Kollmorgen Automation and Motion Solutions Catalog

Kollmorgen Automation Suite™

AKC™ Programmable Automation Controllers

Micron™ Gearheads

S700 Servo Drive

AKM™ Servomotors

AKD™ Servo Drive

Cartridge Direct Drive Rotary™ Motors

S300 Servo Drive

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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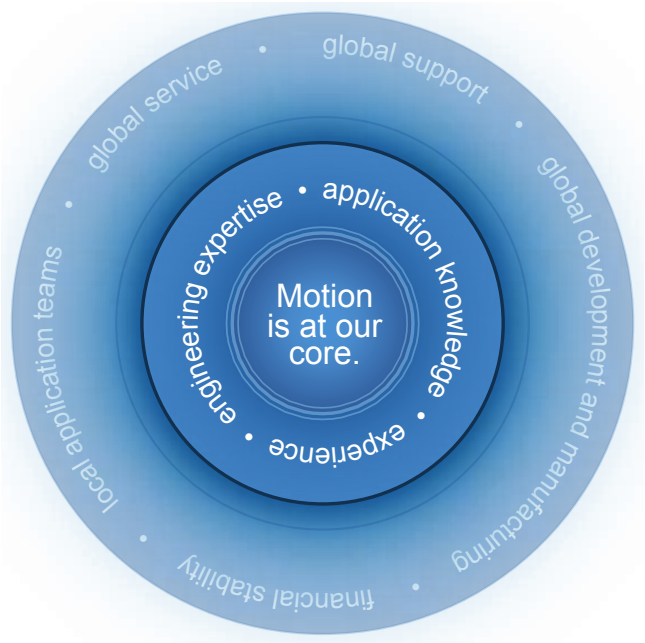


Kollmorgen Automation Suite™

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.

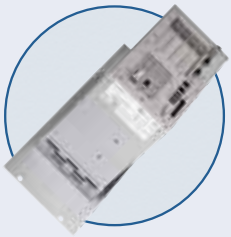
Our certified components mean that the commissioning and start-up process is faster. Our new drive, the Advanced Kollmorgen Drive (AKD™), is integrated into the product line to deliver the next generation of servo technology. With the award-winning motor and drive component families integrated into the 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

HMI, I/O, and System Cables

HMI

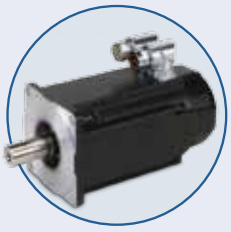
I/O

Motor and Feedback Cables

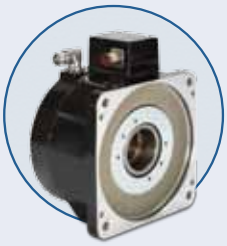
Network Cables

AKD Drives, Motors, and Gearheads

AKD Servo Drives



AKM Servomotors



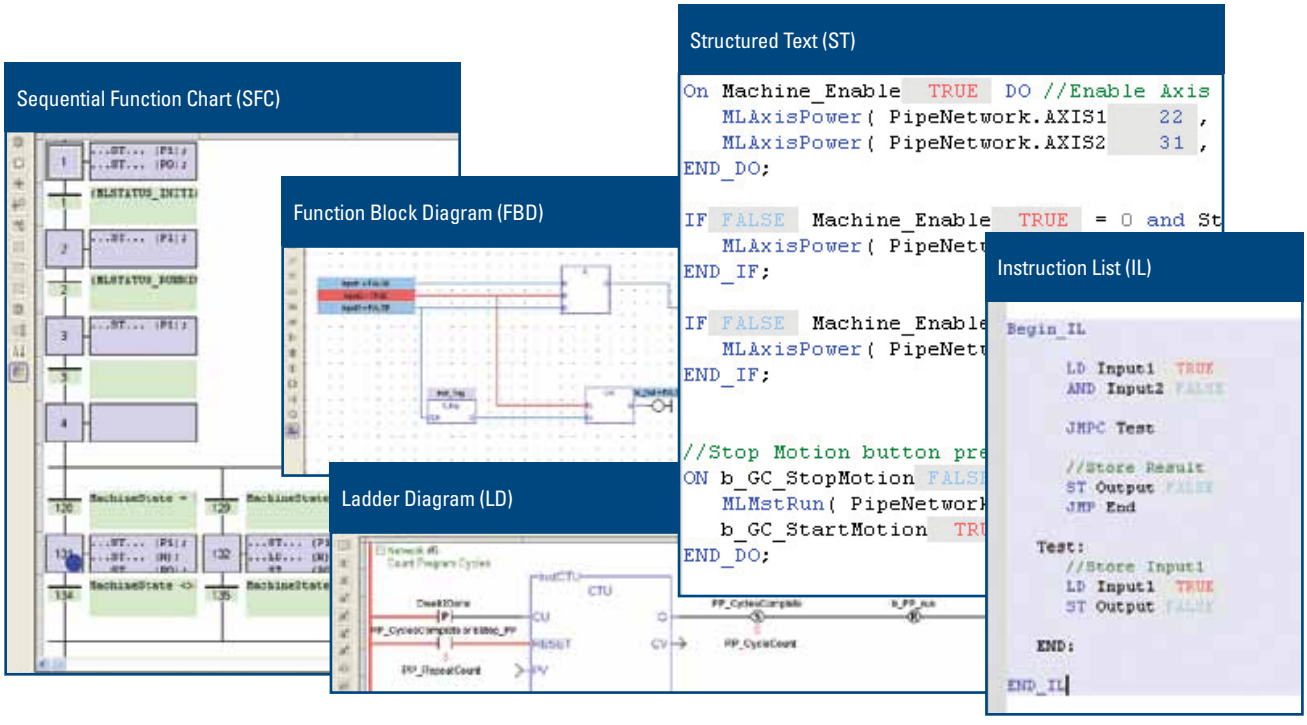
Cartridge Direct Drive Rotary Motors

Micron Gearheads

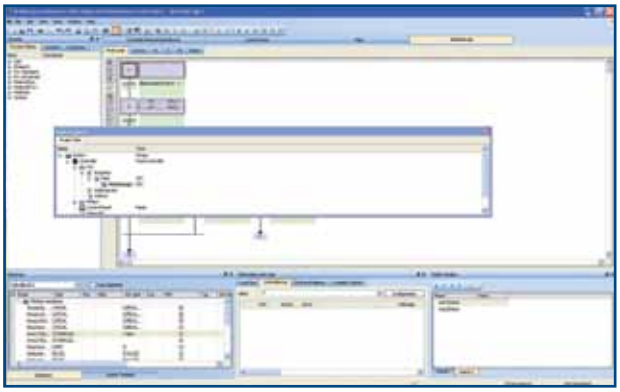
Software PLC

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

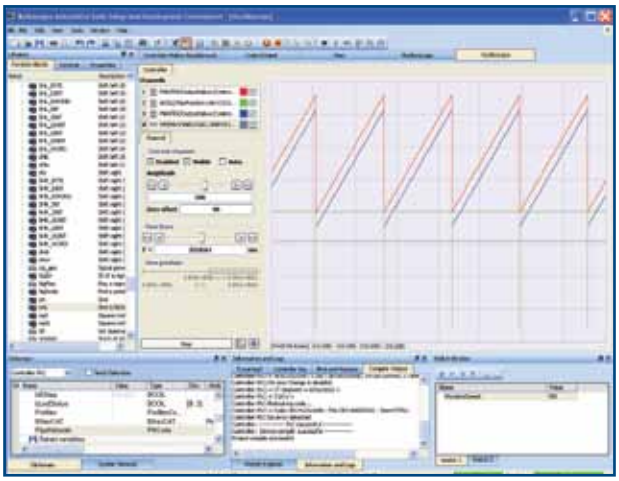
- Kollmorgen Automation Suite offers an integrated set of tools that allow the automation systems programmer to achieve quality software results. This includes not only our motion control solution set, but also the industry standard IEC 61131-3 toolkit for PLC programming.
- The environment for developing PLC programs has been created to help the engineer create solutions faster. Recognize and configure motion control components to accelerate systems development. With auto-recognize and auto-configure features, testing efforts are reduced.
- Once an application or a function block has been created for a given application, the user can store this as a "user-defined function block" to promote reuse of tested software in subsequent projects to save time.
- Maintain your standards in corporate programming languages by using any of the IEC 61131-3 languages. In fact, enhance it further by mixing and matching languages to deliver the best solution for the application.
- 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

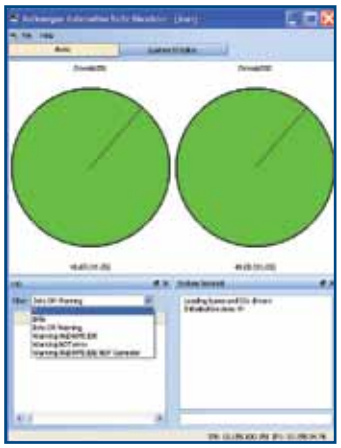


Customizable environment for docking/undocking and floating panels on the screen
Watch window to closely monitor special variables
Filter information and log messages to focus on the essentials
Ability to customize the environment and set parameters across the environment

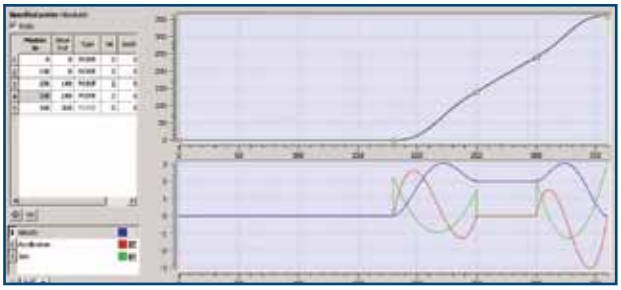


Built-in soft oscilloscope

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



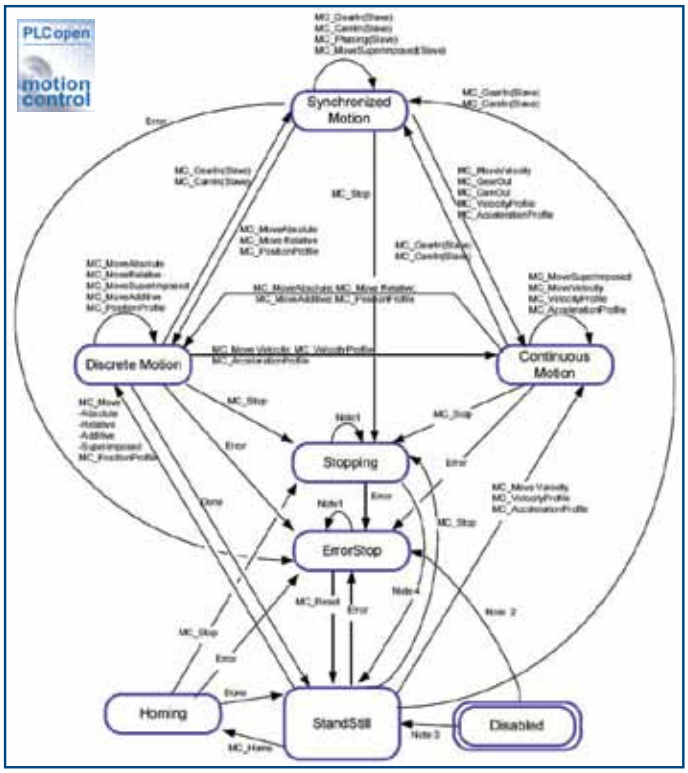
Graphical environment for creating CAMs

Motion Programming

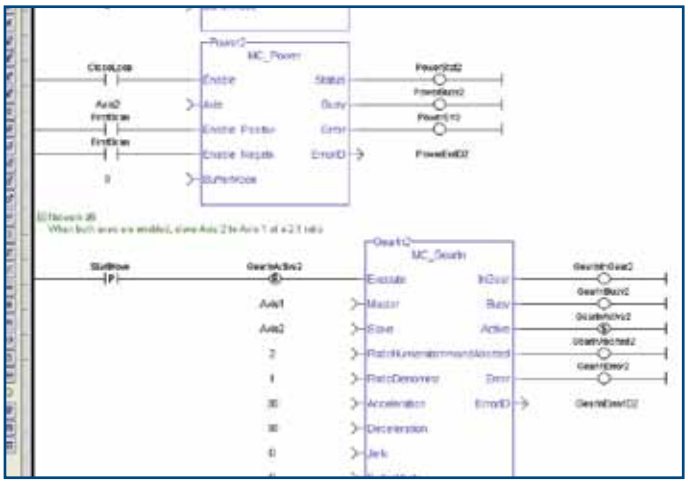
Our solution offering in motion control is backed by vast experience solving customer problems in the industry. We recognize that customers may want standard solutions for reuse of existing knowledge and resource bases or may want custom solutions that offer differentiation. To this end, we offer two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

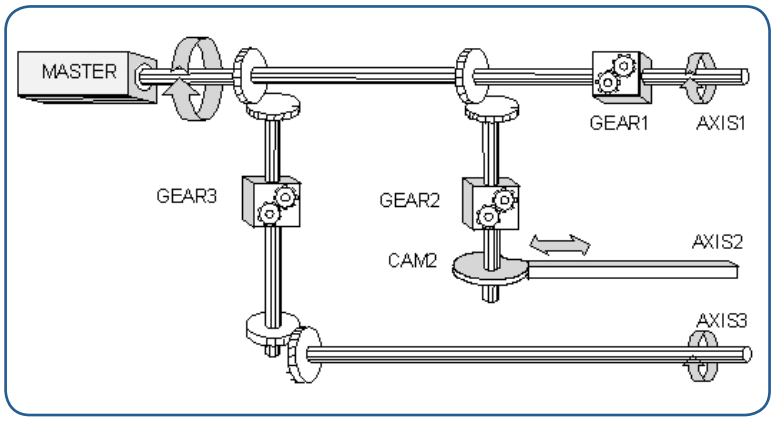
Pipe Network™

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.

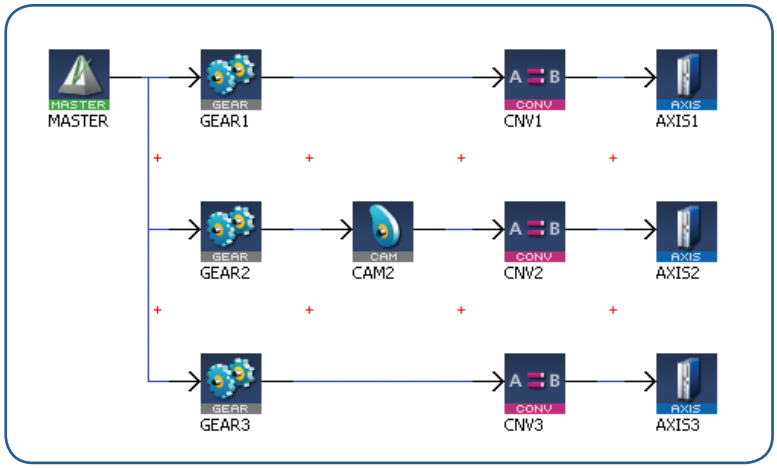
Mechanical System

- 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

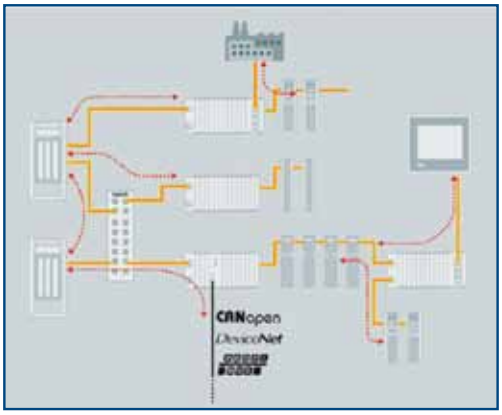


Real-time Motion Bus

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	250cd / m²	250cd / 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 Vdc	
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 (3.048 m), Storage: 15000 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	> 40000 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 Vdc	
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)	
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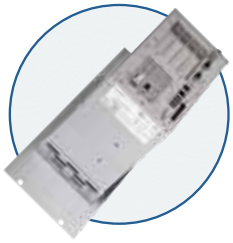
Vibration DIN EN 60068-2-6	Operating: 10-500 Hz: 1G / 3 axis / Storage: 10-500 Hz: 2G / 3 axis	
Temperature / Humidity	Operating: 0°C to +50° / 20 to 85% non condensing / Storage: -20°C to +60° / 5 to 95% non condensing	
MTBF	> 40000 h (excluding the Backlight Tube)	
RoHS compliant	Yes	



Rack-Mount

- 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 Vdc		
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: 0o C to +50o C / 20 to 85% non condensing / Storage: -20o C to +60o 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, 64K 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/°C2
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 Vdc (20 - 30 Vdc). 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 ° to +50 ° C Horizontal installation: 0 ° to +40 ° C
Storage temperature	-20 ° to +70 °C
Relative operating humidity	5 - 85 % non-condensed
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, 64K 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/°C2
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 Vdc (20 - 30 Vdc). 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 ° to +50 ° C Horizontal installation: 0 ° to +40 ° C
Storage temperature	-20 ° to +70 °C
Relative operating humidity	5 - 85 % non-condensed
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, 64K 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/°C2
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 Vdc (20 - 30 Vdc). 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 ° to +50 ° C Horizontal installation: 0 ° to +40 ° C
Storage temperature	-20 ° to +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	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, 64K 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/°C2
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 Vdc (20 - 30 Vdc). 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 ° to +50 ° C Horizontal installation: 0 ° to +40 ° C
Storage temperature	-20 ° to +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	3,7 kg

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.

