

Kinetix 6000M Integrated Drive-Motor Systems



The Kinetix 6000M integrated drive-motor system combines the reliable high-performance MP-Series food-grade servo motor and Kinetix 6000 servo drive technologies into a single, compact package that provides significant space savings and machine control system simplification.

The Kinetix 6000M integrated drive-motor (IDM) units feature mounting flanges and shaft dimensions that are identical to MP-Series motors of the same frame size, making it easy to upgrade to integrated drive-motor technology.

Hybrid and network cables connect the Kinetix 6000M power interface module (IPIM) and daisy-chain to as many as 16 Kinetix 6000M integrated drive-motor (IDM) units.

Kinetix 6000M Integrated Drive-Motor System Features

Attribute	Value
Main characteristics	<ul style="list-style-type: none"> Combines the reliable high-performance MP-Series servo motors and Kinetix 6000 servo drives Compatible with 400V-class Kinetix 6000 and Kinetix 6200 drive systems Integrated SIL2/PLd safe torque-off capability Motor mounting flanges and shaft dimensions same as MP-Series motors Low rotor inertia
Features	<ul style="list-style-type: none"> As many as 4 Kinetix 6000M IPIM modules on a single 2094 power rail. As many as 16 Kinetix 6000M integrated drive-motor (IDM) units connect to a single IPIM module 5 digital inputs on each integrated drive-motor (home, over-travel, and registration) USDA compliant food-grade paint 180° rotatable hybrid cable connectors
Motor type	Brushless AC synchronous servo motors
Environmental rating	<ul style="list-style-type: none"> IP66 with shaft seal (standard) and use of environmentally sealed cable connectors Food grade grease on shaft seal
Continuous stall torque	3.0...7.25 N·m (27...64 lb·in)
Peak stall torque	11.0...22.0 N·m (93...192 lb·in)
Speed	3000, 3500, and 5000 rpm
Motor rated output	1.0...1.4 kW
Compatible servo drives	<ul style="list-style-type: none"> Kinetix 6200 (400V-class) drives Kinetix 6000 (400V-class) drives
Typical applications	<ul style="list-style-type: none"> Food packaging Volumetric filling Form, fill, seal Food handling For meat and poultry applications, the MP-Series Stainless Steel motors are recommended

Catalog Numbers - Kinetix 6000M Integrated Drive-Motors

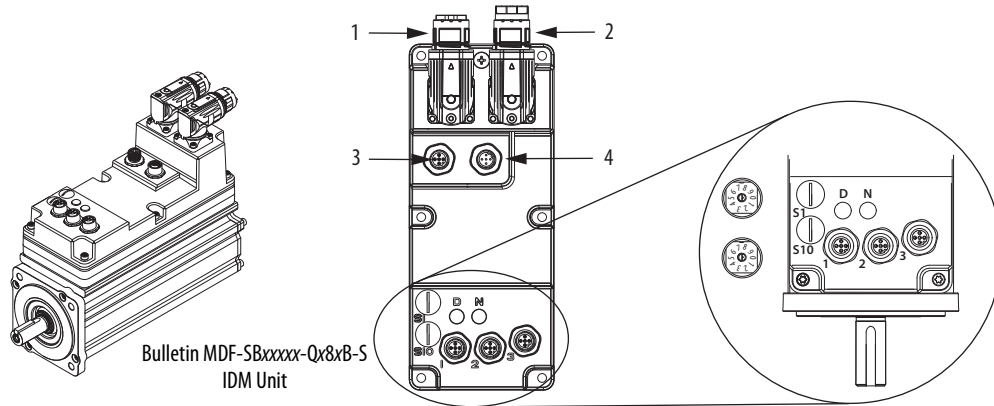
Catalog numbers consist of various characters, each of which identifies a specific option for that component. Use the catalog numbering table chart below to understand the configuration of your motor. For questions regarding product availability, contact your Allen-Bradley distributor.



(1) Not all combinations are available. Only the configurations for rated speed and magnet stack length, as listed in Kinetix 6000M Integrated Drive-Motor Unit (400V-class) Performance Specifications on [page 96](#), are available. Use Motion Analyzer software to size and select motors for your application.

