

Hardware Reference

The information in this chapter will enable you to:

- Use this chapter as a quick-reference tool for most system specifications (dimensions and performance)
- Use this chapter as a quick-reference tool for DIP switch settings

Environmental Specifications

Drive Temperature

131°F (50°C) measured at the heatsink fins. An internal thermostat will shut down the drive if the unit reaches 158°F (70°C) internally. *Current settings in excess of 4A in high ambient temperature environments (above 113°F [45°C]) may require fan cooling to keep the heatsink temperature within allowable limits and to keep the drive from shutting itself down due to over temperature.*

Motor Temperature

212°F (100°C) maximum allowable motor case temperature. Actual temperature rise is duty cycle dependent.

Electrical Specifications

Input Power

- 90VAC to 132VAC @ 50/60 Hz

Output Power

- Low power: 0.1 to 6A per phase at 170VDC
- High power: 0.2 to 8A per phase at 170VDC

Output Type

- Two phase MOSFET bipolar (H-bridge) switching at 21 kHz (nominal), pulse width modulated

Fault Output

- Open-collector
- Open emitter
- 4N35
- $V_{CE} = 35\text{VDC}$
- $V_{CESAT} = 0.3\text{VDC}$
- Collector Current = 10 mA minimum
- Dissipation = 100 mW maximum

Minimum Motor Winding Inductance

- 2 mH (Compumotor recommends 5 mH measured in series or parallel)

Maximum Motor Winding Inductance

- None (Compumotor recommends 50 mH measured in series or parallel)

Minimum Motor Hipot

- 500VAC

Step & Direction Signal Specification

The inputs are optically isolated and may be driven (activated) by providing a positive pulse to the plus input with respect to the minus input. These inputs may also be differentially driven. The input driver must provide a minimum of 6.5 mA (15 mA maximum).

Step Pulse Input

You must operate the step pulse input within the following guidelines.

- 200 nanosecond-pulse minimum
- 40% - 60% duty cycle (2 MHz max pulse rate)

Direction Input

The direction input may change polarity coincident with the last step pulse. The direction input must be stable for at least 2 ms before the drive receives the first pulse.

Shutdown & Set Zero Phase Signal Specification

The inputs are optically isolated and may be driven (activated) by providing a positive pulse to the plus input with respect to the *minus* input. *The input driver must provide a minimum of 2.5 mA (30 mA maximum). The maximum reverse voltage for this input is 3VDC.*

Shutdown Input (Amplifier Disable)

You may enable this function when the motor is not moving. The input must be active for 100 ms to disable the amplifier. The SHUTDOWN input must be inactive for 100 ms before the first step pulse is received.

Set Zero Phase Input

This input allows you to reset the motor phase currents to power-up position. It is primarily for linear motor applications. The input must be active for 100 ms to reset the motor phase currents to the zero state. The ZERO PHASE input must be inactive for 100 ms before the first step pulse is received.

Fault Output

This output is an open-collector, open emitter output from a 4N35 OPTO isolator. The output transistor will conduct when the drive is functioning properly. The transistor will not conduct when any of the following conditions exist:

- No power is applied to the drive
- There is insufficient AC line voltage (90VAC)
- The drive temperature is too high
- The drive detects a motor fault
- The Shutdown input is enabled

Helpful Hint: Electric Parameters—Outputs

This output has the following characteristics:

- $V_{CE} = 35\text{VDC}$
- $V_{CESAT} = 0.3\text{VDC}$
- Collector Current = 10 mA minimum
- Dissipation = 100 mW maximum

Operational Specifications

Accuracy

±5 arcminutes typical (unloaded, bidirectional) with Compumotor motors.

Repeatability

±5 arcseconds typical (unloaded, unidirectional).

Hysteresis

Less than 2 arcminutes (0.0334°) unloaded, bidirectional.

Rotor Inertia

Size 23	Rotor Inertia oz-in ²	Rotor Inertia (Kg-m ² x 10 ⁻⁶)
S57-51	0.546	9.998
S57-83	1.1	20.1
S57-102	1.69	30.9
Size 34	Rotor Inertia oz-in ²	Rotor Inertia (Kg-m ² x 10 ⁻⁶)
S83-62	3.47	63.4
S83-93	6.76	124
S83-135	10.47	191
Size 42	Rotor Inertia oz-in ²	Rotor Inertia Kg-cm ²
S106-178	44.0	8.05
S106-205	52.0	9.51
S106-250	63.0	12.14

Rotor Inertia (Compumotor Motors)

Motor Current & Torque

Speed/torque curves for the S Drive are provided later in this chapter.