I/O

Typical Bus Coupler

EtherCAT Bus Coupler

Typical I/O Terminal

Front Wiring View

Side Label View

Available Motion Bus Coupler Model	
AKT-ECT-000-000	EtherCAT Bus Coupler
Available Analog Input Terminal Models	
AKT-AN-410-000	4 Channel Analog Input Module, 0-10 Vdc
AKT-AN-420-000	4 Channel Analog Input Module, 0-20 ma
AKT-AN-810-000	8 Channel Analog Input Module, 0-10 Vdc
AKT-AN-820-000	8 Channel Analog Input Module, 0-20 ma
AKT-AN-200-000	2 Channel Thermocouple Input Module
AKT-AN-400-000	4 Channel Thermocouple Input Module
Available Analog Output Terminal Models	
AKT-AT-220-000	2 Channel Analog Output Module, 0-20 ma
AKT-AT-410-000	4 Channel Analog Output Module, 0-10 Vdc
AKT-AT-420-000	4 Channel Analog Output Module, 0-20 ma
AKT-AT-810-000	8 Channel Analog Output Module, 0-10 Vdc
AKT-AT-820-000	8 Channel Analog Output Module, 0-20 ma
Available Digital Output Terminal Models	
AKT-DT-004-000	4 Channel Digital Output Module, 0,5A
AKT-DT-008-000	8 Channel Digital Output Module, 0,5A
AKT-DT-2RT-000	2 Channel Relay Output Module, 2,0A, N/O
Available Digital Input Terminal Models	
AKT-DN-004-000	4 Channel Digital Input Module, 3ms
AKT-DNH-004-000	4 Channel Digital Input Module, .2ms
AKT-DN-008-000	8 Channel Digital Input Module, 3ms
AKT-DNH-008-000	8 Channel Digital Input Module, .2ms
Available Specialty Terminal Models	
AKT-EM-000-000	End Module
AKT-IM-000-000	Isolation Module
AKT-PS-024-000	Bus Feed Terminal, 24 Vdc
AKT-PSF-024-000	Bus Feed Terminal, 24 Vdc, Fused

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
- Helps 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 done 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.

kas.kollmorgen.com

On the Kollmorgen Automation Suite website, find extensive information about developing solution architectures. It provides the right level of information and is structured to prevent information overload. Complete, detailed data sheets and installation manuals for the various Kollmorgen Automation Suite products are available for download on the site.

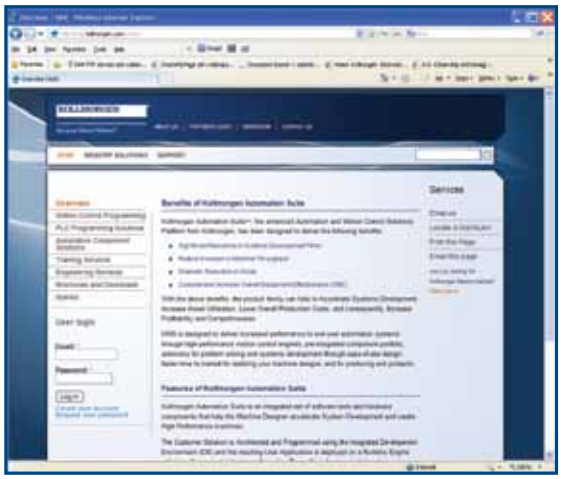
In addition, personalize your experience with the MyKAS website - interact with Kollmorgen's product development, engineering, and marketing teams. This website can be used for:

- **Bug Reporting**
  Reporting bugs and receiving direct support from the R&D and product management teams.

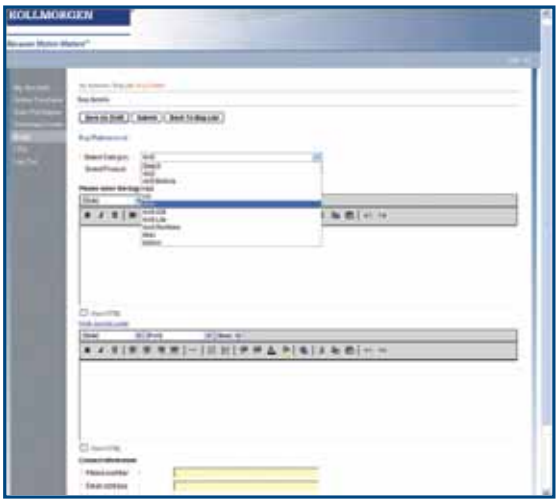
- **Dynamic FAQs (Frequently Asked Questions)**
  Most static FAQs are a guesswork of what the systems development engineers may be interested in. The Kollmorgen FAQ evolves by looking at what the developer community needs. Questions that receive higher viewing bubble to the top to provide information on areas of customer concern. This also alerts Kollmorgen to aspects of the product which may need to be explained better. Such alerts result in benefit to the engineer as Kollmorgen can improve product documentation or create additional examples.

  The community can also ask questions online and Kollmorgen's continuous improvement philosophy ensures that these questions are taken into account either for online response or for future product development.

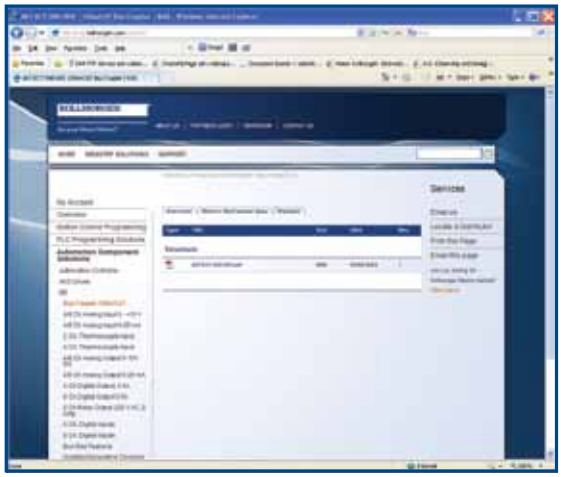
- **Online Purchases**
  Using PayPal™, purchase limited sets of items online for development and prototyping.



Learn about the product family and offerings



Rich text edit of bug report to product management and engineering. Workflow includes automatic email/follow-up request to product management and engineering management



Review product specifications and download manuals and datasheets online

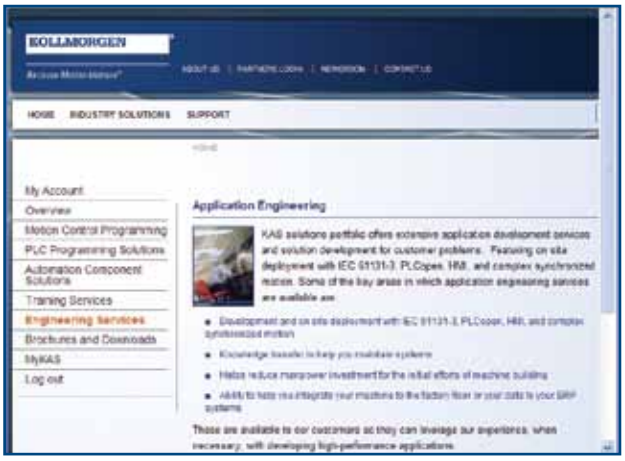
kas.kollmorgen.com

Personalized Services

- Living FAQ that makes highly clicked questions bubble to the top
- Report bugs and review responses online
- Ask questions and review responses online
- Buy products with payments integrated by PayPal
- Download software using provided download codes
- Review past purchases and print receipts online

Discover Kollmorgen Automation Suite programming solution and approach

Make online purchase



Review our engineering and training services capabilities

View purchases

Advanced Systems Creation

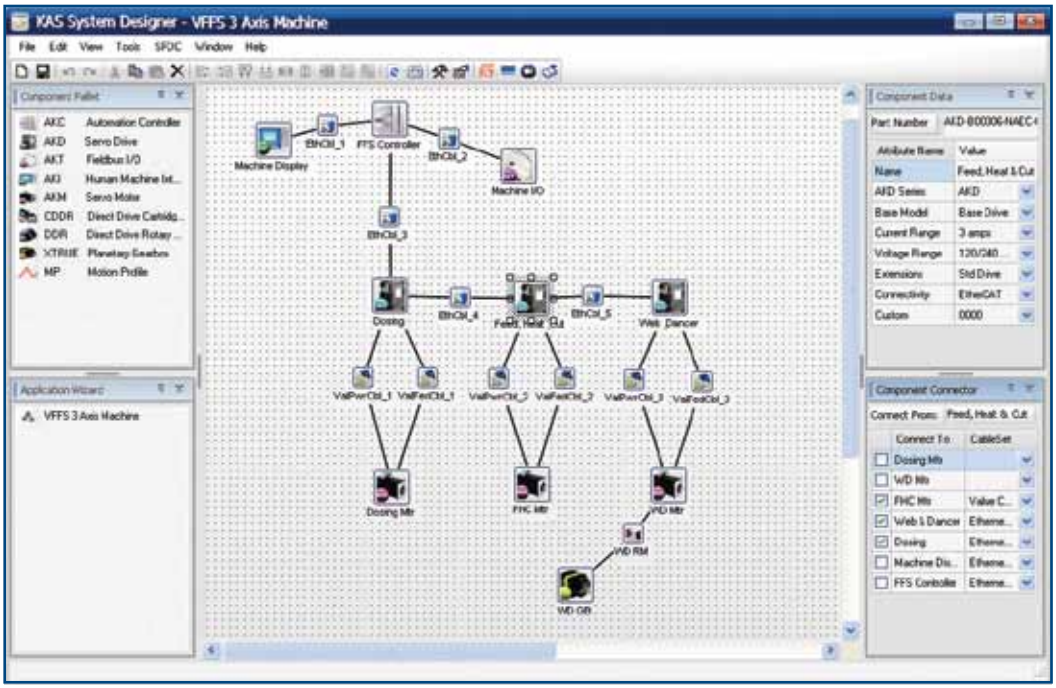
Creating Your System with our Sales Representative

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%.

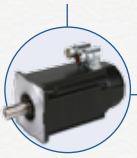
* Patents pending.

Benefits	Key Features
• Higher machine speed/throughput	• Highest resolution feedback (up to 27-bit) • High bandwith torque-and-velocity loops – fastest digital torque loop in the market: 0,67 µs • Multi-function Bode Plot makes it easy to evaluate and optimize motion and machine performance • Industry-leading and patent pending auto-tuning algorithms • Advanced servo techniques such as high-order observer and bi-quad filters that yield industry-leading machine performance • High resolution reference input (digital --> analog)
• Reduced scrap, better quality	• Powerful dual processor enables fast settling times
• Quicker changeover, greater uptime	• Powerful dual processor to hold programs/recipes • Six-channel "real-time" software oscilloscope for fast commissioning and diagnostics • Auto-complete of programmable commands saves looking up parameter names • One-click capture and sharing of program plots and parameter settings allows you to send machine performance data instantly • Best Graphical User Interface (GUI) in the market – extremely powerful and easy to use • Robust and dependable quality
• Quicker time to market	• Supports a variety of single- and multi-turn feedback devices – Smart Feedback Device (SFD), EnDat2.2, EnDat2.1, BiSS, Analog Sin/Cos encoder, incremental encoder, HIPERFACE®, and resolver • Tightly integrated Ethernet motion buses on board base drive – EtherCAT®, SynqNet®, Modbus/TCP, and CANopen® • Runs rotary and linear motors • Widest range of programming options in the industry • Seamlessly compatible with a range of front-end controls • Industry-leading power density

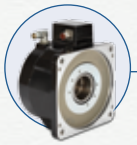
AKD Servo Drive

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.

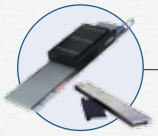
Micron™ Gearheads



AKM™ Servomotors



Cartridge Direct Drive Rotary™ Motors



Direct Drive Linear Motors*

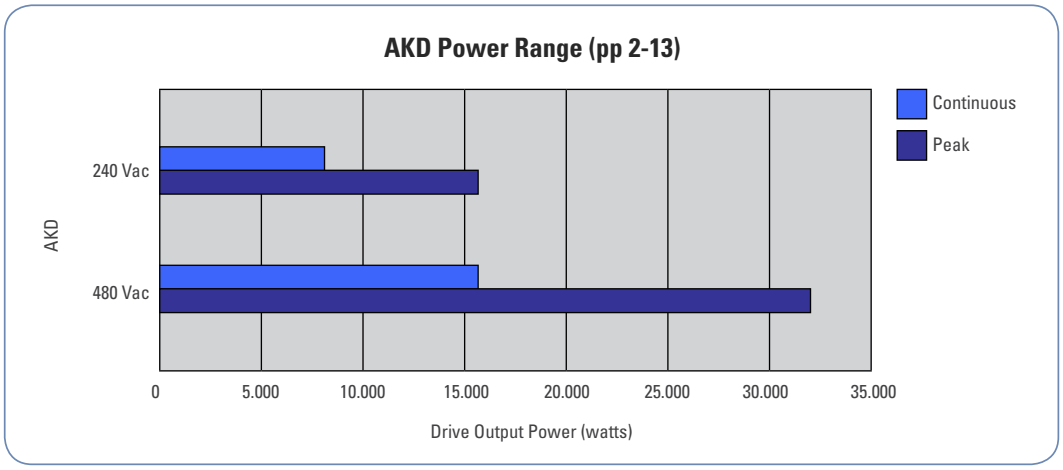
Best-in-Class Components

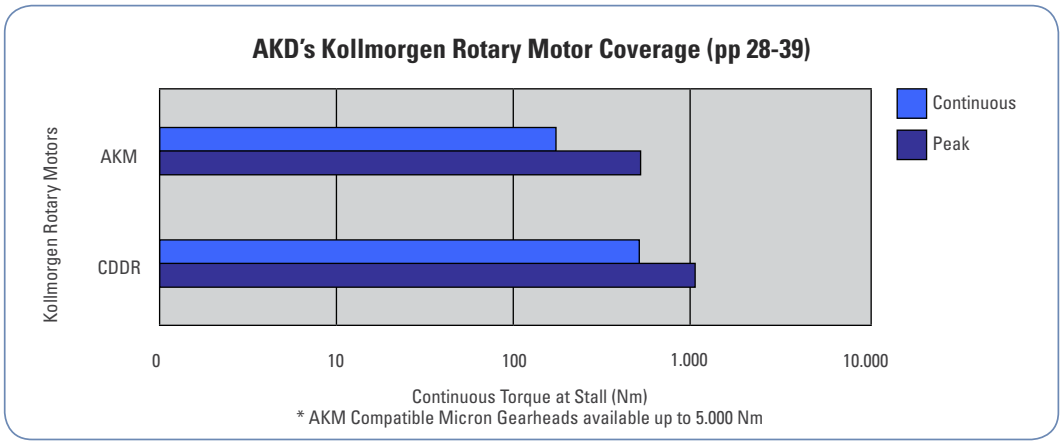
AKD works seamlessly with Kollmorgen motors – well-known for quality, reliability, and performance.

EtherCAT CANopen Modbus/TCP SynqNet

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 Arms continuous current and 9 to 48 Arms 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.

Industry-leading high performance servo loops

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 Line Frequency	
Feedback	Smart Feedback Device (SFD), EnDat2.2, EnDat2.1, BiSS, Analog Sine/Cos encoder, incremental encoder, HIPERFACE®, and resolver	
Logic Supply	24 Vdc	
	Base Drive	With I/O Expansion
Digital Input (24 Vdc)	8 (1 dedicated to enable)	20 (1 dedicated to enable)
Digital Output (24 Vdc)	3 (1 dedicated to fault relay)	13 (1 dedicated to fault relay)
Analog Input (+/- 10 Vdc, 16-bit)	1	2
Analog Output (+/- 10 Vdc, 16-bit)	1	2
Programmable Inputs	7	19
Programmable Outputs	2	12
Sink/Source Inputs/Outputs	Yes	Yes

Industry-leading power density

Modbus/TCP

SynqNet EtherCAT CANopen

UL LISTED CE ISO RoHS

General Specifications

120 / 240 Vac 1& 3Ø (85 -265 V)	Continuous Current (Arms)	Peak Current (Arms)	Drive Continuous Output Power (watts)	Internal Regen (watts)	(ohms)	Height (mm)	Width (mm)	Depth (mm)	Depth with Cable Bend Radius (mm)
AKD-■00306	3	9	1100	0	0	168	57	153	184
AKD-■00606	6	18	2000	0	0	168	57	153	184
AKD-■01206	12	30	4000	100	15	195	76	186	215
AKD-■02406*	24	48	8000	200	8	250	100	230	265

480 Vac 3Ø (187 -528 V)	Continuous Current (Arms)	Peak Current (Arms)	Drive Continuous Output Power (watts)	Internal Regen (watts)	(ohms)	Height (mm)	Width (mm)	Depth (mm)	Depth with Cable Bend Radius (mm)
AKD-■00307	3	9	2000	100	33	256	70	186	221
AKD-■00607	6	18	4000	100	33	256	70	186	221
AKD-■01207	12	30	8000	100	33	256	70	186	221
AKD-■02407	24	48	16,000	200	23	310	105	229	264
AKD-■04807*	48	96	32.000	*Coming in 2010*					
AKD-■09607*	96	192	64.000	*Coming in 2010*					

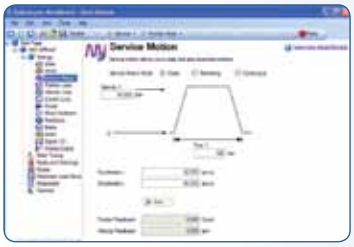
Note: For complete AKD model nomenclature, refer to page 46.
* Available 2010.

Scalable Programmability

The AKD Servo Drive delivers cutting-edge technology and performance with one of the most compact footprints in the industry. The AKD is flexible enough for virtually any application. From one axis that is as simple as analog torque and velocity, to 128 axes of fully programmable synchronized motion, AKD is the answer.

