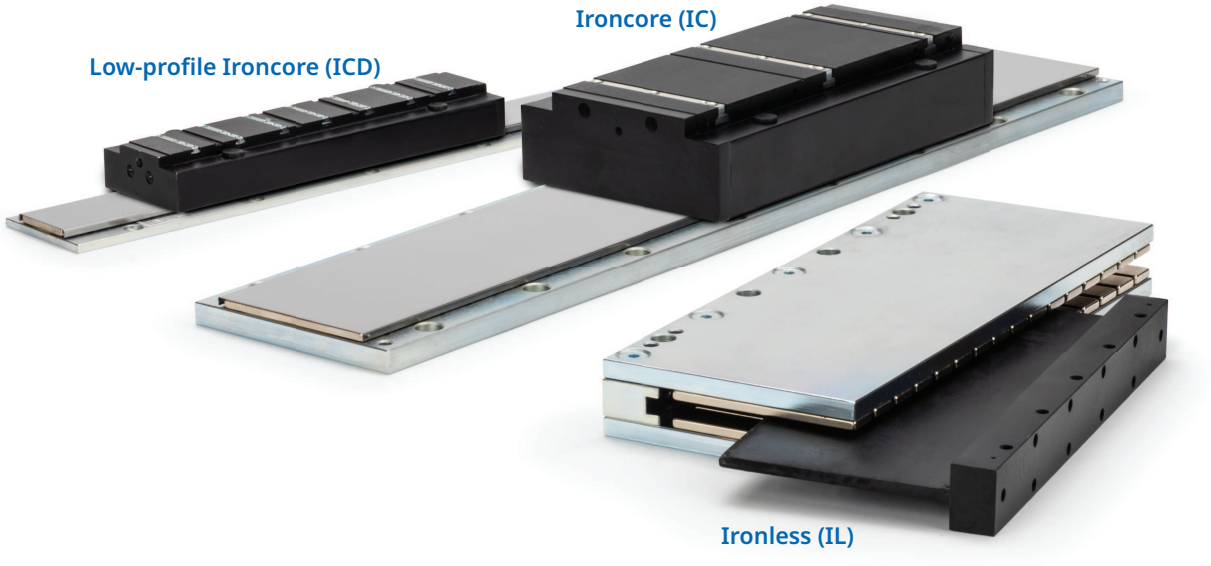
# DDL

## 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: G, June 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 overhaul, 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. |
| G | June 2025 | Updated images and approval/certification text. |

# 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 useful information. |
| IMPORTANT | Indicates specific information that could impact results. |
|  | Warning of a danger (general).<br>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

NOTE

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

# 2 Part Number Scheme

This section provides the nomenclatures for the:



## 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

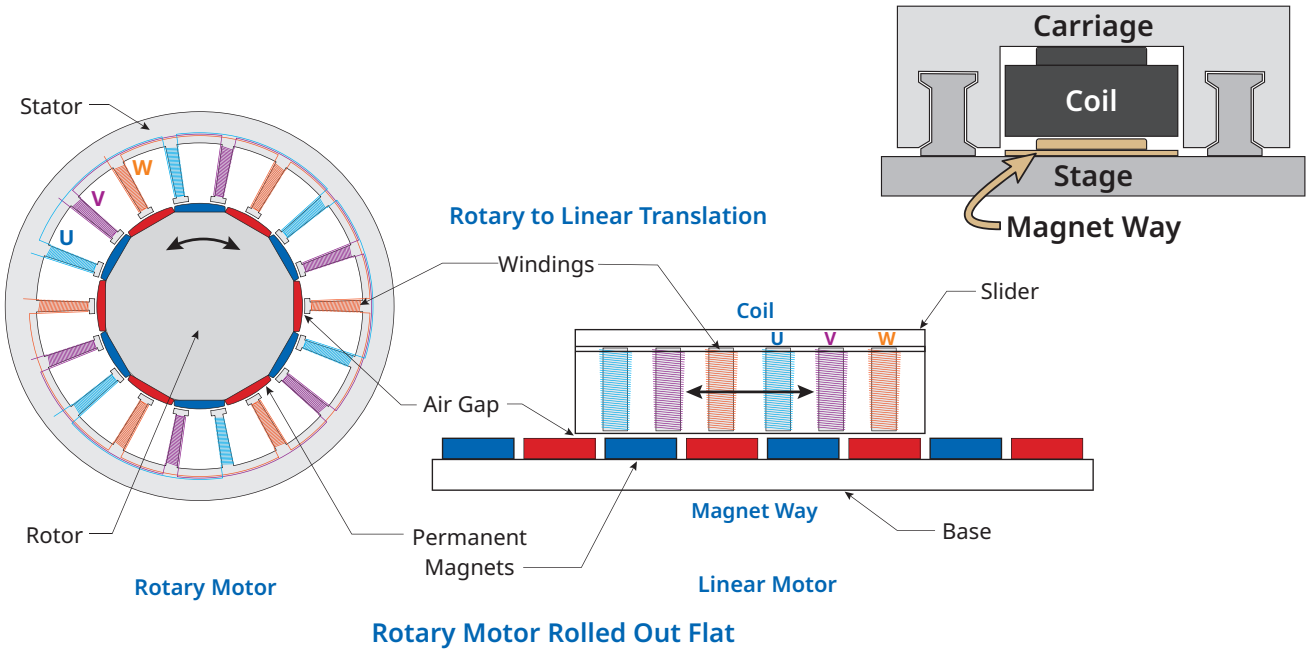



**Figure 6-1:** Example for Definitions

| Term | Definition |
|---|---|
| Carriage | The carriage is the moving portion of the direct drive linear system in the machine builder's design.<br>• A typical carriage assembly provides mounting locations for the motor coil, linear ball bearings, an encoder readhead, a cable track, and any other sensors or equipment specific to the process that the machine is being designed for.<br>• 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.<br>• The coil causes motion by creating a moving magnetic field according to the current supplied by the drive.<br>• 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.<br>• It is best suited for applications requiring high acceleration of large masses or maintaining stiffness during machining or process forces.<br>• Due to the steel laminations, Ironcore motors have high magnetic attractive forces ranging from over 300 pounds up to many tons.<br>• 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.<br>• It is best suited for applications that require very high positional accuracy or precise constant velocity movement.<br>• Ironless motors offer the advantages of light mass, zero cogging force, and absolutely no magnetic attraction. |

| Term | Definition |
|---|---|
| Magnet Way / Magnet Plate | The magnet way is the portion of the frameless direct drive linear motor containing the permanent magnets.<br>• The magnet way creates a stationary magnetic field that interacts with the moving field created by the coil.<br>• Typically, the magnet ways are fixed in position and the motor coil moves along them.<br>• The magnet ways are equivalent to the rotor in a typical permanent magnet brushless rotary motor.<br>**WARNING**<br>  <br>• 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.<br>• **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.<br>• 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.<br>• 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 900$V_{DC}$. 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 60$V_{DC}$.

**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. 31).
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)


- 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.

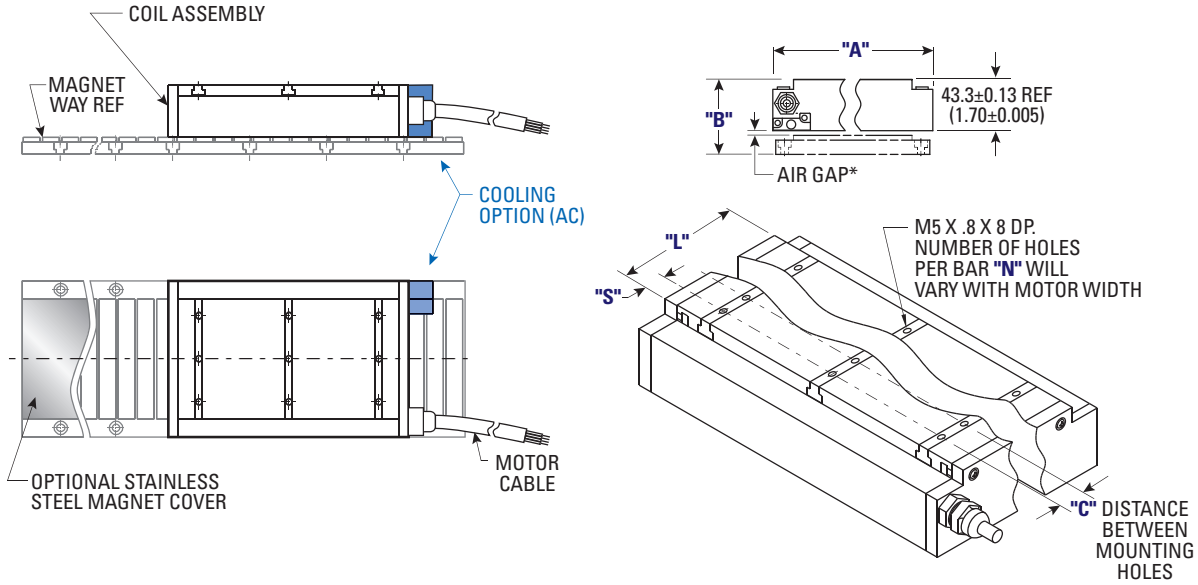
### 6.1.1 Ironcore - Typical Installation Specifications

**⚠ 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.

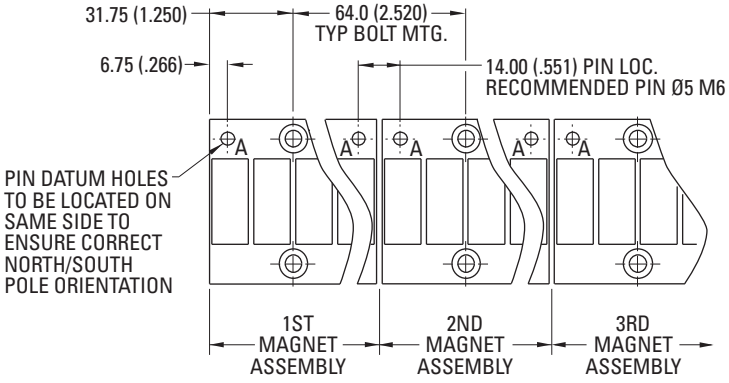


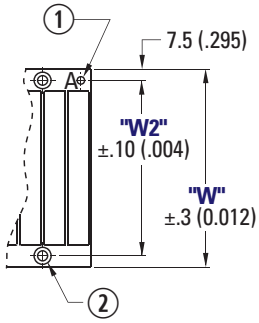

**Figure 8-1:** Mount Multiple Assemblies

### 6.1.2.2 MCxxx Magnetic Way Typical Dimension Data

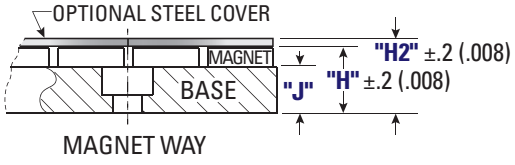
**MCxxx Magnetic Way Typical Dimensions**

| 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

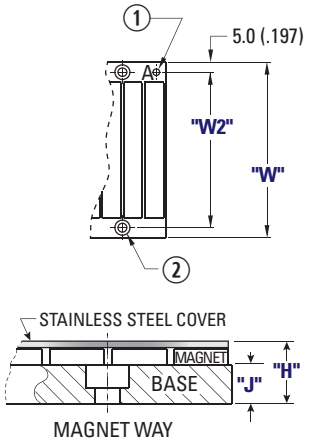
#### MCDxxx Magnet Way Typical Dimensional Data

| 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**

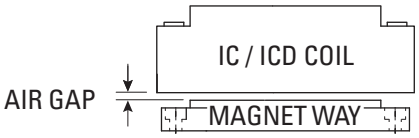
1. Lightly stone and thoroughly clean the mounting surfaces on the stage for both the coil assembly and magnet plates.
2. Use the M5 screws to securely mount the coil assembly to the carriage.
   See "Ironcore Multiple Magnet - Installation Diagram" (→ p. 21).
3. Push the carriage to one end of travel 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.

