Kollmorgen Essentials Motor

3-Phase AC Permanent Magnet Servomotor

English		Instruction Manual
Deutsch		Betriebsanleitung
Español		Manual de Instrucciones
Français		Manuel d'Installation
Italiano		Manuale di Istruzioni
Português		Manual de instruções
中文		说明手册

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Part Number: TBD
Original Language: English

For safe and proper use, follow these instructions.
Keep for future use.

Record of Document Revisions

Revision	Date	Remarks
BETA	02/2025	Initial content for beta program

Table of Contents

1 English

1.1 Welcome to Kollmorgen Essentials

This section should provide an overview of what Kollmorgen Essentials is,

Ease of use

Components

Compliance when the drive is used in the system with an Essentials motor and cable.

1.2 About this Manual

This manual describes the Kollmorgen Essentials Motor series of synchronous servomotors (standard version / low voltage versions). The motors are operated in drive systems together with Kollmorgen servo amplifiers.

Read all this system documentation:

- Instruction manual for the servo amplifier
- Bus Communication manual (e.g., CANopen or EtherCAT)
- Online help of the amplifier's setup software
- Regional accessories manual
- Technical description of the Kollmorgen Essentials Motor series of motors

More background information is available from the Kollmorgen Support Network at kdn.kollmorgen.com.

NOTE Contact Kollmorgen customer support for a free printed copy of the installation manual.

1.2.1 Symbols Used

Symbol	Indication
DANGER	Indicates a hazardous situation which, if not avoided, **will result in death or serious injury**.
WARNING	Indicates a hazardous situation which, if not avoided, **could result in death or serious injury**.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates situations which, if not avoided, could result in property damage.
NOTE	Indicates useful information.
IMPORTANT	Indicates specific information that could impact results.
	Warning of a danger (general). The type of danger is specified by the text next to the symbol.
	Warning of danger from electricity and its effects.
	Warning of danger from hot surface.
	Warning of danger from suspended loads.

1.3 Part Number Scheme

IMPORTANT

- The part number scheme is for product identification only.
- Do not use for the order process because not all combinations of features are possible.

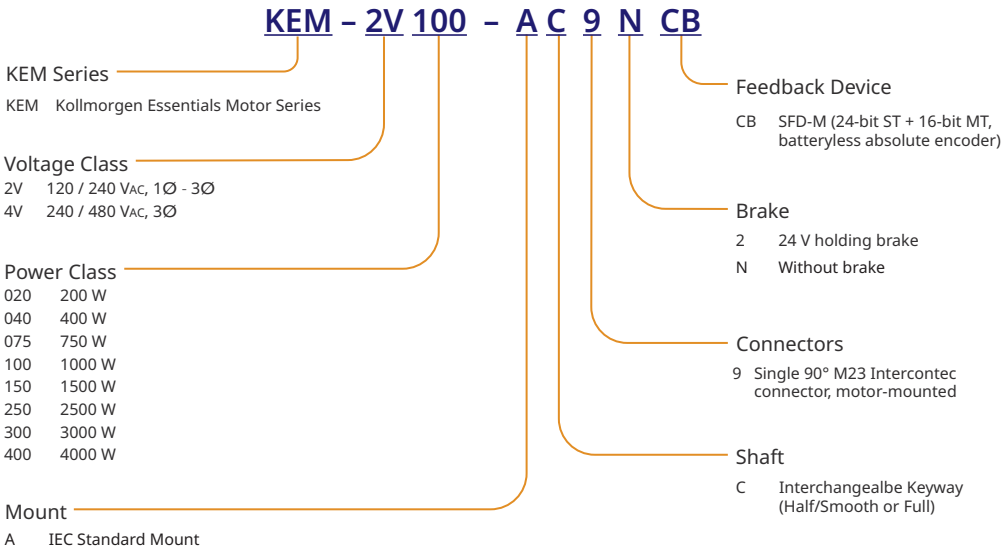


Figure 2-1: KEM Part Number Scheme

1.3.1 Connector Options (C)

NOTE See "Connector Pinouts" (→ p. 29) for connector options.

Connector	Usage	Contacts - Pins	Max. Current [A]	Max. Cross Section [mm2]	Protection Class	Cable Power Conductor Size [mm2]	Suggested Mating Connecotor
		Power / Signal					
M23 SpeedTec right angle connectors (Size 1)	Hybrid (SFD-M)	4 / 4	20 / 10	2.5 / 1.0	IP65	1.5	BSTA-108-NN-00-08-0036
		4 / 4	20 / 10	2.5 / 1.0		2.5	

1.3.2 Feedback Options

Motor length depends on the built-in feedback device, see the Dimension Diagrams.

Retrofitting is not possible. See Connector Pinout for the connector options.

1.3.3 Feedback Description

Code	Type	Motor ID Support[1]	Accuracy [2] (arc-min)	RMS Noise[3] (Rev rms)	Resolution	Absolute Revs	Compatible Drives	Functional Safety Support
CB	SFD-M	Yes	+/– 1' (typical)	2^{-22}	24 bits	65,536	All Kollmorgen drives	No

1. Motor ID Support means electronic motor nameplate data is included, allowing for plug-and-play commissioning.
2. Accuracy referes to overall system accuracy once installed in the motor.
3. Noise refers to the RMS position noise when at stand-still.

1.4 Safety

1.4.1 Specialist Staff Required!

Only properly qualified personnel are permitted to perform such tasks as transport, assembly, setup and maintenance.

Qualified specialist staff are people familiar with the transport, installation, assembly, commissioning, and operation of motors and who use their relevant minimum qualifications in their duties.

- Transport: Only by personnel with knowledge of handling electrostatically sensitive components.
- Mechanical Installation: Only by mechanically qualified personnel.
- Electrical Installation: Only by electrical engineering qualified personnel.
- Setup: Only by qualified personnel with extensive knowledge of electrical engineering and drive technology.

The qualified personnel must know and observe IEC 60364 / IEC 60664 and national accident prevention regulations.

