10 DCS Series
DC Servo Drives

The DCS series drives are fully digital brushed servo drives developed with high performance DSP and advanced algorithms for smooth motion control. Opto-isolated step and direction control inputs allow the drives to be drop-in replacements for stepper motor drives. In low power motion control applications DC servo motor systems perform as well as or even better than AC servo motor systems with high precision, high reliability and low noise at far lower costs.

The DCS series drives are easy to use. Leadshine offers PC-based software ProTuner for Windows. A handheld tuning and configuration tool, the STU-DCS allows configuration of the drives out in the field.

The DCS303 is a micro-size (86×55.5×20.5 mm or 3.4×2.2×0.81 inches) brushed DC servo drive. It is ideal for low power applications with limited mounting space.

The DSC810S is designed to replace the DB810-50V which was widely used in inkjet printers. It offers improved performance with the same electrical connections.

The DCS810 accepts differential command and encoder feedback inputs, offering better anti-interference performance.

Rated Power

90W	400W	400W

10.1 Features

- Advanced DSP control technology for smooth motion
- 18 VDC to 80 VDC supply range and capable of providing 10 A continuous and 20 A peak current
- Suitable for 10 W to 400 W brushed DC servo motors
- Position control with 4 × encoder resolution accuracy
- Adjustable position following error alarm range
- Electronic gearing with adjustable ratio from 1/255 to 255
- Built-in pulse generator for servo tuning and self-test
- Support step&direction and CW/CCW pulse commands
- Opto-isolated inputs supporting single-ended or differential signals
- PC-based and handheld configuration tools available
- Over-current, over-voltage, under-voltage, phase error, encoder error and position following error protections
- 10 error history log for easy troubleshooting

10.2 Typical Applications

Widely used in large format inkjet printers, solvent printers, small and medium engraving machines, electronic manufacturing, CNC machines, packing machines and production line equipment. These brushed DC servo drives are particularly suited to systems that require high precision and high speed at low cost.

Printing Machines

Packing Machines

High Precision — Highly Cost-effective — Compact Size — Quick Response — High Speed

DC Servo Systems

Pick and place Machines

Electronic Manufacturing

CNC Machines

10.3 Part Number

DCS	8	10	S
①	②	③	④

①	Series	DCS: DCS Series DC Servo Drives
②	Maximum Input Voltage	8: 80 VDC 3: 30 VDC
③	Maximum Continuous Current	10: 10 A 3: 3A
④	Special Model Symbol	Blank: Standard S: Single-ended input

10.4 Specifications

Electrical Specifications

Parameters	DCS303	DCS810	DCS810S
Maximum Continuous Power	90 W	400 W	400 W
Maximum Continuous Current	3 A	10 A	10 A
Peak Current	15 A	20 A	20 A
Input Voltage	18 to 30 VDC	18 to 80 VDC	18 to 80 VDC
Logical Signal Input Current	7 to 20 mA	7 to 20 mA	7 to 20 mA
Pulse Input Frequency	0 to 250 kHz	0 to 250 kHz	0 to 250 kHz
Isolation Resistance	500 MΩ	500 MΩ	500 MΩ
Current Provided for Encoder	50 mA	50 mA	50 mA

Control Specifications

Parameters	DCS303	DCS810	DCS810S
Command Input	Step/Direction	Step/Direction & CW/CCW	Step/Direction & CW/CCW
	Single-ended	Single-ended & Differential	Single-ended
Enable/Disable Input	Single-ended	Differential	Differential
Alarm Signal Output	Isolated, OC Output	No	NONE-Isolated, OC Output
Communication Connector	B4B-PH	RJ11	RJ11
Communication Interface	RS232	RS232	RS232
Encoder Feedback	A, B (Single-ended)	A+, A-, B+, B- (Differential)	A, B (Single-ended)

Configuration and Tuning Tools

Parameters	DCS303	DCS810	DCS810S
PC based tuning software	ProTuner	ProTuner	ProTuner
Handheld tuning unit	STU-DCS	STU-DCS	STU-DCS

Mechanical Specifications

Parameters	DCS303	DCS810	DCS810S
Size (mm)	86×55.5×20.5	116×69.2×26.5	116×69.2×26.5
Weight (g)	100	210	212