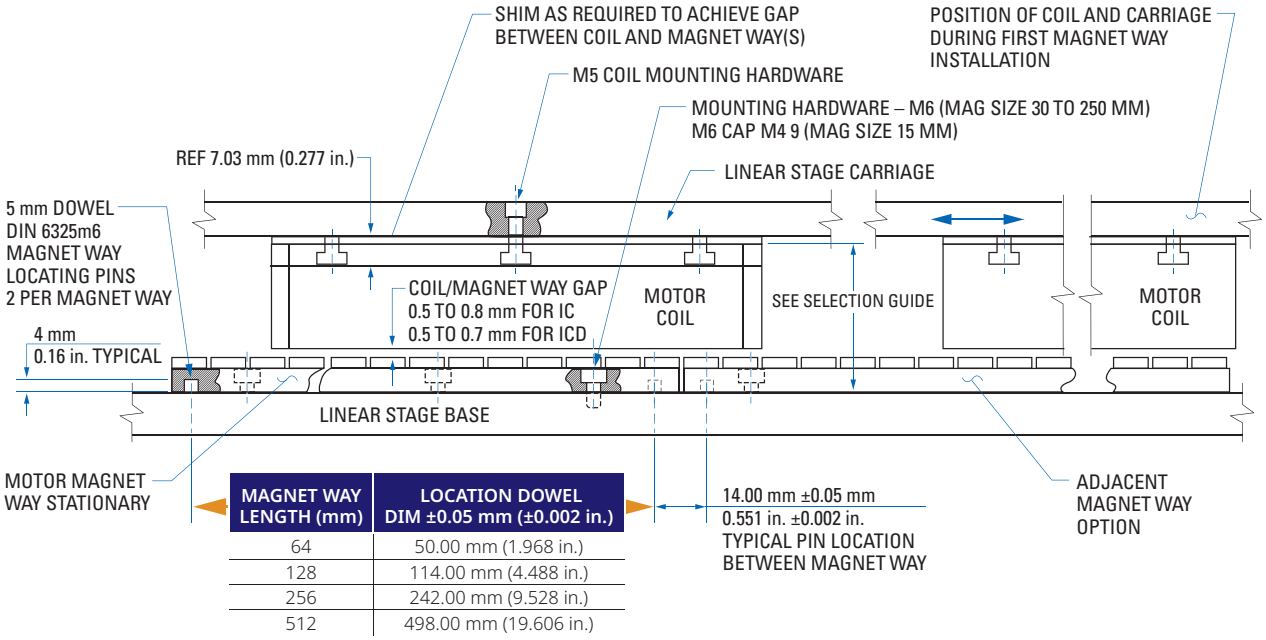
**⚠CAUTION**

- 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.) |

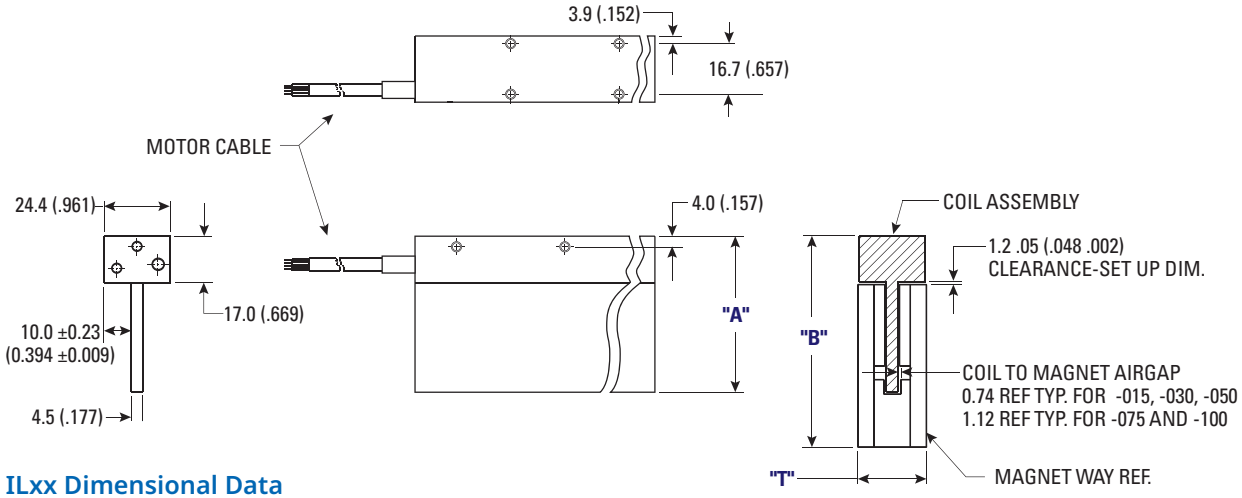
## 6.2 Ironless Linear Motor

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



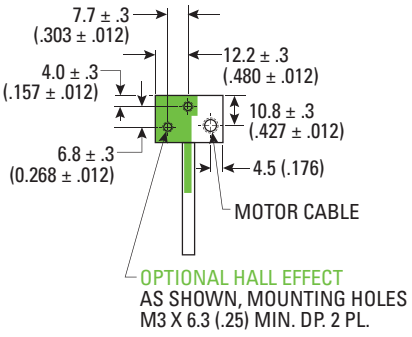

#### ILxx Dimensional Data

| 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)


