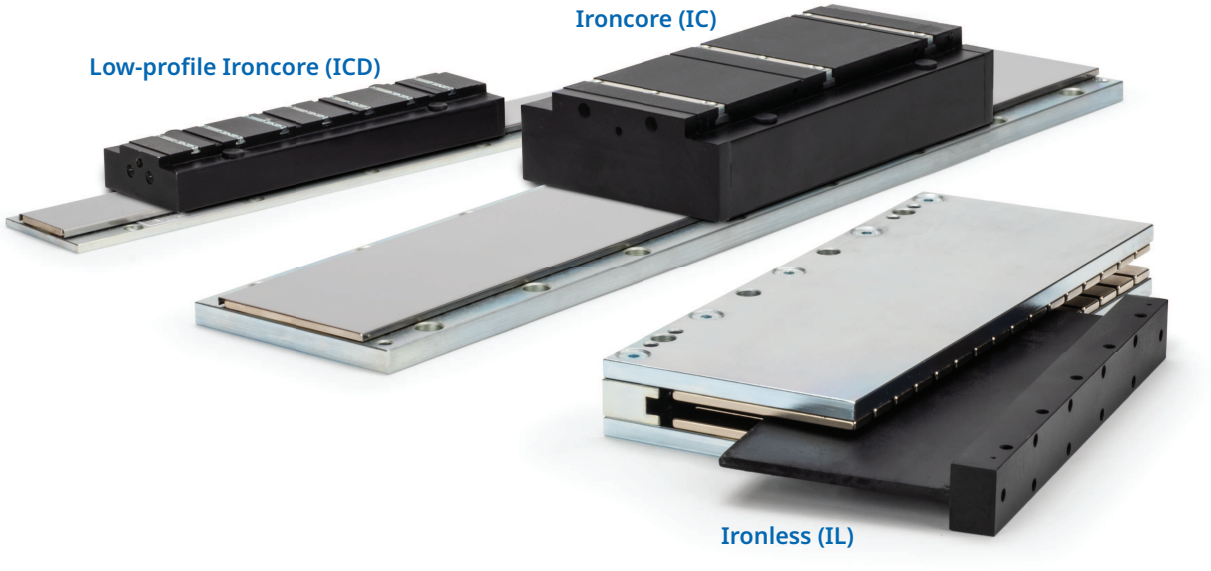
DDL

Direct Drive Linear Motor

English Installation Manual



WARNING

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

Edition: F, April 2025

Part Number M-LN-016-0702

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

RoHS compliant REACh

Record of Document Revisions

Revision	Date	Remarks
A	September 1996	Initial Release
B	June 2002	Corrected wiring information
C	September 2004	Update corporate identity and contact information
D	May 2007	Corrected airgap and shim information
E	April 2024	Updated for UL certification $480V_{DC}$
F	April 2025	Major content overhall, removed flex cables, removed ICH, added high voltage IC options, new coil options, removed all Servostar drive content, added AKD / AKD2G content, new cabling/wiring content, added new performance data, curves, and new dimensional drawings, updated several graphics, updated branding, updated instructions.

Table of Contents

1 About this Manual

This manual provides a guideline and procedures for installing the Kollmorgen DDL Ironcore Linear Motor and Ironless Linear Motor.

- Troubleshooting procedures are provided to assist with any problems that may occur during installation.
- These procedures assume that all other devices pertinent to system operation have been installed and are operating normally.
- Manual updates can be downloaded from the www.kollmorgen.com.

1.1 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 important notes.
	Warning of a danger (general). The type of danger is specified by the text next to the symbol.
	Warning of danger from automatic start.
	Warning of danger from electricity and its effects.
	Warning of danger from hot surface.
	Warning of danger of magnetized environment.
	Warning of danger from suspended loads.

1.2 Abbreviations Used

See Technical Data Terminology-Technical Data Terminology.

NOTE In this document, the symbol (→ p. 53) means: see page 53.

2 Part Number Scheme

This section provides the nomenclatures for the:

- "Coil Part Number Scheme" (➔ p. 7)
- "Magnetic Way Part Number Scheme" (➔ p. 8)
- "Hall Effect Part Number Scheme" (➔ p. 8)

2.1 Coil Part Number Scheme

IL 06 030 A1 AC TR C1 - XXX

Coil Type
IL Ironless
ICD Low Profile Ironcore
IC Ironcore

Coil Series
03 03 Series Ironless
06 06 Series Ironless
12 12 Series Ironless
18 18 Series Ironless
24 24 Series Ironless
05 05 Series ICD
10 10 Series ICD
11 11 Series Ironcore
22 22 Series Ironcore
33 33 Series Ironcore
44 44 Series Ironcore

Magnetic Way
015 15 (IL Only)
030 30
050 50
075 75
100 100
150 150 (IC Only)
200 200 (IC Only)
250 250 (IC Only)

Winding Coil
A1, A2, A3, A4 — Y "Wye" Windings
A5, A6, A7, A8 — Δ "Delta" Windings
AS — Alternate Windings
Three-digit suffix shown in Options field

Options
Omit field for standard configurations
001, 002, 003...

Terminal Options
Cx – Motor cable and thermal cable with flying leads:
C1 400 mm (16")
C4 1200 mm (48")
CS Alternate cable length
Three-digit suffix shown in Options field

Thermal Protection / Monitoring Option
TS Thermostat (Thermal switch) (IC only)
TR PTC (IC, ICD, IL)
T1 PT1000 (Linear Type) (IC Only)

Cooling Options (IC Only)
AC Water Cooling
If Natural Cooling, leave blank

Example: IL06030A1TRC1
Ironless 6 Series motor coil, 30 width,
A1 winding designation terminated with 16" cable with flying leads

2.2 Hall Effect Part Number Scheme

HSIL 100 - XX

Hall Effect
HSIC Digital for Ironcore (Microswitch SS461A)
HSIL Digital for Ironless (Microswitch SS461A)

Winding Code
100 A1, A2, A3, A4
200 A5, A6, A7, A8

Terminal Option
C1 400 mm (16") Shielded cable with flying leads
P1 400 mm (16") Shielded cable with connector

Example: HSIL100-C1
Hall effect assembly with digital outputs for Ironless motor terminated with 400 mm cable.

2.3 Magnetic Way Part Number Scheme

MW 030 L 0128 - XXX

Magnetic Way Type
MW Ironless
MCD ICD
MC Ironcore

Magnetic Way Width

015	15 (IL only)	100	100
030	30	150	150 (IC only)
050	50	200	200 (IC only)
075	75	250	250 (IC only)

Magnetic Way Option
L Low Profile (030 & 050 Ironless only)
T Thinner (015 Ironless only)
blank Standard assemblies or Ironcore

Magnetic Way Height (IC/ICD)

	No Cover	With Cover
030 - 100	14.1 mm	14.35 mm
150 - 250	16.1 mm	16.35 mm

Cover is 0.25 mm (0.01 in) thick

Customization
001 With stainless cover (IC, ICD)
XXX Customization

Magnetic Assembly Way Length
0064 64 mm
0128 128 mm
0256 256 mm
0512 512 mm

Example: MW0300128
Ironless magnet way, 30 magnet width, 128 assembly length (IC/ICD).

3 Safety

Only qualified personnel are permitted to transport, assembly, commission, and maintenance this equipment. Properly qualified personnel are persons who are familiar with the transport, assembly, installation, commissioning and operation of motors, and who have the appropriate qualifications for their jobs. The qualified personnel must know and observe these standards and regulations:

- IEC 60364
  - IEC 364 resp. CENELEC HD 384 or DIN VDE 0100
- IEC 60664
  - IEC report 664 or DIN VDE 0110
- National regulations for safety and accident prevention or VBG 4

⚠ CAUTION

- Read all available documentation before assembly and commissioning.
  - Incorrect handling of products in this manual can result in injury and damage to persons and machinery.
  - Strictly adhere to the technical information on the installation requirements.
- It is vital to ensure that all system components are connected to earth ground.
  - Electrical safety is impossible without a low-resistance earth connection.

⚠ DANGER

- During operation keep all covers and cabinet doors shut.
  - There are deadly hazards that could possibility cause severe damage to health or the product.
- In operation, depending on the degree of enclosure protection, the product can have bare components that are live or have hot surfaces.
  - Control and power cables can carry a high voltage even when the motor is not moving.
- Never pull out or plug in the product while the system is live.
  - There is a danger of electric arcing and danger to persons and contacts.
- After powering down the product, wait at least 10 minutes before touching live sections of the equipment or undoing connections (e.g., contacts, screwed connections).
  - Capacitors can store dangerous voltages for long periods of time after power has been switched off.
- To be safe, measure the contact points with a meter before touching.

4 Before You Begin

⚠ CAUTION

- Electrical shock may damage equipment!
- Follow proper handling procedures of static-sensitive equipment when handling these products.
- Remove all power to the stage and controlling device.
- Gather additional personnel and suitable lifting devices, if needed.

⚠ WARNING

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

4.1 Unpacking

IMPORTANT Do not dispose of the packing material until all the components of the packing list have been accounted for and verified.

1. Check the package and contents upon arrival.
   If the packaging was damaged upon delivery, contact the shipping carrier prior to removing the components from the container.
2. Check the shipping invoice against the purchase order to make sure that the factory has sent all the ordered components.
   If a discrepancy exists, contact the factory immediately.
3. Remove all the packing material and equipment from the shipping container.
   Exercise caution when unpacking the components to be sure that smaller components are not accidentally discarded.

4.2 Definitions

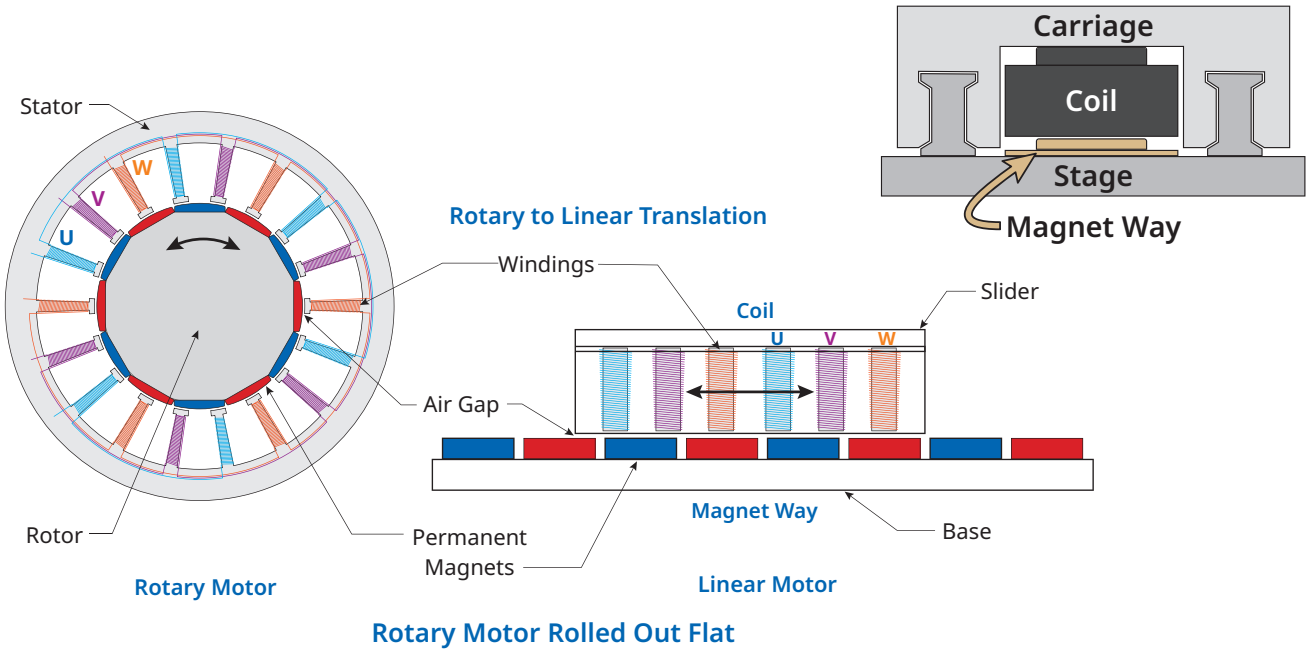


Figure 6-1: Example for Definitions

Carriage: The carriage is the moving portion of the direct drive linear system in the machine builder's design.

- A typical carriage assembly provides mounting locations for the motor coil, linear ball bearings, an encoder sensor , a cable track, and any other sensors or equipment specific to the process that the machine is being designed for.
- The carriage's main plate usually doubles as a heat sink for the motor coil.

Coil: The coil is portion of the frameless direct drive linear motor that contains windings.

- The coil causes motion by creating a moving magnetic field according to the current supplied by the drive.
- The coil is equivalent to the stator in a typical permanent magnet brushless rotary motor.

Ironcore: Ironcore is the type of linear motor constructed with steel laminations incorporated into the coil assembly.

- It is best suited for applications requiring high acceleration of large masses or maintaining stiffness during machining or process forces.
- Due to the steel laminations, Ironcore motors have high magnetic attractive forces ranging from over 300 pounds up to many tons.
- Special attention must be paid to this attractive force when designing stages for this type of motor.

Ironless: Ironless is the type of linear motor that contains no steel within the coil.

- It is best suited for applications that require very high positional accuracy or precise constant velocity movement.
- Ironless motors offer the advantages of light mass, zero cogging force, and absolutely no magnetic attraction.

Magnet Way / Magnet Plate: The magnet way is the portion of the frameless direct drive linear motor containing the permanent magnets.

- The magnet way creates a stationary magnetic field that interacts with the moving field created by the coil.
- Typically, the magnet ways are fixed in position and the motor coil moves along them.
- The magnet ways are equivalent to the rotor in a typical permanent magnet brushless rotary motor.

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

Motor: The frameless direct drive linear motor; the combination of a coil and magnet ways.

Stage: The stage is the portion of the machine builder's design that incorporates the frameless DDL motor.

- A typical stage provides mounting locations for the magnet ways, linear bearing rails, an encoder scale, cable routing, endstops, limit switches, and other sensors or equipment specific to the process the machine is designed for.
- Ironcore: The stage must be designed to withstand the motor's attractive force and any loads incurred during the machine's operation.

5 Setup

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

DANGER **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 down below 40 °C before touching it.

DANGER **Risk of electric shock!**

- Deadly voltages can occur, up to 900V_{DC}. Risk of electric shock!
  - Check 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 60V_{DC}.

CAUTION **Secure unplanned movements!**

The drive performing unplanned movements during commissioning cannot be ruled out

- Make sure that, even if the drive starts to move unintentionally, no danger can result for personnel or machinery.
- The measures you must take in this regard for your task are based on the risk assessment of the application

WARNING

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

5.1 Installation Procedure Overview

IMPORTANT This procedure outlines the sequential steps required to install and set up DDL coils and magnet ways for operation.

- This setup procedure is an example only!
- Change this procedure depending on the application of your equipment.

See either:

- "Ironcore Linear Motor" (➔ p. 17)
- "Ironless Linear Motor" (➔ p. 22)

Procedure

1. Design, fabricate, and assemble the stage and carriage.
2. Install the magnet ways to the stage.
3. Install the DDL coil to the carriage.
4. If applicable, install the Hall sensor module to the coil.
5. If applicable, install encoder scale and sensor following the manufacturer's installation instructions.
6. Run the cables.
   - Motor, Hall sensor, and thermal sensor leads must be fixed in place.
     - They are **not** rated for high-flex operation.
   - High-flex extension cables must be connected to leads coming from the motor, Hall sensors, thermal device, and encoder sensor, if present, and run through the cable track. KOLLMORGEN does not provide high-flex extension cables.
   - The extension cables can then be connected to the AKD/AKD2G drive using KOLLMORGEN supplied power connectors and standard HD15 male Dsub feedback connectors.
     See "DDL to Drive Cable Connection Diagrams" (➔ p. 30).
7. Set up and wire your AKD/AKD2G drive as instructed by the drive's Installation Manual.
8. Install WorkBench on the computer that will connect to the AKD/AKD2G drive.
9. Connect the drive via the service port to the network hub or directly to the WorkBench computer Ethernet port.
10. Open WorkBench and perform the following steps:
    a. Connect to the drive.
    b. Set the motor parameters. Motor Setup Instructions
    c. Set the feedback parameters and verify the encoder scaling and direction is correct.
    d. Verify the BEMF and Hall signals align according to the Hall Phase Diagram.
11. Take safety precautions before enabling the motor.
    a. Decrease limits in drive for safety during setup (motor current limit and user overspeed limit).
    b. Place wood blocks between carriage and endstops.
       The carriage should only travel several inches in each direction.
12. If using Hall sensors, set MOTOR.PHASE (AKD) AXISx.MOTOR.PHASE (AKD2G) to 120.
    This is the standard convention for Kollmorgen DDL motors.
    - If **not** using Hall sensors, find the phase angle using the "Wake and Shake Routine" (➔ p. 36).

      ⚠ CAUTION It is possible, but unlikely, for the motor to enter a runaway condition during the Wake and Shake routine if something is incorrectly wired.

13. Verify proper movement direction and correct behavior in all operation modes.

    ⚠ CAUTION **This is the most likely place for a dangerous runaway condition to occur!**

    a. Set the drive to torque mode and enable the drive.
    b. Use service motion in pulse mode to apply a low current level for a short duration to verify that a positive current command causes positive motion.

DANGER **A runaway condition WILL occur here if:**

- The BEMF/Hall phasing is incorrect.
- The MOTOR.PHASE angle is incorrect.
  - Be careful of 180° offsets in MOTOR.PHASE!
- The motor leads are connected to the drive in the wrong order.
- The encoder is counting in the wrong direction.
  - The encoder MUST count positive in the direction of the motor lead-exit end.

c. Set the drive to Velocity mode.
d. Jog in positive and negative directions at a slow speed to verify the correct movement direction.
e. Set the drive to Position mode.
f. Jog in positive and negative directions at a slow speed to verify the correct movement direction.

14. Verify all required measures have been taken to prevent accidental contact with live and moving parts.
15. In non-gantry multi-axis systems, individually commission each drive unit (drive and motor).

The motor is now ready for tuning.

5.2 Installation Design Requirements

These elements should be accounted for in the machine design before installing a Kollmorgen Platinum DDL:

- The assembly is designed so the motor coil and magnet ways can be installed.
  - The assembly must allow for the appropriate dimensions to be maintained, including the air gap, distance between adjacent magnet plates, and so on.
  - See "Ironcore - Typical Installation Specifications" (→ p. 17).
- The bearings/rails are rated for the motor's attractive force and the speeds and loads that the machine will experience.
  - Lubricate bearings/rails properly and install them parallel to each other with no binding and minimal friction.
- The carriage must have endstops on each end that do not break if the motor enters a runaway condition and goes to the end of the stage.

WARNING Endstops must have dampers or rubber bumpers to protect the carriage.

5.2.1 Encoder Considerations

- Install the encoder scale following the manufacturer's instructions.
- The encoder sensor must be installed and calibrated following the manufacturer's instruction.
- Fix the encoder sensor to carriage with a bracket sturdy enough to prevent vibrations or movement from occurring when the machine moves.
- The encoder scale and sensor must be installed so the encoder counts positive in the same direction that the motor moves towards its lead-exit end.

5.2.2 Cable Considerations

- Cables coming directly from the DDL are not rated for flex operation.
  - This includes the cables for motor power, thermal sensors, and the cable from the Hall sensor module.
  - These cables must be fixed in position on the carriage.
  - High-flex rated extender cables must be connected from a bulkhead on the carriage to the drive through a suitable cable track. Kollmorgen provides the drive mating connectors, but does not offer the extension cables.
- All cables must be strain-relieved properly and fixed on one end of the cable track.
- The cable track must not bend tighter than the high-flex extender cables' minimum bend radius.

6 Mechanical Installation

Review this information for the installation method appropriate for the application:

- "Ironcore Magnet Plate Installation" (➔ p. 20)
- "Ironless Linear Motor Installation" (➔ p. 24)

⚠WARNING

- The magnetic field of the magnet ways, as well as the electromagnetic field generated by the coil and magnet way, can prevent pacemakers from functioning properly.
  - Avoid contact with magnetic fields as much as possible.
- Power magnetic fields and mechanical forces generated from magnet plates can create hazards to personnel through chipping, shattering, or pinching upon impact.
- Whenever possible, leave the protective cardboard and steel plates on the magnets.
- Keep hand tools and equipment away from the magnet plate.
- Use extreme caution when installing the coil assembly over the magnet plate.

6.1 Ironcore Linear Motor

The Kollmorgen Ironcore (IC) Linear Motor is best suited for applications requiring high acceleration of large masses or maintaining stiffness during machining or process forces.

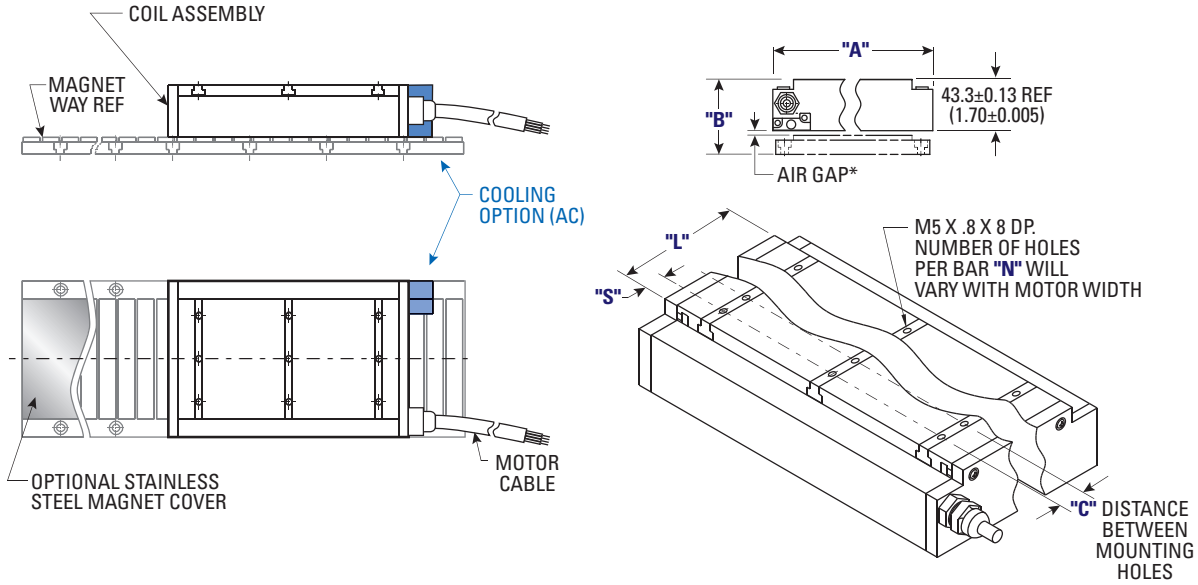
- Due to the steel laminations incorporated in the coil assembly, this type of motor has high magnetic attractive forces ranging from over 300 pounds up to many tons.
- Special attention must be paid to this attractive force when designing stages for this type of motor.

6.1.1 Ironcore - Typical Installation Specifications

⚠ CAUTION Dimension B determines the air gap.

- The airgap must be installed correctly to ensure proper operation of the motor.
- Failure to install the airgap correctly could result in equipment malfunction.
- A large airgap can reduce motor performance.
- A small airgap may cause the coil to contact and damage the magnet way.

ICxx Typical Coil Type Dimensional Drawings and Data



ICxx Dimensional Data, Typical Mounting Bar Lengths & Mounting Holes Tabulation

Motor Coil Type	Coil Width	Height w/ Air Gap		Spacing Between Holes	Mounting Bar Length	# Holes	
	"A"	"B" w/ mag. cvr	"B" w/o mag. cvr	"C"	"L"	"N"	"S"
ICxx030	65.0 (2.559) ± 1.0 (.04)	58.6±0.1 (2.307±.004)	58.3±0.1 (2.295±.004)	16.0 (0.630)	30 (1.18)	2	7.0 (0.28)
ICxx050	85.0 (3.346) ± 1.0 (.04)			36.0 (1.417)	50 (1.97)	2	7.0 (0.28)
ICxx075	110.0 (4.331) ± 1.0 (.04)			32.0 (1.260)	75 (2.95)	3	5.5 (0.21)
ICxx100	135.0 (5.315) ± 1.0 (.04)			36.0 (1.417)	100 (3.94)	3	14.0 (0.55)
ICxx150	185.0 (7.283) ± 1.5 (.06)	60.6±0.1 (2.386±.004)	60.3±0.1 (2.374±.004)	32.0 (1.260)	150 (5.91)	5	11.0 (0.43)
ICxx200	235.0 (9.252) ± 1.5 (.06)			36.0 (1.417)	200 (7.87)	6	10.0 (0.39)
ICxx250	285.0 (11.22) ± 1.5 (.06)			38.0 (1.496)	250 (9.84)	7	11.0 (0.43)

Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

Dimensions in mm (in.)

*AIR GAP:
A suitable air gap should be set to ensure that the feeler gauge of the corresponding size can pass smoothly between the coil and the magnetic circuit.

For the magnetic circuit without cover, the air gap is 0.8 ± 0.1mm

For the covered magnetic circuit, the air gap is 0.55 ± 0.1mm

(Stainless steel cover plate thickness 0.25mm)

6.1.2 Ironcore Magnet Way - Typical Installation Specifications

Ironcore and Ironless linear motor assemblies may be configured using a single, or multiple magnet ways.

Since magnet plates are sold in standard incremental sizes, it is possible to have a number of magnet plates installed together within one linear stage.

6.1.2.1 Multiple Magnet Assemblies

Magnet Way widths correspond to the mating coil assembly width.

- Magnet Way assemblies are modular and come in standard lengths: 64, 128, 256, 512 mm.
- Multiple magnet assemblies can be installed to obtain the desired length.

Figure 8-1 shows multiple mount assemblies.

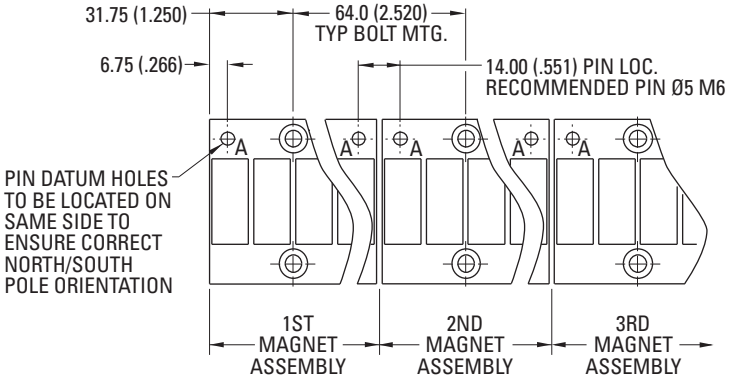


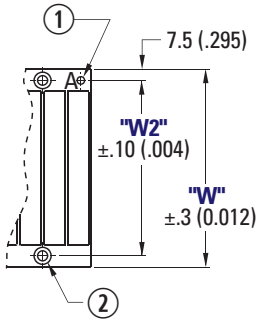
Figure 8-1: Mount Multiple Assemblies

6.1.2.2 MCxxx Magnetic Way Typical Dimension Data

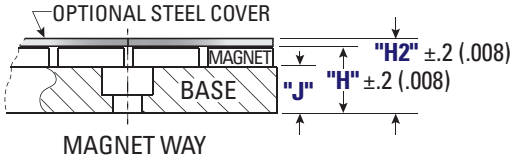
MCxxx Magnetic Way Typical Dimensions

Magnet Way Type	Assembly Width	Mounting Hole Width	Base Height	Base + Magnet Height	Total Height with Cover
	"W"	"W2"	"J"	"H"	"H2"
MC030xxxx	60.0 (2.362)	45.0 (1.772)	10.0 (0.394)	14.1 (0.555)	14.4 (0.556)
MC050xxxx	80.0 (3.150)	65.0 (2.560)			
MC075xxxx	105.0 (4.134)	90.0 (3.544)			
MC100xxxx	130.0 (5.118)	115.0 (4.528)			
MC150xxxx	180.0 (7.087)	165.0 (6.496)	12.0 (0.472)	16.1 (0.634)	16.4 (0.645)
MC200xxxx	230.0 (9.055)	215.0 (8.464)			
MC250xxxx	285.0 (11.22)	270.0 (10.63)			

Dimensions in mm (in.)