Powering Motors

Parameters	DCS303	DCS810	DCS810S
Powering Motors	18 to 30 VDC brush DC servo motors with single-ended encoder, power up to 90W	18 to 80 VDC brush DC servo motors with differential encoder, power up to 400W	18 to 80 VDC brush DC servo motors with single-ended encoder, power up to 400W

Operating Environment

Cooling		Natural cooling or Forced cooling
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0 to +50 ℃.
	Humidity	40% RH to 90%RH, no condensation
	Vibration	5.9 m/s² MAX
Storage Temperature		-20 ℃ to 80 ℃

10.5 System Tuning and Configuration

Configuration and Tuning Tools

Leadshine offers PC based and handheld configuration & tuning tools to meet different requirements and configuration and tuning environments. The user can tune the DCS series drives with two different tuning tools, including ProTuner (Windows based setup software) and STU-DCS (Handheld servo tuning unit).

STU-DCS (Handheldl Servo Tuning Unit)

- Similar to most HMI of servo drives from other manufacturers
- PID parameter settings for position loop
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Real-time current, velocity, position following error display.
- Parameter settings for self motion test (with trapezoidal velocity profile)
- Read the latest 10 failure events and clear the events

Notes:
1. Leadshine offers a special cable for communication between the drive and STU-DCS handheld tuner.

ProTuner (Windows Based Setup Software)

- Upload and Download parameter settings
- Digital oscilloscope for real-time current, velocity, position following error display. Measurements can be taken using the mouse pointer.
- PID parameter settings for position loop
- PI parameter settings for current loop
- Electronic gear rate setting from 1/255 to 255
- Position following error range setting
- Encoder resolution setting
- Parameter settings for self motion test (with trapezoidal velocity profile)
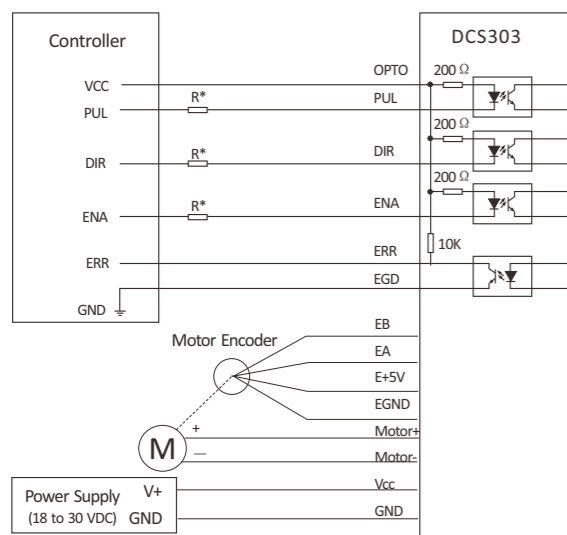- Read the latest 10 failure events and clear the events