Kinetix 6000M Integrated Drive-Motor System Connectors and Indicators

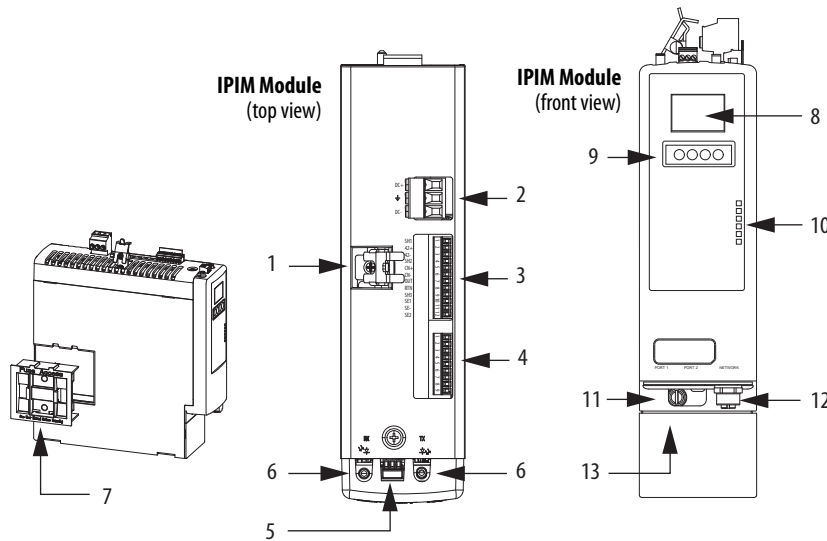
Kinetix 6000M IDM Units



Item	Description
1	Hybrid output connector
2	Hybrid input connector
3	Network output connector
4	Network input connector

Item	Description
1, 2, 3	Digital input connectors (M12)
S1	Network node address switch (least significant digit)
S10	Network node address switch (most significant digit)
D, N	Status indicators

Kinetix 6000M IPIM Modules



Item	Description
1	Hybrid cable shield clamp
2	Hybrid DC bus connector
3	Hybrid communication connector
4	Safe-off connector
5	Enable connector
6	Sercos (Rx and Tx) connectors
7	Fuse holder, fuses (2)
8	System display
9	System display programming switches
10	Status indicators
11	Mounting screw
12	Network connector
13	EtherNet/IP connectors, (not visible)

Kinetix 6000M Integrated Drive-Motor High Resolution Encoders

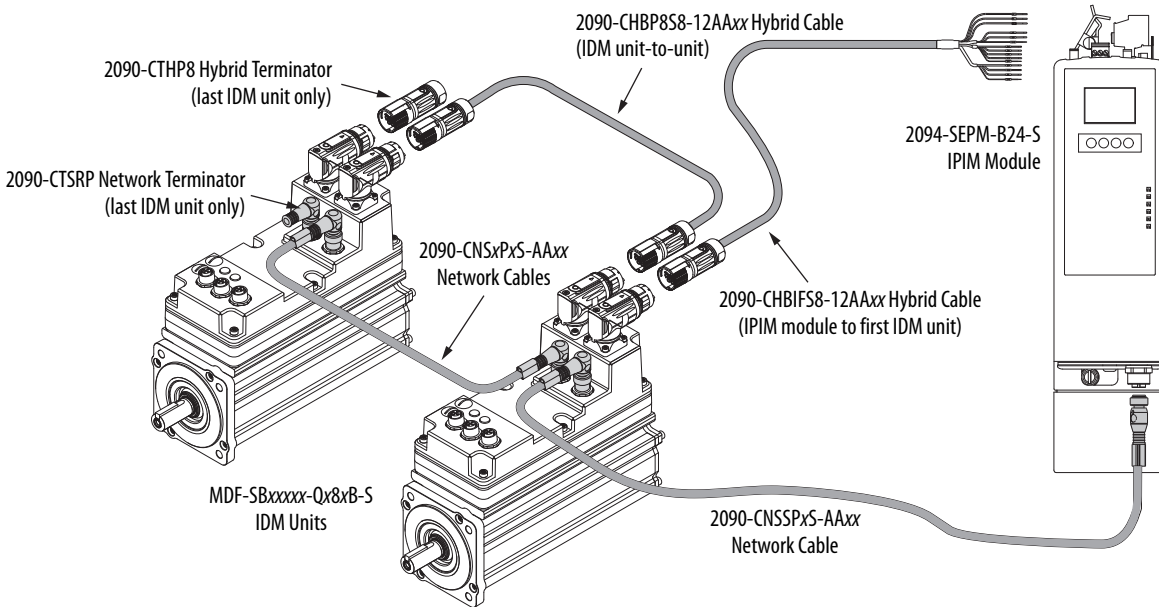
Kinetix 6000M integrated drive-motors are available with high performance digital encoders with multi-turn high resolution feedback:

- 524,288 counts per revolution for smooth performance
- High-resolution multi-turn absolute position feedback within 4096 turns

Kinetix 6000M Integrated Drive-Motor System Cables

Kinetix 6000M integrated drive-motor (IDM) system is compatible with Kinetix 6000 and Kinetix 6200 (400V-class) power rail configurations. The Kinetix 6000M IDM system includes one 2094-SEPM-B24-S IDM power interface module (IPIM), as many as 16 MDF-SBxxxxx IDM units, and cables and terminators as illustrated below.

