

# Decentralized Servo Technology

The on-site drive for the machine design of tomorrow



**KOLLMORGEN**®

*Because Motion Matters™*

# AKD™ - N Decentralized Servo Amplifier

Distributed around the machine with highly integrated functionality and unrivaled connection technology, the new AKD-N servo drives from KOLLMORGEN can be installed in the vicinity of the motor thanks to robust construction and IP67 protection rating. AKD-N offers a complete solution for the next generation of machine design – helping simplify design and reducing the machine footprint.

## **Lower machine complexity**

Secure plug-in connectors, unlimited range of motor options, mounting where there is already space, a high degree of integrated functions: These are only four of the benefits of the decentralized AKD-N servo drives. Connect many AKD-N drives to a common power supply (“AKD-C”) via EtherCAT to reduce complexity even further, and use the optional fieldbus port to connect remote I/O devices without additional network hubs and long cable runs. Likewise, assembly and installation is a breeze - no industrial electrical training is needed.

## **More freedom in design**

“Less is more” holds true for machine design when considering size, power, or complexity. Free up your design with single-cable technology between motors and decentralized drives, thin hybrid cables to the central power supply and a very simple DC-axis connection to streamline installation. The space achieved can be used for smaller cable ducts, lighter trailing chains, and tighter pass-throughs – or simply for more design freedom in the development of new machines.

## **OEE: Overall Equipment Effectiveness**

KOLLMORGEN’s decentralized servo drive system increases the efficiency over the entire life cycle of a machine (overall equipment effectiveness, OEE). First, the design configuration and the simple connection technology decrease the time for assembly, installation and startup in machine construction. During the operating phase, the AKD-N plays a valuable part in energy savings due to the integrated DC connection. Further advantages in the production are faster cleaning cycles via high protection types as well as fewer cables in combination with space-saving electrical cabinet superstructures for an increase in production space. Moreover, the assembly and connection technology increases the machine uptime – and thereby the productivity – because maintenance and service tasks are completed faster.

## The Advantages of Decentralized Drive Technology

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- Reduced costs
  - Reduced cabling because DC and fieldbus, power, I/O and safety (STO) run in one cable
  - Faster and simple assembly requires no special training through ready-made and tested cables
  - Pick the optimum motor for the machine. No derating of oversized motors as required by most integrated solutions
- Compacter machines
  - Smaller and more easily integrated electrical cabinets
  - Servo amplifiers mounted in the immediate vicinity of the motor
  - Robust construction with IP67 protection rating makes large protective enclosures irrelevant
- Faster startup
  - IP67 rated plug connectors for connection without tools
  - At only eleven millimeters, the thin hybrid cable has a small bend radius to help save space – even in cramped machine corners
  - Connect remote I/O modules and fieldbuses devices directly to the drive via the optional 3<sup>rd</sup> EtherCAT port
  - Parameterization with the tools of the Kollmorgen WorkBench®
- Higher machine effectiveness (OEE)
  - Design supports fast and effective cleaning
  - High operating safety through robust construction
  - Precision through digital feedback
  - Everything at a glance: Status display on servo amplifier
- More flexibility in machine design
  - Compatible with all motors from Kollmorgen with single- or dual-cable connection
  - Simple combination of central and decentralized controllers within the comprehensive AKD family
  - Faster modification and upgrade options through linear topology as well as I/O and fieldbus interfaces at the drive

# AKD-N Decentralized Servo Technology: Our way to make machines si

## An overview of the advantages:

- Lower machine complexity
- More design freedom
- Higher OEE (overall equipment effectiveness)