1. Ø5.110-5.135 (.201-.202) THRU 2 PL. MARKED "A" FOR RECOMMENDED 5mm M6 LOCATING PINS
2. Ø6.6 (.260) THRU C'BORE Ø11.0 (.433) X 6.2 (.246) DP. 2 PL. LOCATED AS SHOWN. RECOMMENDED MOUNTING HARDWARE: M6 SOC. HD. CAP DIN 912 (1/4" SOC. HD. CAP SCREW)



6.1.2.3 MCDxxx Magnetic Way Typical Dimension Data

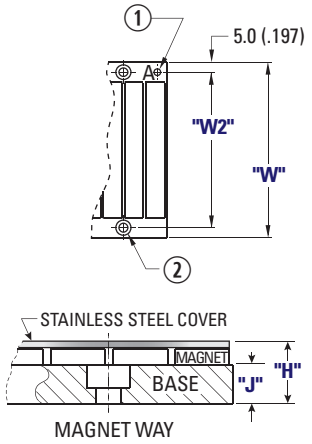
MCDxxx Magnet Way Typical Dimensional Data

Type	"W" ±.25 (.010)	"W2" ±.08 (.003)	"J"	"H" ±.25 (.010)
MCD0300xxx001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)
MCD0500xxx001	75.0 (2.953)	65.0 (2.559)		
MCD0750xxx001	100.0 (3.937)	90.0 (3.543)		
MCD1000xxx001	125.0 (4.921)	115.0 (4.528)		

Dimensions in mm (in.)

1. Ø5.110-5.135 (.201-.202) THRU 2 PL. MARKED "A" FOR RECOMMENDED 5mm M6 LOCATING PINS
2. Ø4.7 (.185) THRU C'BORE Ø8.3 (.327) X 1.6 $^{+0.25}_{-0.00}$ (.063) DP. 2 PL. LOCATED AS SHOWN. RECOMMENDED MOUNTING HARDWARE: M4 SOCKET CAP DIN 912 8-32 SOCKET CAP SCREW

MCDxxx-xxxx



6.1.3 Ironcore Magnet Plate and Coil Assembly Mounting

⚠ CAUTION

- Remove all power to the motor and controlling device.
- Gather additional personnel and suitable lifting devices, if needed.

⚠ WARNING

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

6.1.3.1 Mounting and Design Considerations

NOTE

The magnet way assembly is bolted to the base plate portion of the stage.

- The coil assembly and the encoder sensor are mounted to the stage's carriage component.
- The stage's clearance (or cavity) for the linear motor components must be designed to provide adequate clearance for the motor's maximum outline dimensions.

NOTE

Design the stage and carriage to maintain the prescribed gap between the coil and magnet way.

- If shimming is required to achieve the correct air gap, use shim stock that is thermally and electrically conductive.
- Verify the shims cover the full mounting surface of the coil to preserve heat-sinking.

Procedure

1. The magnet way mounting surface must be flat relative to the carriage travel within 0.127mm (0.005 inches).
2. To install the magnet way properly, it is recommended that the stage base include precision 5mm dowel pins.
3. If multiple magnet ways are designed into the stage, locating dowel pins should be installed to position and align each magnet way assembly.
   See "Ironcore Multiple Magnet - Installation Diagram" (→ p. 21).

NOTE

- The high magnetic attractive forces of the motor can cause the carriage plate to deflect.
  - These attractive forces must be considered in the design stage.
- The attractive forces must be considered when selecting the linear rails and bearings for the stage.
  - The bearings must be able to withstand the preload supplied by the motor.
  - For high speed applications, the maximum speed and acceleration must be factored into the bearing selection.

6.1.4 Ironcore Magnet Plate Installation

⚠WARNING

- Due to the high magnetic attractive forces of the magnet way, exercise extreme caution during handling, installation and operation to avoid damage to equipment or personnel injury.
- **Always keep Ironcore coils and other magnetic metal items at a safe distance from magnet ways.**

Procedure

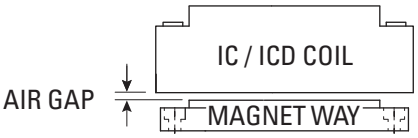
1. Lightly stone and thoroughly clean the mounting surfaces on the stage for both the coil assembly and magnet plates.
2. Use the M5 screws to securely mount the coil assembly to the carriage.
   See "Ironcore Multiple Magnet - Installation Diagram" (→ p. 21).
3. Push the carriage to one end of travel to clear the first magnet way location.
4. Install the first magnet way assembly on the 5 mm locating dowel pins of the stage's mounting surface.

NOTE

- The locating pins ensure the magnet way is parallel to the carriage travel and that the critical magnet spacing between magnet way sections is met.
- The dowel locating pins ensure the magnet plates are lined up with the correct polarity so the North - South - North - South progression is maintained between separate plates.

5. Carefully and slowly move the carriage over the magnet plate.
6. Using soft non-magnetic shim stock, check the air gap between the top of the magnets and the coil.
7. Set a suitable air gap to ensure the feeler gauge of the corresponding size can pass smoothly between the coil and the magnetic circuits.

NOTE



- The air gap is:
  - Magnetic circuit without stainless steel cover: 0.8 ± 0.1mm.
  - Covered magnetic circuit: 0.55 ± 0.1mm.
- The stainless steel cover plate thickness is 0.25mm.

8. Move the carriage away from the magnet way to correct the clearance gap.
9. Remove the coil assembly.
10. Place the required shim stock between the coil mounting surface and the carriage.

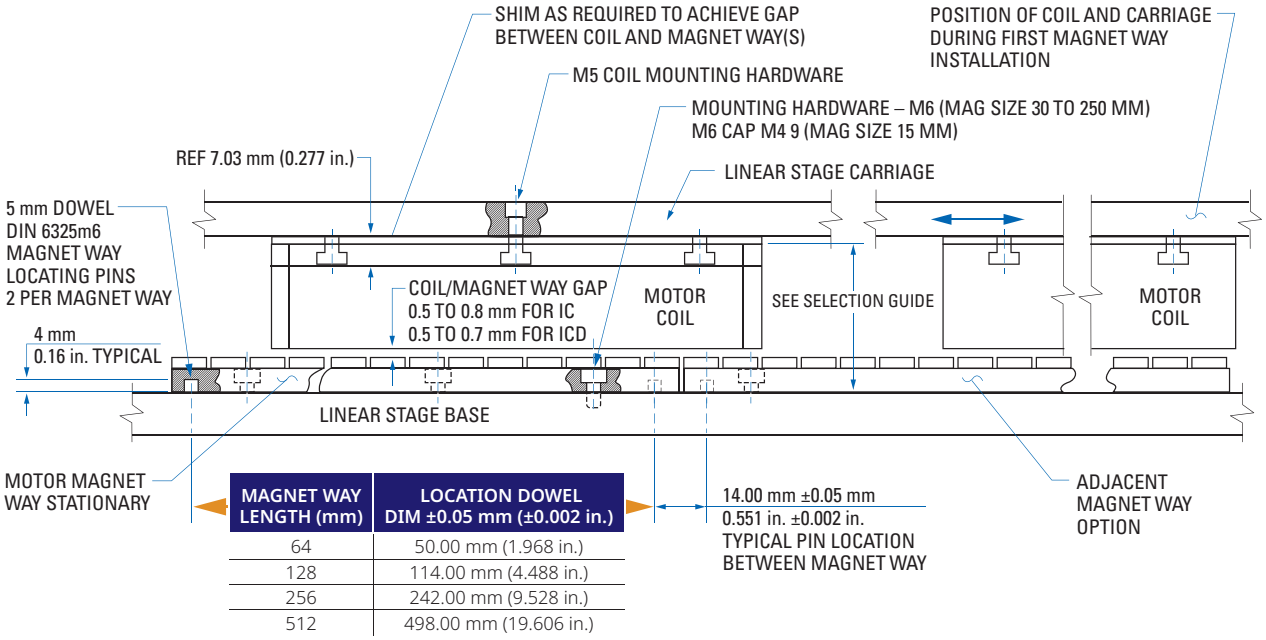
⚠CAUTION

- The shim stock **cannot** be made of plastic.
- The shim stock is needed to maintain heat-sinking between motor coil and carriage assembly.

11. Move the coil over the magnet way to recheck the air gap.
12. When the air gap is properly set, move the carriage to the end of travel over the mounted magnet plate to install the remaining magnet ways.

6.1.4.1 Ironcore Multiple Magnet - Installation Diagram

This is the recommended Ironcore installation with precision locating pins.



MAGNET WAY LENGTH (mm)	LOCATION DOWEL DIM ±0.05 mm (±0.002 in.)
64	50.00 mm (1.968 in.)
128	114.00 mm (4.488 in.)
256	242.00 mm (9.528 in.)
512	498.00 mm (19.606 in.)

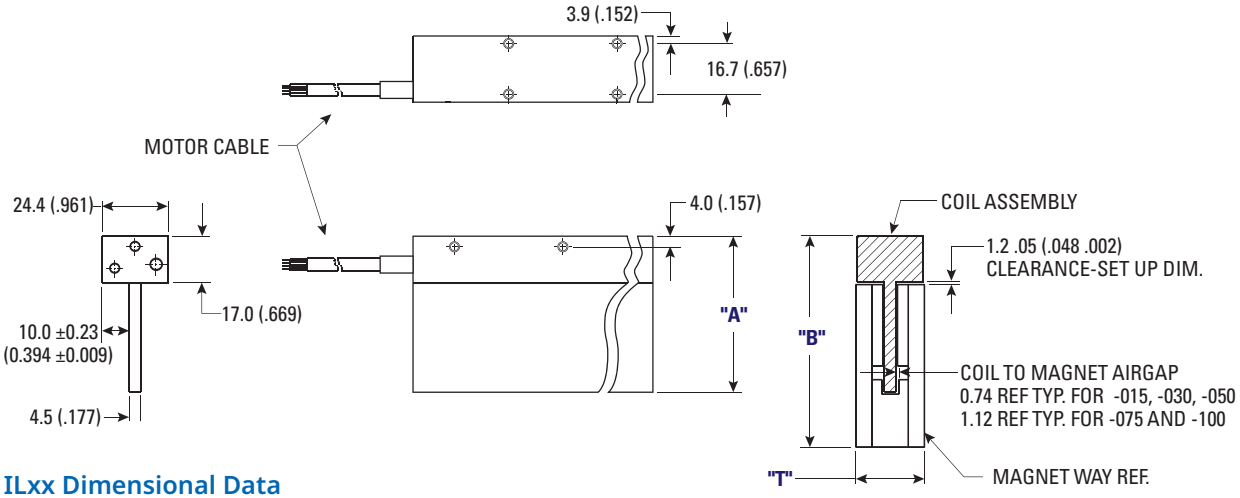
6.2 Ironless Linear Motor

The Kollmorgen Ironless (IL) Linear Motor is best suited for applications that require very high positional accuracy or precise constant velocity movement.

The motor offers the advantages of light mass, zero cogging force, and absolutely no magnetic attraction.

6.2.1 Ironless - Typical Dimensions

ILxx Typical Dimensions



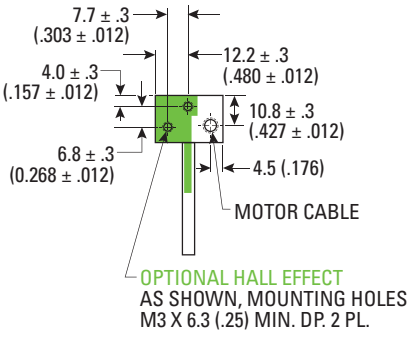
ILxx Dimensional Data

Motor Coil	Coil Width "A" ILxx015: +0.5 (0.020) ILxx030-100: +0.7 (0.027) -0.3 (0.012)	Typ. Assy. Width "B" ±.6 (0.024)	Typ. Assy. Width "T" ±.4 (0.016)
ILxx015	42.30 (1.665)	52.10 (2.051)	25.40 (1.000)
ILxx015 T	42.30 (1.665)	52.10 (2.051)	21.70 (0.854)
ILxx030	57.30 (2.256)	78.50 (3.091)	25.40 (1.000)
ILxx030 L	57.30 (2.256)	67.30 (2.650)	25.40 (1.000)
ILxx050	77.30 (3.043)	98.50 (3.878)	25.40 (1.000)
ILxx050 L	77.30 (3.043)	87.30 (3.437)	25.40 (1.000)
ILxx075	102.30 (4.028)	123.50 (4.862)	30.00 (1.181)
ILxx100	127.30 (5.012)	148.50 (5.846)	34.00 (1.339)

Dimensions in mm (in.)

Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

ILxx Typical Cable Port and Hall Mount Dimensions



6.2.2 Ironless Magnet Way and Coil Assembly Mounting

⚠ CAUTION

- Remove all power to the motor and controlling device.
- Gather additional personnel and suitable lifting devices, if needed.

6.2.2.1 Mounting and Design Considerations

⚠ CAUTION

- The stage should be designed to center the coil in the magnet way with provisions for adjustment in order to maintain proper coil to magnet clearance.
- The relationship of the moving coil relative to the stationary magnet way is critical.
  - The magnet way-mounting surface should be parallel within 0.005 inches total runout with respect to the coil/carriage travel.
- The setup gap between the coil surface and the magnet face surface is required, regardless of motor mounting configuration (bottom or side mount).

See:

- "Ironless Linear Motor Installation Diagram" (→ p. 25)
- "Ironless Typical Side Mounting Installation Diagram" (→ p. 26)
- H1-Installation Guidelines

IMPORTANT

- Precision 5mm dowel pins in the stage base are recommended to position the magnet way accurately.
- Two dowels are required for each magnet way.

NOTE

- Typically, the coil assembly and the encoder reader head are mounted to the same plate.
  - It is a good practice to provide a means to independently align both the reader head and the coil assembly.
- The bracket the encoder reader head is mounted on must be sturdy enough to prevent any vibrations or movement during operation.
- The reader head must be critically adjusted for height, rotation, and perpendicularity.

6.2.2.2 Coil Installation

Top Installation

If the coil is installed from the top (opposite the coils), the coil mounting holes should be slotted to allow for setting up the required airgap between the coil and inside the magnet way.

Side Installation

- If the coil is side mounted, place metal shims between the coil and mounting surface to adjust the coil position and to set up the prescribed airgap between the coil and the magnet surface in the magnet way.
  - If shimming is required to achieve the correct air gap, use shim stock that is thermally and electrically conductive.
  - Verify the shims cover the full mounting surface of the coil to preserve heat-sinking.
- The setup airgap should be done on the reference side of the magnet way.
  - The reference side is the side contacting the stage-mounting surface.

6.2.3 Ironless Linear Motor Installation

1. Lightly stone and thoroughly clean the mounting surfaces on the stage for both the coil assembly and magnet channel.
2. Check the parallelism of the magnet way-mounting surface to the carriage/coil travel. The total runout of the surface must be within 0.005 inches to provide working clearance between the magnet way and the coil.

NOTE

- It is not necessary to consider the magnetic polarity in the linear stage with multiple magnet ways.
- Magnetic orientation is not required.

3. Install the magnet ways using two 5 mm locational dowels (recommended).
   See:
   - "Ironless Linear Motor Installation Diagram" (➔ p. 25)
   - "Ironless Typical Bottom Mounting Installation Diagram" (➔ p. 26)
   - "Ironless Typical Side Mounting Installation Diagram" (➔ p. 26)

NOTE

- Two pins are required per magnet way.
- The pin location between magnet ways is 1.811 ± 0.002 inches for all magnet way lengths.
- For pin location dimensions, see "Ironcore Magnet Way - Typical Installation Specifications" (➔ p. 18).

4. The shims used for the air gap setup clearances between the side surface of the coil and either magnet surface of the magnet way should be:
   - 0.020 to 0.025 inches for 75 and 100 mm magnet ways.
   - 0.010 to 0.015 inches for all smaller sizes.
5. The shims used for the setup clearance dimension between the top of the magnet way and the coil should be 0.050 inches.
   See the "Ironless Linear Motor Installation Diagram" (➔ p. 25).
6. After installation of the coil and the magnet ways, slowly move the carriage/coil through the magnet ways to examine the clearances.
7. If necessary, re-shim or re-position the coil.

6.2.3.1 Ironless Linear Motor Installation Diagram

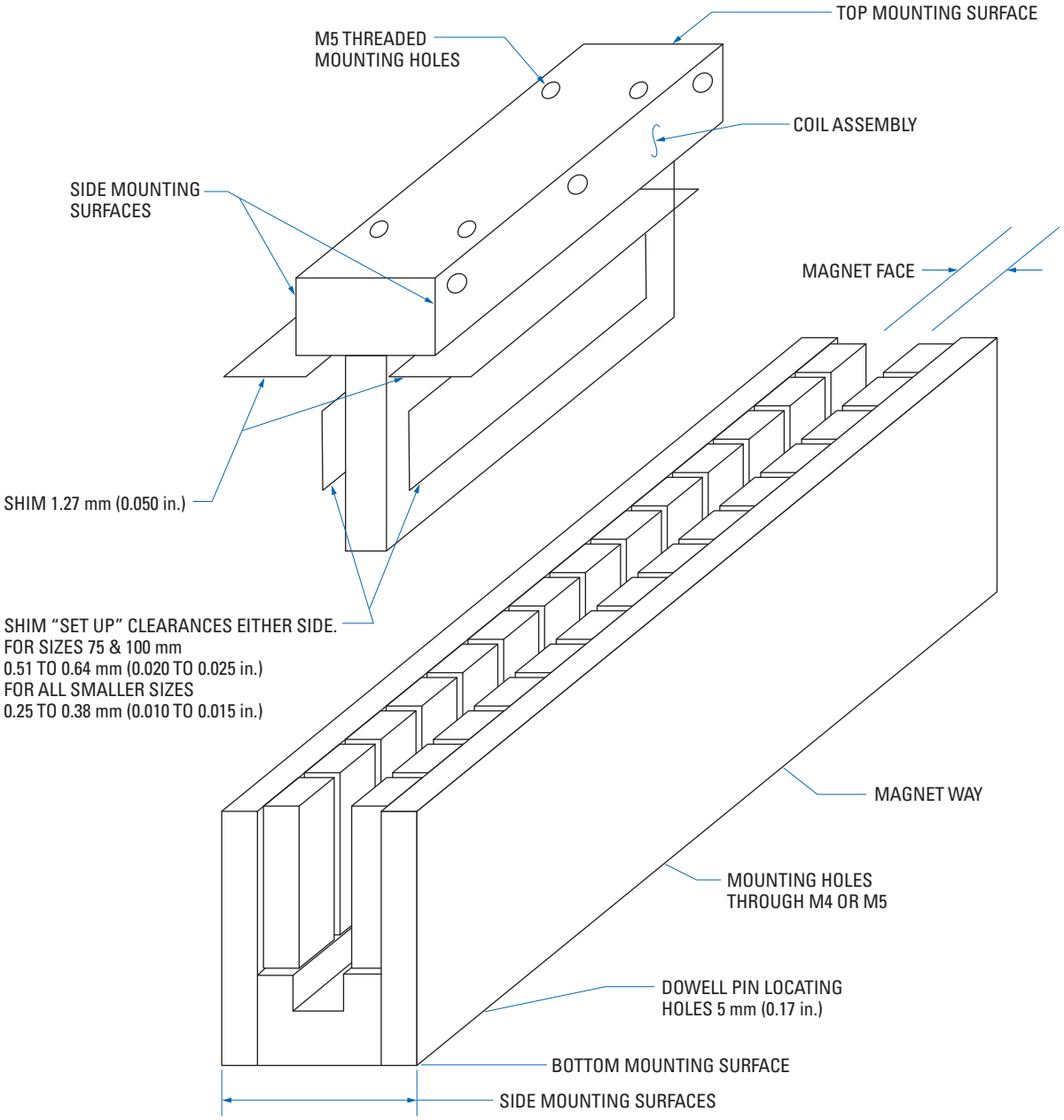


Figure 9-1: Ironless Linear Motor Installation Diagram

6.2.3.2 Ironless Typical Bottom Mounting Installation Diagram

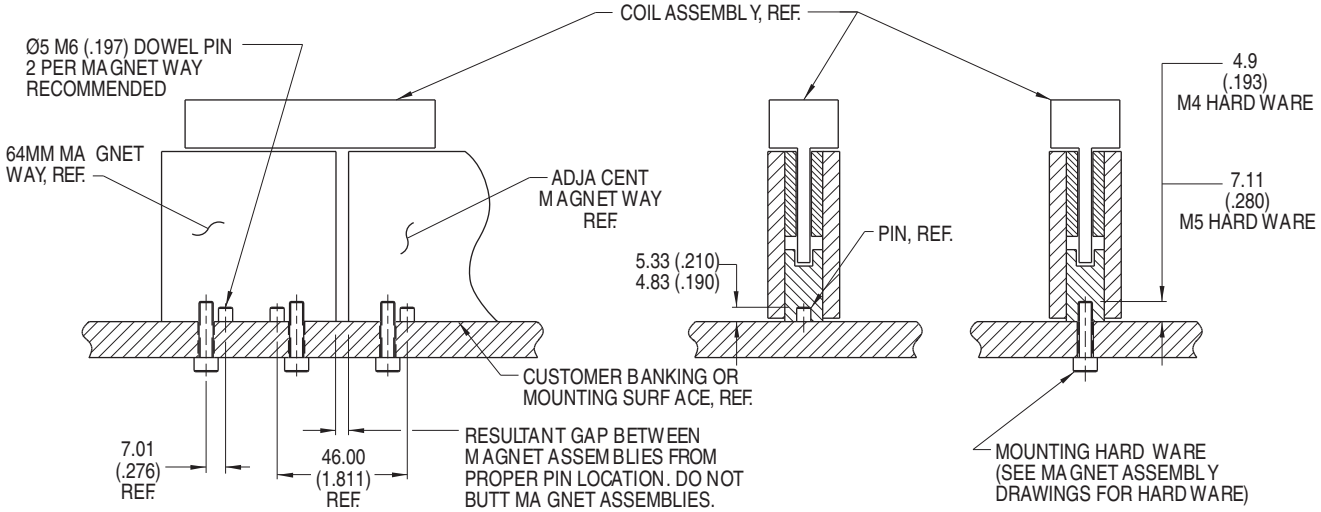


Figure 9-2: Typical Bottom Mounting Installation Diagram

6.2.3.3 Ironless Typical Side Mounting Installation Diagram

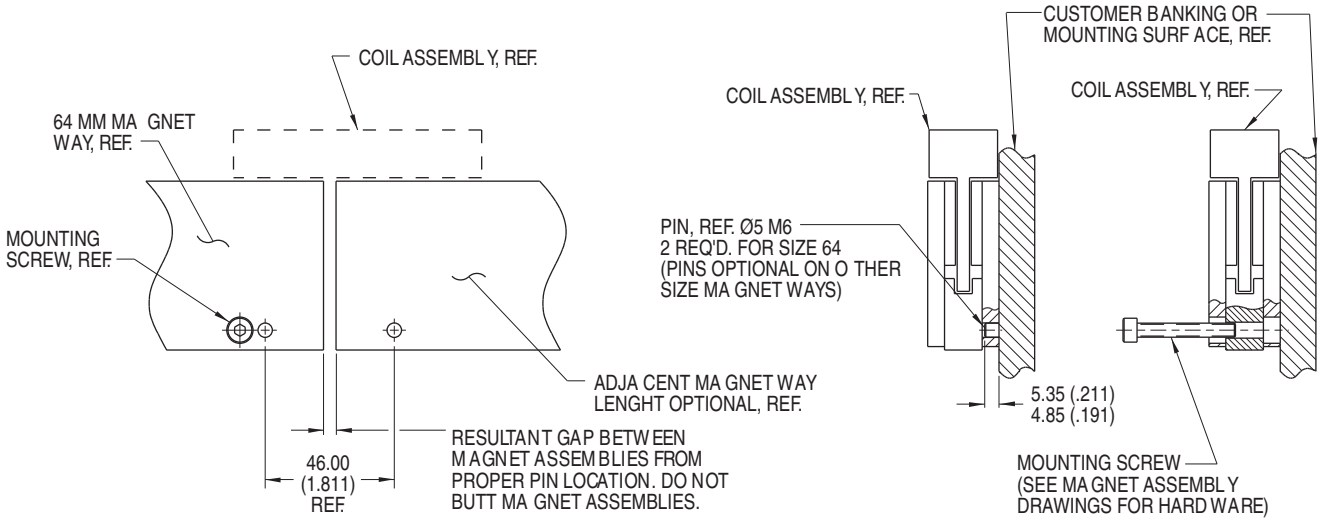


Figure 9-3: Typical Side Mounting Installation Diagram

7 Electrical Installation

7.1 Electrical Installation Guide

NOTE

- Only staff qualified and trained in electrical engineering are allowed to wire up the motor.
- Use the wiring diagrams and connector pinout in the servo drive's installation guide to wire the motor.

⚠ DANGER

- Always verify the motors are de-energized during assembly and wiring.
  - No voltage may be switched on for any piece of equipment that will be connected.
- **Risk of death or severe injury from touching exposed contacts!**
  - Verify the switch cabinet remains turned off (barrier, warning signs etc.).
  - The individual voltages will only be 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 be still 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

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

- Verify the servo drive and motor match each other.
  - Compare the rated voltage and rated current of the unit.
  - Complete the wiring according to the wiring diagram in the servo drive instruction manual.
- Install all cables carrying a heavy current with an adequate cross-section, as per EN 60204.

NOTE

- In case of long motor cables (>25m), and dependent on the type of the servo drive used, a motor choke (3YL or 3YLN) must be switched into the motor cable.
- See the servo drive's instruction manual and accessory manual.

- Verify there is proper earthing of the servo drive and the motor.
  - Use the correct earthing and EMC-shielding according to the servo drive's instruction manual.
  - Earth the mounting plate and motor casing.

7.1.1 Shields

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

7.2 Earth Ground (E1)

- A solid low-impedance connection to this product must be established.
- All shields must tie to this net.
- One or more screw holes for mounting the board are also connected to this net.

7.3 Cabling

All Kollmorgen Platinum DDL brushless motors are wired using the same convention.

See the servo drive's documentation for the connector pinout.

⚠ CAUTION

- Before the power supply is connected to the motor, position two wood blocks on either side of the carriage assembly so the carriage can only travel a few inches in either direction.
  - These blocks ensure the carriage cannot accelerate to dangerous speeds if the motor is improperly connected.
- **Failure to add these blocks during the setup procedure puts the equipment and personnel at risk!**
- You can remove these blocks after setup after the carriage is proven to accelerate and decelerate in a controlled manner.

Motor, Hall sensor, and thermal sensor leads are not rated for high-flex operation so they should be fixed in place.

- High-flex extension cables should be connected to leads coming from the motor power, Halls, and thermal leads, and run through the cable track.
- These can then be connected to the drive using the appropriate cable connectors that match up with the drive connectors.
  - See "DDL to Drive Cable Connection Diagrams" (➔ p. 30).

7.3.0.1 Cable Connection

- Route power cables as separately as possible from control cables.
- Connect the feedback device.
- Connect the motor cables.
- Install motor chokes (if applicable) close to the drive.

7.3.0.2 Cable Material Requirements - Capacity

- Motor cable: Less than 150 pF/m.
- Resolver cable: Less than 120 pF/m.

7.4 Wiring the Motor Drive

Install and wire (e.g., power, STO, etc.) the motor drive per the drive's installation manual.

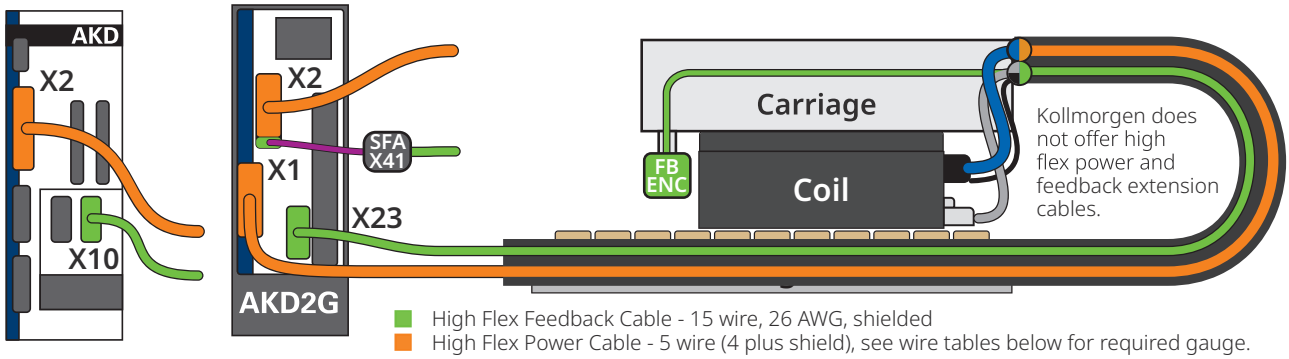
Use these links for Kollmorgen drive installation manuals.

- Kollmorgen AKD Documentation
- Kollmorgen AKD2G Documentation

⚠ CAUTION Only connect the motor’s power leads to the drive after the motor is set up in the drive's software via WorkBench.

