protection against corrosion.

Housing Protective Finish

The coating material of the AKM Washdown servo motors is resistant to acids and alkalis and meets the global migration requirement of the FDA. The rounded and smooth surfaces prevent unwanted contamination traps and germ formation.

Seals and Bearings

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

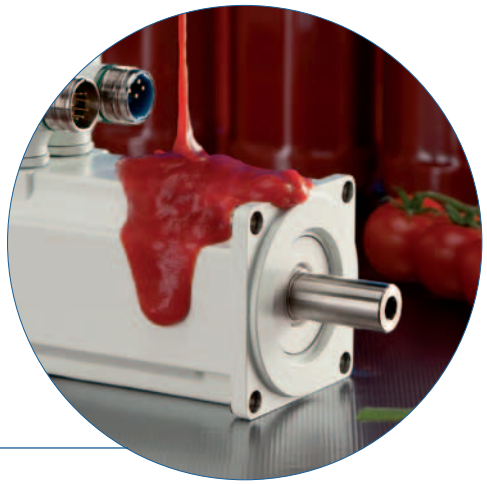
Connectors and Cables

Each in Euro size 1.0 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, FDA*, RoHS

* global migration requirement



Proven in aggressive environments: The AKM Washdown Food is resistant to most acids, alkalis and corrosive substances.

AKM Servomotor

Performance Data

AKM Motor	Frame Size NEMA/mm	Continuos Torque at stall M_0 [Nm]	Current at stall I_0 [A]	Peak Torque M_0max [Nm]	75 V DC			115 V			230 V			400 V			480 V			Inertia [kg·cm²]	Weight [kg]
					Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]		
11B	17/40	0.18	1.16	0.61	–	–	–	4000	0.18	0.08	8000	0.17	0.14	–	–	–	–	–	–	0.017	0.35
11C	17/40	0.18	1.45	0.61	–	–	–	6000	0.18	0.11	–	–	–	–	–	–	–	–	–	0.017	0.35
11E	17/40	0.18	2.91	0.61	6000	0.18	0.11	–	–	–	–	–	–	–	–	–	–	–	–	0.017	0.35
12C	17/40	0.31	1.51	1.08	–	–	–	4000	0.30	0.13	8000	0.28	0.23	–	–	–	–	–	–	0.031	0.49
12E	17/40	0.31	2.72	1.08	3000	0.31	0.10	8000	0.28	0.23	–	–	–	–	–	–	–	–	–	0.031	0.49
13C	17/40	0.41	1.48	1.46	–	–	–	3000	0.41	0.13	8000	0.36	0.30	–	–	–	–	–	–	0.045	0.63
13D	17/40	0.40	2.40	1.44	2000	0.40	0.08	7000	0.36	0.27	–	–	–	–	–	–	–	–	–	0.045	0.63
21C	23/60	0.48	1.58	1.47	–	–	–	2500	0.46	0.12	8000	0.39	0.32	–	–	–	–	–	–	0.11	0.82
21E	23/60	0.50	3.11	1.49	2000	0.48	0.10	7000	0.41	0.30	–	–	–	–	–	–	–	–	–	0.11	0.82
21G	23/60	0.50	4.87	1.51	4000	0.46	0.19	–	–	–	–	–	–	–	–	–	–	–	–	0.11	0.82
22C	23/60	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	23/60	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	23/60	0.88	4.82	2.79	2500	0.83	0.22	7000	0.74	0.54	–	–	–	–	–	–	–	–	–	0.16	1.10
23C	23/60	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	23/60	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	23/60	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	23/60	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	23/60	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	23/60	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	n.z./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	n.z./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	n.z./80	1.23	5.85	4.06	2000	1.20	0.25	6000	0.97	0.61	–	–	–	–	–	–	–	–	–	0.33	1.55
32C	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	34/90	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	34/90	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	34/90	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	34/90	3.35	1.40	11.3	–	–	–	–	–	–	–	–	–	1500	3.10	0.49	2000	3.02	0.63	1.5	3.39
42E	34/90	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	34/90	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	34/90	3.56	8.4	11.6	–	–	–	3000	3.03	0.95	6000	2.36	1.50	–	–	–	–	–	–	1.5	3.39
43E	34/90	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	34/90	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	34/90	4.90	9.60	16.4	–	–	–	2500	4.08	1.07	6000	2.62	1.65	–	–	–	–	–	–	2.1	4.35
44E	34/90	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	34/90	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	34/90	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	42/115	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	42/115	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	42/115	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	42/115	4.90	9.40	11.9	–	–	–	2500	4.15	1.09	5500	2.35	1.35	–	–	–	–	–	–	3.4	4.2

