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CLASS 5 D-STYLE SMARTMOTOR™

High Power in a Small Package

Fully integrated controller with small footprint, great power density and a simplicity of design hard to match on the market.



The drive to improve the performance of its SmartMotor™, while minimizing footprint, sets Moog Animatics apart from its competitors, reinforcing its position as the industry leading provider of fully integrated motors with motion control capabilities.

The Class 5 D-Style SmartMotor™ offers a power range from 100-610W within compact dimensions. It can be used as a stand-alone, hybrid, or fully externally controlled version.

With the capability to use CANopen, RS232, RS485, Modbus RTU, DMX, I^2C and the definable I/Os as a standard there are multiple ways to communicate and control the motor.

Features:

- Fully integrated brushless DC motor
- Power range up to 615 W
- Optical encoder with 4000 counts (NEMA23) and 8000 counts (NEMA34)
- Communications via RS-232 and CANopen over the 7W2 power connector (enabling single cable control)
- Communication via RS485 over D-Sub 15 (supporting DMX, I^2C and MODBUS RTU)
- NEMA 23 and 34 frame sizes
- Combitronic™ technology
- Optional with Drive Enable (DE) – separate power supply for controller and drive
- Optional with Brake (BRK)

ADVANTAGES

- Fully integrated, compact motion system
- High noise immunity
- Industry leading power density
- Enhanced controls with ability to handle complex applications
- Highly programmable systems with the ability to take over complex control tasks
- Free SMI (SmartMotor™ Interface) software is included for programming the motors

APPLICATIONS

- Automated Guided Vehicle (AGV)
- Factory automation
- Medical and laboratory technology
- Packaging
- Pan and tilt applications
- Semiconductor wafer handling
- Test and measurement
- Dosing systems
- Stage equipment
- Mobile robotics

MOOG ANIMATICS

SPECIFICATIONS

TECHNICAL DATA

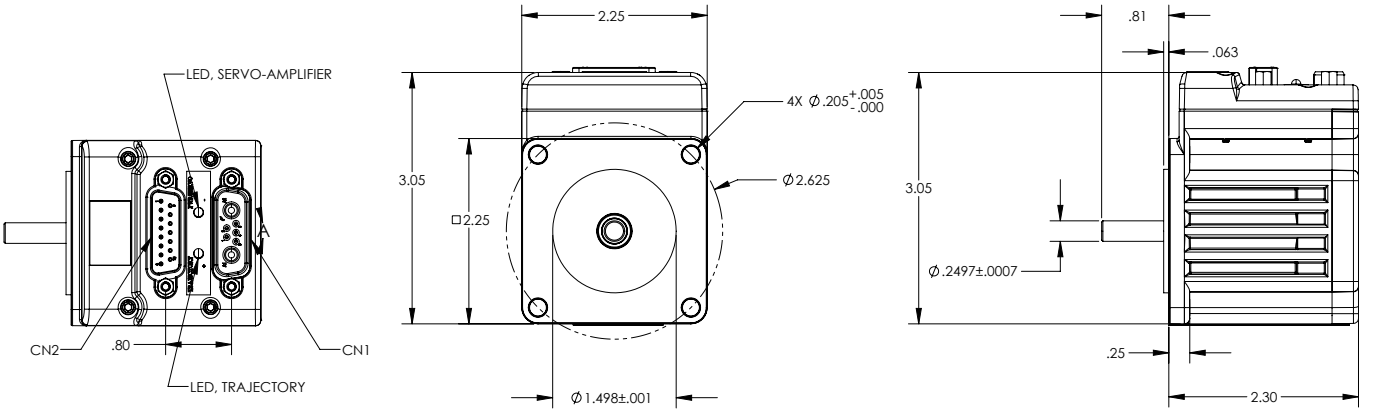


		SM23165D-CDS7	SM23165DT-CDS7	SM34165D-CDS7	SM34165DT-CDS7
Continuous Torque	Nm	0.28	0.52	1.09	1.45
Nominal Continuous Power	Watts	181	204	235	615
Max. Continuous Current @ 48 V	RPM	6,500	3,800	2,400	4,500
	Amps	3.55	5.07	6.02	16.93
Peak Torque	Nm	0.45	0.84	1.60	3.39
Peak Current @ 48 V	RPM	6,000	3,500	1,800	3,500
	Amps	4.43	5.73	6.38	23.86
No Load Speed @ 48 V	RPM	10,400	5,200	3,100	5,100
Voltage Constant	V/krpm	4.45	9.08	14.98	8.90
Inductance	mH	0.83	1.31	1.72	0.32
Encoder Resolution	Counts/Rev	4,000	4,000	8,000	8,000
Rotor Inertia	10-5 kg m2	0.6991	0.7060	9.8900	10.0310
Shaft Diameter	mm	6.35	6.35	9.53	12.70
Shaft, Radial Load	kg	3.18	3.18	6.80	13.61
Shaft, Axial Thrust Load	kg	1.36	1.36	1.36	1.36
Flange Size	mm	57.15	57.15	86.36	86.36
Motor Length	mm	58.42	58.42	95.12	95.12
Weight	kg	0.42	0.59	2.27	2.49
DE Option	-	Yes	Yes	Yes	Yes
BRK Option	-	Yes	Yes	Yes	Yes

Basic configuration of all SmartMotor™ servos listed: incremental optical encoder / communication: CANbus, DMX, ModBus® capability, primary RS-232 communications port / 7 channels 5 V TTL non-isolated I/O, and a dedicated encoder out.

