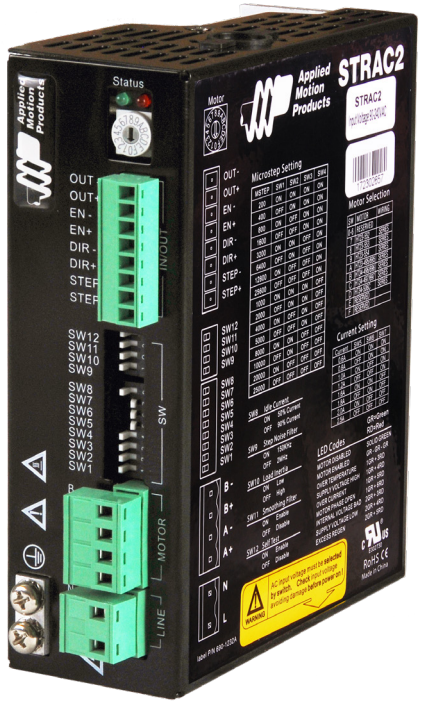
Applied Motion Products
A MOONS' COMPANY

STRAC2

AC Input Step Motor Drive



Hardware Manual

Applied Motion Products, Inc.

Table of Contents

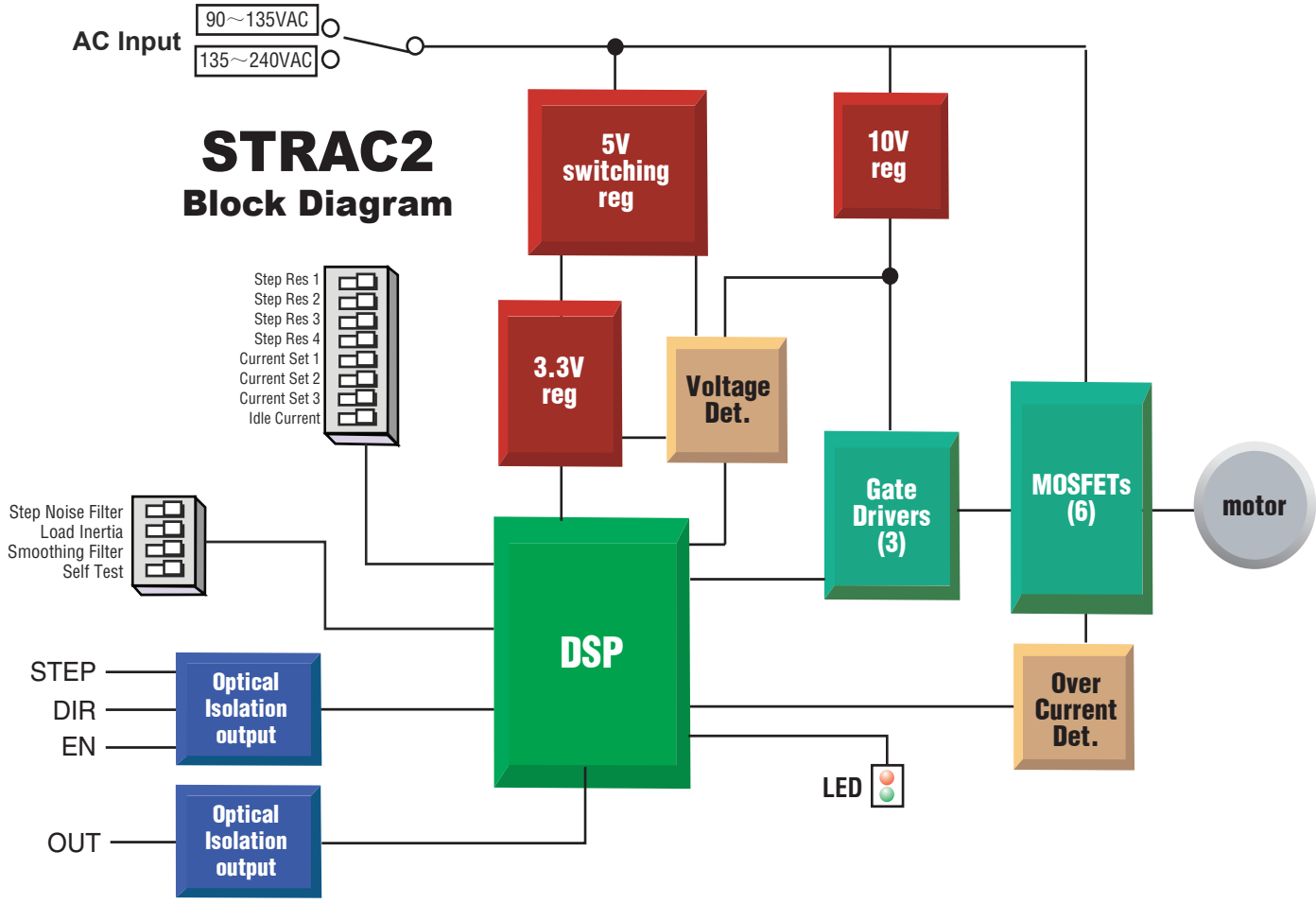
1 Introduction

Thank you for selecting the Applied Motion Products' STRAC2 Step Motor Drive. The STRAC2 series AC input drives are based on advanced digital current control technology and provide high torque, low noise and low vibration. Many of the operational paramteres are switch selectable. We hope our dedication to performance, quality and economy will make your motion control project successful.

1.1 Features

- Advanced digital current control provides excellent high speed torque
- Auto Setup measures motor parameters and configures motor current control and anti-resonance gain settings
- Uses universal AC input 90 to 240 VAC, AC Input Voltage must be selected by switch
- Speed Range - up to 50 rps
- Microstep Resolution - switch selectable, 16 settings: 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 1000, 2000, 4000, 5000, 8000, 10000, 20000, 25000 steps/rev
- Running Current - peak setting, switch selectable, 8 settings: 0.6A, 0.8A, 1.0A, 1.2A, 1.6A, 1.8A, 2.0A, 2.5A.
- Idle Current - automatic reduction of running current 1 second after the motor stops, switch selectable, 2 settings: 50%, 90% of running current
- Anti Resonance - raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor, switch selectable, 2 settings for low to high inertia loads
