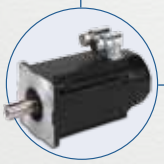
Kollmorgen Servo Systems Catalog

S700 Servo Drive

Micron™ Gearheads



AKM™ Servomotors

Cartridge Direct Drive Rotary™ Motors

AKD™ Servo Drive

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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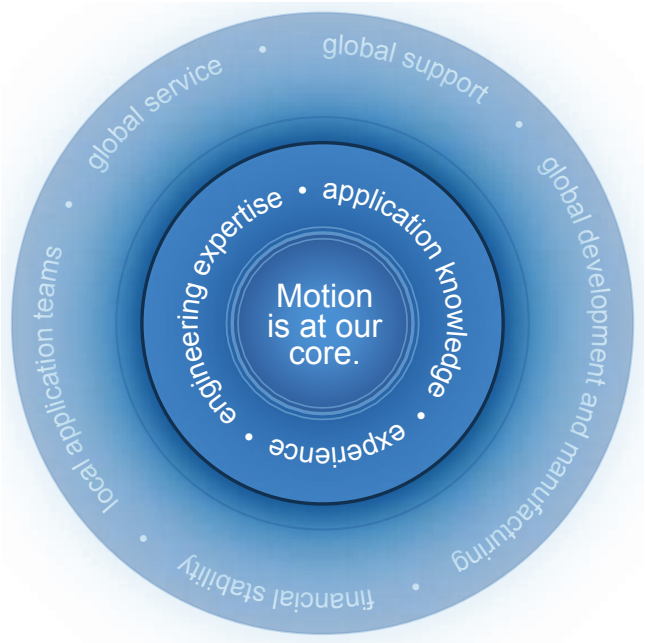


AKD™ Servo Drive

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%.

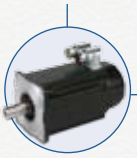
* Patents pending.

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*

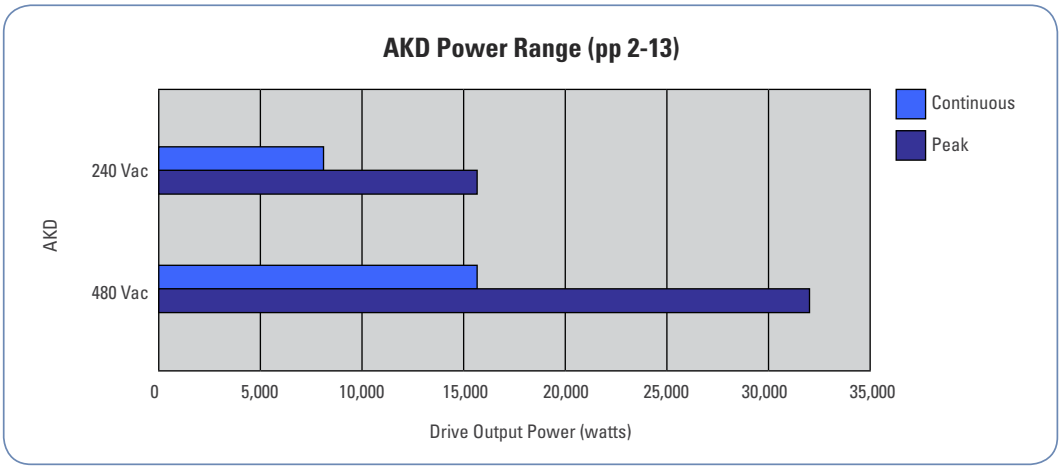
Best-in-Class Components

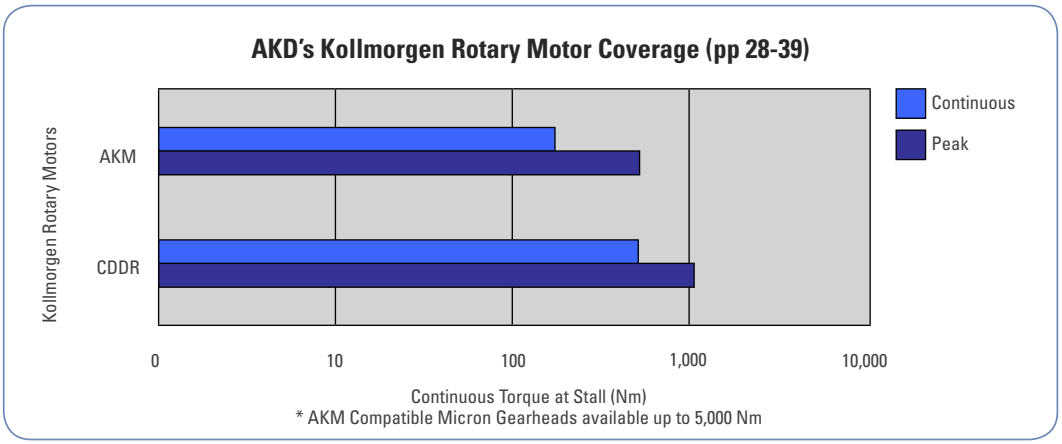
AKD works seamlessly with Kollmorgen motors – well-known for quality, reliability, and performance.

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*					

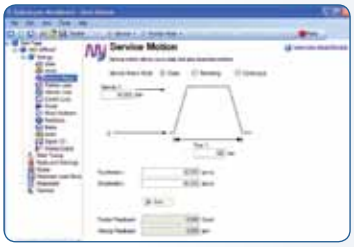
Note: For complete AKD model nomenclature, refer to page 46.
* Available 2010.

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.

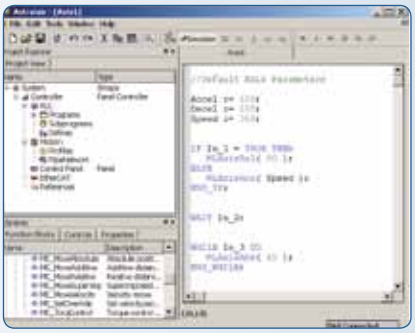
Benefits

- 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



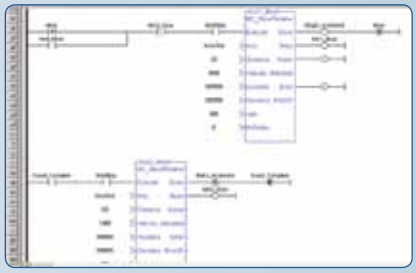
Structured Text Programmable 1.5 Axis Drive ("T" Option)*