Motor Size	Current	Static Torque (in-oz)
S57-51 S	1.18	65
S57-51 P	2.28	65
S57-83 S	1.52	100
S57-83 P	3.09	100
S57-102 S	1.71	130
S57-102 P	3.49	130
S83-62 S	2.19	150
S83-62 P	4.42	150
S83-93 S	2.85	290
S83-93 P	5.62	290
S83-135 S	3.47	400
S83-135 P	6.00	343

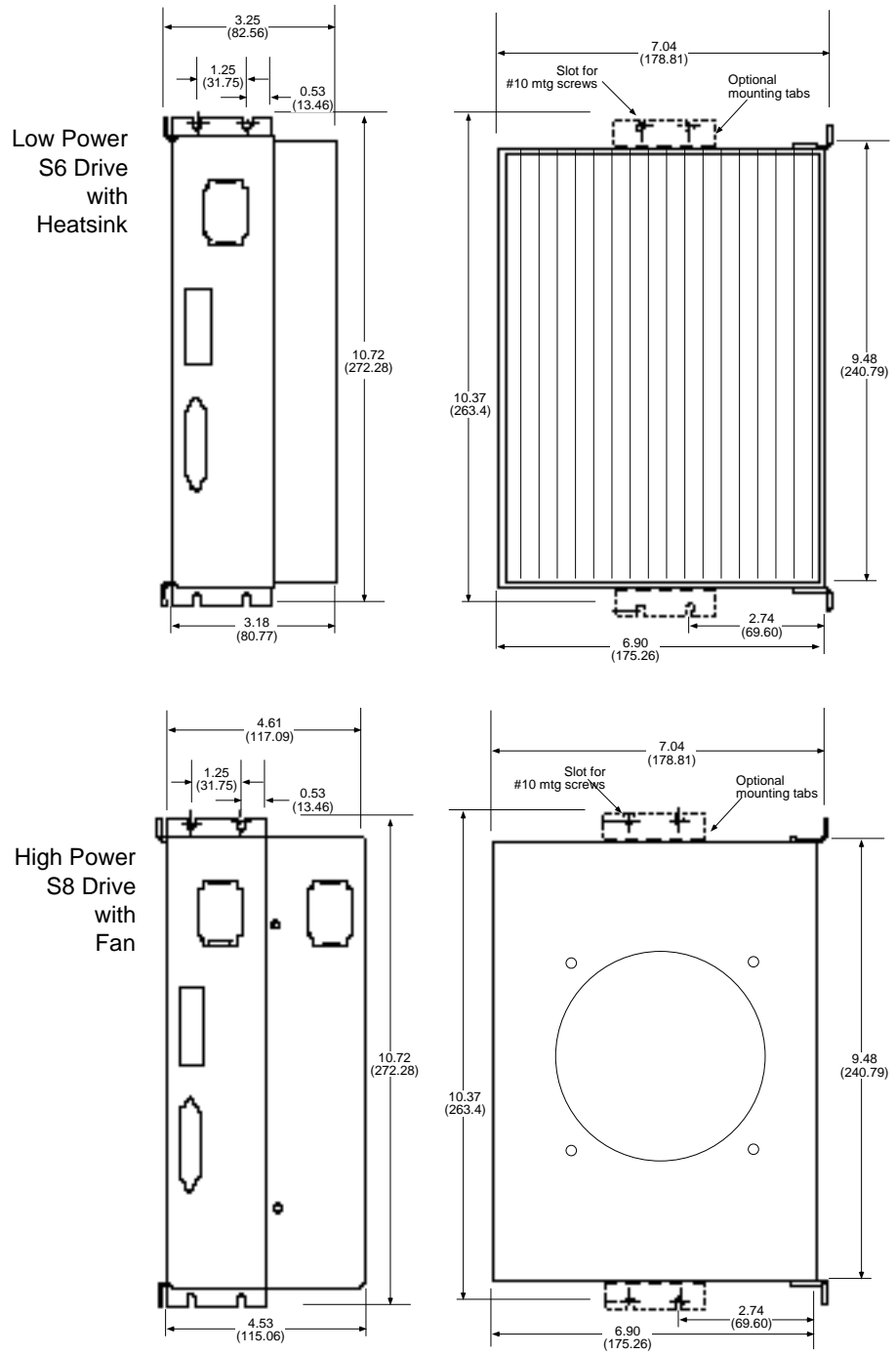
Motor Specifications (S6)

Motor Size	Current	Static Torque (in-oz)
S106-178 S	6.02	1000
S106-178 P	8.0	667
S106-205 S	3.55	1900
S106-205 P	6.99	1900
S106-250 S	6.02	1450
S106-250 P	8.0	967

S: Series Configuration P: Parallel Configuration

Motor Specifications (S8)