1.4.2 Check Hardware Revision!

Check the Hardware Revision Number of the product (see the product label).

- This number is the link between your product and the manual.
- The product Hardware Revision Number must match the Hardware Revision Number on the cover page of the manual.

1.4.3 Read the Documentation!

Read the available documentation before installation and commissioning.

- Improper handling of the can cause harm to people or damage to property.
- Strictly adhere to the technical information on the installation requirements.
- The operator must ensure that all persons entrusted to work on the motor have read and understood the manual and that the safety notices in this manual are observed.

1.4.4 Pay Attention to the Technical Data!

Adhere to the technical data and the specifications on connection conditions (rating plate and documentation).

If permissible voltage values or current values are exceeded, the motors can be damaged (e.g., by overheating).

1.4.5 Perform a Risk Assessment!

The manufacturer of the machine must:

- Generate a risk assessment for the machine.
- Take appropriate measures to ensure that unforeseen movements cannot cause injury or damage to any person or property.
- Specialist staff may have additional requirements as a result of the risk assessment.

1.4.6 Secure the Key!

- Remove any fitted key (if present) from the shaft before letting the motor run without coupled load to avoid the dangerous results of the key being thrown out by centrifugal forces.
- When delivered, the shaft keys are provided in a separate plastic bag.

1.4.7 Safety Warnings

Symbol	Description
	**Hot surface!** The surfaces of the motors can be very hot in operation, according to their protection category. • Risk of minor burns! • Measure the temperature and wait until the has cooled down below 40 °C before touching it.

DANGER 	**Earthing! High voltages!**
	It is vital that you ensure the is safely earthed to the PE (protective earth) busbar in the switch cabinet.
	• Risk of electric shock!
	  • Without low-resistance earthing, no personal protection can be guaranteed and there is a risk of death from electric shock.
	• Not having optical displays does not guarantee an absence of voltage.
	• Do not unplug any connectors during operation.
	  • There is a risk of death or severe injury from touching exposed contacts.
	  • Power connections may be live even when the motor shaft is not rotating.
	  • This can cause flashovers with resulting injuries to persons and damage to the contacts.
	• After disconnecting the servo drive from the supply voltage, wait several minutes before touching any components which are normally live (e.g., contacts, screw connections) or opening any connections.
	• The capacitors in the servo drive can still carry a dangerous voltage several minutes after switching off the supply voltages.
	  • To be safe, measure the DC-link voltage and wait until the voltage has fallen below $60V_{DC}$.

1.4.8 Use as Directed

- The Kollmorgen Essentials Motor series of synchronous servomotors is designed especially for drives for industrial robots, machine tools, textile and packing machinery and similar with high requirements for dynamics.
- The user is only permitted to operate the motors under the ambient conditions defined in this documentation.
- The Kollmorgen Essentials Motor series of motors is **exclusively** intended to be driven by servo drives under speed and / or torque control.
- The motors are installed as components in electrical apparatus or machines and can only be commissioned and put into operation as integral components of such apparatus or machines.
- The thermal sensor integrated in the motor windings must be observed and evaluated.
- The holding brakes are designed as standstill brakes and are not suited for repeated operational braking.
- The conformity of the servo system to the standards mentioned in the EC Declaration of Conformity is only guaranteed when the components (servo drives, motor, cables, etc.) that are used have been supplied by Kollmorgen.
  - See "Approvals" (➔ p. 36).

1.4.9 Prohibited Use

- The use of the is prohibited directly on mains supply networks.
- The use of the is prohibited in:
  - areas where there is a risk of explosions.
  - contact with food and beverage.
  - environments with caustic and/or electrically conducting acids, bases, oils, vapors, dusts.
- Commissioning the motor is prohibited in the EU if the machine in which it was installed:

    - Does not meet the requirements of the EC Machinery Directive.
    - Does not comply with the EMC Directive.
    - Does not comply with the Low Voltage Directive.
- Built-in holding brakes without further equipment must not be used to ensure functional safety.

1.5 Product Life Cycle Handling

1.5.1 Decommissioning

NOTICE Only professional staff who are qualified in electrical engineering are allowed to decommission parts of the system.

1. Switch off the main switch of the switchgear cabinet.
2. Secure the system against restarting.
3. Block the main switch.

1.5.2 Disassembly

NOTICE Only professional staff who are qualified in electrical engineering are allowed to disassemble parts of the system.

1. Decommission the device (see "Decommissioning" (→ p. 12)).
2. Remove the connectors.
   Disconnect the potential earth connection last.
3. Demount: Loosen the fastening screws.
4. Remove the device.

1.5.3 Disposal

NOTICE Contact a certified electronic scrap disposal merchant to properly dispose of the controller or device.

In accordance with the WEEE-2012/19/EU guideline and similar:

- The manufacturer accepts returns of old controllers, devices, and accessories for professional disposal.
- The sender is responsible for the transport costs to return the controller, device, or accessory.
- Send the devices in the original packaging to the appropriate manufacturer address.

North America	Europe
Kollmorgen 201 West Rock Road Radford, VA 24141, USA	**KOLLMORGEN s.r.o** Evropská 864 664 42 Modřice, Brno Czech Republic
South America	**China and SEA**
Altra Industrial Motion do Brasil Equipamentos Industriais LTDA. Avenida João Paulo Ablas, 2970 Jardim da Glória, Cotia – SP CEP 06711-250, Brazil	**KOLLMORGEN** Room 302, Building 5, Libao Plaza, 88 Shenbin Road, Minhang District, Shanghai, China.

1.5.4 Maintenance and Cleaning

- Maintenance and cleaning must be done by qualified personnel only.
- Opening the voids the warranty.
- Once per year or after 2,500 hours of operation:
  - Check the motor for bearing noise.
    - If any unusual noises are heard, stop the operation of the motor.
    - The bearings must be replaced by the manufacturer.
- After 20,000 hours of normal operation:
  - Replace all bearings under rated conditions (by the manufacturer).