■ Connection of external additional components

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

■ Startup with the Kollmorgen WorkBench

■ 3 A, 6 A and 12 A models

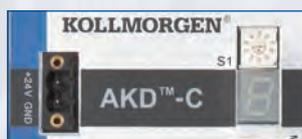
■ Simple connection of local I/O

■ MotionBus (EtherCAT) for connection to automation systems

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

# mppler and more effective

■ Decentralized solution reduces effort and costs for switch cabinet  
■



■ Complete integration in the AKD family  
■

■ Status LED for simple diagnosis

■ Options like tertiary fieldbus and local STO offer maximal flexibility  
■

■ Simple and fast attachment  
■

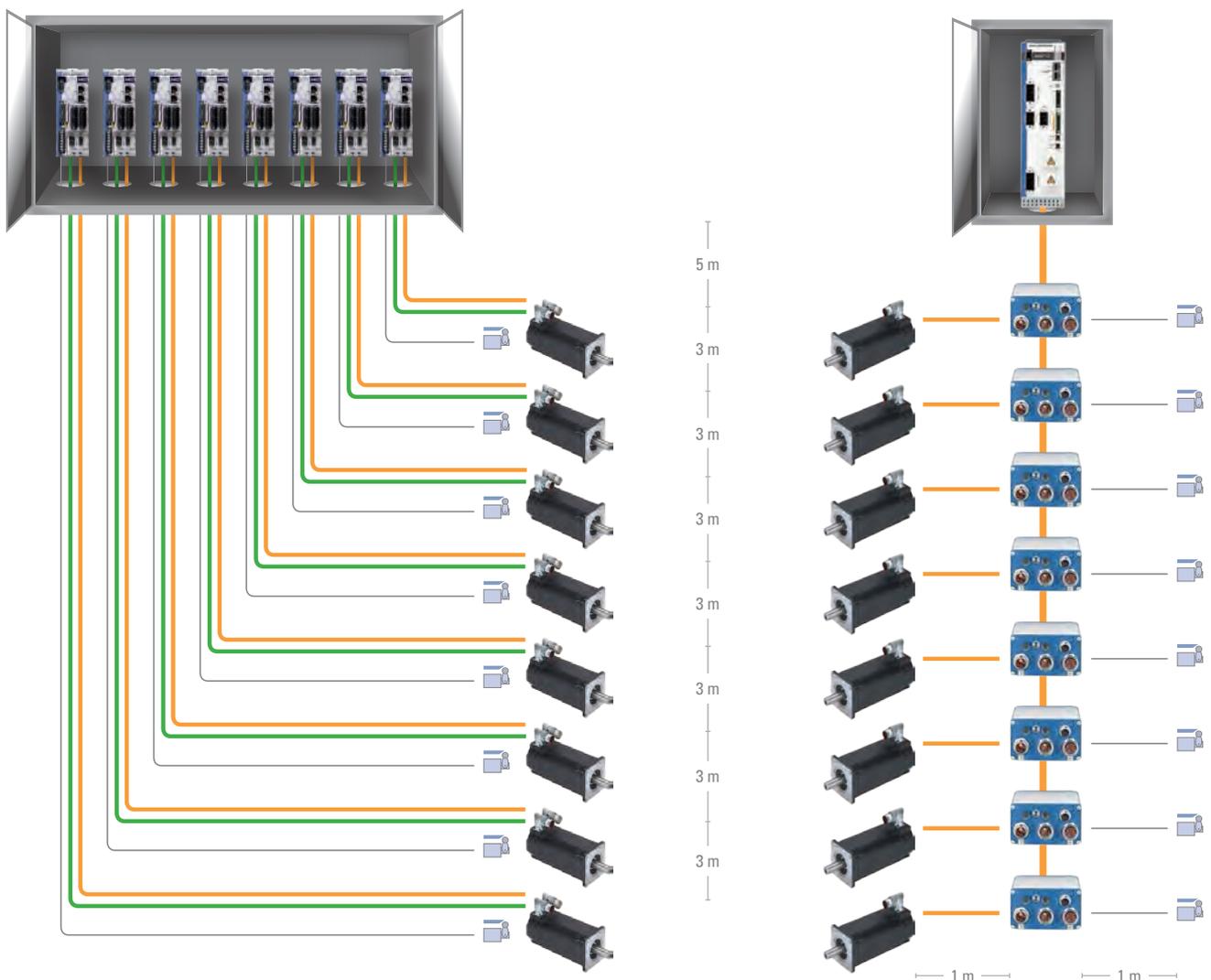
■ IP67 / UL type 4x housing reduces cleaning times and makes special protective enclosures redundant.  
■