- 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

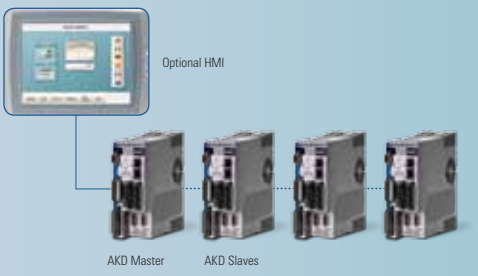
RANGE OF KOLLMORGEN AUTOMATION SUITE CAPABILITIES



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

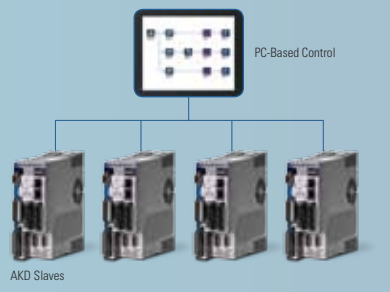
** In Process*



Kollmorgen Automation Suite Programmable Multi-Axis Master*

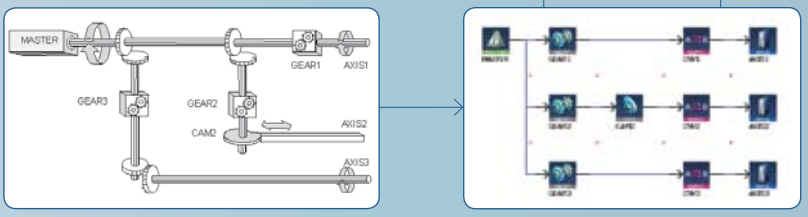
- True synchronized-path control of up to 4 axes
- Sets new standards for precision and optimizes nearly any application
- Easily manages remote I/O via EtherCAT in addition to all drives' I/O
- Pipe Network™ – program sophisticated camming and gearing applications in a matter of minutes
- Adds only 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.

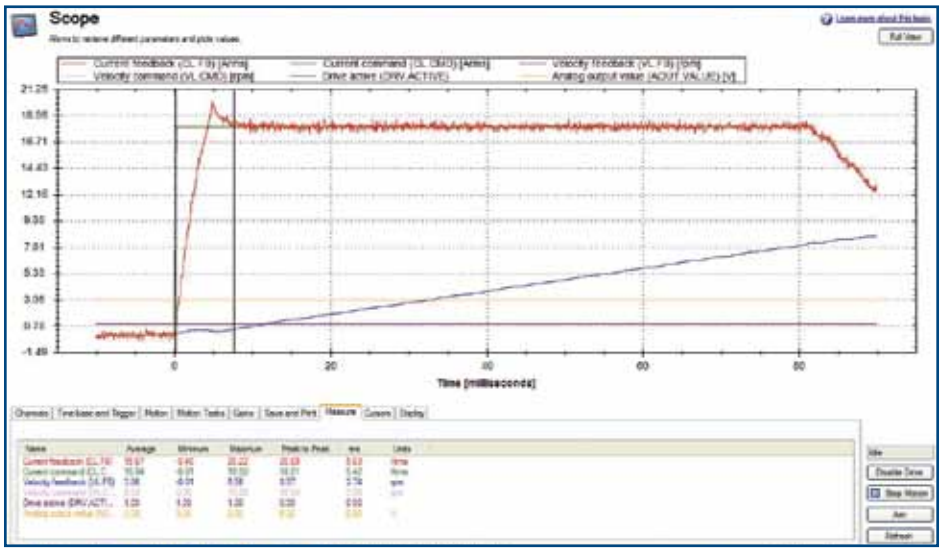
User-Friendly Environment

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.

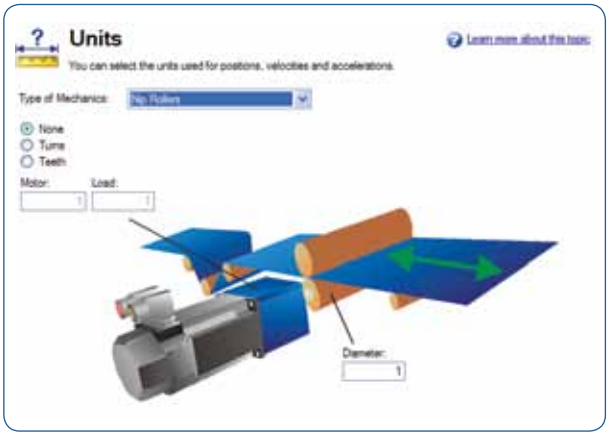
- Save as an image
- Load to an e-mail
- Print