Kinetix 6000M Hybrid and Network Cables



Cat. No.	Cable Type	Description	Quantity
2090-CHBIF58-12AAxx ⁽¹⁾	Hybrid (SpeedTec)	Connects IPIM module (flying-leads) with the first IDM unit	1 required per system
2090-CHBP858-12AAxx ⁽²⁾		Connects from IDM unit-to-unit	1 required for each downstream IDM unit
20990-CBKS8-16AA03		Manual brake release cable	Optional
2090-CTHP8		Hybrid bus terminator, install on the last IDM unit	1 required per system (included with IPIM module)
2090-CNSSPSS-AAxx ⁽²⁾	Network	Straight (pin) connector and straight (socket) connector	1 required per system ⁽³⁾ (IPIM module to first IDM unit) Plus, 1 required for the second IDM unit and each additional downstream IDM unit
2090-CNSRPRS-AAxx ⁽²⁾		Right-angle (pin) connector and right-angle (socket) connector	
2090-CNSRPSS-AAxx ⁽²⁾		Right-angle (pin) connector and straight (socket) connector	
2090-CNSSPRS-AAxx ⁽²⁾		Straight (pin) connector and right-angle (socket) connector	
2090-CTSRP		Network bus terminator, right-angle (pin), to the last IDM unit	1 required per system (included with IPIM module)

(1) Cables are available in standard lengths of 1, 2, 3, 4, 5, 7, 9, 12, 15, 20, and 25 m (3.2, 6.6, 9.8, 13.1, 16.4, 22.9, 29.5, 39.3, 49.2, 65.5, and 82.0 ft).

(2) Cables are available in standard lengths of 0.5, 1, 2, 3, 4, 5, 7, 9, 12, 15, 20, and 25 m (1.6, 3.2, 6.6, 9.8, 13.1, 16.4, 22.9, 29.5, 39.3, 49.2, 65.5, and 82.0 ft).

(3) Use of straight or right-angle connectors depends on application. Right-angle (pin) connectors are not compatible for connection to the IPIM module. Only straight (pin) connectors fit properly.

Digital Input Cables

Kinetix 6000M IDM units have three 5-pin, M12, digital input connectors. Allen-Bradley (Bulletin 889D) DC micro-style patchcords, splitters, and V-cables are available with straight and right-angle connectors for making connections from the IDM unit to input sensors.

Refer to the Kinetix 6000 and Kinetix 6200/6500 Drive Systems Design Guide, publication [GMC-RM003](#), for catalog numbers and example diagrams.

Kinetix 6000M Integrated Drive-Motor Options

Kinetix 6000M integrated drive-motor units are available with these options:

- Holding brake.
- Choice of keyed or keyless shaft. Replacement shaft seal kits are available for field installation. Shaft seals are made of PTFE and kits include a lubricant to reduce wear.

Shaft Seal Kit Catalog Numbers

Motor Cat. No.	Shaft Seal Cat. No.
MDF-SB1003	MPF-SST-A3B3
MDF-SB1153	MPF-SST-A4B4
MDF-SB1304	MPF-SST-A45B45

IMPORTANT Shaft seals are subject to wear and require periodic inspection and replacement. Replacement is recommended every 3 months, not to exceed 12 months, depending on use.

- The positive air-pressure kit (catalog number MPS-AIR-PURGE) is mounted on the rear of the IDM unit to provide positive air pressure to further reduce the chance of contamination inside the motor.

Refer to the Kinetix 6000M Integrated Drive-Motor Installation Instructions, publication [MDF-IN001](#), for motor accessory information.

Technical Specifications - Kinetix 6000M Integrated Drive-Motor System

Kinetix 6000M Integrated Drive-Motor Unit (400V-class) Performance Specifications