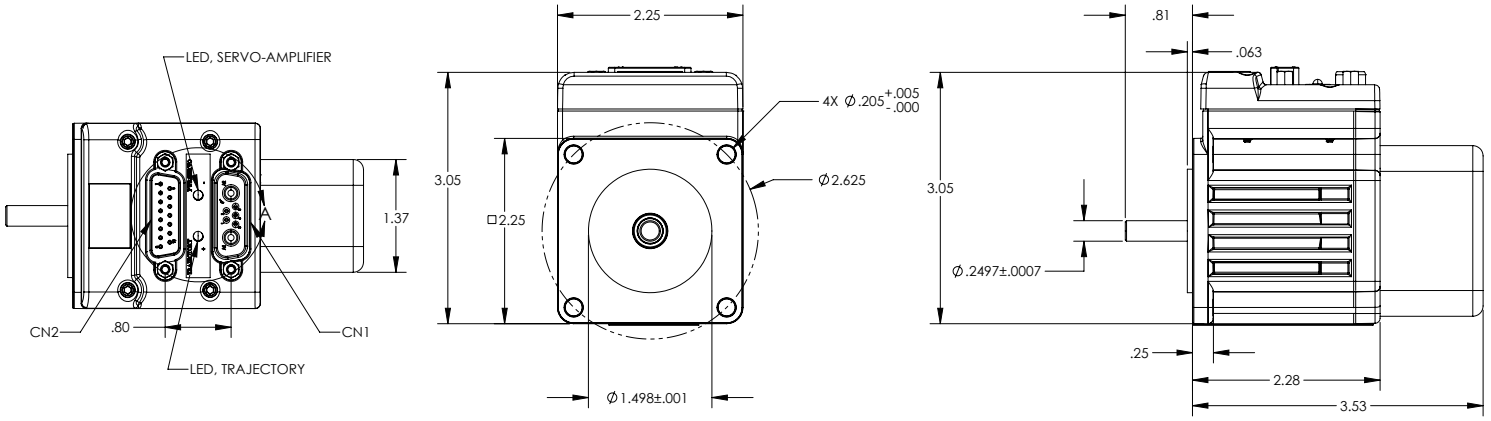
OUTLINE DRAWINGS

SM23165D-CDS7



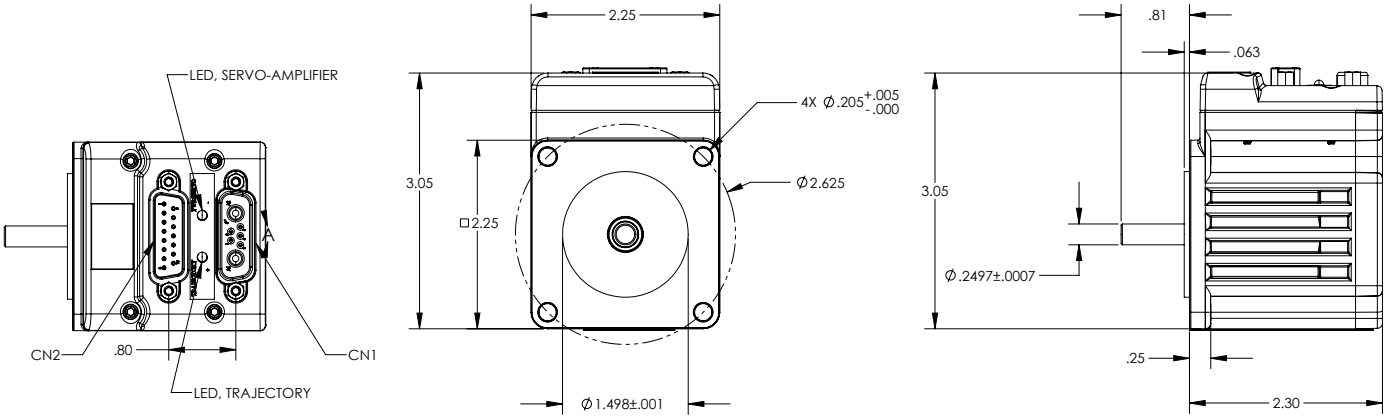
Dimensions in inches [mm]

SM23165D-BRK-CDS7



Dimensions in inches [mm]

SM23165DT-CDS7

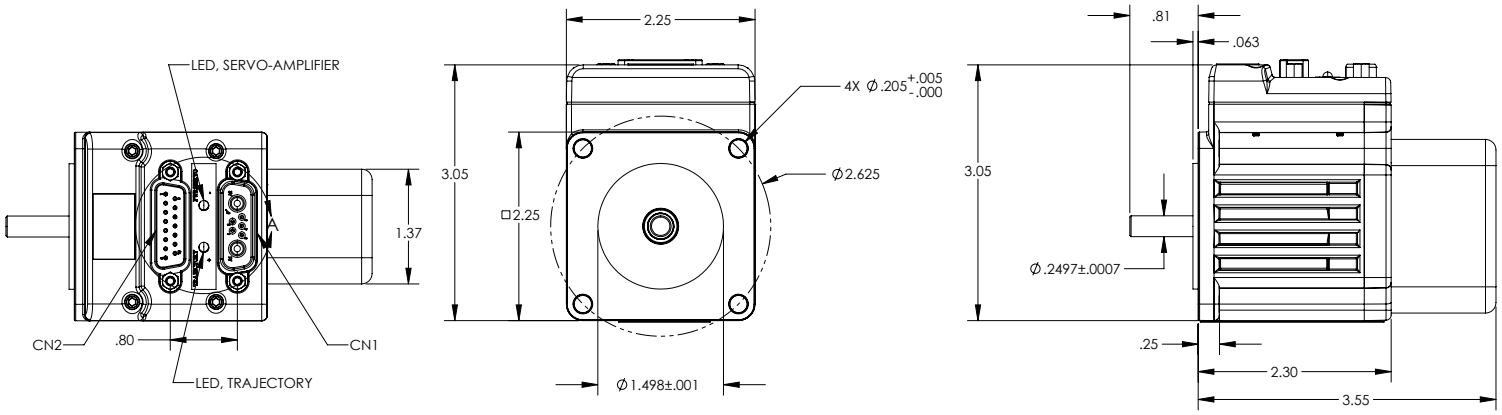


Dimensions in inches [mm]

