Choose your SureStep System

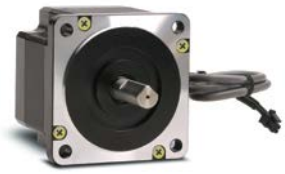
1. Choose a motor

Determine the torque and speed required by your application. Then look at the motor speed-torque curves in the Motors and Standard Integrated and Advanced Integrated sections of this catalog chapter, or the thrust-speed curves for Linear Actuators. Choose a standalone or integrated motor or linear actuator that can run your application with plenty of speed and torque/thrust reserve (most stepper systems should have a 100% safety margin for torque/thrust). If encoder feedback is desired, be sure to choose a "D" or "E" model motor, or "ADJ" model actuator. If an IP65 rating is desired, choose a "W" motor (no IP65 linear actuator models available at this time).

Note: If you chose an Integrated motor/drive, you can skip to "Choose a Power Supply". If you chose an STP-MTRAC-23xxx or -34xxx motor, you are done. These motors use the STP-DRVAC-24025 drive, have no motor extension cable (10' leads on the motor), and require no power supply (the drive uses AC input power).
Note: The STP-MTRAC-42xxx motors cannot use the STP-DRVAC-24025 drive as it doesn't provide enough current.

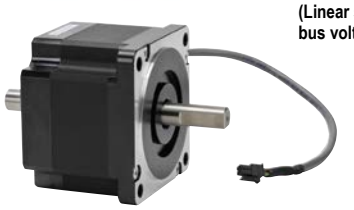
NEMA 14, 17, 23, 34, and 42 mounting flanges

Variety of bipolar step motors to cover a wide range of applications



Holding torque ranges from 8 to 4532 oz·in

Single-shaft, Dual-shaft, IP65, high bus voltage, and encoder-mounted models available (Linear series does not have high bus voltage or IP65 models)



1-ft cable with locking connector on the end (not for linear actuators) (NEMA 23/34 MTRAC motors have 10' leads)

Square frame style produces high torque and achieves best torque-to-volume ratio

NEMA 17, 23 and 24 integrated motor/drives

NEMA 17 and 23 linear actuators

NEMA 42 MTRAC(H)

2. Choose a motor extension cable

[If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply"; an extension cable is not required.]

Our 6-, 10-, and 20-ft motor extension cables have a locking connector that mates up to the motor cable. The extension cables allow you to quickly connect the motor to the drive without having to splice wires or cut any cables.

Note: All NEMA 23/34 STP-MTRAC-x motors have integrated 10-foot cables and don't need an extension cable.

20-foot extension cable with locking connector

SureStep Motor / Cable Compatibility

Motor	*Cable*
STP-LE17 series linear actuator	STP-LA-EXT17-xx
STP-LE23 series linear actuator	STP-LA-EXT23-xx
STP-MTR-xxxx	STP-EXT-0xx
STP-MTR-xxxxW	STP-EXTW-0xx
STP-MTRAC-23xxx/34xxx	None
STP-MTRAC-42xxx	STP-EXT42-0xx
STP-MTRACH-42xxx	STP-EXT42H-0xx
STP-MTRH-xxxx	STP-EXTH-0xx
STP-MTRH-xxxxW	STP-EXTHW-0xx
STP-MTRL-xxxx	STP-EXTL-0xx

Choose your SureStep System

3. Choose a drive

Note: If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply" . . . you have already chosen your drive. If you chose STP-MTRAC-23xxx or STP-MTRAC-34xxx, you are done - these motors use the STP-DRVAC-24025 drive and don't require an extension cable or DC power supply.

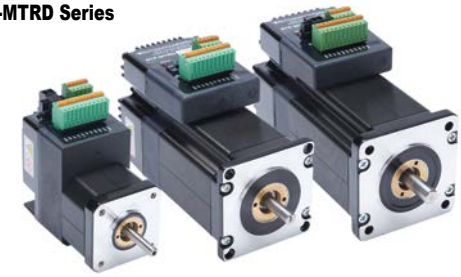
Note: The STP-MTRAC-42xxx motors cannot use the STP-DRVAC-24025 drive as it doesn't provide enough current.

The chart below is a quick selection guide. For a full list of features, check out the Technical Info later in this chapter. The requirements for what you will need from a drive are determined by your applications. Deciding whether you plan to operate the drive via high-speed pulses, analog control, encoder following, or communication commands is an important factor. The voltage supplied to the drive as determined by the speed torque curves is another important factor to consider when choosing a drive. If you need to select a drive based on RMS step motor phase current, please see the next page.

- Standard and Advanced Drives and Integrated Motor/Drives can accept high-speed pulse input control.
- Advanced Drives and some Integrated Motor/Drives can also accept serial communication control.
- STP-MTRAC-23xxx and -34xxx and STP-DRVAC motors and drives are designed for use with high voltages. These components are not designed to work at low voltages (12V, 32V, 48V, 70V).