■ Compatible with all motors from Kollmorgen  
■

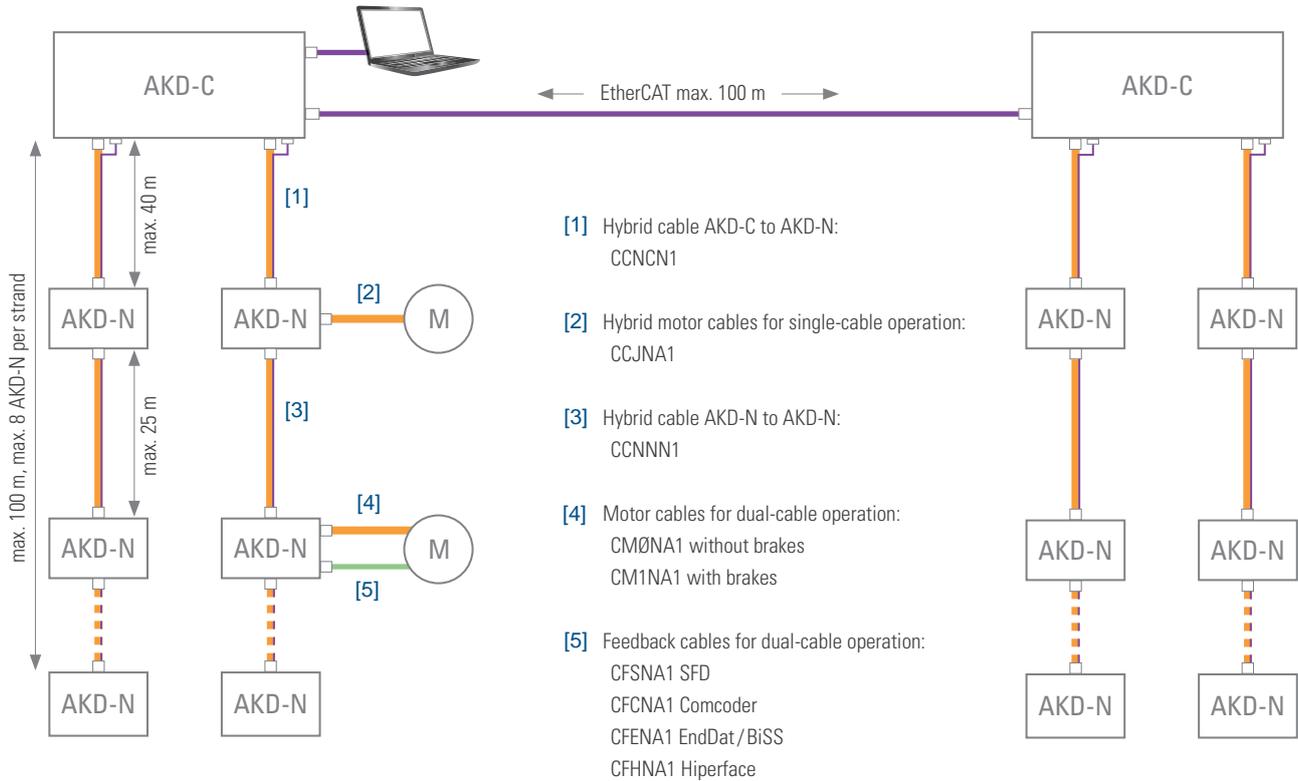
■ Hybrid motor cable for simplified cabling, faster installation and higher reliability  
■

## Why lay 372 m of cable when 42 m suffice?

Consider an eight axis machine, with three meters between each motor and five meters distance to the drive cabinet. This theoretical but realistic model would have a total of 372 meters of cable with standard drives - with the AKD-N, it would have 42 meters. The decentralized servo technology saves 330 meters in this example. Those are cables that don't have to be purchased; don't need to be laid; and don't require any space in the machine. This highlights just one of the many reasons to evaluate a decentralized design for your machine. Additionally, you can connect the AKD-N servo drive and power supply module via ready-made and tested system cables and plugs - it couldn't be simpler.