Attribute	Units	MDF-SB1003P		MDF-SB1153H		MDF-SB1304F	
		No Brake	Brake	No Brake	Brake	No Brake	Brake
Bandwidth ⁽¹⁾ Velocity loop Current loop	Hz Hz	500 1300		500 1300		500 1300	
PWM frequency	kHz	4		4		4	
Nominal bus input voltage	V DC	650		650		650	
Control power Input voltage Power on load Digital input load	V DC W W	32...44 8 0...6		32...44 8 0...6		32...44 8 0...6	
Brake load	W	N/A	15.0	N/A	19.2	N/A	19.2
Digital inputs Supply voltage Supply voltage current	V DC mA	21.6...26.4 200		21.6...26.4 200		21.6...26.4 200	
Speed, max	rpm	5000		3500		3000	
Continuous stall torque	N·m (lb·in)	3.0 (26.5)		4.8 (42.5)		7.25 (64.2)	
Peak stall torque	N·m (lb·in)	10.5 (92.9)		18.5 (164)		21.75 (192)	
Rated output power	kW	1.10	1.02	1.15	1.0	1.39	1.24
Speed at rated output power	rpm	5000		3500		3000	
Rated input power	kVA	1.27	1.28	1.36	1.26	1.61	1.44
Rotor inertia	kg·m ² (lb·in·s ²)	0.00012 (0.0010)	0.00013 (0.0011)	0.00038 (0.0033)	0.00042 (0.0038)	0.00052 (0.0046)	0.00056 (0.0050)
Bus overvoltage	V DC	825		825		825	
Bus undervoltage	V DC	275		275		275	
Weight	kg (lb)	7.2 (15.9)	8.4 (18.5)	8.1 (17.9)	9.9 (21.9)	11.3 (25.0)	13.6 (30.1)

(1) Bandwidth values vary based on tuning parameters and mechanical components.

Kinetix 6000M Integrated Drive-Motor Unit Brake Specifications

IDM Cat. No.	Backlash, max (brake engaged) arc minutes	Holding Torque N·m (lb·in)	Coil Current at 24V DC A	Brake Response Time		Brake Rotor Inertia kg·m ² (lb·in·s ²)	Brake Motor Weight, approx kg (lb)
				Release ms	Engage ms		
MDF-SB1003	45	4.18 (37)	0.45...0.55	100	40	0.00013 (0.0011)	8.4 (18.5)
MDF-SB1153	48	10.2 (90)	0.576...0.704	120	65	0.00042 (0.0038)	9.9 (21.9)
MDF-SB1304						0.00056 (0.0050)	13.6 (30.1)

Kinetix 6000M IPIM Module Specifications

The Kinetix 6000M integrated drive-motor (IDM) power interface module (IPIM), catalog number 2094-SEPM-B24-S, is compatible with Kinetix 6000 and Kinetix 6200 (400V-class) drive families and mounts to the 2094 power rail.

IMPORTANT The 2094-SEPM-B24-S IPIM module is compatible with only 400V-class drive systems.

DC Bus Power Specifications

Attribute	Value
Bus output voltage, nom	650V DC
Bus continuous output current	24 A, rms
Instantaneous output current, max	60 A
Intermittent current duration	400 ms
Intermittent current duty cycle	16%
Continuous power output, nom	15 kW
Internal shunt Continuous power Peak power	200 W 22.5 kW
Internal shunt resistor	28.75 Ω
Capacitance	840 μF
Short circuit current rating	200,000 A (rms) symmetrical

Control Power Specifications

Attribute	Value
Control power output Voltage Power Current	40.4...41.7V DC 270 W 6.5 A
24V output voltage	21.6...26.4V DC
24V output current, max Enable input Safety bypass	50 mA 320 mA

Control power line-loss ride-through is used to determine how long you can remove control power without causing the system to shut down and reset. For the IPIM module, it is highly dependent on the load current and applied voltage. For an example of these calculations, refer to Kinetix 6000M Integrated Drive-Motor User Manual, publication [2094-UM003](#).

Control Power Line-loss Ride-through Specifications

Control Power Input Voltage	Control Power Line-loss Ride-through as % of IPIM Module Control Power Current Output Rating				
	ms				
	20%	40%	60%	80%	100%
AC					
120V	67	34	23	18	14
240V	448	246	173	135	112

You can calculate power (heat) dissipation as it applies to sizing the enclosure for the 2094 power rail that includes your IPIM module by using these tables. For an example, refer to Kinetix 6000M Integrated Drive-Motor User Manual, publication [2094-UM003](#).