1.5.5 Packaging

- Cardboard packing with Instapak® foam cushion.
  - Recycling of foam is possible at special waste collection points.
- You can return the plastic portion to the supplier.
  - See Repair and Disposal (➔ p. 14).

Motor Type	Packaging	Maximum Stacking Height
KEM-xV020/xV040	Cardboard	10
KEM-xV075/xV100	Cardboard	6
KEM-xV150/xV250	Cardboard	5
KEM-xV300/xV400	Cardboard	1

1.5.6 Repair and Disposal

Repair of the motor must be done by the manufacturer.

- Opening the voids the warranty.
- The manufacturer accepts returns of old devices and accessories for professional disposal.
- The sender is responsible for the transport costs to return the motor.

Send the motor to:

KOLLMORGEN s.r.o
Evropská 864
664 42 Modřice, Brno
Czech Republic

1.5.7 Storage

- Store only in the manufacturer's original recyclable packaging.
- Climate category 1K4 according to EN 61800-2, IEC 60721-3-2.
- Humidity: Relative humidity 5% to 95% , no condensation.
- Maximum stacking height: See "Packaging" (→ p. 13).
- Storage temperature: -25 °C to +55 °C, maximum variation 20K/hr.
- Storage time: Unlimited.

1.5.8 Transport

- Transport is only allowed by qualified personnel in the manufacturer's original recyclable packaging.
    - Avoid shocks, especially to the shaft end.
- Climate category 2K3 according to EN 61800-2, IEC 60721-3-2.
- Humidity: Relative humidity 5% to 95% , no condensation.
- Temperature: -25 °C to +70 °C, maximum rate of change 20K/hr.
- If the packaging is damaged, check the motor for visible damage.
    - Inform the carrier and, if appropriate, the manufacturer.

1.6 Package

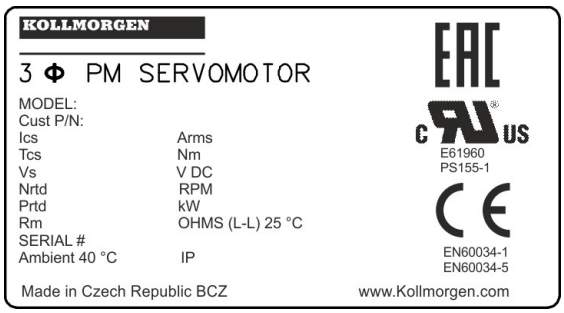
1.6.1 Package Supplied

These items are included in the package:

- Motor from the Kollmorgen Essentials Motor series.
- QR code, printed on the box, leading to the manual.

1.6.2 Nameplate

With standard motors, the nameplate uses adhesive on the housing side.



REPLACE ME!

Figure 2-2: Kollmorgen Essentials Motor Nameplate

Legend	Description
MODEL	Motor Type
Ics	Standstill Current
Tcs	Standstill Torque
Vs	U_N Supply Voltage
Nrtd	nn Rated Speed @ U_n
Prtd	Rated Power
Rm	Winding Resistance @ 25°
SERIAL	Serial Number
AMBIENT	Maximum Ambient Temperature
IPXX	Ingress Protection Rating
CLASS F	Insulation Rating
W	Motor Weight in kg

The year of manufacturing is coded in the serial number.
The first two digits of the serial number are the year of manufacturing (e.g., 17 is 2017).

1.7 General Technical Data

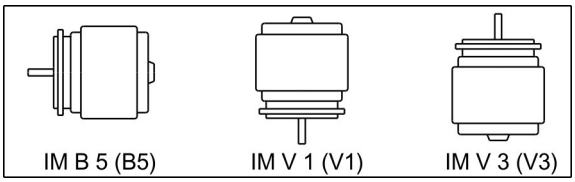
Technical Data	Description
Ambient Temperature	• -20 °C to 40 °C for site altitude up to 1000m AMSL (at rated values). • It is vital to consult our applications department for ambient temperatures above 40 °C and/or any enclosed environment.
Ball Bearing Life	≥ 20,000 operating hours.
Permissible Humidity	Relative humidity 5% to 95% , no condensation.(at rated values)
Power derating (currents and torques)	1%/°K in range 40 °C to 50 °C up to 1000m AMSL. For site altitude above 1000m AMSL and 40 °C: • 1.5%/100m between 1000m to 2000m

NOTE See "Technical Data" (➔ p. 31) for every motor type.

1.8 Standard Features

1.8.1 Style

The basic style for the KEM motors is style IM B5 according to EN 60034-7.



1.8.2 Flange

IEC flange accuracy according to DIN 42955.

Tolerances of shaft extension run-out and of mounting flanges for rotating electrical machines.

Code	Flange
A	• IEC with accuracy N. • Fit KEM: J6

1.8.3 Protection Class

Per EN 60529.

All Kollmorgen Essentials Motors

Connector Option	Shaft Seal	Protection Class
9	without	IP54[1]

1. Optional field-installable shaft seal kits are available as an accessory.
   The motors will meet IP65 Protection Class if properly installed.
   Refer to the separate Kollmorgen Essentials Motor Shaft Seal Kit installation instructions provided with each shaft seal kit.

1.8.4 Insulation Material Class

The motors meet the standard for insulation material Class F according to IEC 60085 (UL1446 class F).

1.8.5 Surface

- The motors are coated with epoxy powder coating in matte black.
- This finish is not resistant against solvents (e.g., trichlorethylene, nitro-thinners, or similar).

1.8.6 Shaft End, A-side

Power transmission is made through the cylindrical shaft end A, fit k6 to EN 50347.

- Per DIN 6885, every motor is provided with a:
  - Half-key insert for smooth shaft requirements.
  - Full-key for keyed shaft requirements.
- Shaft Key Kits (KEM ...SKK) are available as an accessory in case of damaged or misplaced keys.
- Bearing life is calculated with 20.000 operating hours. is this 20 hours or 20,000 hours? - the original text has a decimal point (which makes it 20 hours) instead of a comma (which makes it 20 thousand hours)

Order Code	Shaft End	Available For
C	Smooth shaft with half-key or Keyed shaft with full-key.	All Kollmorgen Essentials Motors

1.8.6.1 Axial Force

When assembling pinions or wheels to the axis and use of angular gearheads, axial forces arise.