STP-DRV Series

STP-MTRD Series



What you need	STP-DRV-4035	STP-DRV-4845	STP-DRV-4850	STP-DRV-6575	STP-DRV-80100	STP-MTRD-17x(E)	STP-MTRD-23x(E)	STP-MTRD-17xR(E)	STP-MTRD-23xR(E)	STP-MTRD-24xRV(E)
12V Speed-Torque Curve (from Step 1)	–	–	–	–	–	✓	✓	✓	✓	✓
32V Speed-Torque Curve (from Step 1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48V Speed-Torque Curve (from Step 1)	–	✓	✓	✓	✓	–	✓	–	✓	✓
70V Speed-Torque Curve (from Step 1)	–	–	–	–	✓	–	✓	–	✓	✓
More than 3.5A/motor phase	–	✓	✓	✓	✓	–	–	–	–	–
More than 5A/motor phsae ("H" motors)	–	–	–	✓	✓	–	–	–	–	–
Supply voltage	12–32	24–48	24–48	24–65	24–80	12–48	12–70	12–48	12–70	12–70
Digital Input Voltage	5V (12V*, 24V*)	5–24V	5V (12V*, 24V*)	5–24V	5V (12V*, 24V*)	5–24V	5–24V	5–24V	5–24V	5–24V
Internal Indexing (Drive can move from point A to point B with a serial communication command)	–	–	✓	–	✓	–	–	✓	✓	✓
High-speed pulse input	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Analog Velocity input	–	–	✓	–	✓	–	–	✓	✓	✓
Position Verification (internal encoder)	–	–	–	–	–	–	–	E models only	E models only	E models only
External encoder	–	–	–	–	–	E models only	E models only	–	–	–
RS-232 communication (ASCII)	–	–	✓	–	✓	–	–	–	–	–
RS-485 communication (ASCII)	–	–	–	–	–	–	–	✓	✓	✓
Variable I/O (I/O can be either a digital input or digital output)	–	–	–	–	–	–	–	–	–	✓

** External dropping resistor required for 12V and 24V I/O use. See Product Data Sheet for wiring details and resistor values.*

Choose your SureStep System

3a. Using RMS Step Motor Phase Current to Select an Appropriate Stepper Drive Rated in Peak Phase Current

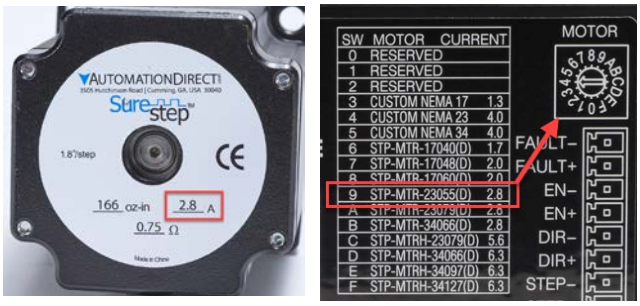
$$(\text{Drive Amps})_{peak} = 1.2 \times (\text{Motor Amps})_{RMS}$$

Generic stepper drives usually have output current specified in peak phase current while stepper motors will have their phase current specified in RMS phase current. This can cause sub-optimal drive to motor pairing unless this is understood. There is no need to understand this difference if you are selecting a system that uses the SureStep drives that are tuned for specific SureStep motors. These drives will have a rotary switch setting (STP-DRV-6575 and STP-DRVAC-24025) or a motor selection in the SureMotion Pro software (STP-DRV-4850 and STP-DRV-80100). These drives when properly paired with a SureStep motor will output 1.2 times the motor rated phase current.

When choosing a drive that only has current selections instead of motor specific selections you will want to select a peak current that is 1.2 times the motor's listed RMS current. The true peak drive current value would be 1.4 times the RMS motor value but this amount of current will cause a lot of motor heating and the torque at higher speeds will actually suffer with due to higher back electro-magnetic force caused by the inductive field of the coils changing polarity quickly.

Example of a SureStep matched stepper system

To use an STP-MTR-23055 motor with a STP-DRV-6575 drive, the drive's rotary switch should be positioned to selection 9 (STP-MTR-23055x). The STP-MTR-23055 has a phase current of 2.8 A (RMS), so the drive will actually output 1.2 x 2.8 A (RMS) = 3.36 A (peak). You do not need to calculate peak or RMS current with a pre-configured SureStep motor and drive system.

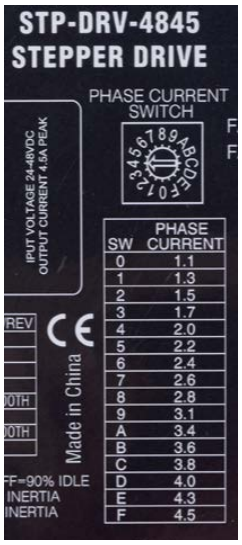


Matched stepper system

Example of an adjustable current stepper drive

To use an STP-MTR-23055 motor with a STP-DRV-4845 drive, you should calculate the correct phase current setting for the drive. The motor phase current is 2.8 A (RMS).

