

# Industrial M-Style SmartMotor with Optional IP-Rating

Moog Animatics' Class 5 SmartMotor™ with M-style connectors offers optional IP65 and IP67 ratings for NEMA 23 and 34 frame sizes. This series of harsh-environment rated M-style SmartMotor combines the quality and advanced motion control capabilities of the integrated servo in combination with an IP rating.

SmartMotors with the IP65 rating are both completely dust tight and protected from ingress of liquid that may occur from any angle, rendering no harmful effects on the electrical enclosure. SmartMotors with the IP67 rating can be submersed in water or other non-hazardous liquids to a depth of one meter for a maximum time of 30 minutes. Therefore, conditions with high levels of humidity and condensation are no longer a problem. The IP-rated models provide the perfect integrated servo for food and beverage manufacturing and packaging, rugged outdoor conditions, as well as any wet environment.



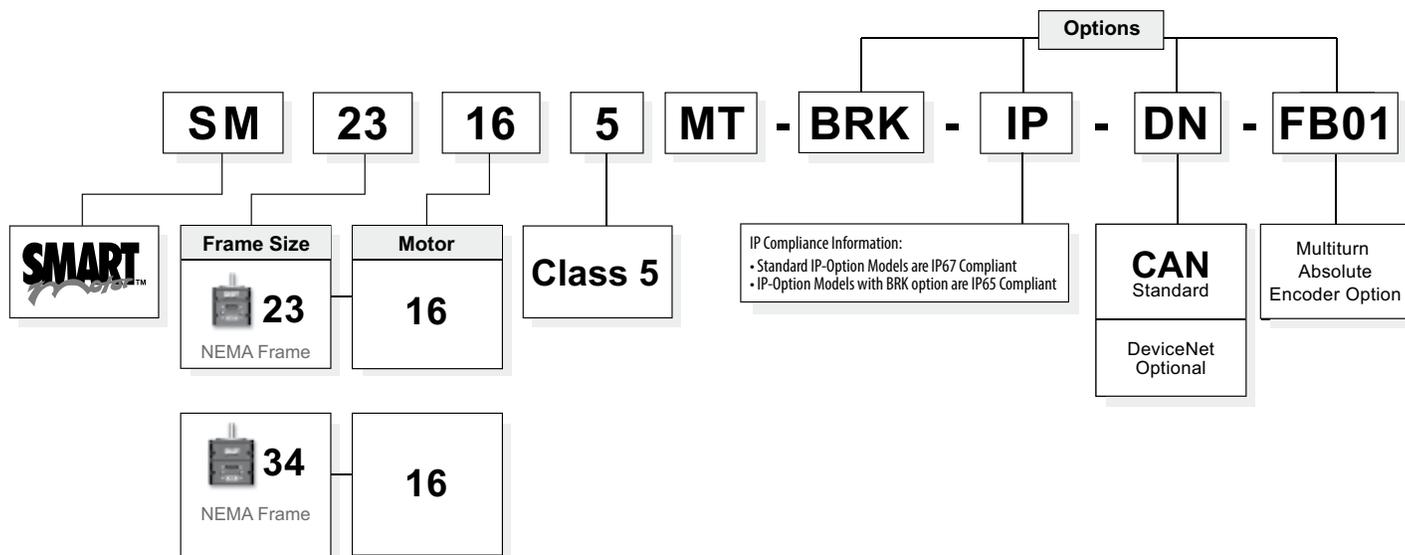
## Class 5 M-Style SmartMotor Features

- Complete barrier against dust and other harmful particles
- Splash and submersion protected for wet environments with the IP options\*
- Industrial style connectors for ensured communication
- New industry capabilities such as food and beverage manufacturing and packaging, demanding outdoor conditions, and nautical machinery

\*IP rating depends on motor options.

For more information about the M-style SmartMotor, applications or to read the white paper "Integrated Solutions for Harsh Environments", visit [www.animatics.com](http://www.animatics.com).

## Understanding M-Style SmartMotor Part Numbers



## Standard on all M-Style SmartMotors: - C, - AD1 and - DE

Though the above items are "options" on the D-Style SmartMotor, they have been incorporated as standard for the M-Style SmartMotors.

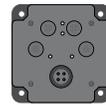
For options such as - F1, - F2, - K, - SL and - SH, please contact Moog Animatics at (650) 960-4216 or email [animatics\\_sales@moog.com](mailto:animatics_sales@moog.com).