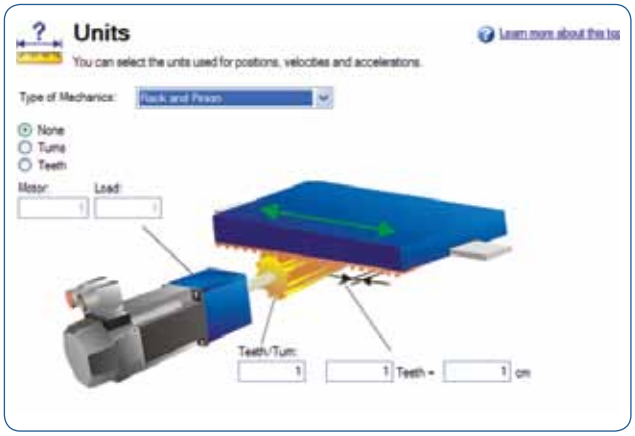
Application Selection

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

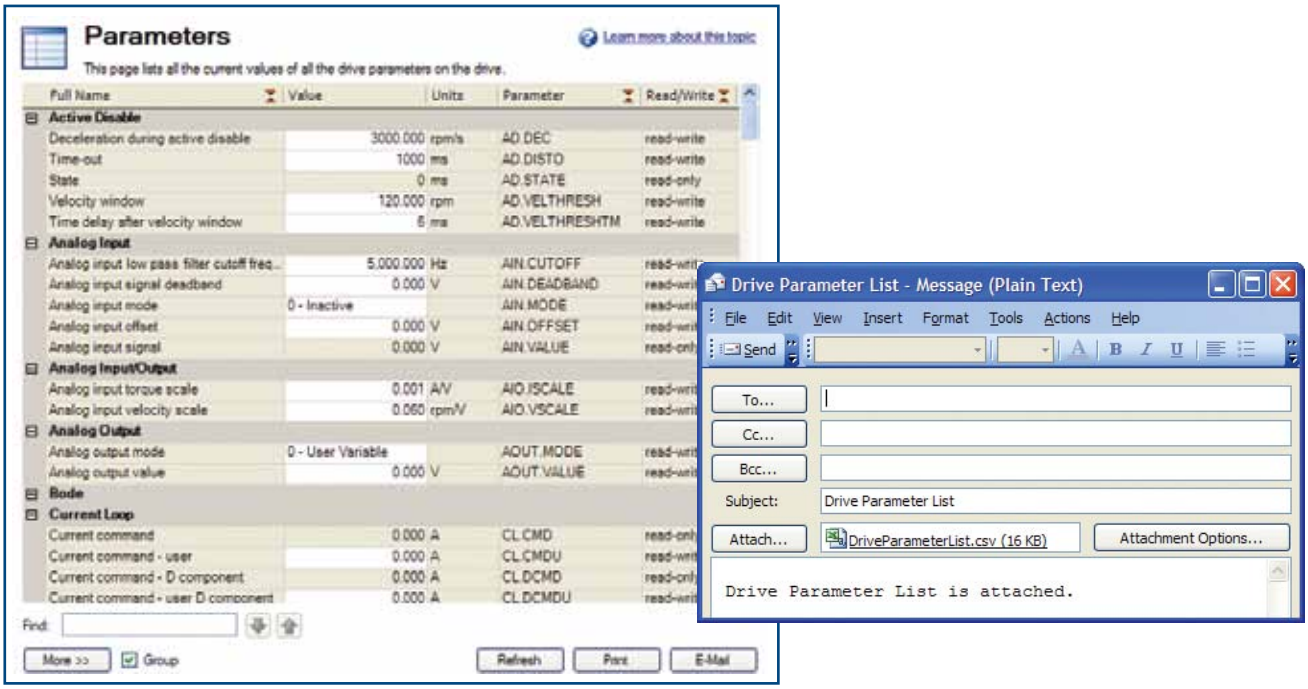


Rack and Pinion Application Selection



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

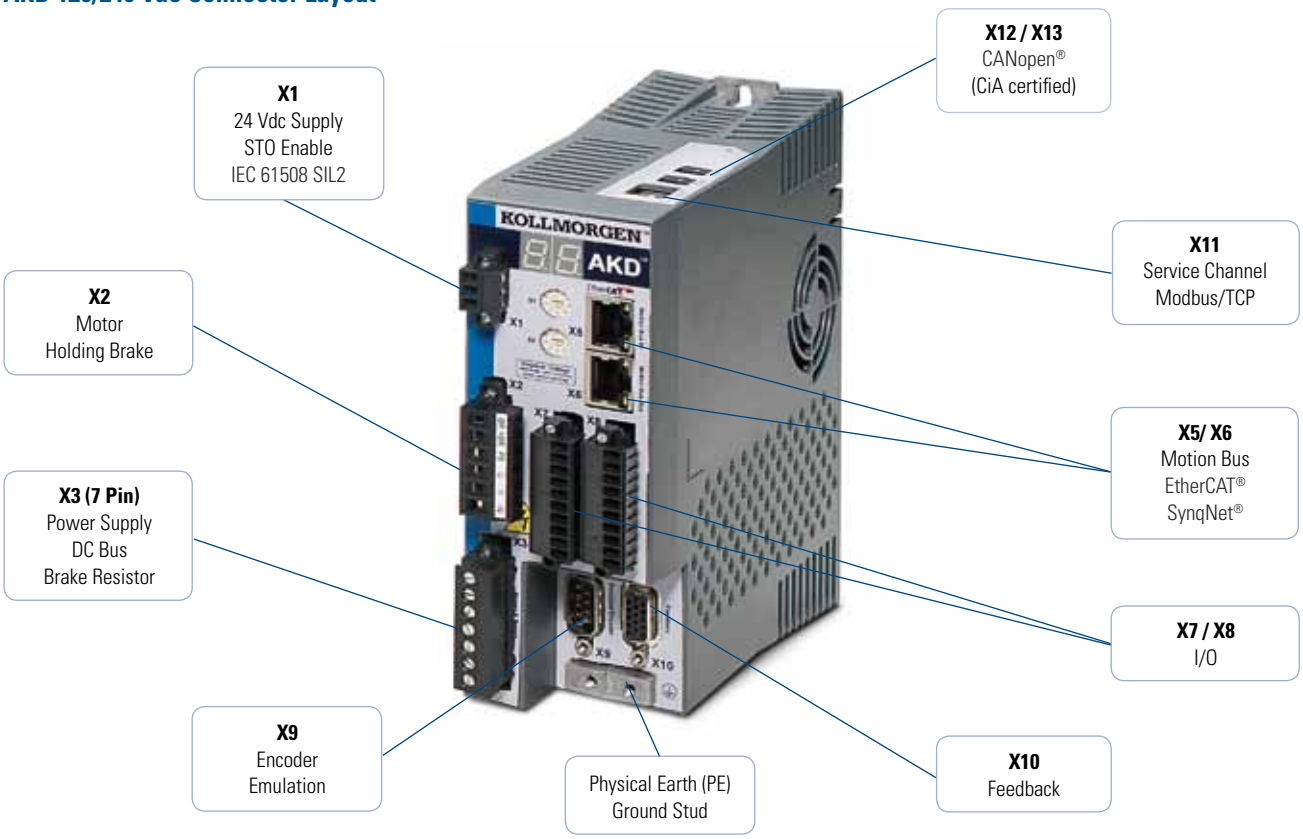
Plug-and-Play with Kollmorgen Motors

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

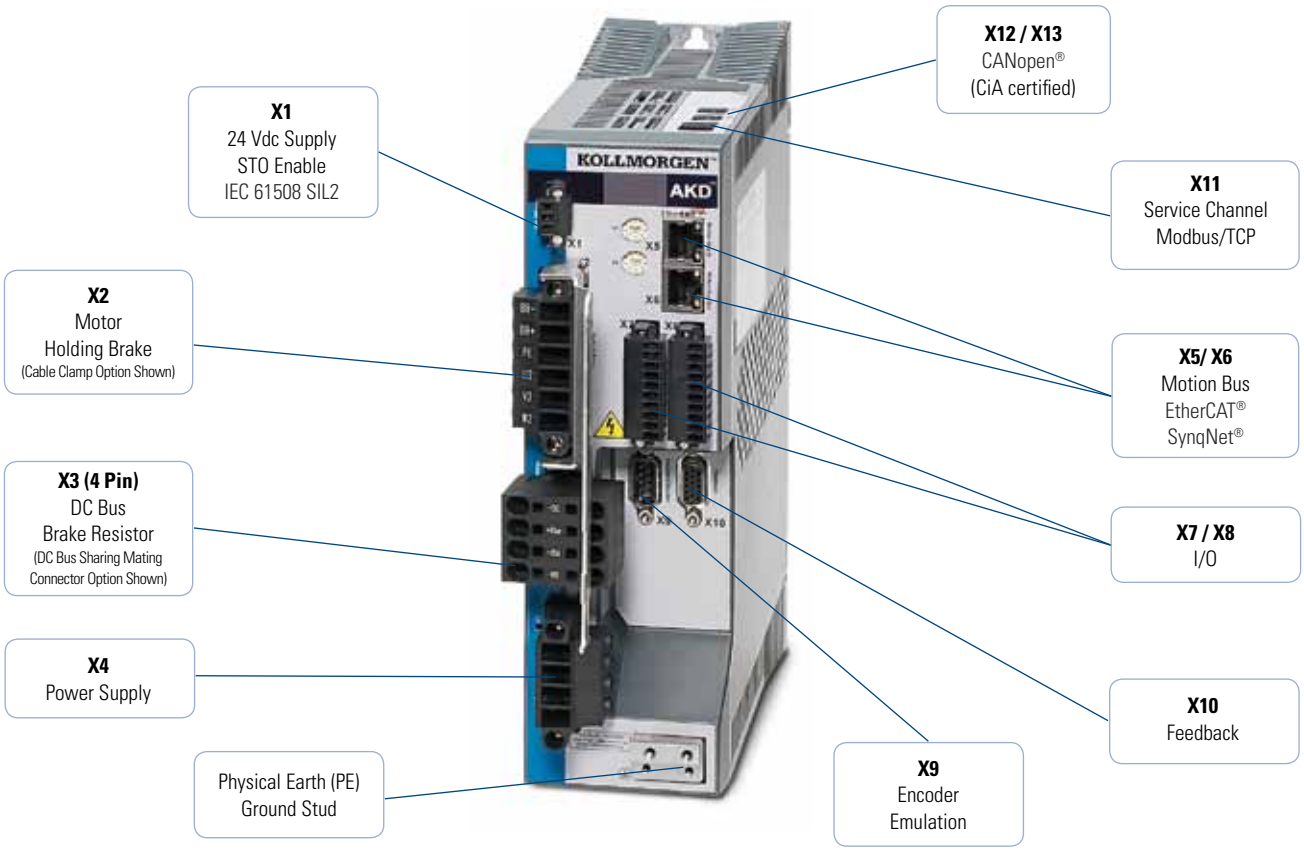
I/O (Base Drive)