# Technical Data and Topology



## AKD-N Decentralized Servo Drive

Continuous current	3 A, 6 A, 12 A
Peak current	9 A, 18 A, 36 A
Continuous input power	1.5 kVA, 3 kVA, 6 kVA
Protection type	IP67
Digital inputs/outputs	3 digital inputs/ 1 digital output
Safety function	STO SIL 2 (only AKD-N-DS and AKD-N-DT)
Feedback systems Dual-cable (not with -DB)	SFD (digital resolver), BISS-C, Comcoder, hall sensor, Endat 2.1 and 2.2, Hiperface
Feedback systems Single-cable	SFD3 (digital resolver) and Hiperface DSL
Communication	EtherCAT
Dimensions (W x H x D)	Housing: 3 A, 6 A: 130 x 75 x 201 (mm) 12 A: 130 x 75 x 211 (mm) * With plugs: 3 A, 6 A: 130 x 75 x 247 (mm) 12 A: 130 x 75 x 257 (mm) *

\* Subject to change

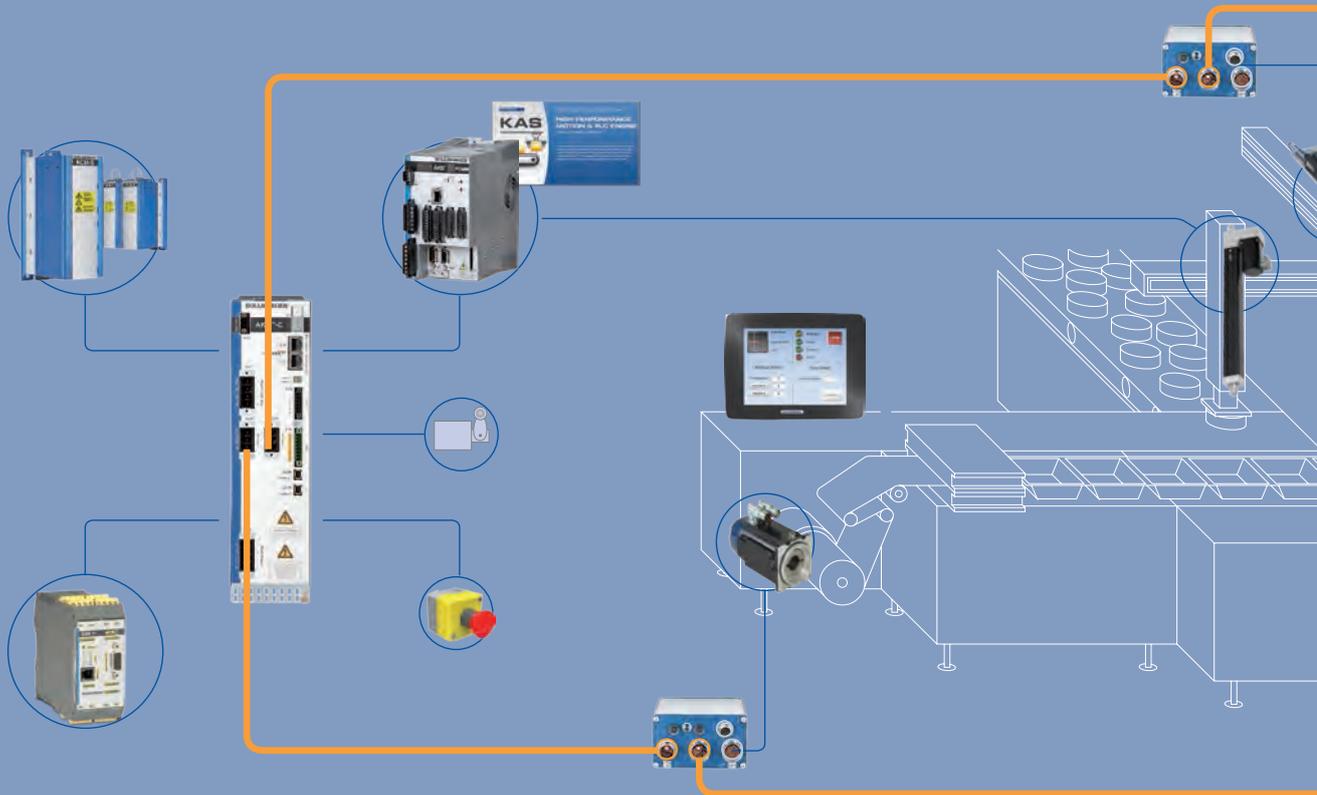
## AKD-C Power Supply Module

Line voltage	400 / 480 V
Overall performance	10 kW, 20 kW *
Intermediate circuit voltage	560 / 680 V DC
Output current	17 A (peak 34 A), 34 A (peak 68 A) *
Protection type	IP20
Output strands	2, for up to 8 AKD-N apiece
Safety function	One STO Enable and STO Status, apiece for each strand, SIL 2