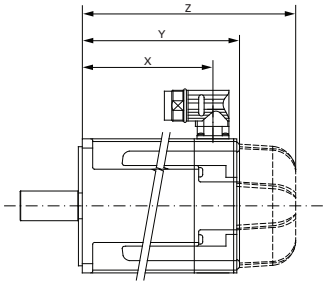
Performance Data

AKM Motor	Frame Size NEMA / mm	Continuos Torque at stall M_0 [Nm]	Current at stall I_0 [A]	Peak Torque M_{max} [Nm]	75 V DC			115 V			230 V			400 V			480 V			Inertia [kg·cm²]	Weight [kg]
					Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]	Rated Speed n_n [min-1]	Rated Torque M_n [Nm]	Rated Power P_n [kW]		
52E	42/115	8.34	2.99	21.3	–	–	–	–	–	–	–	–	–	1500	7.61	1.20	2000	7.28	1.52	6.2	5.8
52G	42/115	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	42/115	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	42/115	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	42/115	8.60	13.1	21.9	–	–	–	–	–	–	4500	5.20	2.45	–	–	–	–	–	–	6.2	5.8
53G	42/115	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	42/115	11.5	6.60	30.0	–	–	–	–	–	–	–	–	–	3000	8.63	2.77	3500	8.23	3.02	9.1	7.4
53K	42/115	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	42/115	11.4	13.4	29.7	–	–	–	–	–	–	3000	8.72	2.74	–	–	–	–	–	–	9.1	7.4
53P	42/115	11.4	19.1	29.8	–	–	–	–	–	–	5000	5.88	3.08	–	–	–	–	–	–	9.1	7.4
54G	42/115	14.3	5.00	38.0	–	–	–	–	–	–	–	–	–	1500	12.9	2.03	2000	12.3	2.57	12	9
54H	42/115	14.2	5.50	37.5	–	–	–	–	–	–	–	–	–	1500	12.6	2.38	2000	12.2	2.56	12	9
54K	42/115	14.4	9.7	38.4	–	–	–	–	–	–	1800	12.7	2.39	3500	10.0	3.68	4000	9.25	3.87	12	9
54L	42/115	14.1	12.5	37.5	–	–	–	–	–	–	2500	11.5	3.00	4500	8.13	3.83	–	–	–	12	9
54N	42/115	14.1	17.8	37.6	–	–	–	–	–	–	3500	9.85	3.61	–	–	–	–	–	–	12	9
62G	n.z./142	11.9	4.9	29.7	–	–	–	–	–	–	–	–	–	1800	10.4	1.96	2000	10.2	2.14	17	8.9
62K	n.z./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	n.z./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	n.z./142	12.3	18.8	30.3	–	–	–	–	–	–	4500	8.10	3.82	–	–	–	–	–	–	17	8.9
63G	n.z./142	16.5	4.5	42.1	–	–	–	–	–	–	–	–	–	1200	14.9	1.87	1500	14.6	2.29	24	11.1
63K	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./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	n.z./180	29.7	9.3	79.4	–	–	–	–	–	–	–	–	–	1500	25.1	3.94	1800	24.0	4.52	65	19.7
72M	n.z./180	30.0	13.0	79.8	–	–	–	–	–	–	–	–	–	2000	23.6	4.94	2500	22.1	5.79	65	19.7
72P	n.z./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	n.z./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	n.z./180	42.0	13.6	112	–	–	–	–	–	–	–	–	–	1500	33.8	5.31	1800	32.1	6.05	92	26.7
73P	n.z./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	n.z./180	41.5	24.5	111	–	–	–	–	–	–	1500	33.4	5.25	3000	25.2	7.92	3500	22	8.07	92	26.7
74L	n.z./180	53.0	12.9	143	–	–	–	–	–	–	–	–	–	1200	43.5	5.47	1400	41.5	6.08	120	33.6
74P	n.z./180	52.5	18.5	142	–	–	–	–	–	–	–	–	–	1800	39.6	7.46	2000	35.9	7.52	120	33.6
74Q	n.z./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	n.z./260	75	48	210	–	–	–	–	–	–	–	–	–	2500	47.5	12.4	3000	38.0	11.9	172	49
83T	n.z./260	130	62	456	–	–	–	–	–	–	–	–	–	2200	70.0	16.1	2500	60.0	15.7	334	73
84T	n.z./260	180	67	668	–	–	–	–	–	–	–	–	–	1800	105	19.8	2000	93.0	19.5	495	97

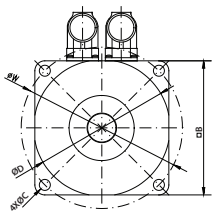
AKM Servo Motors

Model with power and signal connector

Dimensional drawing for AKM11 - AKM84



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



All measurements in mm Measure Y: Length without holding brake, Measure Z: Length with holding brake

Model	X	Resolver		Comcoder		BiSS/Endat		Hiperface		Flange	Pitch circle	Bore diameter	Centering collar
		Y	Z	Y	Z	Y	Z	Y	Z	□B	ØW	ØC	ØD
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	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	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	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	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	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	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	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	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	138	165	11	130
AKM63	155.5	178.7	225.7	178.7	225.7	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	138	165	11	130
AKM65	205.5	228.7	275.7	228.7	275.7	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	188	215	13.5	180
AKM73	198.5	226.5	268.5	226.5	268.5	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	188	215	13.5	180
AKM82	170	267 (5)	333 (5)	267 (5)	333 (5)	267 (5)	333 (5)	267 (5)	333 (5)	260	300	18.5	250
AKM83	250.5	347.5 (5)	413.5 (5)	347.5 (5)	413.5 (5)	347.5 (5)	413.5 (5)	347.5 (5)	413.5 (5)	260	300	18.5	250
AKM84	331	428 (5)	494 (5)	428 (5)	494 (5)	428 (5)	494 (5)	428 (5)	494 (5)	260	300	18.5	250

(1) ØW = 63 mm AKM2xx-Ax
ØW = 65 mm AKM2xx-Dx

(2) ØW = 75 mm AKM3xx-Ax
ØW = 85 mm AKM3xx-Cx

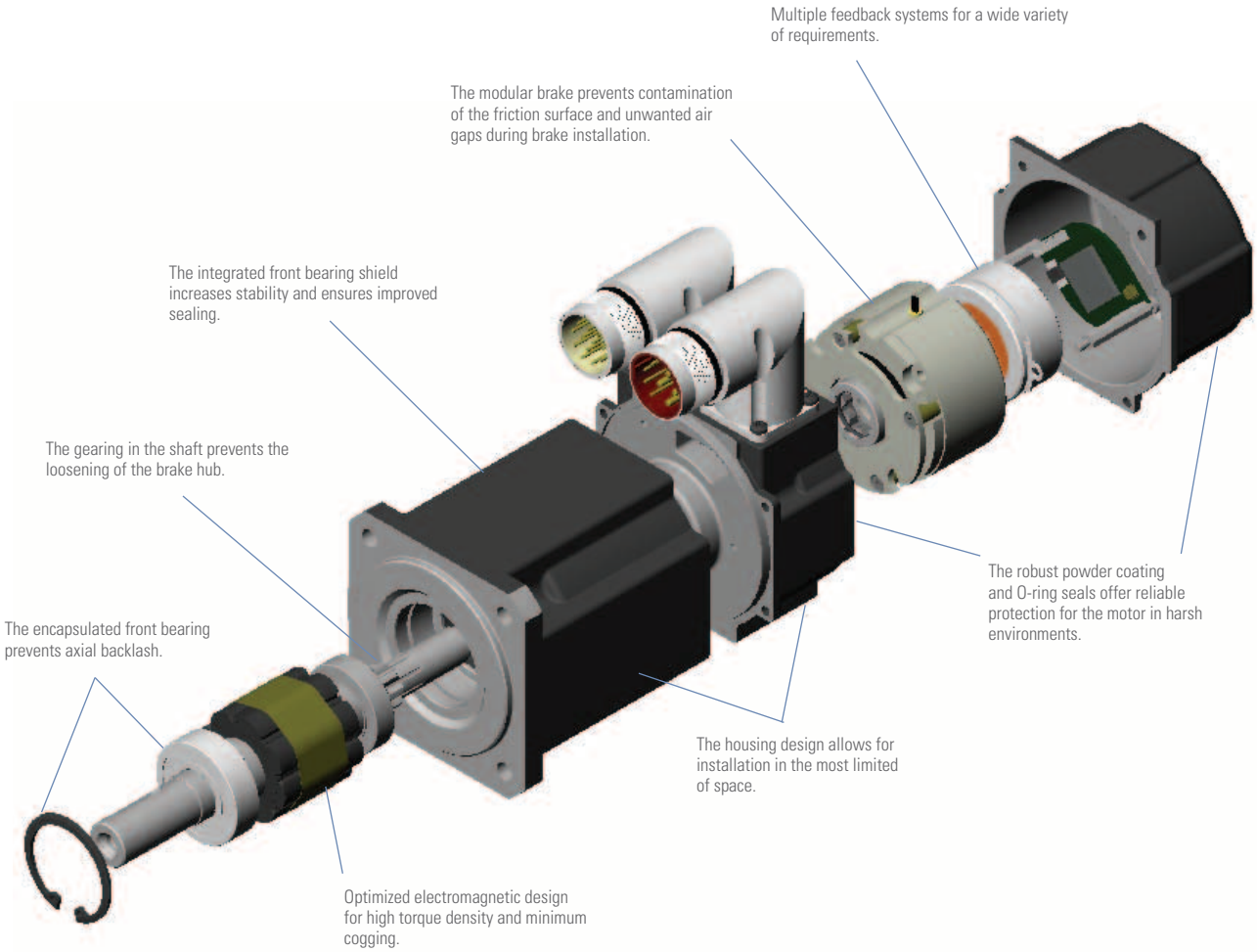
(3) ØW = 100 mm. ØV = 80 mm AKM4xx-Ax
ØW = 90 mm. ØV = 60 mm AKM4xx-Cx