- 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.

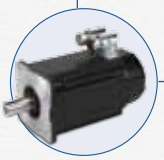
Convenient functions such as auto-tuning, Bode Plots and cogging suppression simplify the adjustment to both high-dynamic and high-precision applications.

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

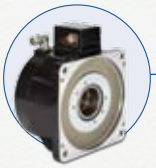
S700 Servo Drive

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

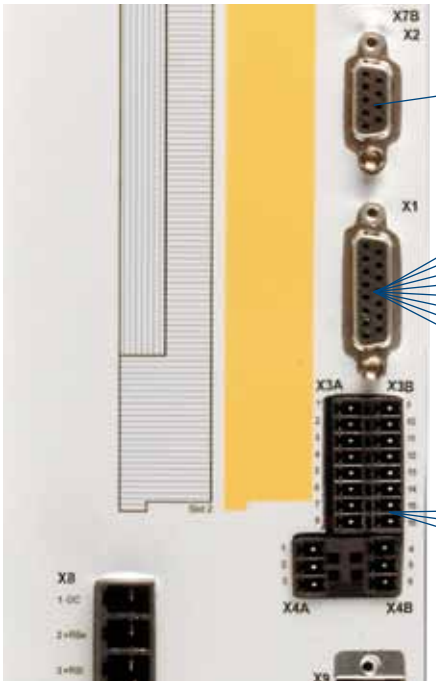
Dimensions

	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.



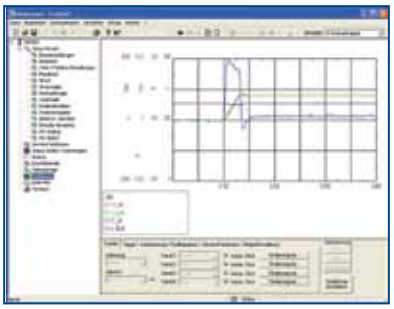
- 2 to 36-pole resolvers
- SinCos encoder with BiSS
- SinCos encoder with EnDat 2.2, EnDat 2.1
- SinCos encoder with HIPERFACE
- SinCos encoder without data track
- SinCos encoder + Hall-effect sensor
- Hall-effect sensor
- Incremental encoder (AquadB) 5 V
- Incremental encoder (AquadB) 5 V + Hall-effect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

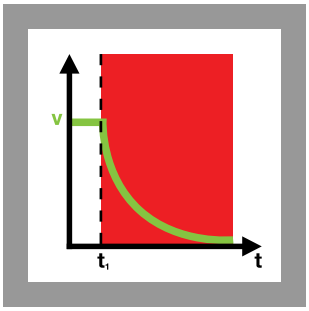
S700 Servo Drive

Safety Functions

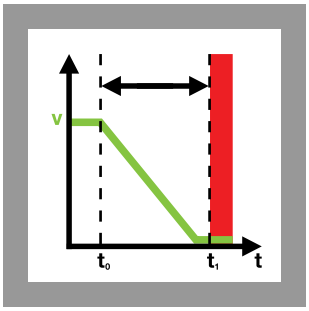
Safe Torque Off (STO) is integrated as standard. The drive for ever-greater productivity means that safe intervention has to be ensured even when the motor remains switched on (in order to hold a load or slow down machinery, for example). That is why the S700 has been equipped with a slot for a safety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

SIL2 and SIL3 Safety Cards Offer the Following Functions

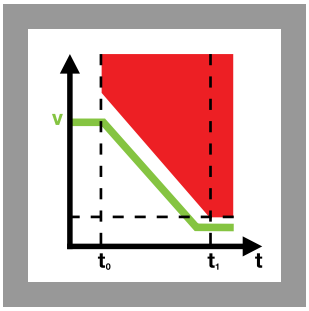
Safe Torque Off (STO)



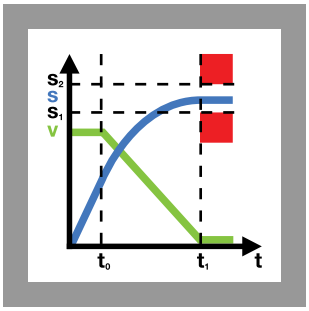
Safe Stop 1 (SS1)



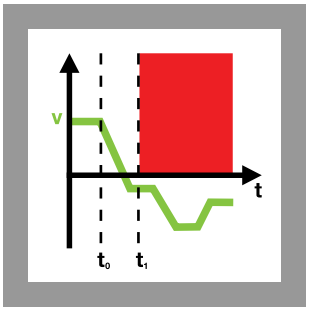
Safe Stop 2 (SS2)



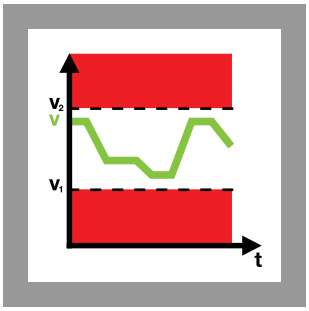
Safe Operating Stop (SOS)



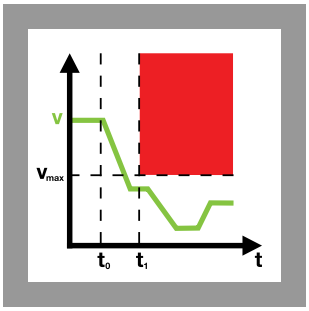
Safe Direction (SDI)



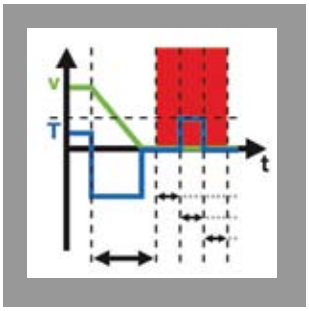
Safe Speed Range 1 (SSR)



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.