- Control Modes - Step/Direction pulse input or CW/CCW pulse input, internal jumper switch selectable
- Input Signal Filter - filters out unwanted noise that can cause extra steps, switch selectable, 2MHz or 150KHz
- Step Smoothing Filter (Microstep Emulation) - performs high resolution stepping by synthesizing coarse steps into fine micro-steps, switch selectable, ON or OFF
- Self Test - performs a1 rev, 0.5RPS, CW/CCW move test, switch selectable, ON or OFF
- Motor Selection - a 16 bit rotary switch is used to select the desired motor database which is pre-loaded at the Factory

1.2 Block diagram



2 Mounting the Drive

The STRAC2 drive can be mounted only on the narrow side of the chassis. M4 screws should be used in the two holes at the back of the drive.

The amplifiers in the drive generate heat. To operate the drive continuously at maximum power forced air cooling, as from a fan, should be provided.

Never use the drive in a space where there is no air flow or where other devices can cause the surrounding air to be more than 40 °C. Never put the drive where it can get wet or where metal particles can fall into it.

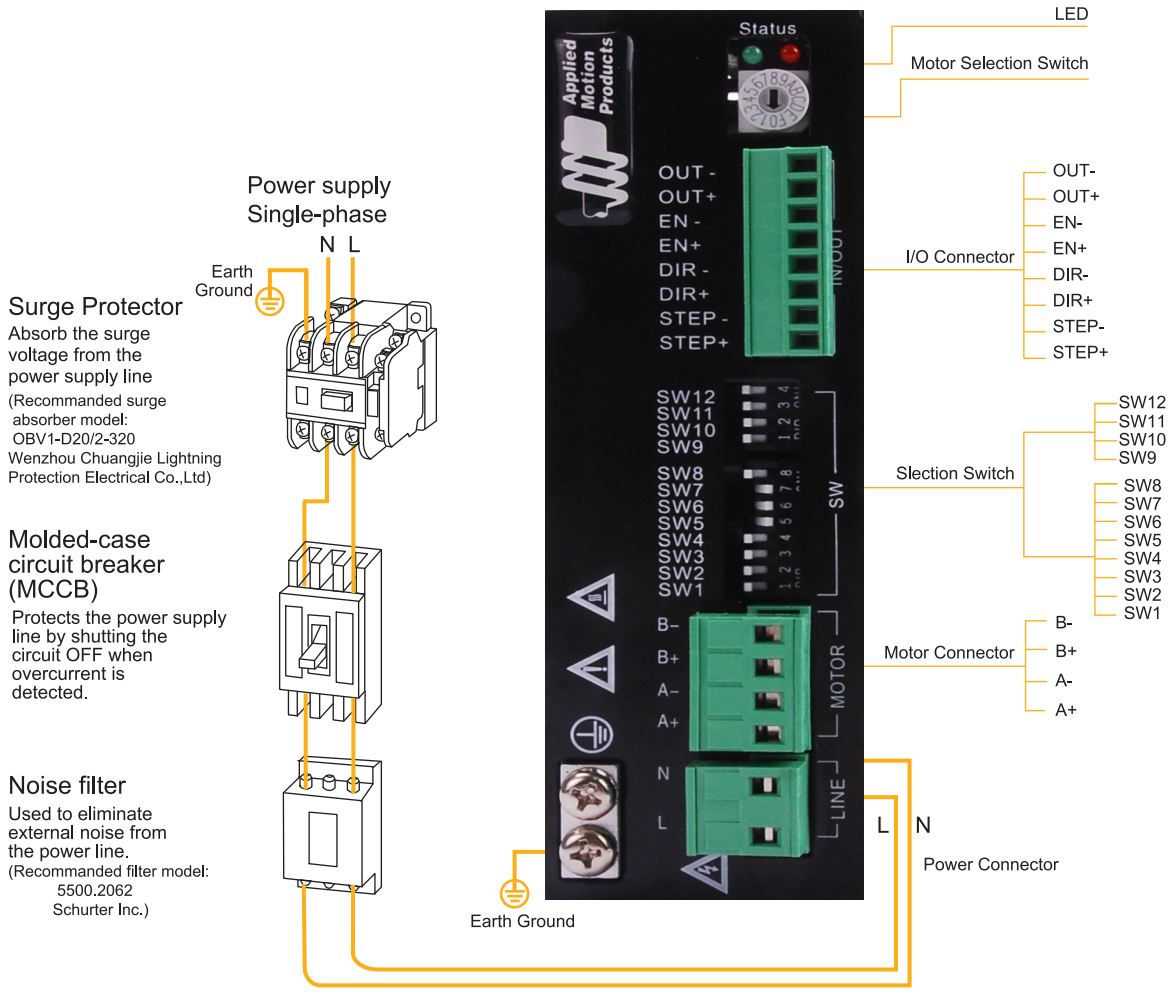
Never use the drive in a space where there is no air flow or where other devices can cause the surrounding air to be more than 40 °C
Never put the drive where it can get wet or where metal particles can fall into it