(4) ØW = 130 mm ØV = 110 mm AKM5xx-Ax
ØW = 115 mm ØV = 95 mm AKM5xx-Ax

(5) No resolver

AKM Servo Motors

The constructional features of AKM in a 3D model



Direct Drive Motors

Kollmorgen offers a comprehensive selection of direct drive motors across a broad range of power and performance ratings. Available as separate rotor/stator packages or as semi-housed versions, Kollmogen Direct drives are characterized by their high precision and reliability, and above by their compact size and zero maintenance. Mechanical components for power transmission such as belts or gearheads are not necessary – you just need the motor and a few bolts for mounting.

The semi-housed Cartridge DDR (Cartridge Direct Drive Rotary) drives combine the performance advantages of rotor/stator direct drives with the simple installation and the handling advantages of conventionally housed motors. The modular design principle used for our KBM series rotor/stator direct drives, allows optimal adaptation into the application.

All Direct Drives can be combined with the AKD or AKD PDMM series servo amplifiers. With the Kollmorgen Automation Suite, an efficient development environment is available for your application programming.

Whatever drive technology you decide on, Kollmorgen offers you an appropriate solution and optimum support during the development phase.

Advantages for you:	Key features
• Superb performance data	• Maximum torque density through innovative, electromagnetic design minimizes the space requirements of the motor. • 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, constant operation in demanding applications • Insulation materials with UL approval facilitate the certification of higher-level assemblies • All materials conform to RoHS
• Configurable design reduces time-to-solution to a minimum	• KBM offers 14 sizes with several lengths • CDDR offers 5 housing with several 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 can be performed easily

Cartridge Direct Drive Rotary Motor

The Cartridge Direct Drive Rotary (DDR) Motor is the first in the industry to combine the space-saving and performance advantages of frameless DDR technology with the ease of installation of a full-frame motor. Cartridge DDR motors also feature an advanced electromagnetic design that provides up to 50% more torque density than comparably sized conventional servomotors.

Consisting of a rotor, stator, factory-aligned high-resolution feedback device, the Cartridge DDR motor uses the machine's bearings to support the rotor. An innovative compression coupling secures the Cartridge DDR's rotor to the machine shaft, and the Cartridge DDR's housing is bolted to the machine frame with a bolt circle and pilot – just like a conventional servomotor – saving space and design time and simplifying the overall system.

Conventional servo systems typically include a number of mechanical transmission components that limit the performance and reliability, and drive up the cost of operation. Cartridge DDR motors eliminate all mechanical transmission parts.

Cartridge DDR Features

- Assembles as quickly as 5 minutes
- 5 frame sizes from 108 to 350 mm, 17 different lengths, 52 standard windings
- Constant torque range from 4,57 up to 510 Nm accomodates a wide range of high power application requirements
- Optimizes torque output with high-pole count efficient electro-magnetic design
- Integrated high-resolution sine-encoder
- 134,217,728 counts / rev
- Speeds up to 2,500 rpm, meets most medium speed and high-torque application requirements
- Meets high power demands of most frameless motor applications
- Direct load connection eliminates maintenance of gearheads, belts or pulleys
- Low cogging for smooth low-speed rotation
- Zero backslash and compliance provides more responsive system performance

The Cartridge Direct Drive Rotary (DDR) Motor combines the space saving and performance advantages of the frameless DDR technology with the ease of installation of a full-frame motor.

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/gearhead. With the Cartridge DDR system, this is all replaced by the motor and 4 mounting bolts.

Improved Accuracy

The best planetary gearheads have a backlash between 1 and 2 arc-minutes. Over the life of the gearhead, 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 0.013 mm where the Press Feed machine with the mechanical transmission has a feed accuracy of 0.05 mm. 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. Gearheads 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

Gearheads have a finite life span, especially in a demanding cyclic application such as a Press Feed. On this machine, the gearhead 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.

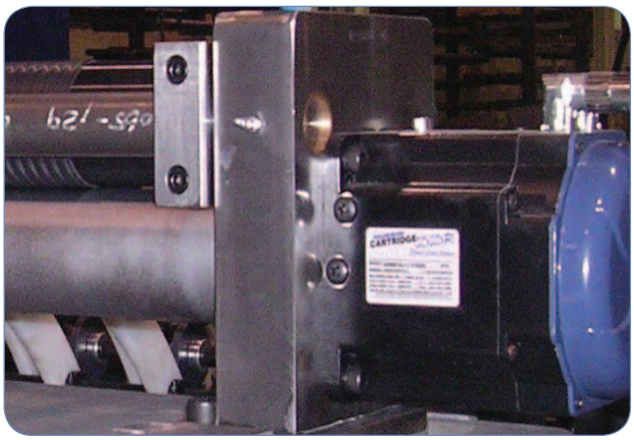
Reduced Audible Noise

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/gearhead 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 servomotor, gearhead, 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 Direct Drive Rotary Motor