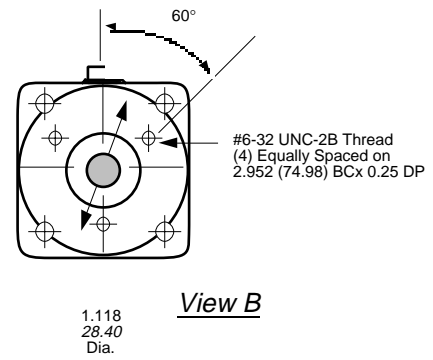
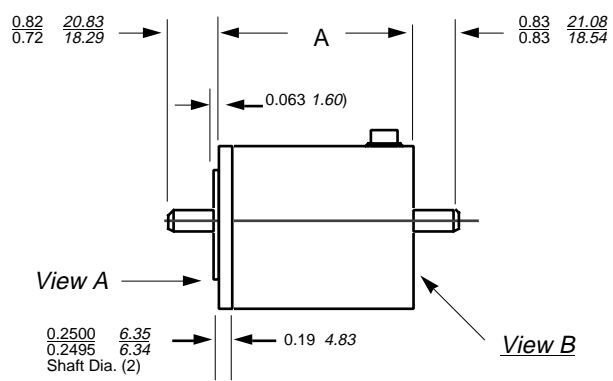
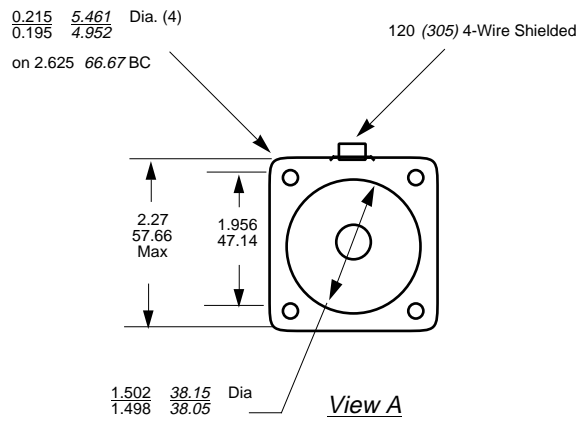
Drive Dimensions



S Drive Dimensions

The fan kit is optional with the low-power version of the S Drive.

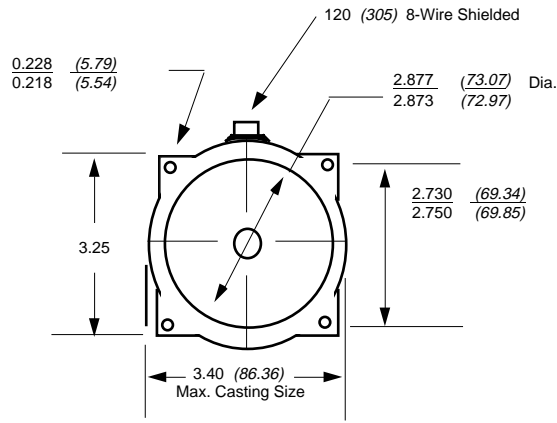
Motor Dimensions



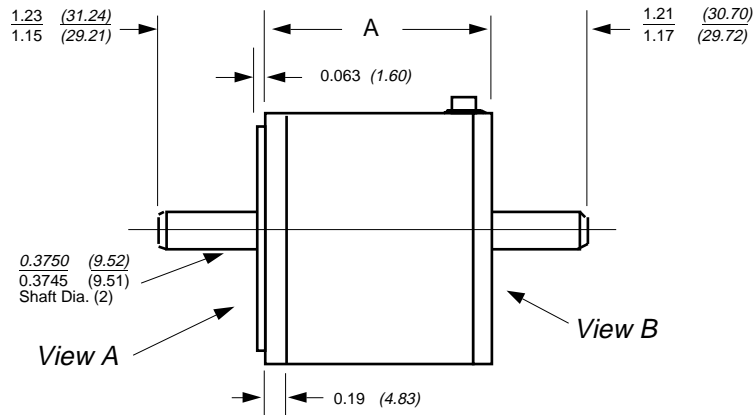
Size 23 frame

Model	A
S 57-51	2.0 (5.1)
S 57-83	3.1 (7.8)
S 57-102	4.0 (10.2)