Digital inputs/outputs	1 input, 1 output, 1 relay output
Communication	EtherCAT, TCP/IP service interface
Dimensions (W x H x D)	Housing (Front) 10 kW: 80 x 260 x 198 (mm) 20 kW: tba Installation dimension with plugs 10 kW: 80 x 329 x 231 (mm) 20 kW: tba *

\* Available 2016

# Next Gen Machine Design Now

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



## Kollmorgen Automation Suite



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

## AKD-C Central Power Supply Module



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

## AKD-N Decentralized Servo Amplifier



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

## AKD PDMM



- High-performance servo amplifier with integrated multi-axis master controller
- Functional scope of the Kollmorgen Automation Suite
- 3 in 1: Servo amplifier, PLC and drive control
- Profinet, Ethernet/IP and Modbus TCP standard

## KCM Condenser Modules

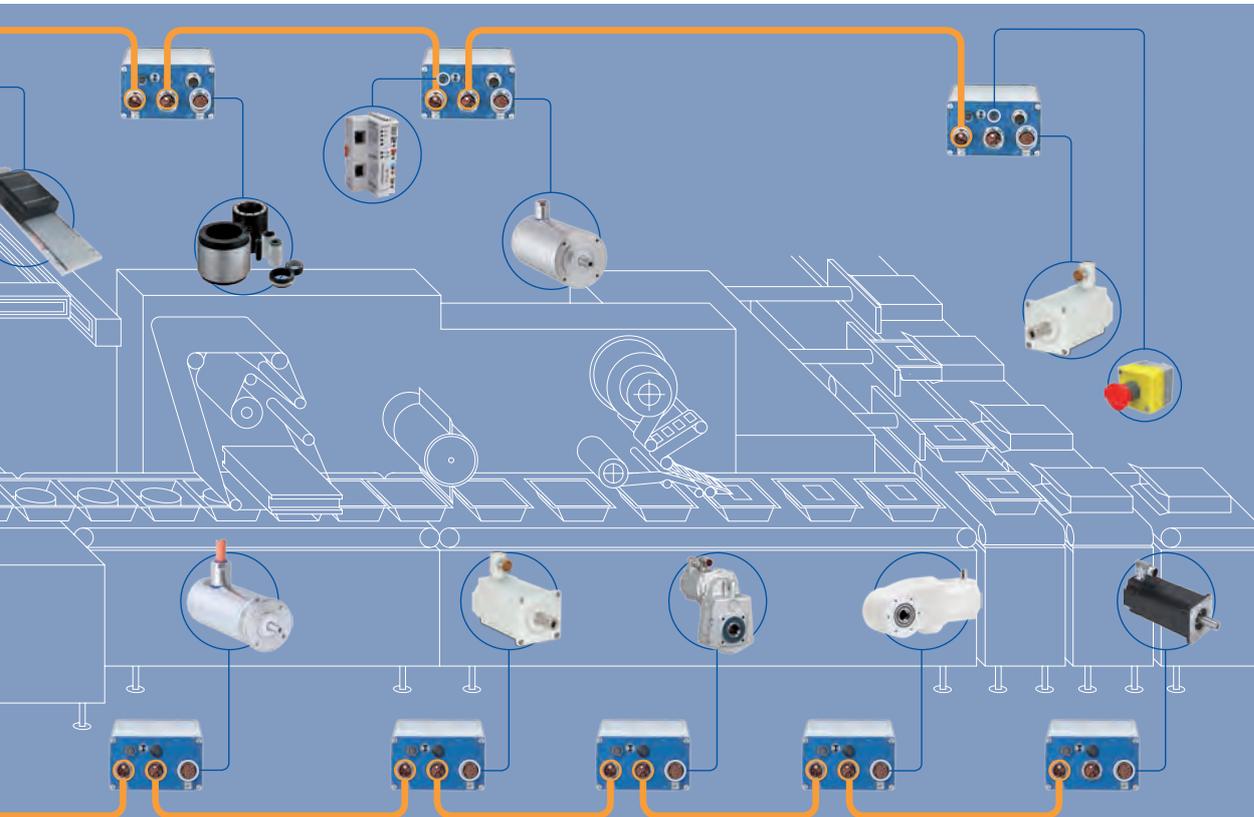


- Reduces the energy costs and prevents downtime
- Simple Implementation
- No harmonics in the power cables
- Scalable capacity