NOTE: Motor specifications are subject to changes without notice. Consult website and factory for latest data.

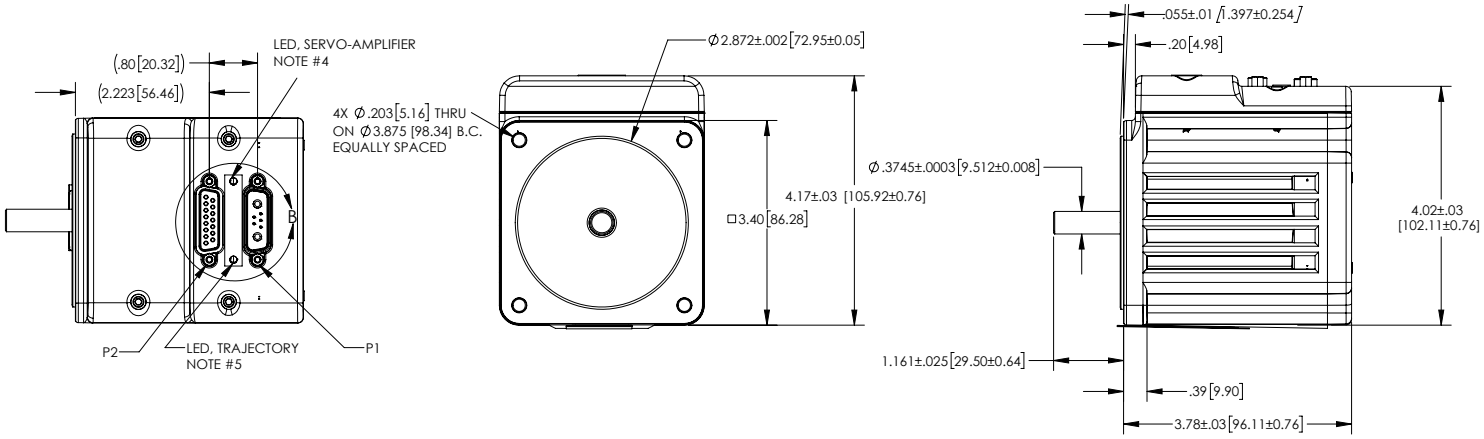
OUTLINE DRAWINGS

SM23165DT-BRK-CDS7



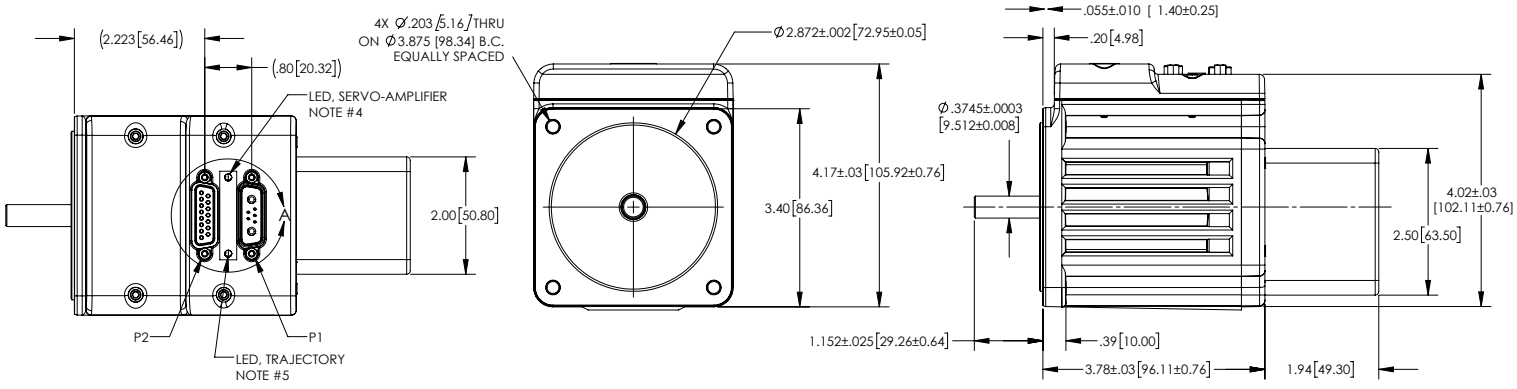
Dimensions in inches [mm]

SM34165D-CDS7



Dimensions in inches [mm]