NEMA 23 Motor Dimensions

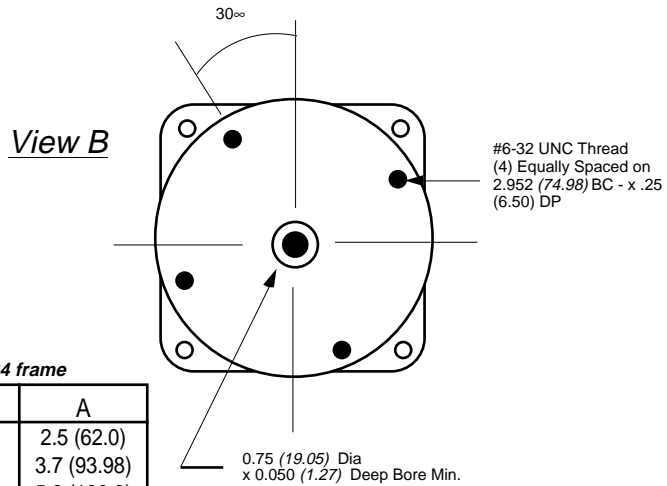


View A



View A

View B



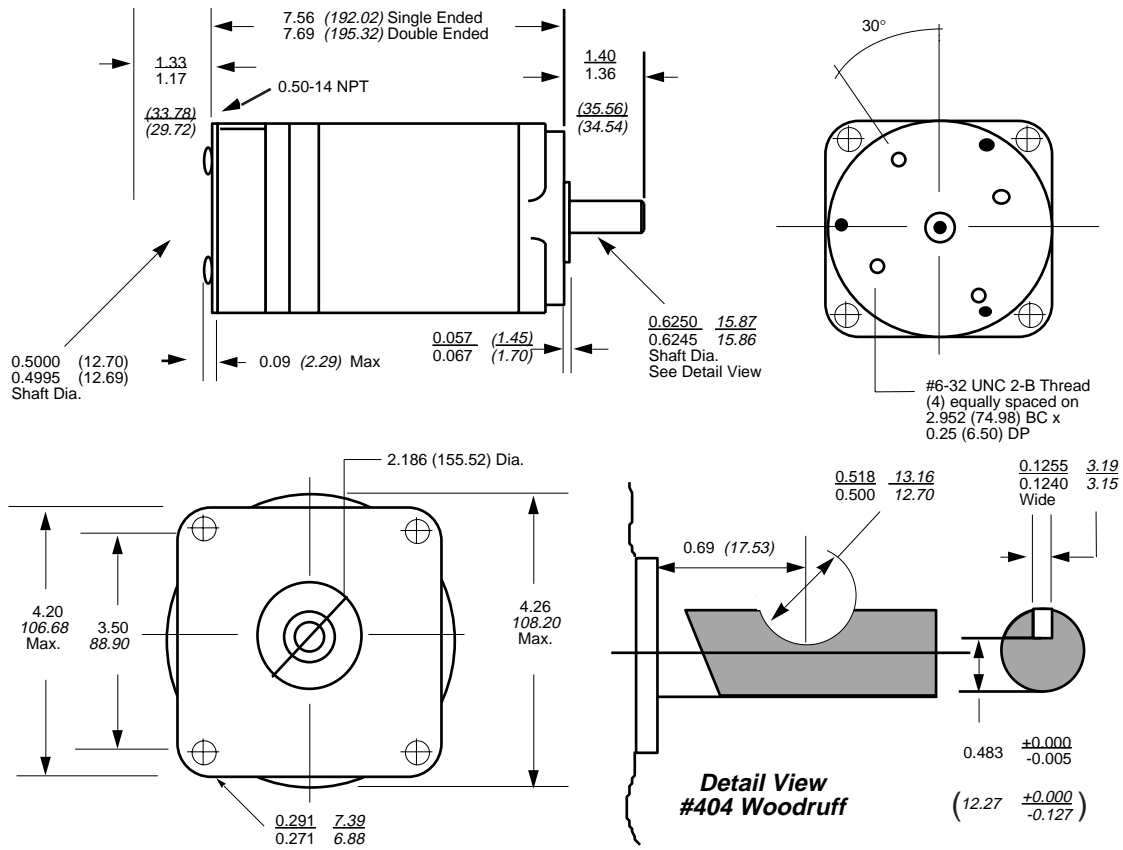
View B

Size 34 frame

Model	A
S 83-62	2.5 (62.0)
S 83-93	3.7 (93.98)
S 83-135	5.2 (129.0)