**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

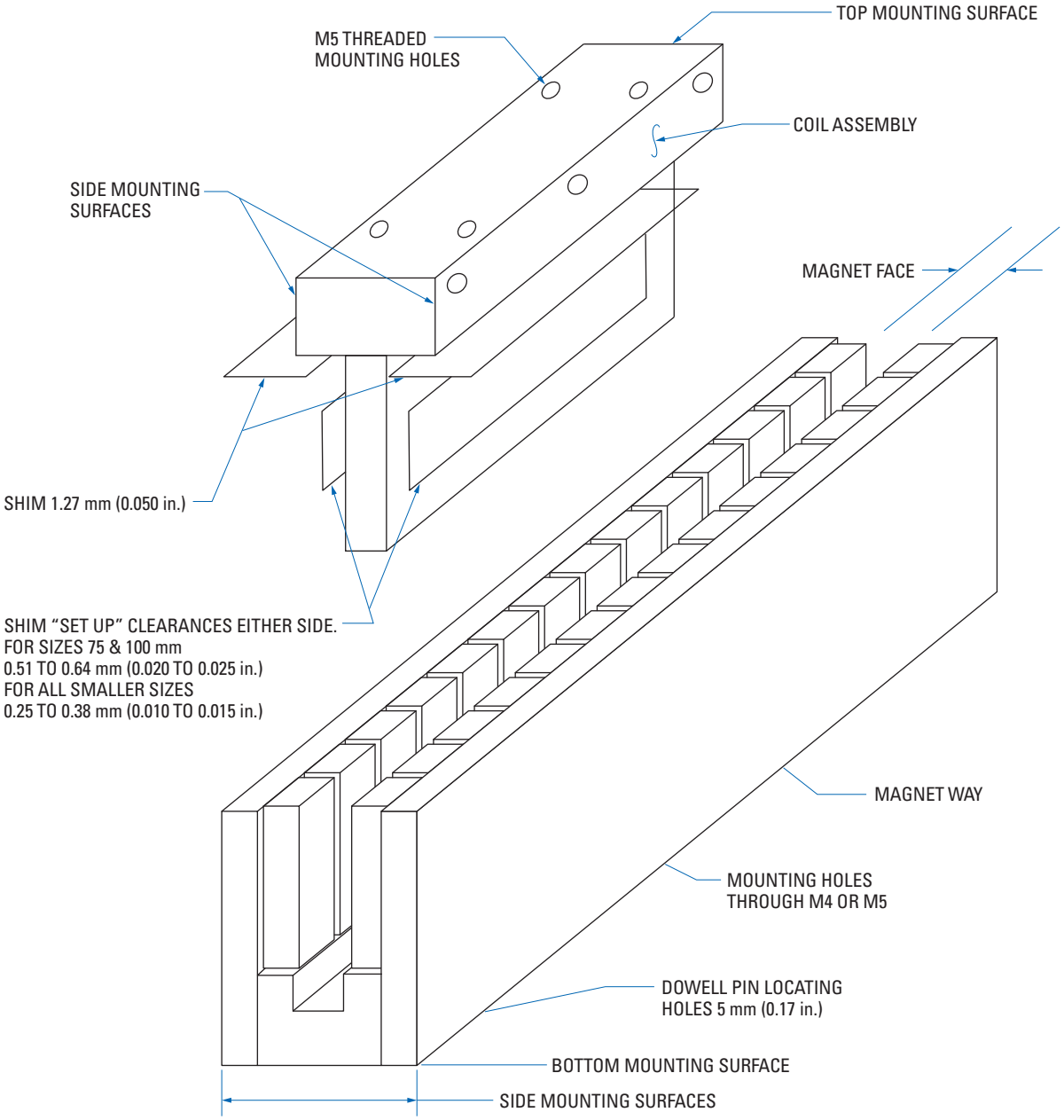



**Figure 9-1:** Ironless Linear Motor Installation Diagram

### 6.2.3.2 Ironless Typical Bottom Mounting Installation Diagram

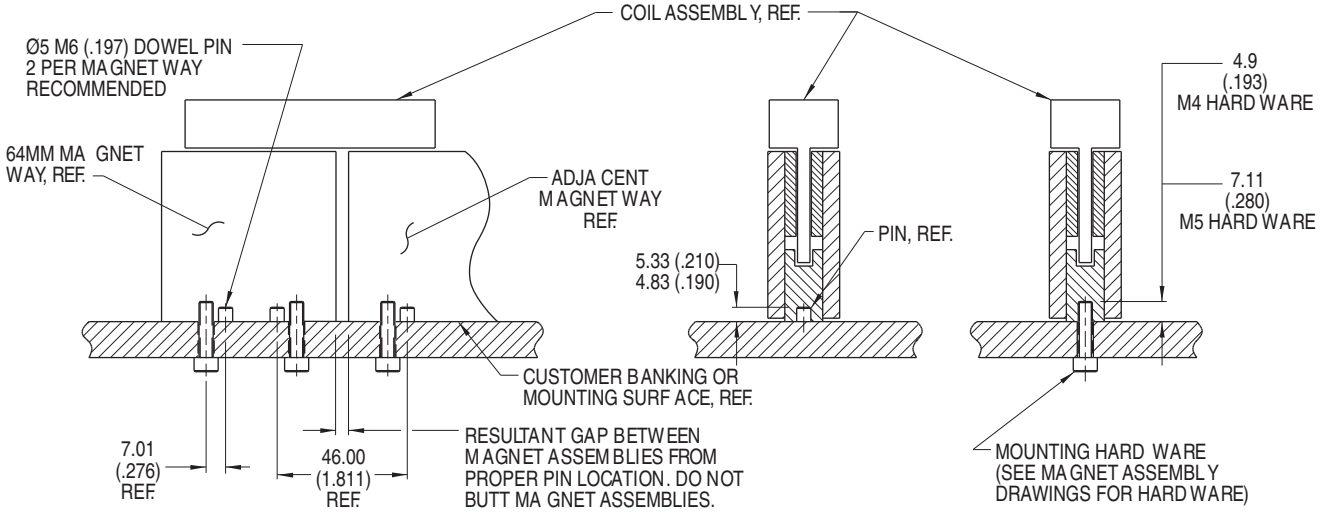



**Figure 9-2:** Typical Bottom Mounting Installation Diagram

### 6.2.3.3 Ironless Typical Side Mounting Installation Diagram

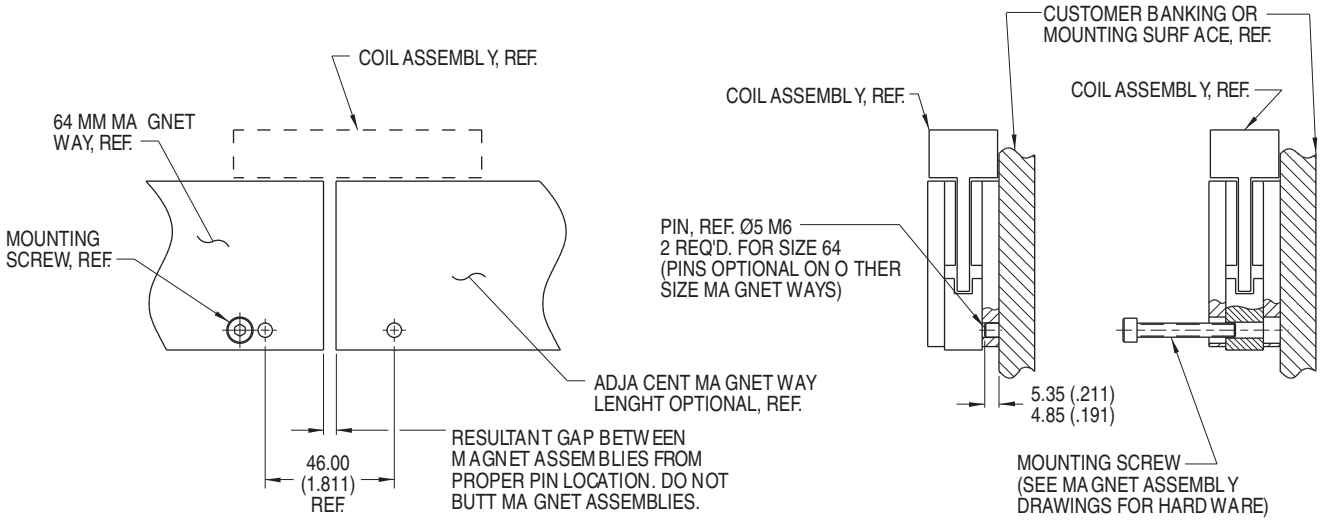



**Figure 9-3:** Typical Side Mounting Installation Diagram

# 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 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. 31).

#### 7.2.0.1 Cable Connection

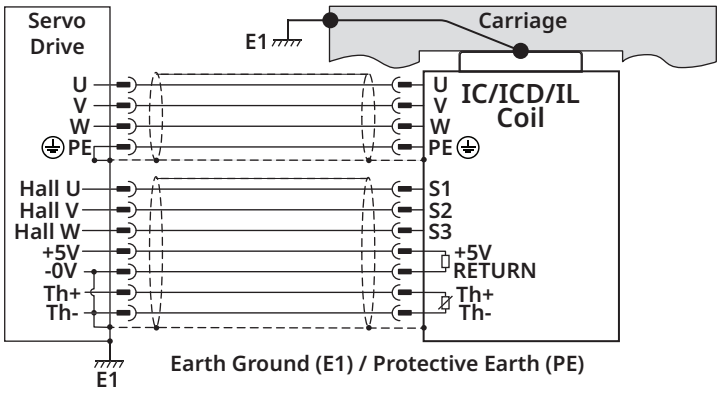
- Route power cables as separately as possible from control cables.
- Connect the feedback device.
- Connect the motor cables.
- Install motor chokes (if applicable) close to the drive.

#### 7.2.0.2 Cable Material Requirements - Capacity

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

## 7.3 Protective Ground (PE) and 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.




**NOTE**

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

**NOTE**

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

## 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.

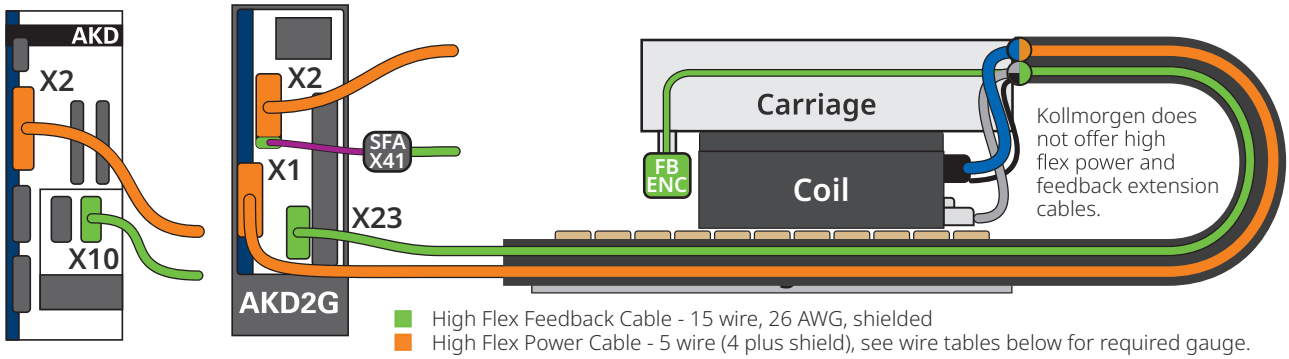
- Kollmorgen AKD Documentation
- Kollmorgen AKD2G Documentation

**⚠ 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**

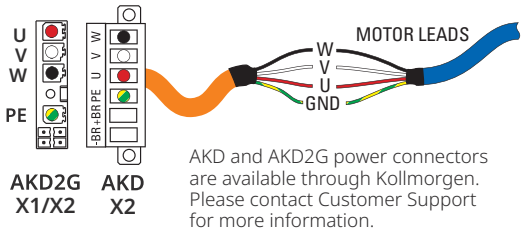
The Smart Feedback Adapter (SFA) X41 port accepts the same HD15 male cable connector as the AKD X10 and AKD2G X23 ports.

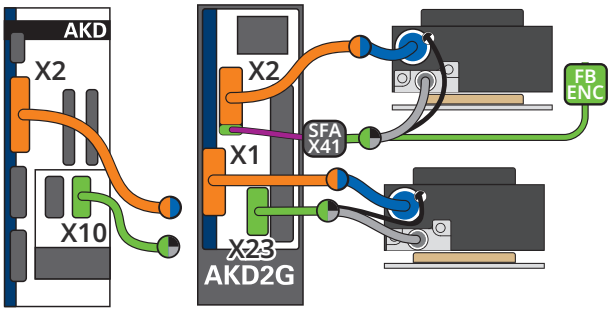
## 7.5.2 DDL to AKD2G / AKD Pinout Configurations

**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.

### DDL to AKD2G / AKD Power Connection

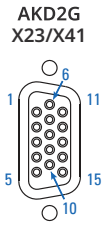



### DDL to AKD2G / AKD Hall, Thermal Device, and Feedback Connections

#### AKD/AKD2G Connector Pinouts to DDL Optional Hall Leads

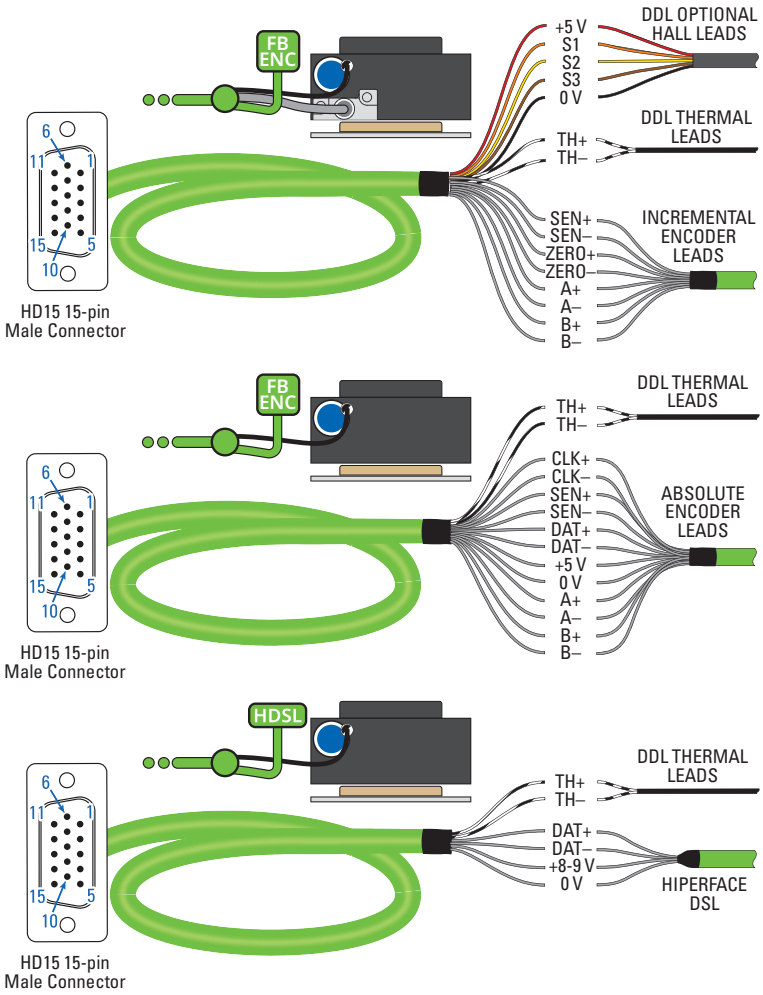
| X23/X41 X10 Pin | X23/X41 X10 Pin Label | DDL HALL + TH Leads |
|---|---|---|
| 1 | Hall U | S1 |
| 2 | Hall V | S2 |
| 3 | Hall W | S3 |
| 8 | TH+ | TH+ |
| 9 | TH- | TH- |
| 10 | +5 V | +5 V |
| 11 | 0 V | Return |




#### 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



## 7.6 Encoder Sensor and Scale Setup

**⚠ CAUTION**

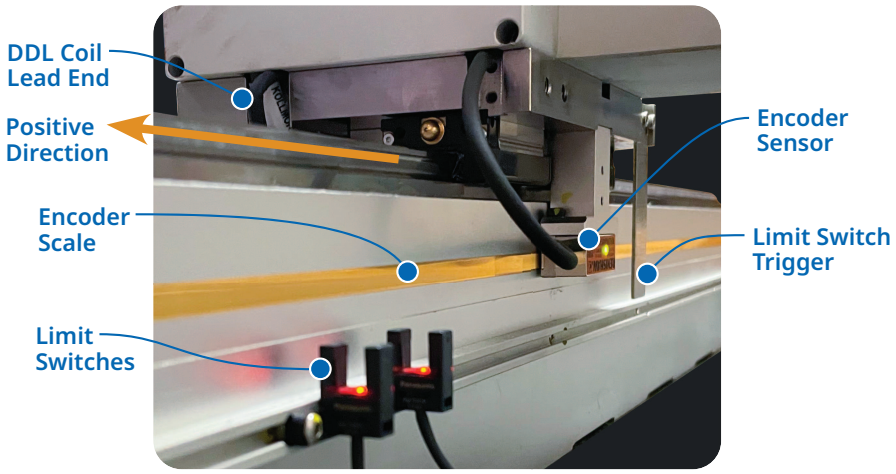
- Verify the encoder counts positive in the positive direction!
- The positive direction is the direction the motor coil's lead-exit end points to.