Notes:
1. One PC RS232 interface or one USB port for USB-to-RS232 converter is necessary.
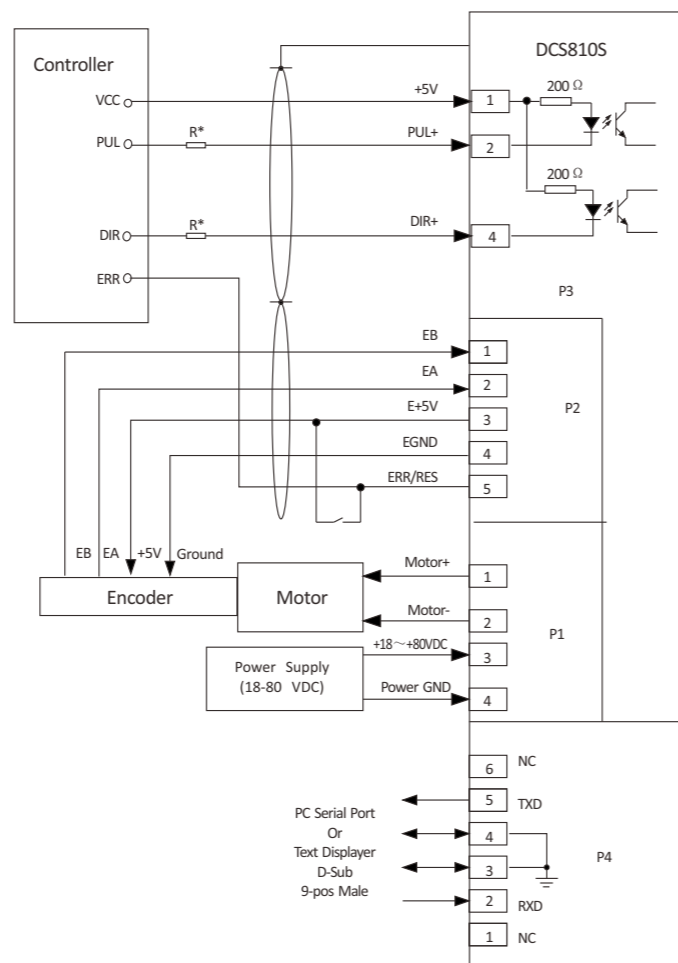2. Leadshine offers special cable for communication between ProTuner and the drive.
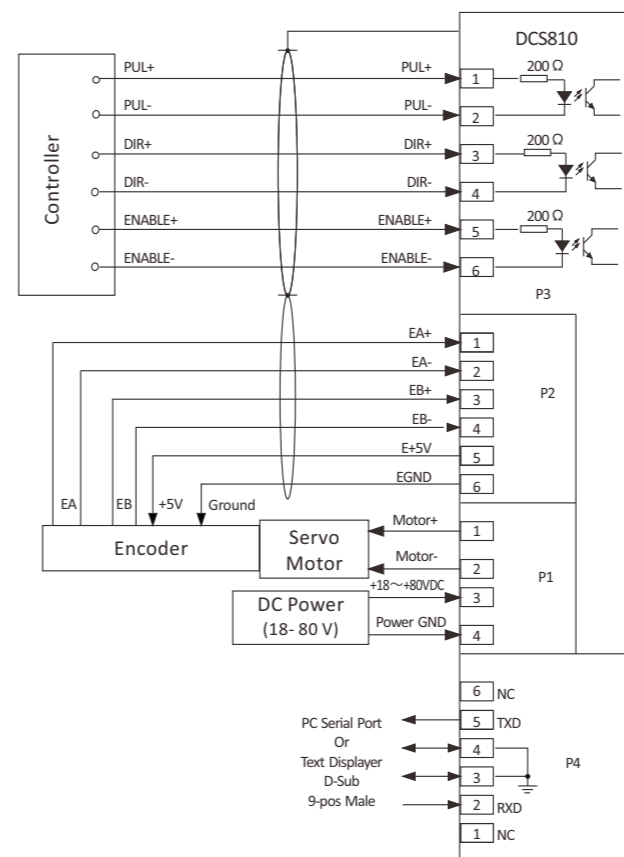
10.6 Wiring Examples

● DCS303

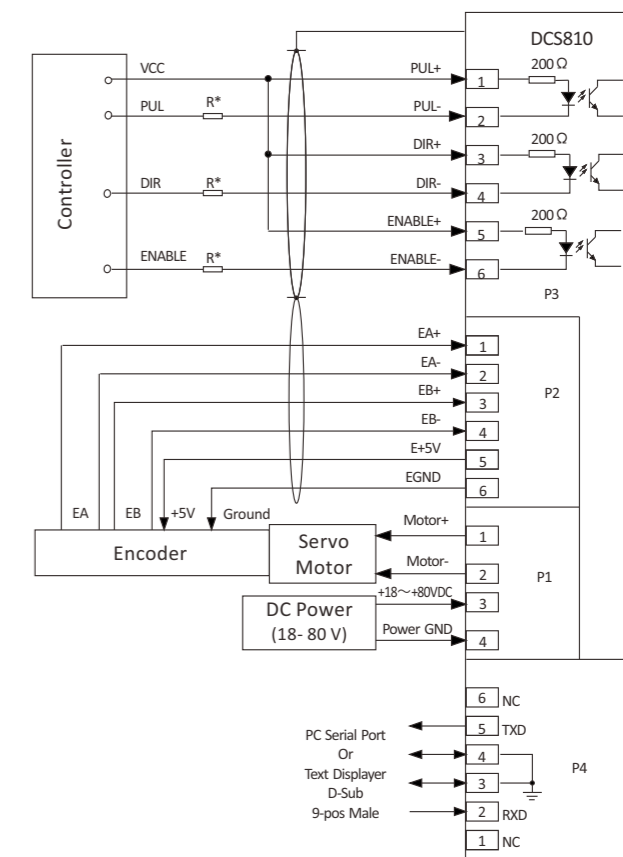
● DCS810S

● DCS810

1) Using differential controller

2) Using single-ended controller

| Differential Control Signals	Single-end Control Signals

Notes:

1. The drive can accept differential and single-ended inputs, including open-collector and PNP output. Recommend use differential (line driver) control signals to increase noise immunity of the system.