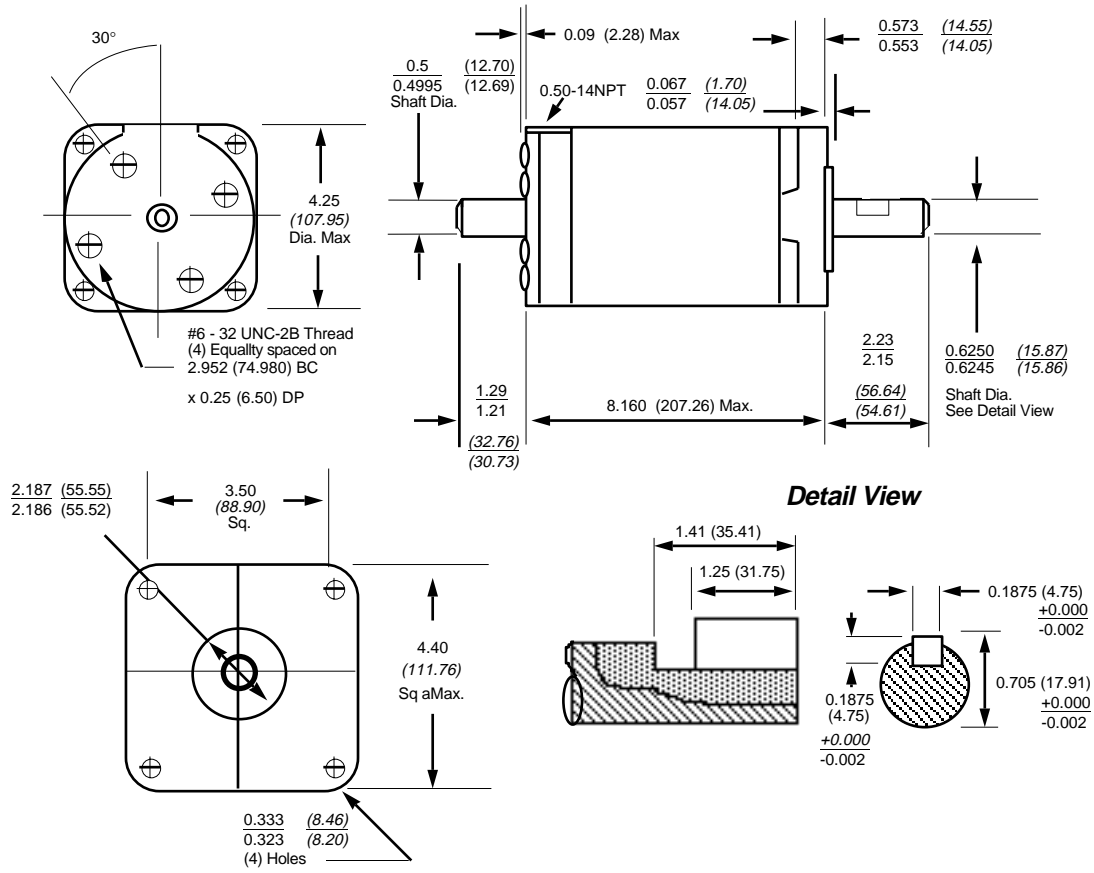
NEMA 34 Motor Dimensions

S106-178 -- S106-250



S106-178 Motor Dimensions

S106-205



S106-205 Motor Dimensions

DIP Switch Summary

The S Drive has two sets of DIP switches (refer to Chapter ③). Each set of DIP switches has eight individual switches. The first set of switches is referred to as **SW1** and the second set as **SW2**. The individual switch will be preceded by the # symbol. Hence, the third switch on **SW1** is referred to as **sw1-#3**, while the third switch on **SW2** is referred to as **SW2-#3**.

Switch #	Function
sw1-#1	Current—most significant bit
sw1-#2	Current
sw1-#3	Current
sw1-#4	Current
sw1-#5	Current
sw1-#6	Current—least significant bit
sw1-#7	Auto Standby
sw1-#8	Auto Standby
sw2-#1	Motor Resolution
sw2-#2	Motor Resolution
sw2-#3	Motor Resolution
sw2-#4	Motor Resolution
sw2-#5	Waveform
sw2-#6	Waveform
sw2-#7	Waveform
sw2-#8	Auto Test = on, Normal operation = off

DIP Switch Summary

Motor Current

Motor Size	Current	sw1-#1	sw1-#2	sw1-#3	sw1-#4	sw1-#5	sw1-#6
S57-51S	1.18	off	off	on	on	off	off
S57-51P	2.28	off	on	on	off	off	off
S57-83S	1.52	off	on	off	off	off	off
S57-83P	3.09	on	off	off	off	off	off
S57-102S	1.71	off	on	off	off	on	off
S57-102P	3.47	on	off	off	on	off	off
S83-62S	2.19	off	on	off	on	on	on
S83-62P	4.42	on	off	on	on	on	off
S83-93S	2.85	off	on	on	on	on	off
S83-93P	5.62	on	on	on	off	on	on
S83-135S	3.47	on	off	off	on	off	off
S83-135P	6.00	on	on	on	on	on	on

S: Series Configuration **P:** Parallel Configuration

S6 Drive Motor Current (Compumotor Motors)

Motor Size	Current	sw1-#1	sw1-#2	sw1-#3	sw1-#4	sw1-#5	sw1-#6
S106-178S	6.02	on	off	on	on	on	on
S106-178P	8.0	on	on	on	on	on	on
S106-205S	3.55	off	on	on	on	off	off
S106-205P	6.99	on	on	off	on	on	on
S106-250S	6.23	on	on	off	off	off	on
S106-250P	8.0	on	on	on	on	on	on