- If you do not understand peak vs RMS current, you would select phase current position #8, the 2.8 A selection on the drive (blue box). This setting will work (and the motor will run very cool) but will provide slightly less than the motor's rated torque.
- If a true peak current value is selected (1.4 x 2.8 A = 3.92 A) then the rotary switch selection would be set to the C position (red box). This will cause excessive motor heating and a lack of performance at higher speeds.
- The optimal phase current selection for stepper motors is 1.2 times the motor RMS phase current (1.2 x 2.8 A (RMS) = 3.36 A (peak)). This will be the rotary switch selection A (green box)



STP-DRV-4845 Motor Selection Ta (A/Phase)(Peak of Sine A)			
Rotary Switch Position	SW1 & SW2 @100%	SW1 & SW2 @90%	SW1 & @80
0	1.1	1.0	0.9
1	1.3	1.2	1.(
2	1.5	1.4	1.2
3	1.7	1.5	1.4
4	2.0	1.8	1.(
5	2.2	2.0	1.8
6	2.4	2.2	1.9
7	2.6	2.3	2.1
8	2.8	2.5	2.2
9	3.1	2.8	2.5
A	3.4	3.1	2.7
B	3.6	3.2	2.9
C	3.8	3.4	3.(
D	4.0	3.6	3.2
E	4.3	3.9	3.4
F	4.5	4.1	3.(

Matching an adjustable stepper drive with any step motor

Choose your SureStep System

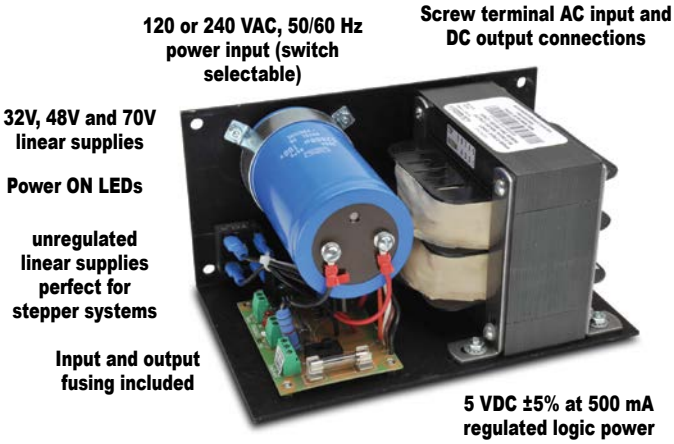
4. Choose a power supply

Since all low voltage SureStep (non-integrated) motors can operate at 32V, 48V, and 70V, the selection of a power supply is dependent on the selected speed-torque curve of the motor and on the selection of drive. If using an integrated motor/drive, then the power supply is dictated by the specifications of the integrated product. If using an STP-MTRAC-23xxx or -34xxx drive, no DC power supply is needed since the drive is powered directly from 115 to 230 VAC. Choose a power supply that matches the desired speed-torque curve and stays within the voltage limit of the selected drive. Each SureStep linear power supply has incoming AC and outgoing DC fusing. The linear supplies have an electronic overload protected 5V supply for all your logic needs. Stepper applications without large fluctuations in load, without aggressive deceleration, and without regeneration (where the load pushes the motor) can often use a switching power supply instead.

Permissible Drive/Power Supply Combinations

DC Powered Drive	Linear Power Supply				Switching Power Supply		
	STP-PWR-3204	***STP-PWR-4805***	***STP-PWR-4810***	***STP-PWR-7005***	***PSB12-xxxS***	***PSB24-xxxS***	***PSB48-xxxS***
STP-DRV-4830 12-48 VDC input (53V max)	√	√	√	–	√	√	√
STP-DRV-4845 24-48 VDC input (60V max)	√	√	√	–	–	√	√
STP-DRV-4850 24-48 VDC input (53V max)	√	√	√	–	–	√	√
STP-DRV-6575 24-65 VDC input (85V max)	√	√	√	–	–	√	√
STP-DRV-80100 24-80 VDC input (88V max)	√	√	√	√	–	√	√
STP-MTRD-17 series 12-48 VDC input (55V max)	√	√	√	–	√	√	√
STP-MTRD-23, -24 series 12-70 VDC input (75V max)	√	√	√	√	√	√	√
Supply current calculation	*For systems that use multiple steppers and only one power supply, the power supply current must be at least the sum of 2/3rds of the combined motor currents:* $I(ps) \geq 2/3 \times (I\_motor1 + I\_motor2 + I\_motor\ 3 + \ldots)$						

Linear Power Supply



Switching Power Supply

Note: For detailed information on the switching power supplies, please see: https://cdn.automationdirect.com/static/specs/rhinopsbc1d2.pdf