- (missing or bad snippet)
- (missing or bad snippet)

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1.8.7 Shaft Seal

If the Kollmorgen Essentials Motor is connected to a machine flange with unsealed shaft region, the optional field installable shaft seal kit (KEM...SSK) should be used to ensure shaft sealing.

- The shaft seal kit option is made of mineral filled PTFE seal (Teflon®).
  - This is self-lubricating and is recommended for applications where regular lubrication of the shaft seal is not possible.
- The Teflon shaft seal ensures the IP65 protection for the shaft area.
- The rated performance is achieved after some hours of shaft seal run-in.
  - No special procedure for run-in is needed.
- Some shedding of the Teflon shaft seal material is normal and does not affect the function.
- The shaft seal is pre-lubricated by grease.
  - Additional MOLYKOTE grease is needed for installation.
  - See the Kollmorgen Essentials Motor Shaft Seal Kit installation instructions provided with each shaft seal kit.

1.8.8 Protective Device

The Standard AC voltage version of each motor is fitted with an electrically isolated PTC Avalanche-style thermistor.

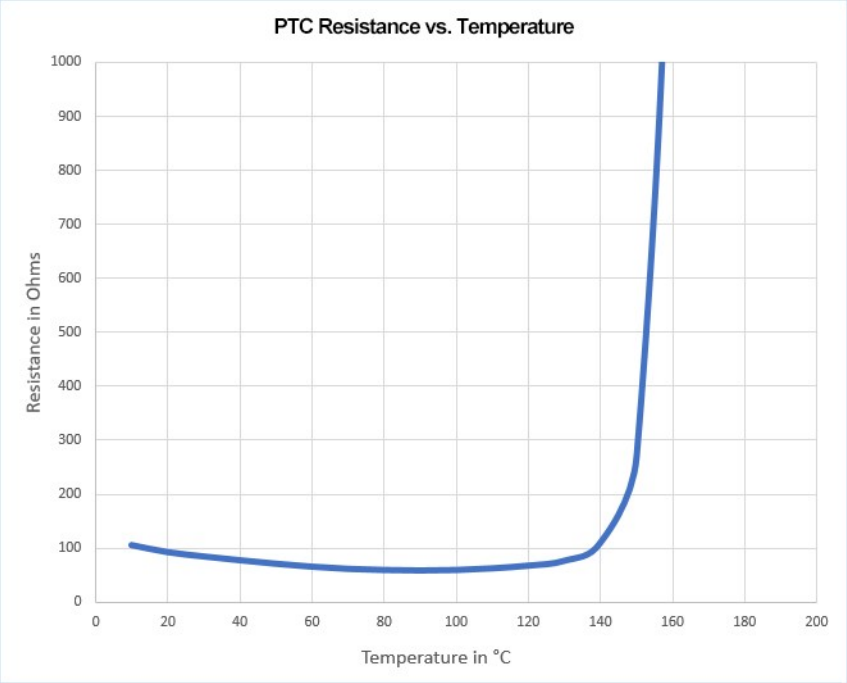
- The thermal sensors **do not** provide any protection against short, heavy overloading.
- With SFD-M digital feedback systems the temperature sensor status is transmitted digitally and evaluated in the servo drives.
- When Kollmorgen-configured feedback cables are used, the sensor is integrated into the monitoring system of the digital servo drives

1.8.8.1 Thermal Device: Resistance vs. Temperature Graph

Thermal Device curves show the equivalent resistance in ohms that corresponds to a given temperature of the motor windings.

The drive used with the motor must support the selected thermal device for proper operation.

1.8.8.1.1 Kollmorgen Essentials Motor Standard Thermal Device Option



1.8.9 Vibration Class

The motors are made to vibration class A according to EN 60034-14.

For a speed range of 600RPM to 3600RPM, and a shaft center between 56mm and 132mm, the actual value of the permitted vibration severity is 1.6mm/s.

1.9 Wiring Technology

1.9.1 Connectors

- See "Connector Options (C)" (➔ p. 8) for a description of the connector.
- See "Connector Pinouts" (➔ p. 29) for a description of the pinout.

1.9.2 Wire Cross Sections

Wire cross sections for 40 °C ambient.

Hybrid Cable

Type	Cross Section	Remarks
SFD-M	(4 x 1.5 + (2 x 0.34) + (2 x 0.75))	4 power lines & 2 brake lines & 2 signal lines
SFD-M	(4 x 2.5 + (2 x 0.34) + (2 x 1.0))	

1.10 Holding Brake

All motors are available with a holding brake option.

WARNING

Secure hanging loads!
Risk of injury exists for personnel operating the machine.

- If there is a suspended load (vertical axes), the motor's holding brake is released and at the same time the servo drive does not produce any output, the load may fall down!
- The user should consider:
  - Required local safety standards in the case of hanging loads (vertical axes).
  - The need to insure personnel safety by using additional safety measures for hazard avoidance.

NOTICE

- The holding brakes are designed as standstill brakes.
  - They are **not** suited for repeated operational braking.
- In the case of frequent, operational braking, premature wear and failure of the holding brake is to be expected.

- A spring applied brake ($24V_{DC}$) is integrated into the motors.
  - When this brake is de-energized, it blocks the rotor.
- The length of the motor increases when a holding brake is mounted.
- The holding brake can be controlled directly by the servo drive.
  - **There is no personal safety!**
- The winding is suppressed in the servo drive.
  - Additional circuitry is not required (see the instruction manual of the servo drive).
- If the holding brake is not controlled directly by the servo drive, additional wiring (e.g., varistor) is required.
  - Contact "Support and Services" (→ p. 37) for assistance.
- (missing or bad snippet)

1.11 Mechanical Installation

NOTE See "Dimension Drawings" (➔ p. 30).

1.11.1 Flange Mounting

NOTE Only qualified staff with mechanical engineering knowledge are permitted to assemble the motor.