2. *Series connect resistors for current-limiting when +12V or +24V single-ended control signals are used. R=1K (Power>0.25W), if Vcc=12 V, and R=2K (Power>0.25W), if Vcc=24 V.
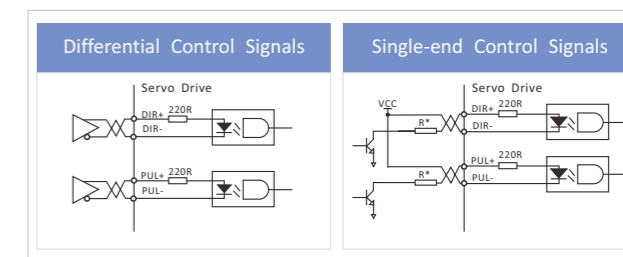
10.7 Mechanical Specifications

Units: mm   1 inch = 25.4 mm

●DCS303
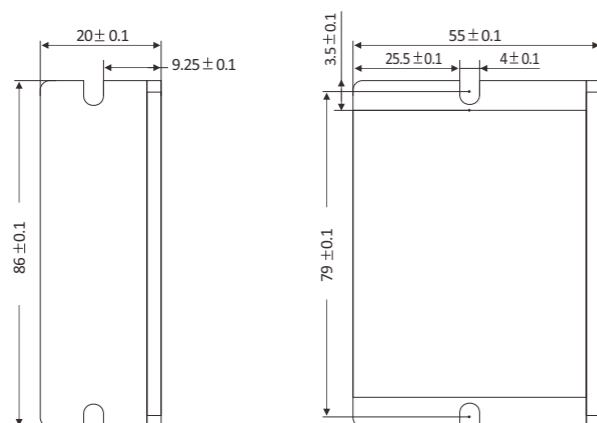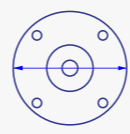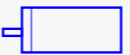
●DCS810, DCS810S
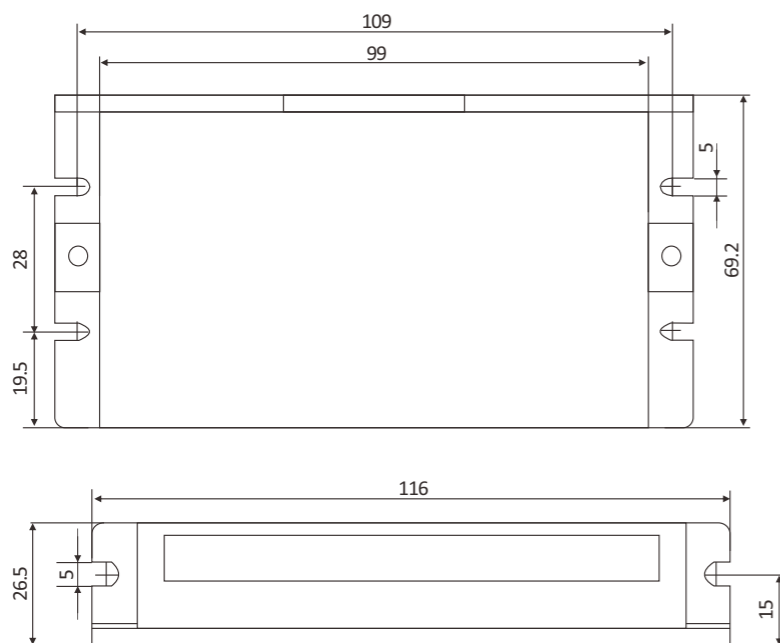
11 DCM Series
DC Servo Motors

The DCM series motors are permanent magnet brushed DC servo motors. The motors are high quality and cost-effective, making them ideal for cost sensitive applications. All of them come with an attached encoder which provides position feedback to controllers.