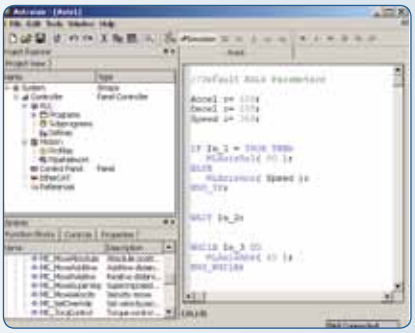
Benefits

- Optimized performance in seconds
- Greater throughput and accuracy
- Easy-to-use Graphical User Interface (GUI) for faster commissioning and troubleshooting
- Flexible and scalable to meet any application



Motion Tasking

- Adds simple point-and-click indexing
- Provides user with pre-programmed options
- Guides novice user through simplified steps to create indexing moves
- Includes access to 11 digital I/O and 2 analog I/O
- Includes 2 high-speed digital inputs
- Expandable to 31 digital I/O and 4 analog I/O
- Controlled by analog torque-and-velocity commands
- Includes electronic gearing via X9 connector



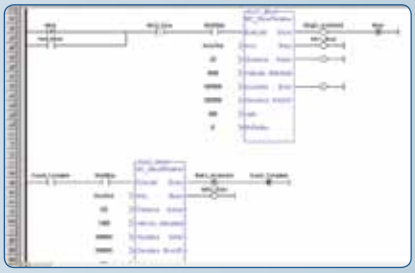
Structured Text Programmable 1.5 Axis Drive ("T" Option)*

- Adds simplified "basic-like" programmability to base AKD
- Greater functionality than simple indexing
- Code is easily portable to higher levels of programmability
- Includes access to 11 digital I/O and 2 analog I/O on base drive
- Includes 2 high-speed digital inputs
- Expandable to 31 digital I/O and 4 analog I/O

** In Process*

Basic Operation Single-Axis

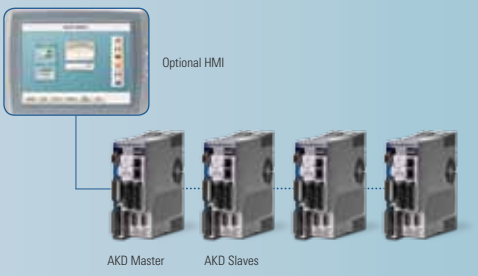
RANGE OF KOLLMORGEN AUTOMATION SUITE CAPABILITIES



Kollmorgen Automation Suite Programmable Drive*

- Powerful 1,5 axis controller: new standard for performance!
- All five IEC 61131-3 languages (Structured Text, Function Block Diagram, Ladder Diagram, Instruction List, Sequential Function Chart) for process programming (soft PLC)
- PLCopen for motion programming
- Exclusive function blocks such as "wait" and "interrupt" so your program can act as a scanning language or sequential language
- Includes access to 11 digital I/O and 2 analog I/O on base drive
- Includes 2 high-speed digital inputs
- Expandable to 31 digital I/O and 4 analog I/O

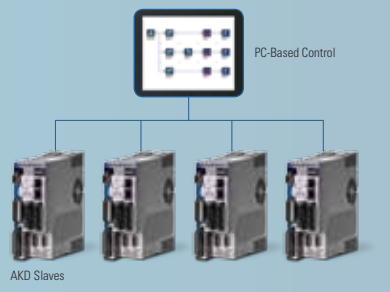
**In Process*



Kollmorgen Automation Suite Programmable Multi-Axis Master*

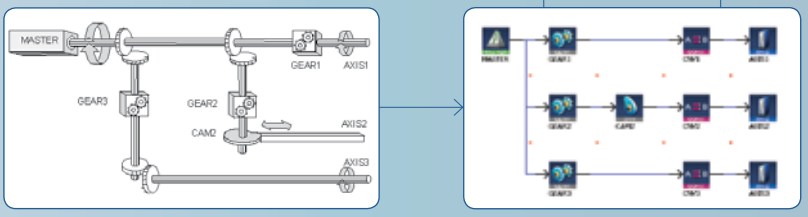
- True synchronized-path control of up to 4 axes
- Sets new standards for precision and optimizes nearly any application
- Easily manages remote I/O via EtherCAT in addition to all drives' I/O
- Pipe Network™ – program sophisticated camming and gearing applications in a matter of minutes
- Adds only 30 millimeters to width of drives below 12 Amps; same size as larger base drives
- Includes 11 digital I/O and 2 analog I/O per axis
- Includes 2 high-speed digital inputs per axis

** In Process*



Kollmorgen Automation Suite Programmable Automation Controller (PAC)

- Capable of controlling up to 128 axes using a PAC and EtherCAT-enabled base AKD
- Easily manages remote I/O via EtherCAT in addition to all drives' I/O
- Sets new standards for precision and optimizes nearly any application
- Pipe Network – program sophisticated camming and gearing applications in a matter of minutes
- Adds only 30 millimeters to width of drives below 12 Amps; same size as larger base drives
- Includes 11 digital I/O and 2 analog I/O per axis
- Includes 2 high-speed digital inputs per axis



Using the exclusive Pipe Network™ provides a one-to-one translation of a mechanical system into a logical world.

Programming

Multi-Axis Programming

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 high-performance drive with world-class Kollmorgen motors very simple.

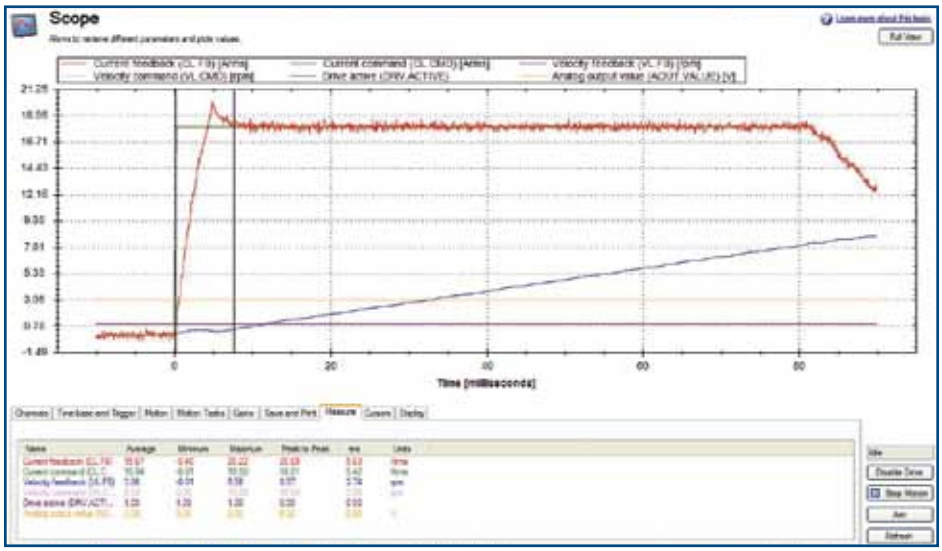
User-Friendly Environment

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

Sleek Six-Channel "Real-Time" Software Oscilloscope

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

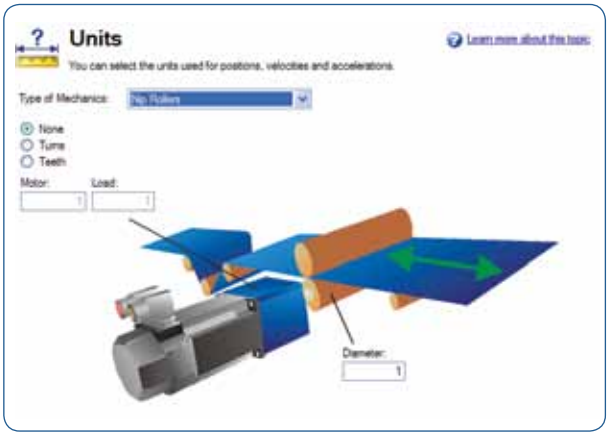
- Save as an image
- Load to an e-mail
- Print



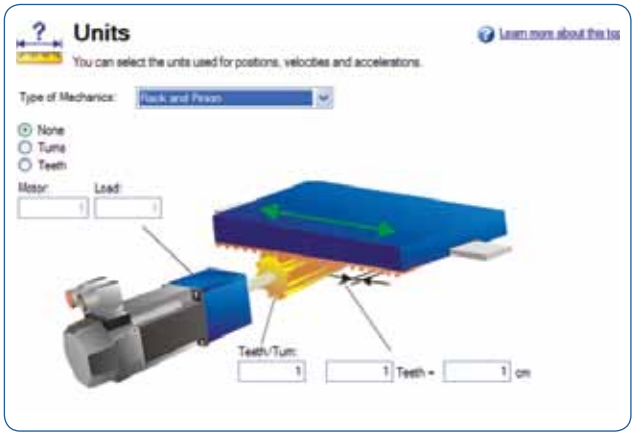
Application Selection

Simplifies set-up by allowing use of machine or application-based units. Nip Roller and Rack and Pinion set-ups shown.

Nip Roller Application Selection

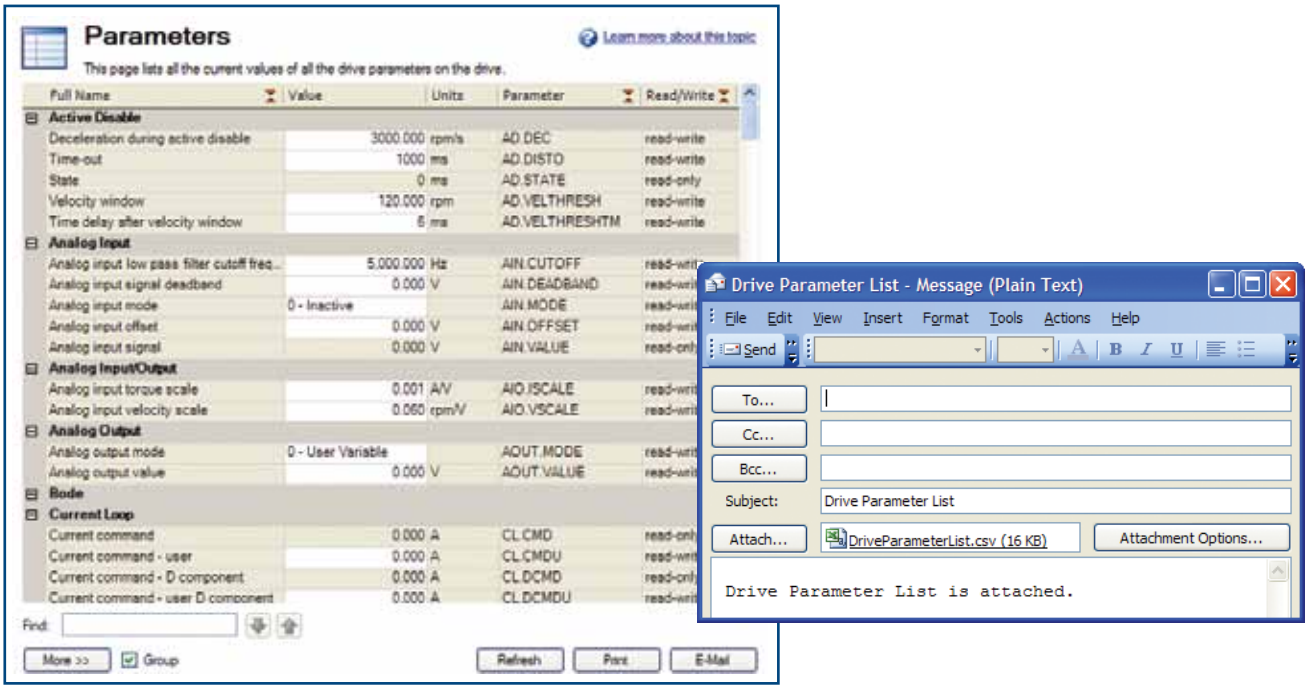


Rack and Pinion Application Selection



Data-Sharing

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



AKD Connector Layout and Functionality

Ethernet Connectivity

- Ethernet-based AKD provides the user with multiple bus choices
- EtherCAT® (DSP402 protocol), Modbus/TCP, SynqNet®, and CANopen®
- No option cards are required

Industrial Design

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

Safe-Torque-Off (STO)

(IEC 61508 SIL2, Certification Pending)

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

Internal Dynamic Braking Resistor

(All powers except 120/240 Vac 3 Arms and 6 Arms)

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

Auto-Tuning

- Optimized performance with auto-tuning, guided tuning, or manual tuning
- Handles inertia mismatches up to 1000:1
- Industry leading bandwidth under compliant and stiff load conditions, no matter the mechanical bandwidth of the machine

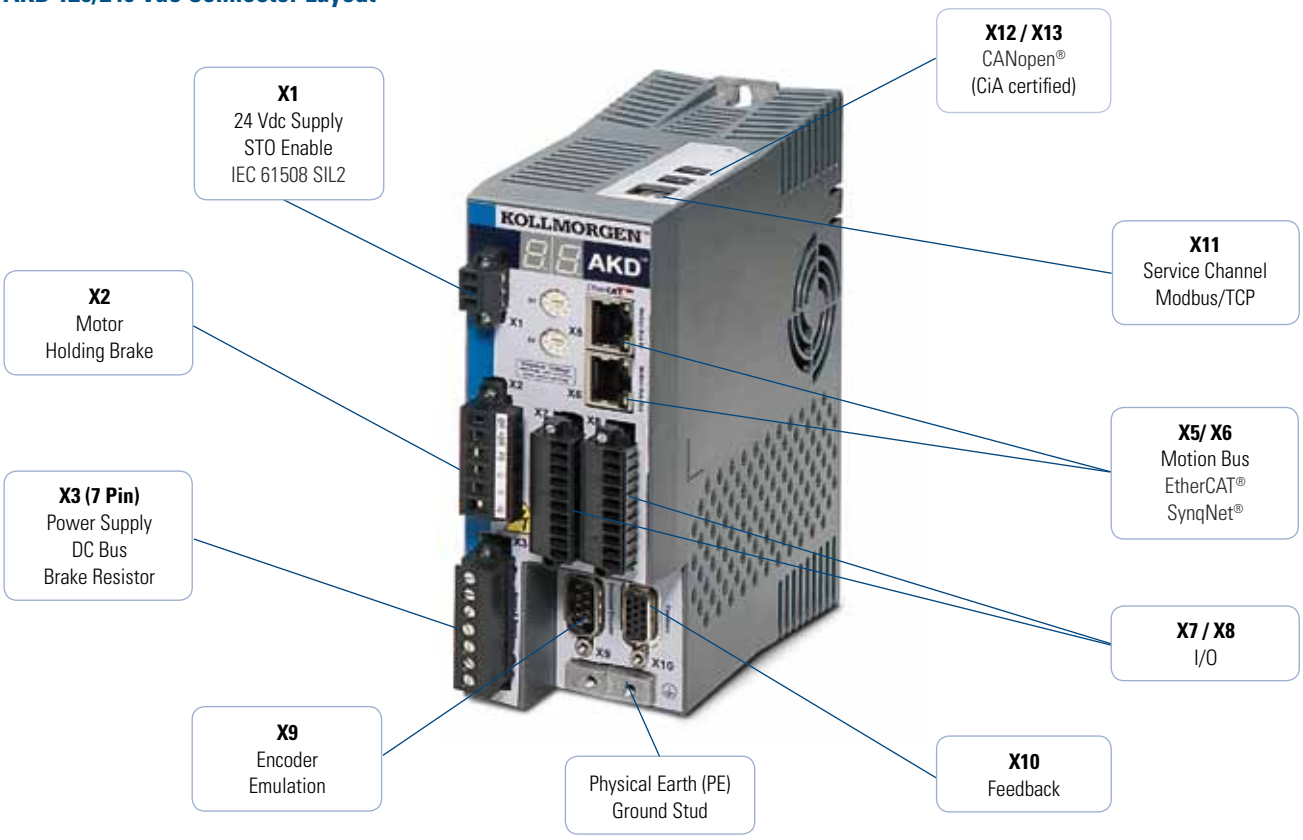
Plug-and-Play with Kollmorgen Motors

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

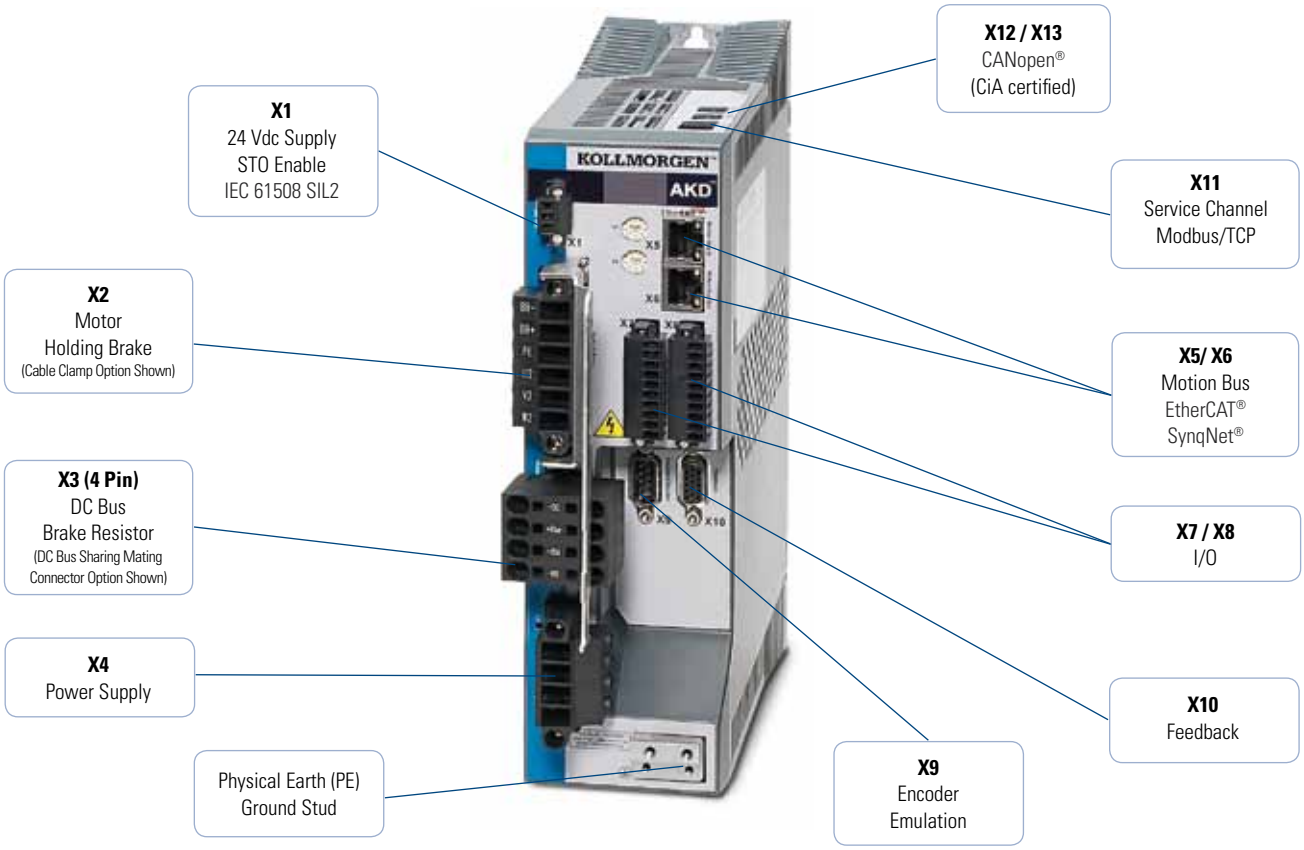
I/O (Base Drive)

- 8 digital inputs (1 dedicated to enable)
- 2 high-speed digital inputs (maximum time delay of 1,0 µs)
- 3 digital outputs (1 dedicated to fault relay)
- 1 analog input - 16 bit
- 1 analog output - 16 bit

AKD 120/240 Vac Connector Layout



AKD 480 Vac Connector Layout



S700 Servo Drive

Integrated safety functions contribute to greater machine availability, and hence, higher productivity. The S700 models include a tested STO (Safe Torque Off) as standard, while optional safety expansion cards are available upon request. The optional safety expansion cards enable many additional safety functions such as “Safe Stop,” “Safe Limited Speed” and “Safe Direction,” for SIL2 or SIL3 applications.