1.11.1.1 Flange Mounting Guidelines

- Protect the motor from unacceptable stresses.
  - During transport and handling, no components must be damaged.
- The site must be free of conductive and aggressive material.
  - For V3-mounting (shaft end upwards), make sure that no liquids can enter the bearings.
- Verify there is unhindered ventilation of the motors.
- Observe the permissible ambient and flange temperatures.
  - For ambient temperatures above 40 °C, see our applications department beforehand.
  - Verify there is adequate heat transfer in the surroundings and the motor flange.
- The motor flange and shaft are especially vulnerable during storage and assembly - avoid brute force.
  - It is important to use the provided locking thread to tighten couplings, gear wheels, pulley wheels, and warm up the drive components, where possible.
  - Blows, or the use of force, leads to damage to the bearings and the shaft.

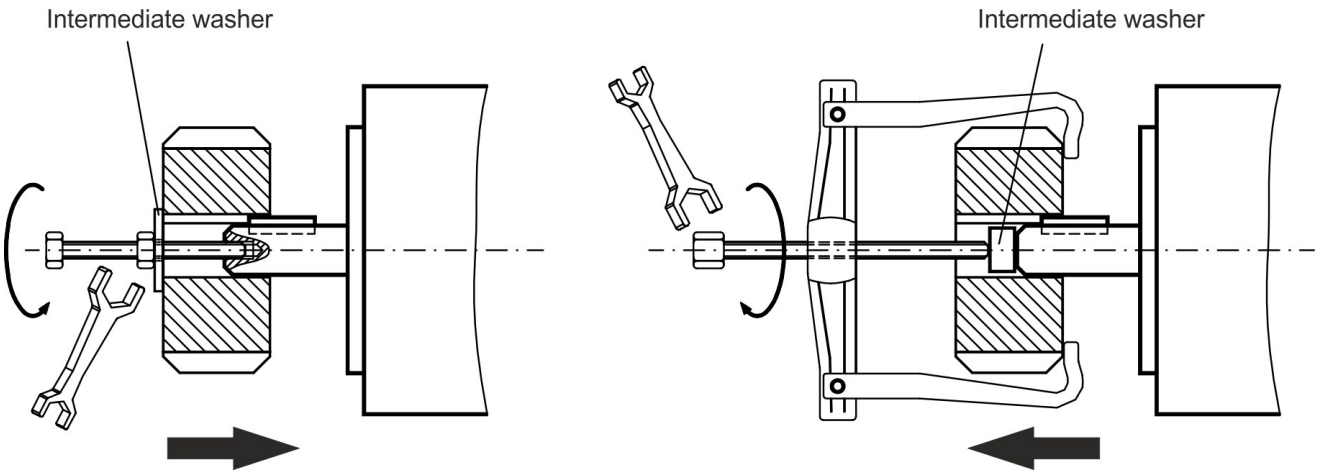


Figure 2-3: Example: Intermediate Washer

- Wherever possible, use only backlash-free, frictionally-locking collets or couplings.
  - Verify correct alignment of the couplings.
  - A displacement causes unacceptable vibration and the destruction of the bearings and the coupling.
- In all cases, **do not** create a mechanically constrained motor shaft mounting by using a rigid coupling with additional external bearings (e.g., in a gearbox).
- Identify the number of motor poles and resolver poles (if applicable).
  - Verify the correct setting is made in the used servo drive.
  - An incorrect setting can lead to the destruction of the motor, especially with small motors.
- If possible, avoid axial loads on the motor shaft.
  - Axial loading significantly shortens the life of the motor.
- Check the compliance to the permitted radial and axial forces F_R and F_A.
  - When a toothed belt drive is used, the minimal permitted diameter of the pinion follows from the equation: $d_{min} \geq (M_0/F_R)*2$.

1.12 Electrical Installation

IMPORTANT Only qualified staff with electrical engineering knowledge are permitted to assemble the motor.

DANGER **Dangerous Voltage!**

- Always verify the motors are de-energized during assembly and wiring.
  - No voltage can be switched on for any piece of equipment which is to be connected.
- There is a risk of death or severe injury from touching exposed contacts.
  - Verify the switch cabinet remains turned off (e.g., barrier, warning signs etc.).
  - The individual voltages are only turned on again during setup.
- Risk of electric shock!
  - Never undo the electrical connections to the motor while it is energized.
  - In unfavorable circumstances, electric arcs can arise causing harm to people and damaging contacts.
- A dangerous voltage, resulting from residual charge, can still be present on the capacitors up to 10 minutes after switch-off of the mains supply.
  - Even when the motor is not rotating, control and power leads may be live.
- Measure the DC-link voltage and wait until it has fallen below $60V_{DC}$.

NOTE Pinouts for the connector are here: "Connector Pinouts" (→ p. 29).
Pinouts of the servo drive are in the instructions manual of the servo drive.

NOTE

- The ground symbol ( ) indicates that you must provide an electrical connection.
  - This connection must have as large a surface area as possible between the unit indicated and the mounting plate in the switch cabinet.
  - The symbol is found in the wiring diagrams.
- This connection is to suppress HF interference and must not be confused with the PE (protective earth) symbol (protective measure to EN 60204).

NOTE To connect the motor, use the wiring diagrams in the Installation and Setup Instructions of the servo drive.

1.12.1 Electrical Installation Guide

- Verify the servo drive and motor match each other.
  - Compare the rated voltage and rated current of the unit.
  - Install the wiring according to the wiring diagram in the instructions manual of the servo drive.
  - The connections to the motor are in "Connector Pinouts" (→ p. 29).
- Install all cables carrying a heavy current with an adequate cross-section, as per EN 60204.
  - The recommended cross-section is in the "Technical Data" (→ p. 31).

NOTE

- For long motor cables (>25m), and dependent on the type of the used servo drive, a motor choke must be switched into the motor cable.
- See the servo drive instruction manual and accessory manual.