The DCM series brushed DC servo motors are widely used in inkjet printers, medical equipment, measuring devices, engraving machines, electronic packing equipment, and so on. Particularly suited to the applications requiring minimal vibration, super-low noise, high precision and high speed.

Frame Size	⌀ 54mm Max
Rated Power	50W 80W 120W

11.1 Part Number

$$\underset{①}{\text{DCM}} \quad \underset{②}{\text{50205}} \quad \underset{③}{\text{D}} \!-\! \underset{④}{\text{1000}}$$

①	Series	DCM: DCM Series DC servo motors		
②	Power	50202A: 50W	50205: 80W	50207: 120W
③	Encoder Type	D: Differential	Blank: Single-ended	
④	Encoder Resolution	1000: 1000-line(4000ppr)	2500: 2500-line(10000ppr)	

11.2 Electrical Specifications

⌀ 54mm Max

Power: 50W, 80W, 120W

Specifications

Parameters	Units	DCM50202A	DCM50205	DCM50207
Rated Voltage	VDC	24	24	30.3
Rated Power	W	50	80	120
Continuous Torque (Max)	Nm	0.15	0.25	0.35
Peak Torque (Stall)	Nm	0.76	1.59	2.90
No-load Speed	RPM	4600±10%	4000±10%	3600±10%
Rated Speed	RPM	3500	3400	2900
Rated Current	A	1.79	2.95	3.94
Peak Current (Stall)	A	13.9	21.6	32.6
No-load Current	A	0.45	0.5	0.45
Torque Constant	Nm/A	48×10^{-3}	52×10^{-3}	80×10^{-3}
Rotor Inertia	$Kg*m^2 \times 10^{-5}$	1.62	3.11	4.73
Winding Temperature	°C	155 (Max)	155 (Max)	155 (Max)
Thermal Impedance	°C/watt	9.00	7.30	4.98
Encoder Resolution	Line	500/1000 optional	500/1000 optional	500/1000 optional
Length (Plus Encoder)	mm	133±2	165±2	196±2
Weight (Plus Encoder)	g	694	1182	1338

Encoder Specifications & Connections

The rated voltage of the encoders come with the DCM series motors is 5VDC, and it consumes 50mA(max). The DCM5xxxxx-1000 motor comes with a 1000-line encoder, and the DCM5xxxxx-500 motor comes with a 50-line encoder. The Z (Index) signal is NOT offered by standard models, please contact Leadshine if an encoder with Z (Index) signal is required.

Encoder Connections

| Connections of a single-ended encoder			Connections of a differential encoder		
Pin	Wire Color	Connection (DCS303, DCS810S / DCS810)	Pin	Wire Color	Connection (DCS810)
1	Blue	Channel B (EB / EB+)	1	Black	Channel A+ (EA+)
2	Yellow	Channel A (EA / EA+)	2	Blue	Channel A- (EA-)
3	Red	VCC (E+5V / E+5V)	3	Yellow	Channel B+ (EB+)
4	Black	Ground (EGND / EGND)	4	Green	Channel B- (EB-)
5	Green	Index / NC (NC / NC)	5	Red	VCC (E+5V)
			6	White	Ground (EGND)