Consistent high-performance control electronics are common across the range of S700 servo drives. The fast current controller, speed controller and onboard position controller deliver the highest quality performance, and ensure that all axes are optimally synchronized at all times. Extremely quick and accurate control enable reduced machine cycle times to help facilitate potentially significant productivity increases.

Special application tasks and functions are programmed with the integrated macro language (IEC 61131). Extensive processes for individual axes can be implemented with the Macrostar development tool.

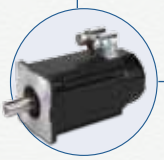
Convenient functions such as auto-tuning, Bode Plots and cogging suppression simplify the adjustment to both high-dynamic and high-precision applications.

Benefits	Key Features
• Increased productivity	• High-speed current, speed and position control results in higher machine cycle rates • SIL2 and SIL3 safety functions to IEC 61508 increase machine availability • Multiple homing methods • 200 motion tasks storable
• One type for all applications	• Multi interface • Multi feedback • Synchron servomotors • Direct drives - rotary and linear motors • Induction machines • HF motors • DC motors
• Smaller switchgear cabinets	• EMV-filter on board • Integrated power supply and brake resistor • Mains choke is not necessary
• Faster startup	• Memory card for parameter & firmware updates • All connections via connectors • Auto-tuning
• Easy to use	• Setup referring to application type • SI-unit calculator • Context sensitive online help • Wiki system for technical background

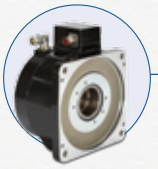
S700 Servo Drive

S700 servo drives can control rotary synchron 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 approaches.

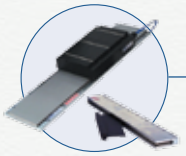
Micron™ Gearheads



AKM™ Servomotors



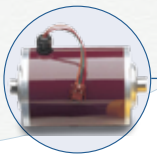
Cartridge Direct Drive Rotary™ Motors



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	S712/30	S724	S724/72	S748	S772
Rated line voltage	V~	1 x 110 V-230 V, 3 x 208 V-10 % … 3 x 480 V+10 %							3 x 280 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=	24								
Rated DC-link voltage	V=	290-675								
Rated output current (rms value)										
At 1 x 110 V*	Arms	2,5	5	6	12	12	24	-	-	-
At 3 x 110 V	Arms	2,5	5	6	12	12	24	-	-	-
At 1 x 230 V*	Arms	2,5	5	6	12	12	24	-	-	-
At 3 x 208 V	Arms	2,5	5	6	12	12	24	24	48	72
At 3 x 230 V	Arms	2,5	5	6	12	12	24	24	48	72
At 3 x 400 V	Arms	2	4	6	12	12	24	24	48	72
At 3 x 480 V	Arms	1,5	3	6	12	12	24	24	48	72
Peak output current (rms value)	Arms	4,5	9	18	24	30	48	72	96	140

*Power Limit

S701-S712

S724

S748 / S772

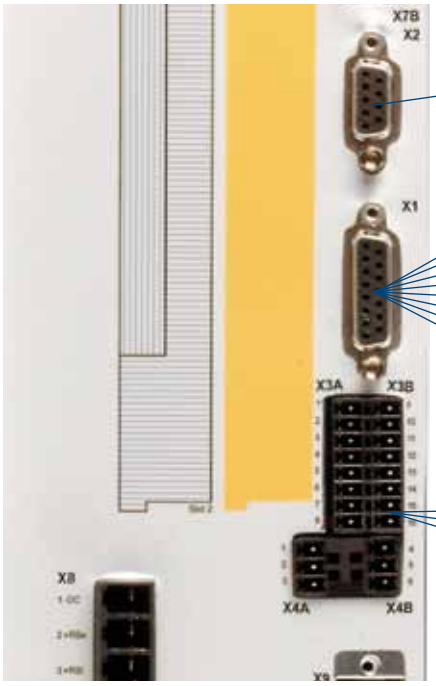
Dimensions

	DIM	S701	S703	S706	S712	S712/30	S724	S724/72	S748	S772
(H) Height incl. Fan	mm	345					348		385	
(W) Width	mm	70					100		190	
(D) Depth incl. Connector	mm	243							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.



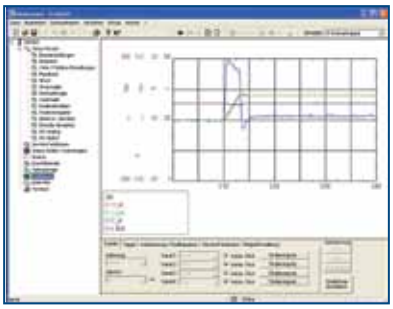
- 2 to 36-pole resolvers
- SinCos encoder with BiSS
- SinCos encoder with EnDat 2.2, EnDat 2.1
- SinCos encoder with HIPERFACE
- SinCos encoder without data track
- SinCos encoder + Hall-effect sensor
- Hall-effect sensor
- Incremental encoder (AquadB) 5 V
- Incremental encoder (AquadB) 5 V + Hall-effect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

Optional
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.

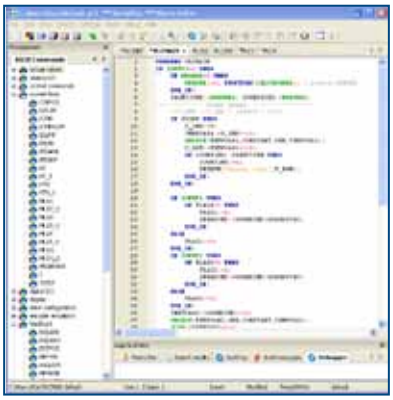
All S700 interfaces can be configured, any connected devices (e.g. motor type, feedback system, fieldbus) can be selected and the Autotuning functions can be launched. A four-channel oscilloscope and Bode Plot ensure optimum display of the auto-tuning results. Specialists are able to address all existing 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. Missed functions in the standard drive firmware can be programmed with IEC 61131 structured text. The development tool MacroStar assists with included variables and commands catalogs 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

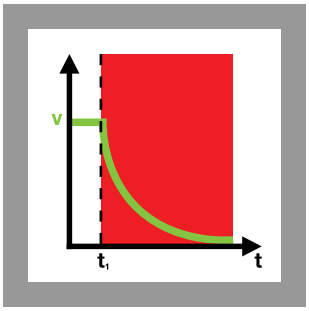


Safety Functions

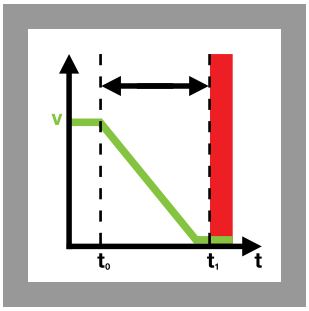
Safe Torque Off (STO) is integrated as standard. The drive for ever-greater productivity means that safe intervention has to be ensured even when the motor remains switched on (in order to hold a load or slow down machinery, for example). That is why the S700 has been equipped with a slot for a safety expansion card, which supports advanced safety functions, such as SIL2 and SIL3.

SIL2 and SIL3 Safety Cards Offer the Following Functions

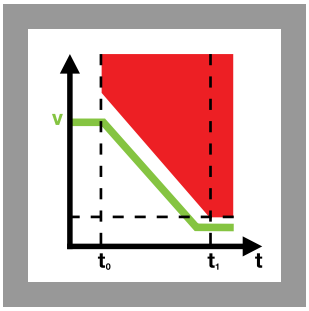
Safe Torque Off (STO)



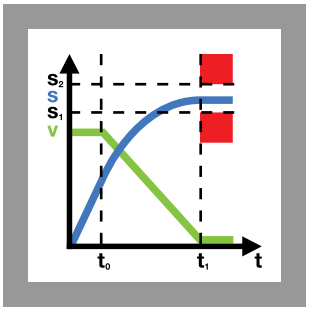
Safe Stop 1 (SS1)



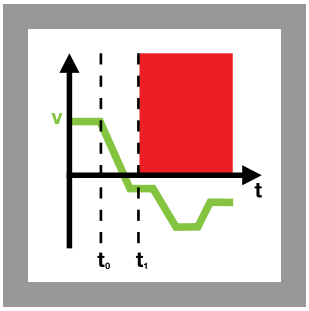
Safe Stop 2 (SS2)



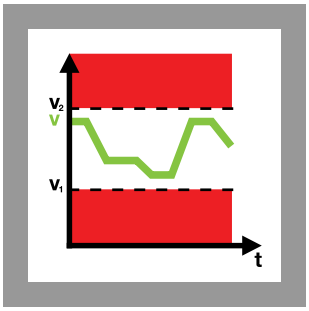
Safe Operating Stop (SOS)



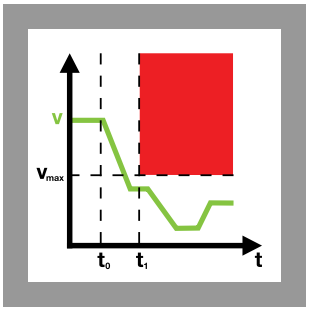
Safe Direction (SDI)



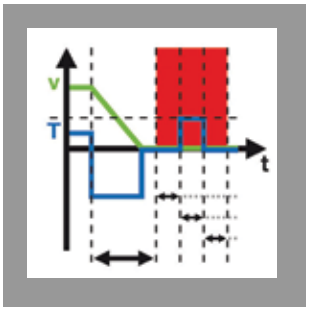
Safe Speed Range 1 (SSR)



Safely Limited Speed (SLS)



Safe Brake Control (SBC) with SIL3 card only



Sources: Pilz, www.pilz.com

Multi Interface

Standard

CANopen EtherCAT **RS232**

Optional/Expansion Card

PROFIBUS DeviceNet SERCOS interface SynqNet

In Preparation

ProfiNET
SERCOS III
Pos I/O - Monitor
Ethernet TCP/IP

S300 Servo Drive

SERVO**STAR**® 300 (S300) Series digital servo drives are compact and easy-to-use drives that offer a maximum range of flexibility to your project design. The small footprint saves space in the switchgear cabinet; the broad connectivity reduces the number of different types of drives.

The S300 models include a tested STO (Safe Torque Off) for SIL2 applications.

Consistent high-performance control electronics are common across the range of S300 servo drives. The fast current controller, speed controller and onboard position controller deliver the highest quality performance, and ensure that all axes are optimally synchronized at all times. Extremely quick and accurate control enable reduced machine cycle times to help facilitate potentially significant productivity increases.

Special application tasks and functions are programmed with the integrated macro language (IEC61131). Extensive processes for individual axes can be implemented with the Macrostar development tool.

Convenient functions such as auto-tuning, Bode Plots and cogging suppression simplify the adjustment to both high-dynamic and high-precision applications.

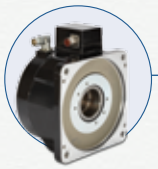
Benefits	Key Features
• Increased productivity	• High-speed current, speed and position control results in higher machine cycle rates • SIL2 STO (Safe Torque OFF) increases machine availability
• One type for all applications	• Multi interface • Multi feedback • Synchron servomotors • Direct drives - rotary and linear motors • Induction machines • HF motors • DC motors • Multiple homeing methods • 200 motion tasks storable
• Smaller switchgear cabinets	• EMV-filter on board • Integrated power supply and brake resistor • Mains choke is not necessary
• Faster startup	• All connections via connectors • Auto-tuning
• Lower system costs	• IEC 601131 structured text • A single device for all application variants • Flexible interfaces make configuration easy
• Easy to use	• Setup referring to application type • SI-unit calculator • Context sensitive online help • Wiki system for technical background

S300 Servo Drive

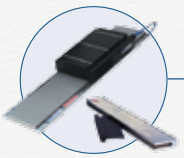
SERVO**STAR**® 300 (S300) servo drives can control rotary Synchron servomotors, induction machines, HF motors, DC motors as well as rotary and linear direct drive motors. The S300 offers a function for suppressing cogging torque within defined traverse distances. This function has been specifically designed 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 approaches.

Micron™ Gearheads

AKM™ Servomotors



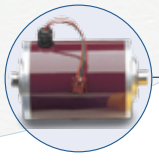
Cartridge Direct Drive Rotary™ Motors



Direct Drive Linear Motors

Induction Machines*

HF Motors*



DC Motors*

*Third party motor types

Best-in-Class Components

S300 works seamlessly with Kollmorgen motors – well-known for quality, reliability, and performance.

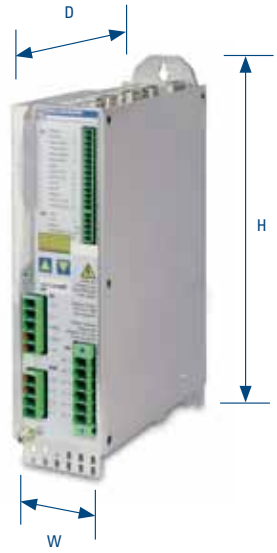
General Specifications

Rated Data	DIM	SERVOSTAR® 300					
		S303	S306*	S310*	S341	S343*	S346*
Rated supply voltage	25	3 x 110 $V_{-10\%}$ ... 230 $V^{+10\%}$			3 x 208 $V_{-10\%}$ ... 480 $V^{+10\%}$		
Rated installed power for S1 operation	kVA	1,2	2,4	4	1,4	3,3	5
Rated DC link voltage	V=	145–360			560–675		
Rated output current (rms value, ± 3 %)/Peak output current (max. 5 s, ± 3 %)							
At 1 x 110 V mains voltage**	Arms	3,5 / 9	8 / 15	10 / 20	–	–	–
At 1 x 230 V/240 V mains voltage	Arms	3 / 9	6 / 15	10 / 20	–	–	–
At 3 x 115 V mains voltage	Arms	3,5 / 9	8 / 15	10 / 20	–	–	–
At 3 x 230 V mains voltage	Arms	3 / 9	6 / 15	10 / 20	2 / 4,5	5 / 7,5	6 / 12
At 3 x 400 V mains voltage	Arms	–	–	–	1,5 / 4,5	4 / 7,5	6 / 12
At 3 x 480 V mains voltage	Arms	–	–	–	1,5 / 4,5	3 / 7,5	6 / 12
Continuous power brake circuit (RBint)	W	20	50	50	20	50	50
Continuous power brake circuit (RBext) max.	kW	0,3	0,3	0,3	0,3	1,0	1,0
Peak power regen brake (RBext) max.	kW	0,75...3	0,75...3	0,75...3	2,1...9	2,1...9	2,1...9

* with fan
** power limit

Dimensions

	SERVOSTAR® 300	
	S303 / S306 / S310	S341 / S343 / S346
(H) Height	246 mm	246 mm
(W) Width	70 mm	70 mm
(D) Depth without connectors	171 mm	171 mm
(D) Depth with connectors	< 200 mm	< 235 mm



STO, Safe Torque Off

A frequently required application task is the protection of personnel against the restarting of drives. The S300 servo drive offers a single channel STO function (Safe Torque Off) that can be used as a personnel safe restart lock. The restart lock concept is certified. The safety circuit concept for realizing the safety function “Safe Torque Off” in the servo drive is suited for SIL2 according to IEC 61508 and PL “d” according to ISO 13849-1.

S300 Servo Drive

Multi Interface

Standard

CANopen

Optional/Expansion Card

SERCOS interface · EtherCAT · PROFIBUS · DeviceNet · SynqNet

Multi Feedback

The S300 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 S300 into different applications is concerned. Control without a feedback system is also supported, e.g. in the case of asynchronous motors.

- SinCos encoder with BiSS
- SinCos encoder with 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

- 2 to 36-pole resolver

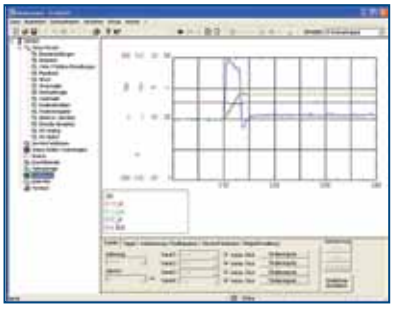
- SSI absolute encoder
- Pulse/direction 5 V

- Incremental encoder (AquadB) 24 V
- Pulse/direction 24 V

Drive GUI setup software

To facilitate initial setup of the S300, we provide graphics-based Windows® software that offers access to all S300 parameters and functions.

All S300 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 Autotuning 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 S300 servo drives. It provides stand-alone, single-axis programmable positioning capability. Missed functions in the standard drive firmware can be programmed with IEC 61131 structured text. The development tool MacroStar assists with included variables and commands catalogs the fast programming of functions.

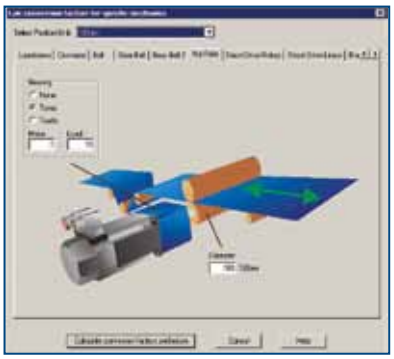
- 62,5 µs / 250 µs / 1 ms / 4 ms / 16 ms / IDLE / IRQ
- 128 kByte code memory
- 400 simple instructions every 62,5 µs
- CAN objects for multi-axis control

SI unit calculation

Thanks to the convenient, integrated tool for calculating the application parameters in SI units, the preferred SI units can always be used for position, speed and acceleration.

This not only eases operation, it also minimizes commissioning time and limits the amount of rejects at the start of production.

The SI unit calculator can also be easily scaled to deal with complex applications.



Servo System Components

When you need precise position control, choose from Kollmorgen's broad portfolio of Servo System components. Our unparalleled product line breadth provides great flexibility for any application. Whether it's any combination of motors and drives, cables, controller, 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.