Power Dissipation Specifications

Power Dissipation as % of DC Bus Current Output Rating Watts					Heat Dissipation Formula ⁽¹⁾
20%	40%	60%	80%	100%	
2	7	14	25	38	$Y = 33.95x^2 + 3.18x$

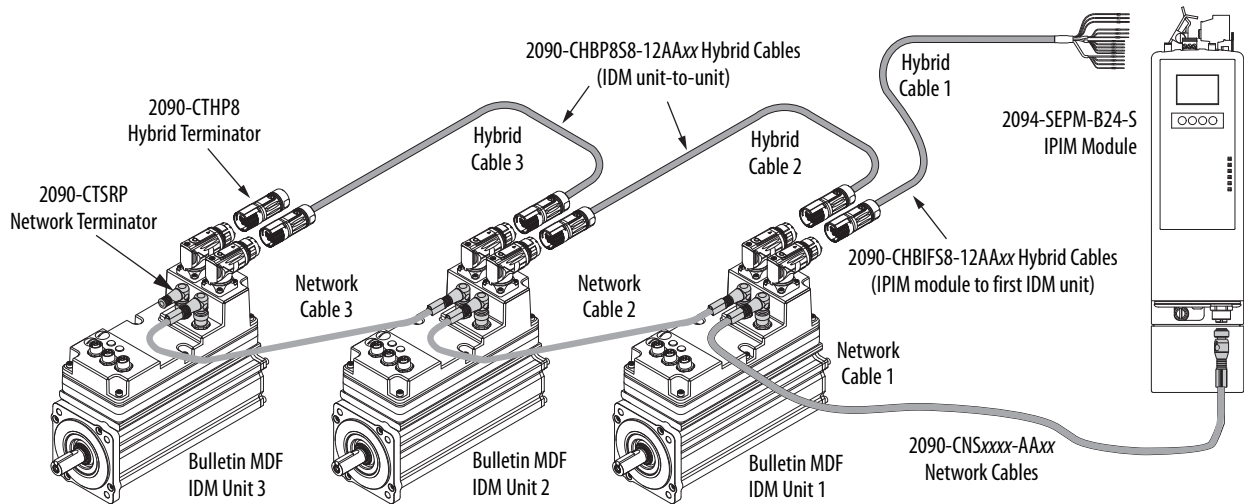
(1) x = percent of DC bus current output rating; any value between 0.0 and 1.0.

Control Power Input		Power Dissipation as % of IPIM Module Control Power Output Rating Watts					Heat Dissipation Formulas ⁽¹⁾
Frequency Hz	Voltage AC	20%	40%	60%	80%	100%	
50	120V	22	29	38	48	61	$Y = 23.76x^2 + 20.73x + 16.54$
	240V	34	42	52	63	76	$Y = 18.56x^2 + 30.19x + 27.41$
60	120V	23	27	32	39	46	$Y = 14.57x^2 + 11.40x + 20.01$
	240V	38	49	62	76	92	$Y = 19.63x^2 + 43.22x + 28.75$

(1) x = percent of IPIM module control power output rating; any value between 0.0 and 1.0.

Maximum System Cable Lengths

The maximum length for hybrid and network cables is 25 m (82 ft). The maximum combined cable length for all axes daisy-chained from the same IPIM module is 100 m (328 ft).



For example, in this Kinetix 6000M system, if each cable length is the maximum 25 m (82 ft), the combined cable length is 75 m (246 ft).

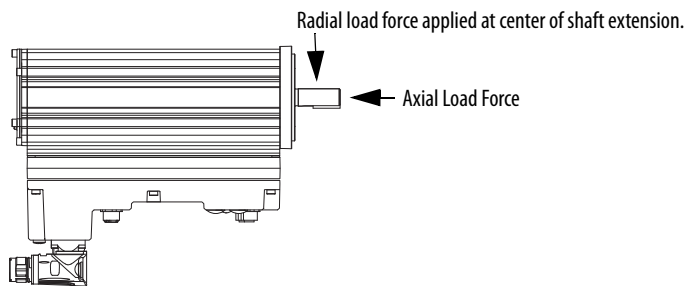
Kinetix 6000M Integrated Drive-Motor Load Force Ratings

Bulletin MDF motors are capable of operating with the maximum radial or maximum axial shaft loads listed in the following tables. Radial loads listed are applied in the middle of the shaft extension. These tables represent an L_{10} bearing fatigue life of 20,000 hours. This 20,000-hour life does not account for possible application-specific life reduction that can occur due to bearing grease contamination from external sources. Maximum operating speed is limited by motor winding.