**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. 31). 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.

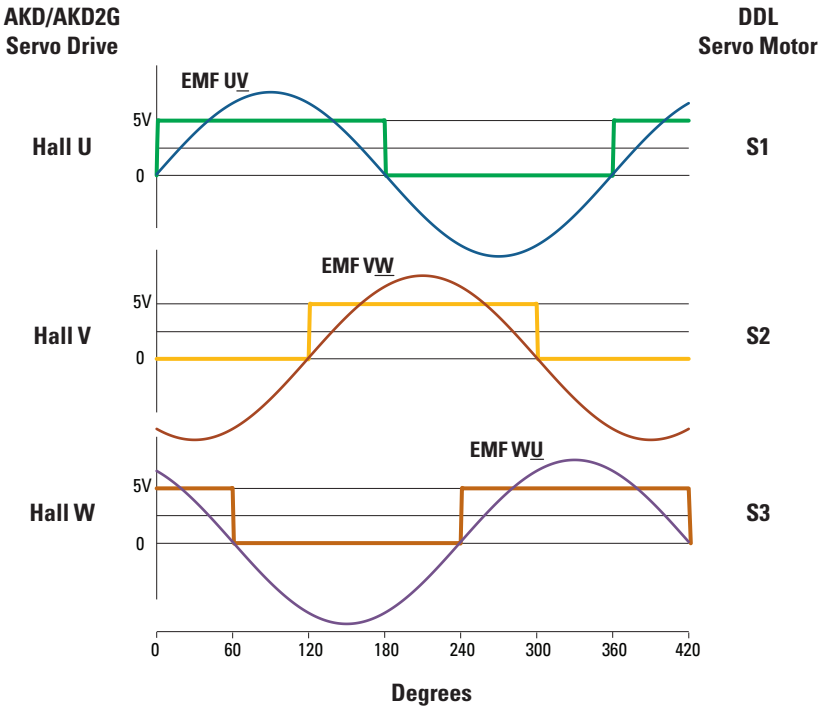
### 7.7.2 Verify BEMF Voltage and Hall Sensor Alignment

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.

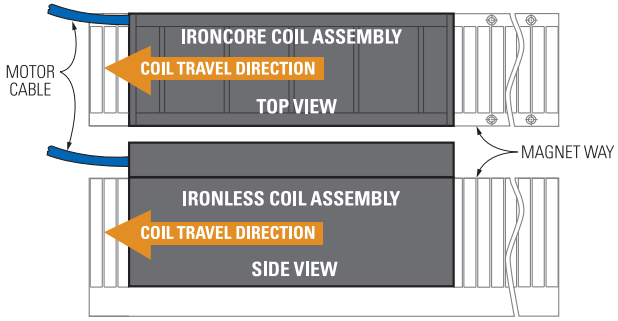
- These waveforms represent the BEMF voltage of motor phases UV and VW.
- Notice that phase UV (channel 1) leads phase VW (channel 2) by 120°.
- This agrees with the waveforms in the "Hall Phase Diagram" (➔ p. 35).
  - By monitoring the Hall effect signals, you can find a pair of motor phases aligned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

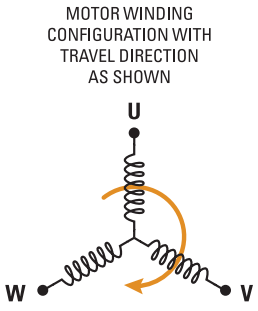
## 7.7.3 Hall Phase Diagram

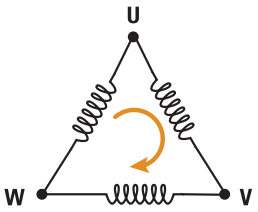



Positive Direction
Motor Phase Sequence:
EMF UV – U leads V by 120°
EMF VW – V leads W by 120°
EMF WU – W leads U by 120°

## 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. 93).
- 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!

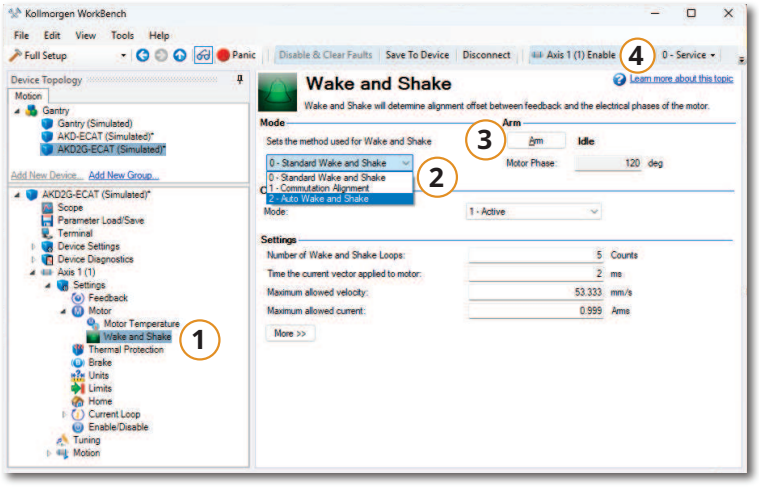
### 7.8.1 Wake and Shake Routine

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

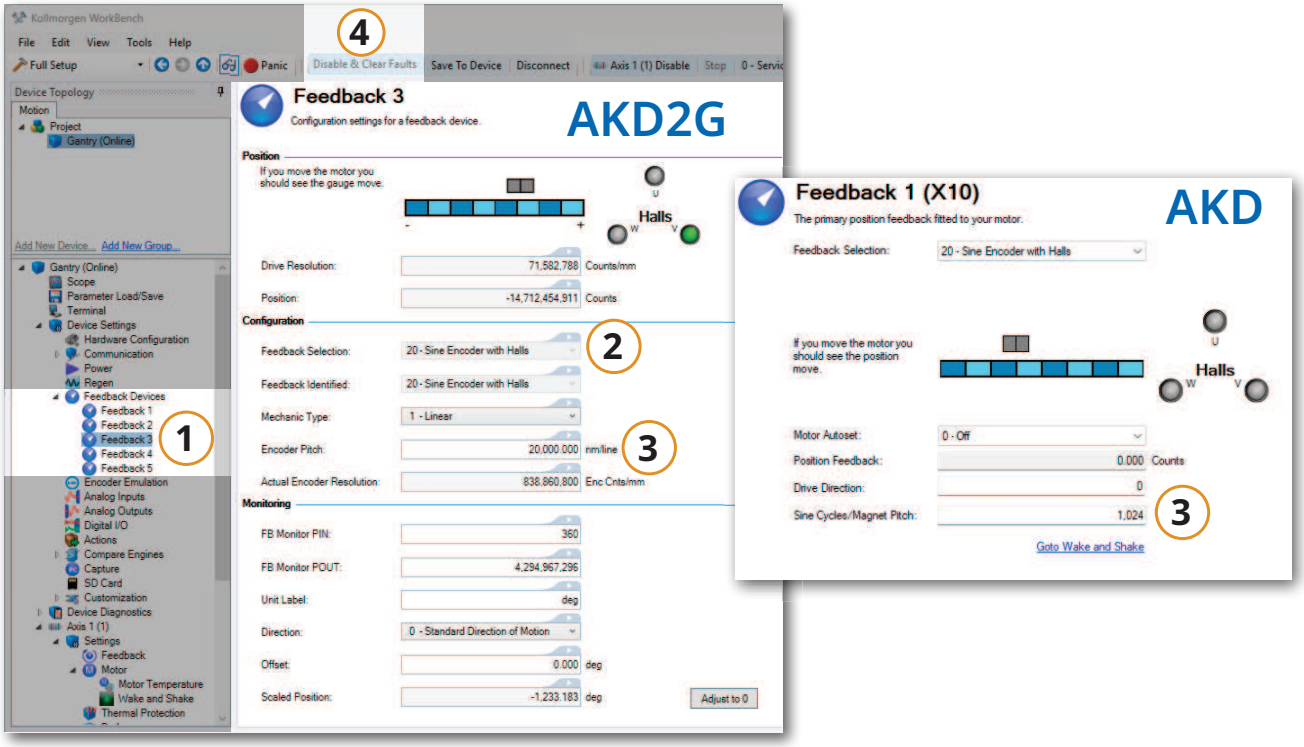



**Figure 10-1:** DDL Feedback window

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.

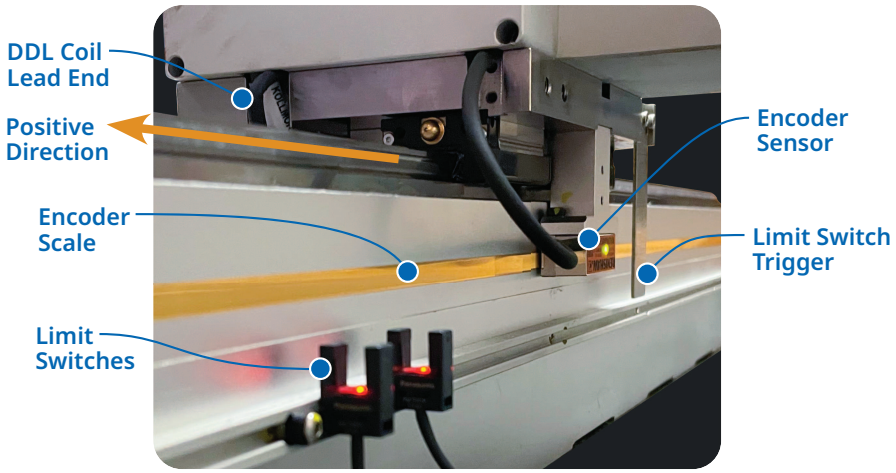
This table provides typical encoder resolution figures and their equivalent AKD / AKD2G value.

| | 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

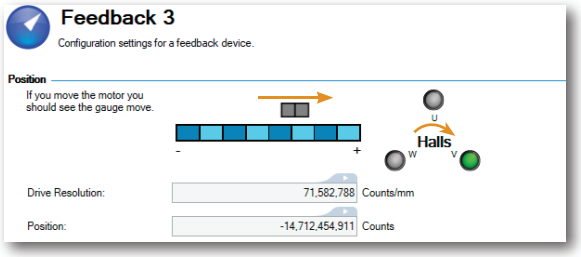
The direction of the encoder, the motor phase sequence, and Hall sequence must match exactly.

- 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).



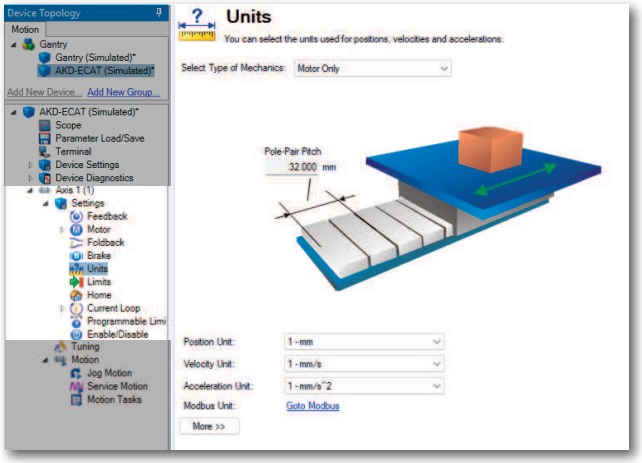

#### Procedure

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

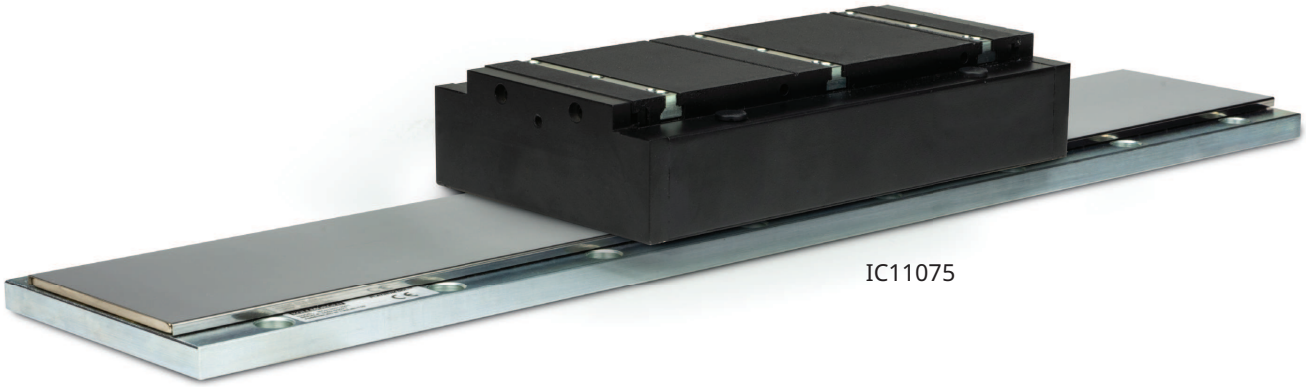
## 8.1 IC Ironcore - General Specifications