SM34165D-BRK-CDS7

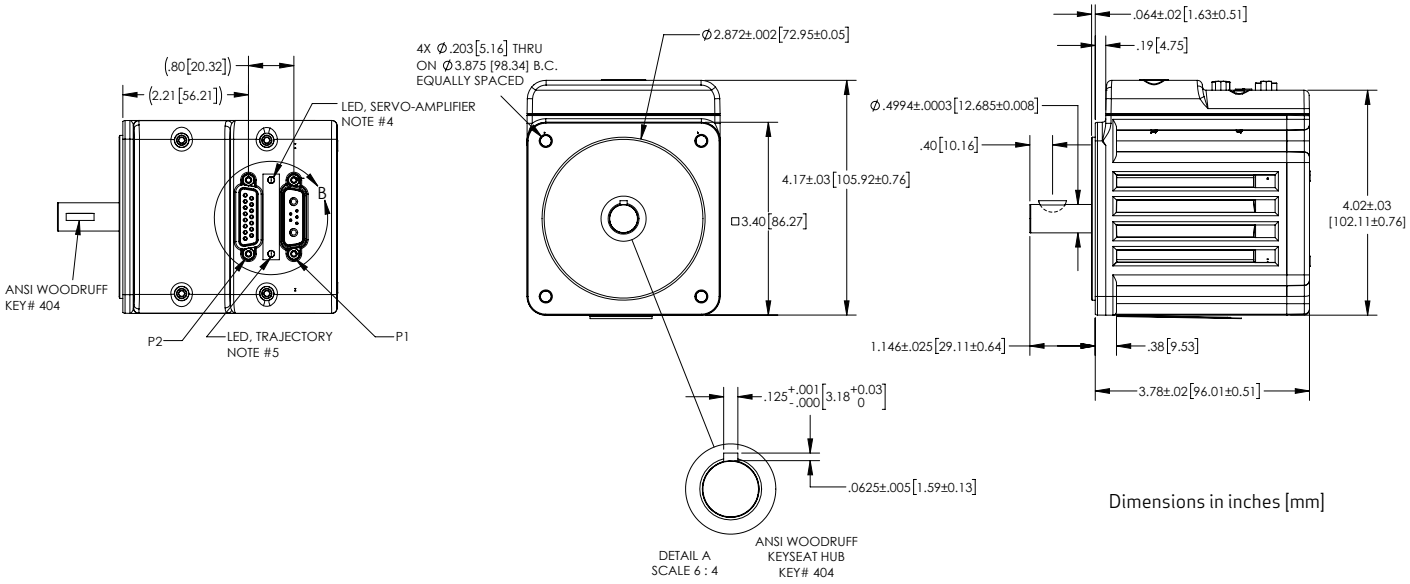


Dimensions in inches [mm]

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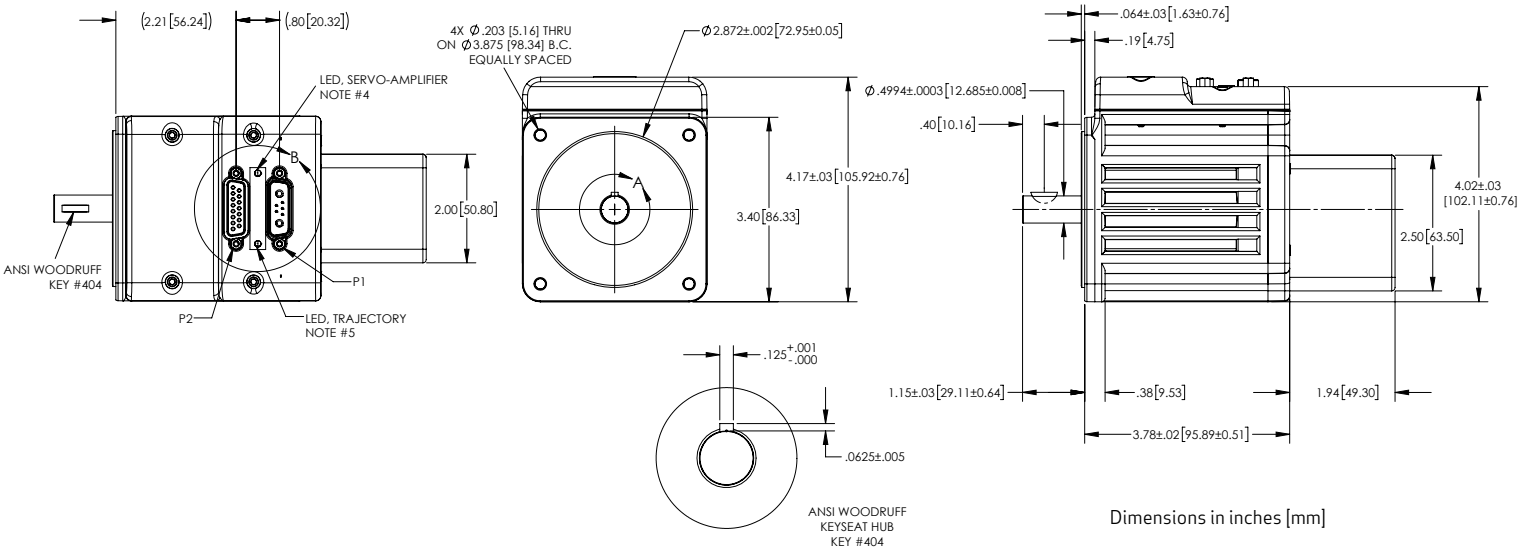
OUTLINE DRAWINGS

SM34165DT-CDS7



Dimensions in inches [mm]