**NOTE: DMX protocol is standard on all Class 5 SmartMotors.**

# Class 5 M-Style Motor Comparison Chart



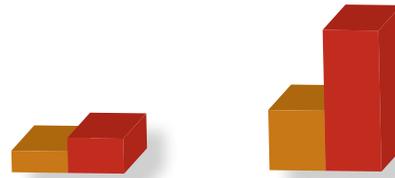
- All M-style SmartMotors have a primary RS-485 communications port
- All M-style SmartMotors have 11 channels general purpose 24V isolated I/O
- Dedicated Drive Enable In and NOT-FAULT Out
- Dedicated encoder bus
- IP65/IP67 available (depends on other options)  
*IP rating may affect performance - consult factory for details.*



Back View



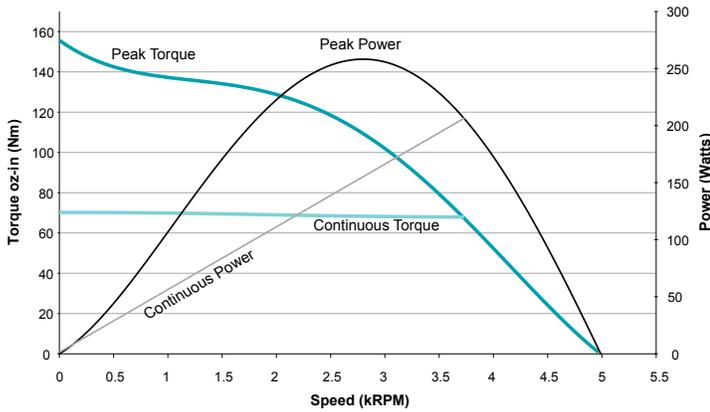
Back View



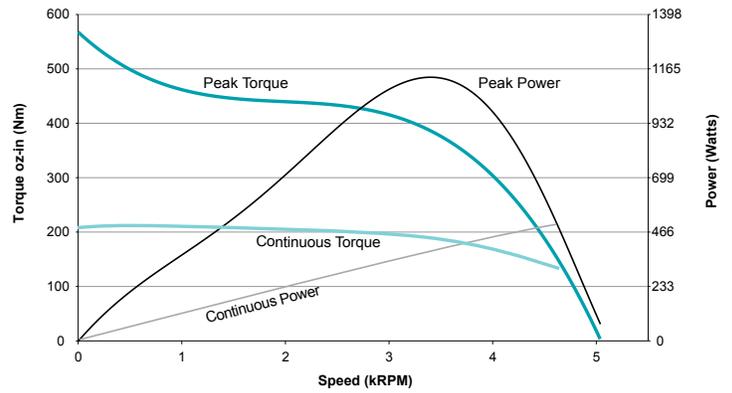
		SM23165MT	SM34165MT
<b>Continuous Torque @48V</b>	in-lb	4.25	12.58
	oz-in	68	201
<b>Peak Torque</b>	N-m	0.48	1.42
	in-lb	9.45	34.88
	oz-in	151	558
	N-m	1.07	3.94
<b>Nominal Continuous Power</b>	Watts	189	472
<b>No Load Speed</b>	RPM	5,000	4,900
<b>Max. Continuous Current</b>	RPM	3,700	4,500
	Amps	6.4	13
<b>Peak Power</b>	RPM	2,800	3,300
	Watts	255	1120
<b>Voltage Constant</b>	V/krpm	9.6	9.8
<b>Inductance</b>	mH	2.01	0.315
<b>Encoder Resolution</b>	Counts/Rev	4,000	8,000
<b>Rotor Inertia</b>	oz-in-sec <sup>2</sup>	0.001	0.0142
	10 <sup>-5</sup> kg-m <sup>2</sup>	0.706	10.031
<b>Weight</b>	lb	1.5	6.0
	kg	0.68	2.72
<b>Shaft Diameter</b>	in	0.375	0.500
	mm	9.53	12.70
<b>Shaft, Radial Load</b>	lb	15	30
	kg	6.80	13.61
<b>Shaft, Axial Thrust Load</b>	lb	3	3
	kg	1.36	1.36
<b>DeviceNet Option</b>		Firmware Option	Firmware Option
<b>PROFIBUS Option</b>			
<b>CANopen Option</b>		Standard	Standard

Due to the variety of operating conditions and applications for Moog Animatics' products, the end user is solely responsible for making the final selection of the Moog Animatics products and systems based on their own analysis and testing, and ensuring that all performance, safety and warning requirements for the application and product are met. Please consult factory for any supporting hardware and cables needed, full details and latest information.