7.5 DDL to Drive Cable Connection Diagrams

7.5.1 DDLto AKD / AKD2G Connection Via High-Flex Extension Cables



- High Flex Feedback Cable - 15 wire, 26 AWG, shielded
- High Flex Power Cable - 5 wire (4 plus shield), see wire tables below for required gauge.

AKD and AKD2G power connectors are available through Kollmorgen. Please contact Customer Support for more information.

Wiring Specification Tables for High Flex Extension Cables

Motor Wire Table
SEE TABLE BE LOW FOR AWG DIA

Wire Color	Function
–	–
Red	U
White	V
Black	W
Grn/Yel	GND
Violet	Shield

Hall Effect Wire Table
26 AWG 6.0 DIA (.24")

Pin #	Color	Function
1	Red	+5 VDC
2	Orange	S1
3	Yellow	S2
4	Brown	S3
5	Black	Return
Shell	Shield	Shield

Thermal Protection Wire Table
Cable Diameter 3.8 (.15 in.)

Type	Thermostat	Thermistor	
Wire Gauge	22 AWG	26 AWG	
Code	TS	TR - PTC	T1 - PT1000
Wire/Pin #	Color		
1	Black/White	Black/White	Blue
2	Black/White	Black/White	Blue

Notes:
PTC - Transition point 120˚C (IC/ICD) / 90˚C (IL)
PT1000 - Linear 180˚C max. (IC only)

Note: Ground and shield connection at shell: first make/last break

IC WIRE TABLE NON-COOLED

WINDING CODE	AWG	APPROX. CBL. DIA.
A1	18	6.69 mm (.265 in)
A2	18	6.69 mm (.265 in)
A3	14	7.96 mm (.315 in)
A5	18	6.69 mm (.265 in)
A6	14	7.96 mm (.315 in)
A7	12	8.97 mm (.355 in)

IC WIRE TABLE COOLED (AC)

WINDING CODE	AWG	APPROX. CBL. DIA.
A1	18	6.69 mm (.265 in)
A2	14	7.96 mm (.315 in)
A3	12	8.97 mm (.355 in)
A5	14	7.96 mm (.315 in)
A6	12	8.97 mm (.355 in)

ICD WIRE TABLE

WINDING CODE	AWG	APPROX. CBL. DIA.
ALL (A1 - A4)	22	6.18 mm (.245 in)

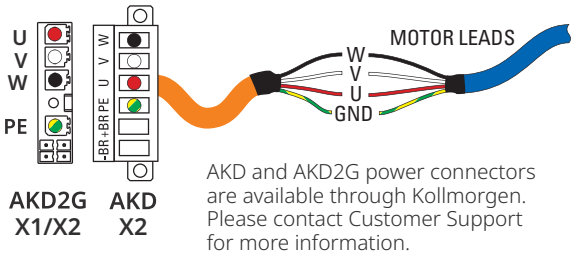
IL WIRE TABLE

WINDING CODE	AWG	APPROX. CBL. DIA.
ALL (A1,A2,A3,A4)	18	6.69 mm (.265 in)

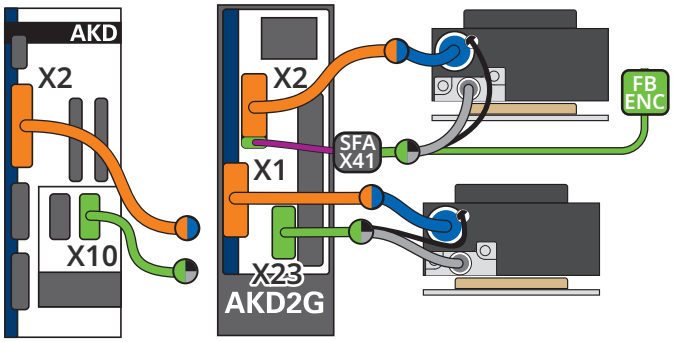
NOTE The Smart Feedback Adapter (SFA) X41 port accepts the same HD15 male cable connector as the AKD X10 and AKD2G X23 ports.

7.5.2 DDL to AKD2G / AKD Pinout Configurations

DDL to AKD2G / AKD Power Connection



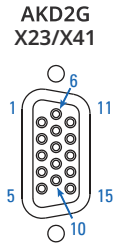
AKD and AKD2G power connectors are available through Kollmorgen. Please contact Customer Support for more information.



DDL to AKD2G / AKD Hall, Thermal Device, and Feedback Connections

AKD/AKD2G Connector Pinouts to DDL Optional Hall Leads

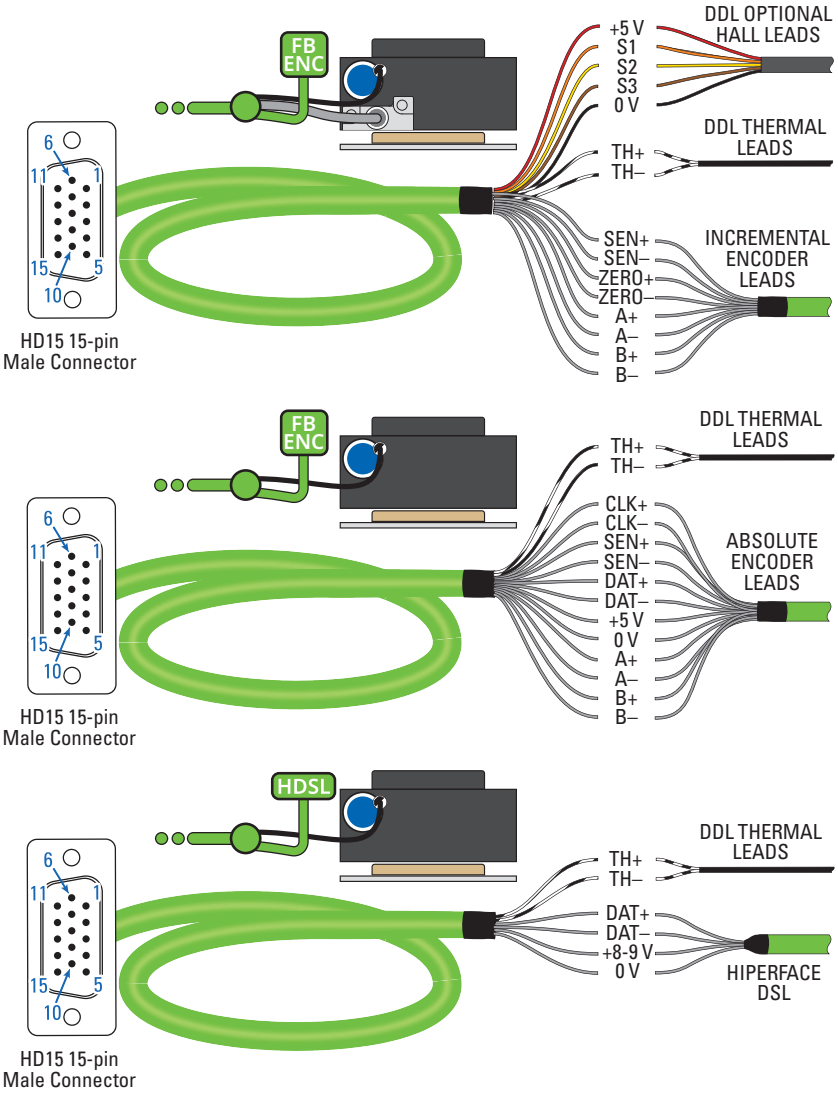
X23/X41 X10 Pin	X23/X41 X10 Pin Label	DDL HALL + TH Leads
1	Hall U	S1
2	Hall V	S2
3	Hall W	S3
8	TH+	TH+
9	TH-	TH-
10	+5 V	+5 V
11	0 V	Return



AKD/AKD2G Connector Pinouts to Feedback Leads

	FB ENC		HDSL
X23/X41 X10 Pin	Optional Incr. Encoder Leads	Optional Abs. Encoder Leads	HIPERFACE DSL
2	–	CLK+	–
3	–	CLK–	–
4	SENSE+	SENSE+	–
5	SENSE–	SENSE–	–
6	Zero+	DAT+	DAT+
7	Zero–	DAT–	DAT–
8	DDL TH+		
9	DDL TH–		
10	–	+5 V	+8-9 V
11	–	0 V	0 V
12	A+	A+	–
13	A–	A–	–
14	B+	B+	–
15	B–	B–	–

Hall, Thermal Device, and Optional Feedback Leads to HD15 15-pin AKD/AKD2G Mating Connector



IMPORTANT

- If supplied, both inner and outer shield of the encoder cable are to be terminated to the connector shell.
- Verify the encoder wire function before powering system.
- Failure to verify the pin-out configuration may result in damage to the encoder, amplifier, or both.

7.6 Encoder Sensor and Scale Setup

⚠ CAUTION

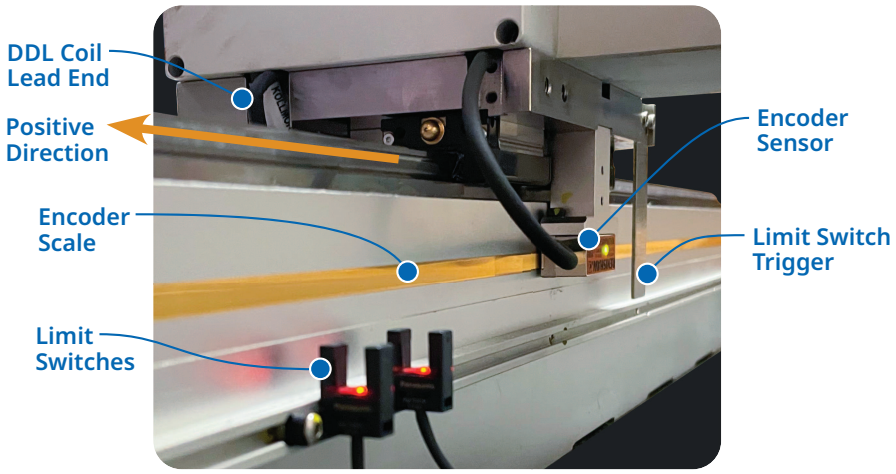
- Verify the encoder counts positive in the positive direction!
- The positive direction is the direction the motor coil's lead-exit end points to.

IMPORTANT

- Install the encoder scale and sensor following the manufacturer's installation instructions.
- If using a Kollmorgen drive, follow this procedure to set up your encoder.

Procedure

1. Connect the encoder cable to drive using the "DDL to Drive Cable Connection Diagrams" (→ p. 30). Note the encoder pinout table.
2. Set the feedback type in WorkBench so DC power is applied properly to the encoder.
3. Follow the encoder manufacturer's sensor calibration and setup procedures.
4. Setup the feedback parameters in WorkBench.
5. Verify these are correct:
   - Encoder scaling and direction.
   - Hall sequence.



7.7 Back EMF / Hall Signal Phasing

All Kollmorgen Platinum DDL brushless motors are wired using the same convention.

⚠ CAUTION

- Verify the Back EMF (BEMF) and Hall effect signals align.
- See the "Hall Phase Diagram" (➔ p. 35).

7.7.1 Wiring

All Kollmorgen Platinum DDL brushless motors are wired using the same convention.

- Phase UV leads phase VW by 120° with the cable exit leading.
  - See either:
    - "Hall Phase Diagram" (➔ p. 35)
    - "Ironcore and Ironless Commutation Diagram" (➔ p. 35)
- The term UV is defined as the back EMF (BEMF) voltage produced by the motor as it moves over the magnet way and can be veiwed and measured by connecting the probe of an oscilloscope to motor phase U and the probe return to motor phase V
- You can observe the BEMF of the motor with a two channel storage oscilloscope.

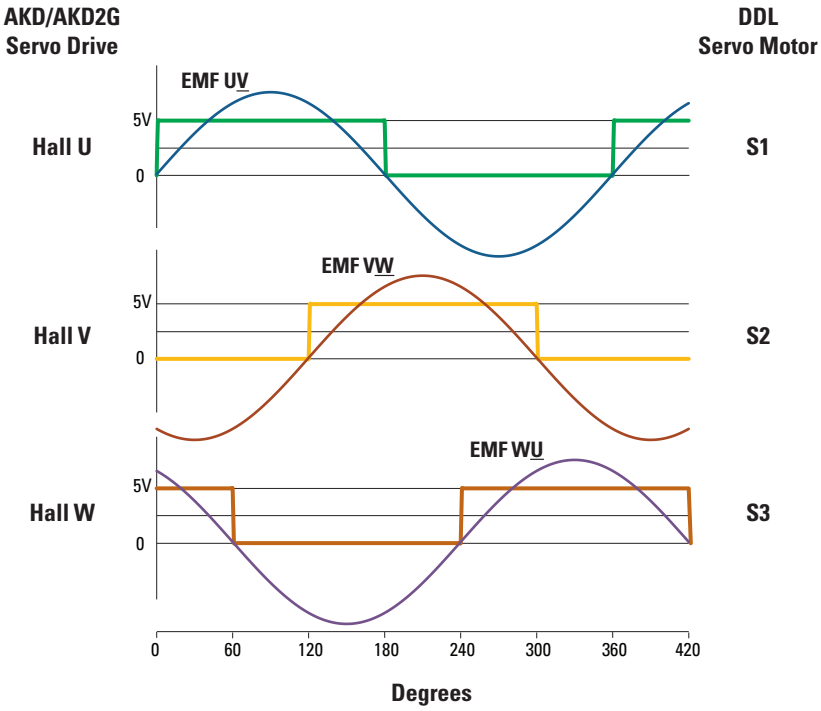
7.7.2 Verify BEMF Voltage and Hall Sensor Alignment

1. If the motor power leads are connected to the drive, verify the drive is disabled.
2. Disconnect the motor leads.
3. Connect the Channel 1 probe to motor phase U, reference to phase V.
4. Connect the Channel 2 probe to motor phase W, reference to phase V.
5. Set both inputs to DC.
6. Invert the Channel 2 input.
7. Push the carriage back and forth by hand.
8. Adjust the scope's vertical scale so that the waveform is fully displayed without clipping
9. Adjust the scope's horizontal scale so that several full sine cycles can be displayed on the screen at once.
10. Push the carriage in the positive direction, so the motor cable exit is leading.
11. Stop the scope recording to capture this waveform.
    - The positive direction is shown in the "Ironcore and Ironless Commutation Diagram" (➔ p. 35).

You will see two sinusoidal waveforms on the scope.

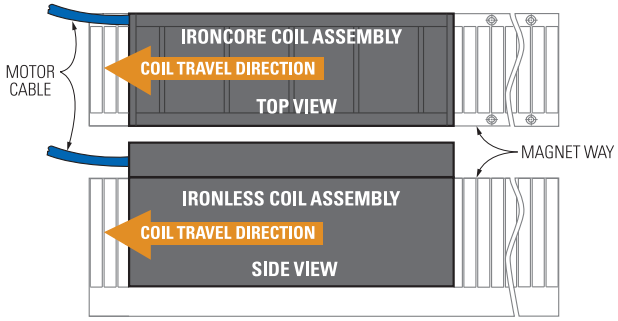
- These waveforms represent the BEMF voltage of motor phases UV and VW.
- Notice that phase UV (channel 1) leads phase VW (channel 2) by 120°.
- This agrees with the waveforms in the "Hall Phase Diagram" (➔ p. 35).
  - By monitoring the Hall effect signals, you can find a pair of motor phases aligned with each individual Hall effect.

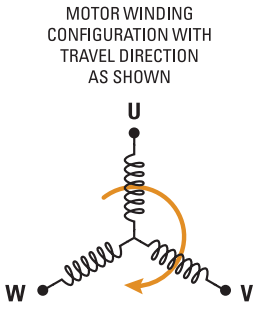
7.7.3 Hall Phase Diagram

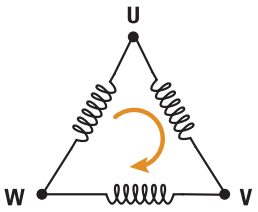


Positive Direction
Motor Phase Sequence:
EMF UV – U leads V by 120°
EMF VW – V leads W by 120°
EMF WU – W leads U by 120°

7.7.4 Ironcore and Ironless Commutation Diagram







7.8 Set Up the Motor in WorkBench

Follow the procedure in the AKD or AKD2G installation manual to select your motor model.

- If your motor cannot be found in the WorkBench selection database, set it up as a custom motor following the procedure in the drive's installation manual.
- If you require additional assistance, contact Kollmorgen Customer Service to ensure the motor is set up correctly.
  - See "Support and Services" (➔ p. 91).
- If the feedback device is an absolute encoder, or if Hall sensors are used, the motor phase = 120.
- If the feedback device is **not** an absolute encoder, run the "Wake and Shake Routine" (➔ p. 36) to find the motor phase.

⚠ CAUTION

- The motor parameters must be set up properly in the drive's software before the axis is enabled.
- The motor can enter a runaway condition if certain parameters are incorrect.
- After the motor is setup in WorkBench, connect the motor leads to the drive connector per the cable connection diagram
- Verify UVW and PE connect to the correct terminals on the drive!

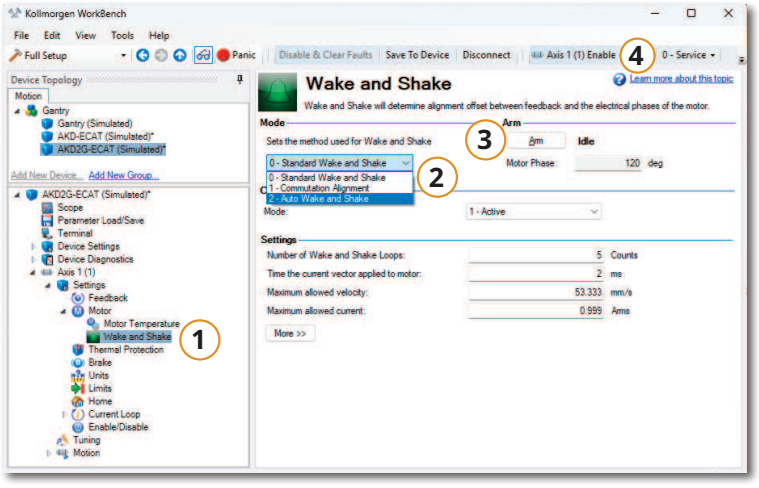
7.8.1 Wake and Shake Routine

The Wake and Shake routine determines the alignment offset between feedback and the electrical phases of the motor and finds the MOTOR.PHASE offset value.

- When commissioning the linear motor system, the Wake and Shake routine should be performed in several different positions of the motor's travel.
- The MOTOR.PHASE values should be no more than 5 degrees different in each position.

In WorkBench, complete this procedure:

1. In the navigation tree, select **Motor** > **Wake and Shake**.
2. In the drop-down menu under **Mode**, select **2-Auto Wake and Shake**.
3. Click the **Arm** button.
4. Click **Enable** for the appropriate axis in the WorkBench toolbar.



⚠ CAUTION

The motor may shake during the phase seeking process. Please ensure the safety of the operating environment before proceeding.

7.9 Encoder Setup and Verification in WorkBench

This section is the process of configuring the feedback resolution and verifying proper setup.

7.9.1 Configure the Encoder Resolution

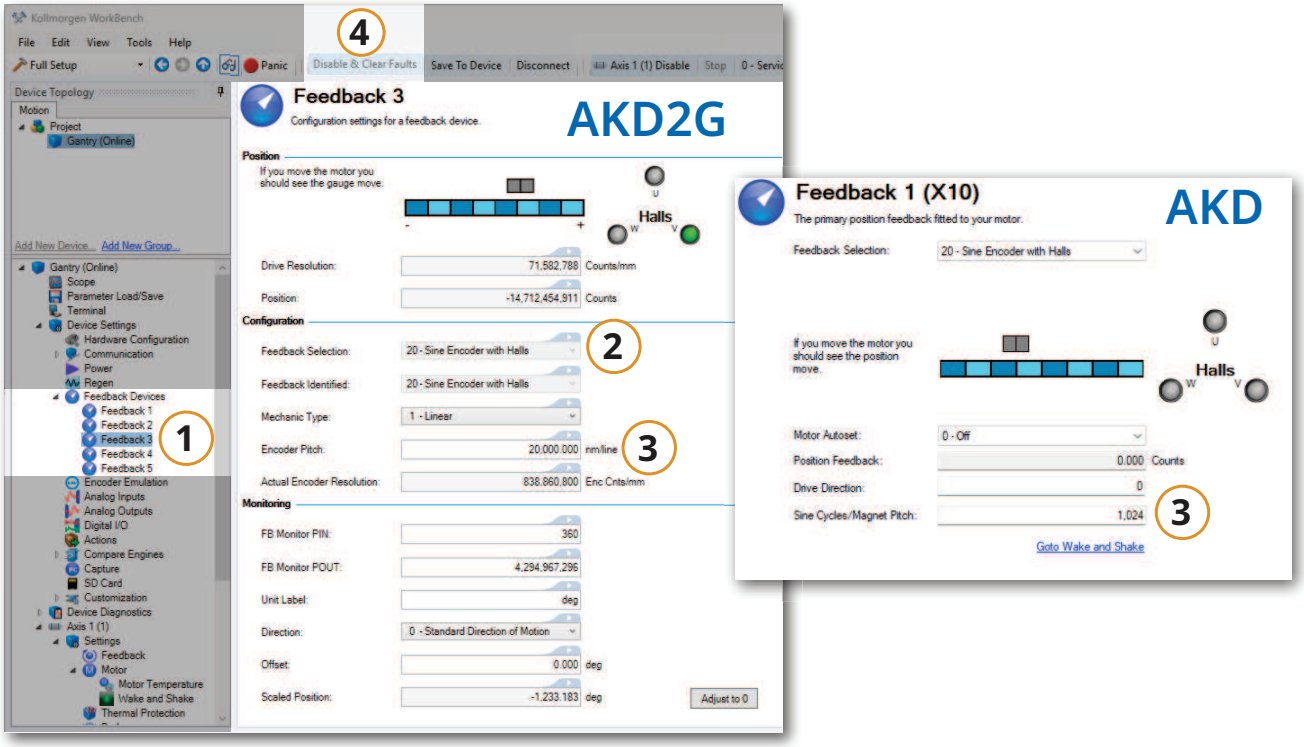


Figure 10-1: DDL Feedback window

1. In the navigation tree, select the feedback device you're using to commutate the motor (described in the drive documentation).
2. In the Feedback view, select the feedback in the **Feedback Selection** drop-down menu.
3. In the **Sine Cycles/Magnet Pitch** (AKD) or **Encoder Pitch** (AKD2G) text box, set the feedback resolution. See "Encoder Resolution" (→ p. 39).
4. In the toolbar, click the **Disable & Clear Faults** button to reset the drive.

7.9.2 Encoder Resolution

The encoder resolution is based on the magnet pitch of the motor divided by the encoder resolution.

- The units are lines/pitch.
- Kollmorgen DDL motors have a magnet pitch of 32mm.
- Example:
  - If the encoder has a 20 micron pitch, enter (32mm / 20 micron pitch *1000) = 1600 line count (lines per 32mm) as your encoder resolution.
  - For AKD2G values, enter the encoder pitch in nm/line.

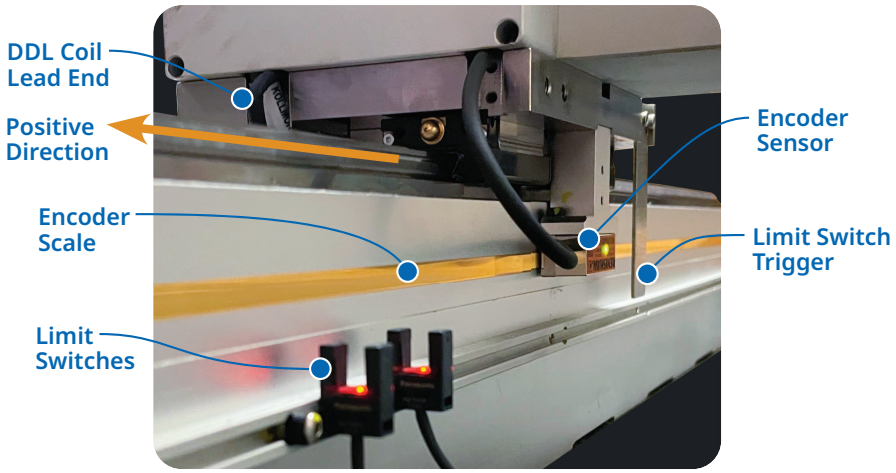
This table provides typical encoder resolution figures and their equivalent AKD / AKD2G value.

	AKD	AKD2G
Encoder Signal Period (µm)	Sine Cycles/Magnet Pitch	Encoder Pitch (nm/line)
2000	16	2000000
1000	32	1000000
40	800	40000
20	1600	20000
2	16000	2000
1	8000	1000
0.8	40000	800
0.4	80000	400
0.2	160000	200
0.08	400000	80
0.05	640000	50
0.04	800000	40
0.02	1600000	20
0.008	4000000	8
0.004	8000000	4

7.9.3 Verify the Encoder Direction

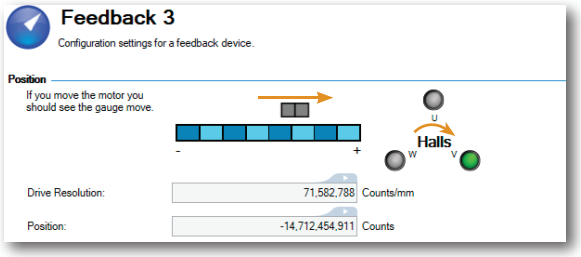
The direction of the encoder, the motor phase sequence, and Hall sequence must match exactly.

- The Hall phasing must match the motor phasing exactly.
  - Drive direction must be set to zero (DRV.DIR = 0).
- The motor's positive direction is toward the end of the motor, where the wire exits.
  - See "Ironcore and Ironless Commutation Diagram" (→ p. 35).



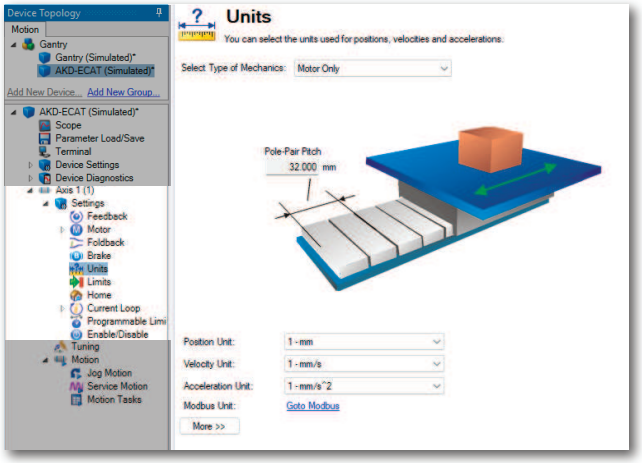
Procedure

1. In the navigation tree, select the feedback device being used to commutate the motor (described in the drive documentation).
2. Move your motor forward.
   If the encoder is properly set up, the indicator in the Feedback view will move left to right as the motor is moved forward.



7.9.4 Verify the Motor Feedback Resolution

1. Mark two lines on the magnet way.
   The farther apart they are, the more accurate the test is.
2. In the navigation tree, select **Units**.
3. Set the Position Unit to **1 - mm**.
4. Set the Velocity Unit to **1 - mm/s**.
5. Set the Acceleration Unit to **1 - mm/s^2**.
6. Click the **More** button to show the position feedback counter.
   This field should change when you move the motor from one line to the other.
7. Move the motor from one line to the other.
8. Verify the position counter changes the correct amount in the correct direction.
   If the position display does not match the distance the motor is moved, confirm the feedback device scale.



7.10 Verifying the Motor Setup

DANGER A runaway condition WILL occur here if the:

- BEMF / Hall phasing is incorrect.
- Motor phase angle is incorrect.
  - Be careful of 180° offsets in motor phase!
    In WorkBench, check the motor phase value in the Terminal pane:
    MOTOR.PHASE for AKD, or AXISx.MOTOR.PHASE for AKD2G
- Motor leads are connected to the drive in the wrong order.
- Encoder is counting in the wrong direction.
  - The encoder **must** count positive in the direction of the motor lead-exit end.

CAUTION These steps help protect the stage and user in case a runaway condition occurs.

- Set the user overspeed limit to a low value, such as 500mm/s.
- Reduce the current limit to a low level.

Procedure

1. Set drive to torque mode and enable.
2. Use service motion in pulse mode to apply a low current level for a short duration.
   Example: Apply 0.3 Arms for 250ms.
   - The current level should be the minimal amount required to overcome friction.
   - The current should be applied for less than one second.
   - The pulse should verify that a positive current command causes positive motion, so the encoder counts positive and the motor moves towards the cable-exit end.
     - A negative current command causes negative motion.
3. Set the drive to Velocity Mode.
4. Jog in positive and negative directions at a slow speed to verify correct movement direction.
5. Set the drive to Position Mode.
6. Jog in positive and negative directions at a slow speed to verify correct movement direction.
7. If the motor operates normally in each mode, the system is ready for tuning.
   You can safely remove the wood blocks.