Radial Load Force Ratings

Motor Cat. No.	500 rpm kg (lb)	1000 rpm kg (lb)	2000 rpm kg (lb)	3000 rpm kg (lb)	3500 rpm kg (lb)	5000 rpm kg (lb)
MDF-SB1003	–	74 (163)	59 (129)	–	49 (107)	43 (95)
MDF-SB1153	106 (234)	84 (185)	67 (148)	–	55 (121)	–
MDF-SB1304	140 (309)	111 (245)	89 (195)	77 (170)	–	–

MDF-SBxxxx-Qx8xB-S Load Forces



Axial Load Force Ratings (maximum radial load)

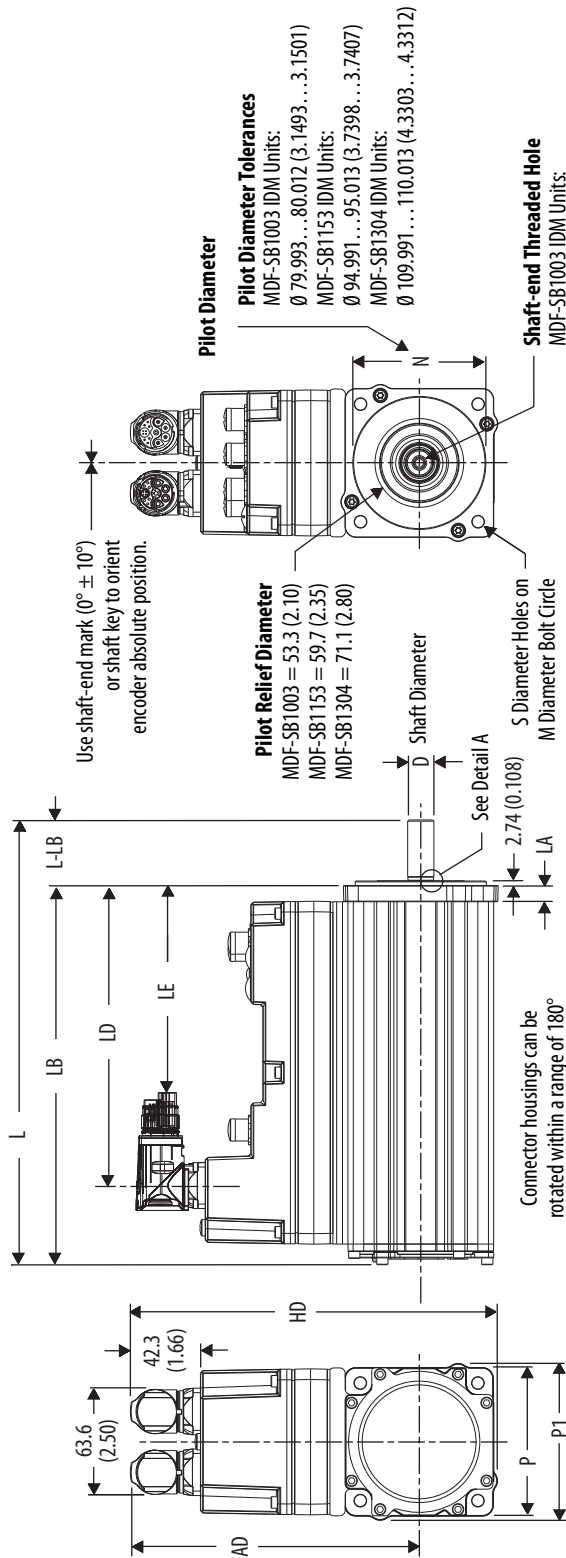
Motor Cat. No.	500 rpm kg (lb)	1000 rpm kg (lb)	2000 rpm kg (lb)	3000 rpm kg (lb)	3500 rpm kg (lb)	5000 rpm kg (lb)
MDF-SB1003	–	27 (59)	20 (44)	–	16 (35)	13 (29)
MDF-SB1153	52 (115)	39 (86)	29 (64)	–	22 (49)	–
MDF-SB1304	49 (107)	36 (80)	27 (60)	22 (49)	–	–

Axial Load Force Ratings (zero radial load)

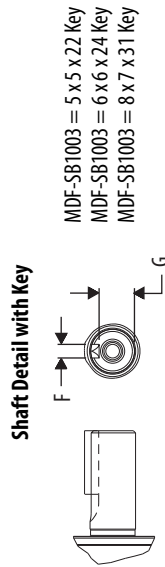
Motor Cat. No.	500 rpm kg (lb)	1000 rpm kg (lb)	2000 rpm kg (lb)	3000 rpm kg (lb)	3500 rpm kg (lb)	5000 rpm kg (lb)
MDF-SB1003	–	36 (80)	27 (59)	–	21 (47)	18 (40)
MDF-SB1153	69 (152)	51 (112)	38 (83)	–	30 (66)	–
MDF-SB1304	69 (152)	51 (112)	38 (83)	31 (69)	–	–

Dimensions - Kinetix 6000M Integrated Drive-Motor System

MDF-SB1003, MDF-SB1153, MDF-SB1304 IDM Unit Dimensions



Shaft Diameter Tolerances
 MDF-SB1003 IDM Units: $\varnothing 15.997 \dots 16.008$ (0.6298...0.6301)
 MDF-SB1153 IDM Units: $\varnothing 18.996 \dots 19.009$ (0.7479...0.7483)
 MDF-SB1304 IDM Units: $\varnothing 23.996 \dots 24.009$ (0.9448...0.9451)