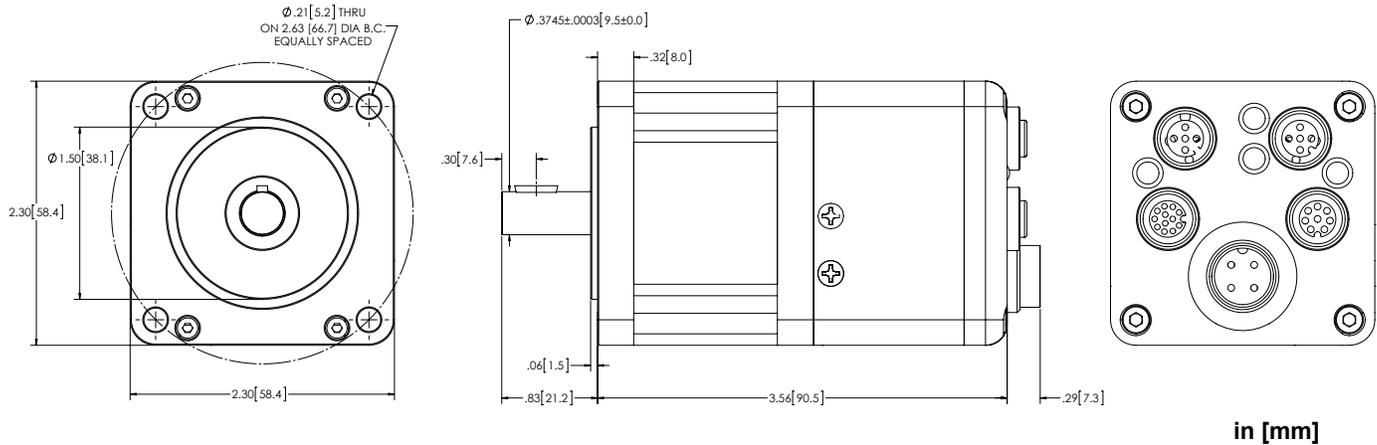
## SM23165MT



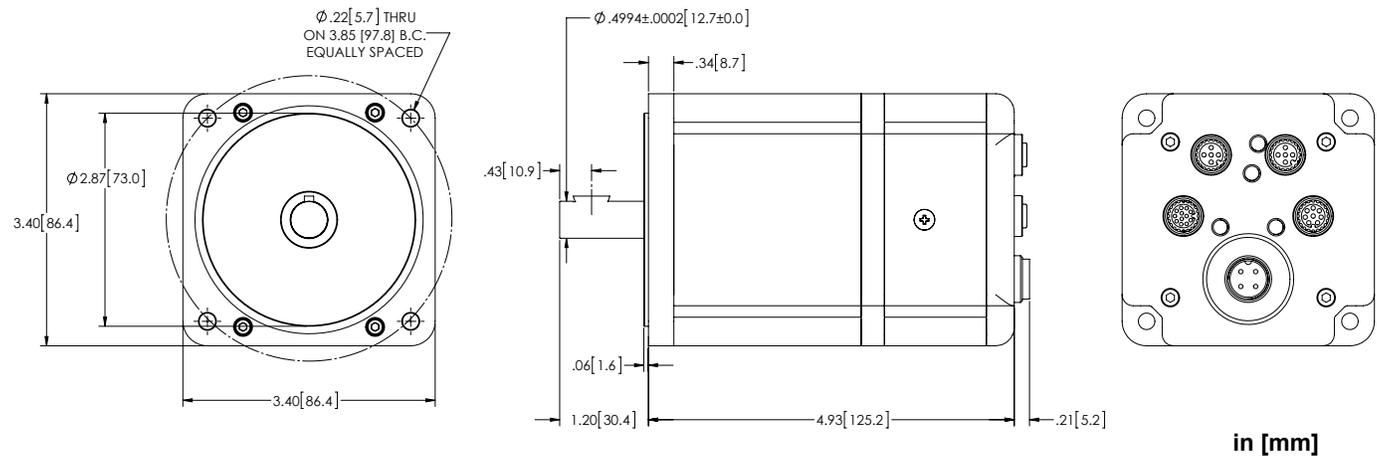
## SM34165MT



### SmartMotor SM23165MT (No Options) CAD Drawing



### SmartMotor SM34165MT (No Options) CAD Drawing



All torque curves based on 48 VDC at 25°C ambient with rise to 85°C.  
 Motors were operated using MDE (Enhanced Drive Mode) Commutation.  
 For ambient temperatures above 25°C, continuous torque must be linearly derated to 0% at 85°C.  
 Operating temperature range: 0°C – 85°C.  
 Storage temperature range: -10°C – 85°C, noncondensing.

# M-Style Connector Pinouts

Overview

Software

C5 D-Style

C5 M-Style

C6 M-Style

C6 Low-Cost

Cables, Etc.