SM34165DT-BRK-CDS7

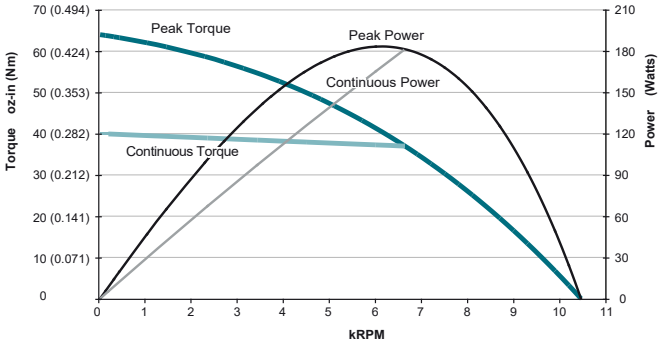


Dimensions in inches [mm]

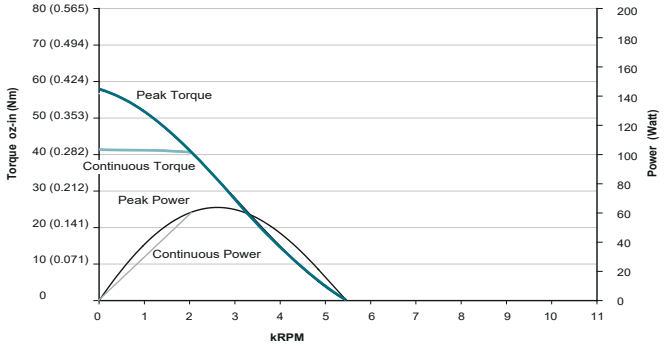
NOTE: Motor specifications are subject to changes without notice. Consult website and factory for latest data.

PERFORMANCE TORQUE POWER CURVES AND TECHNICAL DATA

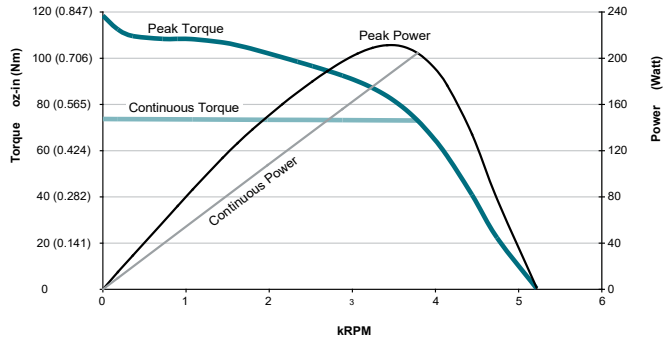
SM23165D-CDS7
Standard winding for 48 V, operating with 48 V



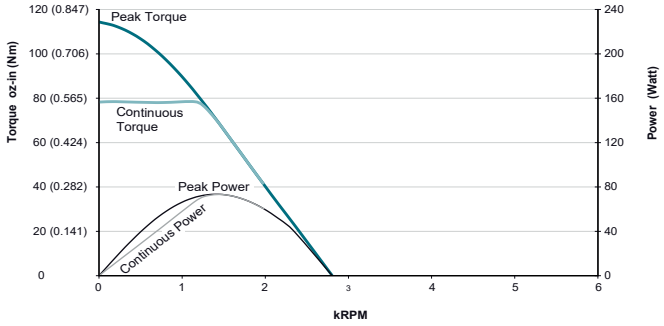
SM23165D-CDS7
Standard winding for 48 V, operating with 24 V



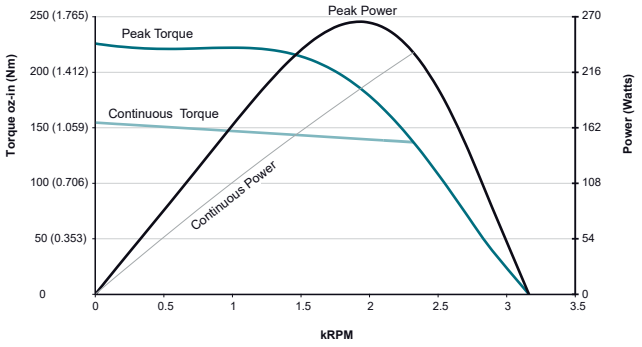
SM23165DT-CDS7
Winding for max. torque and 48 V, operating with 48 V



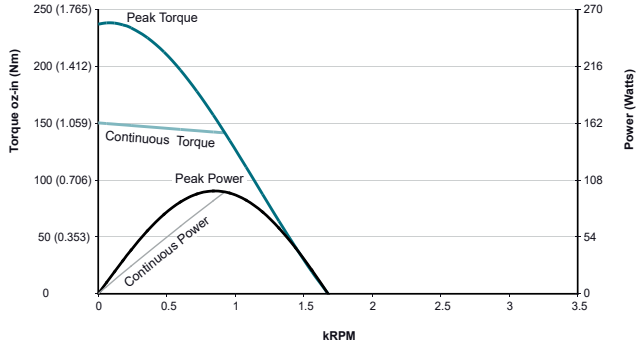
SM23165DT-CDS7
Winding for max. torque and 48 V, operating with 24 V



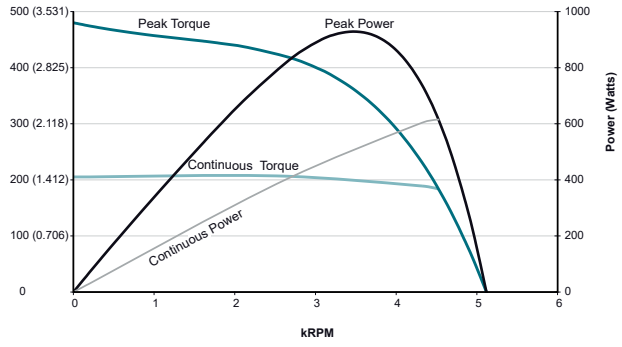
SM34165D-CDS7
Standard winding for 48 V, operating with 48 V