Shaft, Pilot, and Keyway Tolerances	MDF-SB1003	MDF-SB1153	MDF-SB1304
Shaft Runout (T.I.R.)	0.035 (0.0014)	0.04 (0.0016)	0.04 (0.0016)
Pilot Eccentricity (T.I.R.)	0.08 (0.0031)	0.08 (0.0031)	0.10 (0.0039)
Max Face Runout (T.I.R.)	0.08 (0.0031)	0.08 (0.0031)	0.10 (0.0039)
Keyway Depth (G)	12.90...13.00 (0.508...0.512)	15.40...15.49 (0.606...0.610)	19.82...19.98 (0.780...0.787)
Keyway Width (F)	4.97...5.00 (0.196...0.197)	5.97...6.00 (0.235...0.236)	7.96...8.00 (0.314...0.315)

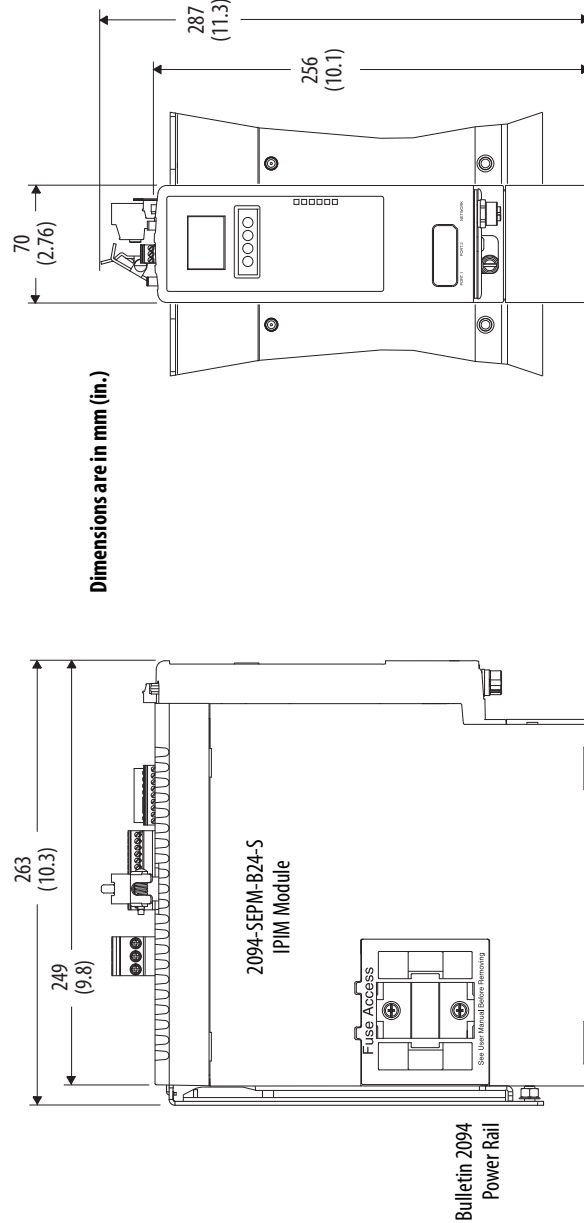
MDF-SB1003, MDF-SB1153, MDF-SB1304 IDM Unit Dimensions

IDM Unit Cat. No.	AD mm (in.)	HD mm (in.)	LA mm (in.)	LD ⁽¹⁾ mm (in.)	LE ⁽¹⁾ mm (in.)	L ⁽¹⁾ mm (in.)	LB ⁽¹⁾ mm (in.)	L-LB ⁽²⁾ mm (in.)	D ⁽³⁾ mm (in.)	M mm (in.)	S ⁽⁴⁾ mm (in.)	N ⁽³⁾ mm (in.)	P mm (in.)	P1 mm (in.)	G ⁽³⁾ mm (in.)	F ⁽³⁾ mm (in.)
MDF-SB1003	173.8 (6.84)	221.0 (8.70)	9.90 (0.39)	183.0 (7.21)	126.3 (4.97)	271.3 (10.68)	231.3 (9.11)	40.0 (1.575)	16.0 (0.629)	100.0 (3.937)	7.0 (0.283)	80.0 (3.15)	89.4 (3.52)	94.4 (3.72)	12.95 (0.510)	5.0 (0.197)
MDF-SB1153	178.2 (7.02)	229.0 (9.02)	10.20 (0.40)	183.3 (7.22)	126.5 (4.98)	271.2 (10.67)	231.2 (9.10)		19.0 (0.740)	115.0 (4.528)	10.0 (0.401)	95.0 (3.74)	98.3 (3.87)	101.6 (4.0)	15.40 (0.606)	6.0 (0.236)
MDF-SB1304	185.8 (7.31)	244.7 (9.63)	12.20 (0.48)	212.0 (8.35)	155.2 (6.11)	310.6 (12.23)	260.6 (10.26)	50.0 (1.969)	24.0 (0.945)	130.0 (5.118)		110.0 (4.33)	113.7 (4.48)	117.7 (4.63)	19.82 (0.780)	8.0 (0.315)