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<br>Thermistor – PTC<br>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 | 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 | | | | | | | | | | | |
| | 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

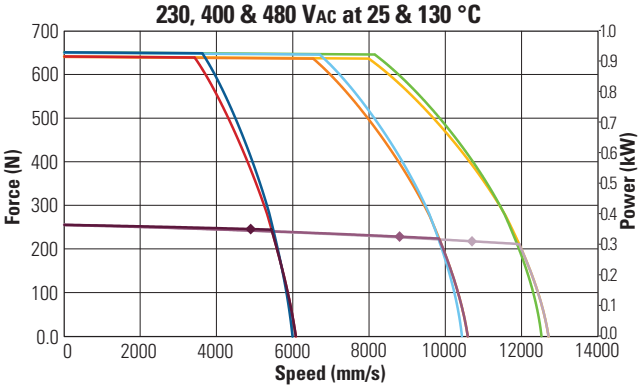
## 8.2.8.1 IC44 Water Cooled Motor Series - Performance Data (continued)

| | | 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

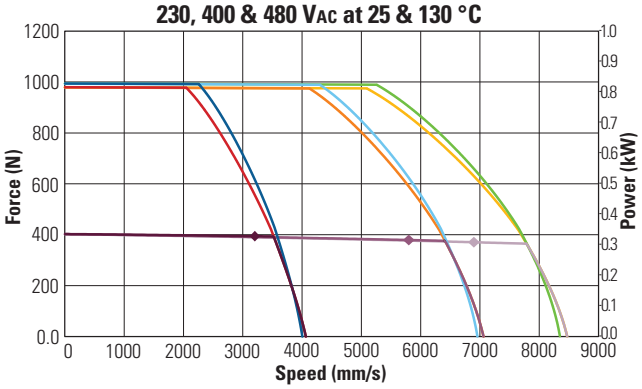
## 8.3 IC Ironcore - Performance Curves

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



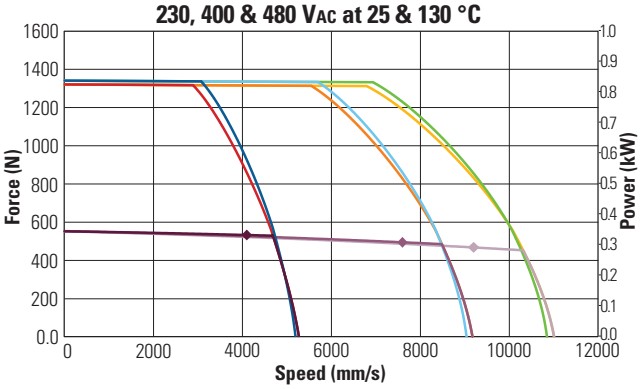

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



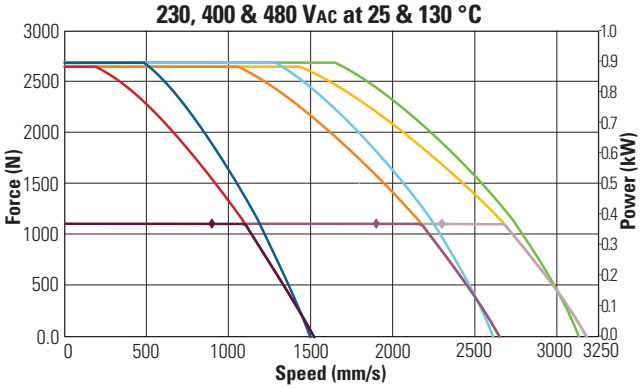

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



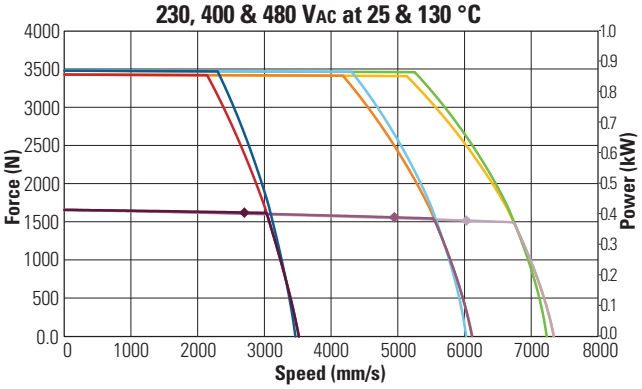

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



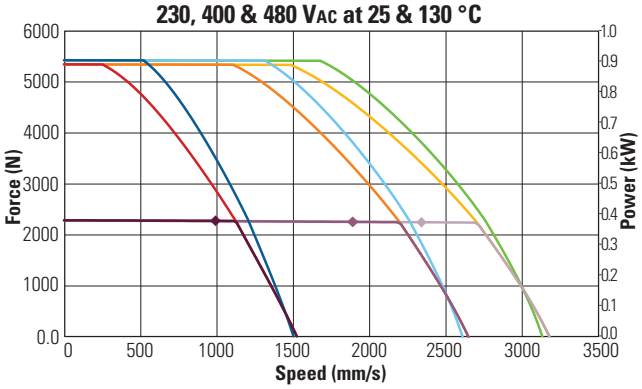

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

**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

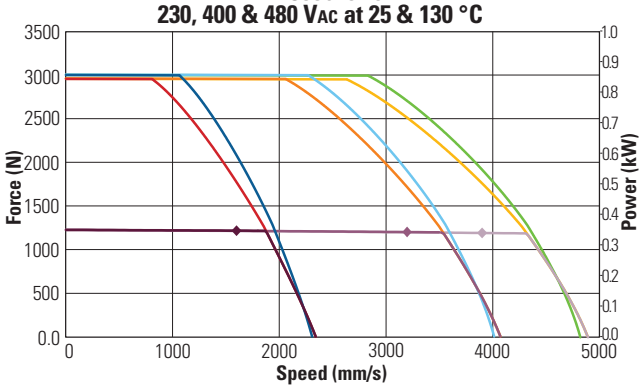
**IC22200A2**
**230, 400 & 480 VAC at 25 & 130 °C**




$I_{pk}$ 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

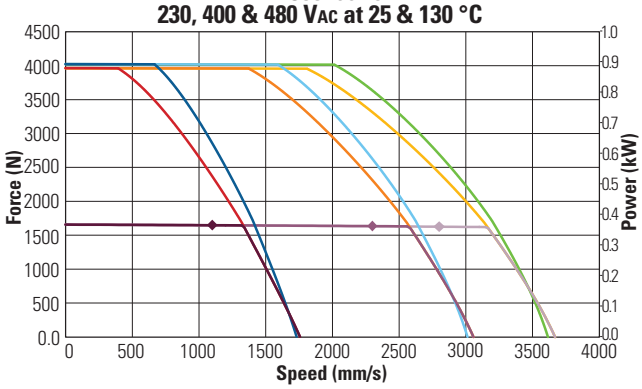
## 8.3.1 IC Ironcore - Performance Curves, continued

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



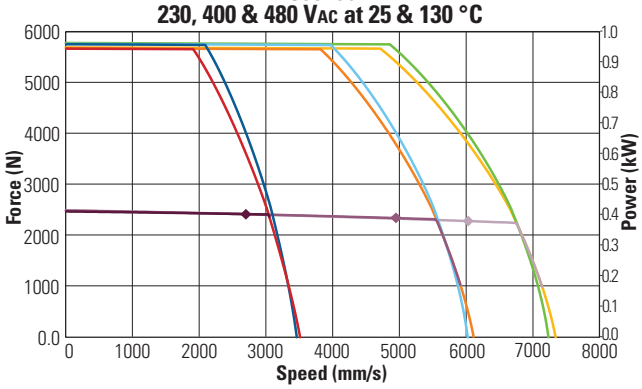

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



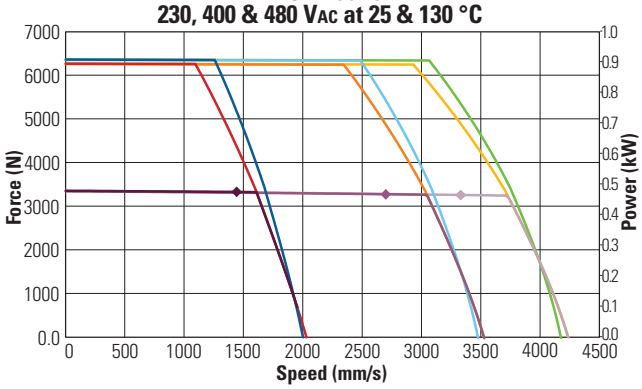

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



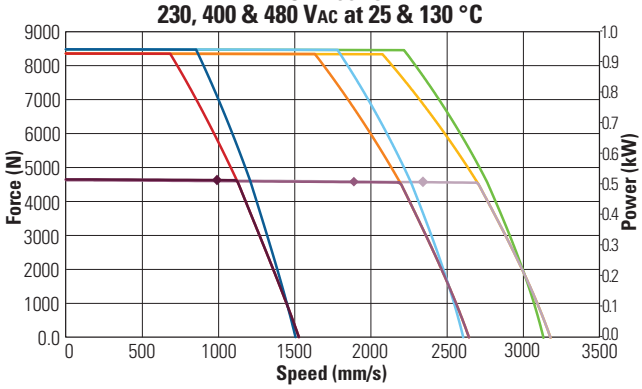

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

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



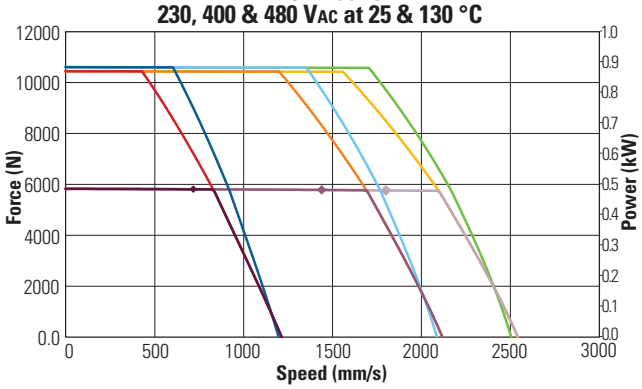

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

**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**



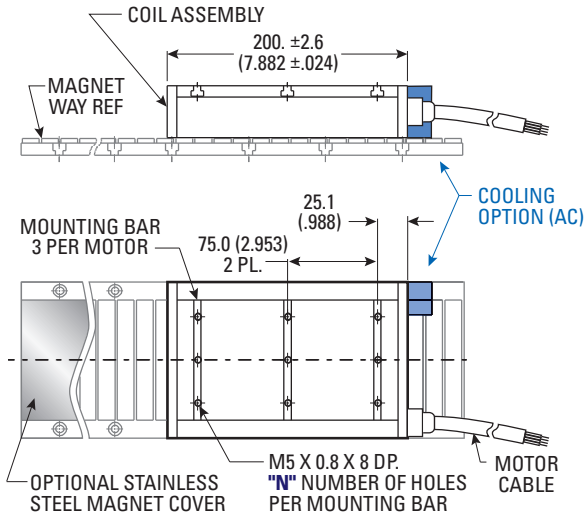

$I_{pk}$ Motor winding @ 130 °C: 230 VAC 400 VAC 480 VAC
$I_{pk}$ Motor winding @ 25 °C ambient: 230 VAC 400 VAC 480 VAC
Rated Power: 230 400 480 SOAC (cont. operation): 230 400 480