240 V AC Performance Data

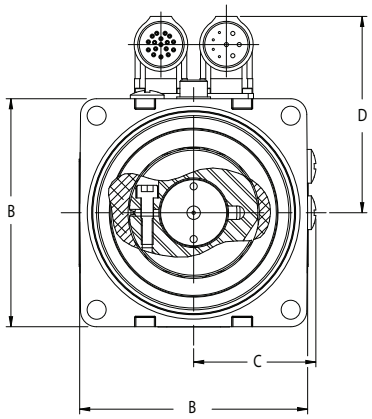
Cartridge Motor	Servo Drive		Frame Size	Contin. Torque	Peak Torque	Maximum Speed	Weight	Inertia
	AKD	S700	mm	Nm	Nm	RPM	kg	kg·cm²
C041A	P00306	S703	108	4.57	12.3	1750	4.08	5.86
C041B	P00606	S706	108	4.52	12.2	2500	4.08	5.86
C042A	P00606	S706	108	8.25	22.2	1700	5.67	8.87
C042B	P01206	S712	108	8.45	22.8	2500	5.67	8.87
C043A	P00606	S706	108	11.1	30.0	1250	7.26	11.9
C043B	P01206	S712	108	11.2	30.2	2500	7.26	11.9
C044A	P00606	S706	108	13.9	37.4	1050	8.84	14.9
C044B	P01206	S712	108	14.1	37.9	2150	8.84	14.9
C051A	P00606	S706	138	11.7	30.2	1200	8.39	27.4
C051B	P01206	S712	138	11.9	30.6	2450	8.39	27.4
C052C	P00606	S706	138	16.9	43.1	950	10.7	35.9
C052D	P01206	S712	138	16.5	42.3	2050	10.7	35.9
C053A	P01206	S712	138	21.0	54.1	1350	13.2	44.3
C053B	P02406	-	138	20.2	50.1	2500	13.2	44.3
C054A	P01206	S712	138	24.9	63.8	1200	15.4	52.8
C054B	P02406	-	138	23.8	61.2	2500	15.4	52.8
C061A	P01206	S712	188	33.8	86.8	900	18.6	94.1
C061B	P02406	-	188	32.6	75.6	1950	18.6	94.1
C062C	P01206	S712	188	48.4	117	700	23.6	126
C062B	P02406	-	188	44.6	102	1400	23.6	126
C063C	P01206	S712	188	61.8	157	550	29.0	157
C063B	P02406	-	188	59.0	136	1050	29.0	157
C091A	P02406	S712	246	50.2	120	600	27.7	280
C092C	P02406	-	246	102	231	450	41.3	470
C093C	P02406	-	246	139	317	350	54.4	660
C131C	P02406	-	350	189	395	250	63.5	1240
C131B	P04806	-	350	190	396	450	63.5	1240
C132C	P02406	-	350	362	818	120	101	2250
C132B	P04806	-	350	361	759	225	101	2250
C133C	P02406	-	350	499	1070	100	132	3020
C133B	P04806	-	350	510	1090	175	132	3020

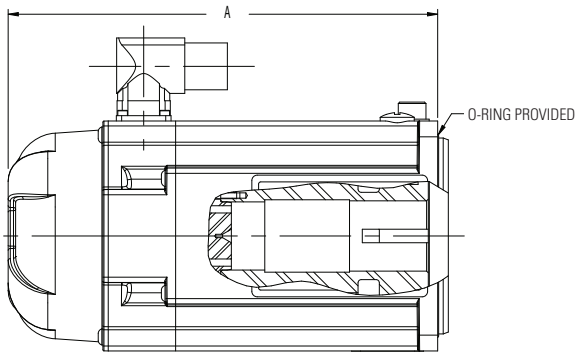
400/480 V AC Systems Performance Data

Cartridge Motor	Servo Drive		Frame Size	Contin. Torque	Peak Torque	Maximum Speed		Weight	Inertia
	AKD	S700	mm	Nm	Nm	RPM		kg	kg-cm²
						400 V AC	480 V AC		
CH041A	P00307	S703	108	4.56	11.3	2500	2500	4.08	5.86
CH042A	P00607	S706	108	8.26	19.0	2500	2500	5.67	8.87
CH043A	P00607	S706	108	11.1	25.3	2250	2500	7.26	11.9
CH044A	P00607	S706	108	13.9	31.6	1850	2250	8.84	14.9
CH051A	P00607	S706	138	11.7	28.0	2100	2500	8.39	27.4
CH052C	P00607	S706	138	16.9	43.1	1750	2100	10.7	35.9
CH053A	P01207	S712	138	21.0	54.1	2350	2500	13.2	44.3
CH054A	P01207	S712	138	24.9	63.8	2100	2500	15.4	52.8
CH061A	P01207	S712	188	33.8	86.8	1600	1900	18.6	94.1
CH062C	P01207	S712	188	48.4	117	1250	1550	23.6	126
CH063C	P01207	S712	188	61.8	157	950	1150	29.0	157
CH063B	P02407	S724	188	59.0	136	1850	2200	29.0	157
CH091A	P02407	S712	246	50.2	120	1200	1500	27.7	280
CH092C	P02407	S724	246	102	231	800	1000	41.3	470
CH093C	P02407	S724	246	139	317	700	800	54.4	660
CH131C	P02407	S724	350	189	395	500	600	63.5	1240
CH131B	P04807	S748	350	190	396	800	1000	63.5	1240
CH132C	P02407	S724	350	362	818	250	300	101	2250
CH132B	P04807	S748	350	361	759	400	500	101	2250
CH133C	P02407	S724	350	499	1070	200	250	132	3020
CH133B	P04807	S748	350	510	1090	350	400	132	3020

Cartridge DDR C04, C05 und C06 – Dimensions

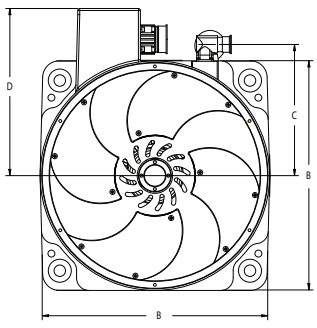
Cartridge Motor	A mm	B mm	C mm	D mm
C(H)041	171	108	59	93
C(H)042	202	108	59	93
C(H)043	233	108	59	93
C(H)044	264	108	59	93
C(H)051	195	138	76	108
C(H)052	220	138	76	108
C(H)053	245	138	76	108
C(H)054	270	138	76	108
C(H)061	226	188	99	133
C(H)062	260	188	99	133
C(H)063	294	188	99	133

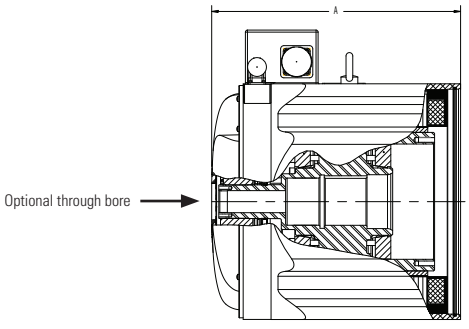




Cartridge DDR C09 und C13 – Dimensions

Cartridge 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





KBM™ Direct Drives With No Housing

With the KBM series, Kollmorgen – the leading provider of direct drive technologies – is offering a versatile and extremely powerful modular brushless motor system with no housing. Supplied as separate rotor/stator packages the KBM series meet exceptionally high standards and offer superb performance, extremely long life and ease of installation.

The Highest Quality

- Fully encapsulated stator winding
- Designed for 155°C constant winding temperature
- PTC thermistor (avalanche type) overload protection
- Magnet material - rare earth neodymium-iron-boron
- Protective tape overlay of the rotor magnets*
- RoHS-compatible

Available Options (without additional development costs)

Sensor feedback (KBMS models)

Preset digital Latching Hall Effect sensors are installed in-factory on the front of the stator. Connection instructions and timing diagrams are contained in the product overview. KBMS series models offer extra axial rotor lengths to ensure more secure triggering.