8 Ironcore DDL Motors - Technical Data

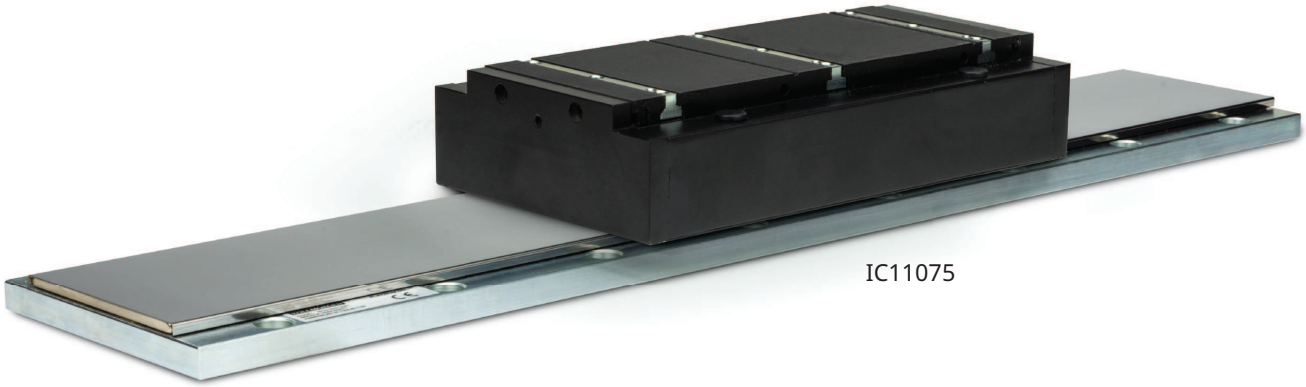
8.1 IC Ironcore - General Specifications

Ironcore DDL linear motors have the highest rated force per size, a high Km motor constant (equals low thermal losses), and low cogging forces without the need for skewing of the magnets. The high thrust forces possible with these motors make them ideal for accelerating and moving high masses, and maintaining stiffness during machining or process forces.

General Specifications

- Coil frame size 11, 22, 33, 44
- Coil width 030, 050, 075, 100, 150, 200, 250
- Low and high-speed coil winding designs fit various application needs
- Water cooling increased continuous force output in the same profile
- Low cogging electrical magnetic design for smooth force output

	IC11/22/33/44
Peak force range	320 – 12500N
Continuous force range	144 – 9620 N
Insulation voltage rating	230/400/480VAC
Cooling options	Non-cooling and water-cooling
Feedback	Optional hall sensor
Thermal Devices	Thermostat Thermistor – PTC Thermistor – PT-1000
Certification	UL, CE, RoHS, REACH