11.3 Mechanical Specifications
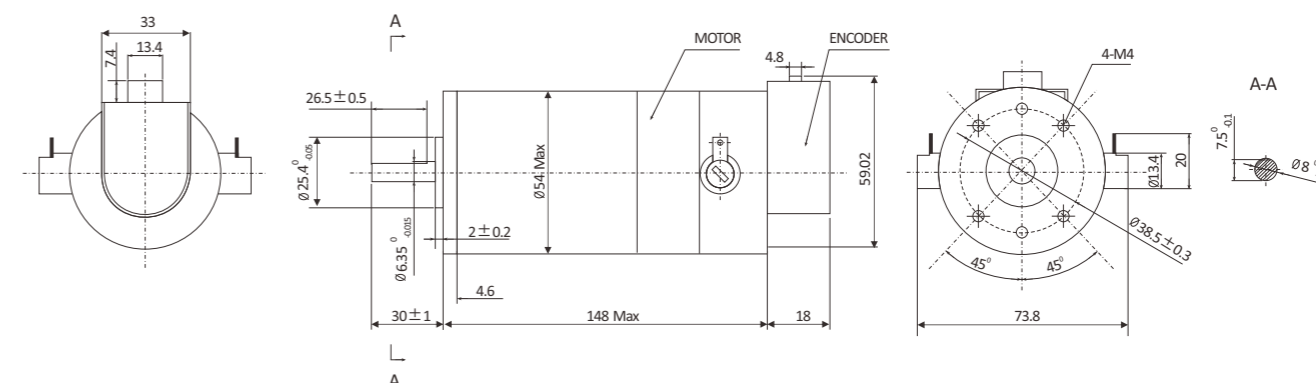
Units: mm   1 inch = 25.4 mm
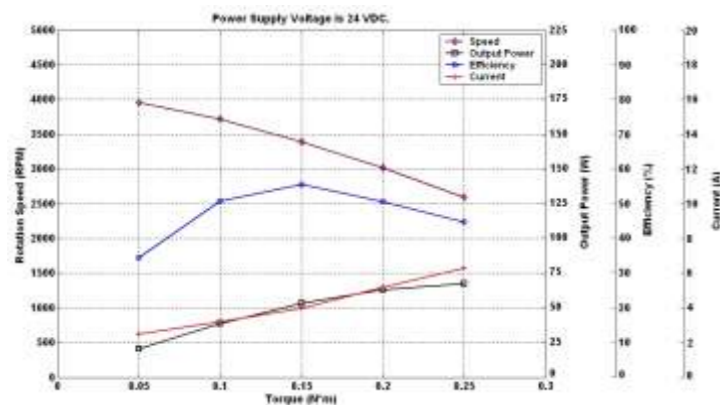
● DCM50202A
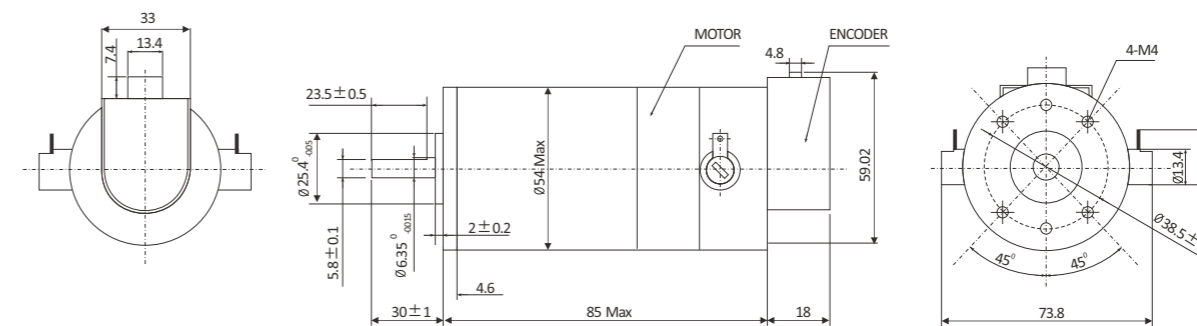
● DCM50205
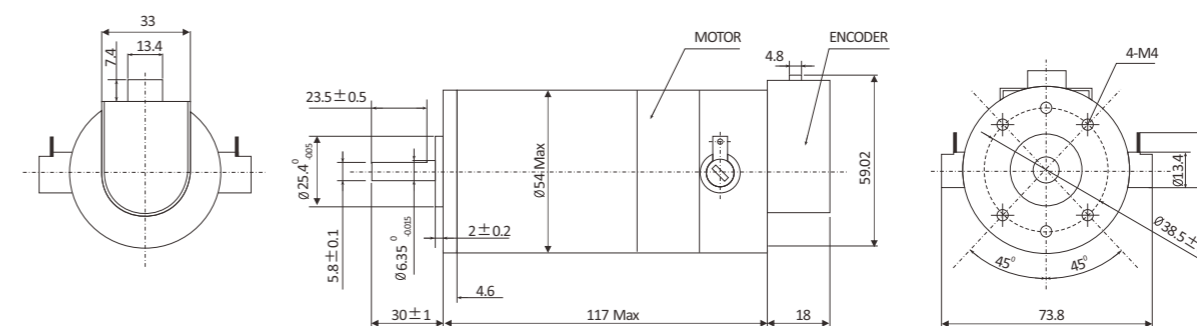
● DCM50207

Installation Notes:

(1) Do not give strong impact shock to the motor shaft.