## 8.4 IC Ironcore - Dimensional Drawings

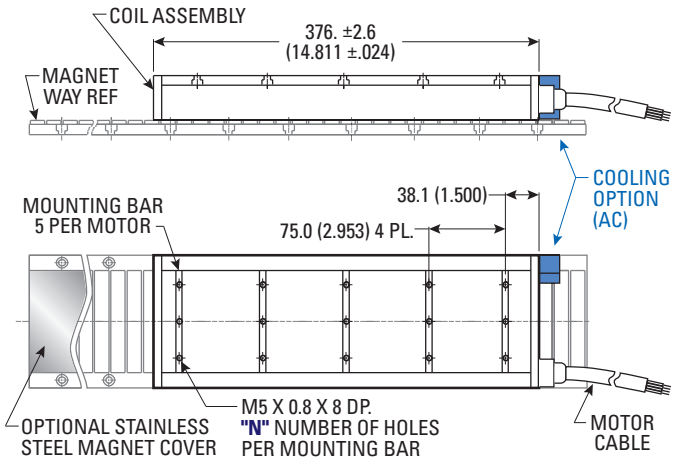
**IMPORTANT**

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

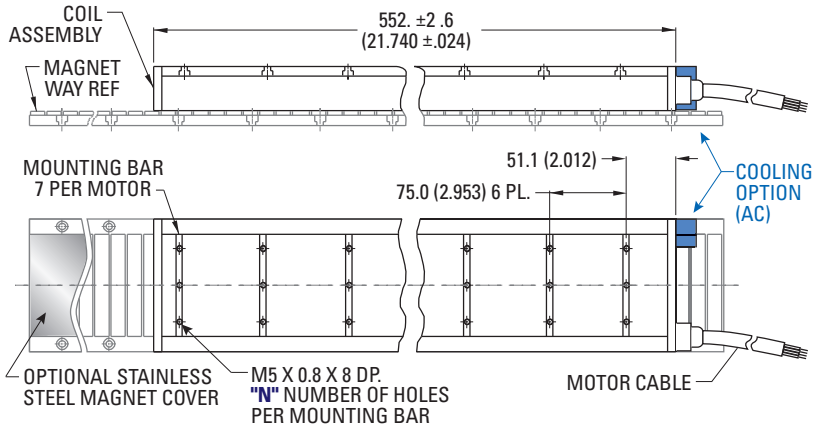
### IC11 Dimensional Drawings



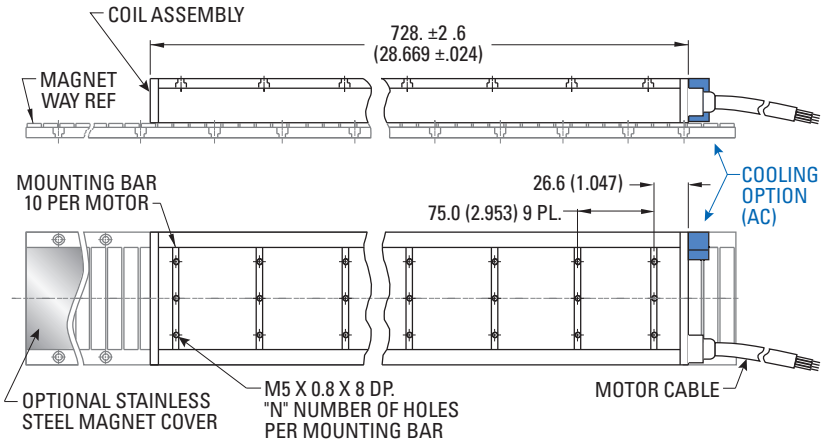

### IC22 Dimensional Drawings




### IC33 Dimensional Drawings

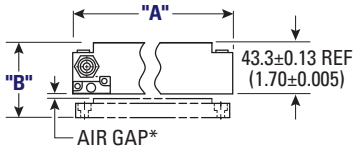


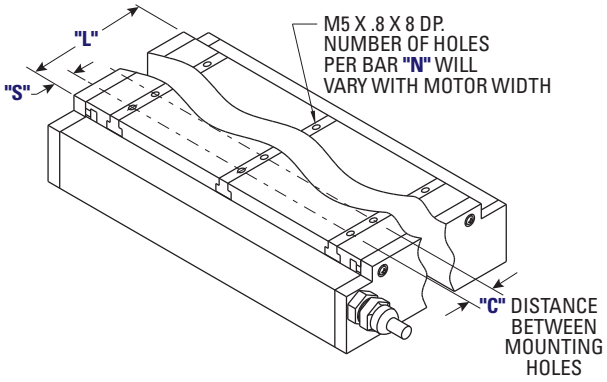

### IC44 Dimensional Drawings




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)

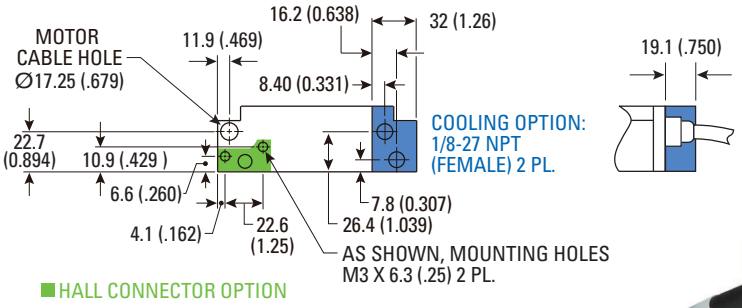
### ICxx Dimensional Data, Typical Mounting Bar Lengths & Mounting Holes Tabulation

| Motor Coil Type | Coil Width "A" | Height w/ Air Gap "B" | | Spacing Between Holes "C" | Mounting Bar Length "L" | # Holes "N" | "S" | |
|---|---|---|---|---|---|---|---|---|
| | | w/ mag. cvr | w/o mag. cvr | | | | | |
| 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

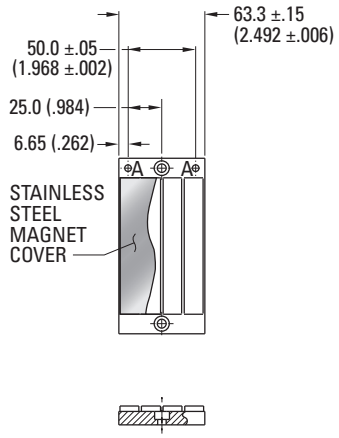
Optional Cooling Unit

## 8.5 MC Magnet Way - Dimensional Drawings and Data

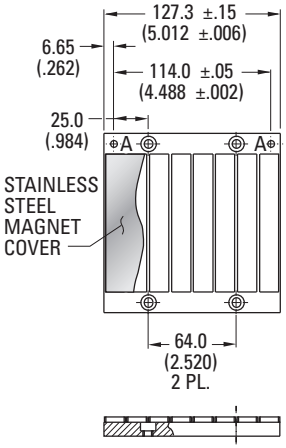
**IMPORTANT**

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

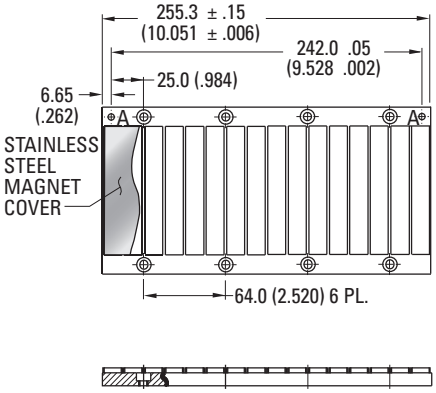
### MCxxx-0064



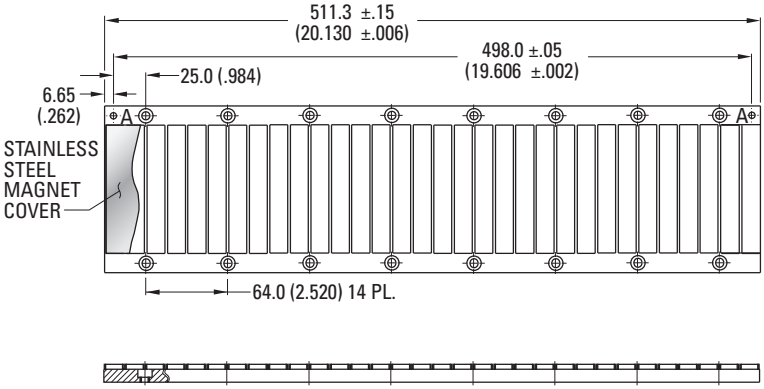

### MCxxx-0128




### MCxxx-0256



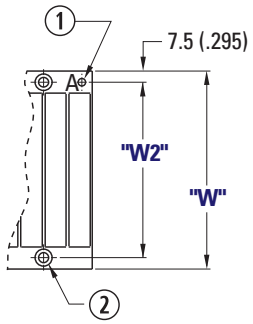

### MCxxx-0512



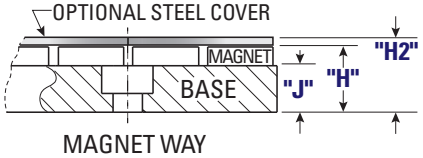

### Magnetic Way Typical Dimensions

| 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 | | | |

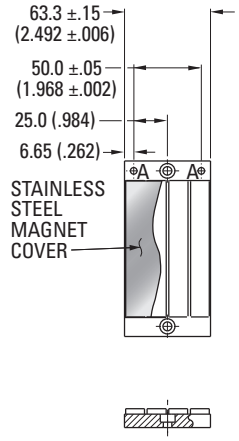
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak 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