Insulation Options

S (standard) – Designed for operational voltages of up to 240 V AC
H (high voltage) – Designed for operational voltages of between 240 V AC and 480 V AC

Modifications (with additional development costs)

Give us a call – We will offer you advice without obligation, or ask for a quote. The product price can fluctuate depending on the scope of the modification.

Different Windings

The motor windings can be optimized so that the desired performance data for speed and torque can be achieved at a given operating voltage and a specified current consumption. Before issuing a quote, our engineers must confirm the electrical and mechanical feasibility of each special winding arrangement.

Rotor Hub Dimensions

Rotor hubs can be offered with different customer-specific hole patterns, fastening options or smaller internal bore diameters. The standard KBM(S) models listed here allow for the largest available internal bore diameters.

Rotor Hub Design

In the standard design, the rotor hubs of KBM(S) motors are produced from uncoated, cold-rolled steel. If a coated, lacquered or specially cleaned rotor design is required, or a different material is called for, our engineers must check the feasibility and costs before quoting.

Stator Sleeve Design

In the standard design, the motors KBM(S) 10, 14, 17, 25, 35, 45, 163 and 260 are equipped with a stator sleeve made from uncoated aluminum. If a lacquered or coated design is desired, our engineers must confirm the feasibility and the change in price before a quote can be issued. Special stator sleeves are only available for the motor sizes listed above.

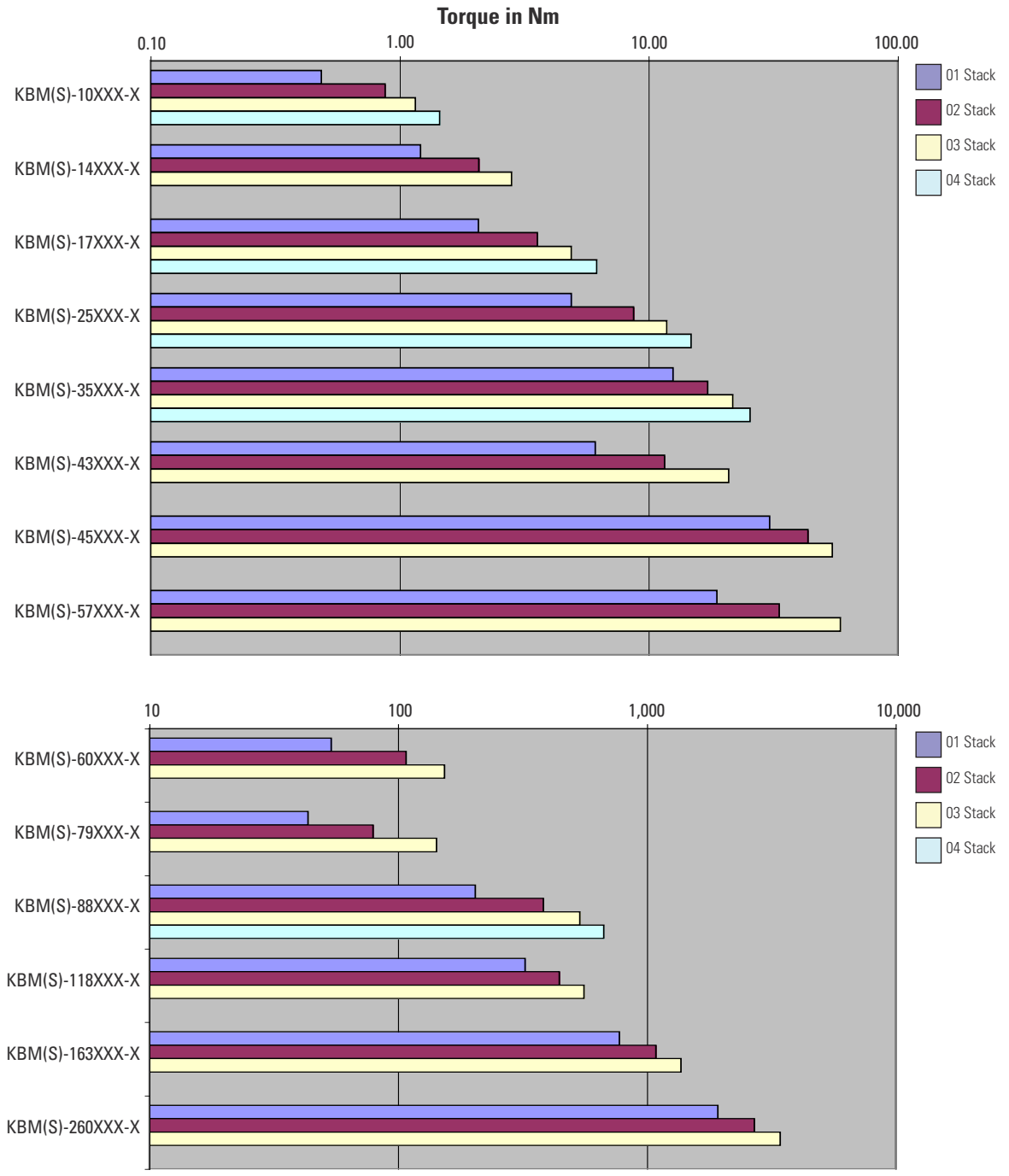
Information on UL/CE Certification

KBM(S) series motors facilitate UL or CE certification for higher level assemblies. The stator insulation is constructed exclusively from verified and certified materials and is designed in conformance with the guidelines of the certification bodies with regard to leakage currents and minimum distances. The dielectric strength between the windings and the earthed, metallic stator surface is tested at a voltage specified by the agency. Adherence to the guidelines of the certifications depends on a correct installation and a proper design of the surrounding housing by the end user. Please pay attention to the mounting and installation guidelines recommended by Kollmorgen.

* Not with KBM 163 or KBM 260

KBM(S) Performance Overview

Select the right motor for your application from the wide range of sizes and torques.

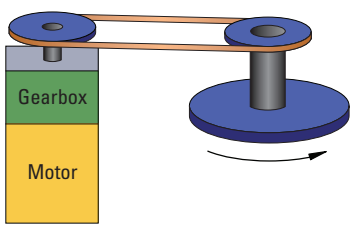


You can find more information and interactive 3D models with 2D product views at www.kollmorgen.com/kbm.

Direct Drive Technology

Conventional servo systems commonly have a mechanical transmission which can consist of gears, gearheads, belts/pulleys or cams connected between the motor and the load.

With Direct Drive Technology, the mechanical transmission is eliminated and the motor is coupled directly to the load.