(2) Make sure the encoder signals are connected to the drive correctly.

(3) The motors are not water proof. Please contact Leadshine if you need a water proof product.

(4) Keep the ambient temperature within the permissible temperature range (0 to 40 °C) for the product. Use force cooling methord if necessary.
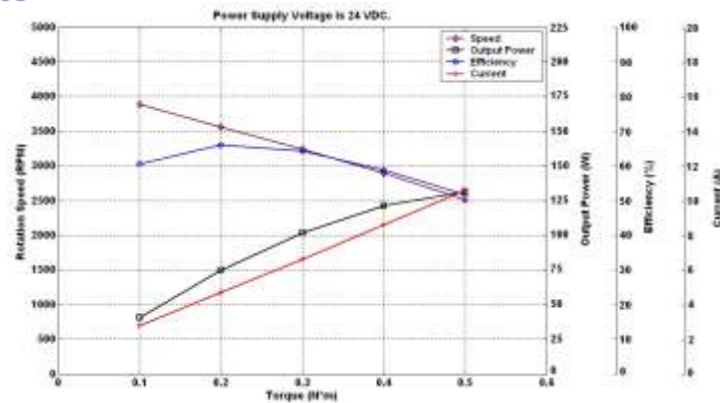
11.4 Speed-Torque Curves

Matching Drives
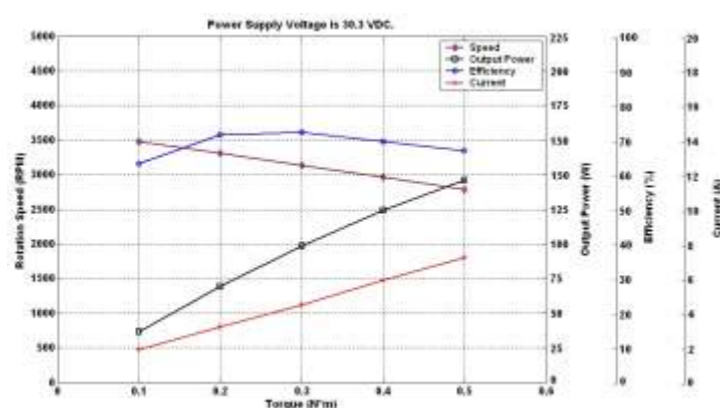
DCS303	DCS810 / DCS810S
90 W	400 W

●DCM50202A

●DCM50205

●DCM50207

12 DC Servos
Order Information

Power	Drive	Motor	Accessories
50 W	DCS303	DCM50202A-1000	CABLE-PC-1 (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50202A-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase single-ended), and the DCM50202A-500, a DC servo motor with a 500-line incremental encoder (A, B phase single-ended) is optional.
50 W	DCS810	DCM50202AD-1000	CABLE-PC-1 (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50202AD-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase differential), and the DCM50202AD-500, a DC servo motor with a 500-line incremental encoder (A, B phase differential) is optional.
80 W	DCS810S	DCM50205-1000	CABLE-PC (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50205-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase single-ended), and the DCM50205-500, a DC servo motor with a 500-line incremental encoder (A, B phase single-ended) is optional.
80 W	DCS810	DCM50205D-1000	CABLE-PC (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50205D-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase differential), and the DCM50205D-500, a DC servo motor with a 500-line incremental encoder (A, B phase differential) is optional.
120 W	DCS810S	DCM50207-1000	CABLE-PC (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50207-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase single-ended), and the DCM50207-500, a DC servo motor with a 500-line incremental encoder (A, B phase single-ended) is optional.
120 W	DCS810	DCM50207D-1000	CABLE-PC (RS232 cable for using ProTuner. 1.5m standard.) Note: The DCM50207D-1000 is a DC servo motor with a 1000-line incremental encoder (A, B phase differential), and the DCM50207D-500, a DC servo motor with a 500-line incremental encoder (A, B phase differential) is optional.

Note: The STU-DCS and the cable between the STU-DCS and drive are NOT standard accessories. Please specify when you place an order if you need.