IC11075

8.2 Ironcore DDL Motors (Natural-Cooled / Water-Cooled) - Performance Data

8.2.1 IC11 Natural Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC11-030		IC11-050		IC11-075		IC11-100	
	Winding Code ②				A1	A5	A1	A5	A1	A5	A1	A5
	Rated Performance											
	Max Rated Voltage	Un		VAC	480	230	480	400	480	480	480	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	140		256		402		554	
				lbf	31.5		58		90		125	
	Motor constant	Km		N/√W	0.322		0.313		0.323		0.339	
	Continous Current @ Tmax	Ic		Arms	3.97	6.9	4.35	7.5	4.56	7.9	4.71	8.2
230 VAC	Peak Force @ Tmax ⑤	Fp		N	369	369	641	642	982	980	1324	1323
				lbf	83	83	144	144	221	220	298	297
	Peak Current @ Tmax ⑤	Ip		Arms	13.9	24.0	15.2	26.4	16.0	27.6	16.5	28.5
	Rated force @ Speed ⑤	Frtd		N	129	112	246	230	394	380	547	534
				lbf	29	25.2	55	52	89	85	123	120
	Rated Speed	Nrtd		m/s	8.4	13.5	4.86	8.7	3.15	5.7	2.25	4.14
400 VAC	Peak Force @ Tmax ⑤	Fp		N	369	-	641	642	982	980	1324	1323
				lbf	83	-	144	144	221	220	298	297
	Peak Current @ Tmax ⑤	Ip		Arms	13.9	-	15.2	26.4	16.0	27.6	16.5	28.5
	Rated force @ Speed ⑤	Frtd		N	112	-	229	189	380	336	534	496
				lbf	25.2	-	51	42.5	85	76	120	112
	Rated Speed	Nrtd		m/s	13.5	-	8.8	13.5	5.8	10.3	4.23	7.6
480 VAC	Peak Force @ Tmax ⑤	Fp		N	369	-	641	-	982	980	1324	1323
				lbf	83	-	144	-	221	220	298	297
	Peak Current @ Tmax ⑤	Ip		Arms	13.9	-	15.2	-	16.0	27.6	16.5	28.5
	Rated force @ Speed ⑤	Frtd		N	109	-	217	-	370	302	526	470
				lbf	24.5	-	48.8	-	83	68	118	106
	Rated Speed	Nrtd		m/s	13.5	-	10.7	-	6.9	12.5	5.1	9.2
	Electrical Specifications ②											
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	1.95	0.66	2.68	0.9	3.6	1.21	4.51	1.51
	Electrical Inductance L-L	L	±20%	mh	17.8	5.9	28.0	9.3	40.8	13.6	54	17.8
	Force Constant @ 25°C	Kf	±10%	N/Arms	35.8	20.7	60	34.5	90	52	119	69
				lbf/Arms	8	4.65	13.5	7.8	20.2	11.7	26.8	15.5
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	29.3	16.9	48.8	28.2	73	42.2	98	56
				Vpeak/in/sec	0.74	0.43	1.24	0.72	1.86	1.07	2.48	1.43
	Figures of Merit and Additional Data											
	Electrical Time Constant	Te		ms	9.1		10.4		11.3		11.9	
	Max. Theoretical Acceleration ③	Amax		g's	15.1		18.2		20.1		20.8	
	Magnetic Attraction	Fa		kN	1.4		2.4		3.7		4.9	
				lbf	315		540		832		1102	
	Thermal Resistance ④	Rthw-a		°C/Watt	1.64		0.99		0.67		0.5	
	Max. Allowable Coil Temp. ④	Tmax		°C	130							
	Mechanical Specifications											
	Coil Assembly Weight	Mc	±15%	kg	2.5		3.6		5		6.5	
				lbs	5.5		7.9		11		14.3	
	Magnet Way Type (MCxxx)				**030**		**050**		**075**		**100**	
	Magnet Way Weight	Mw	±15%	kg/m	5.4		7.5		10.1		12.7	
				lbs/in	0.302		0.42		0.57		0.71	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.1.1 IC11 Natural Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC11-150		IC11-200		IC11-250	
	Winding Code ②				A1	A5	A1	A5	A1	A5
	Rated Performance									
	Max Rated Voltage	Un		VAC	480	480	480	480	480	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	837		1163		1434	
				lbf	188		261		322	
	Motor constant	Km		N/√W	0.383		0.42		0.46	
	Continous Current @ Tmax	Ic		Arms	4.74	8.2	4.9	8.6	4.87	8.5
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1990	1991	2687	2688	3336	3344
				lbf	447	448	604	604	750	752
	Peak Current @ Tmax ⑤	Ip		Arms	16.6	28.8	17.3	30.0	16.9	29.5
	Rated force @ Speed ⑤	Frtd		N	832	820	1158	1150	1429	1421
				lbf	187	184	260	259	321	319
	Rated Speed	Nrtd		m/s	1.35	2.70	0.99	1.89	0.72	1.44
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1990	1991	2687	2688	3348	3344
				lbf	447	448	604	604	753	752
	Peak Current @ Tmax ⑤	Ip		Arms	16.6	28.8	17.3	30.0	17.1	29.5
	Rated force @ Speed ⑤	Frtd		N	820	789	1150	1121	1421	1398
				lbf	184	177	259	252	319	314
	Rated Speed	Nrtd		m/s	2.70	4.95	1.89	3.60	1.44	2.79
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1990	1991	2687	2688	3348	3344
				lbf	447	448	604	604	753	752
	Peak Current @ Tmax ⑤	Ip		Arms	16.6	28.8	17.3	30.0	17.1	29.5
	Rated force @ Speed ⑤	Frtd		N	813	768	1143	1103	1416	1381
				lbf	183	173	257	248	318	310
	Rated Speed	Nrtd		m/s	3.33	6.0	2.34	4.41	1.80	3.42
	Electrical Specifications ②									
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	6.3	2.12	8.2	2.74	10.0	3.35
	Electrical Inductance L-L	L	±20%	mh	79	26.4	105	34.9	130	43.4
	Force Constant @ 25°C	Kf	±10%	N/Arms	179	103	239	138	299	172
				lbf/Arms	40.2	23.2	54	31	67	38.7
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	146	84	195	113	244	141
				Vpeak/in/sec	3.71	2.14	4.95	2.86	6	3.57
	Figures of Merit and Additional Data									
	Electrical Time Constant	Te		ms	12.5		12.8		13	
	Max. Theoretical Acceleration ③	Amax		g's	21.6		22.3		22.5	
	Magnetic Attraction	Fa		kN	7.3		9.9		12.3	
				lbf	1641		2226		2765	
	Thermal Resistance ④	Rthw-a		°C/Watt	0.35		0.25		0.21	
	Max. Allowable Coil Temp. ④	Tmax		°C	130					
	Mechanical Specifications									
	Coil Assembly Weight	Mc	±15%	kg	9.4		12.3		15.2	
				lbs	20.7		27.1		33.5	
	Magnet Way Type (MCxxx)				**150**		**200**		**250**	
	Magnet Way Weight	Mw	±15%	kg/m	20.7		26.8		33.2	
				lbs/in	1.16		1.5		1.86	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.2 IC11 Water Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC11-030		IC11-050		IC11-075		IC11-100	
	Winding Code ②				A1	A5	A1	A5	A1	A5	A1	A5
	Rated Performance											
	Max Rated Voltage	Un		VAC	480	230	480	230	480	400	480	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	251		418		626		820	
				lbf	56		94		141		184	
	Motor constant	Km		N/√W	0.181		0.191		0.205		0.222	
	Continous Current @ Tmax	Ic		Arms	9.8	17.0	9.8	17.1	9.8	17.0	9.6	16.6
230 VAC	Peak Force @ Tmax ⑤	Fp		N	384	385	641	641	961	960	1270	1270
				lbf	86	87	144	144	216	216	286	286
	Peak Current @ Tmax ⑤	Ip		Arms	19.6	34.0	19.6	34.0	19.6	33.9	19.2	33.2
	Rated force @ Speed ⑤	Frtd		N	241	230	410	395	619	606	814	802
				lbf	54	52	92	89	139	136	183	180
	Rated Speed	Nrtd		m/s	9.2	13.5	5.3	9.9	3.4	6.5	2.43	4.77
400 VAC	Peak Force @ Tmax ⑤	Fp		N	384	-	641	-	961	960	1270	1270
				lbf	86	-	144	-	216	216	286	286
	Peak Current @ Tmax ⑤	Ip		Arms	19.6	-	19.6	-	19.6	33.9	19.2	33.2
	Rated force @ Speed ⑤	Frtd		N	230	-	395	-	606	565	802	766
				lbf	52	-	89	-	136	127	180	172
	Rated Speed	Nrtd		m/s	13.5	-	10.0	-	6.5	11.9	4.77	8.8
480 VAC	Peak Force @ Tmax ⑤	Fp		N	384	-	641	-	961	-	1270	1270
				lbf	86	-	144	-	216	-	286	286
	Peak Current @ Tmax ⑤	Ip		Arms	19.6	-	19.6	-	19.6	-	19.2	33.2
	Rated force @ Speed ⑤	Frtd		N	228	-	384	-	597	-	795	742
				lbf	51	-	86	-	134	-	179	167
	Rated Speed	Nrtd		m/s	13.5	-	12.2	-	7.9	-	5.6	10.7
	Electrical Specifications ②											
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	1.58	0.53	2.17	0.73	2.90	0.97	3.64	1.22
	Electrical Inductance L-L	L	±20%	mh	11.4	3.80	18.0	6.0	26.2	8.7	34.4	11.5
	Force Constant @ 25°C	Kf	±10%	N/Arms	28.7	16.6	47.8	27.6	72	41.4	96	55
				lbf/Arms	6.5	3.73	10.7	6.2	16.2	9.3	21.6	12.4
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	23.4	13.5	39.1	22.6	59	33.8	78	45.1
				Vpeak/in/sec	0.6	0.344	0.99	0.57	1.49	0.86	1.98	1.15
	Figures of Merit and Additional Data											
	Electrical Time Constant	Te		ms	7.2		8.3		9.0		9.5	
	Max. Theoretical Acceleration ③	Amax		g's	15.8		18.2		19.6		20.0	
	Magnetic Attraction	Fa		kN	1.4		2.4		3.7		4.9	
				lbf	315		540		832		1102	
	Thermal Resistance ④	Rthw-a		°C/Watt	0.33		0.24		0.18		0.15	
	Max. Allowable Coil Temp. ④	Tmax		°C	130							
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8							
	Mechanical Specifications											
	Coil Assembly Weight	Mc	±15%	kg	2.5		3.6		5		6.5	
				lbs	5.5		7.9		11		14.3	
	Magnet Way Type (MCxxx)				**030**		**050**		**075**		**100**	
	Magnet Way Weight	Mw	±15%	kg/m	5.4		7.5		10.1		12.7	
				lbs/in	0.302		0.42		0.57		0.71	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.2.1 IC11 Water Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC11-150		IC11-200		IC11-250	
	Winding Code ②				A1	A5	A1	A5	A1	A5
	Rated Performance									
	Max Rated Voltage	Un		VAC	480	480	480	480	480	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	1262		1655		2013	
				lbf	284		372		453	
	Motor constant	Km		N/√W	0.249		0.281		0.308	
	Continous Current @ Tmax	Ic		Arms	9.9	17.1	9.7	16.8	9.4	16.2
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1929	1929	2552	2552	3141	3141
				lbf	434	434	574	574	706	706
	Peak Current @ Tmax ⑤	Ip		Arms	19.8	34.3	19.4	33.6	18.7	32.4
	Rated force @ Speed ⑤	Frtd		N	1257	1247	1651	1643	2010	2002
				lbf	283	280	371	369	452	450
	Rated Speed	Nrtd		m/s	1.44	2.97	0.99	2.07	0.63	1.62
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1929	1929	2552	2552	3140	3141
				lbf	434	434	574	574	706	706
	Peak Current @ Tmax ⑤	Ip		Arms	19.8	34.3	19.4	33.6	18.7	32.4
	Rated force @ Speed ⑤	Frtd		N	1247	1220	1643	1617	2002	1979
				lbf	280	274	369	364	450	445
	Rated Speed	Nrtd		m/s	2.97	5.6	2.07	4.14	1.62	3.24
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1929	1929	2552	2552	3141	3141
				lbf	434	434	574	574	706	706
	Peak Current @ Tmax ⑤	Ip		Arms	19.8	34.3	19.4	33.6	18.7	32.4
	Rated force @ Speed ⑤	Frtd		N	1241	1201	1637	1601	1997	1964
				lbf	279	270	368	360	449	442
	Rated Speed	Nrtd		m/s	3.69	6.8	2.61	5.0	2.07	3.96
	Electrical Specifications ②									
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	5.1	1.70	6.6	2.19	8.0	2.68
	Electrical Inductance L-L	L	±20%	mh	51	16.9	67	22.4	84	27.9
	Force Constant @ 25°C	Kf	±10%	N/Arms	144	83	191	110	239	138
				lbf/Arms	32.4	18.7	42.9	24.7	54	31
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	117	68	156	90	195	113
				Vpeak/in/sec	2.98	1.72	3.97	2.29	4.96	2.86
	Figures of Merit and Additional Data									
	Electrical Time Constant	Te		ms	10.0		10.2		10.5	
	Max. Theoretical Acceleration ③	Amax		g's	21.0		21.2		21.1	
	Magnetic Attraction	Fa		kN	7.3		9.9		12.3	
				lbf	1641		2226		2765	
	Thermal Resistance ④	Rthw-a		°C/Watt	0.10		0.08		0.07	
	Max. Allowable Coil Temp. ④	Tmax		°C	130					
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8					
	Mechanical Specifications									
	Coil Assembly Weight	Mc	±15%	kg	9.4		12.3		15.2	
				lbs	20.7		27.1		33.5	
	Magnet Way Type (MCxxx)				**150**		**200**		**250**	
	Magnet Way Weight	Mw	±15%	kg/m	20.7		26.8		33.2	
				lbs/in	1.16		1.5		1.86	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.3 IC22 Natural Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC22-030			IC22-050			IC22-075			IC22-100		
	Winding Code ②				A1	A2	A6	A1	A2	A6	A1	A2	A6	A1	A2	A6
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	480	230	480	480	230	480	480	230	480	480	400
	Max Continuous Force @ Tmax ① ⑤	Fc		N	283			512			802			1112		
				lbf	64			115			180			250		
	Motor constant	Km		N/√W	0.41			0.41			0.44			0.46		
	Continous Current @ Tmax	Ic		Arms	4.00	8.0	13.9	4.35	8.7	15.1	4.55	9.1	15.8	4.73	9.5	16.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	741	741	741	1283	1285	1284	1959	1959	1960	2648	2650	2516
				lbf	167	167	167	288	289	289	440	440	441	595	596	566
	Peak Current @ Tmax ⑤	Ip		Arms	14.0	28.0	48.5	15.2	30.5	53	15.9	31.8	55	16.5	33.1	50
	Rated force @ Speed ⑤	Frtd		N	276	261	227	507	494	460	798	786	758	1108	1098	1073
				lbf	62	59	51	114	111	103	179	177	170	249	247	241
	Rated Speed	Nrtd		m/s	3.96	8.4	13.5	2.25	4.90	8.7	1.35	3.15	5.7	0.90	2.25	4.14
400 VAC	Peak Force @ Tmax ⑤	Fp		N	741	741	-	1283	1285	-	1959	1959	-	2648	2650	2516
				lbf	167	167	-	288	289	-	440	440	-	595	596	566
	Peak Current @ Tmax ⑤	Ip		Arms	14.0	28.0	-	15.2	30.5	-	15.9	31.8	-	16.5	33.1	50
	Rated force @ Speed ⑤	Frtd		N	265	227	-	498	459	-	789	757	-	1102	1073	997
				lbf	60	51	-	112	103	-	177	170	-	248	241	224
	Rated Speed	Nrtd		m/s	7.2	13.5	-	4.14	8.8	-	2.70	5.8	-	1.89	4.14	7.6
480 VAC	Peak Force @ Tmax ⑤	Fp		N	741	741	-	1283	1285	-	1959	1959	-	2648	2650	-
				lbf	167	167	-	288	289	-	440	440	-	595	596	-
	Peak Current @ Tmax ⑤	Ip		Arms	14	28	-	15.2	30.5	-	15.9	31.8	-	16.5	33.1	-
	Rated force @ Speed ⑤	Frtd		N	259	221	-	492	435	-	785	739	-	1097	1055	-
				lbf	58	49.7	-	111	98	-	176	166	-	247	237	-
	Rated Speed	Nrtd		m/s	8.7	13.5	-	5.1	10.7	-	3.24	6.9	-	2.34	5.1	-
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	3.81	0.96	0.324	5.3	1.33	0.45	7.1	1.79	0.60	8.9	2.25	0.75
	Electrical Inductance L-L	L	±20%	mh	35.5	8.9	2.96	56	14.0	4.66	82	20.4	6.8	107	26.8	8.9
	Force Constant @ 25°C	Kf	±10%	N/Arms	72	35.8	20.7	119	60	34.5	179	90	52	239	119	69
				lbf/Arms	16.2	8	4.65	26.8	13.5	7.8	40.2	20.2	11.7	54	26.8	15.5
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	59	29.3	16.9	98	48.8	28.2	146	73	42.2	195	98	56
				Vpeak/in/sec	1.49	0.74	0.43	2.48	1.24	0.72	3.71	1.86	1.07	4.95	2.48	1.43
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	9.3			10.6			11.5			12		
	Max. Theoretical Acceleration ③	Amax		g's	15.8			19.0			20.8			21.6		
	Magnetic Attraction	Fa		kN	2.9			4.9			7.3			9.8		
				lbf	652			1102			1641			2203		
	Thermal Resistance ④	Rthw-a		°C/Watt	0.82			0.50			0.34			0.25		
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	4.8			6.9			9.6			12.5		
				lbs	10.6			15.2			21.2			27.6		
	Magnet Way Type (MCxxx)				**030**			**050**			**075**			**100**		
	Magnet Way Weight	Mw	±15%	kg/m	5.4			7.5			10.1			12.7		
				lbs/in	0.302			0.42			0.57			0.71		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.3.1 IC22 Natural Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC22-150			IC22-200			IC22-250		
	Winding Code ②				A1	A2	A6	A1	A2	A6	A1	A2	A6
	Rated Performance												
	Max Rated Voltage	Un		VAC	480	480	480	480	480	480	480	480	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N		1656			2286			2806	
				lbf		372			514			631	
	Motor constant	Km		N/√W		0.54			0.59			0.65	
	Continous Current @ Tmax	Ic		Arms	4.69	9.4	16.3	4.86	9.7	16.8	4.77	9.5	16.5
230 VAC	Peak Force @ Tmax ⑤	Fp		N	3628	3963	3428	4151	5347	4570	4494	6646	5713
				lbf	816	891	771	933	1202	1027	1010	1494	1284
	Peak Current @ Tmax ⑤	Ip		Arms	13.4	32.8	42.0	10.4	34.0	42.0	8.5	33.4	42.0
	Rated force @ Speed ⑤	Frtd		N	1653	1643	1622	2285	2277	2259	2805	2797	2782
				lbf	372	369	365	514	512	508	631	629	625
	Rated Speed	Nrtd		m/s	0.54	1.44	2.70	0.27	0.99	1.89	0.18	0.72	1.44
400 VAC	Peak Force @ Tmax ⑤	Fp		N	3963	3963	3428	5347	5347	4570	6333	6646	5713
				lbf	891	891	771	1202	1202	1027	1424	1494	1284
	Peak Current @ Tmax ⑤	Ip		Arms	16.4	32.8	42.0	17.0	34.0	42.0	14.8	33.4	42.0
	Rated force @ Speed ⑤	Frtd		N	1647	1621	1559	2278	2259	2202	2801	2780	2735
				lbf	370	364	350	512	508	495	630	625	615
	Rated Speed	Nrtd		m/s	1.17	2.70	4.95	0.81	1.89	3.60	0.54	1.53	2.79
480 VAC	Peak Force @ Tmax ⑤	Fp		N	3963	3963	3428	5347	5347	4570	6646	6646	5713
				lbf	891	891	771	1202	1202	1027	1494	1494	1284
	Peak Current @ Tmax ⑤	Ip		Arms	16.4	32.8	42.0	17.0	34.0	42.0	16.7	33.4	42.0
	Rated force @ Speed ⑤	Frtd		N	1643	1608	1516	2276	2246	2165	2797	2770	2700
				lbf	369	361	341	512	505	487	629	623	607
	Rated Speed	Nrtd		m/s	1.44	3.33	6.0	0.99	2.34	4.41	0.72	1.89	3.42
	Electrical Specifications ②												
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	12.6	3.16	1.06	16.3	4.08	1.36	19.9	5.0	1.67
	Electrical Inductance L-L	L	±20%	mh	158	39.6	13.2	209	52	17.4	260	65	21.7
	Force Constant @ 25°C	Kf	±10%	N/Arms	358	179	103	478	239	138	597	299	172
				lbf/Arms	80	40.2	23.2	107	54	31	134	67	38.7
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	293	146	84	390	195	113	488	244	141
				Vpeak/in/sec	7	3.71	2.14	10	4.95	2.86	12	6	3.57
	Figures of Merit and Additional Data												
	Electrical Time Constant	Te		ms		12.5			12.8			13.1	
	Max. Theoretical Acceleration ③	Amax		g's		22.3			23.1			23.0	
	Magnetic Attraction	Fa		kN		14.6			19.7			24.6	
				lbf		3282			4429			5530	
	Thermal Resistance ④	Rthw-a		°C/Watt		0.18			0.13			0.11	
	Max. Allowable Coil Temp. ④	Tmax		°C					130				
	Mechanical Specifications												
	Coil Assembly Weight	Mc	±15%	kg		18.1			23.7			29.3	
				lbs		39.9			52			65	
	Magnet Way Type (MCxxx)					**150**			**200**			**250**	
	Magnet Way Weight	Mw	±15%	kg/m		20.7			26.8			33.2	
				lbs/in		1.16			1.5			1.86	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.4 IC22 Water Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC22-030			IC22-050			IC22-075			IC22-100		
	Winding Code ②				A1	A2	A6	A1	A2	A6	A1	A2	A6	A1	A2	A6
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	230	230	480	480	230	480	480	230	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	512			841			1252			1664		
				lbf	115			189			281			374		
	Motor constant	Km		N/√W	0.239			0.256			0.279			0.305		
	Continous Current @ Tmax	Ic		Arms	10.1	20.2	34.9	9.9	19.8	34.3	9.8	19.6	33.9	9.8	19.5	33.8
230 VAC	Peak Force @ Tmax ⑤	Fp		N	777	777	777	1286	1286	1286	1922	1922	1922	2557	2557	2558
				lbf	175	175	175	289	289	289	432	432	432	575	575	575
	Peak Current @Tmax ⑤	Ip		Arms	20.2	40.3	70	19.8	39.6	67	19.6	39.2	68	19.5	39.0	68
	Rated force @ Speed ⑤	Frtd		N	507	494	471	837	825	795	1248	1238	1213	1661	1652	1629
				lbf	114	111	106	188	185	179	281	278	273	373	371	366
	Rated Speed	Nrtd		m/s	4.05	9.1	13.5	2.34	5.3	9.9	1.35	3.42	6.4	0.90	2.43	4.68
400 VAC	Peak Force @ Tmax ⑤	Fp		N	777	-	-	1286	1286	-	1922	1922	-	2557	2557	-
				lbf	175	-	-	289	289	-	432	432	-	575	575	-
	Peak Current @ Tmax ⑤	Ip		Arms	20.2	-	-	19.8	39.6	-	19.6	39.2	-	19.5	39.0	-
	Rated force @ Speed ⑤	Frtd		N	498	-	-	829	795	-	1241	1212	-	1655	1629	-
				lbf	112	-	-	186	179	-	279	272	-	372	366	-
	Rated Speed	Nrtd		m/s	7.7	-	-	4.50	9.9	-	2.88	6.5	-	2.07	4.68	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	777	-	-	1286	1286	-	1922	1922	-	2557	2557	-
				lbf	175	-	-	289	289	-	432	432	-	575	575	-
	Peak Current @ Tmax ⑤	Ip		Arms	20.2	-	-	19.8	39.6	-	19.6	39.2	-	19.5	39.0	-
	Rated force @ Speed ⑤	Frtd		N	492	-	-	824	774	-	1237	1194	-	1650	1614	-
				lbf	111	-	-	185	174	-	278	268	-	371	363	-
	Rated Speed	Nrtd		m/s	9.5	-	-	5.6	12.2	-	3.60	7.9	-	2.61	5.8	-
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	3.08	0.77	0.260	4.26	1.07	0.358	5.7	1.43	0.48	7.2	1.80	0.60
	Electrical Inductance L-L	L	±20%	mh	22.8	5.7	1.90	35.9	9.0	2.99	52	13.1	4.36	69	17.2	5.7
	Force Constant @ 25°C	Kf	±10%	N/Arms	57	28.7	16.6	96	47.8	27.6	144	72	41.4	191	96	55
				lbf/Arms	12.8	6.5	3.73	21.6	10.7	6.2	32.4	16.2	9.3	42.9	21.6	12.4
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	46.9	23.4	13.5	78.1	39.1	22.6	117	59	33.8	156	78	45.1
				Vpeak/in/sec	1.19	0.6	0.344	1.98	0.99	0.57	2.98	1.49	0.86	3.97	1.98	1.15
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	7.4			8.4			9.1			9.6		
	Max. Theoretical Acceleration ③	Amax		g's	16.5			19.0			20.4			20.8		
	Magnetic Attraction	Fa		kN	2.9			4.9			7.3			9.8		
				lbf	652			1102			1641			2203		
	Thermal Resistance ④	Rthw-a		°C/Watt	0.16			0.12			0.091			0.073		
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	4.8			6.9			9.6			12.5		
				lbs	10.6			15.2			21.2			27.6		
	Magnet Way Type (MCxxx)				**030**			**050**			**075**			**100**		
	Magnet Way Weight	Mw	±15%	kg/m	5.4			7.5			10.1			12.7		
				lbs/in	0.302			0.42			0.57			0.71		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.4.1 IC22 Water Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC22-150			IC22-200			IC22-250		
	Winding Code ②				A1	A2	A6	A1	A2	A6	A1	A2	A6
	Rated Performance												
	Max Rated Voltage	Un		VAC	480	480	230	480	480	230	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N		2493			3333			4012	
				lbf		560			749			902	
	Motor constant	Km		N/√W		0.349			0.391			0.44	
	Continous Current @ Tmax	Ic		Arms	9.7	19.5	33.7	9.8	19.6	33.9	9.3	18.6	32.2
230 VAC	Peak Force @ Tmax ⑤	Fp		N	3570	3832	3834	4084	5119	5118	-	6267	6270
				lbf	803	861	862	918	1151	1151	-	1409	1410
	Peak Current @ Tmax ⑤	Ip		Arms	16.7	38.9	68	13.0	39.1	68	-	37.2	65
	Rated force @ Speed ⑤	Frtd		N	2491	2483	2464	3332	3325	3309	-	4006	3989
				lbf	560	558	554	749	747	744	-	901	897
	Rated Speed	Nrtd		m/s	0.36	1.44	2.97	0.13	0.99	2.07	-	0.63	1.62
400 VAC	Peak Force @ Tmax ⑤	Fp		N	3535	3832	-	5114	5119	-	6236	6267	-
				lbf	795	861	-	1150	1151	-	1402	1409	-
	Peak Current @ Tmax ⑤	Ip		Arms	19.5	38.9	-	19.5	39.1	-	18.4	37.2	-
	Rated force @ Speed ⑤	Frtd		N	2486	2464	-	3327	3309	-	4008	3988	-
				lbf	559	554	-	748	744	-	901	897	-
	Rated Speed	Nrtd		m/s	1.17	2.97	-	0.72	2.07	-	0.45	1.62	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	3835	3832	-	5114	5119	-	6267	6267	-
				lbf	862	861	-	1150	1151	-	1409	1409	-
	Peak Current @ Tmax ⑤	Ip		Arms	19.5	38.9	-	19.5	39.1	-	18.6	37.2	-
	Rated force @ Speed ⑤	Frtd		N	2482	2451	-	3325	3297	-	4004	3979	-
				lbf	558	551	-	747	741	-	900	895	-
	Rated Speed	Nrtd		m/s	1.53	3.69	-	0.99	2.61	-	0.72	2.07	-
	Electrical Specifications ②												
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	10.1	2.54	0.85	13.1	3.27	1.09	16.0	4.00	1.34
	Electrical Inductance L-L	L	±20%	mh	102	25.4	8.5	134	33.6	11.2	167	41.8	13.9
	Force Constant @ 25°C	Kf	±10%	N/Arms	287	144	83	383	191	110	478	239	138
				lbf/Arms	65	32.4	18.7	86	42.9	24.7	107	54	31
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	234	117	68	313	156	90	391	195	113
				Vpeak/in/sec	6	2.98	1.72	8	3.97	2.29	10	4.96	2.86
	Figures of Merit and Additional Data												
	Electrical Time Constant	Te		ms		10.1			10.2			10.4	
	Max. Theoretical Acceleration ③	Amax		g's		21.6			22.1			21.7	
	Magnetic Attraction	Fa		kN		14.6			19.7			24.6	
				lbf		3282			4429			5530	
	Thermal Resistance ④	Rthw-a		°C/Watt		0.052			0.040			0.036	
	Max. Allowable Coil Temp. ④	Tmax		°C				130					
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min				2.8					
	Mechanical Specifications												
	Coil Assembly Weight	Mc	±15%	kg		18.1			23.7			29.3	
				lbs		39.9			52			65	
	Magnet Way Type (MCxxx)					**150**			**200**			**250**	
	Magnet Way Weight	Mw	±15%	kg/m		20.7			26.8			33.2	
				lbs/in		1.16			1.5			1.86	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.5 IC33 Natural Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC33-030				IC33-050				IC33-075				IC33-100			
	Winding Code ②				A1	A3	A5	A7	A1	A3	A5	A7	A1	A3	A5	A7	A1	A3	A5	A7
	Rated Performance																			
	Max Rated Voltage	Un		VAC	480	400	480	230	480	400	480	230	480	400	480	230	480	400	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	424				774				1224				1654			
				lbf	95				174				275				372			
	Motor constant	Km		N/√W	0.49				0.49				0.52				0.57			
	Continous Current @ Tmax	Ic		Arms	4.00	12.0	6.9	20.8	4.39	13.2	7.6	22.8	4.62	13.9	8.0	24.0	4.69	14.1	8.1	24.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1112	1112	1113	1112	1935	1933	1932	1896	2957	2957	2957	2844	3536	3963	3963	3793
				lbf	250	250	250	250	435	435	434	426	665	665	665	639	795	891	891	853
	Peak Current @ Tmax ⑤	Ip		Arms	14.0	42.0	24.3	73	15.4	46.1	26.6	76	16.2	48.5	28.0	76	12.8	49.2	28.4	76
	Rated force @ Speed ⑤	Frtd		N	419	391	411	339	770	746	763	695	1220	1199	1215	1157	1652	1633	1646	1595
				lbf	94	88	92	76	173	168	172	156	274	270	273	260	371	367	370	359
	Rated Speed	Nrtd		m/s	2.52	8.4	4.68	13.5	1.35	4.86	2.61	8.7	0.81	3.15	1.62	5.7	0.45	2.25	1.17	4.14
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1112	1112	1113	-	1935	1933	1932	-	2959	2957	2957	-	3963	3963	3963	-
				lbf	250	250	250	-	435	435	434	-	665	665	665	-	891	891	891	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.0	42.0	24.3	-	15.4	46.1	26.6	-	16.2	48.5	28.0	-	16.4	49.2	28.4	-
	Rated force @ Speed ⑤	Frtd		N	411	339	390	-	763	693	746	-	1215	1155	1199	-	1646	1593	1633	-
				lbf	92	76	88	-	172	156	168	-	273	260	270	-	370	358	367	-
	Rated Speed	Nrtd		m/s	4.68	13.5	8.5	-	2.61	8.8	4.86	-	1.62	5.8	3.15	-	1.17	4.23	2.25	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1112	-	1113	-	1935	-	1932	-	2959	-	2957	-	3963	-	3963	-
				lbf	250	-	250	-	435	-	434	-	665	-	665	-	891	-	891	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.0	-	24.3	-	15.4	-	26.6	-	16.2	-	28.0	-	16.4	-	28.4	-
	Rated force @ Speed ⑤	Frtd		N	407	-	377	-	759	-	734	-	1211	-	1189	-	1643	-	1624	-
				lbf	91	-	85	-	171	-	165	-	272	-	267	-	369	-	365	-
	Rated Speed	Nrtd		m/s	5.7	-	10.2	-	3.24	-	5.9	-	2.07	-	3.87	-	1.44	-	2.79	-
	Electrical Specifications ②																			
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	5.7	0.64	1.90	0.213	7.9	0.88	2.63	0.294	10.6	1.19	3.55	0.396	13.4	1.49	4.47	0.50
	Electrical Inductance L-L	L	±20%	mh	52	5.8	17.4	1.93	82.1	9.1	27.4	3.04	120	13.3	39.9	4.43	157	17.4	52	5.8
	Force Constant @ 25°C	Kf	±10%	N/Arms	107	35.8	62	20.7	179	60	103	34.5	269	90	155	52	358	119	207	69
				lbf/Arms	24.1	8	13.9	4.65	40.2	13.5	23.2	7.8	60	20.2	34.8	11.7	80	26.8	46.5	15.5
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	88	29.3	51	16.9	146	48.8	84	28.2	219	73	127	42.2	293	98	169	56
				Vpeak/in/sec	2.23	0.74	1.29	0.43	3.71	1.24	2.14	0.72	6	1.86	3.22	1.07	7	2.48	4.29	1.43
	Figures of Merit and Additional Data																			
	Electrical Time Constant	Te		ms	9.1				10.4				11.3				11.7			
	Max. Theoretical Acceleration ③	Amax		g's	15.5				19.0				21.0				21.4			
	Magnetic Attraction	Fa		kN	4.4				7.4				11.0				14.7			
				lbf	989				1664				2473				3305			
	Thermal Resistance ④	Rthw-a		°C/Watt	0.55				0.33				0.22				0.17			
	Max. Allowable Coil Temp. ④	Tmax		°C	130															
	Mechanical Specifications																			
	Coil Assembly Weight	Mc	±15%	kg	7.3				10.4				14.4				18.9			
				lbs	16.1				22.9				31.7				41.7			
	Magnet Way Type (MCxxx)				**030**				**050**				**075**				**100**			
	Magnet Way Weight	Mw	±15%	kg/m	5.4				7.5				10.1				12.7			
				lbs/in	0.302				0.42				0.57				0.71			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.5.1 IC33 Natural Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC33-150				IC33-200				IC33-250			
	Winding Code ②				A1	A3	A5	A7	A1	A3	A5	A7	A1	A3	A5	A7
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	400	480	230	480	400	480	230	480	400	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	2486				3486				4311			
				lbf	559				784				969			
	Motor constant	Km		N/√W	0.65				0.71				0.78			
	Continous Current @ Tmax	Ic		Arms	4.70	14.1	8.1	24.4	4.90	14.8	8.6	25.7	4.89	14.7	8.5	25.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	4235	5949	5837	5689	4640	7991	6840	7585	4904	9988	7498	9482
				lbf	952	1337	1312	1279	1043	1796	1538	1705	1102	2245	1686	2132
	Peak Current @ Tmax ⑤	Ip		Arms	9.0	49.3	27.0	76	7.0	50	20.9	76.0	5.7	50	17.1	76
	Rated force @ Speed ⑤	Frtd		N	2484	2467	2480	2434	3485	3471	3482	3445	4311	4298	4308	4274
				lbf	558	555	558	547	783	780	783	774	969	966	968	961
	Rated Speed	Nrtd		m/s	0.18	1.44	0.63	2.70	0.09	0.99	0.36	1.89	0.01	0.72	0.27	1.44
400 VAC	Peak Force @ Tmax ⑤	Fp		N	5853	5949	5952	-	6865	7991	8057	-	7528	9988	10042	-
				lbf	1316	1337	1338	-	1543	1796	1811	-	1692	2245	2258	-
	Peak Current @ Tmax ⑤	Ip		Arms	15.7	49.3	28.5	-	12.2	50	29.9	-	9.9	50	29.6	-
	Rated force @ Speed ⑤	Frtd		N	2480	2434	2467	-	3482	3445	3471	-	4308	4274	4298	-
				lbf	558	547	555	-	783	774	780	-	968	961	966	-
	Rated Speed	Nrtd		m/s	0.63	2.70	1.44	-	0.36	1.89	0.99	-	0.27	1.44	0.72	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	5945	-	5952	-	7557	-	8057	-	8469	-	10042	-
				lbf	1336	-	1338	-	1699	-	1811	-	1904	-	2258	-
	Peak Current @ Tmax ⑤	Ip		Arms	16.4	-	28.5	-	14.6	-	29.9	-	11.9	-	29.6	-
	Rated force @ Speed ⑤	Frtd		N	2476	-	2459	-	3479	-	3464	-	4306	-	4292	-
				lbf	557	-	553	-	782	-	779	-	968	-	965	-
	Rated Speed	Nrtd		m/s	0.90	-	1.80	-	0.54	-	1.26	-	0.36	-	0.90	-
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	18.9	2.10	6.3	0.70	24.4	2.71	8.1	0.90	29.9	3.32	10.0	1.11
	Electrical Inductance L-L	L	±20%	mh	232	25.8	77	8.6	307	34.1	102	11.4	382	42.4	127	14.1
	Force Constant @ 25°C	Kf	±10%	N/Arms	537	179	310	103	716	239	414	138	896	299	517	172
				lbf/Arms	121	40.2	70	23.2	161	54	93	31	201	67	116	38.7
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	439	146	253	84	585	195	338	113	731	244	422	141
				Vpeak/in/sec	11	3.71	6	2.14	15	4.95	9	2.86	19	6	11	3.57
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	12.3				12.6				12.8			
	Max. Theoretical Acceleration ③	Amax		g's	22.3				22.9				23.3			
	Magnetic Attraction	Fa		kN	22.1				29.4				36.8			
				lbf	4968				6609				8273			
	Thermal Resistance ④	Rthw-a		°C/Watt	0.12				0.084				0.070			
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	27.3				35.7				44.1			
				lbs	60				79				97			
	Magnet Way Type (MCxxx)				**150**				**200**				**250**			
	Magnet Way Weight	Mw	±15%	kg/m	20.7				26.8				33.2			
				lbs/in	1.16				1.5				1.86			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.6 IC33 Water Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC33-030			IC33-050			IC33-075			IC33-100		
	Winding Code ②				A1	A3	A5	A1	A3	A5	A1	A3	A5	A1	A3	A5
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	230	480	480	230	480	480	230	480	480	230	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	761			1259			1877			2513		
				lbf	171			283			422			565		
	Motor constant	Km		N/√W	0.289			0.307			0.339			0.372		
	Continous Current @ Tmax	Ic		Arms	10.0	29.9	17.3	9.9	29.6	17.1	9.8	29.4	17.0	9.8	29.5	17.0
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1160	1160	1160	1925	1927	1927	2882	2880	2881	3483	3848	3850
				lbf	261	261	261	433	433	433	648	647	648	783	865	866
	Peak Current @ Tmax ⑤	Ip		Arms	19.9	60	34.3	19.7	59	34.2	19.6	59	33.9	16.0	59	34.1
	Rated force @ Speed ⑤	Frtd		N	757	733	750	1255	1233	1250	1875	1856	1869	2510	2494	2506
				lbf	170	165	169	282	277	281	422	417	420	564	561	563
	Rated Speed	Nrtd		m/s	2.52	9.2	4.95	1.35	5.4	2.79	0.63	3.42	1.71	0.270	2.43	1.17
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1160	-	1160	1925	-	1927	2882	-	2881	3851	-	3850
				lbf	261	-	261	433	-	433	648	-	648	866	-	866
	Peak Current @ Tmax ⑤	Ip		Arms	19.9	-	34.5	19.7	-	34.2	19.6	-	33.9	19.7	-	34.1
	Rated force @ Speed ⑤	Frtd		N	750	-	732	1250	-	1233	1869	-	1856	2506	-	2494
				lbf	169	-	165	281	-	277	420	-	417	563	-	561
	Rated Speed	Nrtd		m/s	3.72	-	9.3	2.79	-	5.4	1.71	-	3.42	1.17	-	2.43
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1160	-	1160	1925	-	1927	2882	-	2881	3851	-	3850
				lbf	261	-	261	433	-	433	648	-	648	866	-	866
	Peak Current @ Tmax ⑤	Ip		Arms	19.9	-	34.5	19.7	-	34.2	19.6	-	33.9	19.7	-	34.1
	Rated force @ Speed ⑤	Frtd		N	746	-	720	1246	-	1223	1867	-	1846	2503	-	2486
				lbf	168	-	162	280	-	275	420	-	415	563	-	559
	Rated Speed	Nrtd		m/s	6.1	-	11.3	3.51	-	6.7	2.16	-	4.32	1.53	-	3.06
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	4.58	0.51	1.53	6.3	0.71	2.12	8.5	0.95	2.85	10.8	1.20	3.58
	Electrical Inductance L-L	L	±20%	mh	33.5	3.72	11.2	53.0	5.9	17.6	77	8.5	25.6	101	11.2	33.6
	Force Constant @ 25°C	Kf	±10%	N/Arms	86	28.7	49.7	144	47.8	83	215	72	124	287	96	166
				lbf/Arms	19.3	6.5	11.2	32.4	10.7	18.7	48.3	16.2	27.9	65	21.6	37.3
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	70	23.4	40.6	117	39.1	68	176	59	101	234	78	135
				Vpeak/in/sec	1.79	0.6	1.03	2.98	0.99	1.72	4.46	1.49	2.58	6	1.98	3.44
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	7.3			8.4			9.1			9.4		
	Max. Theoretical Acceleration ③	Amax		g's	16.2			18.9			20.4			20.8		
	Magnetic Attraction	Fa		kN	4.40			7.4			11.0			14.7		
				lbf	989			1664			2473			3305		
	Thermal Resistance ④	Rthw-a		°C/Watt	0.110			0.081			0.061			0.048		
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	7.3			10.4			14.4			18.9		
				lbs	16.1			22.9			31.7			41.7		
	Magnet Way Type (MCxxx)				**030**			**050**			**075**			**100**		
	Magnet Way Weight	Mw	±15%	kg/m	5.4			7.5			10.1			12.7		
				lbs/in	0.302			0.42			0.57			0.71		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.6.1 IC33 Water Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC33-150			IC33-200			IC33-250		
	Winding Code ②				A1	A3	A5	A1	A3	A5	A1	A3	A5
	Rated Performance												
	Max Rated Voltage	Un		VAC	480	230	480	480	230	480	480	230	480
	Max Continuous Force @ Tmax ① ⑤	Fc		N	3729			4979			6021		
				lbf	838			1119			1354		
	Motor constant	Km		N/√W	0.43			0.48			0.53		
	Continous Current @ Tmax	Ic		Arms	9.7	29.1	16.8	9.7	29.2	16.8	9.3	27.9	16.1
230 VAC	Peak Force @ Tmax ⑤	Fp		N	4173	5741	5741	-	7660	6745	-	9408	7394
				lbf	938	1291	1291	-	1722	1516	-	2115	1662
	Peak Current @ Tmax ⑤	Ip		Arms	11.3	58	33.6	-	58	26.1	-	56	21.3
	Rated force @ Speed ⑤	Frtd		N	3728	3725	3725	-	4967	4977	-	6012	6020
				lbf	838	837	837	-	1117	1119	-	1352	1353
	Rated Speed	Nrtd		m/s	0.020	1.44	0.54	-	0.99	0.27	-	0.63	0.120
400 VAC	Peak Force @ Tmax ⑤	Fp		N	5741	-	5741	6764	-	7664	7417	-	9411
				lbf	1291	-	1291	1521	-	1723	1667	-	2116
	Peak Current @ Tmax ⑤	Ip		Arms	19.4	-	33.6	15.2	-	33.7	12.4	-	32.3
	Rated force @ Speed ⑤	Frtd		N	3725	-	3714	4977	-	4967	6020	-	6012
				lbf	837	-	835	1119	-	1117	1353	-	1352
	Rated Speed	Nrtd		m/s	0.54	-	1.44	0.27	-	0.99	0.12	-	0.63
480 VAC	Peak Force @ Tmax ⑤	Fp		N	5741	-	5741	7446	-	7664	8344	-	9411
				lbf	1291	-	1291	1674	-	1723	1876	-	2116
	Peak Current @ Tmax ⑤	Ip		Arms	19.4	-	33.6	18.2	-	33.7	14.8	-	32.3
	Rated force @ Speed ⑤	Frtd		N	3722	-	3707	4975	-	4962	6019	-	6005
				lbf	837	-	833	1118	-	1116	1353	-	1350
	Rated Speed	Nrtd		m/s	0.81	-	1.89	0.45	-	1.26	0.27	-	0.99
	Electrical Specifications ②												
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	15.2	1.68	5.1	19.6	2.17	6.5	24.0	2.66	8.0
	Electrical Inductance L-L	L	±20%	mh	149	16.5	49.6	197	21.9	66	245	27.2	82
	Force Constant @ 25°C	Kf	±10%	N/Arms	431	144	249	574	191	331	718	239	414
				lbf/Arms	97	32.4	56	129	42.9	74	161	54	93
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	352	117	203	469	156	271	586	195	338
				Vpeak/in/sec	9	2.98	5	12	3.97	7	15	4.96	9
	Figures of Merit and Additional Data												
	Electrical Time Constant	Te		ms	9.8			10.1			10.2		
	Max. Theoretical Acceleration ③	Amax		g's	21.5			21.8			21.8		
	Magnetic Attraction	Fa		kN	22.1			29.4			36.8		
				lbf	4968			6609			8273		
	Thermal Resistance ④	Rthw-a		°C/Watt	0.035			0.027			0.022		
	Max. Allowable Coil Temp. ④	Tmax		°C	130								
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8								
	Mechanical Specifications												
	Coil Assembly Weight	Mc	±15%	kg	27.3			35.7			44.1		
				lbs	60			79			97		
	Magnet Way Type (MCxxx)				**150**			**200**			**250**		
	Magnet Way Weight	Mw	±15%	kg/m	20.7			26.8			33.2		
				lbs/in	1.16			1.5			1.86		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.7 IC44 Natural Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC44-030				IC44-050				IC44-075				IC44-100			
	Winding Code ②				A1	A2	A3	A7	A1	A2	A3	A7	A1	A2	A3	A7	A1	A2	A3	A7
	Rated Performance																			
	Max Rated Voltage	Un		VAC	480	480	230	230	480	480	230	230	480	480	400	230	480	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	568				1028				1609				2186			
				lbf	128				231				362				491			
	Motor constant	Km		N/√W	0.55				0.57				0.61				0.66			
	Continous Current @ Tmax	Ic		Arms	4.02	8.0	16.1	27.9	4.37	8.7	17.5	30.3	4.56	9.1	18.2	31.6	4.64	9.3	18.6	32.2
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1487	1487	1486	1293	2573	2573	2573	2156	3403	3923	3505	3234	3903	5267	4176	4311
				lbf	334	334	334	291	578	578	578	485	765	882	788	727	877	1184	939	969
	Peak Current @ Tmax ⑤	Ip		Arms	14.1	28.2	56	76	15.3	30.6	61	76	12.0	31.9	50	76	9.5	32.5	42.0	76
	Rated force @ Speed ⑤	Frtd		N	563	555	524	455	1025	1017	990	922	1607	1600	1576	1520	2184	2178	2157	2104
				lbf	127	125	118	102	230	229	223	207	361	360	354	342	491	490	485	473
	Rated Speed	Nrtd		m/s	1.80	3.96	8.4	13.5	0.90	2.25	4.86	8.7	0.45	1.35	3.15	5.7	0.270	0.99	2.25	4.23
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1487	1487	-	-	2573	2573	-	-	3928	3923	3505	-	5273	5267	4176	-
				lbf	334	334	-	-	578	578	-	-	883	882	788	-	1185	1184	939	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.1	28.2	-	-	15.3	30.6	-	-	16.0	31.9	50.4	-	16.3	32.5	42.0	-
	Rated force @ Speed ⑤	Frtd		N	557	533	-	-	1020	999	-	-	1602	1583	1518	-	2179	2165	2104	-
				lbf	125	120	-	-	229	225	-	-	360	356	341	-	490	487	473	-
	Rated Speed	Nrtd		m/s	3.42	7.2	-	-	1.89	4.14	-	-	1.17	2.70	5.8	-	0.81	1.89	4.23	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1487	1487	-	-	2573	2573	-	-	3928	3923	-	-	5273	5267	4176	-
				lbf	334	334	-	-	578	578	-	-	883	882	-	-	1185	1184	939	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.1	28.2	-	-	15.3	30.6	-	-	16.0	31.9	-	-	16.3	32.5	42.0	-
	Rated force @ Speed ⑤	Frtd		N	554	519	-	-	1016	987	-	-	1599	1574	-	-	2178	2155	2071	-
				lbf	125	117	-	-	228	222	-	-	359	354	-	-	490	484	466	-
	Rated Speed	Nrtd		m/s	4.14	8.8	-	-	2.34	5.1	-	-	1.44	3.24	-	-	0.99	2.34	5.1	-
	Electrical Specifications ②																			
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	7.5	1.89	0.48	0.160	10.5	2.63	0.66	0.221	14.1	3.54	0.89	0.297	17.8	4.46	1.12	0.374
	Electrical Inductance L-L	L	±20%	mh	70	17.4	4.35	1.45	110	27.4	6.8	2.28	159	39.9	10.0	3.32	209	52	13.1	4.36
	Force Constant @ 25°C	Kf	±10%	N/Arms	143	72	35.8	20.7	239	119	60	34.5	358	179	90	52	478	239	119	69
				lbf/Arms	32.1	16.2	8	4.65	54	26.8	13.5	7.8	80	40.2	20.2	11.7	107	54	26.8	15.5
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	117	59	29.3	16.9	195	98	48.8	28.2	293	146	73	42.2	390	195	98	56
				Vpeak/in/sec	2.97	1.49	0.74	0.43	4.95	2.48	1.24	0.72	7	3.71	1.86	1.07	10	4.95	2.48	1.43
	Figures of Merit and Additional Data																			
	Electrical Time Constant	Te		ms	9.3				10.5				11.3				11.7			
	Max. Theoretical Acceleration ③	Amax		g's	15.8				18.9				20.9				21.5			
	Magnetic Attraction	Fa		kN	5.9				9.8				14.7				19.6			
				lbf	1326				2203				3305				4406			
	Thermal Resistance ④	Rthw-a		°C/Watt	0.41				0.250				0.170				0.130			
	Max. Allowable Coil Temp. ④	Tmax		°C	130															
	Mechanical Specifications																			
	Coil Assembly Weight	Mc	±15%	kg	9.6				13.9				19.2				25.0			
				lbs	21.2				30.6				42.3				55			
	Magnet Way Type (MCxxx)				**030**				**050**				**075**				**100**			
	Magnet Way Weight	Mw	±15%	kg/m	5.4				7.5				10.1				12.7			
				lbs/in	0.302				0.42				0.57				0.71			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.7.1 IC44 Natural Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC44-150				IC44-200				IC44-250			
	Winding Code ②				A1	A2	A3	A7	A1	A2	A3	A7	A1	A2	A3	A7
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	480	480	230	480	480	480	230	480	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	3353				4649				5834			
				lbf	754				1045				1312			
	Motor constant	Km		N/√W	0.75				0.82				0.9			
	Continous Current @ Tmax	Ic		Arms	4.75	9.5	19.0	32.9	4.94	9.9	19.8	34.2	4.96	9.9	19.8	34.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	4505	7264	6264	6467	-	8309	8352	8623	-	8996	10440	10779
				lbf	1013	1633	1408	1454	-	1868	1878	1939	-	2022	2347	2423
	Peak Current @ Tmax ⑤	Ip		Arms	6.7	26.9	42.0	76	-	20.8	42.0	76	-	17.0	42.0	76
	Rated force @ Speed ⑤	Frtd		N	3352	3347	3329	3285	-	4646	4630	4595	-	5830	5816	5784
				lbf	754	752	748	738	-	1044	1041	1033	-	1311	1307	1300
	Rated Speed	Nrtd		m/s	0.090	0.54	1.44	2.70	-	0.27	0.99	1.89	-	0.180	0.72	1.44
400 VAC	Peak Force @ Tmax ⑤	Fp		N	6716	7967	6264	-	7546	10750	8352	-	8090	12637	10440	-
				lbf	1510	1791	1408	-	1696	2417	1878	-	1819	2841	2347	-
	Peak Current @ Tmax ⑤	Ip		Arms	11.7	33.3	42.0	-	9.1	34.6	42.0	-	7.4	29.6	42.0	-
	Rated force @ Speed ⑤	Frtd		N	3350	3336	3285	-	4647	4633	4595	-	5832	5822	5784	-
				lbf	753	750	738	-	1045	1042	1033	-	1311	1309	1300	-
	Rated Speed	Nrtd		m/s	0.360	1.17	2.70	-	0.18	0.81	1.89	-	0.11	0.54	1.44	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	7426	7967	6264	-	8550	10750	8352	-	9288	13448	10440	-
				lbf	1669	1791	1408	-	1922	2417	1878	-	2088	3023	2347	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.1	33.3	42.0	-	10.9	34.6	42.0	-	8.9	34.7	42.0	-
	Rated force @ Speed ⑤	Frtd		N	3347	3328	3257	-	4646	4630	4569	-	5830	5816	5761	-
				lbf	752	748	732	-	1044	1041	1027	-	1311	1307	1295	-
	Rated Speed	Nrtd		m/s	0.54	1.44	3.33	-	0.27	0.90	2.34	-	0.18	0.72	1.80	-
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	25.1	6.3	1.58	0.53	32.5	8.1	2.03	0.68	39.8	10.0	2.49	0.83
	Electrical Inductance L-L	L	±20%	mh	309	77	19.3	6.4	409	102	25.6	8.5	510	127	31.8	10.6
	Force Constant @ 25°C	Kf	±10%	N/Arms	716	358	179	103	955	478	239	138	1194	597	299	172
				lbf/Arms	161	80	40.2	23.2	215	107	54	31	268	134	67	38.7
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	585	293	146	84	780	390	195	113	975	488	244	141
				Vpeak/in/sec	15	7	3.71	2.14	20	10	4.95	2.86	25	12	6	3.57
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	12.3				12.6				12.8			
	Max. Theoretical Acceleration ③	Amax		g's	22.4				23.2				23.4			
	Magnetic Attraction	Fa		kN	29.4				39.4				49.2			
				lbf	6609				8857				11061			
	Thermal Resistance ④	Rthw-a		°C/Watt	0.088				0.063				0.052			
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	36.2				47.4				58.5			
				lbs	80				104				129			
	Magnet Way Type (MCxxx)				**150**				**200**				**250**			
	Magnet Way Weight	Mw	±15%	kg/m	20.7				26.8				33.2			
				lbs/in	1.16				1.5				1.86			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