## KSM safety controller



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



**AKM Servo Motors**

- High torque density
- High precision and dynamics
- Production for Europe, US and Asia on site



**AKM Washdown Servo Motors**

- Applications with regular cleaning
- Housing coating is Ecolab-certified



**AKM Washdown Food Servo Motors**

- For use in the food and beverage industry
- Protection class IP67, FDA compliant



**AKMH Stainless Steel Motors**

- For the highest hygienic requirements
- Protection class IP69K
- Fulfills EHEDG directive



**AKM Gear Washdown Food Gear-Servo Motor**

- Specially for the highest hygienic requirements
- High efficiency
- Single-cable connection



**Cartridge DDR Rotary Direct Drives**

- Direct load coupling without gears or belts
- High precision, low noise generation



**KBM Direct Drives with No Housing**

- Low weight, exceptionally compact
- Modular system

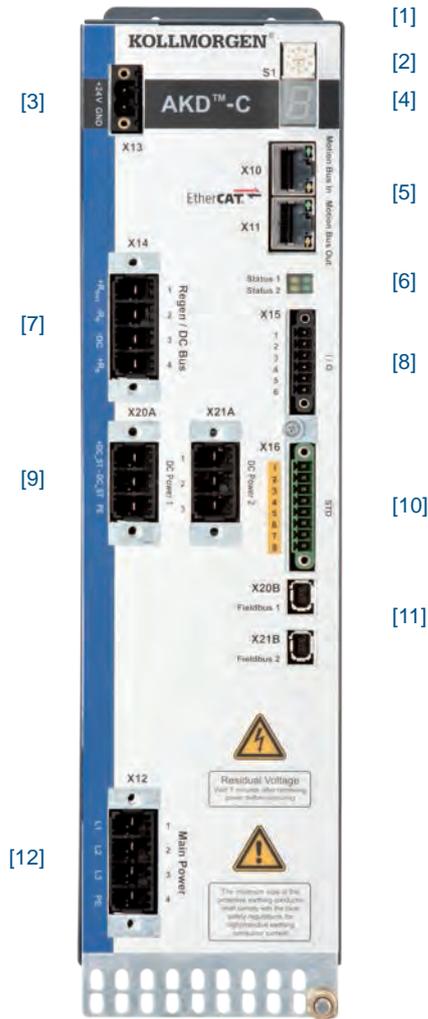


**DDL Linear Motor**

- High power density
- Large dynamics (>10g)
- Patented anti-cogging design

# Connections and Controls

## Power Supply Module AKD-C



- [1] Network connection for service PC (TCP/IP) (on the top)
- [2] Setting the IP address
- [3] 24 V DC power supply
- [4] Error and status displays
- [5] Motion Bus I/O connections (EtherCAT)
- [6] Status display of the local fieldbus
- [7] Connection for external brake resistor and KCM buffer module
- [8] I/O (1 each digital input and output, 1 relay output)
- [9] DC outputs for connection of up to eight distributed AKD-N servo amplifiers apiece
- [10] STO input, STO status output (one each per strand),
- [11] Local fieldbus for communication with AKD-N
- [12] Power connection 400V / 480VAC

## Decentralized Servo Amplifiers AKD-N Connection Options

AKD-N-	Single-cable technology	Separates Feedback	Digital E/A	Tertiary Fieldbus	Local STO
DB	✓	—	✓	—	—
DF	—	✓	✓	✓	—
DG	✓	—	✓	✓	—
DS	—	✓	✓	—	✓
DT	✓	—	✓	—	✓

### AKD-N-DB

[4] [5]



[1] [2] [3]

- [1] [2] Connections for hybrid cable
- [3] Motor connection

### AKD-N-DF, -DS

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

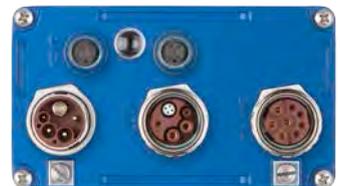


[1] [2] [3]