Benefits	Key Features
• Same size AKM delivers up to 47% more shaft power than before • Reduction in drive size and motor size • Reduction in system cost	• Optimized AKM and Direct Drive motor windings to AKD Drive
• Reduction in set-up time for each servo system • Immediate and adaptive response to dynamic loads optimizes performance in seconds • Precise control of all motor types • Compensation for stiff and compliant transmissions and couplings	• Plug-and-play motor-recognition drive commissioning for AKM, CDDR and DDR motor families • Industry-leading and patent pending auto-tuning algorithms
• Improve machine precision with high resolution and improved accuracy • Reduce cycle time and sensor-and-wiring costs by eliminating traditional homing methods	• New lower cost multi-turn feedback option
• Don't let motor size dictate the size of your machine • Fit more motor into a smaller space than you thought possible	• Industry-leading motor power density
• Over 50.000 standard motor variations including a wide range of mounting, connectivity, feedback and other options • Flexibility provides choices to help you find an exact-fit solution • Simplifies or eliminates mechanical modifications and engineering adaptation	• AKM offers 25 frame-stack combinations and nearly 120 standard windings in a single motor line • CDDR offers 17 frame-stack combinations and 31 windings • DDR offers 12 frame-stack combinations and 12 windings
• Apply AKM into hostile industrial applications with confidence and long-term reliability	• New IP67 protection class 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 Vac operation
- Flexible flange mount and shaft options
- Industry leading low-cogging contributing to extreme smoothness
- Wide feedback options for high-performance and precision or rugged environment
- Unmatched customization – special windings, special shafts, and much more

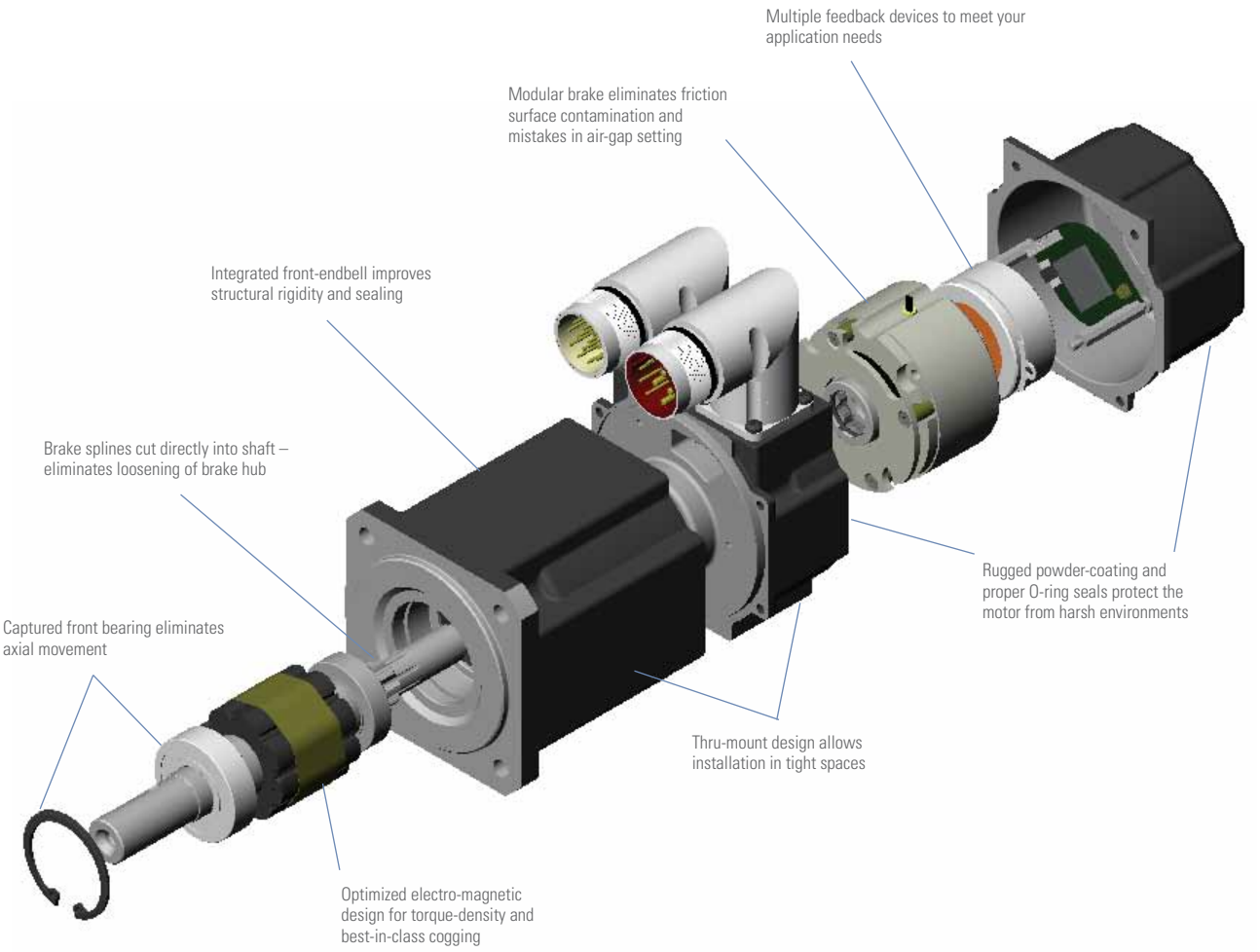
AKD with AKM Plug-and-Play Feedback

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 Accuracy (arc-min)	Single-turn Absolute Resolution (bits)	Single-turn Absolute Motor Key	Multi-turn Absolute Accuracy (arc-min)	Multi-turn Absolute Resolution (bits)	Multi-turn Absolute Motor Key
Value Line	AKM1	16	24	C	–	–	–
	AKM2-3	9	24	C	8	20	LB
	AKM4-8	9	24	C	4,66	20	LB
Performance Line	AKM2-4	1,0	20	DA	1,0	20	DB
	AKM5-8	0,333	20	DA	0,333	20	DB

AKM (Exploded) 3D Model Shows Key Design Features



AKM Servomotor

Performance Data

AKM Motor		Servo Drive			Frame Size NEMA/ mm	Cont. Torque at stall Tcs Nm (lb-in)	Peak Torque at stall Tps Nm (lb-in)	Rated Speed Nrtd RPM	Power Prtd watts	Inertia (Jm) Kg-cm^2 (lb-in-s^2 x10^{-3})
		AKD	S300	S700						
120 Vac	AKM11B	X00306	S30361	-	17/ 40	0,18 (1,59)	0,61 (5,4)	4000	80	0,017 (0,015)
	AKM11C	X00306	S30361	-	17/ 40	0,19 (1,68)	0,62 (5,5)	6000	110	0,017 (0,015)
	AKM12C	X00306	S30361	-	17/ 40	0,31 (2,74)	1,08 (9,56)	4000	130	0,031 (0,0274)
	AKM12E	X00306	S30361	-	17/ 40	0,31 (2,74)	0,91 (8,05)	8000	230	0,031 (0,0274)
	AKM13C	X00306	S30361	-	17/ 40	0,41 (3,63)	1,46 (12,9)	3000	130	0,045 (0,040)
	AKM13D	X00306	S30361	-	17/ 40	0,40 (3,54)	1,36 (12,0)	7000	270	0,045 (0,040)
	AKM21C	X00306	S30361	-	23/ 60	0,48 (4,25)	1,48 (13,1)	2500	120	0,107 (0,095)
	AKM21E	X00306	S30361	-	23/ 60	0,47 (4,16)	1,21 (10,7)	7000	300	0,107 (0,095)
	AKM22C	X00306	S30361	-	23/ 60	0,84 (7,43)	2,39 (21,2)	1000	90	0,161 (0,142)
	AKM22E	X00306	S30361	-	23/ 60	0,87 (7,70)	2,42 (21,4)	3500	290	0,107 (0,095)
	AKM23D	X00306	S30361	-	23/ 60	1,15 (10,2)	3,89 (34,4)	1500	180	0,216 (0,191)
	AKM23F	X00606	S30661	-	23/ 60	1,18 (10,4)	3,88 (34,3)	4500	500	0,216 (0,191)
	AKM24D	X00306	S30361	-	23/ 60	1,40 (12,4)	4,84 (42,8)	1500	210	0,270 (0,239)
	AKM24F	X00606	S30661	-	23/ 60	1,41 (12,5)	4,82 (42,7)	3000	420	0,270 (0,239)
	AKM31E	X00306	S30361	-	na/ 80	1,20 (10,6)	3,23 (28,6)	2500	310	0,330 (0,292)
	AKM32E	X00306	S30361	-	na/ 80	2,04 (18,1)	5,97 (52,8)	1000	210	0,590 (0,522)
	AKM32H	X00606	S30661	-	na/ 80	2,10 (18,6)	6,22 (55,1)	3000	620	0,590 (0,522)
	AKM33H	X00606	S30661	-	na/ 80	2,87 (25,4)	8,55 (75,7)	2500	690	0,850 (0,752)
	AKM41E	X00306	S30361	-	34/ 90	2,01 (17,8)	5,33 (47,2)	1200	240	0,810 (0,717)
	AKM41H	X00606	S30661	-	34/ 90	2,05 (18,1)	5,49 (48,6)	3000	580	0,810 (0,717)
	AKM43H	X00606	S30661	-	34/ 90	4,82 (42,7)	14,0 (124)	1200	560	2,09 (1,85)
	AKM43L	X01206	S31061	-	34/ 90	4,73 (41,9)	11,7 (104)	3000	1190	2,09 (1,85)
	AKM44H	X00606	S30661	-	34/ 90	5,89 (43,3)	17,0 (150)	1000	570	2,73 (2,42)
	AKM51H	X00606	S30661	-	42/ 115	4,79 (42,4)	11,7 (104)	1200	560	3,42 (3,03)
	AKM51L	X01206	S31061	-	42/ 115	4,89 (43,3)	10,6 (93,8)	3000	1240	3,42 (3,03)
	AKM52L	X01206	S31061	-	42/ 115	8,67 (76,7)	19,6 (173)	1500	1240	6,22 (5,51)
	AKM53L	X01206	S31061	-	42/ 115	11,6 (103)	26,5 (235)	1200	1350	9,12 (8,07)
	AKM54L	X01206	S31061	-	42/ 115	13,5 (119)	31,3 (277)	1200	1630	11,9 (10,6)
240 Vac	AKM11B	X00306	S30361	S701	17/ 40	0,18 (1,59)	0,61 (5,4)	8000	140	0,017 (0,015)
	AKM12C	X00306	S30361	S701	17/ 40	0,31 (2,74)	1,08 (9,56)	8000	230	0,031 (0,0274)
	AKM13C	X00306	S30361	S701	17/ 40	0,41 (3,63)	1,46 (12,9)	8000	300	0,045 (0,040)
	AKM21C	X00306	S30361	S701	23/ 60	0,48 (4,25)	1,48 (13,1)	8000	320	0,107 (0,095)
	AKM22C	X00306	S30361	S701	23/ 60	0,84 (7,43)	2,73 (24,2)	3500	290	0,161 (0,142)
	AKM22E	X00306	S30361	S703	23/ 60	0,87 (7,70)	2,42 (21,4)	8000	580	0,161 (0,142)
	AKM23D	X00306	S30361	S703	23/ 60	1,15 (10,2)	3,89 (34,4)	5000	530	0,216 (0,191)
	AKM23F	X00606	S30661	S706	23/ 60	1,18 (10,4)	3,88 (34,3)	8000	780	0,216 (0,191)
	AKM24D	X00306	S30361	S703	23/ 60	1,40 (12,4)	4,84 (42,8)	4000	540	0,270 (0,239)
	AKM24F	X00606	S30361	S703	23/ 60	1,41 (12,5)	4,82 (42,7)	8000	930	0,270 (0,239)
	AKM31C	X00306	S30361	S701	na/ 80	1,15 (10,2)	3,87 (34,3)	2500	290	0,330 (0,292)
	AKM31E	X00306	S30361	S703	na/ 80	1,20 (10,6)	3,23 (28,6)	6000	600	0,330 (0,292)
	AKM32E	X00306	S30361	S703	na/ 80	2,04 (18,1)	5,97 (52,8)	3000	600	0,590 (0,522)
	AKM32H	X00606	S30661	S706	na/ 80	2,10 (18,6)	6,22 (55,1)	7000	1060	0,590 (0,522)
	AKM33E	X00306	S30361	S703	na/ 80	2,80 (24,8)	8,95 (79,2)	2000	550	0,850 (0,752)
	AKM33H	X00606	S30661	S706	na/ 80	2,87 (25,4)	8,55 (75,7)	5500	1300	0,850 (0,752)
	AKM41E	X00306	S30361	S703	34/ 90	2,01 (17,8)	5,33 (47,2)	3000	570	0,810 (0,717)
	AKM41H	X00606	S30661	S706	34/ 90	2,05 (18,1)	5,49 (48,6)	6000	1010	0,810 (0,717)
	AKM42E	X00306	S30361	S703	34/ 90	3,42 (30,3)	9,74 (86,2)	1800	590	1,45 (1,28)
	AKM42G	X00606	S30661	S706	34/ 90	3,51 (31,1)	11,0 (97,4)	3500	1060	1,45 (1,28)
	AKM43H	X00606	S30661	S706	34/ 90	4,82 (42,7)	14,0 (124)	3000	1210	2,09 (1,85)
	AKM43L	X01206	S31061	S712	34/ 90	4,73 (41,9)	11,7 (104)	6000	1590	2,09 (1,85)
	AKM44E	X00306	S30361	S703	34/ 90	5,79 (51,2)	16,5 (146)	1200	660	2,73 (2,42)
	AKM44H	X00606	S30661	S706	34/ 90	5,89 (43,3)	17,0 (150)	2500	1220	2,73 (2,42)

Performance Data

AKM Motor		Servo Drive			Frame Size NEMA/ mm	Cont. Torque at stall Tcs Nm (lb-in)	Peak Torque at stall Tps Nm (lb-in)	Rated Speed Nrtd RPM	Power Prtd watts	Inertia (Jm) Kg-cm^2 (lb-in-s^2 x10^{-3})
		AKD	S300	S700						
240 Vac	AKM51H	X00606	S30661	S706	42/ 115	4,79 (42,4)	11,7 (104)	3000	1220	3,42 (3,03)
	AKM51L	X01206	S31061	S712	42/ 115	4,89 (43,3)	10,6 (93,8)	6000	1260	3,42 (3,03)
	AKM52H	X00606	S30661	S706	42/ 115	8,48 (75,1)	21,6 (191)	1800	1420	6,22 (5,51)
	AKM52L	X01206	S31061	S712	42/ 115	8,67 (76,7)	19,6 (173)	3500	2350	6,22 (5,51)
	AKM53H	X00606	S30661	S706	42/ 115	10,5 (92,9)	27,8 (246)	1500	1650	9,12 (8,07)
	AKM53L	X01206	S31061	S712	42/ 115	11,6 (103)	26,5 (235)	2500	2510	9,12 (8,07)
	AKM54H	X00606	S30661	S706	42/ 115	14,2 (126)	37,5 (332)	1000	1400	11,9 (10,6)
	AKM54L	X01206	S31061	S712	42/ 115	13,5 (119)	31,3 (277)	2500	3010	11,9 (10,6)
	AKM62H	X00606	S30661	S706	na/ 142	11,9 (105)	29,61 (262)	1000	1170	16,9 (15,0)
	AKM62L	X01206	S31061	S712	na/ 142	12,2 (108)	26,3 (233)	2500	2620	16,9 (15,0)
	AKM63L	X01206	S31061	S712	na/ 142	16,8 (149)	39,3 (348)	1500	2330	24,2 (21,4)
	AKM63N	X02406	-	S724	na/ 142	17,0 (150)	40,3 (357)	3000	4080	24,2 (21,4)
	AKM64L	X01206	-	S712	na/ 142	19,7 (174)	44,4 (393)	1500	2890	31,6 (28,0)
	AKM64Q	X02406	-	S724	na/ 142	19,5 (173)	43,1 (381)	3000	4810	31,6 (28,0)
	AKM65L	X01206	-	S712	na/ 142	24,6 (218)	55,4 (490)	1300	3040	40,0 (35,4)
	AKM65P	X02406	-	S724	na/ 142	24,5 (217)	53,9 (477)	2400	4790	40,0 (35,4)
	AKM72P	X02406	-	S724	na/ 180	29,5 (261)	65,8 (606)	1800	4500	64,5 (57,1)
	AKM72Q	X02406	-	S724	na/ 180	24,5 (217)	56,0 (496)	2000	4860	64,5 (57,1)
	AKM73P	X02406	-	S724	na/ 180	41,4 (366)	95,3 (828)	1300	4700	92,1 (81,5)
	AKM73Q	X02406	-	S724	na/ 180	33,0 (292)	76,1 (674)	1500	5250	92,1 (81,5)
	AKM74Q	X02406	-	S724	na/ 180	46,8 (414)	90,7 (803)	1200	5380	120 (106)
400 Vac	AKM22C	X00307	S30101	S701	23/ 60	0,84 (7,43)	2,73 (24,2)	8000	570	0,161 (0,142)
	AKM23D	X00307	S30301	S703	23/ 60	1,15 (10,2)	3,89 (34,4)	8000	760	0,216 (0,191)
	AKM24D	X00307	S30301	S703	23/ 60	1,40 (12,4)	4,84 (42,8)	8000	920	0,270 (0,239)
	AKM31C	X00307	S30101	S701	na/ 80	1,15 (10,2)	3,87 (34,3)	5000	520	0,330 (0,292)
	AKM32E	X00307	S30301	S703	na/ 80	2,04 (18,1)	5,97 (52,8)	6500	1020	0,590 (0,522)
	AKM33E	X00307	S30301	S703	na/ 80	2,80 (24,8)	8,95 (79,2)	4500	1100	0,850 (0,752)
	AKM41E	X00307	S30301	S703	34/ 90	2,01 (17,8)	5,33 (47,2)	6000	990	0,810 (0,717)
	AKM42E	X00307	S30301	S703	34/ 90	3,42 (30,3)	9,74 (86,2)	3500	1030	1,45 (1,28)
	AKM42G	X00607	S30601	S706	34/ 90	3,51 (31,1)	11,0 (97,4)	6000	1470	1,45 (1,28)
	AKM43H	X00607	S30601	S706	34/ 90	4,82 (42,7)	14 (124)	5500	1620	2,09 (1,85)
	AKM44E	X00307	S30301	S703	34/ 90	5,79 (51,2)	16,5 (146)	2000	1010	2,73 (2,42)
	AKM44H	X00607	S30601	S706	34/ 90	5,89 (43,3)	17,0 (150)	4500	1640	2,73 (2,42)
	AKM51H	X00607	S30601	S706	42/ 115	4,79 (42,4)	11,7 (104)	6000	1230	3,42 (3,03)
	AKM52H	X00607	S30601	S706	42/ 115	8,48 (75,1)	21,6 (191)	3500	2290	6,22 (5,51)
	AKM52L	X01207	S31061	S712	42/ 115	8,67 (76,7)	19,6 (173)	6000	2050	6,22 (5,51)
	AKM53H	X00607	S30601	S706	42/ 115	10,5 (92,9)	27,8 (246)	3000	2770	9,12 (8,07)
	AKM53L	X01207	S31061	S712	42/ 115	11,6 (103)	26,5 (235)	5000	3140	9,12 (8,07)
	AKM54H	X00607	S30601	S706	42/ 115	14,2 (126)	37,5 (332)	1800	2350	11,9 (10,6)
	AKM54L	X01207	S31061	S712	42/ 115	13,5 (119)	31,3 (277)	4500	3830	11,9 (10,6)
	AKM62H	X00607	S30601	S706	na/ 142	11,9 (105)	29,6 (262)	2000	2140	16,9 (15,0)
	AKM62L	X01207	S31061	S712	na/ 142	12,2 (108)	26,3 (233)	5000	3880	16,9 (15,0)
	AKM63L	X01207	S31061	S712	na/ 142	16,8 (149)	39,3 (348)	3000	4040	24,2 (21,4)
	AKM63N	X02407	-	S724	na/ 142	17,0 (150)	40,3 (357)	5000	4900	24,2 (21,4)
	AKM64L	X01207	-	S712	na/ 142	19,7 (174)	44,4 (393)	3000	4900	31,6 (28,0)
	AKM64Q	X02407	-	S724	na/ 142	19,5 (173)	43,1 (381)	5000	5600	31,6 (28,0)
	AKM65L	X01207	-	S712	na/ 142	24,6 (218)	55,4 (490)	2500	5030	40,0 (35,4)
	AKM65P	X02407	-	S724	na/ 142	24,5 (217)	53,9 (477)	4000	6240	40,0 (35,4)
	AKM72L	X01207	-	S712	na/ 180	30,0 (266)	70,5 (624)	1500	3970	64,5 (57,1)
	AKM72P	X02407	-	S724	na/ 180	29,5 (261)	68,5 (606)	3000	6280	64,5 (57,1)
	AKM72Q	X02407	-	S724	na/ 180	24,5 (217)	56,0 (496)	4000	6830	64,5 (57,1)
	AKM73L	X01207	-	S712	na/ 180	41,7 (369)	95,4 (844)	1400	5060	92,1 (81,5)
	AKM73P	X02407	-	S724	na/ 180	41,4 (366)	93,5 (828)	2400	7130	92,1 (81,5)
	AKM73Q	X02407	-	S724	na/ 180	33,0 (292)	76,1 (674)	3000	7920	92,1 (81,5)
	AKM74L	X01207	-	S712	na/ 180	49,7 (440)	114 (1010)	1200	5470	120 (106)
	AKM74P	X02407	-	S724	na/ 180	52,3 (463)	125 (1110)	1800	7050	120 (106)
	AKM74Q	X02407	-	S724	na/ 180	46,8 (414)	90,7 (803)	2500	8250	120 (106)