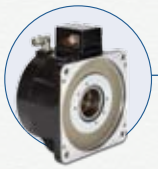
Benefits	Key Features
• Increased productivity	• High-speed current, speed and position control results in higher machine cycle rates • SIL2 STO (Safe Torque OFF) increases machine availability
• One type for all applications	• Multi interface • Multi feedback • Synchron servomotors • Direct drives - 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

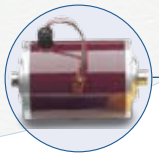


Cartridge Direct Drive Rotary™ Motors

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

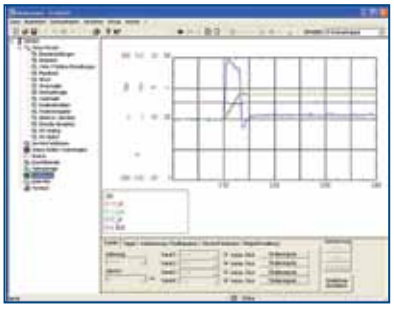
- SSI absolute encoder
- Pulse/direction 5 V

- 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.

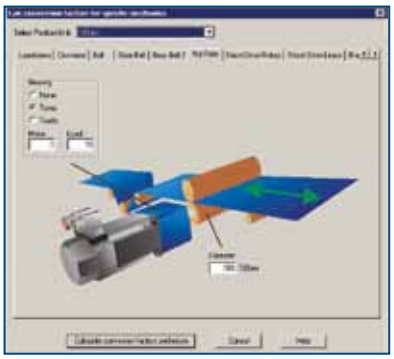
- 62.5 µs / 250 µs / 1 ms / 4 ms / 16 ms / IDLE / IRQ
- 128 kByte code memory
- 400 simple instructions every 62.5 µs
- CAN objects for multi-axis control

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

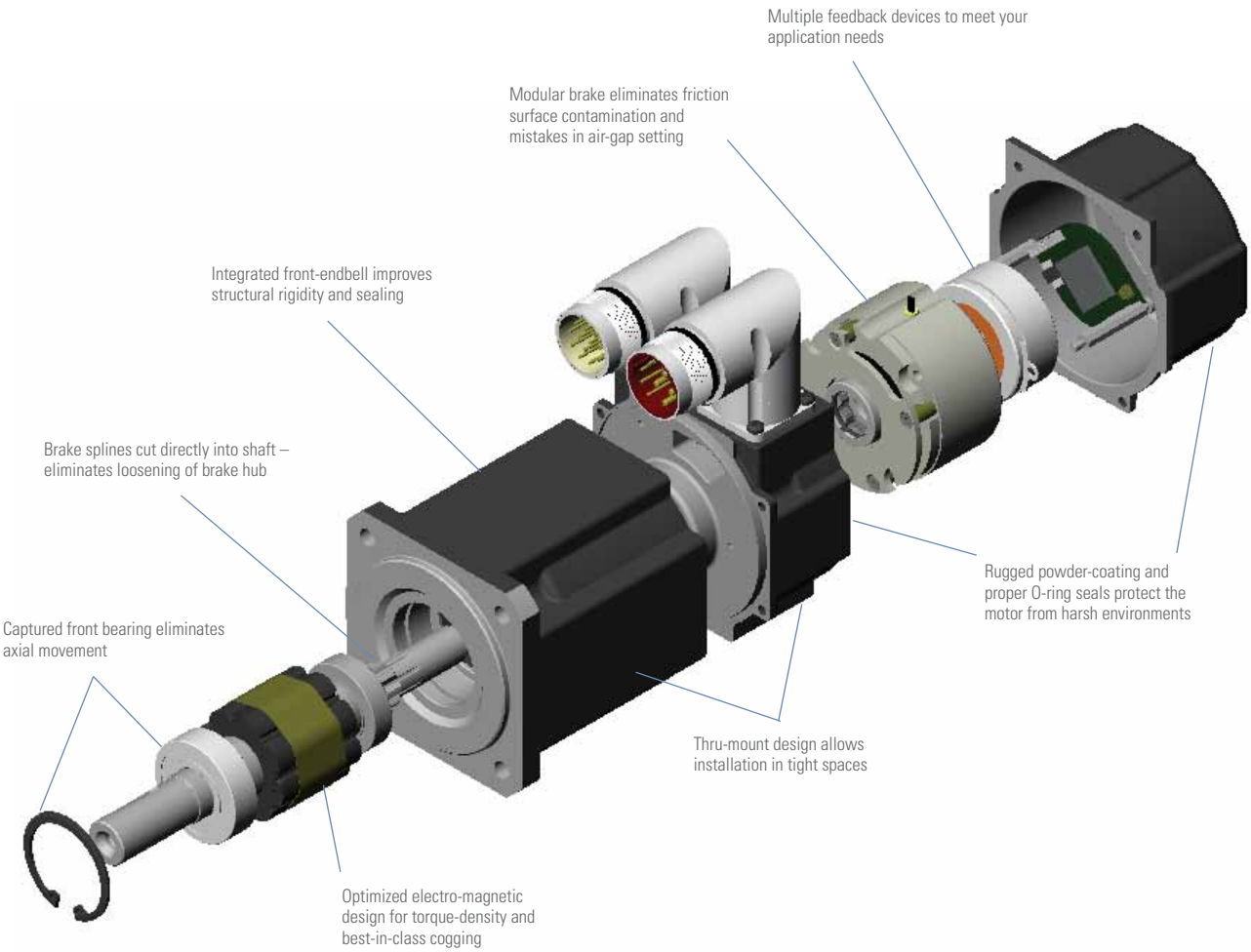
AKD with AKM Plug-and-Play Feedback

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

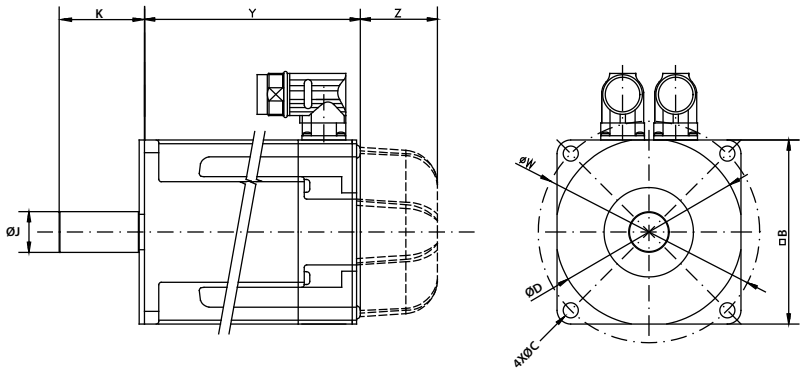
AKM Motor		Servo Drive			Frame Size NEMA/ mm	Cont. Torque at stall Tcs Nm (lb-in)	Peak Torque at stall Tps Nm (lb-in)	Rated Speed Nrtd RPM	Power Prtd watts	Inertia (Jm) Kg-cm^2 (lb-in-s^2 x10^{-3})
		AKD	S300	S700						
480 Vac	AKM22C	X00307	S30101	S701	23/ 60	0.84 (7.43)	2.34 (20.7)	8000	570	0.161 (0.142)
	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