S: Series Configuration **P:** Parallel Configuration

S8 Drive Motor Current (Compumotor Motors)

Low-Power S6 Drive

Current	SW1	SW2	SW3	SW4	SW5	SW6	Current	SW1	SW2	SW3	SW4	SW5	SW6
0.04	off	off	off	off	off	off	3.09	on	off	off	off	off	off
0.13	off	off	off	off	off	on	3.19	on	off	off	off	off	on
0.23	off	off	off	off	on	off	3.28	on	off	off	off	on	off
0.32	off	off	off	off	on	on	3.38	on	off	off	off	on	on
0.42	off	off	off	on	off	off	3.47	on	off	off	on	off	off
0.51	off	off	off	on	off	on	3.57	on	off	off	on	off	on
0.61	off	off	off	on	on	off	3.66	on	off	off	on	on	off
0.70	off	off	off	on	on	on	3.76	on	off	off	on	on	on
0.80	off	off	on	off	off	off	3.85	on	off	on	off	off	off
0.89	off	off	on	off	off	on	3.95	on	off	on	off	off	on
0.99	off	off	on	off	on	off	4.04	on	off	on	off	on	off
1.08	off	off	on	off	on	on	4.14	on	off	on	off	on	on
1.18	off	off	on	on	off	off	4.23	on	off	on	on	off	off
1.27	off	off	on	on	off	on	4.33	on	off	on	on	off	on
1.37	off	off	on	on	on	off	4.42	on	off	on	on	on	off
1.46	off	off	on	on	on	on	4.51	on	off	on	on	on	on
1.52	off	on	off	off	off	off	4.58	on	on	off	off	off	off
1.62	off	on	off	off	off	on	4.68	on	on	off	off	off	on
1.71	off	on	off	off	on	off	4.77	on	on	off	off	on	off
1.81	off	on	off	off	on	on	4.86	on	on	off	off	on	on
1.90	off	on	off	on	off	off	4.96	on	on	off	on	off	off
2.00	off	on	off	on	off	on	5.05	on	on	off	on	off	on
2.09	off	on	off	on	on	off	5.15	on	on	off	on	on	off
2.19	off	on	off	on	on	on	5.24	on	on	off	on	on	on
2.28	off	on	on	off	off	off	5.34	on	on	on	off	off	off
2.38	off	on	on	off	off	on	5.43	on	on	on	off	off	on
2.47	off	on	on	off	on	off	5.53	on	on	on	off	on	off
2.57	off	on	on	off	on	on	5.62	on	on	on	off	on	on
2.66	off	on	on	on	off	off	5.72	on	on	on	on	off	off
2.76	off	on	on	on	off	on	5.81	on	on	on	on	off	on
2.85	off	on	on	on	on	off	5.91	on	on	on	on	on	off
2.95	off	on	on	on	on	on	6.00	on	on	on	on	on	on

Setting S6 Drive Motor Current (Non-Compumotor Motors)

High-Power S8 Drive

Current	SW1	SW2	SW3	SW4	SW5	SW6	Current	SW1	SW2	SW3	SW4	SW5	SW6
0.05	off	off	off	off	off	off	4.12	on	off	off	off	off	off
0.18	off	off	off	off	off	on	4.25	on	off	off	off	off	on
0.30	off	off	off	off	on	off	4.38	on	off	off	off	on	off
0.43	off	off	off	off	on	on	4.50	on	off	off	off	on	on
0.56	off	off	off	on	off	off	4.63	on	off	off	on	off	off
0.69	off	off	off	on	off	on	4.75	on	off	off	on	off	on
0.81	off	off	off	on	on	off	4.89	on	off	off	on	on	off
0.93	off	off	off	on	on	on	5.01	on	off	off	on	on	on
1.06	off	off	on	off	off	off	5.14	on	off	on	off	off	off
1.19	off	off	on	off	off	on	5.26	on	off	on	off	off	on
1.31	off	off	on	off	on	off	5.39	on	off	on	off	on	off
1.44	off	off	on	off	on	on	5.51	on	off	on	off	on	on
1.59	off	off	on	on	off	off	5.64	on	off	on	on	off	off
1.69	off	off	on	on	off	on	5.77	on	off	on	on	off	on
1.82	off	off	on	on	on	off	5.90	on	off	on	on	on	off
1.94	off	off	on	on	on	on	6.02	on	off	on	on	on	on
2.03	off	on	off	off	off	off	6.11	on	on	off	off	off	off
2.16	off	on	off	off	off	on	6.23	on	on	off	off	off	on
2.28	off	on	off	off	on	off	6.36	on	on	off	off	on	off
2.41	off	on	off	off	on	on	6.48	on	on	off	off	on	on
2.54	off	on	off	on	off	off	6.61	on	on	off	on	off	off
2.66	off	on	off	on	off	on	6.73	on	on	off	on	off	on
2.79	off	on	off	on	on	off	6.87	on	on	off	on	on	off
2.91	off	on	off	on	on	on	6.99	on	on	off	on	on	on
3.04	off	on	on	off	off	off	7.12	on	on	on	off	off	off
3.17	off	on	on	off	off	on	7.24	on	on	on	off	off	on
3.297	off	on	on	off	on	off	7.37	on	on	on	off	on	off
3.42	off	on	on	off	on	on	7.49	on	on	on	off	on	on
3.55	off	on	on	on	off	off	7.62	on	on	on	on	off	off
3.67	off	on	on	on	off	on	7.75	on	on	on	on	off	on
3.80	off	on	on	on	on	off	7.87	on	on	on	on	on	off
3.93	off	on	on	on	on	on	8.00	on	on	on	on	on	on