AKM Servomotor

Performance Data

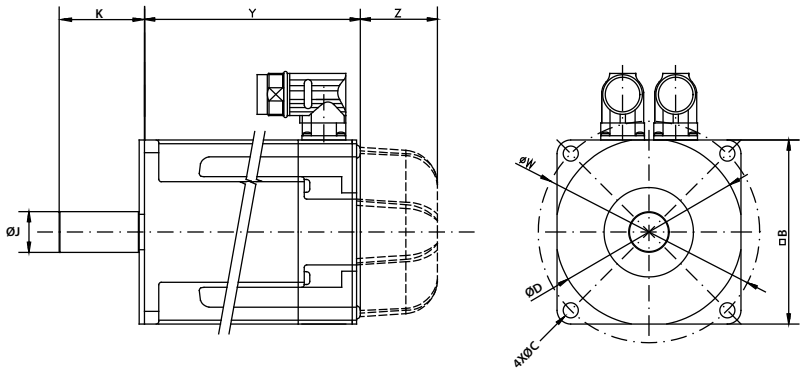
AKM Motor		Servo Drive			Frame Size NEMA/ mm	Cont. Torque at stall Tcs Nm (lb-in)	Peak Torque at stall Tps Nm (lb-in)	Rated Speed Nrtd RPM	Power Prtd watts	Inertia (Jm) Kg-cm^2 (lb-in-s^2 x10^{-3})
		AKD	S300	S700						
480 Vac	AKM22C	X00307	S30101	S701	23/ 60	0,84 (7,43)	2,34 (20,7)	8000	570	0,161 (0,142)
	AKM23D	X00307	S30301	S703	23/ 60	1,15 (10,2)	3,89 (34,4)	8000	760	0,216 (0,191)
	AKM24D	X00307	S30301	S703	23/ 60	1,40 (12,4)	4,84 (42,8)	8000	920	0,270 (0,239)
	AKM31C	X00307	S30101	S701	na/ 80	1,15 (10,2)	3,35 (29,7)	6000	570	0,330 (0,292)
	AKM32E	X00307	S30301	S703	na/ 80	2,04 (18,1)	5,97 (52,8)	8000	1020	0,590 (0,522)
	AKM33E	X00307	S30301	S703	na/ 80	2,80 (24,8)	8,95 (79,2)	5000	1190	0,850 (0,752)
	AKM41E	X00307	S30301	S703	34/ 90	2,01 (17,8)	5,33 (47,2)	6000	990	0,810 (0,717)
	AKM42E	X00307	S30301	S703	34/ 90	3,42 (30,3)	9,74 (86,2)	4000	1140	1,45 (1,28)
	AKM42G	X00607	S30601	S706	34/ 90	3,51 (31,1)	11,0 (97,4)	6000	1470	1,45 (1,28)
	AKM43H	X00607	S30601	S706	34/ 90	4,82 (42,7)	14,0 (124)	6000	1620	2,09 (1,85)
	AKM44E	X00307	S30301	S703	34/ 90	5,79 (51,2)	16,5 (146)	2500	1200	2,73 (2,42)
	AKM44H	X00607	S30601	S706	34/ 90	5,89 (43,3)	17,0 (150)	5500	1690	2,73 (2,42)
	AKM51H	X00607	S30601	S706	42/ 115	4,79 (42,4)	11,7 (104)	6000	1230	3,42 (3,03)
	AKM52H	X00607	S30601	S706	42/ 115	8,48 (75,1)	21,6 (191)	4000	2420	6,22 (5,51)
	AKM52L	X01207	S31061	S712	42/ 115	8,67 (76,7)	19,6 (173)	6000	2050	6,22 (5,51)
	AKM53H	X00607	S30601	S706	42/ 115	10,5 (92,9)	27,8 (246)	3000	2770	9,12 (8,07)
	AKM53L	X01207	S31061	S712	42/ 115	11,6 (103)	26,5 (235)	6000	2540	9,12 (8,07)
	AKM54H	X00607	S30601	S706	42/ 115	14,2 (126)	37,5 (332)	2000	2560	11,9 (10,6)
	AKM54L	X01207	S31061	S712	42/ 115	13,5 (119)	31,3 (277)	5000	3690	11,9 (10,6)
	AKM62H	X00607	S30601	S706	na/ 142	11,9 (105)	29,6 (262)	2400	2480	16,9 (15,0)
	AKM62L	X01207	S31061	S712	na/ 142	12,2 (108)	26,3 (233)	6000	3610	16,9 (15,0)
	AKM63L	X01207	S31061	S712	na/ 142	16,8 (149)	39,3 (348)	3500	4400	24,2 (21,4)
	AKM63N	X02407	-	S724	na/ 142	17,0 (150)	40,3 (357)	6000	4400	24,2 (21,4)
	AKM64L	X01207	-	S712	na/ 142	19,7 (174)	44,4 (393)	3500	5280	31,6 (28,0)
	AKM64Q	X02407	-	S724	na/ 142	19,5 (173)	43,1 (381)	6000	4620	31,6 (28,0)
	AKM65L	X01207	-	S712	na/ 142	24,6 (218)	55,4 (490)	2800	5450	40,0 (35,4)
	AKM65P	X02407	-	S724	na/ 142	24,5 (217)	53,9 (477)	4500	6360	40,0 (35,4)
	AKM72L	X01207	-	S712	na/ 180	30,0 (266)	70,5 (624)	1800	4580	64,5 (57,1)
	AKM72P	X02407	-	S724	na/ 180	29,5 (261)	68,5 (606)	3000	6680	64,5 (57,1)
	AKM72Q	X02407	-	S724	na/ 180	24,5 (217)	56,0 (496)	4500	6640	64,5 (57,1)
	AKM73L	X01207	-	S712	na/ 180	41,7 (369)	95,4 (844)	1500	5620	92,1 (81,5)
	AKM73P	X02407	-	S724	na/ 180	41,4 (366)	93,5 (828)	2400	7130	92,1 (81,5)
	AKM73Q	X02407	-	S724	na/ 180	33,0 (292)	76,1 (674)	3500	8060	92,1 (81,5)
	AKM74L	X01207	-	S712	na/ 180	49,7 (440)	114 (1010)	1400	6080	120 (106)
	AKM74P	X02407	-	S724	na/ 180	52,3 (463)	125 (1110)	1800	7050	120 (106)
	AKM74Q	X02407	-	S724	na/ 180	46,8 (414)	90,7 (803)	3000	8580	120 (106)
	AKM82T*	-	-	S748	na/ 260	80 (708)	170 (506)**	3000	14000**	173
	AKM83T*	-	-	S772	na/ 260	110 (973)	240 (2124)**	2200	19000**	343
	AKM84T*	-	-	S772	na/ 260	150 (1327)	350 (3098)**	2000	23000**	511

* Available May 2010

**Status as of October 2009

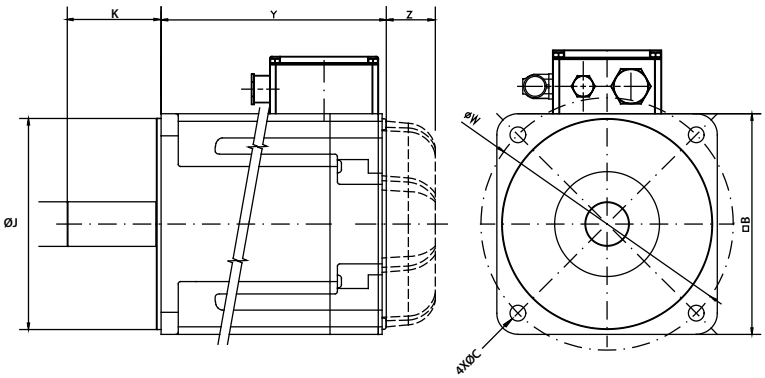
Model with Power Connector

Outline indicative of AKM11 - AKM74



Model with Terminal Box

Outline indicative of AKM82 - AKM84



Dimensions (mm)

Model	Shaft*	Shaft Length	Length 1	Length 2	Length 3	Length 4	Length 5	Resolver / Comcoder	Sine-Encoder
	Ø "J"	"K"	"Y"	"Y"	"Y"	"Y"	"Y"	"Z" (Brake)	"Z" (Brake)
AKM1	8	25	79	98	117	n.a.	n.a.	n.a.	n.a.
AKM2	9	20	95,4	114,4	133,4	152,4	n.a.	34,1	34,1
AKM3	14	30	109,8	140,8	171,8	n.z.	n.a.	30,5	30,5
AKM4	19	40	118,8	147,8	176,8	205,8	n.a.	33,5	33,5
AKM5	24	50	127,5	158,5	189,5	220,5	n.a.	45	61,5
AKM6	32	58	n.a.	153,7	178,7	203,7	228,7	47	66
AKM7	38	80	n.a.	192,5	226,5	260,5	n.a.	42	60,8
AKM8	42/48	80/110	n.a.	263,4	343,9	424,4	n.a.	66	66

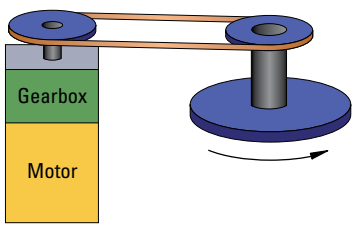
Model	Frame	Bolt Circle*	Mount Hole*	Mount Pilot*
	□ "B"	Ø "W"	Ø "C"	Ø "D"
AKM1	40	36	4.3	30
AKM2	58	63	4.8	40
AKM3	70	75	5.8	60
AKM4	84	100	7	80
AKM5	108	130	9	110
AKM6	138	165	11	130
AKM7	188	215	13.5	180
AKM8	260	250	18.5	230

* Assumes the "A" international mount, other mounts availble see AKM selection guide online.

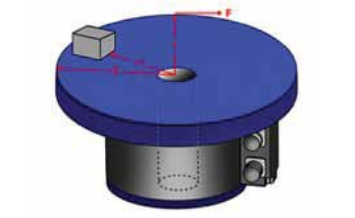
Direct Drive Technology

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



Direct Drive Motor

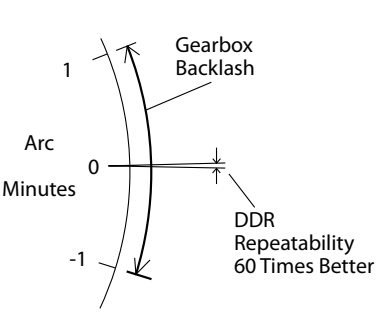
Why Use Direct Drive Technology?

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

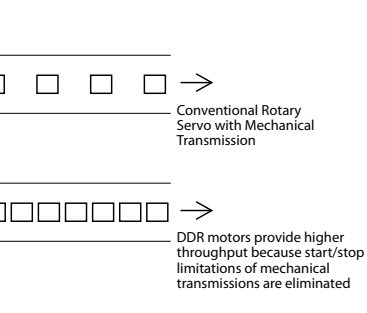


Improved Repeatability

Higher Bandwidth

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

Direct drive 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.



Increased Throughput

Improved Reliability and Zero Maintenance

Gears, belts, and other mechanical transmission parts break. By eliminating these parts and using DDR motors, the reliability of the machine is improved. 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.

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

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 cost of operation. Cartridge DDR motors eliminate all mechanical transmission parts, resulting in the following features:

Cartridge DDR Features

- Assembles as quickly as 5 minutes
- 5 frame sizes, multiple lengths
- Continuous torque range: 4,57 Nm (3.37 lb-ft) to 510 Nm (373 lb-ft), accommodates a wide range of high-power application requirements
- Optimized torque output with high-pole count efficient electromagnetic 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 backlash and compliance provides more responsive system performance

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, resulting in fewer parts to maintain and cost savings.

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 +/- 0,0005 inch where the Press Feed machine with the mechanical transmission has a feed accuracy of 0,002 inch. Therefore, there was an overall four times improvement in machine accuracy with the Cartridge DDR system.

Increased Throughput

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

Improved Reliability and Simplified Maintenance

The Cartridge DDR system eliminates parts that wear, change over time, or fail. 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.

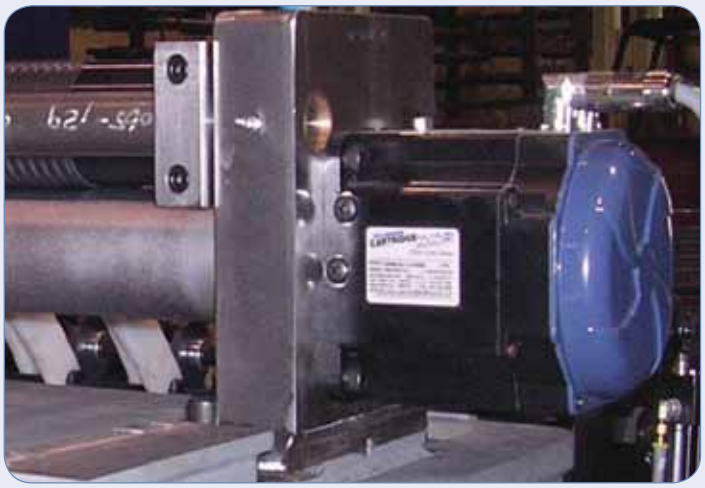
Reduced Audible Noise

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 Vac Performance Data

Cartridge Motor	Servo Drive			Frame Size	Continuous Torque	Peak Torque	Maximum Speed	Weight	Inertia (Jm)
	AKD	S300	S700	mm (in)	Nm (lb-in)	Nm (lb-in)	RPM	kg (lb)	kg-cm^2 (lb-in-s^2 x10^{-3})
C041A	X00306	S30361	S703	108 (4,25)	4,57 (40,4)	12.3 (109)	1750	4,08 (9,00)	5,86 (5,19)
C041B	X00606	S30661	S706	108 (4,25)	4,52 (40,0)	12.2 (108)	2500	4,08 (9,00)	5,86 (5,19)
C042A	X00606	S30661	S706	108 (4,25)	8,25 (73,0)	22.2 (196)	1700	5,67 (12,5)	8,87 (7,85)
C042B	X01206	S31061	S712	108 (4,25)	8,45 (74,8)	22.8 (202)	2500	5,67 (12,5)	8,87 (7,85)
C043A	X00606	S30661	S706	108 (4,25)	11,1 (98,2)	30.0 (265)	1250	7,26 (16,0)	11,9 (10,5)
C043B	X01206	S31061	S712	108 (4,25)	11,2 (99,1)	30.2 (267)	2500	7,26 (16,0)	11,9 (10,5)
C044A	X00606	S30661	S706	108 (4,25)	13,9 (123)	37.4 (331)	1050	8,84 (19,5)	14,9 (13,2)
C044B	X01206	S31061	S712	108 (4,25)	14,1 (125)	37.9 (335)	2150	8,84 (19,5)	14,9 (13,2)
C051A	X00606	S30661	S706	138 (5,43)	11,7 (104)	30.2 (267)	1200	8,39 (18,5)	27,4 (24,2)
C051B	X01206	S31061	S712	138 (5,43)	11,9 (105)	30.6 (271)	2450	8,39 (18,5)	27,4 (24,2)
C052C	X00606	S30661	S706	138 (5,43)	16,9 (150)	43.1 (381)	950	10,7 (23,5)	35,9 (31,8)
C052D	X01206	S31061	S712	138 (5,43)	16,5 (146)	42.3 (374)	2050	10,7 (23,5)	35,9 (31,8)
C053A	X01206	S31061	S712	138 (5,43)	21,0 (186)	54.1 (479)	1350	13,2 (29,0)	44,3 (39,2)
C053B	X02406	-	-	138 (5,43)	20,2 (179)	50.1 (443)	2500	13,2 (29,0)	44,3 (39,2)
C054A	X01206	S31061	S712	138 (5,43)	24,9 (220)	63.8 (565)	1200	15,4 (34,0)	52,8 (46,7)
C054B	X02406	-	-	138 (5,43)	23,8 (211)	61.2 (542)	2500	15,4 (34,0)	52,8 (46,7)
C061A	X01206	S31061	S712	188 (7,40)	33,8 (299)	86.8 (768)	900	18,6 (41,0)	94,1 (83,2)
C061B	X02406	-	-	188 (7,40)	32,6 (288)	75.6 (669)	1950	18,6 (41,0)	94,1 (83,2)
C062C	X01206	S31061	S712	188 (7,40)	48,4 (428)	117 (1040)	700	23,6 (52,0)	126 (112)
C062B	X02406	-	-	188 (7,40)	44,6 (395)	102 (900)	1400	23,6 (52,0)	126 (112)
C063C	X01206	S31061	S712	188 (7,40)	61,8 (547)	157 (1380)	550	29,0 (63,0)	157 (139)
C063B	X02406	-	-	188 (7,40)	59,0 (522)	136 (1200)	1050	29,0 (63,0)	157 (139)
C091A	X02406	S31061	S712	246 (9,68)	50,2 (444)	120 (1060)	600	27,7 (61,0)	280 (248)
C092C	X02406	-	-	246 (9,68)	102 (900)	231 (2050)	450	41,3 (91,0)	470 (416)
C093C	X02406	-	-	246 (9,68)	139 (1230)	317 (2800)	350	54,4 (120)	660 (584)
C131C	X02406	-	-	350 (13,8)	189 (1670)	395 (3500)	250	63,5 (140)	1240 (1100)
C131B	X04806*	-	-	350 (13,8)	190 (1680)	396 (3500)	450	63,5 (140)	1240 (1100)
C132C	X02406	-	-	350 (13,8)	362 (3200)	818 (7240)	120	101 (223)	2250 (1990)
C132B	X04806*	-	-	350 (13,8)	361 (3190)	759 (6720)	225	101 (223)	2250 (1990)
C133C	X02406	-	-	350 (13,8)	499 (4410)	1070 (9890)	100	132 (292)	3020 (2670)
C133B	X04806*	-	-	350 (13,8)	510 (4510)	1090 (9700)	175	132 (292)	3020 (2670)