Servomotor and Gearhead

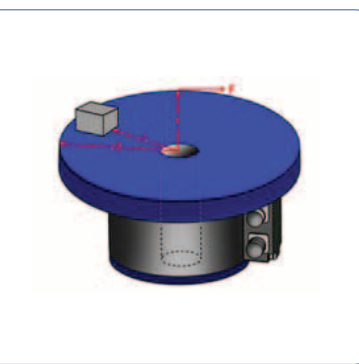
Why Use Direct Drive Technology?

Increased Accuracy and Repeatability

A "precision" planetary gearhead 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) servomotors have repeatability better than 1 arc-second. Therefore, a direct drive motor can hold a position 60 times better than a conventional motor/gearhead.

The increased accuracy of direct drive technology 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

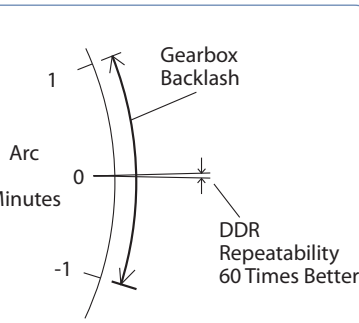


Direct Drive Motor

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.

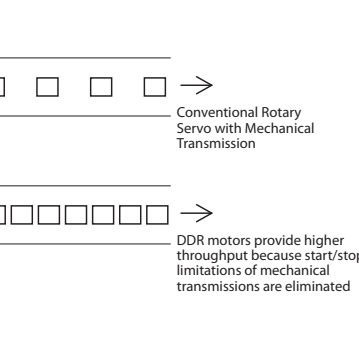
Direct drive technology removes these limitations and allows for much faster start/stop cycles and also provides greatly reduced settling time. This will allow a greater throughput from the machine. Users of direct drive systems have reported up to a 2X increase in throughput.



Improved Repeatability

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. Gearheads 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.



Increased Throughput

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/gearhead 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 technology. 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.

Direct Drive Technology

Kollmorgen's 50 years of electromagnetic and electromechanical design experience combined with our quality and service, allowed us to refine and expand DDR technology for easy installation, use, and short lead times. The Cartridge DDR is the right DDR solution for your application.

Cartridge DDR

This motor is the first in the industry to combine the space-saving and performance advantages of Frameless DDR technology 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 mounts to the machine with a bolt circle and pilot diameter just like a conventional servomotor, saving space and design time and simplifying the overall system.

DDR Applications

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

Micron™ TRUE Planetary™ Gearhead

Helical gear wheels are characterized by low-noise and smooth running and transfer higher capacities than spur gearing. Both properties can be attributed to the improved overlap (effective teeth in the mesh) when compared with helical gear wheels.

An extremely quiet helical gearhead with high torque has been developed in which the positive features of the crowned tooth profile and helical gearing have been combined with the planetary design. The result is a gearhead with the lowest developed noise currently on the market.

- Innovative gearhead technology offers reduced size and increased performance
- The RediMount™ system ensures fault-free and reliable installation.

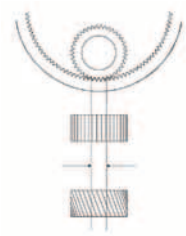
TRUE Planetary™ Gearhead Technology uses Crowned, Helical Gearing

Features

- High torque capacity
- Low gear backlash
- Smooth running
- Improved load distribution
- Extremely quiet
- Long life span

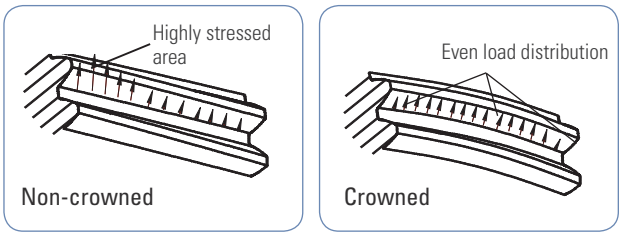
Spur Gearing vs. Helical Gearing

The typical overlap of spur gearing is 1.5. For comparable helical gearing this is 3.3 – so more than double the overlap.



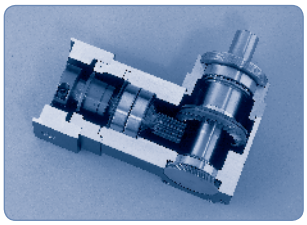
Crowned vs. Non-Crowned

The crowned profile optimizes the gear mesh alignment of the gear within the gear train. This increases torque capacity, reduces noise development and prevents heavy wear in highly stressed areas through improved load distribution on the tooth flank.

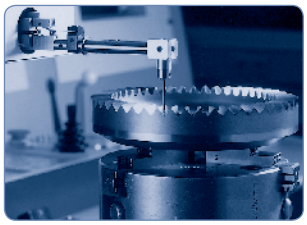


ValueTRUE™ Right Angle Gearheads

- Reduced gear backlash from single axis mesh adjustment
- Compact design based on crown gear technology
- Extremely quiet operation through high overlap
- Meshing ratios of 1:1 to 5:1
- Extreme efficiency (>98 %)

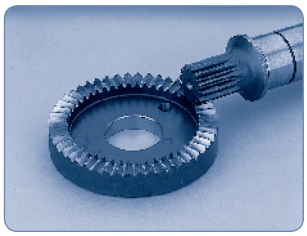


PowerTRUE™ gearhead technology

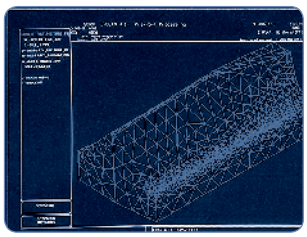


Computer measurement of a tooth profile

PowerTrue technology, with a mesh ratio of 5:1, is used in all rectangular Micron™ gearheads. Conventional bevel gears offer a maximum mesh ratio of only 3:1.



There are many teeth on the crown gear simultaneously engaged with a standard involute pinion. The high overlap between the gear and the pinion considerably increases the torque and degree of efficiency.



XTRUE™

Precision gearheads with the RediMount™ system.

Straight	Dimensions Metric	Max. Peak torque (Nm)		All sizes	Gearhead transmission ratio n:1	Degree of efficiency	Backlash (arc minute)
		Single-stage	Dual-stage				
XT040	40 mm	18.3	33.8	Single-stage	3, 4, 5, 7, 10	93%	13
XT060	60 mm	55	55				
XT080	80 mm	165	175				
XT120	120 mm	298	298	Dual-stage	15, 20, 25, 30, 40, 50, 70, 100	88%	15
XT160	160 mm	7,876	876				

ValueTRUE™

Helical True Planetary gearheads, designed for flange installation with stainless steel housing and RediMount™ system.