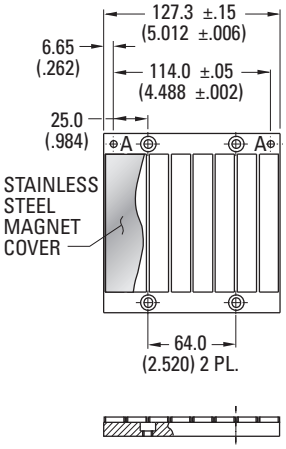
**IMPORTANT**

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

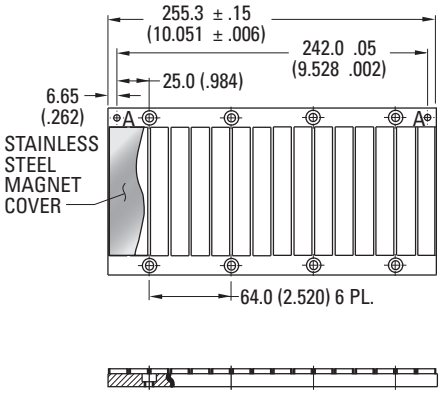
### MCDxx-0064



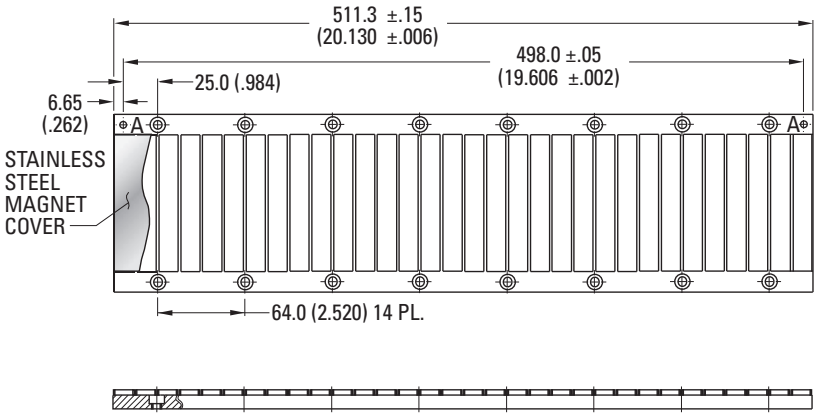

### MCDxxx-0128




### MCDxxx-0256




### MCDxxx-0512



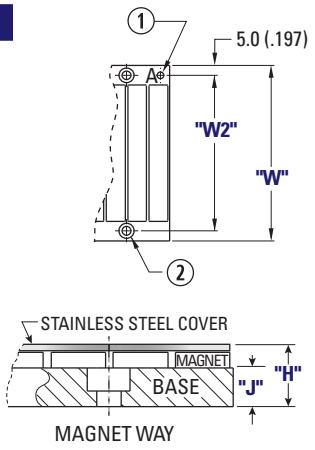

### MCDxxx Magnet Way Typical Dimensional Data

| 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

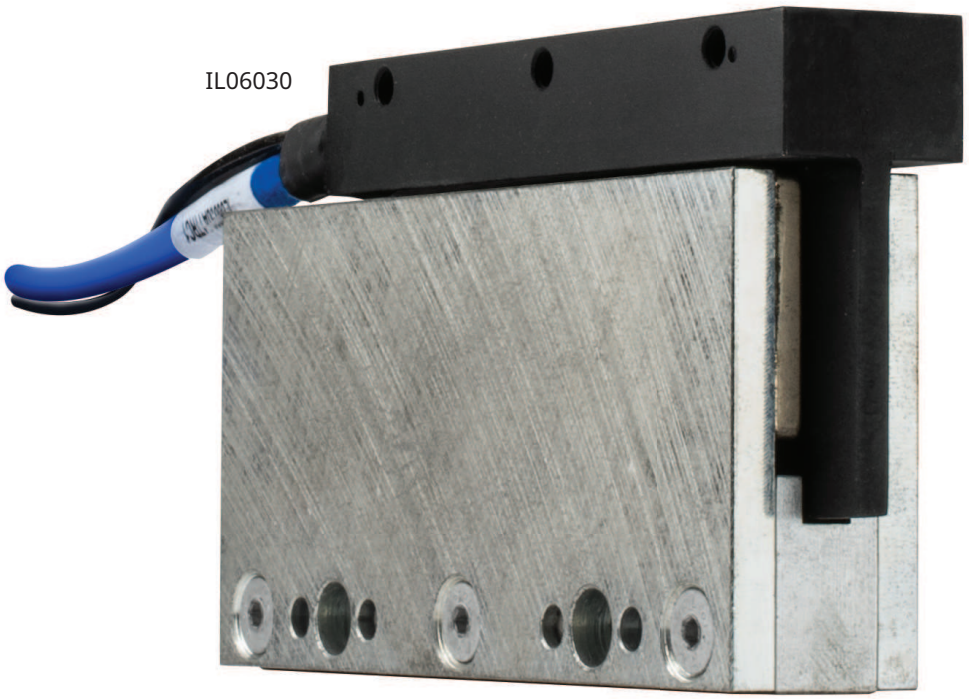
Ironless motors have no iron, or slots for the coils to be wound on. Therefore, these motors have zero cogging, a very light mass, and absolutely no attractive forces between the coil assembly and the magnet way. These characteristics are ideal for applications requiring very low bearing friction, high 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 | | | |

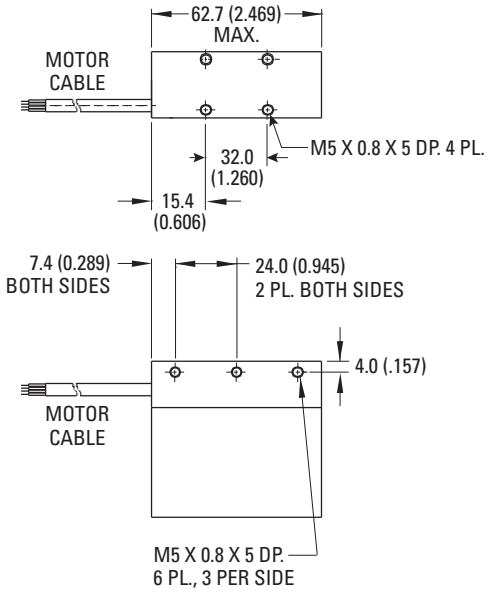
Notes:
① The motor continuous rated force is measured with the motor coils achieving the motor maximum allowable temperature Tmax.
② Alternate windings can be made available. Please consult Kollmorgen Customer Support for design options.
③ Maximum theoretical acceleration is based on the motor's peak 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

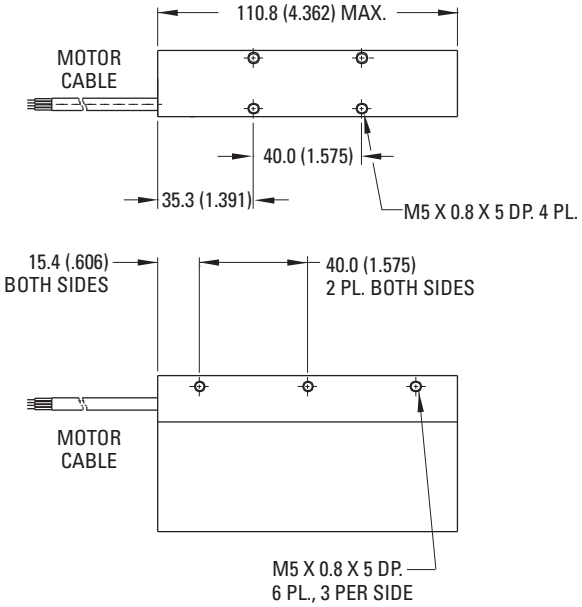
**IMPORTANT**

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

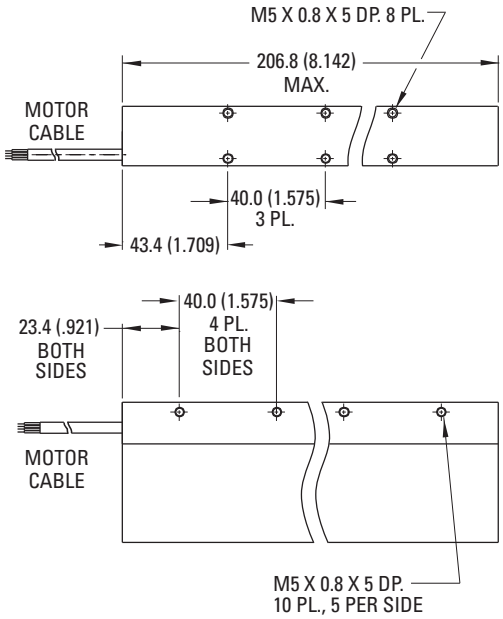
### IL03 Dimensions




### IL06 Dimensions




### IL12 Dimensions

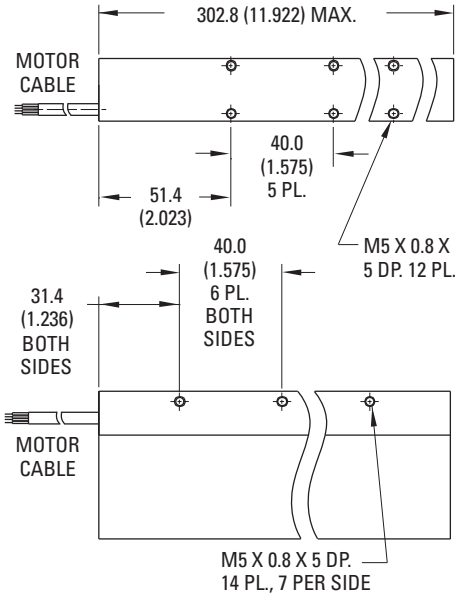



Continued on next page

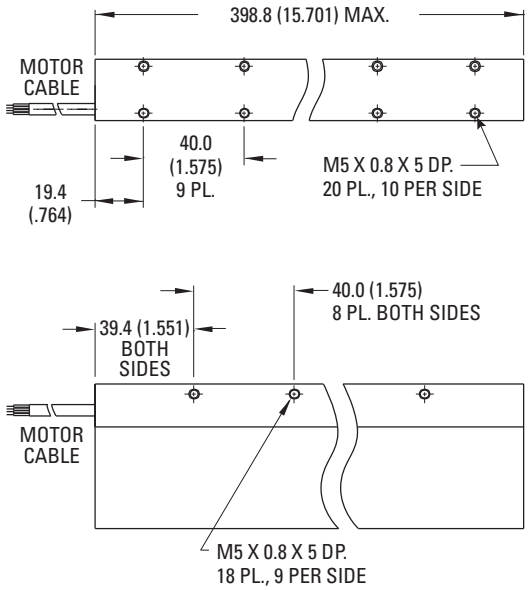
Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

## 10.3.1 IL Ironless - Dimensional Drawings, continued

### IL18 Dimensions




### IL24 Dimensions



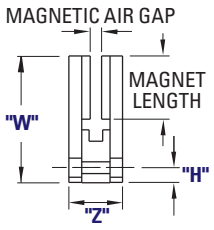

Note:
1. Dimensions in mm (inches)
2. Tolerances (unless otherwise specified):
   No decimal places: ±0.8
   One decimal place: ±0.1
   Two decimal places: ±0.05

## 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

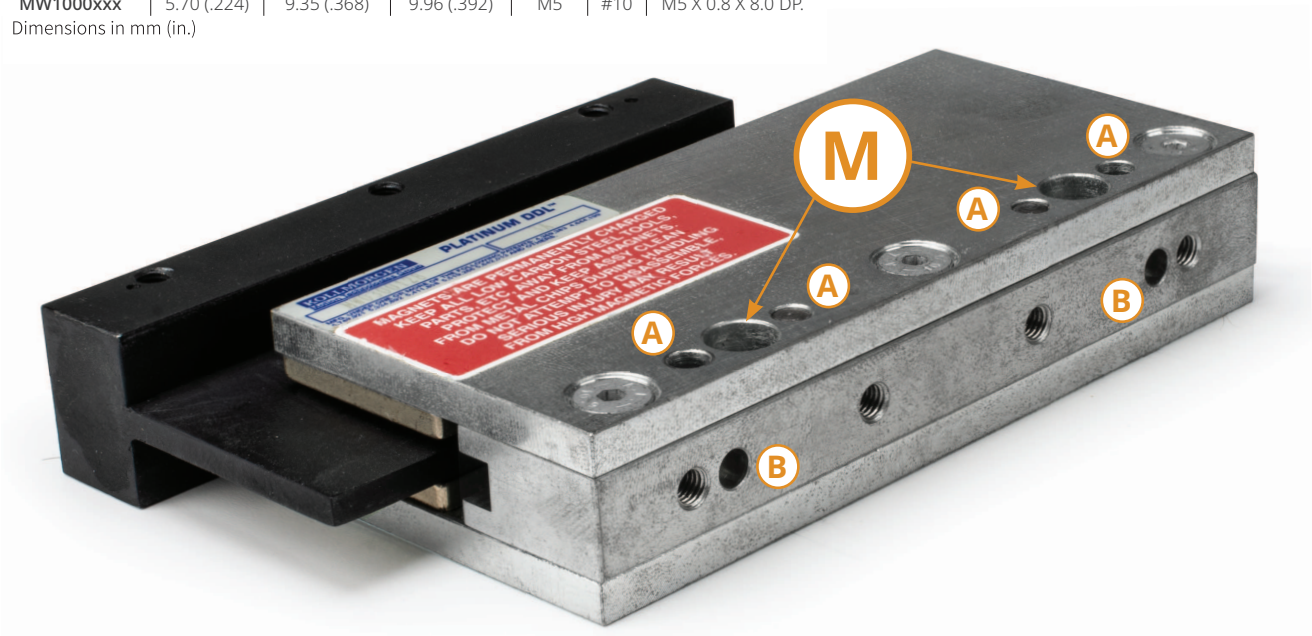



| Magnet Way | Magnet Size Reference | "H" ±.8 (.003) | "W" ±.4 (.016) | "Z" ±.4 (.016) |
|---|---|---|---|---|
| MW0150xxx | 15 mm | 5.69 (.224) | 33.80 (1.331) | 25.40 (1.000) |
| MW015T0xxx | 15 mm | 5.69 (.224) | 33.80 (1.331) | 21.8 (0.858) |
| MW0300xxx | 30 mm | 7.11 (.280) | 60.20 (2.370) | 25.40 (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

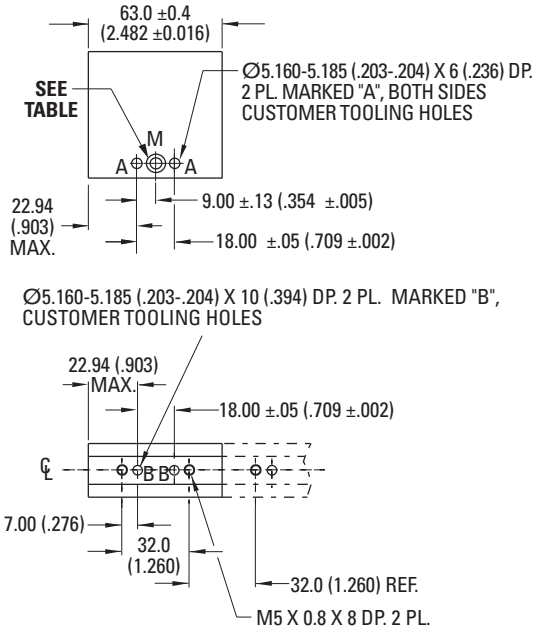
| Magnet Way | Hardware (Hex, Socket Head Cap) | | | | | |
|---|---|---|---|---|---|---|
| | Hole Dia. ±.13 (.005) | C'bore Dia. ±.13 (.005) | C'bore Depth ±.13 (.005) | Metric | Inch | Bottom Mount Thread Option |
| MW0150xxx | 4.70 (.185) | 7.80 (.307) | 4.00 (.158) | M4 | #8 | M4 X 0.7 X 6.0 DP. |
| 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.)