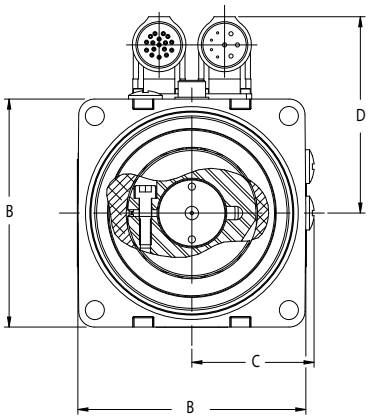
400/480 Vac Systems Performance Data

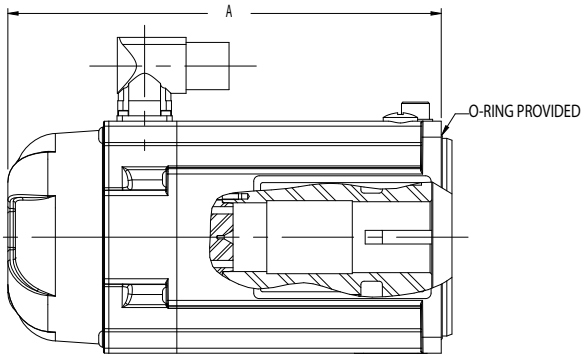
Cartridge Motor	Servo Drive			Frame Size	Continuous Torque	Peak Torque	Maximum Speed RPM		Weight	Inertia (Jm)
	AKD	S300	S700	mm (in)	Nm (lb-in)	Nm (lb-in)	400 Vac	480 Vac	kg (lb)	kg-cm^2 (lb-in-s^2 x10^{-3})
H041A	X00307	S30301	S703	108 (4,25)	4.56 (40.4)	11.3 (100)	2500	2500	4.08 (9.00)	5.86 (5.19)
CH042A	X00607	S30601	S706	108 (4,25)	8.26 (73.1)	19.0 (168)	2500	2500	5.67 (12.5)	8.87 (7.85)
CH043A	X00607	S30601	S706	108 (4,25)	11.1 (98.2)	25.3 (224)	2250	2500	7.26 (16.0)	11.9 (10.5)
CH044A	X00607	S30601	S706	108 (4,25)	13.9 (123)	31.6 (280)	1850	2250	8.84 (19.5)	14.9 (13.2)
CH051A	X00607	S30601	S706	138 (5,43)	11.7 (104)	28.0 (248)	2100	2500	8.39 (18.5)	27.4 (24.2)
CH052C	X00607	S30601	S706	138 (5,43)	16.9 (150)	43.1 (381)	1750	2100	10.7 (23.5)	35.9 (31.8)
CH053A	X01207	-	S712	138 (5,43)	21.0 (186)	54.1 (479)	2350	2500	13.2 (29.0)	44.3 (39.2)
CH054A	X01207	-	S712	138 (5,43)	24.9 (220)	63.8 (565)	2100	2500	15.4 (34.0)	52.8 (46.7)
CH061A	X01207	-	S712	188 (7,40)	33.8 (299)	86.8 (768)	1600	1900	18.6 (41.0)	94.1 (83.2)
CH062C	X01207	-	S712	188 (7,40)	48.4 (428)	117 (1040)	1250	1550	23.6 (52.0)	126 (112)
CH063C	X01207	-	S712	188 (7,40)	61.8 (547)	157 (1380)	950	1150	29.0 (63.0)	157 (139)
CH063B	X02407	-	S724	188 (7,40)	59.0 (522)	136 (1200)	1850	2200	29.0 (63.0)	157 (139)
CH091A	X02407	-	S712	246 (9,68)	50.2 (444)	120 (1060)	1200	1500	27.7 (61.0)	280 (248)
CH092C	X02407	-	S724	246 (9,68)	102 (900)	231 (2050)	800	1000	41.3 (91.0)	470 (416)
CH093C	X02407	-	S724	246 (9,68)	139 (1230)	317 (2800)	700	800	54.4 (120)	660 (584)
CH131C	X02407	-	S724	350 (13,8)	189 (1670)	395 (3500)	500	600	63.5 (140)	1240 (1100)
CH131B	X04807*	-	S748	350 (13,8)	190 (1680)	396 (3500)	800	1000	63.5 (140)	1240 (1100)
CH132C	X02407	-	S724	350 (13,8)	362 (3200)	818 (7240)	250	300	101 (223)	2250 (1990)
CH132B	X04807*	-	S748	350 (13,8)	361 (3190)	759 (6720)	400	500	101 (223)	2250 (1990)
CH133C	X02407	-	S724	350 (13,8)	499 (4410)	1070 (9480)	200	250	132 (292)	3020 (2670)
CH133B	X04807*	-	S748	350 (13,8)	510 (4510)	1090 (9700)	350	400	132 (292)	3020 (2670)

*Available in 2010.

Cartridge DDR C04, C05 and C06 Dimensions

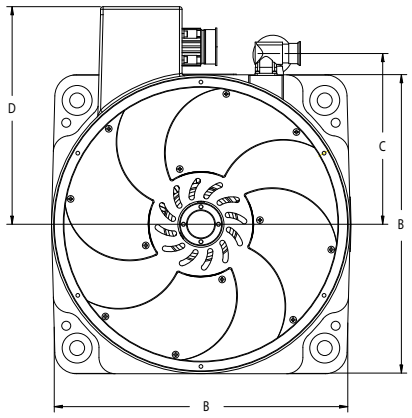
Cartridge Motor	A mm (in)	B mm (in)	C mm (in)	D mm (in)
C(H)041	171 (6,73)	108 (4,25)	59 (2,31)	93 (3,67)
C(H)042	202 (7,95)	108 (4,25)	59 (2,31)	93 (3,67)
C(H)043	233 (9,17)	108 (4,25)	59 (2,31)	93 (3,67)
C(H)044	264 (10,4)	108 (4,25)	59 (2,31)	93 (3,67)
C(H)051	195 (7,68)	138 (5,43)	76 (3,00)	108 (4,25)
C(H)052	220 (8,66)	138 (5,43)	76 (3,00)	108 (4,25)
C(H)053	245 (9,65)	138 (5,43)	76 (3,00)	108 (4,25)
C(H)054	270 (10,6)	138 (5,43)	76 (3,00)	108 (4,25)
C(H)061	226 (8,90)	188 (7,40)	99 (3,88)	133 (5,25)
C(H)062	260 (10,2)	188 (7,40)	99 (3,88)	133 (5,25)
C(H)063	294 (11,6)	188 (7,40)	99 (3,88)	133 (5,25)

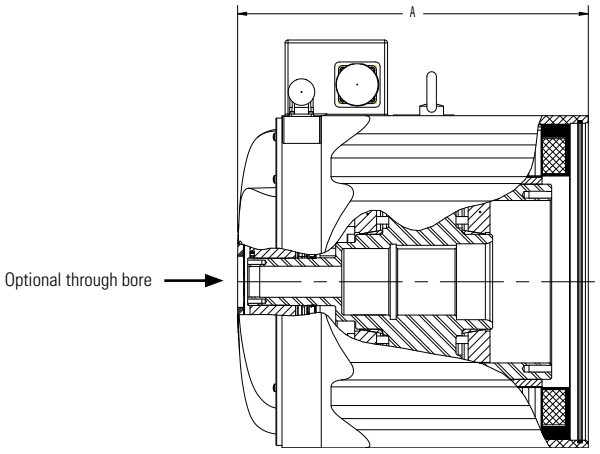




Cartridge DDR C09 and C13 Dimensions

Cartridge Motor	A mm (in)	B mm (in)	C mm (in)	D mm (in)
C(H)091	204 (8,03)	246 (9,68)	149 (5,88)	182 (7,18)
C(H)092	253 (9,96)	246 (9,68)	149 (5,88)	182 (7,18)
C(H)093	302 (11,9)	246 (9,68)	149 (5,88)	182 (7,18)
C(H)131	231 (9,09)	350 (13,8)	200 (7,87)	256 (10,1)
C(H)132	301 (11,9)	350 (13,8)	200 (7,87)	256 (10,1)
C(H)133	370 (14,6)	350 (13,8)	200 (7,87)	256 (10,1)





Micron™ TRUE Planetary™ Gearheads

Helical gears are known for their quiet and smooth operation along with their ability to transmit higher loads than spur gears. Both of these features of helical gearing result from the improved contact ratio (effective teeth in mesh) over spur gears.

A high torque, whisper quiet helical gearhead has been designed by combining the positive attributes of gear crowning and helical gearing with the planetary construction to create the smoothest operating gearhead on the market.

- Innovative gear technology offers size and performance advantages
- RediMount™ system provides error-free and reliable installations

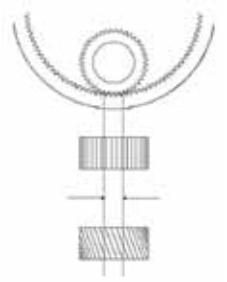
Helical Crowned TRUE Planetary™ Gearing

Features

- High torque capacity
- Low backlash
- Smooth operation
- Greater load sharing
- Whisper quiet

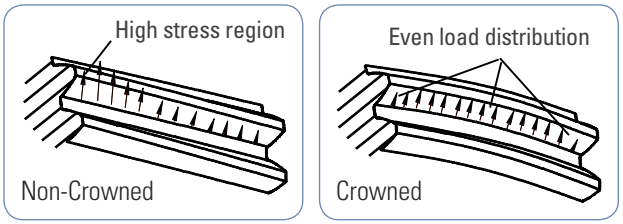
Spur vs. Helical Gearing

Typical contact ratio is 1,5 for spur gearing. Contact ratio for equivalent helical gear is 3,3 – more than double the contact ratio.



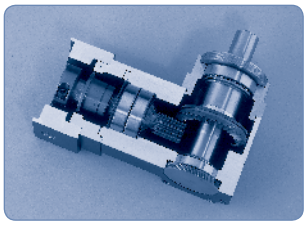
Crowned vs. Non-Crowned

Crowning optimizes the gear mesh alignment within a gear train to increase the torque capacity and reduce noise. It also enhances load distribution on the tooth flank to reduce high stress regions.

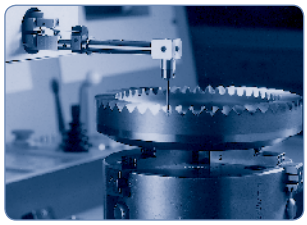


PowerTRUE™ Right Angle Gearheads

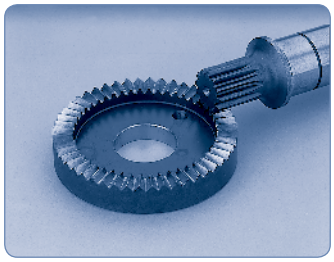
- Lower backlash from single axis mesh adjustment
- A compact design using Face Gear technology
- Whisper quiet operation due to high contact ratio
- Mesh ratios from 1:1 to 5:1
- Extremely efficient (98%)



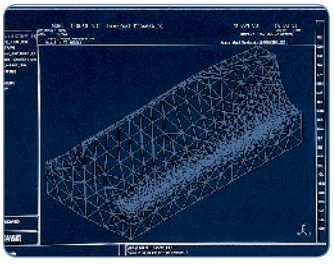
PowerTRUE™ Gear Technology



Computerized mapping of gear tooth profile



All Micron™ Right Angle Gearheads use the PowerTRUE Technology which increases the mesh ratio to 5:1 compared to a maximum of 3:1 typical in bevel gears.



Multiple teeth in the Face Gear simultaneously mesh with a standard involute pinion. The continuous tooth engagement yields a high contact ratio between the gear and the pinion, increasing torque and efficiency.

XTRUE™

The XTRUE Series is a new precision gearhead employing RediMount™ system that compliments our TRUE Planetary gearhead line – already the largest selection of planetary gearheads in the world.

Inline	Frame Size Metric	Max T Peak (Nm)		All Sizes	Gear Ratios Available	Efficiency	Backlash (arc-min)
		1 Stage	2 Stage				
XT040	40 mm	18,3	33,8	1 Stage	3, 4, 5, 7, 10	93%	13
XT060	60 mm	55,0	55,0				
XT080	80 mm	165	175				
XT120	120 mm	298	298	2 Stage	15, 20, 25, 30, 40, 50, 70, 100	88%	15
XT160	160 mm	876	876				

ValueTRUE™

Helical True Planetary gearhead, flange mount design with stainless steel housing employing RediMount™ system.

Inline	Frame Size Metric	Max T Peak (Nm)		All Sizes	Gear Ratios Available	Efficiency	Backlash (arc-min)
		1 Stage	2 Stage				
VT006	61 mm	91	103	1 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	2 Stage	16, 20, 25, 28, 35, 40, 50, 70, 100	93%	5
VT014	141 mm	1066	1271				
VT018	182 mm	2242	2970				
VT022	220 mm	4180	4972				

ValueTRUE™

Helical True Planetary gearhead, flange mount design with stainless steel housing employing RediMount™ system.

Right Angle	Frame Size Metric	Max T Peak (Nm)	All Sizes*	Gear Ratios Available	Efficiency	Backlash (arc-min)
		2 Stage				
VTR006	61 mm	98	2 Stage	4, 5, 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				
VTR115	115 mm	518				
VTR014	141 mm	1206				
VTR018	182 mm	2800				

* 4 and 5:1 ratios not available with VTR006-VTR090.

Note 1: Torque capacity is maximum of frame size stage design, not all ratios have the same rated torque capacity.
Note 2: Torque capacity is the maximum allowable momentary torque for emergency stopping or heavy shock loading.

Optimized Solutions

With Kollmorgen, there's always a way. Because we have decades of experience in developing optimized solutions for motion applications, you can be confident that we can provide the answer to your motion challenges. We have a huge breadth of standard products that can be modified in varying degrees, or we can develop custom motor and electronic products for true optimization.

Working with our proven portfolio of products, we can deliver solutions quickly, often with recognized cost efficiencies and reduced lead times. That means rapid prototyping creation, a shorter design cycle and getting to market faster. We do it all, because motion matters.

Optimized Solutions

Whether it's modifying a product from our standard catalog or a white sheet design for a custom solution, you can rely on decades of Kollmorgen expertise to solve your motion challenges and help your machine stand out from the crowd.

Modified Standard

Because our application expertise runs deep and our product portfolio is so broad, we can take any standard product and modify it a lot or a little to suit many needs—in a very rapid time frame. This approach ensures quality, performance and reliability by leveraging our proven track record.

Kollmorgen application engineers have a great deal of experience helping OEM engineers achieve their objectives. Typical modifications include shaft alterations, feedback type, mounting dimensions, connectors, and making components more rugged, vacuum-rated, radiation- and explosion-proof.

Custom Products

With motion as our core capability, we bring a significant history of innovation to today's engineering challenges. We leverage our design and engineering excellence and technical knowledge to deliver creative new solutions for virtually any need. Our vast experience also helps us deliver a custom product in a surprisingly short time. If you can conceive it, we can make it happen.

Structured Development Process

Working from our broad standard product portfolio, we create fully optimized solutions through the combination of off-the-shelf products, modified standard products and completely custom components. Our proven components and technology are the foundation for all of our solutions, expediting the design cycle and ensuring optimum performance for any application.

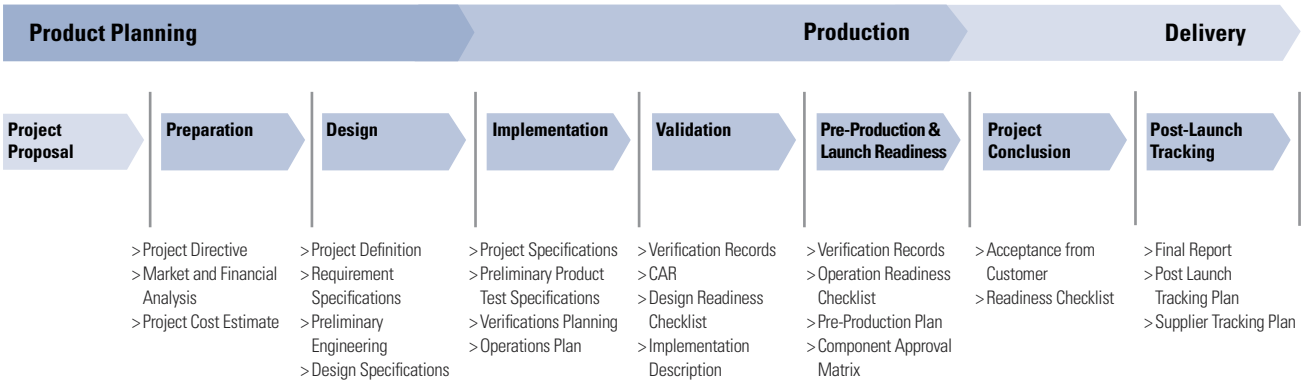
We follow a strict and efficient development process from initial concept to volume production. This ensures that products we develop meet customer needs, are cost effective to manufacture and move quickly from prototype to production. Customer involvement is key to our process, with ongoing collaboration throughout the initiative and multiple approval points to ensure a smooth, successful design cycle from beginning to end.