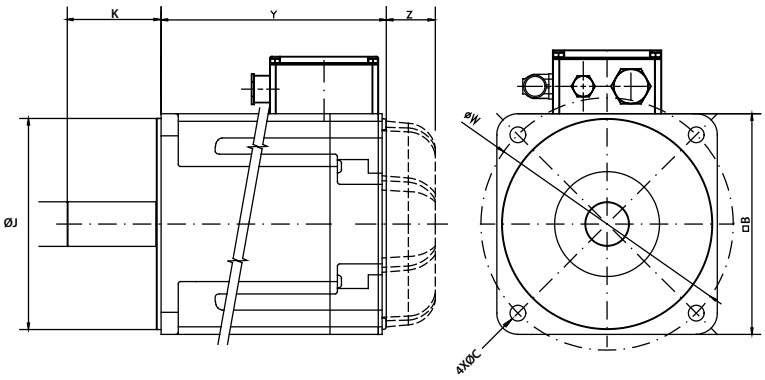
Model with Power Connector

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

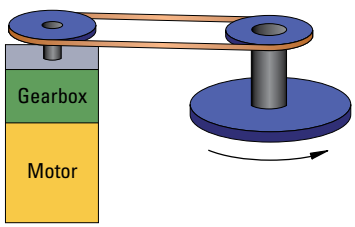
Model	Frame	Bolt Circle*	Mount Hole*	Mount Pilot*
	□ "B"	Ø "W"	Ø "C"	Ø "D"
AKM1	40	36	4.3	30
AKM2	58	63	4.8	40
AKM3	70	75	5.8	60
AKM4	84	100	7	80
AKM5	108	130	9	110
AKM6	138	165	11	130
AKM7	188	215	13.5	180
AKM8	260	250	18.5	230

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

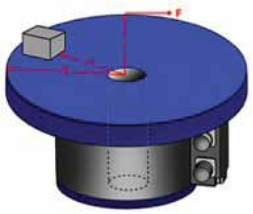
Direct Drive Technology

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.

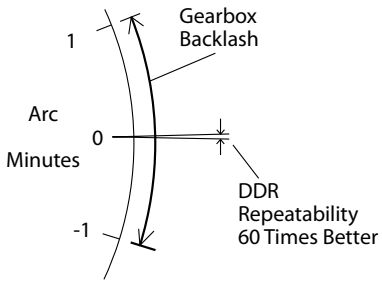
With Direct Drive Technology, the mechanical transmission is eliminated and the motor is coupled directly to the load.



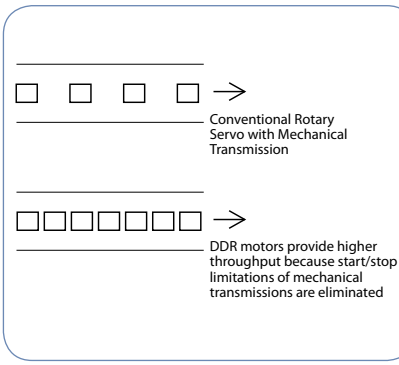
Servomotor and Gearhead



Direct Drive Motor



Improved Repeatability



Increased Throughput

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

Higher Bandwidth

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

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

Improved 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

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.

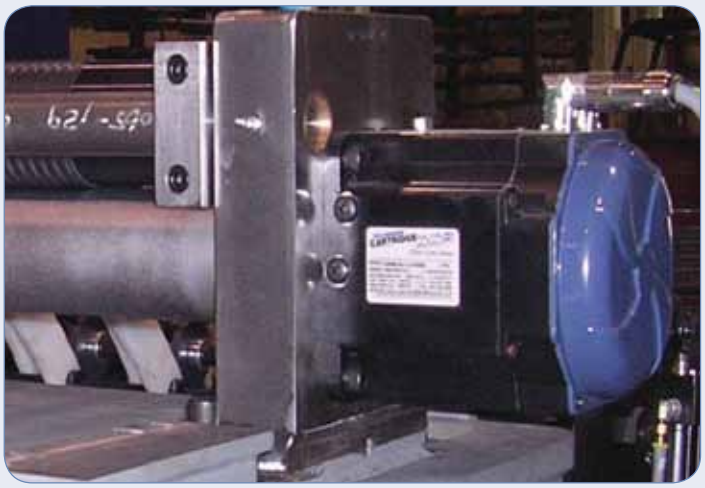
Reduced Audible Noise

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)

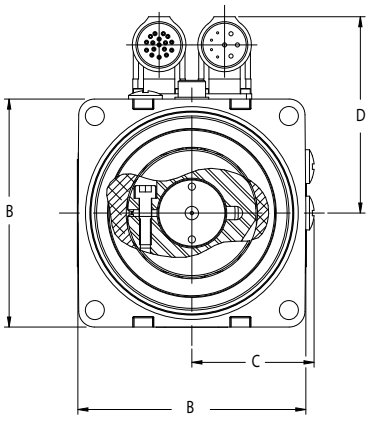
400/480 Vac Systems Performance Data

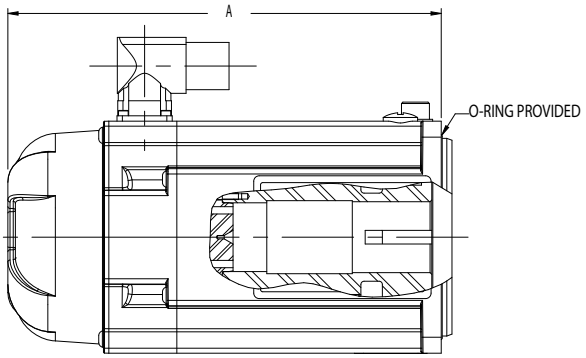
Cartridge Motor	Servo Drive			Frame Size	Continuous Torque	Peak Torque	Maximum Speed RPM		Weight	Inertia (Jm)
	AKD	S300	S700	mm (in)	Nm (lb-in)	Nm (lb-in)	400 Vac	480 Vac	kg (lb)	kg-cm^2 (lb-in-s^2 x10^{-3})
H041A	X00307	S30301	S703	108 (4.25)	4.56 (40.4)	11.3 (100)	2500	2500	4.08 (9.00)	5.86 (5.19)
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

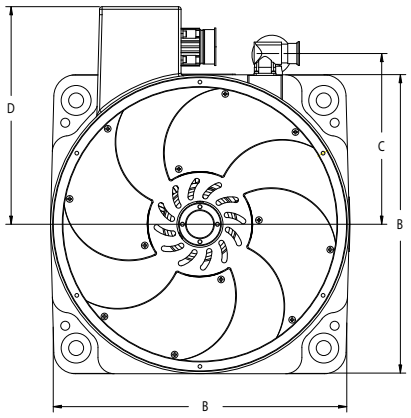
Cartridge Motor	A mm (in)	B mm (in)	C mm (in)	D mm (in)
C(H)041	171 (6.73)	108 (4.25)	59 (2.31)	93 (3.67)
C(H)042	202 (7.95)	108 (4.25)	59 (2.31)	93 (3.67)
C(H)043	233 (9.17)	108 (4.25)	59 (2.31)	93 (3.67)
C(H)044	264 (10.4)	108 (4.25)	59 (2.31)	93 (3.67)
C(H)051	195 (7.68)	138 (5.43)	76 (3.00)	108 (4.25)
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)