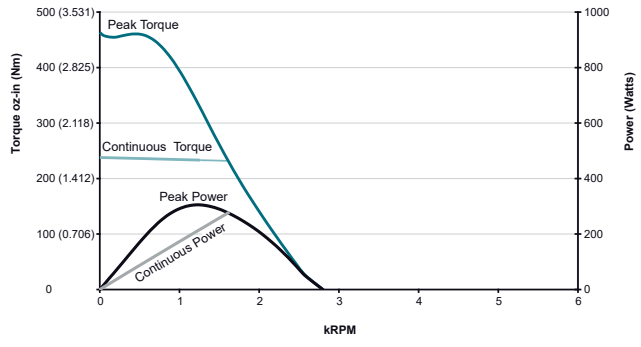
SM34165D-CDS7
Standard winding for 48 V, operating with 24 V



SM34165DT-CDS7
Winding for max. torque and 48 V, operating with 48 V

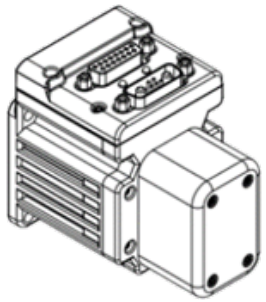


SM34165DT-CDS7
Winding for max. torque and 48 V, operating with 24 V



All torque curves based on 25° C ambient. For ambient temperatures above 25° C, continuous torque must be linearly derated to 0% at 105° C. Operating temperature range: from -20 to 105° C. Storage temperature range: from -40 to 125° C. Relative humidity: < 85%, noncondensing. Motors were operated using MDE (Enhanced Trapezoidal Drive Mode) commutation.

OPTIONS



Options	Available
Add -DE (drive enable)	Ability to power controller and drive separately
Add -BRK (brake)	Inline
Standard on all models	DMX protocol CANopen per CIA402 Combitronic™ communications over CANopen CAN over D-Sub 7W2 (CDS7) MODBUS RTU Encoder IN / OUT RS232/RS485 communication 7 freely definable I/Os

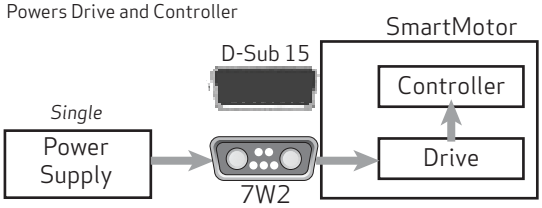
HARDWARE DE OPTION

The DE option allows the controller and drive-amplifier to be powered from separate 24-48 VDC power supplies.

- Controller can be powered from a standard 24 VDC supply
- Position will not be lost on loss-of-drive-power
- No need to re-home
- Load surges will not cause power surge on controller
- Standard battery options are made simpler

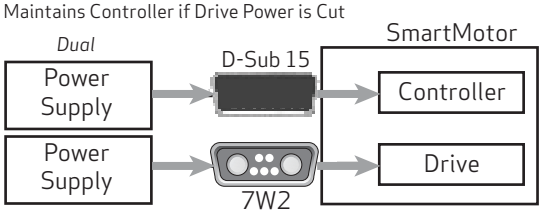
Single Power Supply

Powers Drive and Controller



Dual Power Supplies

Maintains Controller if Drive Power is Cut



CONNECTORS - CDS7

7W2 Combo D-Sub Connector



Pin	Description
A1	Main Power +20 - 48 VDC
A2	Common Ground (Req'd. POWER Ground)
1	CAN Low (Also on D-Sub 15)
2	CAN High (Also on D-Sub 15)
3	RS-232 Transmit (COM CH 0)
4	RS-232 Receive (COM CH 0)
5	SIG Ground

P2 DB-15 D-Sub Connector



Pin	Description
1	I/O - 0 GP or Enc. A or Step Input
2	I7O - 1 GP or Enc. B or Dir. Input
3	I/O - 2 Positive Over Travel or GP
4	I/O - 3 Negative Over Travel or GP
5	I/O - 4 GP or RS485 A Channel(1)
6	I/O - 5 GP or RS485 B Channel(1)
7	I/O - 6 GP or "G" command
8	Phase A Encoder Output

Pin	Description
9	Phase B Encoder Output
10	CAN Low
11	CAN High
12	+5VDC Out
13	SIG Ground
14	Encoder Ground A
15	Main Power: +20-48VDC

POWER CABLES AND ADAPTER

Power and Communication Cable (Flying Leads) for Main 7W2 Connector on the SmartMotor™

CBLPWRCOM3 series provides power along with RS-232 and CAN Bus communications in one convenient cable to simplify installation. It consists of a 7W2 main motor connector with RS-232 and CAN communications separately shielded from power, and a full shield over the entire length terminating at a metal jacket inside the over-molded connector.

Part Number	Length
CBLPWRCOM3-5M	5 meters
CBLPWRCOM3-10M	10 meters

NOTE: The connector has a blue cover.