- Verify there is proper earthing of the servo drive and the motor.
  - Use correct earthing and EMC-shielding according to the used servo drive instructions manual.
  - Earth the mounting plate and motor casing.
- If a hybrid cable is used, and it includes integral brake control leads, the brake control leads must be shielded.

- The shielding must be connected at both ends.
- See the servo drive instruction manual.

1.12.1.1 Cabling

1.12.1.1.1 Cable Connection

- Route motor cables as separately as possible from control cables.
- Connect the feedback device.
- Connect the motor cables.
- Connect the holding brake, if used.
- Install motor chokes (if applicable) close to the servo drive.

1.12.1.1.2 Cable Material Requirements - Capacity

Requirements for cable material:

- Hybrid cable: less than 120 pF/m.

1.12.1.2 Shields

- Connect shields to shielding terminals or EMC connectors at both ends.
- Connect the shielding at both ends.
- Connect all shielding via a wide surface-area contact (low impedance) and metallized connector housings or EMC-cable glands.

1.12.2 Connect the Motor

- Install the wiring in accordance with the valid standards and regulations.
- Use only Kollmorgen pre-assembled, shielded cables for the feedback and power connections.
- Incorrectly installed shielding leads to EMC interference and has an adverse effect on system function.
- The maximum cable length is defined in the instruction manual of the used servo drive.

NOTE For a detailed description of configured cables, see the regional accessories manual.

1.13 Setup

IMPORTANT Only specialist personnel with extensive knowledge in electrical engineering / drive technology are allowed to commission the drive unit of the servo drive and motor.

DANGER **High Voltages!**

- Deadly voltages can occur, up to 900V_{DC}.
- Risk of electric shock!
  - Verify that all live connection points are safe against accidental contact.
  - Never undo the electrical connections to the motor when it is live.
- The residual charge in the capacitors of the drive can produce dangerous voltages up to 10 minutes after the mains supply has been switched off.
- Even when the motor is not rotating, control and power leads may be live.
- Measure the DC-link voltage and wait until it has fallen below .

CAUTION **Hot Surface!**

- Danger of light burns!
  - The surface temperature of the motor can exceed 100 °C in operation.
  - Check (measure) the temperature of the motor.
- Wait until the motor has cooled below 40 °C before touching it.

CAUTION **Secure Unplanned Movements!**

- The drive performing unplanned movements during commissioning cannot be ruled out.
- Verify that, if the drive moves unintentionally, no danger can result to personnel or machinery.
- The safety measures you must take for your task are based on the risk assessment of the application.

1.13.1 Setup Procedure

NOTE

- This procedure is an example of the setup.
- A different method may be appropriate or necessary, depending on the application of the equipment.

1. Check the assembly and orientation of the motor.
2. Check the drive components (e.g., clutch, gear unit, belt pulley) for the correct seating and setting.
3. Observe the permissible radial and axial forces.
4. Check the wiring and connections to the motor and the servo drive. this text is for AKM - verify this against AKMA, AKM2G
5. Check that the earthing is correct.
6. Test the function of the holding brake, if used.
   Apply 24V_{DC}, brake must be released.
7. Check whether the rotor of the motor revolves freely.
   Release the brake, if necessary.
8. Listen for grinding noises.
9. Check that all the required measures against accidental contact with live and moving parts have been implemented.
10. Conduct any further tests specifically required for the system based on the risk assessment.
11. Commission the drive according to the servo drive setup instructions.
12. In multi-axis systems, individually commission each drive unit (servo drive and motor).

1.14 Troubleshooting

There can be a large number of different reasons for a fault, depending on the particular conditions in the system.

- The fault causes in the tables are those which directly influence the motor.
- Peculiarities which appear in the control loop behavior can usually be traced back to an error in the parameterization of the servo drive.
- The documentation for the servo drive and the setup software provides information.
- For multi-axis systems there may be further hidden reasons for faults.

1.14.1 Brake Does Not Engage

Possible Cause	Correction Measures
Faulty brake.	Replace the motor.
Motor shaft is axially overloaded.	Check the axial load, reduce it. Replace the motor, since the bearings have been damaged.
Required holding torque is too high.	Check the dimensioning.

1.14.2 Error Message: Feedback

Possible Cause	Correction Measures
Break in feedback cable, cable crushed, or similar.check the 'feedback' text in KEM - does it belong in this sentence?	Check the cable.
Feedback connector is not properly plugged in.	Check the connector.

1.14.3 Error Message: Motor Brake

Possible Cause	Correction Measures
Faulty motor holding brake.	Replace the motor.
Short-circuit in the supply voltage lead to the motor holding brake.	Remove the short-circuit.

1.14.4 Error Message: Motor Temperature

Possible Cause	Correction Measures
Loose feedback connector or break in the feedback cable. check the 'feedback' text in KEM - does it belong in this sentence?	Check the connector. Replace the feedback cable, if necessary.check the 'feedback' text in KEM - does it belong in this sentence?
Motor thermosensor has switched.	Wait until the motor has cooled down. Investigate why the motor becomes too hot.

1.14.5 Error Message: Output Stage Fault

Possible Cause	Correction Measures
Motor cable has short-circuit or earth short.	Replace the cable.
Motor has short-circuit or earth short.	Replace the motor.

1.14.6 Motor does not Rotate

Possible Cause	Correction Measures
Brake is not released.	Check the brake controls.
Break in the setpoint lead.	Check the setpoint lead.
Drive is mechanically blocked.	Check the mechanism.
Motor phases in wrong sequence.	Correct the phase sequence.
Servo amplifier is not enabled.	Supply ENABLE signal.

1.14.7 Motor Oscillates

Possible Cause	Correction Measures
Break in the cable shielding.	Replace the cable.
Servo -Servo amplifier gain too high.	Use the motor default values.

1.14.8 Motor Runs Away

Possible Cause	Correction Measures
Motor phases are in the wrong sequence.	Correct the phase sequence.

2 Connector Pinouts

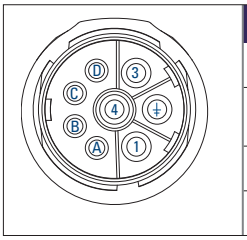
All connector views are facing front.