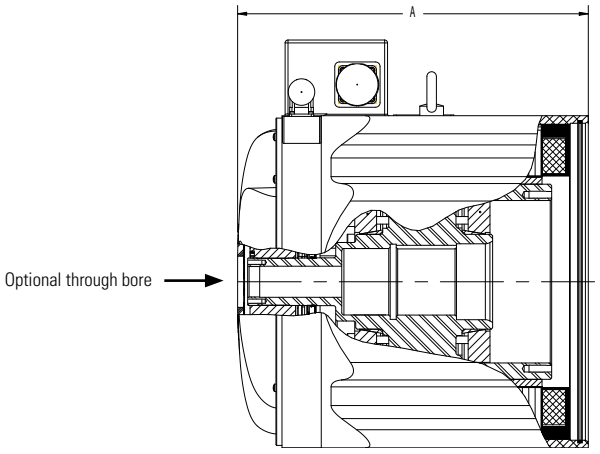




Cartridge DDR C09 and C13 Dimensions

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

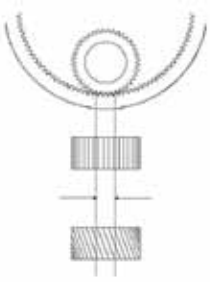
Helical Crowned TRUE Planetary™ Gearing

Features

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

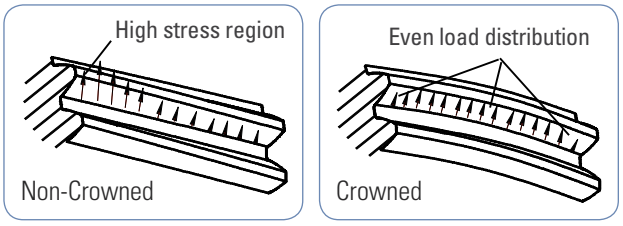
Spur vs. Helical Gearing

Typical contact ratio is 1.5 for spur gearing. Contact ratio for equivalent helical gear is 3.3 – more than double the contact ratio.



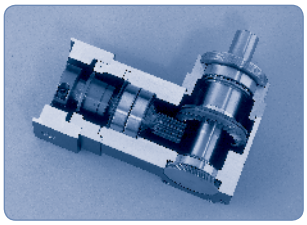
Crowned vs. Non-Crowned

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.

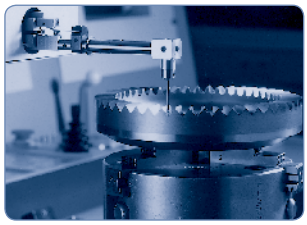


PowerTRUE™ Right Angle Gearheads

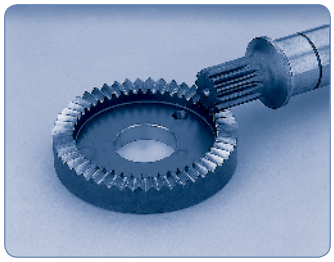
- Lower backlash from single axis mesh adjustment
- A compact design using Face Gear technology
- Whisper quiet operation due to high contact ratio
- Mesh ratios from 1:1 to 5:1
- Extremely efficient (98%)



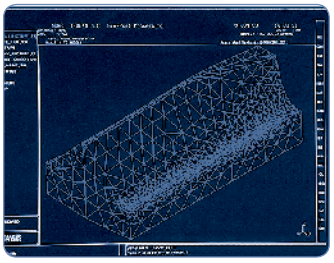
PowerTRUE™ Gear Technology



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.

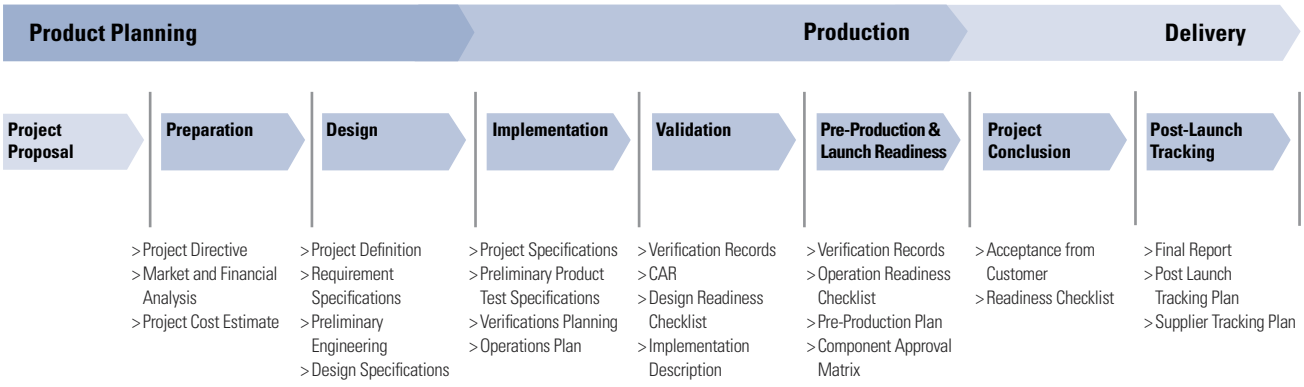
We follow a strict and efficient development process from initial concept to volume production. This ensures that products we develop meet customer needs, are cost effective to manufacture and move quickly from prototype to production. Customer involvement is key to our process, with ongoing collaboration 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

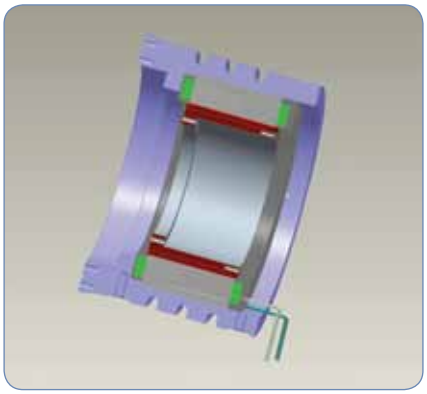
Motor Solutions

- 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

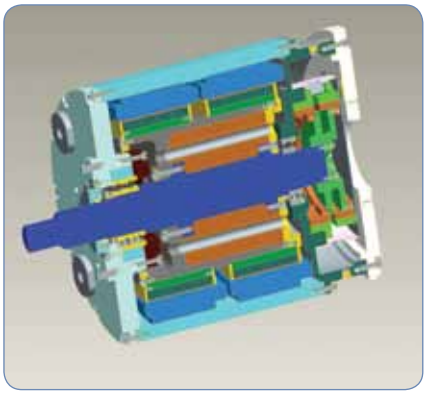
Drive Solutions

- 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

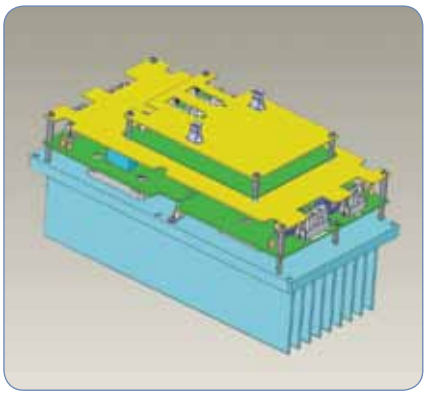
Medical diagnostics drive optimized for form-factor, I/O and EMC