8.2.8 IC44 Water Cooled Motor Series - Performance Data

		Symbol	Tol	Units	IC44-030			IC44-050			IC44-075			IC44-100		
	Winding Code ②				A1	A2	A3	A1	A2	A3	A1	A2	A3	A1	A2	A3
	Rated Performance															
	Max Rated Voltage	Un		VAC	480	480	230	480	480	230	480	480	230	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N	1019			1678			2500			3352		
				lbf	229			377			562			754		
	Motor constant	Km		N/√W	0.33			0.354			0.393			0.43		
	Continous Current @ Tmax	Ic		Arms	10.0	20.0	40.1	9.9	19.7	39.4	9.8	19.5	39.1	9.8	19.7	39.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	1549	1551	1521	2567	2567	2535	3347	3839	3803	3839	5134	5071
				lbf	348	349	342	577	577	570	752	863	855	863	1154	1140
	Peak Current @ Tmax ⑤	Ip		Arms	20.0	40.1	76	19.7	39.4	76	14.9	39.1	76	11.8	39.4	76
	Rated force @ Speed ⑤	Frtd		N	1016	1008	981	1675	1668	1644	2499	2492	2471	3352	3346	3327
				lbf	228	227	221	377	375	370	562	560	556	754	752	748
	Rated Speed	Nrtd		m/s	1.62	4.14	9.2	0.72	2.34	5.4	0.27	1.35	3.42	0.05	0.90	2.43
400 VAC	Peak Force @ Tmax ⑤	Fp		N	1549	1551	-	2567	2567	-	3835	3839	-	5134	5134	-
				lbf	348	349	-	577	577	-	862	863	-	1154	1154	-
	Peak Current @ Tmax ⑤	Ip		Arms	20.0	40.1	-	19.7	39.4	-	19.5	39.1	-	19.7	39.4	-
	Rated force @ Speed ⑤	Frtd		N	1010	989	-	1671	1652	-	2494	2478	-	3348	3333	-
				lbf	227	222	-	376	371	-	561	557	-	753	749	-
	Rated Speed	Nrtd		m/s	3.51	7.8	-	1.89	4.59	-	1.08	2.88	-	0.63	2.07	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	1549	1551	-	2567	2567	-	3835	3839	-	5134	5134	-
				lbf	348	349	-	577	577	-	862	863	-	1154	1154	-
	Peak Current @ Tmax ⑤	Ip		Arms	20.0	40.1	-	19.7	39.4	-	19.5	39.1	-	19.7	39.4	-
	Rated force @ Speed ⑤	Frtd		N	1007	978	-	1667	1642	-	2492	2468	-	3346	3324	-
				lbf	226	220	-	375	369	-	560	555	-	752	747	-
	Rated Speed	Nrtd		m/s	4.32	9.6	-	2.43	5.7	-	1.44	3.60	-	0.99	2.61	-
	Electrical Specifications ②															
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	6.08	1.52	0.382	8.4	2.11	0.53	11.4	2.84	0.71	14.3	3.58	0.90
	Electrical Inductance L-L	L	±20%	mh	44.7	11.2	2.79	70	17.6	4.39	102	25.6	6.4	134	33.6	8.4
	Force Constant @ 25°C	Kf	±10%	N/Arms	115	57	28.7	191	96	47.8	287	144	72	383	191	96
				lbf/Arms	25.9	12.8	6.5	42.9	21.6	10.7	65	32.4	16.2	86	42.9	21.6
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	94	46.9	23.4	156	78	39.1	234	117	59	313	156	78
				Vpeak/in/sec	2.38	1.19	0.6	3.97	1.98	0.99	6	2.98	1.49	8	3.97	1.98
	Figures of Merit and Additional Data															
	Electrical Time Constant	Te		ms	7.4			8.3			8.9			9.4		
	Max. Theoretical Acceleration ③	Amax		g's	16.5			18.9			20.4			21.0		
	Magnetic Attraction	Fa		kN	5.9			9.8			14.7			19.6		
				lbf	1326			2203			3305			4406		
	Thermal Resistance ④	Rthw-a		°C/Watt	0.082			0.061			0.046			0.036		
	Max. Allowable Coil Temp. ④	Tmax		°C	130											
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min	2.8											
	Mechanical Specifications															
	Coil Assembly Weight	Mc	±15%	kg	9.6			13.9			19.2			25.0		
				lbs	21.2			30.6			42.3			55		
	Magnet Way Type (MCxxx)				**030**			**050**			**075**			**100**		
	Magnet Way Weight	Mw	±15%	kg/m	5.4			7.5			10.1			12.7		
				lbs/in	0.302			0.42			0.57			0.71		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

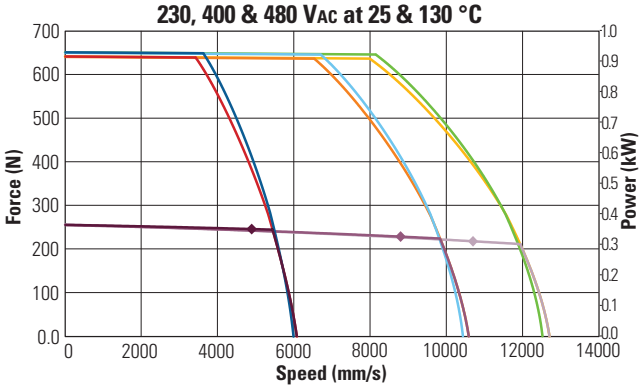
8.2.8.1 IC44 Water Cooled Motor Series - Performance Data (continued)

		Symbol	Tol	Units	IC44-150			IC44-200			IC44-250		
	Winding Code ②				A1	A2	A3	A1	A2	A3	A1	A2	A3
	Rated Performance												
	Max Rated Voltage	Un		VAC	480	480	230	480	480	230	480	480	230
	Max Continuous Force @ Tmax ① ⑤	Fc		N		4992			6673			8211	
				lbf		1122			1500			1846	
	Motor constant	Km		N/√W		0.49			0.55			0.61	
	Continous Current @ Tmax	Ic		Arms	9.8	19.5	39.0	9.8	19.6	39.1	9.6	19.2	38.4
230 VAC	Peak Force @ Tmax ⑤	Fp		N	-	7153	7606	-	8183	10142	-	-	12677
				lbf	-	1608	1710	-	1840	2280	-	-	2850
	Peak Current @ Tmax ⑤	Ip		Arms	-	33.5	76	-	26.0	76	-	-	76
	Rated force @ Speed ⑤	Frtd		N	-	4989	4972	-	6671	6657	-	-	8198
				lbf	-	1122	1118	-	1500	1497	-	-	1843
	Rated Speed	Nrtd		m/s	-	0.36	1.44	-	0.130	0.99	-	-	0.63
400 VAC	Peak Force @ Tmax ⑤	Fp		N	6610	7671	-	7428	10238	-	-	12484	-
				lbf	1486	1725	-	1670	2302	-	-	2807	-
	Peak Current @ Tmax ⑤	Ip		Arms	14.6	39.0	-	11.3	39.1	-	-	36.9	-
	Rated force @ Speed ⑤	Frtd		N	4990	4978	-	6673	6662	-	-	8203	-
				lbf	1122	1119	-	1500	1498	-	-	1844	-
	Rated Speed	Nrtd		m/s	0.18	1.17	-	0.010	0.72	-	-	0.45	-
480 VAC	Peak Force @ Tmax ⑤	Fp		N	7311	7671	-	8417	10238	-	9144	12705	-
				lbf	1644	1725	-	1892	2302	-	2056	2856	-
	Peak Current @ Tmax ⑤	Ip		Arms	17.5	39.0	-	13.6	39.1	-	11.1	38.4	-
	Rated force @ Speed ⑤	Frtd		N	4989	4970	-	6671	6657	-	8211	8196	-
				lbf	1122	1117	-	1500	1497	-	1846	1843	-
	Rated Speed	Nrtd		m/s	0.36	1.53	-	0.160	0.99	-	0.01	0.72	-
	Electrical Specifications ②												
	Electrical Resistance @ 25°C L-L	Rm	±10%	Ohms	20.2	5.0	1.26	26.0	6.5	1.63	31.9	8.0	2.00
	Electrical Inductance L-L	L	±20%	mh	198	49.6	12.4	263	66	16.4	327	82	20.4
	Force Constant @ 25°C	Kf	±10%	N/Arms	574	287	144	765	383	191	957	478	239
				lbf/Arms	129	65	32.4	172	86	42.9	215	107	54
	Back EMF Constant @ 25°C L-L	Ke	±10%	Vpeak/m/s	469	234	117	625	313	156	781	391	195
				Vpeak/in/sec	12	6	2.98	16	8	3.97	20	10	4.96
	Figures of Merit and Additional Data												
	Electrical Time Constant	Te		ms		9.8			10.1			10.2	
	Max. Theoretical Acceleration ③	Amax		g's		21.6			22.1			22.1	
	Magnetic Attraction	Fa		kN		29.4			39.4			49.2	
				lbf		6609			8857			11061	
	Thermal Resistance ④	Rthw-a		°C/Watt		0.026			0.020			0.017	
	Max. Allowable Coil Temp. ④	Tmax		°C				130					
	Min. Flow Rate of Coolant @ 25°C Max.			liters/min				2.8					
	Mechanical Specifications												
	Coil Assembly Weight	Mc	±15%	kg		36.2			47.4			58.5	
				lbs		80			104			129	
	Magnet Way Type (MCxxx)					**150**			**200**			**250**	
	Magnet Way Weight	Mw	±15%	kg/m		20.7			26.8			33.2	
				lbs/in		1.16			1.5			1.86	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.
⑤ All data referenced to sinusoidal commutation

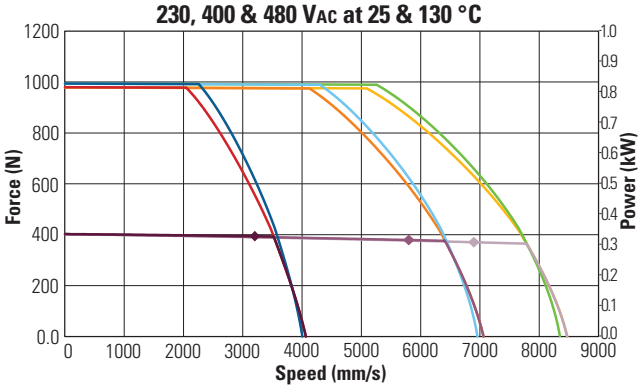
8.3 IC Ironcore - Performance Curves

IC11050A1
230, 400 & 480 VAC at 25 & 130 °C



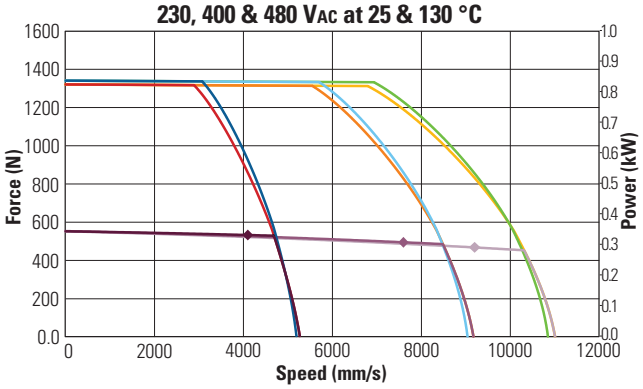
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

IC11075A1
230, 400 & 480 VAC at 25 & 130 °C



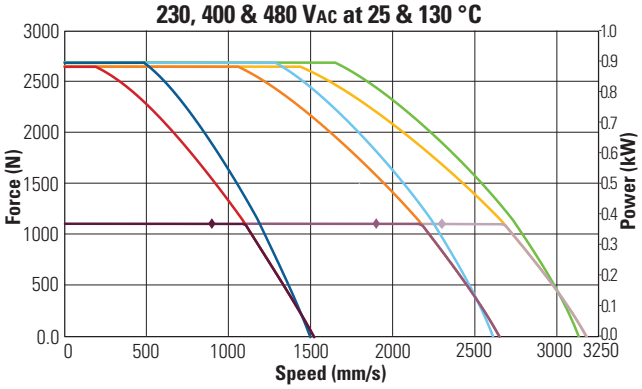
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

IC11100A5
230, 400 & 480 VAC at 25 & 130 °C



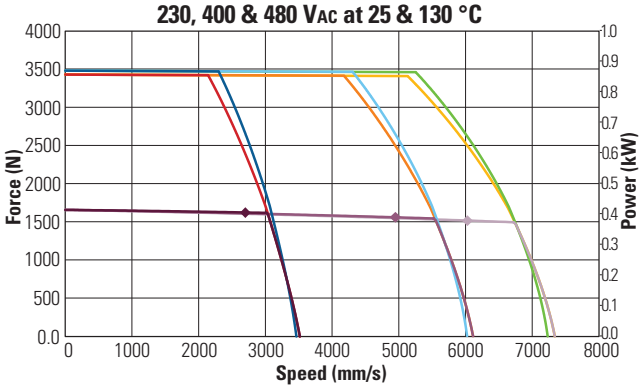
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

IC22100A1
230, 400 & 480 VAC at 25 & 130 °C



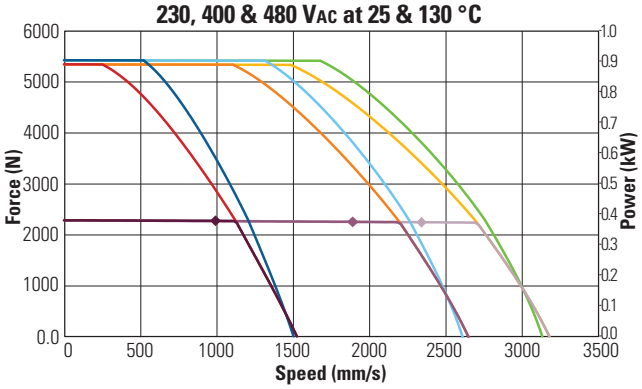
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

IC22150A6
230, 400 & 480 VAC at 25 & 130 °C



I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

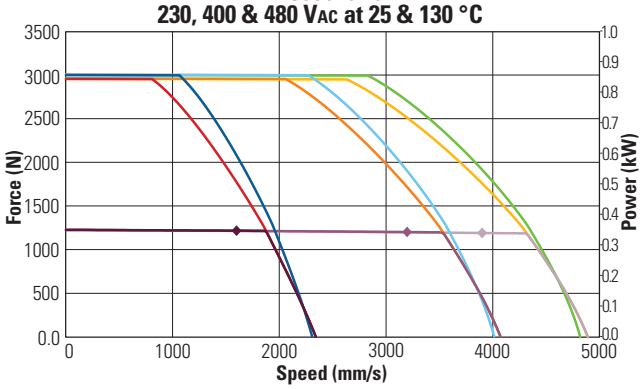
IC22200A2
230, 400 & 480 VAC at 25 & 130 °C



I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

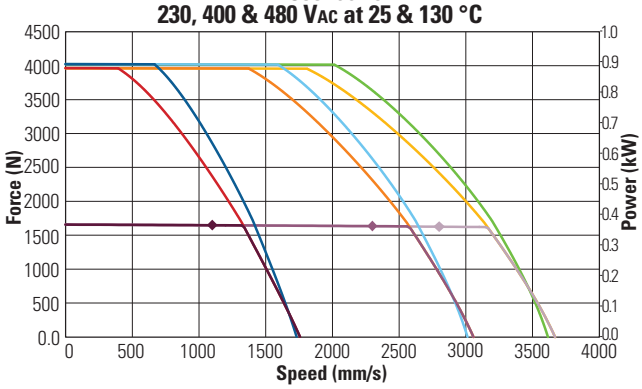
8.3.1 IC Ironcore - Performance Curves, continued

IC33075A5
230, 400 & 480 VAC at 25 & 130 °C



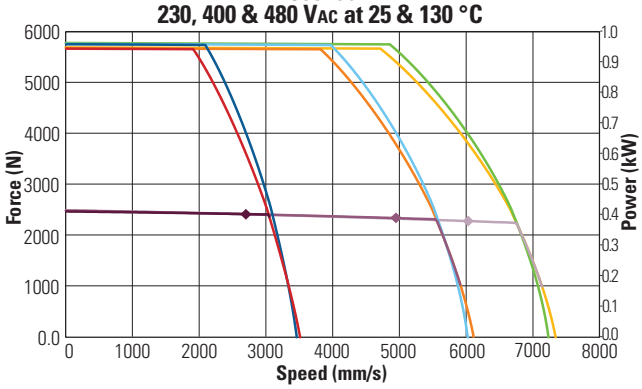
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

IC33100A5
230, 400 & 480 VAC at 25 & 130 °C



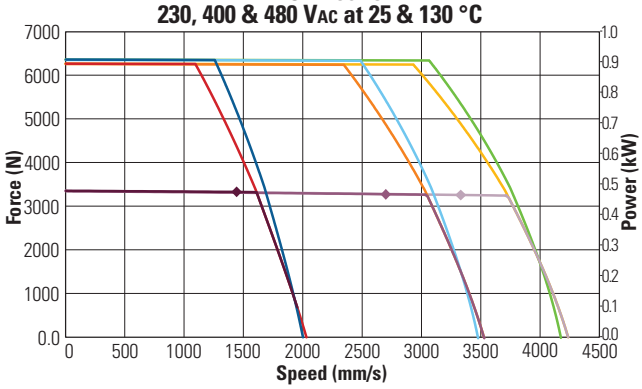
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

IC33150A7
230, 400 & 480 VAC at 25 & 130 °C



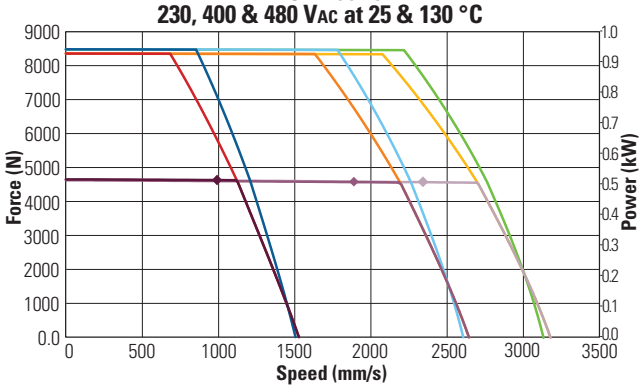
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

IC44150A3
230, 400 & 480 VAC at 25 & 130 °C



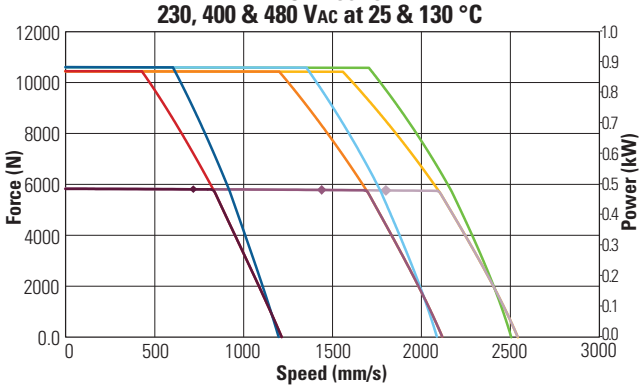
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

IC44200A3
230, 400 & 480 VAC at 25 & 130 °C



I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

IC44250A3
230, 400 & 480 VAC at 25 & 130 °C



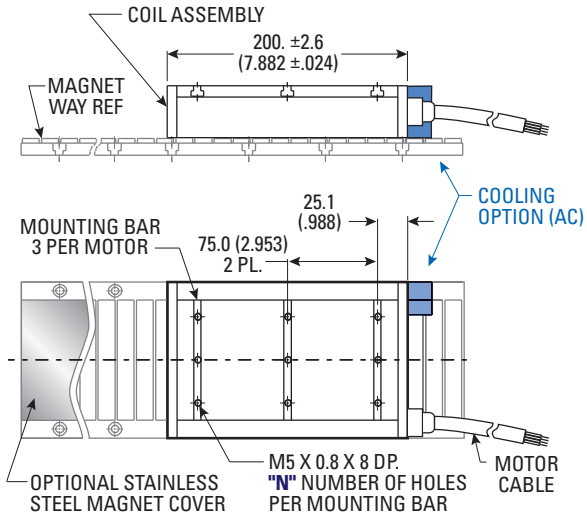
I_{pk} Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
I_{pk} Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: ◆230 ◆400 ◆480 SOAC (cont. operation): 230 400 480

8.4 IC Ironcore - Dimensional Drawings

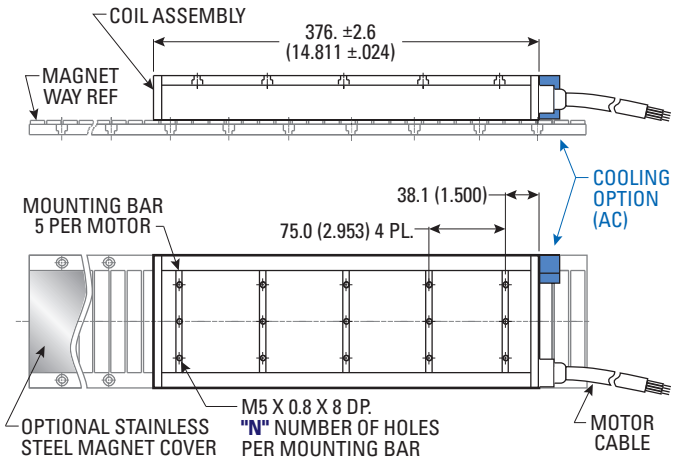
IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at Kollmorgen Design Tools - 3D Models.

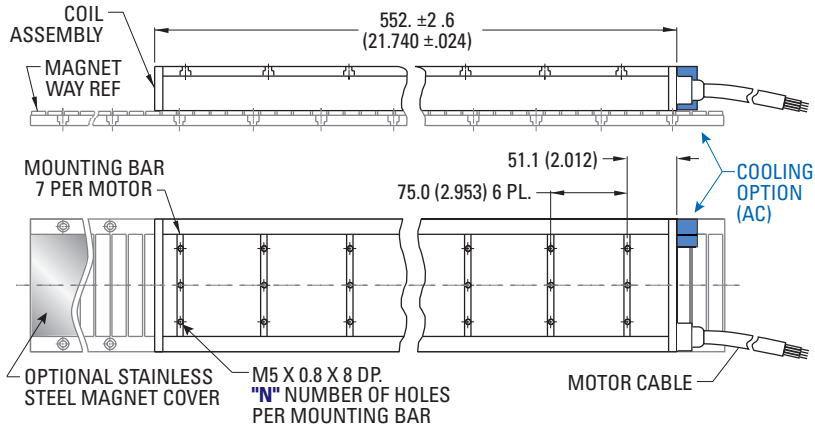
IC11 Dimensional Drawings



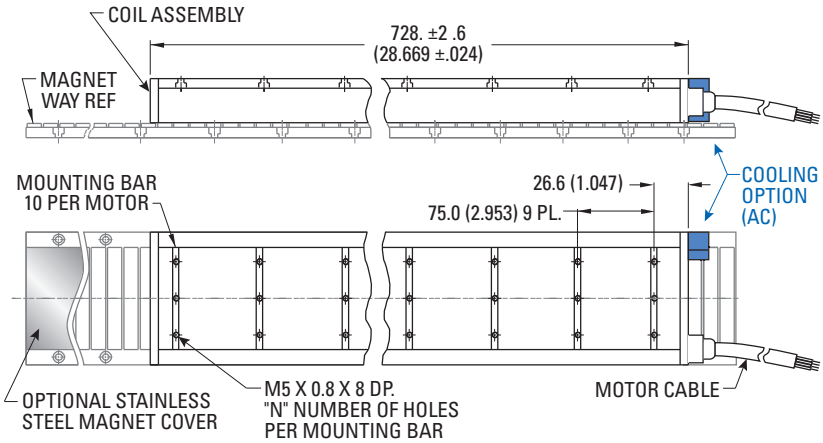
IC22 Dimensional Drawings



IC33 Dimensional Drawings

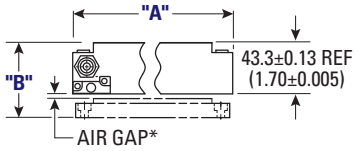


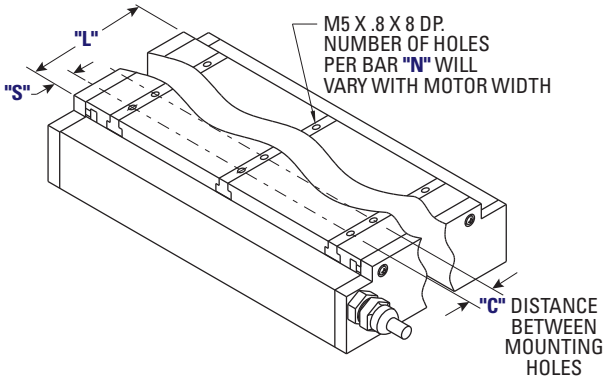
IC44 Dimensional Drawings



Dimensions in mm (in)

8.4.1 IC Ironcore - Dimensional Drawings, continued





*AIR GAP:
A suitable air gap should be set to ensure that the feeler gauge of the corresponding size can pass smoothly between the coil and the magnetic circuit.

For the magnetic circuit without cover, the air gap is 0.8 ± 0.1mm

For the covered magnetic circuit, the air gap is 0.55 ± 0.1mm

(Stainless steel cover plate thickness 0.25mm)

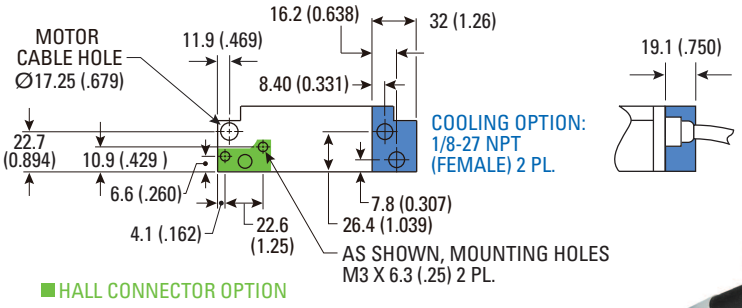
ICxx Dimensional Data, Typical Mounting Bar Lengths & Mounting Holes Tabulation

Motor Coil Type	Coil Width "A"	Height w/ Air Gap "B" w/ mag. cvr	"B" w/o mag. cvr	Spacing Between Holes "C"	Mounting Bar Length "L"	# Holes "N"	"S"	"S"
ICxx030	65.0 (2.559) ± 1.0 (.04)	58.6±0.1 (2.307±.004)	58.3±0.1 (2.295±.004)	16.0 (0.630)	30 (1.18)	2	7.0 (0.28)	
ICxx050	85.0 (3.346) ± 1.0 (.04)			36.0 (1.417)	50 (1.97)	2	7.0 (0.28)	
ICxx075	110.0 (4.331) ± 1.0 (.04)			32.0 (1.260)	75 (2.95)	3	5.5 (0.21)	
ICxx100	135.0 (5.315) ± 1.0 (.04)			36.0 (1.417)	100 (3.94)	3	14.0 (0.55)	
ICxx150	185.0 (7.283) ± 1.5 (.06)	60.6±0.1 (2.386±.004)	60.3±0.1 (2.374±.004)	32.0 (1.260)	150 (5.91)	5	11.0 (0.43)	
ICxx200	235.0 (9.252) ± 1.5 (.06)			36.0 (1.417)	200 (7.87)	6	10.0 (0.39)	
ICxx250	285.0 (11.22) ± 1.5 (.06)			38.0 (1.496)	250 (9.84)	7	11.0 (0.43)	

Dimensions in mm (in.)

Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

ICxx Typical Cable Port and Cooling Unit Dimensions



Optional IC Hall Effect Connector Cable

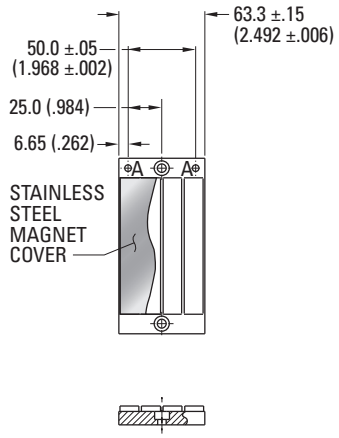
Optional Cooling Unit

8.5 MC Magnet Way - Dimensional Drawings and Data

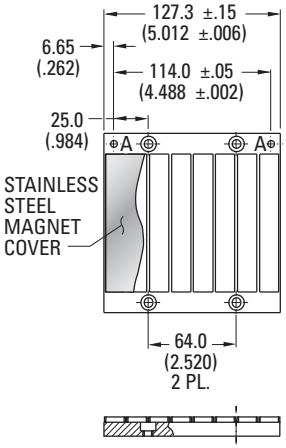
IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at Kollmorgen Design Tools - 3D Models.

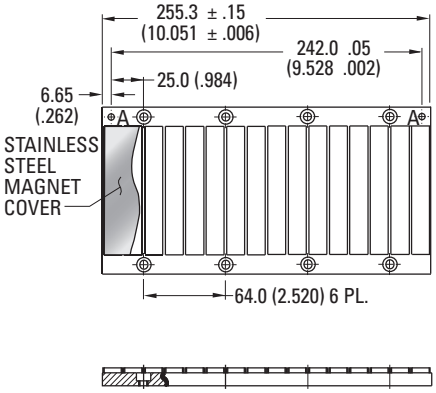
MCxxx-0064



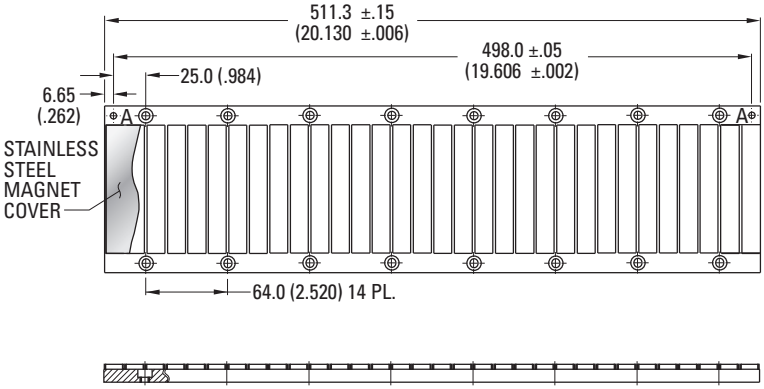
MCxxx-0128



MCxxx-0256



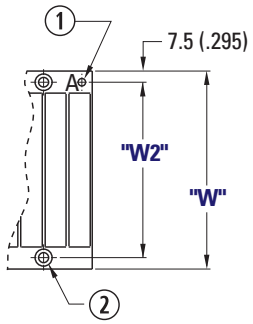
MCxxx-0512



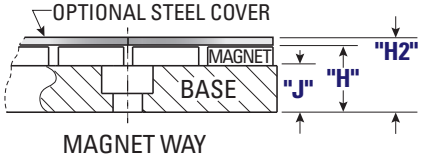
Magnetic Way Typical Dimensions

Magnet Way Type	Assembly Width	Mounting Hole Width	Base Height	Base + Magnet Height	Total Height with Cover
	"W"	"W2"	"J"	"H"	"H2"
MC030xxxx	60.0 (2.362)	45.0 (1.772)	10.0 (0.394)	14.1 (0.555)	14.4 (0.556)
MC050xxxx	80.0 (3.150)	65.0 (2.560)			
MC075xxxx	105.0 (4.134)	90.0 (3.544)			
MC100xxxx	130.0 (5.118)	115.0 (4.528)			
MC150xxxx	180.0 (7.087)	165.0 (6.496)	12.0 (0.472)	16.1 (0.634)	16.4 (0.645)
MC200xxxx	230.0 (9.055)	215.0 (8.464)			
MC250xxxx	285.0 (11.22)	270.0 (10.63)			

Dimensions in mm (in.)



1. Ø5.110-5.135 (.201-.202) THRU 2 PL. MARKED "A" FOR RECOMMENDED 5mm M6 LOCATING PINS
2. Ø6.6 (.260) THRU C'BORE Ø11.0 (.433) X 6.2 (.246) DP. 2 PL. LOCATED AS SHOWN. RECOMMENDED MOUNTING HARDWARE: M6 SOC. HD. CAP DIN 912 (1/4" SOC. HD. CAP SCREW)



9 Ironcore DDL Low Profile Motors - Technical Data

9.1 ICD Ironcore Low Profile - General Specifications

Ironcore DDL linear motors have a compact profile to provide force moving load.

General Specifications

» Coil frame size 05, 10
» Coil width 030, 050, 075, 100
» Low and high-speed coil winding designs fit various application needs

	ICD05/10
Peak force range	165 – 1099N
Continuous force range	57 – 315 N
Insulation voltage rating	230VAC
Cooling options	Natural-cooled only
Feedback	Optional hall sensor
Thermal Devices	Thermistor – PTC
Certification	RoHS, REACH

ICD10

9.2 Ironcore DDL Low Profile Motors - Technical Data

9.2.1 ICD05 - Performance Data

	Symbol	Units	ICD05030		ICD05050		ICD05075		ICD05100	
Rated Performance										
Peak Force	Fp	N	165		295		441		588	
		lbf	37.1		66.3		99.1		132	
Continuous Force @ Tmax ①	Fc	N	57.0		87.0		125		157	
		lbf	12.8		19.6		28.1		35.3	
Motor Constant @ 25°C	Km	N/√W	12.3		17.2		22.0		26.0	
		lbf/√W	2.8		3.9		4.9		5.9	
Electrical Specifications										
Winding Code ②			**A1**	**A5**	**A1**	**A5**	**A1**	**A5**	**A1**	**A5**
Peak Current	Ip	Arms	7.9	13.7	8.5	14.7	8.5	14.7	8.5	14.7
Continuous Current @ Tmax	Ic	Arms	2.1	3.7	2.0	3.4	1.9	3.3	1.8	3.1
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	3.2	1.1	4.5	1.5	6.1	2.0	7.7	2.6
Electrical Inductance ±20%	L	mh L-L	9.1	3.0	14.4	4.8	21.0	7.0	27.6	9.2
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	21.8	12.6	36.3	21.0	54.3	31.4	72.4	41.8
		Vpeak/in/sec L-L	0.55	0.32	0.92	0.53	1.38	0.80	1.84	1.06
Force Constant @ 25°C±10%	Kf	N/Arms	26.7	15.4	44.5	25.7	66.5	38.4	88.7	51.2
		lbf/Arms	6.0	3.5	10.0	5.8	15.0	8.6	19.9	11.5
Mechanical Specifications										
Coil Assembly Weight ±15%	Mc	kg	0.62		0.95		1.36		1.71	
		lbs	1.4		2.1		3.0		3.8	
Magnetic Way Type (MCDxxx)			**030**		**050**		**075**		**100**	
Magnetic Way Weight ±15%	Mw	kg/m	2.70		3.93		5.48		7.04	
		lbs/in	0.15		0.22		0.31		0.39	
Figures of Merit and Additional Data										
Electrical Time Constant	Te	ms	2.9		3.2		3.4		3.6	
Max. Theoretical Acceleration ③	Amax	g's	28.0		30.2		31.9		32.8	
Magnetic Attraction	Fa	kN	0.53		0.89		1.33		1.78	
		lbf	119		200		299		400	
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	3.50		2.90		2.30		2.06	
Max. Allowable Coil Temp. ④	Tmax	°C	130		130		130		130	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

9.2.2 ICD10 - Performance Data

	Symbol	Units	ICD10030				ICD10050			
Rated Perfomance										
Peak Force	Fp	N	330				550			
		lbf	74.2				124			
Continuous Force @ Tmax ①	Fc	N	104				171			
		lbf	23.4				38.4			
Motor Constant @ 25°C	Km	N/√W	17.3				24.3			
		lbf/√W	3.9				5.5			
Electrical Specifications										
Winding Code ②			A1	A4	A5	A8	A1	A4	A5	A8
Peak Current	Ip	Arms	7.9	15.8	13.7	27.4	7.9	15.8	13.7	27.4
Continuous Current @ Tmax	Ic	Arms	1.9	3.9	3.4	6.8	1.9	3.8	3.3	6.6
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	6.4	1.6	2.1	0.5	9.0	2.2	3.0	0.7
Electrical Inductance ±20%	L	mh L-L	18.3	4.6	6.1	1.5	29.0	7.3	9.7	2.4
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	43.7	21.8	25.2	12.6	72.8	36.4	42.0	21.0
		Vpeak/in/sec L-L	1.11	0.55	0.64	0.32	1.85	0.92	1.07	0.53
Force Constant @ 25°C±10%	Kf	N/Arms	53.5	26.8	30.9	15.4	89.2	44.6	51.5	25.7
		lbf/Arms	12.0	6.0	6.9	3.5	20.1	10.0	11.6	5.8
Mechanical Specifications										
Coil Assembly Weight ±15%	Mc	kg	1.1				1.9			
		lbs	2.5				4.1			
Magnetic Way Type (MCDxxx)			030				050			
Magnetic Way Weight ±15%	Mw	kg/m	2.70				3.93			
		lbs/in	0.15				0.22			
Figures of Merit and Additional Data										
Electrical Time Constant	Te	ms	2.9				3.2			
Max. Theoretical Acceleration ③	Amax	g's	30.7				30.7			
Magnetic Attraction	Fa	kN	1.06				1.78			
		lbf	2.38				400			
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	2.05				1.52			
Max. Allowable Coil Temp. ④	Tmax	°C	130				130			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

9.2.2.1 ICD10 - Performance Data, continued

	Symbol	Units	ICD10075				ICD10100			
Rated Perfomance										
Peak Force	Fp	N	824				1099			
		lbf	185				247			
Continuous Force @ Tmax ①	Fc	N	246				315			
		lbf	55.3				70.8			
Motor Constant @ 25°C	Km	N/√W	31.3				37.1			
		lbf/√W	7.0				8.3			
Electrical Specifications										
Winding Code ②			A1	A4	A5	A8	A1	A4	A5	A8
Peak Current	Ip	Arms	7.9	15.8	13.7	27.4	7.9	15.8	13.7	27.4
Continuous Current @ Tmax	Ic	Arms	1.8	3.7	3.2	6.4	1.8	3.5	3.1	6.1
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	12.2	3.0	4.1	1.0	15.4	3.9	5.1	1.3
Electrical Inductance ±20%	L	mh L-L	42.4	10.6	14.1	3.5	55.8	13.9	18.6	4.6
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	109.2	54.6	63.1	31.5	145.7	72.8	84.1	42.0
		Vpeak/in/sec L-L	2.77	1.39	1.60	0.80	3.70	1.85	2.14	1.07
Force Constant @ 25°C±10%	Kf	N/Arms	134	66.9	77.2	38.6	178	89.2	103	51.5
		lbf/Arms	30.1	15.0	17.4	8.7	40.1	20.1	23.2	11.6
Mechanical Specifications										
Coil Assembly Weight ±15%	Mc	kg	2.7				3.4			
		lbs	5.9				7.5			
Magnetic Way Type (MCDxxx)			075				100			
Magnetic Way Weight ±15%	Mw	kg/m	5.48				7.04			
		lbs/in	0.31				0.39			
Figures of Merit and Additional Data										
Electrical Time Constant	Te	ms	3.5				3.6			
Max. Theoretical Acceleration ③	Amax	g's	32.5				33.7			
Magnetic Attraction	Fa	kN	2.66				3.56			
		lbf	598				800			
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	1.21				1.04			
Max. Allowable Coil Temp. ④	Tmax	°C	130				130			

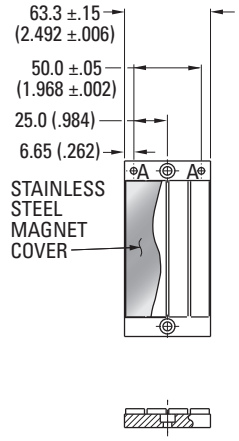
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

9.3 MCD Magnet Way - Dimensional Drawing and Data

IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at Kollmorgen Design Tools - 3D Models.

MCDxx-0064



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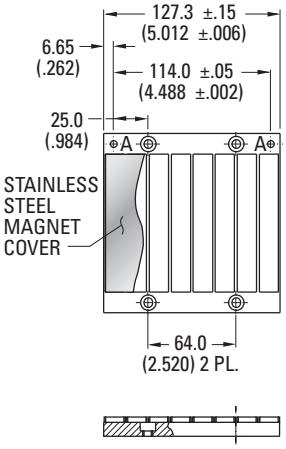

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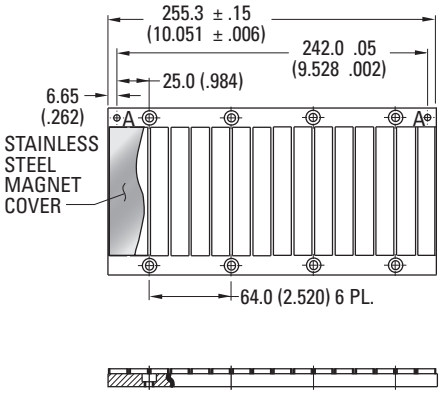

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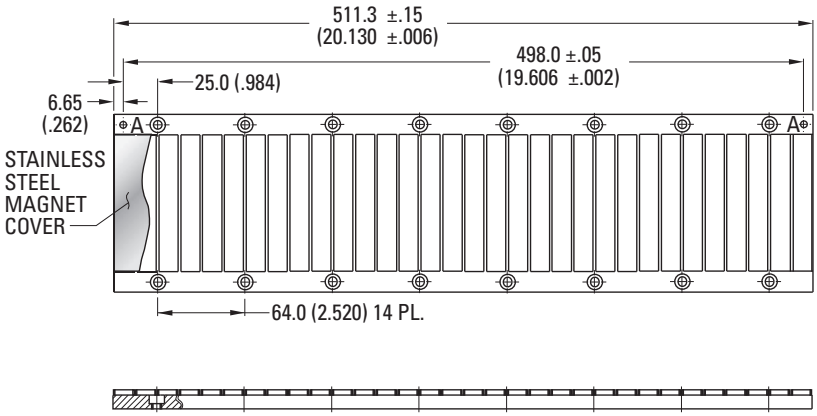


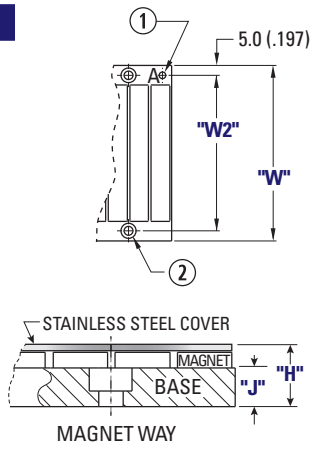
MCDxxx Magnet Way Typical Dimensional Data

Type	"W"	"W2"	"J"	"H"	"H2"
MCD0300xxx001	55.0 (2.165)	45.0 (1.772)	4.0 (.157)	8.25 (.325)	8.50 (.335)
MCD0500xxx001	75.0 (2.953)	65.0 (2.559)			
MCD0750xxx001	100.0 (3.937)	90.0 (3.543)			
MCD1000xxx001	125.0 (4.921)	115.0 (4.528)			

Dimensions in mm (in.)

1. Ø5.110-5.135 (.201-.202) THRU 2 PL. MARKED "A" FOR RECOMMENDED 5mm M6 LOCATING PINS
2. Ø4.7 (.185) THRU C'BORE Ø8.3 (.327) X 1.6 $^{+0.25}_{-0.00}$ (.063) DP. 2 PL. LOCATED AS SHOWN. RECOMMENDED MOUNTING HARDWARE: M4 SOCKET CAP DIN 912 8-32 SOCKET CAP SCREW

MCDxxx-xxxx



10 Ironless DDL Motors - Performance Data

10.1 IL Ironless - General Specifications

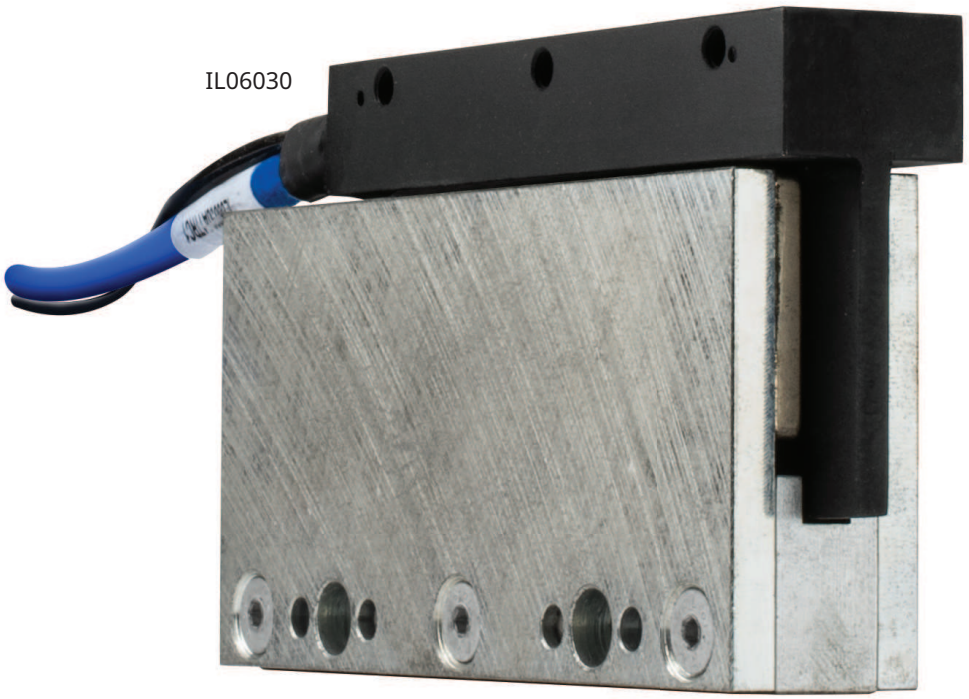
Ironless motors have no iron, or slots for the coils to be wound on. Therefore, these motors have zero cogging, a very light mass, and absolutely no attractive forces between the coil assembly and the magnet way. These characteristics are ideal for applications requiring very low bearing friction, high acceleration of lighter loads, and for maximizing constant velocity, even at ultra low speeds. The modular magnet ways consists of a double row of magnets to maximize the generated thrust force DDL linear motors have a compact profile to provide force moving load.

General Specifications

» Coil frame size 03, 06, 12, 18, 24
» Coil width 015, 030, 050, 075, 100
» Low and high-speed coil winding designs fit various application needs

	IL03/06/12/18/24
Peak force range	30 – 1600 N
Continuous force range	10 – 262 N
Insulation voltage rating	230 VAC
Cooling options	Natural-cooled only
Feedback	Optional hall sensor
Thermal Devices	Thermistor – PTC
Certification	RoHS, REACH, UL, CE

IL06030



10.2 Ironless DDL Motors - Performance Data

10.2.1 IL03 - Performance Data

	Symbol	Units	IL03015	IL03030	IL03050
Rated Perfomance					
Peak Force	Fp	N	30	60	100
		lbf	6.74	13.5	22.5
Continuous Force @ Tmax ①	Fc	N	10	19	31
		lbf	2.3	4.3	7.0
Motor Constant	Km	N√W	2.4	3.9	5.6
Electrical Specifications					
Winding Code ②			**A1**	**A1**	**A1**
Peak Current	Ip	Arms	7.2	7.1	7.0
Continuous Current @ Tmax	Ic	Arms	2.5	2.3	2.1
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	2.1	3.1	4.3
Electrical Inductance ±20%	L	mH L-L	0.25	0.65	1.50
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	3.4	6.9	11.6
		Vpeak/in/sec L-L	0.1	0.2	0.3
Force Constant @ 25°C±10%	kf	N/Arms	4.2	8.4	14.3
		lbf/Arms	0.9	1.9	3.2
Mechanical Specifications					
Coil Assembly Weight ±15%	Mc	kg	0.12	0.14	0.16
		lbs	0.26	0.31	0.35
Magnetic Way Type (MWxxx)			**015**	**030**	**050**
Magnetic Way Weight ±15%	Mw	kg/m	5.1	9.4	12.2
		lb/in	0.29	0.51	0.68
Figures of Merit and Additional Data					
Electrical Time Constant	Te	ms	0.12	0.21	0.35
Max. Theoretical Acceleration ③	Amax	g's	25.5	43.7	63.7
Magnetic Attraction	Fa	kN	0	0	0
		lbf	0	0	0
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	3.94	3.22	2.52
Max. Allowable Coil Temp. ④	Tmax	°C	130	130	130

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.2 IL06 - Performance Data

	Symbol	Units	IL06015		IL06030		IL06050		IL06075		IL06100	
Rated Perfomance												
Peak Force	Fp	N	60		120		200		300		400	
		lbf	13.5		27		45		68		90	
Continuous Force @ Tmax ①	Fc	N	21		30.3		49.7		67.6		82.8	
		lbf	4.72		6.81		11.2		15.2		18.6	
Motor Constant	Km	N√W	3.3		5.6		8.0		10.2		12.1	
Electrical Specifications												
Winding Code ②			A1	A4	A1	A4	A1	A4	A1	A4	A1	A4
Peak Current	Ip	Arms	7.2	14.4	7.1	14.2	7.0	14.0	7.0	14.0	7.0	14.0
Continuous Current @ Tmax	Ic	Arms	2.5	4.9	1.8	3.6	1.7	3.5	1.6	3.2	1.5	2.9
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	4.2	1.1	6.1	1.5	8.6	2.2	11.7	2.9	14.7	3.7
Electrical Inductance ±20%	L	mH L-L	0.50	0.13	1.3	0.33	3.00	0.75	5.00	1.25	7.00	1.75
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	6.9	3.4	13.7	6.9	23.3	11.6	34.9	17.5	46.5	23.3
		Vpeak/in/sec L-L	0.18	0.09	0.35	0.17	0.59	0.30	0.89	0.44	1.18	0.59
Force Constant @ 25°C±10%	kf	N/Arms	8.4	4.2	16.8	8.4	28.5	14.3	42.8	21.4	57.0	28.5
		lbf/Arms	1.9	0.9	3.8	1.9	6.4	3.2	9.6	4.8	12.8	6.4
Mechanical Specifications												
Coil Assembly Weight ±15%	Mc	kg	0.23		0.27		0.32		0.38		0.45	
		lbs	0.5		0.6		0.7		0.8		1.0	
Magnetic Way Type (MWxxx) L = low profile T = Thinner			015	015T	030	030L	050	050L	075		100	
Magnetic Way Weight ±15%	Mw	kg/m	5.1	4.2	9.4	7.3	12.2	10.2	18.9		27.3	
		lb/in	0.29	0.24	0.51	.040	0.68	0.56	1.05		1.51	
Figures of Merit and Additional Data												
Electrical Time Constant	Te	ms	0.12		0.21		0.35		0.43		0.48	
Max. Theoretical Acceleration ③	Amax	g's	26.8		45.2		63.6		80.6		90.7	
Magnetic Attraction	Fa	kN	0		0		0		0		0	
		lbf	0		0		0		0		0	
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	1.97		1.61		1.26		1.04		0.87	
Max. Allowable Coil Temp. ④	Tmax	°C	130		130		130		130		130	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.3 IL12 - Performance Data

	Symbol	Units	IL12015			IL12030			IL12050			IL12075			IL12100	
Rated Performance																
Peak Force	Fp	N	120			240			400			600			800	
		lbf	27			54			90			135			180	
Continuous Force @ Tmax ①	Fc	N	41			62.1			88.4			119			148	
		lbf	9.22			14.0			19.9			26.8			33.3	
Motor Constant @ 25°C	Km	N√W	4.8			7.8			11.3			14.5			17.2	
Electrical Specifications																
Winding Code ②			A1	A2	A4	A1	A2	A4	A1	A2	A4	A1	A2	A4	A2	A4
Peak Current	Ip	Arms	7.1	14.3	28.3	7.1	14.2	28.5	7.0	14.0	28.1	7.0	14.0	28.1	14.0	28.1
Continuous Current @ Tmax	Ic	Arms	2.4	4.9	9.8	1.8	3.7	7.4	1.6	3.1	6.2	1.4	2.8	5.6	2.6	5.2
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	8.5	2.1	0.5	12.2	3.1	0.8	17.2	4.3	1.1	23.3	5.8	1.5	7.4	1.8
Electrical Inductance ±20%	L	mH L-L	1.00	0.25	0.06	2.60	0.65	0.16	6.00	1.5	0.38	10.0	2.5	0.63	3.5	0.88
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	13.7	6.9	3.4	27.5	13.8	6.9	46.5	23.3	11.6	69.8	34.9	17.5	46.5	23.3
		Vpeak/in/sec L-L	0.35	0.18	0.09	0.70	0.35	0.17	1.18	0.59	0.30	1.77	0.89	0.44	1.18	0.59
Force Constant @ 25°C±10%	Kf	N/Arms	16.8	8.4	4.2	33.7	16.9	8.4	57.0	28.5	14.3	85.5	42.8	21.4	57.0	28.5
		lbf/Arms	3.78	1.89	0.94	7.6	3.8	1.9	12.8	6.4	3.2	19.2	9.6	4.8	12.8	6.4
Mechanical Specifications																
Coil Assembly Weight ±15%	Mc	kg	0.35			0.42			0.52			0.65			0.77	
		lbs	0.8			0.9			1.1			1.4			1.7	
Magnetic Way Type (MWxxx) L = low profile T = Thinner			015	015T		030	030L		050	050L		075			100	
Magnetic Way Weight ±15%	Mw	kg/m	5.1	4.2		9.4	7.3		12.2	10.2		18.9			27.3	
		lb/in	0.29	0.24		0.51	0.40		0.68	0.56		1.05			1.51	
Figures of Merit and Additional Data																
Electrical Time Constant	Te	ms	0.12			0.21			0.35			0.43			0.48	
Max. Theoretical Acceleration ③	Amax	g's	35.0			58.2			78.4			94.1			106	
Magnetic Attraction	Fa	kN	0			0			0			0			0	
		lbf	0			0			0			0			0	
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	0.984			0.804			0.629			0.519			0.433	
Max. Allowable Coil Temp. ④	Tmax	°C	130			130			130			130			130	

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.4 IL18 - Performance Data

	Symbol	Units	IL18015				IL18030				IL18050			
Rated Performance														
Peak Force	Fp	N	180				360				600			
		lbf	40				81				135			
Continuous Force @ Tmax ①	Fc	N	62				92.1				131			
		lbf	13.9				20.7				29.4			
Motor Constant @ 25°C	Km	N√W	5.8				9.7				13.8			
Electrical Specifications														
Winding Code ②			**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak Current	Ip	Arms	7.1	14.2	21.3	42.6	7.1	14.3	21.4	42.8	7.0	14.0	21.0	42.1
Continuous Current @ Tmax	Ic	Arms	2.4	4.9	7.3	14.7	1.8	3.6	5.5	11.0	1.5	3.1	4.6	9.2
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	12.7	3.2	1.4	0.4	18.2	4.6	2.0	0.5	25.7	6.4	2.9	0.7
Electrical Inductance ±20%	L	mH L-L	1.50	0.38	0.17	0.04	3.8	0.95	0.42	0.11	9.00	2.25	1.00	0.25
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	20.7	10.3	6.9	3.4	41.2	20.6	13.7	6.9	69.8	34.9	23.3	11.6
		Vpeak/in/sec L-L	0.53	0.26	0.18	0.09	1.05	0.52	0.35	0.17	1.77	0.89	0.59	0.30
Force Constant @ 25°C±10%	Kf	N/Arms	25.3	12.7	8.4	4.2	50.5	25.3	16.8	8.4	85.5	42.8	28.5	14.3
		lbf/Arms	5.7	2.9	1.9	0.9	11.4	5.7	3.8	1.9	19.2	9.6	6.4	3.2
Mechanical Specifications														
Coil Assembly Weight ±15%	Mc	kg	0.46				0.57				0.72			
		lbs	1.0				1.3				1.6			
Magnetic Way Type (MWxxx) L = low profile T = Thinner			**015**		**015T**		**030**		**030L**		**050**		**050L**	
Magnetic Way Weight ±15%	Mw	kg/m	5.1		4.2		9.4		7.3		12.2		10.2	
		lb/in	0.29		0.24		0.51		0.40		0.68		0.56	
Figures of Merit and Additional Data														
Electrical Time Constant	Te	ms	0.12				0.21				0.35			
Max. Theoretical Acceleration ③	Amax	g's	40.2				64.5				84.9			
Magnetic Attraction	Fa	kN	0				0				0			
		lbf	0				0				0			
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	0.656				0.536				0.419			
Max. Allowable Coil Temp. ④	Tmax	°C	130				130				130			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.4.1 IL18 - Performance Data, continued