Setting S8 Drive Motor Current (Non-Compumotor Motors)

Automatic Standby Function

Current	SW1-#7	SW1-#8
* Full Current	off	off
75%	on	off
50%	off	on
25%	on	on

* Default Setting

Automatic Standby Function

Motor Resolutions

Resolution	SW2-#1	SW2-#2	SW2-#3	SW2-#4
50,800 steps	off	off	off	on
50,000 steps	off	off	on	off
36,000 steps	off	off	on	on
25,600 steps	off	on	off	off
25,400 steps	off	on	off	on
* 25,000 steps	off	off	off	off
21,600 steps	off	on	on	off
20,000 steps	off	on	on	on
18,000 steps	on	off	off	off
12,800 steps	on	off	off	on
10,000 steps	on	off	on	off
5,000 steps	on	off	on	on
2,000 steps	on	on	off	off
1,000 steps	on	on	off	on
400 steps	on	on	on	off
200 steps	on	on	on	on

* Default Setting

Motor Resolution Settings

Motor Waveforms

Waveform Shape	SW2-#5	SW2-#6	SW2-#7
Pure Sine	on	on	off
-2% 3rd harmonic	on	off	on
* -4% 3rd harmonic	off	off	off
-4% 3rd harmonic	on	on	on
-4% 3rd harmonic	on	off	off
-6% 3rd harmonic	off	on	on
-8% 3rd harmonic	off	on	off
-10% 3rd harmonic	off	off	on