Straight	Dimensions Metric	Max. Peak torque (Nm)		All sizes	Gearhead transmission ratio n:1	Degree of efficiency	Backlash: (Arc minute)
		Single-stage	Dual-stage				
VT006	61 mm	91	103	Single-stage	4, 5, 7, 10	95%	4
VT075	75 mm	161	185				
VT090	90 mm	161	185				
VT010	101 mm	463	542				
VT115	115 mm	463	542	Dual-stage	16, 20, 25, 28, 35, 40, 50, 70, 100	93%	5
VT014	141 mm	1,066	1,271				
VT018	182 mm	2,242	2,970				
VT022	220 mm	4,180	4,972				

ValueTRUE™

Helical True Planetary right-angle gearheads, designed for flange installation with stainless steel housing and RediMount™ system.

Rectangular design	Dimensions Metric	Max. Peak torque (Nm)	All sizes	Gearhead transmission ratio n:1	Degree of efficiency	Backlash: (Arc minute)
		Dual-stage				
VTR006	61 mm	98	Dual stage	8, 10, 12, 14, 15, 16, 20, 25, 28, 30, 35, 40, 50	93%	5
VTR075	75 mm	177				
VTR090	90 mm	177				
VTR010	101 mm	518		4, 5, 8, 10, 12, 14, 15, 16, 20, 25, 28, 30, 35, 40, 50		
VTR115	115 mm	518				
VTR014	141 mm	1,206				
VTR018	182 mm	2,800				

AquaTRUE™

Stainless steel gearheads in protection class IP66/IP67. Especially suited for application in the food industry.

Straight	Dimensions Metric	Max. Peak torque (Nm)	All sizes	Gearhead transmission ratio n:1	Degree of efficiency	Backlash (arc minute)
AQT060	60 mm	55 to 47	Single stage	3, 4, 5, 7, 10	93%	13
AQT080	80 mm	165		3, 4, 5, 7, 8, 10		
AQT120	110.5 mm	298		3, 4, 5, 7, 10		
AQT160	140 mm	876		3, 4, 5, 7, 10		

Note 1: The torque capacity specified is the maximum for the respective housing design; not all transmissions offer the same nominal torque.
Note 2: The torque capacity specified is the maximum briefly permitted peak torque for non-stop and shock loads.

TYPE CODE

Brushless AKM Servo Motors

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 .. 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

Design

00	**Standard**
01	With shaft seal
0W	Washdown
0F	Washdown food
xx	Special

Feedback device

All options see opposite page
S Special

Brake

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

Connections

All options see opposite page
S Special

Shaft

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

Note: Options in blue type are standard products.

Feedback Device Options

Code	Designation	Model	Can be used with	Comments
1-	Comcorder		AKM1 - AKM8	1,024 Incr/rev
2-	Comcorder		AKM1 - AKM8	2,048 Incr/rev
AA	BiSS B encoder	AD36	AKM2 - AKM4	Single-turn
AA	BiSS B encoder	AD58	AKM5 - AKM8	Single-turn
AB	BiSS B encoder	AD36	AKM2 - AKM4	Multi-turn
AB	BiSS B encoder	AD58	AKM5 - AKM8	Multi-turn
C-	Smart feedback device	Size 10	AKM1	Single-turn
C-	Smart feedback device	Size 15	AKM2 - AKM4	Single-turn
C-	Smart feedback device	Size 21	AKM5 - AKM8	Single-turn
DA	EnDAT 2.1 encoder	ECN 1113	AKM2 - AKM4	Single-turn. Optical
DA	EnDAT 2.1 encoder	ECN 1313	AKM5 - AKM8	Single-turn, optical
DB	EnDAT 2.1 encoder	EQN 1125	AKM2 - AKM4	Multi-turn, optical
DB	EnDAT 2.1 encoder	EQN 1325	AKM5 - AKM8	Multi-turn, optical
LA	EnDAT 2.1 encoder	ECI 1118	AKM2 - AKM3	Single-turn, inductive
LA	EnDAT 2.1 encoder	ECI 1319	AKM4 - AKM8	Single-turn, inductive
LB	EnDAT 2.1 encoder	ECI 1130	AKM2 - AKM3	Multi-turn, inductive
LB	EnDAT 2.1 encoder	ECI 1331	AKM4 - AKM8	Multi-turn, inductive
GA*	HIPERFACE encoder	SKS36	AKM2 - AKM8	Single-turn
GB*	HIPERFACE encoder	SKM36	AKM2 - AKM8	Multi-turn
GC	HIPERFACE encoder	SEK34	AKM1	Single-turn, capacitive
GD	HIPERFACE encoder	SEL34	AKM1	Multi-turn, capacitive
GE	Hiperface DSL encoder	EKS36	AKM2 - AKM8	Single-turn
GF	Hiperface DSL encoder	EKM36	AKM2 - AKM8	Multi-turn
R-	Resolver	Size 10	AKM1	2-pole, hollow shaft
R-	Resolver	Size 15	AKM2 - AKM4	2-pole, hollow shaft
R-	Resolver	Size 21	AKM5 - AKM8	2-pole, hollow shaft

* not available for AKM2 with connection option C (cable with IP65 connector)

Connection Options

Code		Can be used with	Designation	Connector position
With PTC	With KTY 84-130			
B	1	AKM2	IP65, 2 connectors angled, rotatable	Mounted on motor
C	7	AKM1 - AKM2	IP65, 2 connectors	on 0.5 m cable
C	1	AKM3 - AKM7	IP65, 2 connectors, angled, rotatable	Mounted on motor
D	–	AKM1 - AKM5, with Hiperface DSL or SFD without brake	IP65, 1 connector, angled, rotatable	Mounted on motor
G	9	AKM2 - AKM7	IP65, 2 straight connectors	Mounted on motor
H	7	AKM74Q and AKM82T	IP65, feedback connector size 1.0, power connector size 1.5	Mounted on motor
M	–	AKM1 - AKM4	IP20, 2 Molex connector, $I_0 < 6$ A	on 0.5 m cable
P	–	AKM1 - AKM4 with SFD, without brake	IP20, 1 Molex connector, $I_0 < 6$ A	on 0.5 m cable
T	1	AKM8	IP65, terminal boxes for power, feedback connector size 1.0	Mounted on motor
Y	1	AKM1	IP65, ytec®connector	Mounted on motor

TYPE CODE

AKD Servo Amplifier

AKD – P 003 07 – NB CC 0000

Family

AKD	AKD

Version

B	Basis
P	**Position control with drive tasks**
T	BASIC
M	PDMM

Current class

003	3 A_{rms}
006	6 A_{rms}
012	12 A_{rms}
024	24 A_{rms}

Voltage class

06	120 / 240 V AC 1~ / 3~
07	240 / 480 V AC 3~

Design

D000	Standard EU, German
E000	Standard EU, English
F000	Standard EU, French
I000	Standard EU, Italian

Connection options

AN	Analog
EC	EtherCAT
CN	CANopen
CC	**EtherCAT and CANopen**
PN	PROFINET RT
EI	Ethernet / IP
SQ	SynqNet 4

Expansion Options

NA	No option (rev7 board)
NB	**No option (rev9 board)**
IC	I/O option card (only for AKD-T)
MC	Motion control card (only for AKD-M)

Note: Options in blue type are standard products.