Actuators

Gearheads

Power Supplies

PIN	Main Power	Specifications	Notes	P1
1	Control Power In	+12.5V Min., 32V Max.	Also Supplies I/O	
2	Chassis Ground	Chassis Ground Only	Not Connected to Common	
3	Control, Com, I/O and Amplifier Ground	Common Ground (Req'd. Ground)	Nonisolated	
4	Amplifier Power In	+12.5V Min., 48V Max.	Powers Amplifier Only	

PIN	Communications Connector	Specifications	Notes	P2
1	Control, Com, I/O and Amp Ground	Common Ground	Nonisolated	
2	RS-485 B, Com ch. 0	115.2 Kbaud Max.		
3	RS-485 A, Com ch. 0	115.2 Kbaud Max.		
4	Encoder A+ Input/Output	1.5 MHz Max. as Encoder or Step Input	Configurable as Encoder Output	
5	Encoder B- Input/Output	1.5 MHz Max. as Encoder or Direction Input	Configurable as Encoder Output	
6	Encoder A- Input/Output	1.5 MHz Max. as Encoder or Step Input	Configurable as Encoder Output	
7	+5V Out	250 mA Max.		
8	Encoder B+ Input/Output	1.5 MHz Max. as Encoder or Direction Input	Configurable as Encoder Output	

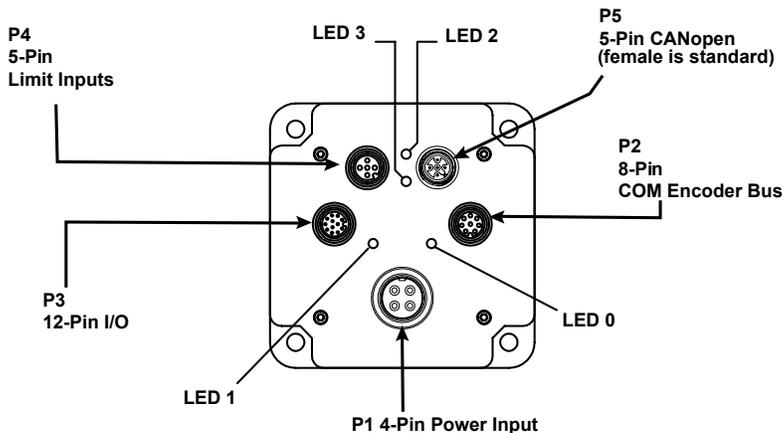
PIN	24V I/O Connector	Specifications	Notes	P3	
1	I/O – 0 GP	150 mAmps Max.			
2	I/O – 1 GP	150 mAmps Max.			
3	I/O – 4 GP	150 mAmps Max.			
4	I/O – 5 GP or Index	150 mAmps Max.			These I/O ports also support analog input
5	I/O – 6 GP or "G" Command	150 mAmps Max.			
6	I/O – 7 GP	150 mAmps Max.			
7	I/O – 8 GP or Brake Line Output	300 mAmps Max.			
8	I/O – 9 GP	300 mAmps Max.			
9	Not Fault Out	150 mAmps Max.			
10	Drive Enable Input	150 mAmps Max.			
11	+24 Volts Out	12.5 V Min., 28 V Max.			
12	Ground Common	Common Ground			Nonisolated

Note: I/O ports input impedance > 10 kohm

PIN	24V I/O Connector	Specifications	Notes	P4
1	+24 Volts Out		From Control Pwr In	
2	I/O – 3 GP -Limit	150 mAmps Max.	Configurable; supports analog in	
3	Ground	Common Ground	Nonisolated	
4	I/O – 2 GP +Limit	150 mAmps Max.	Configurable; supports analog in	
5	I/O – 10 GP	150 mAmps Max.	Configurable; supports analog in	

Note: I/O ports input impedance > 10 kohm

PIN	CAN Connector	Specifications	Notes	P5
1	NC	NC		
2	+V	NC Except DeviceNet	Input Current < 10 mA	
3	-V (Ground)	Common Ground	Nonisolated	
4	CAN-H	1 Mbaud Max.		
5	CAN-L	1 Mbaud Max.		



**CAUTION:** Exceeding 32 VDC into control power on any of the +24V pins may cause immediate damage to the internal electronics. Exceeding a sustained voltage of 48V to pin 4 of the P1 Power Input may cause immediate damage to the internal electronics. Exceeding these voltage limits will void the warranty.

**CAUTION:** M-style connectors must be finger tightened only! DO NOT use a tool. Doing so can cause overtightening of the connection, which may damage the connector and will void the warranty.