- (1) If ordering an MDF-SB1003 IDM unit with brake, add 34.5 mm (1.36 in.) to dimensions L, LB, LD, and LE. If ordering an MPF-SB1153 IDM unit with brake, add 48.5 mm (1.91 in.) to dimensions L, LB, LD, and LE. If ordering an MPF-SB1304 IDM unit with brake, add 48.5 mm (1.91 in.) to dimensions L, LB, LD, and LE.
- (2) Tolerance for this dimension is ±0.7 mm (±0.028 in.).
- (3) For keyway, shaft diameter, and pilot diameter tolerances, refer to [page 100](#).
- (4) Tolerance for this dimension is ±0.36 mm (±0.007 in.).

IDM units are designed to metric dimensions. Inch dimensions are approximate conversions from millimeters. Dimensions without tolerances are for reference.

2094-SEPM-B24-S IPIM Module Dimensions



Modules are shown mounted to the 2094 power rail and the dimensions reflect that.

Environmental Specifications - Kinetix 6000M IPIM Module

Attribute	Operational Range	Storage Range (nonoperating)
Temperature, ambient	0...50 °C (32...122 °F)	-40...70 °C (-40...158 °F)
Relative humidity	5...95% noncondensing	5...95% noncondensing
Altitude	1000 m (3281 ft) 3000 m (9843 ft) with derating	3000 m (9843 ft) during transport
Vibration	5...55 Hz @ 0.35 mm (0.014 in.) double amplitude, continuous displacement; 55...500 Hz @ 2.0 g peak constant acceleration (10 sweeps in each of 3 mutually perpendicular directions)	
Shock	15 g, 11 ms half-sine pulse (3 pulses in each direction of 3 mutually perpendicular directions)	
Weight	3.5 kg (7.8 lb)	

Certifications - Kinetix 6000M IDM System

Agency Certification ⁽¹⁾	Standards
c-UL-us ⁽²⁾	UL Listed to U.S. and Canadian safety standards (UL 508C File E59272). Solid-state motor overload protection provides dynamic fold-back of motor current when 110% of the motor rating is reached with a peak current limit based on the peak rating of the motor as investigated by UL to comply with UL 508C (UL File E59272, volume 1, section 22).
CE	European Union 2004/108/EC EMC Directive compliant with EN 61800-3:2004: Adjustable Speed Electrical Power Drive Systems - Part 3; EMC requirements and specific test methods. European Union 2006/95/EC Low Voltage Directive compliant with: <ul style="list-style-type: none"> EN 61800-5-1:2007 - Adjustable speed electrical power drive systems. EN 50178:1997 - Electronic Equipment for use in Power Installations.
Functional Safety	TÜV Certified for Functional Safety: up to SIL CL2, according to EN 61800-5-2, EN 61508, and EN 62061; up to Performance Level PLd and Category 3, according to EN ISO 13849-1; when used as described in the Kinetix 6000M Integrated Drive-Motor User Manual, publication 2094-UM003 .
C-Tick	Australian Radio Communications Act, compliant with: <ul style="list-style-type: none"> AS/NZS CISPR 11; Industrial Emissions Radio Communications Act: 1992 Radio Communications (Electromagnetic Compatibility) Standard: 1998 Radio Communications (Compliance Labelling - Incidental Emissions) Notice: 1998 AS/NZS CISPR 11: 2003 (Group 2, Class A)
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: <ul style="list-style-type: none"> Article 58-2 of Radio Waves Act, Clause 3 IDM unit registration number, KCC-REM-RAA-MDF IPIM module registration number, KCC-REM-RAA-2094
ODVA	EtherNet/IP conformance tested (applies to IPIM module).

(1) When product is marked, refer to <http://www.ab.com> for Declarations of Conformity Certificates.

(2) Underwriters Laboratories Inc. has not evaluated the safe-off, safe torque-off, or safe speed-monitoring options in these products.