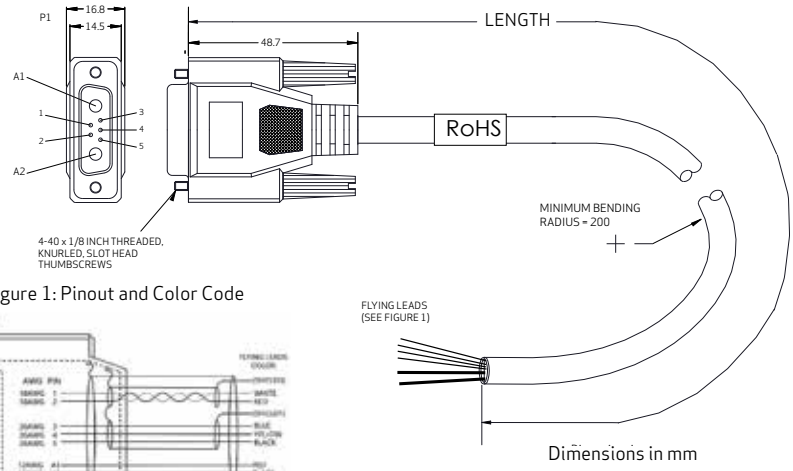


Figure 1: Pinout and Color Code

POWER CABLES AND ADAPTER

CBLSMCDS-xM (Moog Animatics CDS7 "Add-A-Motor™" Cable)

Power, RS-232 and CAN Bus Communications Daisy Chain Cable for Single-Cable Connections Between Multiple Moog Animatics SmartMotor™ Servos

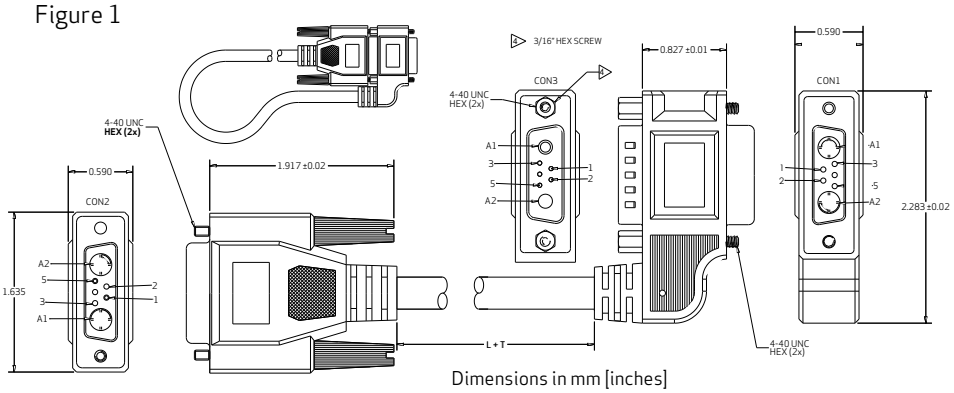
Part Number	Length
CBLSMCDS-0.3	0.3 meters
CBLSMCDS-0.9	0.9 meters
CBLSMCDS-3.0	3 meters

CBLSMCDS series is the "Add-A-Motor" -style power and communications cable for a CDS7-equipped SmartMotor. It consists of a pass-thru 7W2 main motor connector split out to a single second motor 7W2 connector. This single cable is capable of carrying power, RS-232 and CAN Bus communications from motor to motor using only the 7W2 connector.

The CBLSMCDS cable is designed to allow ease of connection to multiple motors in a single daisy-chain network. The main power ground wire is a larger gauge to decrease noise emissions at the ground-plane level. All communications lines are internally shielded from the power lines.

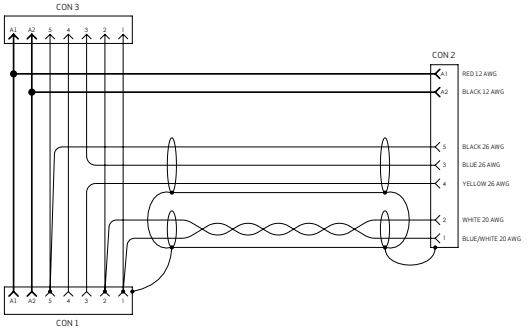
The two end nodes of the CAN Bus network must be terminated with a 120 ohm terminator (shunt) for proper biasing. If an end node is a SmartMotor, a pass-thru terminator is available (PN: CBLSM-TR120) that attaches directly to the motor's 15-pin D-sub connector to serve as the terminator.

Figure 1



Dimensions in mm [inches]

Figure 2



Connector Pinouts					
CON 3 Pin	AWG - Color / Stripe	CON 1 Pin	AWG - Color / Stripe	CON 2 Pin	Description
1	18 - Any	1	18 - Blue/White	1	CAN Bus Low
2	18 - Any	2	18 - White	2	CAN Bus High
3		NC	26 - Blue	3	RS-232 TX
NC		3	26 - Yellow	4	RS-232 Crossover
4	26 - Any	4		NC	RS-232 RX
5	26 - Any	5	26 - Black	5	Signal Return
A1	12 - Any	A1	*12 - Red	A1	Power
A2	12 - Any	A2	*12 - Black	A2	Ground

*CON 2 PIN A1 and A2 wires spliced to wires between CON 1 and 3.

Terminate 20/26 AWG shield drain wires to CON 1 and CON 2 as shown in Figure 2.

CAUTION: CBLSMCDS-xM should not to be used with any non-CDS7 version motors.

CAUTION: When using these cables with the larger 34 frame motors, please consult the factory for power limitations.