This table lists the abbreviations:

Abbreviation	Description
BR	Motor holding brake
n.c.	not connected
PE	Protection Earth
SFD	SFD-M Signal (incl. thermal device signal)
U	Motor phase U
V	Motor phase V
W	Motor phase W

2.1 Connector Code 9: All Kollmorgen Essentials Motors

Power & SFD-M All motors (Feedback Code: CB)



Pin	Function	Pin	Function
1	U	A	BR+
⏚	PE	B	BR–
3	W	C	SFD-M –
4	V	D	SFD-M +

3 Dimension Drawings

IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at www.kollmorgen.com.

4 Technical Data

All data is valid for 40 °C environmental temperature and 100K overtemperature of the winding.

- Determination of nominal data with constant temperature of adapter flange of 65 °C.
- The data can have a tolerance of +/- 10%.

4.1 Technical Data Terminology

NOTE

- Technical data for every motor type is in "Technical Data" (➔ p. 31).
- All data is valid for 40 °C environmental temperature and 100K overtemperature of the winding.
- Determination of nominal data with constant temperature of adapter flange of 65 °C.
- The data can have a tolerance of +/- 10%.

Term	Definition
Peak Current, (pulse current) I_{0max} [A]	• The Peak Current of the motor (effective sinusoidal value) is several times the rated current, depending on the motor size and winding. • The actual value is determined by the peak current of the drive which is used.
Rated Torque, M_n [Nm]	• The Rated Torque is produced when the motor is drawing the rated current at the rated speed. • The rated torque can be produced indefinitely at the rated speed in continuous operation (S1).
Release Delay Time t_{BRH}[ms] / Engage Delay Time t_{BRL}[ms] of the brake	These constants define the response times of the holding brake when operated with the rated voltage from the servo drive.
Rotor Moment of Inertia, J [kg.cm²]	The constant J is a measure of the acceleration capability of the motor. Example: At I_0, the acceleration time t_b from 0 to 3000RPM is given as: $t_b\left[s\right] = \frac{3000 \bullet 2\pi}{M_0 \bullet 60s} \bullet \frac{m^2}{10^4 \bullet cm^2} \bullet J$ with M_0 in Nm and J in kg.cm².
Standstill Current, I_{0rms} [A]	The standstill current is the effective sinusoidal current which the motor draws at 0<n<100RPM to produce the standstill torque.
Standstill Torque, M_0 [Nm]	The standstill torque can be maintained indefinitely at a speed 0<n<100RPM and rated ambient conditions.
Thermal Time Constant, t_{th} [min]	• The constant t_{th} defines the time for the cold motor, under a load of I_{0rms}, to heat up to a temperature rise of 0.63 x 105 Kelvin. • This temperature rise happens in a much shorter time when the motor is loaded with the peak current.
Torque Constant,	• The Torque Constant defines how much torque in Nm is produced by the motor with 1A r.m.s. current. • The relationship is M=I x K_T(up to I = 2 x I_0). this is AKM text - does it apply to AKMA, AKM2G, KEM?
U_N	Rated mains voltage.
U_n	• DC-Bus link voltage. • $U_n = \sqrt{2} \bullet U_N$
Voltage Constant, K_{Erms} [mV/min^{-1}]	• The Voltage Constant defines the induced motor EMF, as an effective sinusoidal value between two terminals, per 1000RPM. • Measured at 25 °C.

4.2 Technical Data - Brakes

4.2.1 Failsafe, Holding Brake

The holding brake is designed to provide static holding torque to the motor shaft with the brake coil de-energized.

- The brake must first be released (coil energized) prior to commanding motor rotation as determined by its drop-out time.
- The brake is intended for holding or parking of a stationary motor.
  - It is not intended for dynamic braking.
- There should be absolutely no motion of the rotor when power is removed from the brake coil.

4.2.2 Emergency Stops

The brake can be used for a limited number of emergency stop conditions.

- Such use will eventually cause wear, leading to eventual malfunction of the brake.
- The number of emergency stops strongly depends on applied load.
- Contact Kollmorgen for proper calculation of energy that needs to be absorbed during emergency stops in application.

4.2.3 Motor Contamination

Contamination of the motor internal compartment by oil or other foreign materials results in failure of the brake.

Check the suitability of motor sealing for the working environment.

NOTE Contact Kollmorgen for detailed specification and all other inquiries.
See Support and Services (→ p. 37).

4.2.3.1 Notes

Note	Description
1	Minimum Dry Static Torque - The maximum torque that can be applied to a brake without the risk of slipping.
2	• Maximum Release Voltage - The value of voltage where the brake is 100% OPEN. • The brake is mounted inside of the motor.
3	• Minimum Re-Engage Voltage - The value of voltage where the brake is 100% CLOSED. • The brake is mounted inside of the motor.
4	Backlash • The amount of clearance, or free rotation, from a point based in one direction to a point in the opposite direction with torque applied, between the drive connection of the brake to the motor shaft. • 25% of the rated torque of the brake can be applied during the backlash measurement.
5	• Maximum Backlash is calculated using worst-case tolerancing. • Typical Backlash is calculated using statistical tolerancing.
6	
7	• Brake release time is fairly consistent regardless of how the brake is switched. • This is the time for the brake to release when the power is applied to the brake.
8	

Note	Description
9	
10	Current of the brake is calculated from nominal voltage and nominal resistance at 25 °C.
11	Acceleration calculated from maximum acceleration of Kollmorgen motor with the brake without external load.
12	Brake is able to perform 50.000.000 reverse cycles with maximum acceleration and backlash up to 0.8°.
13	B_{10d} is the number of operations where 10% of the sample would fail to danger.
14	• New brake - brake mounted in the motor without previous usage. • Parameters could be influenced by the number of emergency stops absorbed by brake during lifetime.
15	
16	