3 Connections

To use the STRAC2 Step Drive, the following items are needed:

- Universal AC input of 90 to 240 VAC
- Pulse & Direction signal
- A compatible step motor
- AC input voltage must be selected by switch

STRAC2 Wiring Diagram



3.1 Connecting to Power

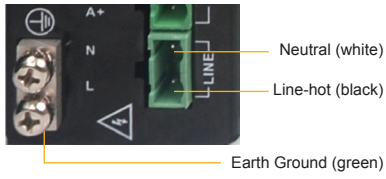
Use the supplied connector to connect to the AC supply according to the diagram below. Use 16 AWG wire for Line (L) and Neutral (N). Use 14 AWG for Earth Ground (G).

AC input voltage must be **selected by switch.Check** input voltage avoiding damage **before power on!**

Input Voltage between 90Vac to 135Vac: Set the switch on 115V Status

Input Voltage between 135VAC to 240VAC: Set the switch on 230V Status

The STRAC2 contains an internal 5A fast acting fuse.



Care should always be taken when working with high voltages.

3.2 Connecting to a Motor

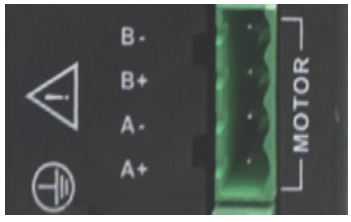
Motor connections should be made according to the following diagrams.

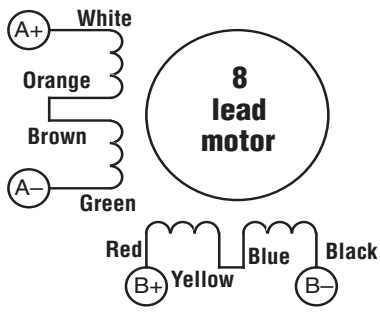
Never connect or disconnect the motor while the power is on.

Note: it is highly recommended that you use a motor with a shielded cable with the STRAC2. Always connect the cable drain wire to the drive's ⏚ terminal (next to the A+ terminal)

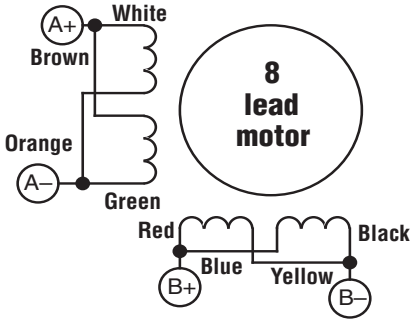
The recommended Applied Motion motors for the STRAC2 include shielded cables. See the Recommended Motors section for a list of part numbers.

Be sure to connect the cable shield for safety and to minimize electrical interference.