CONVENIENT AND SIMPLE CAN BUS PASS-THRU TERMINATION

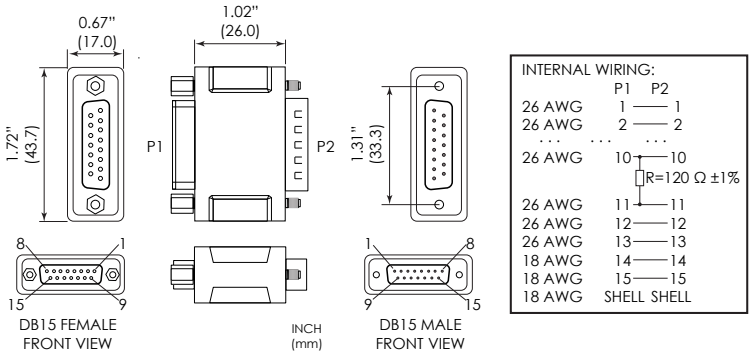
PN: CBLSM-TR120

The CBLSM-TR120 provides convenient, pass-thru termination for CAN Bus signals on the 15-pin D-Sub connector of the Class 5 SmartMotor. It is used on D-style Class 5 CDS7 version SmartMotors.

The CBLSM-TR120 requires no special software or drivers — it simply attaches onto the 15-pin D-sub connector, allowing you to terminate the CAN Bus signal on the last SmartMotor node while still having access to the other D-sub connector pins.

NOTE:

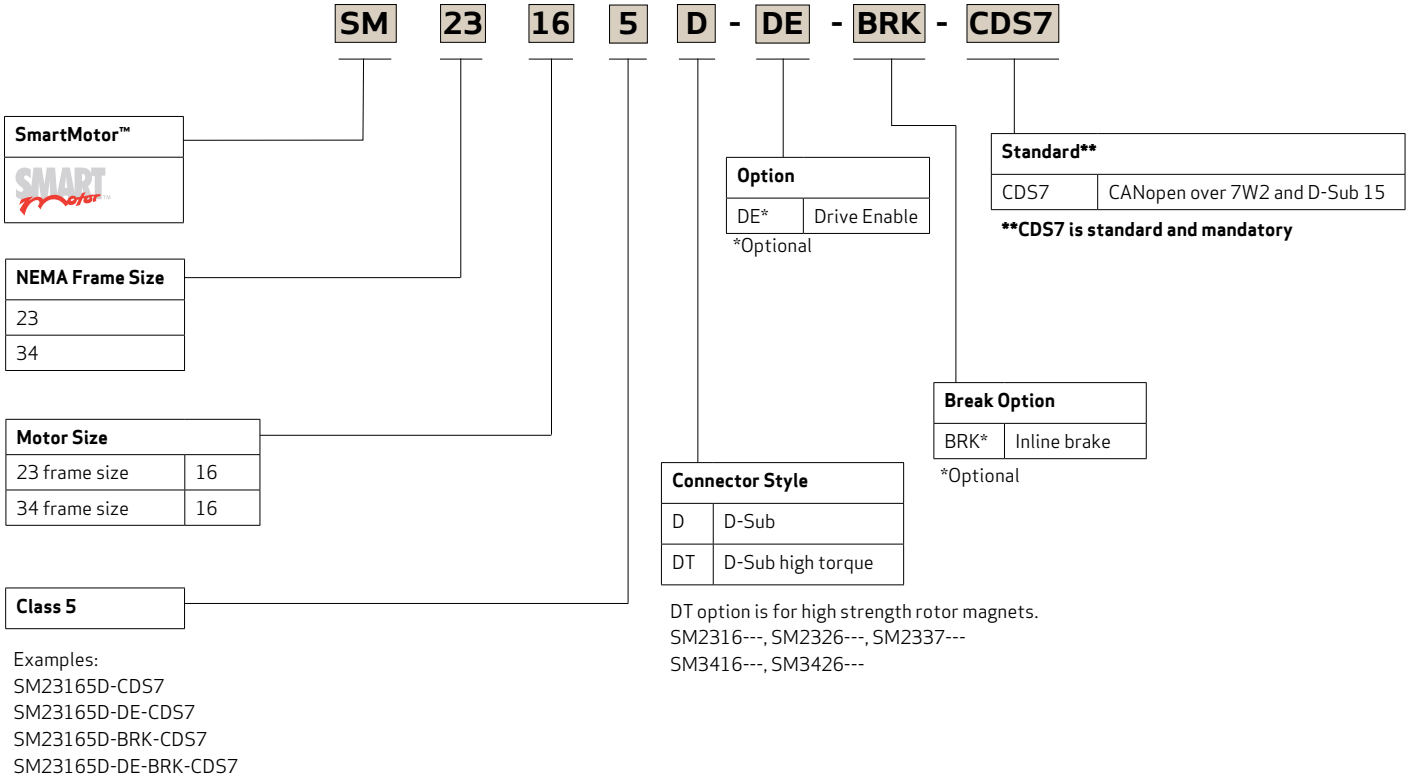
- The last SmartMotor in the daisy chain must also be the last CAN Bus node. If there are other CANopen devices connected to the last SmartMotor, then a 120 ohm terminator (shunt) must be applied to the final CAN Bus device.
- For proper termination, there must be one terminator at each end of the CAN Bus.



CAUTION: Proper termination is critical for successful network communications. Using less than two terminators is not acceptable; using more than two terminators is not acceptable.

PART NUMBERING GUIDELINES

ORDERING CODE



DT option is for high strength rotor magnets.
SM2316---, SM2326---, SM2337---
SM3416---, SM3426---

Examples:
SM23165D-CDS7
SM23165D-DE-CDS7
SM23165D-BRK-CDS7
SM23165D-DE-BRK-CDS7

For product information, visit **www.animatics.com**

For more information or the office nearest you, contact us online, **animatics_sales@moog.com**

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MCM/Rev. -, January 2025, Id. CDL68486-en

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