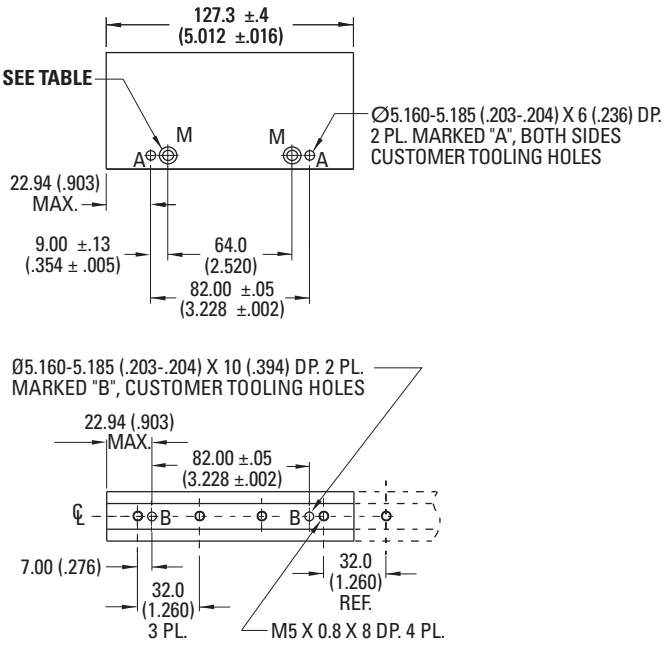


## 10.4.1 MW Magnet Way - Dimensional Drawings and Data, continued

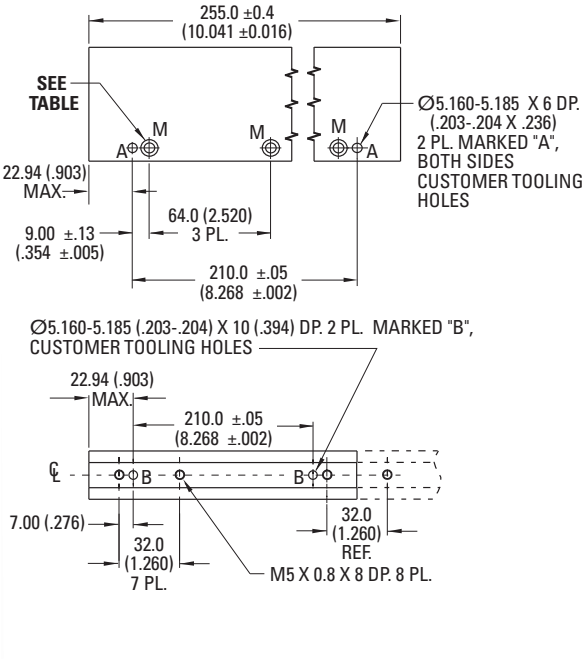
### MWxxx-0064 Dimensional Data



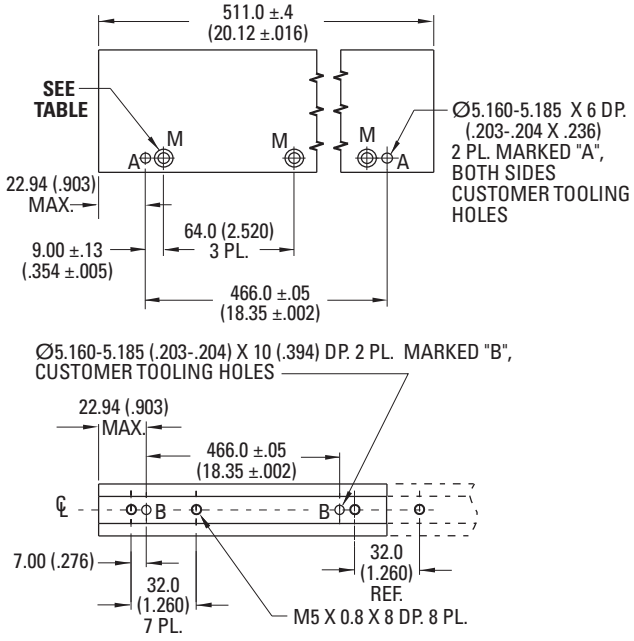

### MWxxx-0128 Dimensional Data




### MWxxx-0256 Dimensional Data




### MWxxx-0512 Dimensional Data



# 11 Thermal Sensor Protective Devices

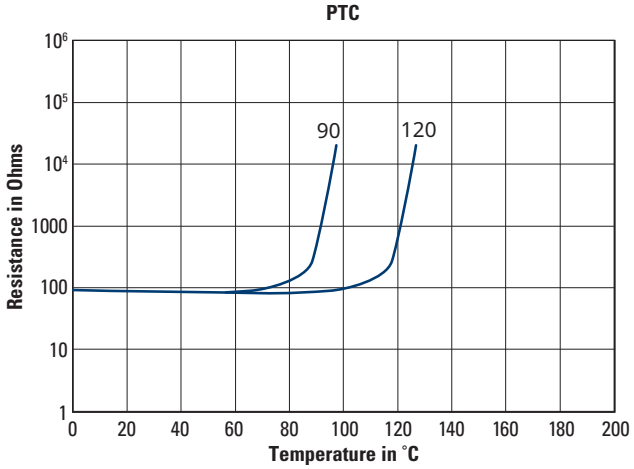
The standard version of each motor is fitted with a choice of an electrically isolated PTC Avalanche-Type thermal sensor, a PT1000 RTD Linear thermal sensor, or a thermostat. The thermal sensors do not provide any protection against short, heavy overloading.

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

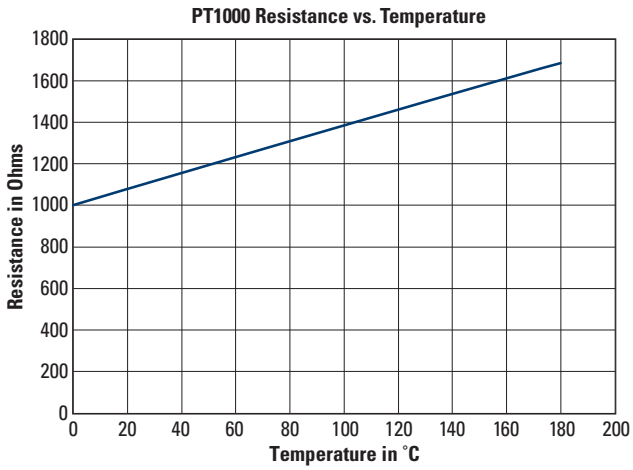
### Thermal Device Options: Resistance vs. Temperature Graphs

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 - Certifications page of the Kollmorgen website.

## 12.1 Conformance with CE

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

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

**NOTICE**

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

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

**NOTE**

CE Declaration of Conformity can be found on the Kollmorgen website.

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

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

## 12.2 CE Mark Conformance

Conforms with the Low Voltage Directive 2014/35/EU, using this harmonized standard:

- EN 60034-1:2010/AC:2010 Rotating electrical machines Part 1.

Conforms with the EMC Directive 2014/30/EU, using this harmonized standard:

- EN 60034-1:2010/AC:2010 Rotating electrical machines Part 1

## 12.3 Conformance with REACH

Regulation (EC) No 1907/2006 of the European Parliament and of the Council 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 17, January 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.

## 12.4 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 (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.

## 12.5 Conformance with UL

Ironcore IC and ICD and Ironless IL are UL recognized components under UL file E136406.

- These have a class B UL insulation system under E301483.
- Ironcore IC and ICD: Evaluated to Class B (130 °C).
- Ironless IL:
  - The linear motors covered in this Report have only been evaluated to the Class A (105 °C) insulation system temperature limits.
  - These linear motors employ the applicant's Class B insulation system downgraded for Class A 105 °C temperature limits to limit surface temperatures.

## 12.6 EU Declaration of Conformity

### EU Declaration of Conformity

KOLLMORGEN
A REGAL REXNORD BRAND

We, the company

A&S Industry Technology (Tianjin) Co Ltd
D9, XEDA International Industrial City
Xiqing Economic Development Area
Tianjin
300385 CHINA

hereby on our sole responsibility declare the conformity of the product series
**Product:** **Three Phase Direct Drive Linear Servo Motor coil & magnet-way assemblies & components**
**Series:** **Kollmorgen Platinum DDL Ironcore – Low Profile**
**Models covered:**
Motor - Coil Assembly:
**ICD05-030, ICD05-050, ICD05-075, ICD05-100, ICD10-030, ICD10-050, ICD10-075, or ICD10-100** followed by A1, A2, A3, A4, A5, A6, A7, A8 or AS, optional may be followed by AC, followed by TS, TR or T1, followed by P or C, followed by 1, 2, 3, 4, or S, followed by optional three digit alphanumeric code.
Magnet Way:
**MC**, followed **by 030, 050, 075, 100, 150, 200, or 250** followed by 0064 or 0128 or 0256, or 0512, followed by 001 or blank.

with the following directives:
The Low Voltage Directive 2014/35/EU, using the following harmonized standard:
**EN 60034-1:2010/AC:2010** **Rotating electrical machines Part 1**

The EMC Directive 2014/30/EU, using the following harmonized standard:
**EN 60034-1:2010/AC:2010** **Rotating electrical machines Part 1**

CE Mark affixed to the motors first time 2025.

*These products comply with the RoHS Directive 2011/65/EU including commission delegated Directive (EU) 2015/863 for installation in a machine. Safety depends upon installing and configuring the motor per the manufacturer's recommendations. The machine in which this product is to be installed must conform to the provisions of the EMC Directive 2014/30/EU.*

*Additional information:*
*Proper installation and operating instructions are available for use with this product.*
*Technical File documentation (CE rationale and test certificates) is available (for EU authorities only).*
*Production and changes are controlled under ISO 9001 certified processes and procedures.*
*Other standards applied: UL 1004-1 and CSA 22.2 No. 100.*

Signed:

David Digby Empson 28 April 2025
Regulatory Compliance Manager
Kollmorgen Corporation
201 W Rock Road
Radford VA, 24141-4099
540 639 2495

EU Contact:

Lars Lindner
Global Product Compliance Manager
Kollmorgen Europe GmbH
Pempelfurtstraße 1 40880 Ratingen,
Germany
+49 2102 9394-0 or
Technical.Support.EU@regalrexnord.com

# 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.

## Kollmorgen Support Locations

**North America**
**Kollmorgen**
201 West Rock Road
Radford, VA 24141, USA

| | |
|---|---|
| **Web:** | www.kollmorgen.com |
| **Email:** | kollmorgen.support@regalrexnord.com |
| **Tel.:** | +1-540-633-3545 |
| **Fax:** | +1-540-639-4162 |

**Europe**
**Kollmorgen Europe GmbH**
Pempelfurtstr. 1
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| **Tel.:** | +86-400 668 2802 |