	Symbol	Units	IL18075				IL18100			
Rated Performance										
Peak Force	Fp	N	900				1200			
		lbf	202				270			
Continuous Force @ Tmax ①	Fc	N	173				211			
		lbf	38.9				47.4			
Motor Constant @ 25°C	Km	N√W	17.7				21.0			
Electrical Specifications										
Winding Code ②			**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak Current	Ip	Arms	7.0	14.0	21.0	42.1	7.0	14.0	21.0	42.1
Continuous Current @ Tmax	Ic	Arms	1.4	2.7	4.0	8.1	1.2	2.5	3.7	7.4
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	35.0	8.8	3.9	1.0	44.2	11.1	4.9	1.2
Electrical Inductance ±20%	L	mH L-L	15.0	3.75	1.67	0.42	21.0	5.25	2.33	0.58
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	105	52.4	34.9	17.5	140	69.9	46.6	23.3
		Vpeak/in/sec L-L	2.66	1.33	0.89	0.44	3.55	1.77	1.18	0.59
Force Constant @ 25°C±10%	Kf	N/Arms	128	64.2	42.8	21.4	171	85.6	57.0	28.5
		lbf/Arms	28.8	14.4	9.6	4.8	38.5	19.2	12.8	6.4
Mechanical Specifications										
Coil Assembly Weight ±15%	Mc	kg	0.91				1.10			
		lbs	2.0				2.4			
Magnetic Way Type (MWxxx)			**075**				**100**			
Magnetic Way Weight ±15%	Mw	kg/m	18.9				27.3			
		lb/in	1.05				1.51			
Figures of Merit and Additional Data										
Electrical Time Constant	Te	ms	0.43				0.48			
Max. Theoretical Acceleration ③	Amax	g's	101				111			
Magnetic Attraction	Fa	kN	0				0			
		lbf	0				0			
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	0.35				0.29			
Max. Allowable Coil Temp. ④	Tmax	°C	130				130			

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.5 IL24 - Performance Data

	Symbol	Units	IL24015			IL24030			IL24050		
Rated Performance											
Peak Force	Fp	N	240			480			800		
		lbf	54			108			180		
Continuous Force @ Tmax ①	Fc	N	83			109			155		
		lbf	18.7			24.5			34.8		
Motor Constant @ 25°C	Km	N√W	6.7			11.2			15.9		
Electrical Specifications											
Winding Code ②			A1	A2	A3	A1	A2	A3	A1	A2	A3
Peak Current	Ip	Arms	7.1	14.2	28.4	7.1	14.2	28.5	7.0	14.0	28.1
Continuous Current @ Tmax	Ic	Arms	2.4	4.9	9.8	1.6	3.2	6.4	1.4	2.7	5.4
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	16.9	4.20	1.10	24.3	6.1	1.5	34.3	8.6	2.1
Electrical Inductance ±20%	L	mH L-L	2.00	0.50	0.13	5.1	1.28	0.32	12.0	3.00	0.75
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	27.5	13.8	6.9	55.0	27.5	13.8	93.1	46.5	23.3
		Vpeak/in/sec L-L	0.70	0.35	0.18	1.40	0.70	0.35	2.36	1.18	0.59
Force Constant @ 25°C ±10%	Kf	N/Arms	33.7	16.9	8.4	67.4	33.7	16.9	114	57.0	28.5
		lbf/Arms	7.6	3.8	1.9	15.2	7.6	3.8	25.6	12.8	6.4
Mechanical Specifications											
Coil Assembly Weight ±15%	Mc	kg	0.57			0.72			0.92		
		lbs	1.3			1.6			2.0		
Magnetic Way Type (MWxxx) L = low profile T = Thinner			015	015T		030	030L		050	050L	
Magnetic Way Weight ±15%	Mw	kg/m	5.1	4.2		9.4	7.3		12.2	10.2	
		lb/in	0.29	0.24		0.51	0.40		0.68	0.56	
Figures of Merit and Additional Data											
Electrical Time Constant	Te	ms	0.12			0.21			0.35		
Max. Theoretical Acceleration ③	Amax	g's	42.9			68.0			88.7		
Magnetic Attraction	Fa	kN	0			0			0		
		lbf	0			0			0		
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	0.49			0.40			0.32		
Max. Allowable Coil Temp. ④	Tmax	°C	130			130			130		

Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.2.5.1 IL24 - Performance Data, continued

	Symbol	Units	IL24075				IL24100			
Rated Performance										
Peak Force	Fp	N	1200				1600			
		lbf	270				360			
Continuous Force @ Tmax ①	Fc	N	211				262			
		lbf	47.4				58.9			
Motor Constant @ 25°C	Km	N√W	20.6				24.4			
Electrical Specifications										
Winding Code ②			**A1**	**A2**	**A3**	**A4**	**A1**	**A2**	**A3**	**A4**
Peak Current	Ip	Arms	7.0	14.0	28.0	56.1	7.0	14.0	28.1	56.1
Continuous Current @ Tmax	Ic	Arms	1.2	2.5	4.9	9.9	1.2	2.3	4.6	9.2
Electrical Resistance @ 25°C±10%	Rm	Ohms L-L	46.6	11.7	2.9	0.73	58.9	14.7	3.7	0.92
Electrical Inductance ±20%	L	mH L-L	20.0	5.0	1.25	0.31	28.0	7.00	1.75	0.44
Back EMF Constant @ 25°C±10%	Ke	Vpeak/m/s L-L	140.	69.9	34.9	17.5	186	93.1	46.6	23.3
		Vpeak/in/sec L-L	3.55	1.77	0.89	0.44	4.73	2.37	1.18	0.59
Force Constant @ 25°C ±10%	Kf	N/Arms	171	85.6	42.8	21.4	228	114	57.0	28.5
		lbf/Arms	38.5	19.2	9.6	4.8	51.3	25.6	12.8	6.4
Mechanical Specifications										
Coil Assembly Weight ±15%	Mc	kg	1.17				1.42			
		lbs	2.6				3.1			
Magnetic Way Type (MWxxx)			**075**				**100**			
Magnetic Way Weight ±15%	Mw	kg/m	18.9				27.3			
		lb/in	1.05				1.51			
Figures of Merit and Additional Data										
Electrical Time Constant	Te	ms	0.43				0.48			
Max. Theoretical Acceleration ③	Amax	g's	105				115			
Magnetic Attraction	Fa	kN	0				0			
		lbf	0				0			
Thermal Resistance ④ (Coils to External Structure)	Rth	°C/Watt	0.26				0.22			
Max. Allowable Coil Temp. ④	Tmax	°C	130				130			

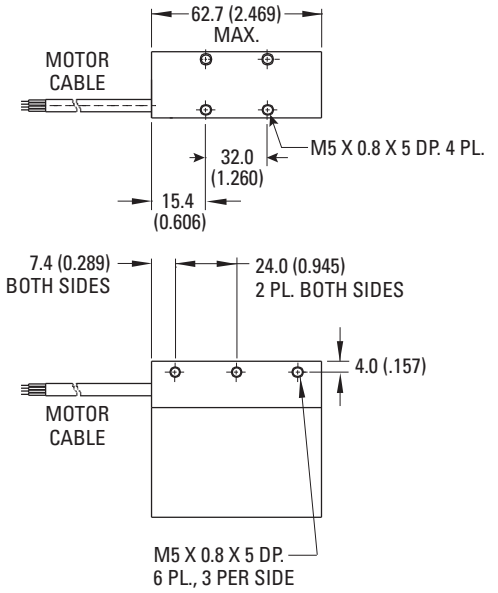
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak force and the motor mass alone. Limitations due to such factors as the additional mass of the load, the bearing type and design, the shock rating of the feedback, and the peak current available from the amplifier etc., must be considered to determine the achievable acceleration in each application.
④ Please see the application sizing section for more details on sizing and thermal considerations.

10.3 IL Ironless - Dimensional Drawings

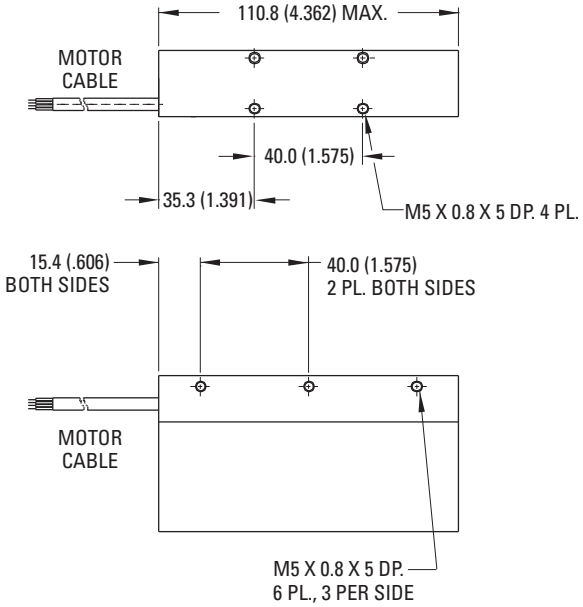
IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at Kollmorgen Design Tools - 3D Models.

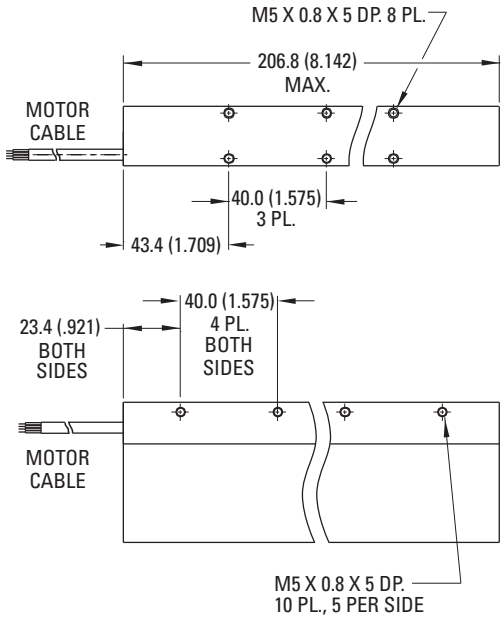
IL03 Dimensions



IL06 Dimensions



IL12 Dimensions

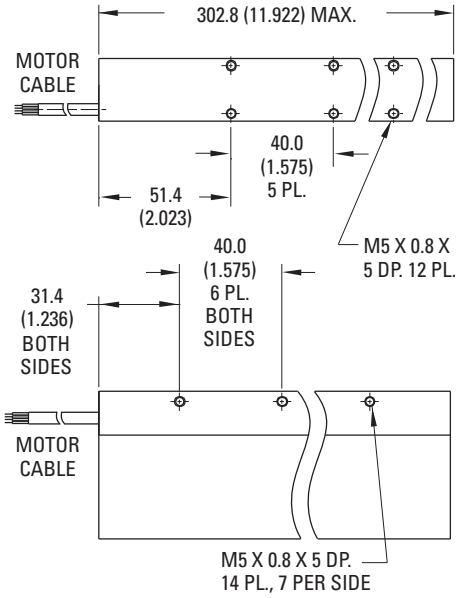


Continued on next page

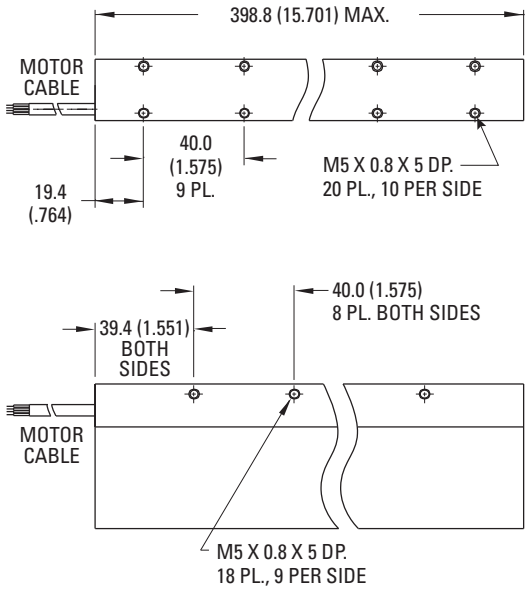
Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

10.3.1 IL Ironless - Dimensional Drawings, continued

IL18 Dimensions



IL24 Dimensions



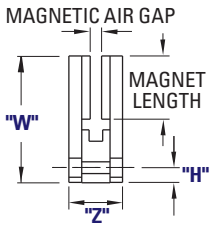
Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

10.4 MW Magnet Way - Dimensional Drawings and Data

IMPORTANT

- All drawings are in principle (not scaled).
- 3D Models are available at Kollmorgen Design Tools - 3D Models.

Magnet Way MWxxx-0xxx Standard Dimensions

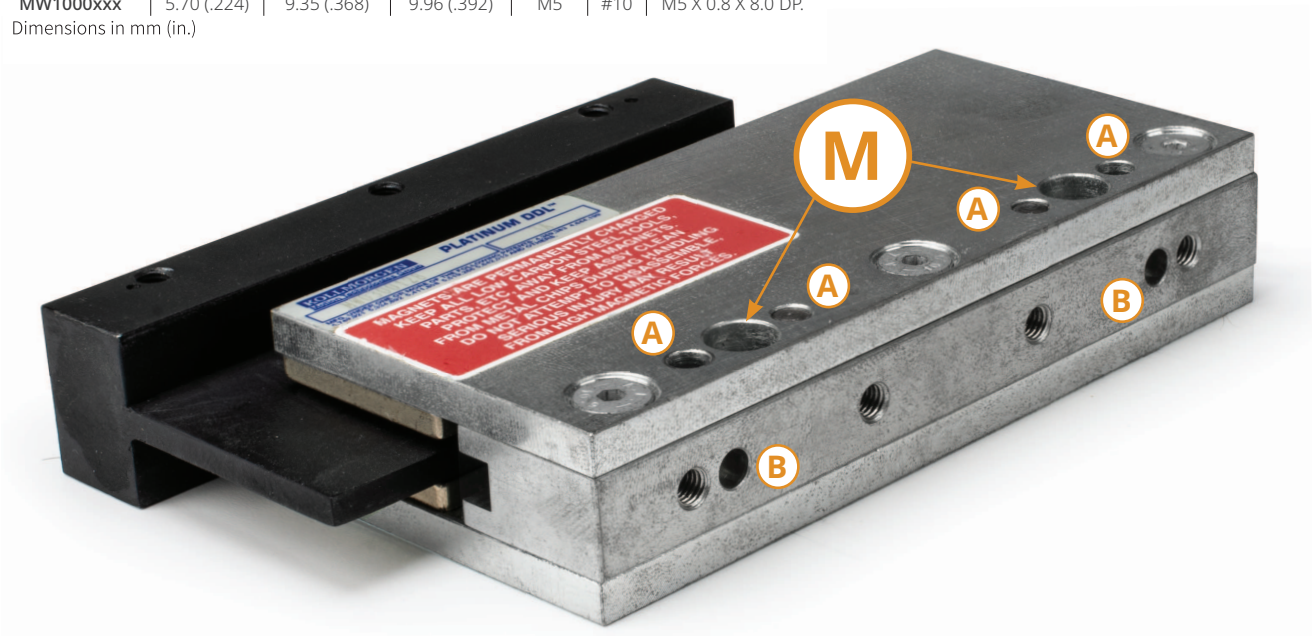


Magnet Way	Magnet Size Reference	"H" ±.8 (.003)	"W" ±.4 (.016)	"Z" ±.4 (.016)
MW0150xxx	15 mm	5.69 (.224)	33.80 (1.331)	25.40 (1.000)
MW015T0xxx	15 mm	5.69 (.224)	33.80 (1.331)	21.8 (0.858)
MW0300xxx	30 mm	7.11 (.280)	60.20 (2.370)	25.40 (1.000)
MW030L0xxx	30 mm	5.69 (.224)	49.00 (1.929)	25.40 (1.000)
MW0500xxx	50 mm	7.11 (.280)	80.20 (3.158)	25.40 (1.000)
MW050L0xxx	50 mm	5.69 (.224)	69.00 (2.716)	25.40 (1.000)
MW0750xxx	75 mm	8.23 (.324)	105.20 (4.142)	30.00 (1.181)
MW1000xxx	100 mm	8.23 (.324)	130.20 (5.126)	34.00 (1.339)

"M" Dimensional Specifications

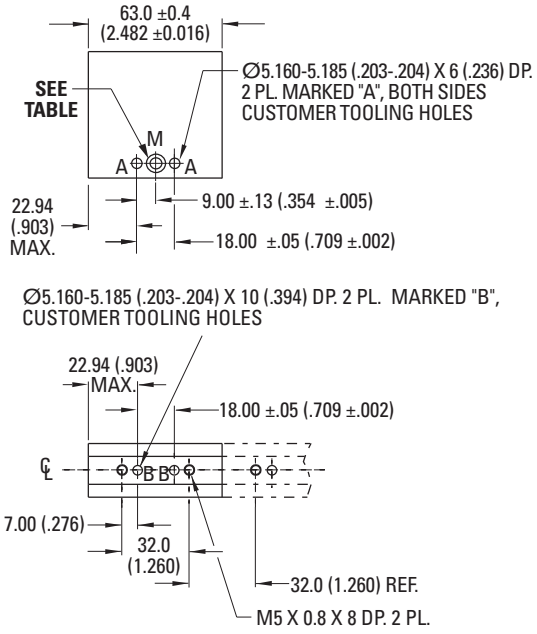
Magnet Way	Hardware (Hex, Socket Head Cap)					
	Hole Dia. ±.13 (.005)	C'bore Dia. ±.13 (.005)	C'bore Depth ±.13 (.005)	Metric	Inch	Bottom Mount Thread Option
MW0150xxx	4.70 (.185)	7.80 (.307)	4.00 (.158)	M4	#8	M4 X 0.7 X 6.0 DP.
MW015T0xxx	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW0300xxx	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW030L0xxx	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW0500xxx	5.70 (.224)	9.35 (.368)	5.79 (.228)	M5	#10	M5 X 0.8 X 8.0 DP.
MW050L0xxx	4.70 (.185)	7.80 (.307)	5.79 (.228)	M4	#8	M4 X 0.7 X 6.0 DP.
MW0750xxx	5.70 (.224)	9.35 (.368)	7.95 (.313)	M5	#10	M5 X 0.8 X 8.0 DP.
MW1000xxx	5.70 (.224)	9.35 (.368)	9.96 (.392)	M5	#10	M5 X 0.8 X 8.0 DP.

Dimensions in mm (in.)

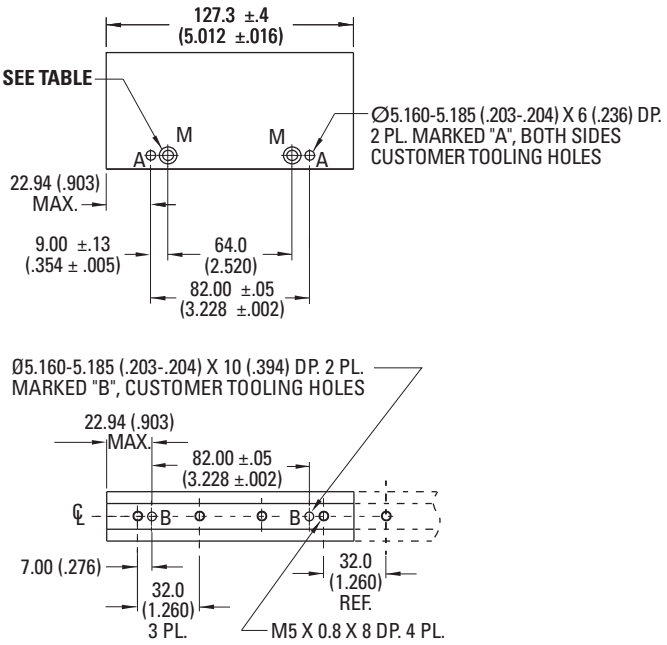


10.4.1 MW Magnet Way - Dimensional Drawings and Data, continued

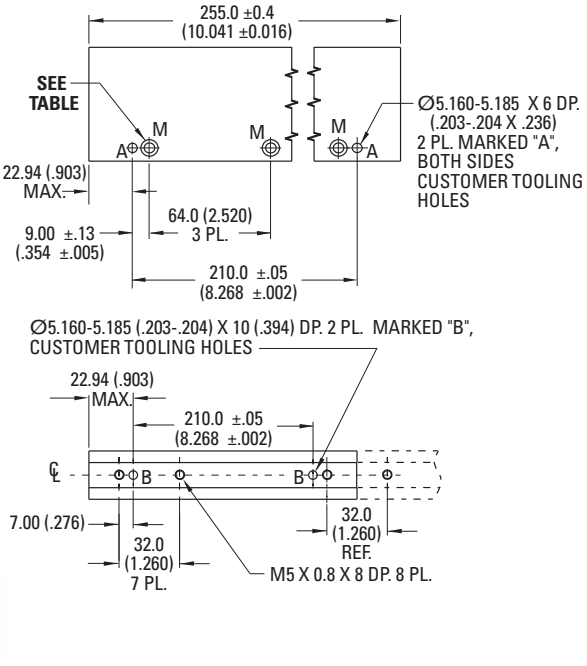
MWxxx-0064 Dimensional Data



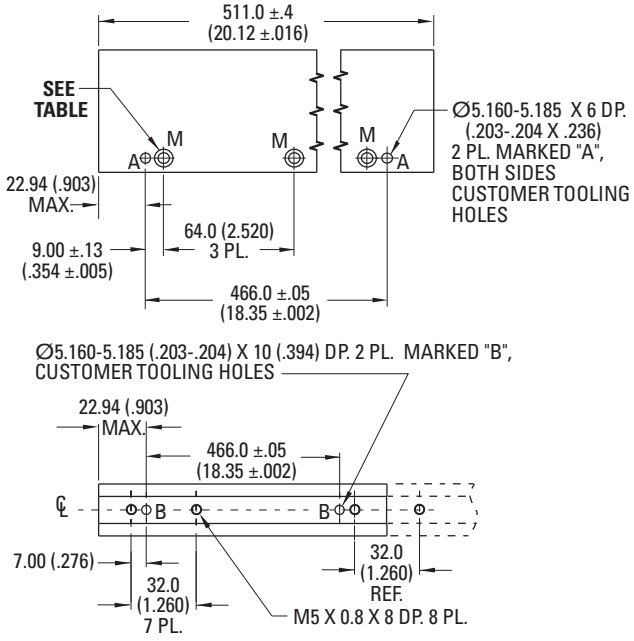
MWxxx-0128 Dimensional Data



MWxxx-0256 Dimensional Data



MWxxx-0512 Dimensional Data



11 Thermal Sensor Protective Devices

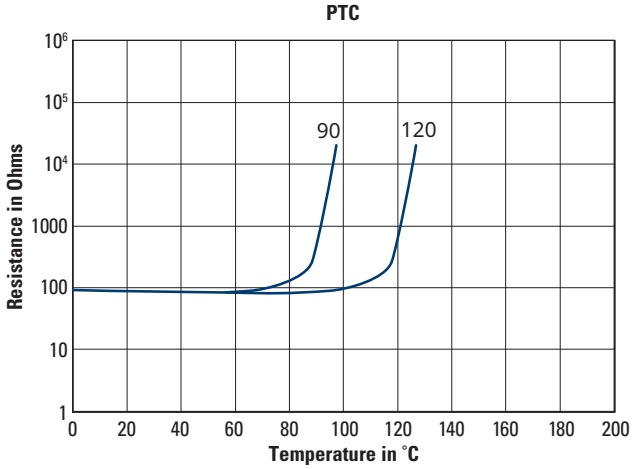
The standard version of each motor is fitted with a choice of an electrically isolated PTC Avalanche-Type thermal sensor, a PT1000 RTD Linear thermal sensor, or a thermostat. The thermal sensors do not provide any protection against short, heavy overloading.

The sensor is integrated into the monitoring system of the digital servo amplifiers with correct connection.

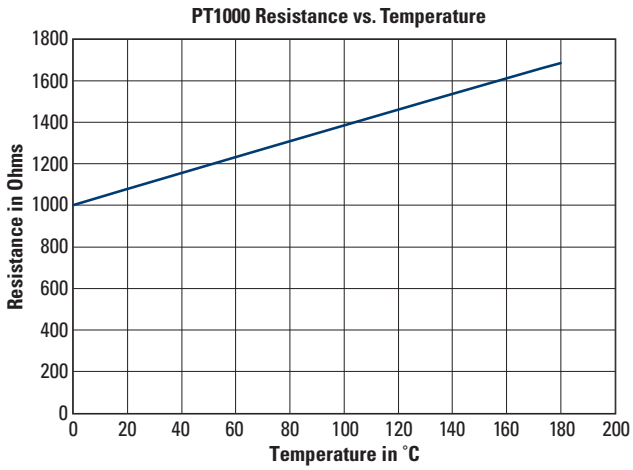
Thermal Device Options: Resistance vs. Temperature Graphs

Kollmorgen AKD drives can directly interpret information from the motor thermal sensors to properly reflect the motor winding temperature. For other drives please refer to the graph Delta Between Motor Winding and Thermal Device on the following page.

Option TR



Option T1



Note: PTC thermistor (155°C ± 5°C switching temperature) installed.

Resistance at 25°C: ≤ 550 ohms.

Switching Resistance: ≥ 1330 ohms within ±5°C of switch temperature.

12 Approvals

Certificates are on the DDL product page of the Kollmorgen website.

12.1 Conformance with UL

Motor uses UL certified insulation system class F UL File E136406.

12.2 Conformance with CE

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 will be 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

The EU Declaration of Conformity are on the DDL product page of the Kollmorgen website.

Kollmorgen declares the conformity of the product series Direct Drive Linear with these directives:

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

12.3 Conformance with RoHS

DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 8 JUNE 2011 ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT, INCLUDING COMMISSION DELEGATED DIRECTIVE (EU) 2015/863.

Products: All standard DDL models. This covers all models who numbers start with (IC, ICD, or IL), and followed by (03, 06, 12, 18, 24, 05, 10, 11, 22, 33, or 44), followed by (015, 030, 050, 075, 100, 150, 200, or 250), followed by (A1, A2, A3, A4, A5, A6, A7, A8, or AS), followed by (AC or a blank), followed by (TS, TR, or T1), followed by (C1, C2, C3, C4, CS, or P1, P2, P3, P4, PS), followed by optional dash and three-digit alphanumeric code.

The declaration may be viewed/downloaded here: Kollmorgen Support Network.

12.4 Conformance with REACH

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL as of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals [REACH Regulations]

Information based on REACH Art. 33 (1) regarding Substances of Very High Concern [SVHC] as referenced by Candidate List last amended on 14, June 2023.

Products: All standard DDL models. This covers all models who numbers start with (IL, ICD, or IC), and followed by (03, 06, 12, 18, 24, 05, 10, 11, 22, 33, or 44), followed by (015, 030, 050, 075, 100, 150, 200 or 250), followed by (A1, A2, A3, A4, A5, A6, A7, A8, or AS), followed by (AC or a blank), followed by (TS, TR, or T1), followed by (C1, C2, C3, C4, CS, or P1, P2, P3, P4, PS), followed by optional dash and three-digit alphanumeric code.

The declaration may be viewed/downloaded here: Kollmorgen Support Network.

12.5 CE Mark Conformance

Servo drives are components that are intended to be incorporated into electrical plant and machines for industrial use. When the servo drives are built into machines or plants, drives cannot be operated until the machine or plant fulfills the requirements of the Machinery Regulation (EU) 2023/1230 and the EC Directive on EMC (2014/30/EU). EN 60204 and EN 292 must also be observed.

In connection with the Low Voltage Directive 2014/35/EU, the harmonized standards of the EN 50178 series are applied to the amplifiers, together with EN 60146, EN 60204, and EN 60439-1.

The manufacturer of the machine or plant is responsible for ensuring that they meet the limits required by the EMC regulations. Advice on the correct installation for EMC - such as shielding, grounding, arrangement of filters, treatment of connectors and the laying out of cabling - can be found within this documentation.

Conformance with the EC Directive on EMC 2014/30/EU and the Low Voltage Directive 2014/35/EU is mandatory for the supply of servo drives within the European Community.

An authorized testing laboratory in a defined configuration with the system components has tested the servo drives. Any divergence from the configuration and installation described in this documentation means that you are responsible for the performance of new measurements to ensure that the regulatory requirements are met.

NOTE

- Installation of the equipment is critical in designing for system and machine electromagnetic compatibility (EMC).
- You must apply the installation recommendations and the CE filtering Practices when mounting and installing the drive system for CE conformance.

12.6 European Directives and Standards for the Machine Builder

The AKD and AKD2G product series are UL recognized components under file E136406 and have been evaluated to UL/cUL 61800-5-1.

This standard describes the fulfillment by design of minimum requirements for electrically operated power conversion equipment, such as frequency converters and servo amplifiers, which is intended to eliminate the risk of fire, electric shock, or injury to persons, being caused by such equipment.

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

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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