- [4] 3 digital inputs, 1 digital outputs
- [5] Status/error display with LED

### AKD-N-DG, -DT

[4] [5] [6]



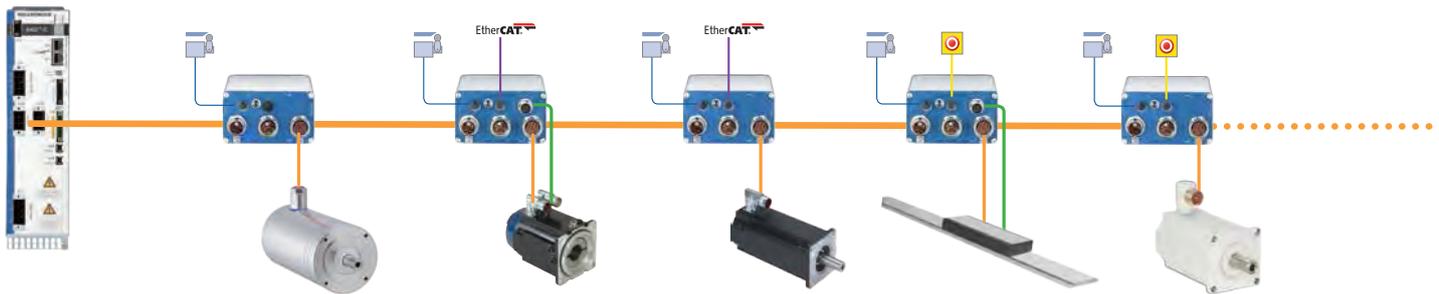
[1] [2] [3]

- [6] STO connection (-DS, -DT) / Tertiary fieldbus (-DF, -DG)
- [7] Connection for feedback with dual-cable technology

# Plug and Play – Regardless of the Motor

It's good to know that our decentralized AKD-N servo drives will work with every motor, whether standard rotary, linear, Direct Drive, or customized. The Kollmorgen solution allows you to realize the advantages of the decentralized single-cable connection technology for any machine.

AKD-C	AKD-N-DB	AKD-N-DF	AKD-N-DG	AKD-N-DS	AKD-N-DT
Central power supply module for up to 16 decentralized AKD-N servo amplifiers	<ul style="list-style-type: none"> <li>• Single-cable connection</li> <li>• Digital I/O</li> </ul>	<ul style="list-style-type: none"> <li>• Separate feedback</li> <li>• Digital I/O</li> <li>• Local fieldbus interface</li> </ul>	<ul style="list-style-type: none"> <li>• Single-cable connection</li> <li>• Digital I/O</li> <li>• Local fieldbus interface</li> </ul>	<ul style="list-style-type: none"> <li>• Separate feedback</li> <li>• Digital I/O</li> <li>• STO safety function</li> </ul>	<ul style="list-style-type: none"> <li>• Single-cable connection</li> <li>• Digital I/O</li> <li>• STO safety function</li> </ul>



## Type Code

### AKD - C 010 07 - CB EC - E000

**Family**  
AKD AKD

**Device design**  
C Central Power Supply  
IP20

**Power class**  
010 10 kW (17 kW @ 570 VDC)  
020 20 kW (34 kW @ 570 VDC) (available in 2016)

**Voltage class**  
07 400/480 VAC

**Customization**  
x000 Standard (x=Language)

**Connection option**  
EC EtherCAT

**Expansions**  
CB No expansion

### AKD - N 003 07 - DB EC - E000

**Family**  
AKD AKD

**Device design**  
N Near Servo Drive  
IP65/IP67

**Current class**  
003 3 Arms  
006 6 Arms  
012 12 Arms

**Voltage class**  
07 700 VDC

**Customization**  
x000 Standard (x=Language)

**Connection option**  
EC EtherCAT

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

## About Kollmorgen

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

For assistance with your application needs, visit [www.kollmorgen.com/deu](http://www.kollmorgen.com/deu) for a global contact list.

- Application Centers
- Worldwide Development and Production Locations
- Worldwide Production Locations



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