* Default Setting

Motor Waveform Settings

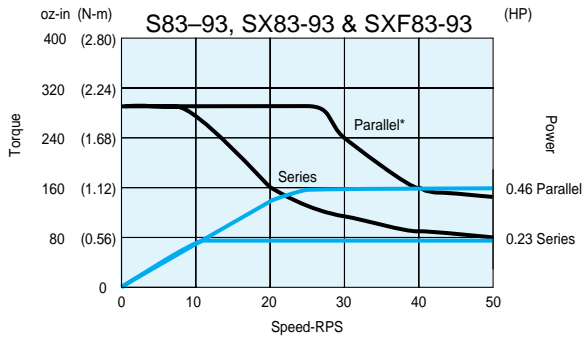
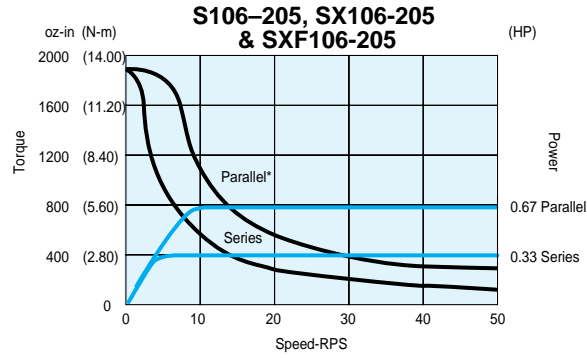
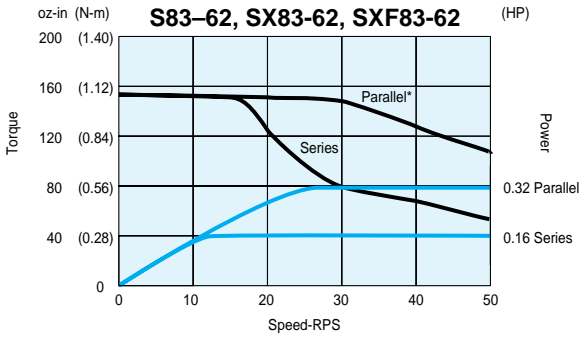
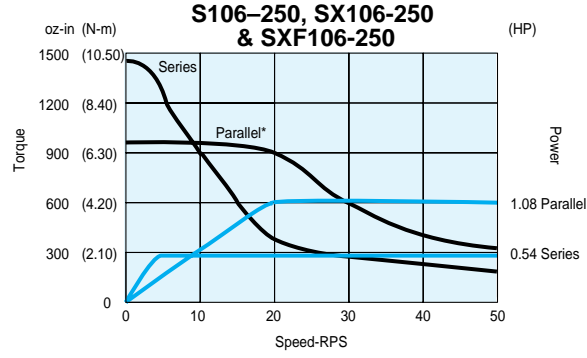
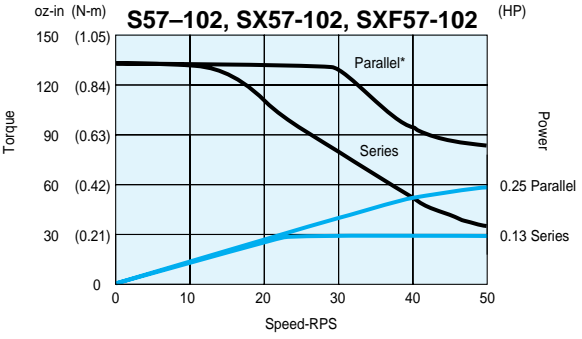
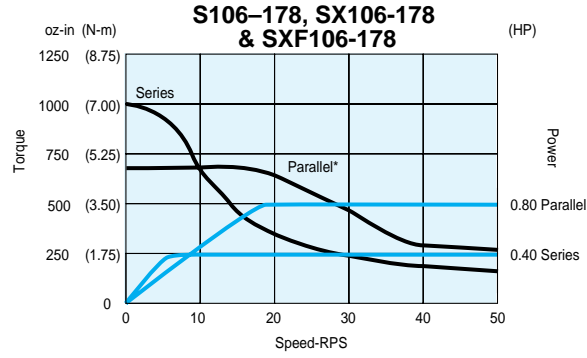
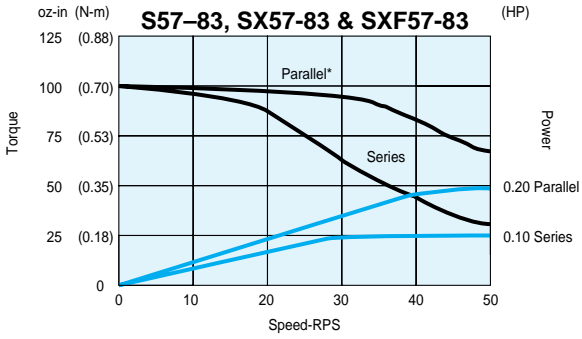
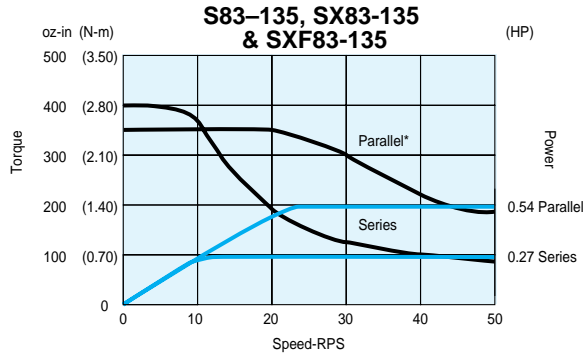
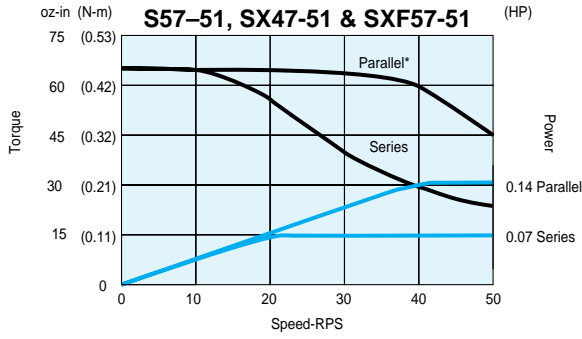
Automatic Test Function

• SW2-#8 OFF Disables Auto Test
SW2-#8 ON Enables Auto Test

* Default Setting

Motor Performance Specifications

S Series motors are designed to allow you to change the motor winding configuration easily. The following performance indicate that different performance levels can be obtained by connecting the step motor windings in series or parallel. Use caution when you run motors in a parallel configuration. *Sustained operation at high speeds may cause the motor to overheat due to electrical pole heating.*



*Parallel connected motors are limited to 50% duty cycle when operated above 5 rps.

For greater than 50% duty cycle above 5 rps, you must connect the motor in series.

Fan cooling the motor will increase duty cycles above 5 rps.