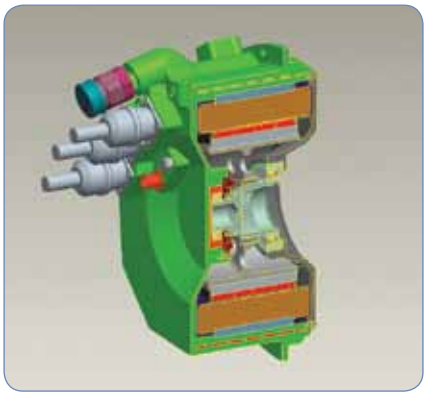
Frameless direct drive rotary motor with water cooling features



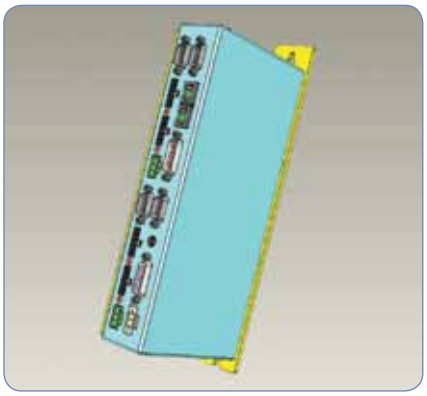
Custom submersible motor



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

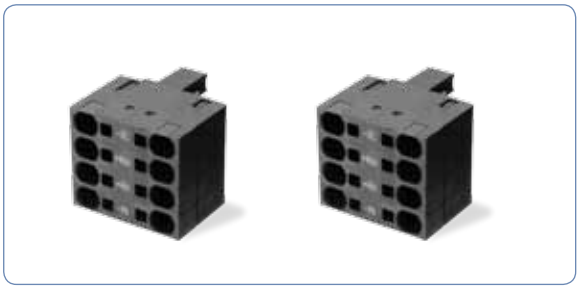
See ratio availability in corresponding gearhead section (pp 42-43)

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

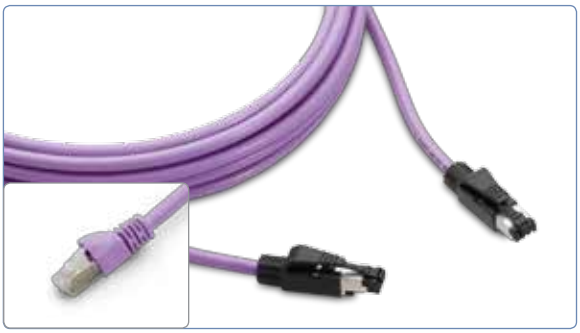
Shielding Solutions

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.

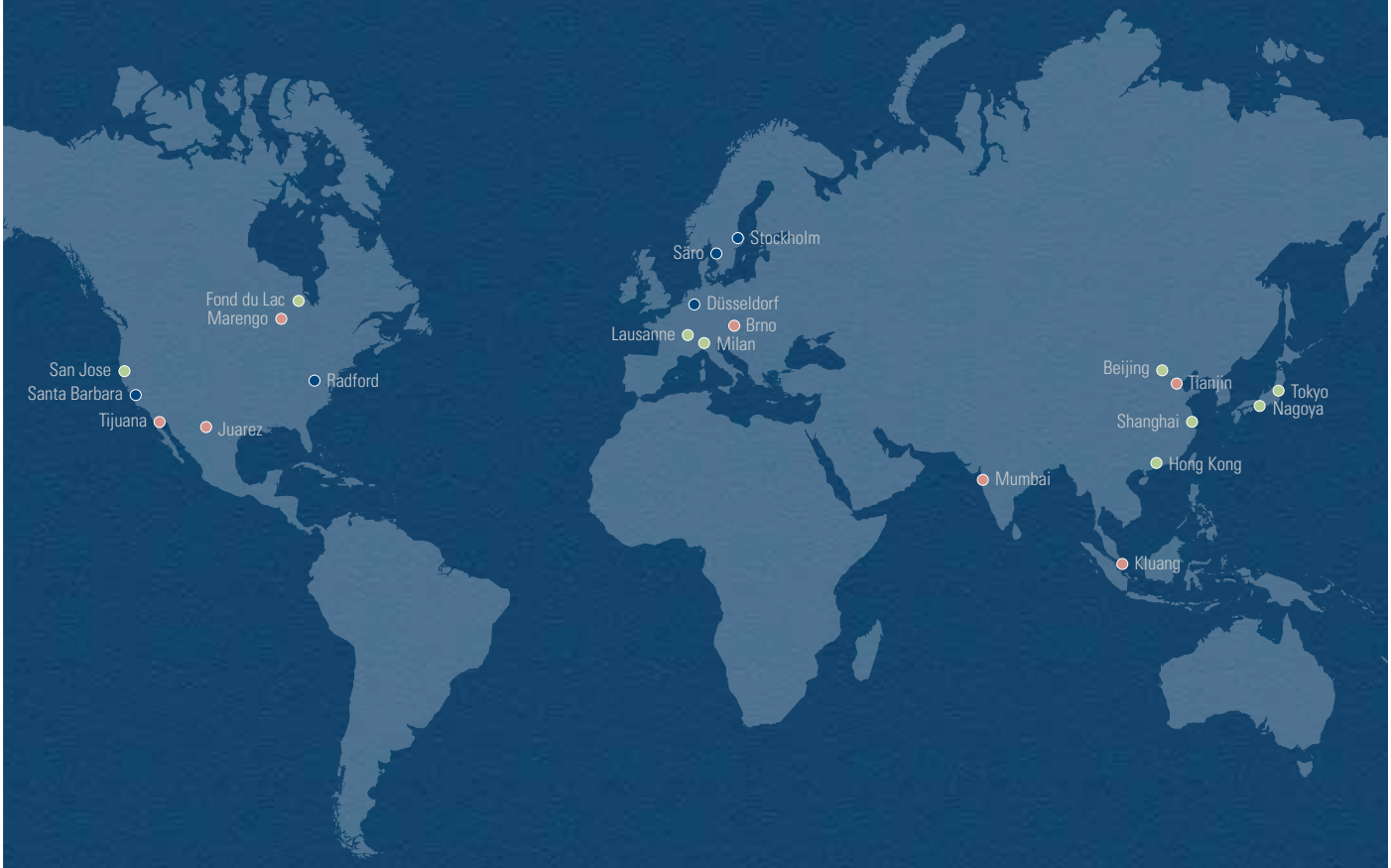
For more information on our accessories, visit Kollmorgen.com

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.



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