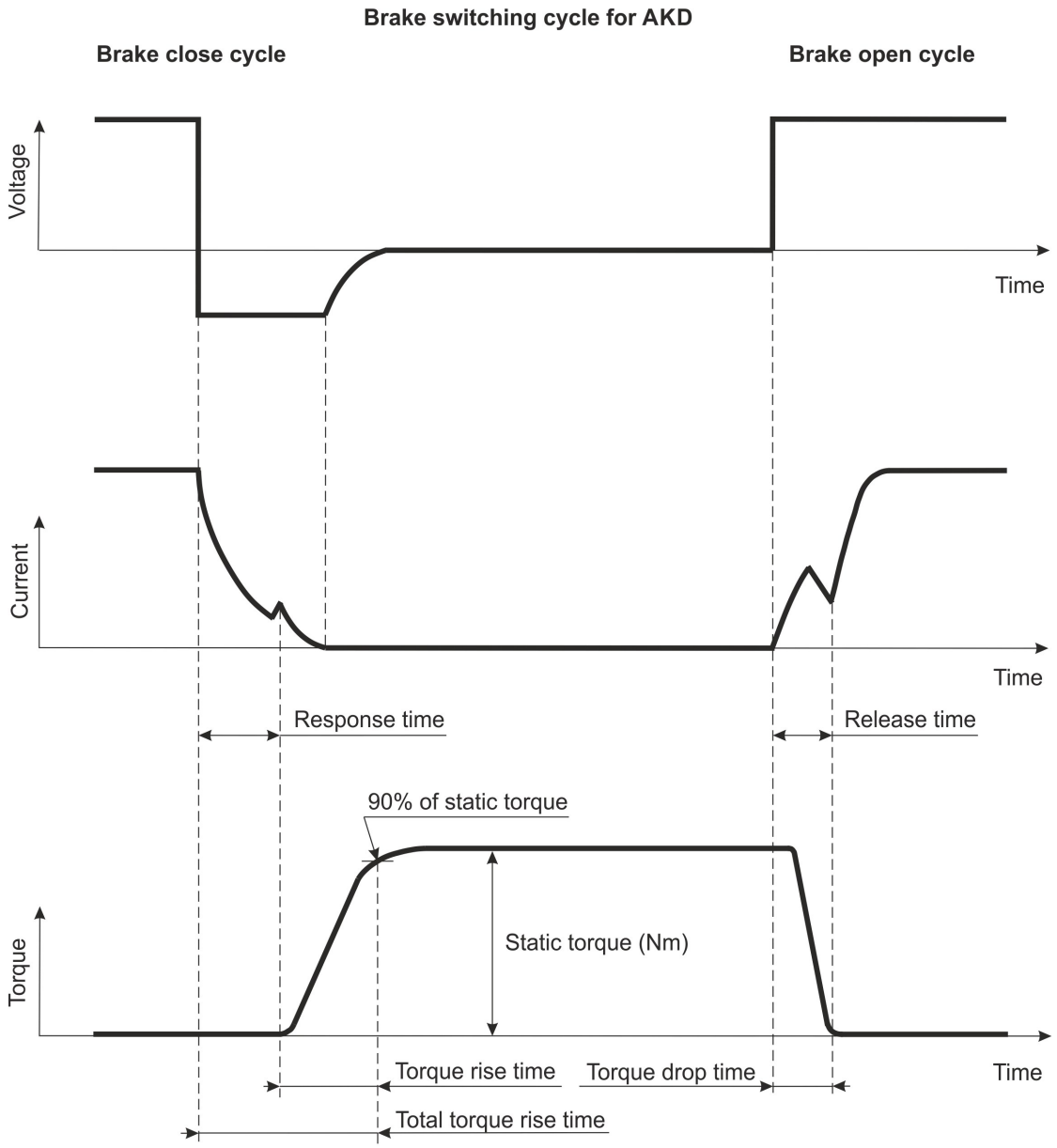


Figure 5-1: Time Needed to Achieve 90% of Static Torque

5 Approvals

Certificates are on the Essentials - Certifications page of the Kollmorgen website.

5.1 Conformance with EAC

EAC is the abbreviation for EurAsian Conformity.

- The mark is used in the states of the Eurasian Customs Union (Russia, Belarus, Kazakhstan) similar to the European EC mark.
- Kollmorgen declares that the :
  - Has passed all required conformity procedures in a member state of the Eurasian Customs Union.
  - Meets all technical requirements requested in the member states of the Eurasian Customs Union :
    - Low voltage (TP TC 020/2011)
    - Electromagnetic Compatibility (TP TC 004/2011)

Contact in Russia:
Intelligence Automatics LLC. , Bakuninskaya Str. d 14, Building 1, RU-105005 Moskau

5.2 Conformance with EC

The motors have been tested by an authorized testing laboratory in a defined configuration.

- Any divergence from the configuration and installation described in this documentation means that the user is responsible for carrying out new measurements to ensure conformance with regulatory requirements.

NOTICE **Feedback systems and contacts must not be tested with high voltage.**

- Feedback systems are not suitable for high voltage testing, it is allowed to exclude sensitive electronic components from these tests.
- Feedback systems might be destroyed during a high voltage test.

NOTE EC Declaration of Conformity can be found on the Kollmorgen website.

Kollmorgen declares the conformity of the product series with these directives:

- EC Directive 2014/30/EU, Electromagnetic compatibility
- EC Directive 2014/35/EU, Low voltage

5.3 Conformance with REACH

5.4 Conformance with RoHS

5.5 Conformance with UL

(missing or bad snippet)

Support and Services

About Kollmorgen

When you need motion and automation systems for your most demanding applications and environments, count on Kollmorgen - the innovation leader for more than 100 years. We deliver the industry's highest-performing, most reliable motors, drives, AGV control solutions and automation platforms, with over a million standard and easily modifiable products to meet virtually any motion challenge. We offer manufacturing facilities, distributors and engineering expertise in all major regions around the world, so you can bring a better machine to market faster and keep it profitable for many years to come.

Kollmorgen Developer Network

Kollmorgen Support Network

Join the Kollmorgen Support Network for product support.
Ask the community questions, search the knowledge base for answers, get downloads, and suggest improvements.

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