Why You Should Partner with Kollmorgen

- Experienced Application Engineers help define a customer's needs and identify the optimal Kollmorgen products and technologies
- Products optimized or developed by cross-functional teams to meet customer needs
- Rapid prototyping
- Smooth transition from prototype designs to sustainable and cost effective manufacturing
- Industry-proven quality, performance, and delivery
- Proven technology building blocks mitigate risks of customization

Optimized Solutions Process

Comprehensive design, manufacture and test capabilities ensure the end product meets the customer performance specifications and quality requirements. Our skilled engineering team works directly with each customer throughout the process, quickly taking the prototype to full production.



Proven Design Capabilities

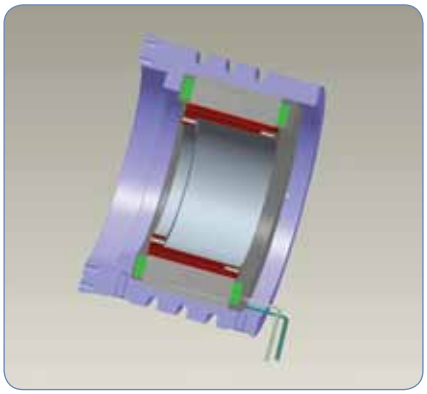
Motor Solutions

- Brushed and brushless motor building blocks used in frameless or housed configurations
- Designed for agency compliance (UL, CE)
- Voltage ratings from 48 Vdc – 600 Vdc, with capabilities in 800 Vdc and up
- Continuous torques from 0,5 Nm – 29.000 Nm
- Proven performance and reliability in a customizable package

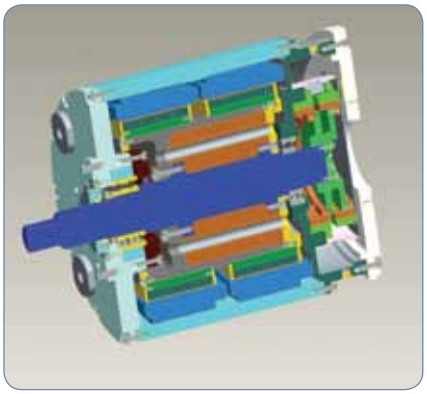
Drive Solutions

- Board-level or packaged solutions supporting single to multi-axis configurations
- AC and DC Servo Drives
- Integrated Controller and Communications options
- Designed for agency approvals (UL 508C, EN 50178, EN 61000-6-6, EN 61800-3, CISPR 14-1, and others available)
- Proprietary technology and software can be embedded into the drive

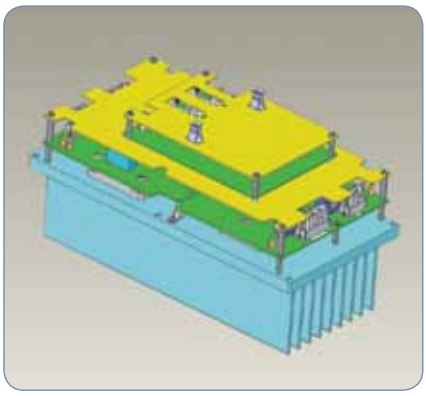
Medical diagnostics drive optimized for form-factor, I/O and EMC



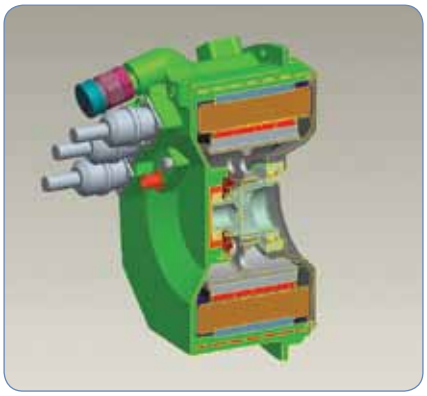
Frameless direct drive rotary motor with water cooling features



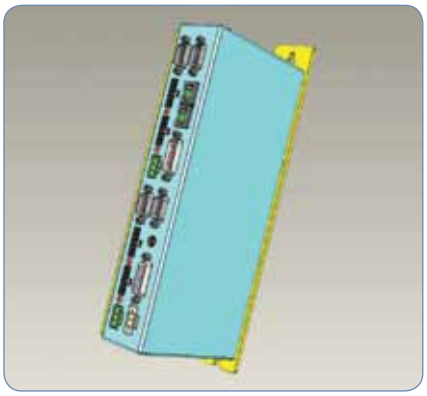
Custom submersible motor



2-axis drive for high-power robotics, optimized for form-factor and communications interface



200 kW electric starter/generator



4-axis drive using SynqNet

Motors and Electronics

Optimized for	Application
Reliability	Implantable heart pumps, military, remote equipment
Precision	Pick and place, satellite tracking, film processing
Package Size	Medical imaging, ground based telescopes, aircraft instrumentation
Weight	Land vehicles, portable equipment, aircraft
Smooth Operation	Medical respirators, high precision robotics, printing and textile machines
Harsh Environments	Deep sea, outer space, high shock and vibration, extreme temperatures

MODEL NOMENCLATURE

AKD Servo Drive

AKD – P 003 06 – NA EC 0000

AKD Series

Version

P = Position indexer (motion tasking)

Current Rating

003 = 3 Amp
006 = 6 Amp
012 = 12 Amp
024 = 24 Amp

Voltage

06 = 120/240 Vac 1Ø/3Ø
07 = 240/400/480 Vac 3Ø

Extension

NA = Without extensions

Connectivity

CN = CANopen
EC = EtherCAT

Variants

0000 = Standard

Note: Options shown in bold blue text are considered standard.

S700 Servo Drive

S7 06 0 2 – EI F2 PM – NA

S700 Series

Current Rating

01 = 1,5 Arms
03 = 3 Arms
06 = 6 Arms
12 = 12 Arms
24 = 24 Arms
48 = 48 Arms
72 = 72 Arms

Voltage Rating

0 = 208…480 V
6 = 110…230 V
(with 1,5 to 24 Arms only)

Electrical Options

2 = Standard
S = Extended Ipeak (with 12 A/24A rated current only)

Expansion Cards Slot 1

NA = No expansion card in Slot 1, EtherCAT and CANopen on board
DN = DEVICENET
PB = PROFIBUS
SE = SERCOS
SN = SYNQNET
EI = I/O extension

Expansion card F2 in Slot 2 can be used combined with a card in Slot 1.

Customizaton/Seal

NA = EtherCAT and CANopen
SN = SYNQNET[1]
PN = PROFINET[1]
S3 = SERCOS III[1]
IP = Ethernet IP[1]
TC = Ethernet TCP/IP[1]

[1] In process

Expansion Cards Slot 3

NA = No expansion card in Slot 3, EtherCAT and CANopen on board
F2 = Fan controller
PM = PosI/O
PA = PosI/O-Monitor
S1 = Safety card SIL 3
S2 = Safety card SIL 2

Expansion Cards Slot 2

NA = No expansion card in Slot 2, EtherCAT and CANopen on board
F2 = Fan controller
PM = PosI/O
PA = PosI/O-Monitor

Expansion card F2 in Slot 2 can be used combined with a card in Slot 1.

Note: Options shown in bold blue text are considered standard.

S300 Servo Drive

S3 06 0 1 – SE*

S300 Series

Current Rating

01 = 1,5 Arms
03 = 3 Arms
06 = 6 Arms
10 = 10 Arms

Voltage Rating

0 = 208…480 V
6 = 110…230 V

Expansions

NA = No expansion, CANopen onboard
FN = Controlled FAN
DN = DEVICENET
PB = PROFIBUS
SE = SERCOS
EC = ETHERCAT
SQ = SYNQNET
I/O = I/O EXTENSION

*Additional coding defines customer specific specials

Electrical Options

1 = STO

Note: Options shown in bold blue text are considered standard.

AKM Brushless Servomotors

AKM 4 2 D – E K C N C- 00

AKM Series

Motor Frame Size

1, 2, 3, 4, 5, 6, 7, 8

Rotor Stack Length

1, 2, 3, 4, 5

Winding Type

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

Mount

A = International standard mount
B = NEMA mount
C = Alternative standard mount
D = Alternative standard mount
G = Alternative standard mount
H = Alternative standard mount
E = NEMA mount
M,T = Reinforced bearings (AKM8)
S = Special

Shaft

C = Closed keyway
K = Open keyway (AKM1)
N = Smooth shaft
S = Special

Customizaton/Seal

00 = Standard motor without shaft seal
01 = Standard motor with shaft seal
Other numbers will be assigned for special motors.

Feedback Device

1- = 1024 PPR digital encoder with commutation
2- = 2048 PPR digital encoder with commutation
C- = Smart Feedback Device (SFD) (available across family)
R- = Resolver
AA = BiSS single-turn absolute (AKM2-8)
AB = BiSS multi-turn absolute (AKM2-8)
DA = Single-turn absolute sine encoder (EnDat2.2, 01) (AKM2-8)
DB = Multi-turn absolute sine encoder (EnDat2.2, 01) (AKM2-8)
LA = Single-turn EnDat ind. encoder
LB = Inductive multi-turn (AKM2-8)
GA = Single-turn HIPERFACE encoder
GB = Multi-turn HIPERFACE encoder
S = Special

Brake

2 = 24 Vdc brake (AKM2-8)
N = No brake
S = Special

Connectors

B = Dual motor-mounted rotatable IP65 connectors (AKM2 only)
C = 0,5 m shielded cables with IP65 connectors (AKM1, 2), motor-mounted rotatable IP65 connectors (AKM3-7)
G = Straight motor-mounted IP65 connectors (AKM2-7)
S = Special
H = Rotatable IP65 connectors size 1,5 for power (only AKM82)
T = Terminal box for power and int. feedback connector size 1,0 (AKM8)

Note: Options shown in bold blue text are considered standard.

Cartridge Direct Drive Rotary Motors

C 09 1 A – 1 1 – 1 1 0 5 ( ) (-)

Cartridge DDR Series
C = 230 Vac winding
CH = 400/480 Vac winding

Frame Size
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

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

Winding Type
A, B, C, D

Mount
1 = Standard flange mount

Connectors
1 = Side connector option (09 and 13 frame sizes only)
2 = Rear connector option (09 and 13 frame sizes only)
3 = 90° rotatable connectors (04, 05 and 06 frame sizes only)

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

Feedback Device
1 = Sine encoder (C09 and C13)
3 = Sine encoder (C04, C05 and C06)

Bearing Option
0 = No bearing design (integral shipping clamp provided)

Unit Sealing
5 = Sealed
(Shaft option "1" – IP64 rating when customer seals interface side)
(Shaft option "2" or "3" – IP65 rating when customer seals interface side)

Agency Certification
Blank = UL/CE certification
S = Non-UL

xxx
Designated for specials. Omit for standard motor.

Note: Options shown in bold blue text are considered standard.

Micron™ TRUE Planetary™ Gearheads

XT 160 – 005 – 0 – ( )

Gearhead Series

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

Motor Model Number

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

Customer Options

0 = None
S = Special

Gearhead Ratio

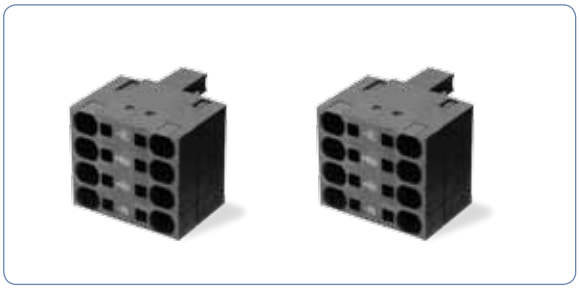
See ratio availability in corresponding gearhead section (pp 42-43)

Gearhead Size

XTRUE™
040 = Size 40
060 = Size 60
080 = Size 80
120 = Size 120
160 = Size 160

ValueTRUE™
ValueTRUE 90™
006 = Size 60
075 = Size 75
090 = Size 90
010 = Size 10
115 = Size 115
014 = Size 14
018 = Size 18
022 = Size 22

Accessories

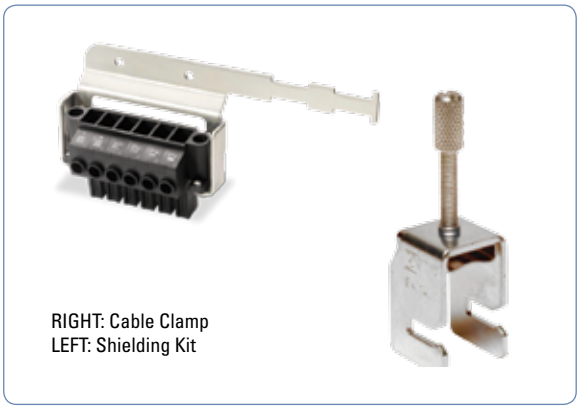


Mating Connectors

The drives includes all screw type mating connectors. Alternative connectors for DC bus and mains sharing are available.

Brake Resistors

We offer a full line of brake resistors up to 6000 watts. Brake resistors are impedance matched with AKD and are available in many sizes and form factors.



RIGHT: Cable Clamp
LEFT: Shielding Kit

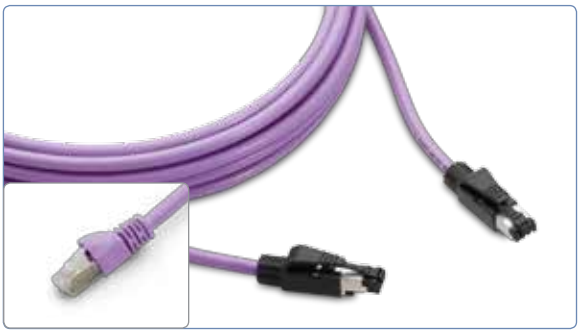
Shielding Solutions

For noisy environments, we offer shielding kits that can be applied to our flexible line cables.

RIGHT: Line Filters
LEFT: Motor Choke

Chokes and Filters

Line filters are offered to improve reliability and to protect the life of the machine in less stable environments. Motor chokes reduce radiated emissions.



Motion Bus and Service Port Cables

We offer industrial shielded PUR cables with RJ45 connections for demanding industrial environments. These cables outperform office cables in EMC resilience, durability, and life.

Motor and Feedback Cables

We offer industrial shielded PUR cables. All cables are suited for use as trailing cables. All cables have CE and are UL recognized.

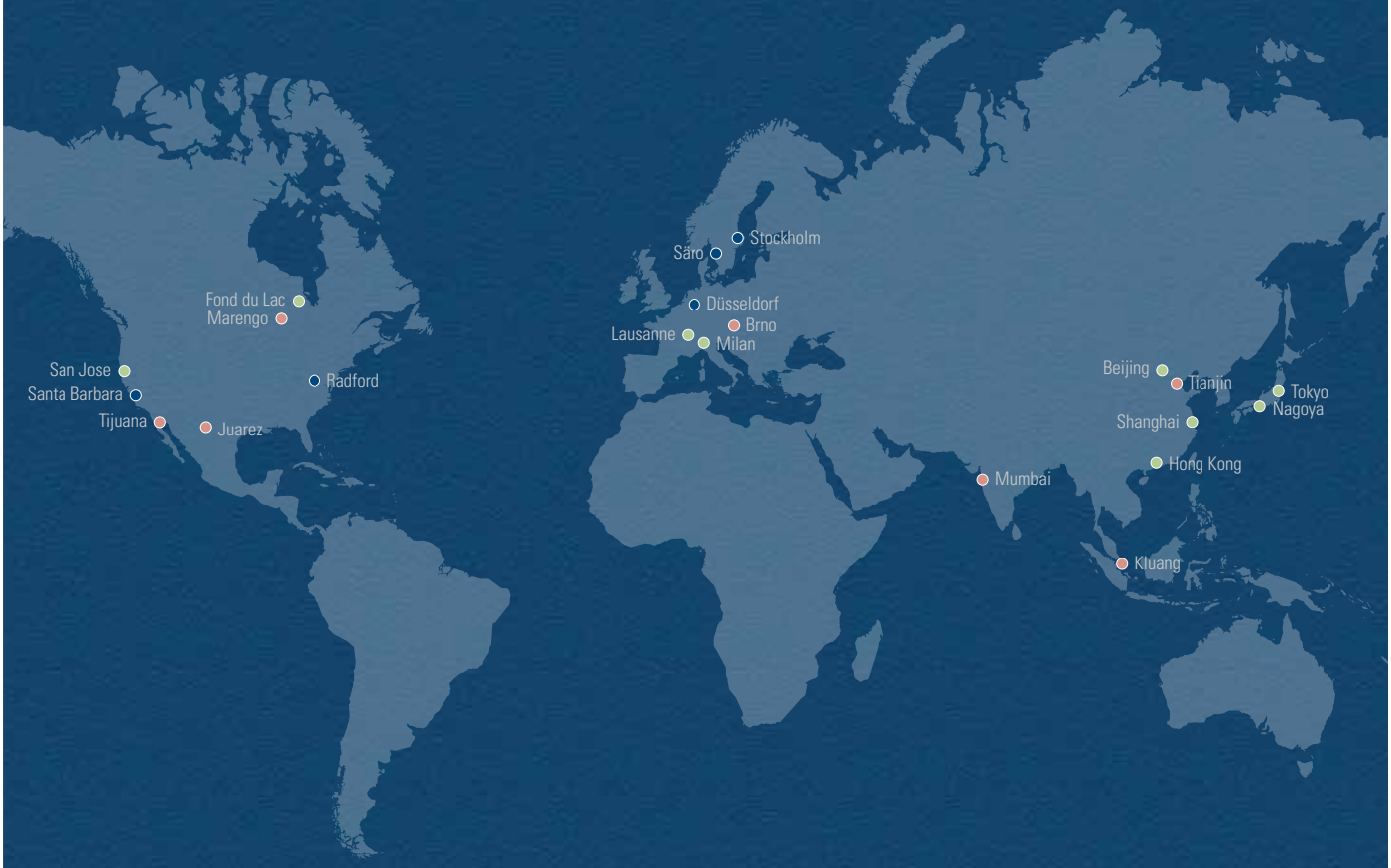
For more information on our accessories, visit Kollmorgen.com

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.



KOLLMORGEN®

Because Motion Matters™

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