TYPE CODE

S700 Servo Amplifier

S7 06 0 2 – EI F2 PM – NA

S700 series

Nominal current

01	1.5 A_{rms}
03	3 A_{rms}
06	6 A_{rms}
12	12 A_{rms}
24	24 A_{rms}
48	48 A_{rms}
72	72 A_{rms}

Nominal voltage

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

Electrical options

2 = Standard
S = Expanded peak current

Expansion card plug slot 1

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

Firmware options

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

Expansion card plug 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

Expansion card plug slot 2

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

Note: Options in blue type are standard products.

TYPE CODE

Cartridge DDR Rotary Direct Drive

C 09 1 A – 1 1 – 1 1 0 5 ( ) (-)

Cartridge DDR series

C = 230 V AC winding
CH = 400/480 V AC winding

Dimensions

04 = 4.25" Square housing
05 = 5.43" Square housing
06 = 7.40" Square housing
09 = 9.68" Square housing
13 = 13.78" Square housing

Motor length

1 = Short motor length
2 = Medium motor length
3 = Long motor length
4 = Extra long motor length (only sizes 04 and 05)

Winding type

A, B, C, D

Fastening

1 = Standard flange mounting

Connector

1 = Option with side connector (only sizes 09 and 13)
2 = Option with rear connector (only sizes 09 and 13)
3 = Connector rotatable by 90° (Only sizes 04, 05 and 06)

Shaft

1 = Hollow shaft with compression coupling and key (only sizes 09 and 13)
2 = Solid shaft with compression coupling and key (only sizes 09 and 13)
3 = Solid shaft with slot ring coupling and no key (only sizes 04, 05 and 06)

Feedback system

1 = ENDAT 2.1 (C04, C05, C06, C09, C13)
3 = BiSS B (C04, C05, C06)

Bearing options

0 = Design without bearings (with integrated transport lock)

Sealing

5 = Sealed
(Shaft option "1" – Protection type IP64 for the sealing of the interface side by the customer)
(Shaft options "2" or "3" – Protection type IP65 for the sealing of the interface side by the customer)

Certification

Blank = UL/CE approval
S = No UL approval

xxx

Designated for special designs. Omitted for standard motors.

Note: Options in blue type are standard products.

TYPE CODE

KBM Direct Drive Without Housing

KBM(S) – 25 H 01 – A XX

Product family

KBM Direct drive with no housing
KBMS Direct drive with sensors with no housing

Housing size

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

Insulation

H High (>240 V AC)
S Standard (<240 V AC)

Stack length

01	1
02	2
03	3
04	4

Winding type

A, B , C, etc.

Special designs

TYPE CODE

Micron™ TRUE Planetary™ Gearhead

XT 160 – 005 – 0 – ( )

Gearhead series

XT = XTRUE™
VT = ValueTRUE™
VTR = ValueTRUE 90™
AQT = AquaTrue™

Gearhead size

XTRUE™	ValueTRUE™ ValueTRUE 90™	AquaTrue™
040 = Size 40	060 = Size 60	060 = Size 60
060 = Size 60	075 = Size 75	080 = Size 80
080 = Size 60	090 = Size 90	120 = Size 120
120 = Size 120	010 = Size 10	160 = Size 160
160 = Size 160	115 = Size 115	
	014 = Size 14	
	018 = Size 18	
	022 = Size 22	

Motor model number

RediMount number (if available)
or motor manufacturer and model number

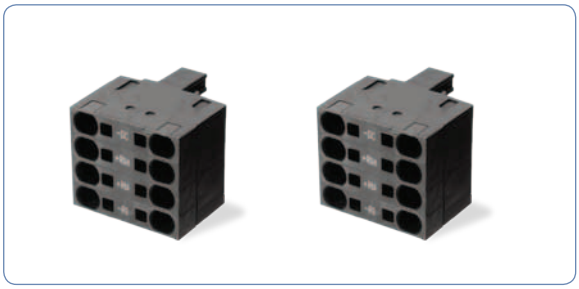
Customer-specific options

0 = None
S = Special

Gearhead transmission

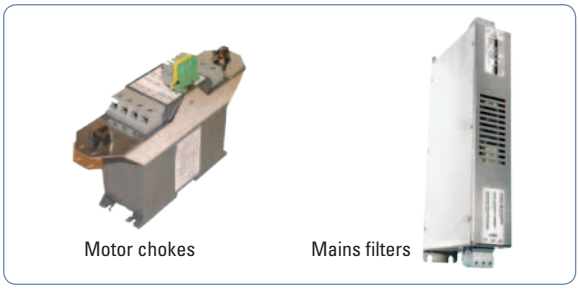
For available transmissions look in the sections on the individual gearheads

Accessories



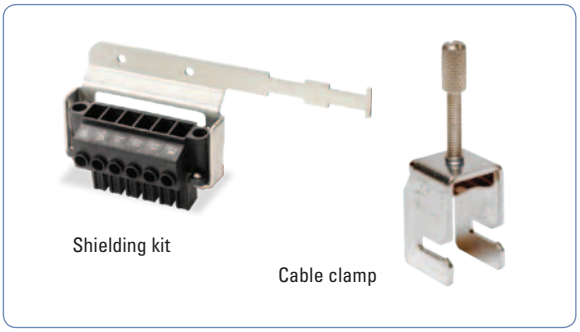
Mating Connector

The amplifiers are fully equipped with screw type mating connectors. Alternative connectors for joint DC bus and mains connections are also available.



Chokes and Filters

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

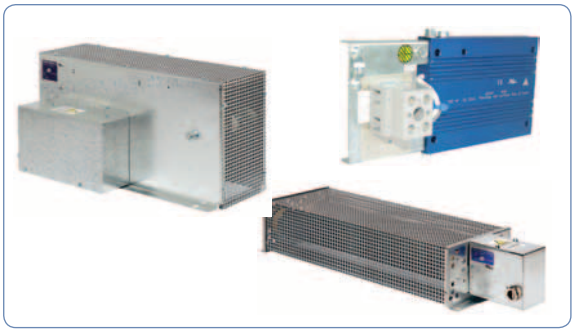


Shielding Solutions

For use in environments with heavy interference, we offer shielding kits for our flexible power cables.

Connection Cable

We offer shielded PUR industrial cables with RJ45 connections for demanding industrial environments with increased EMC, durability and life span requirements. The motor connection and feedback cables are designed as shielded PUR industrial cables. They are suited for use as trailing cables and are CE and UL approved.



Brake Resistors

We offer a complete range of brake resistors with capacities of up to 6,000 watts, which are available in numerous sizes and form factors. The impedance of the brake resistors is adjusted to the Kollmorgen servo amplifier.

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

NOTES:

About Kollmorgen

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are 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.

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Because Motion Matters™

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