8 Leads Series Connected

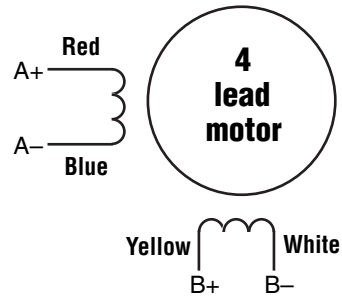


8 Leads Parallel Connected

Connecting Other Motors

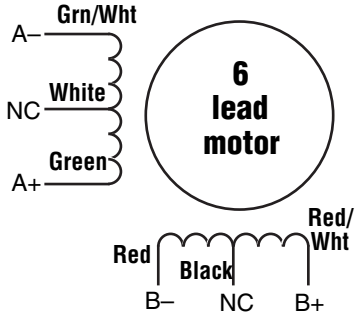
If you do want to connect other motors , here is some information that will help

Four lead motors can only be connected one way. Please follow the sketch at the right.

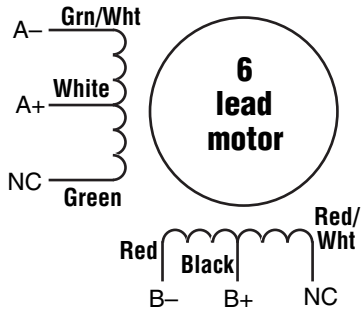


4 Leads

Six lead motors can be connected in series or center tap. In series mode, motors produce more torque at low speeds, but cannot run as fast as in the center tap configuration. In series operation, the motor should be operated at 30% less than the rated current to prevent overheating. Winding diagrams for both connection methods are shown below. NC means not connected.

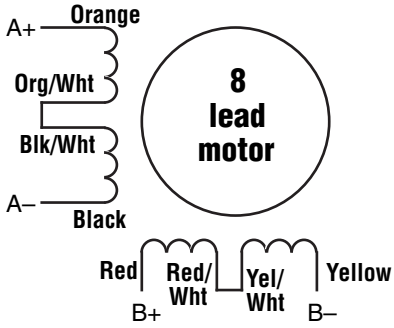


6 Leads Series Connected

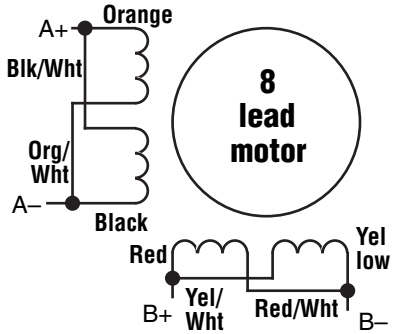


6 Leads Center Tap Connected

Eight lead motors can also be connected in two ways: series and parallel. As with six lead motors, series operation gives you less torque at high speeds, but may result in lower motor losses and less heating. In series operation, the motor should be operated at 30% less than the unipolar rated current. The wiring diagrams for eight lead motors without shielded cables are shown below.



8 Leads Series Connected



8 Leads Parallel Connected

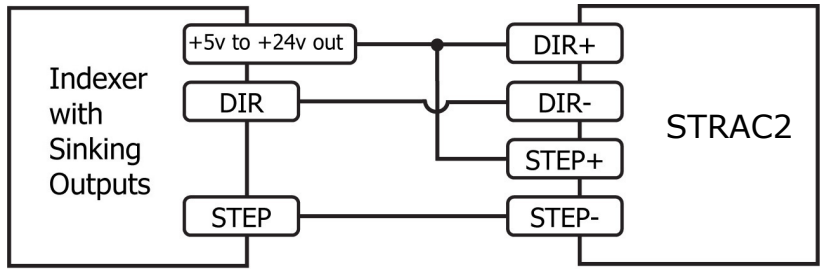
3.3 Connecting the Inputs and Outputs

3.3.1 Step & Direction Inputs

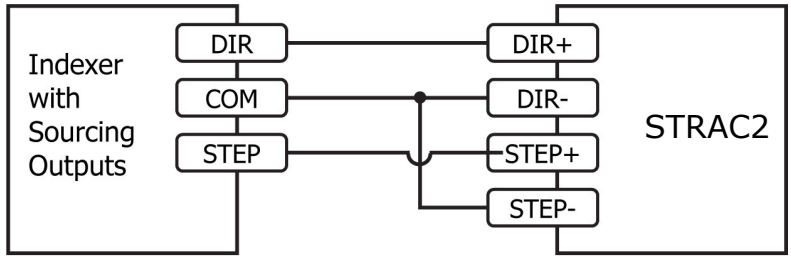
The STRAC2 Step Drive has two high speed optically isolated inputs called STEP and DIR. They accept 5 to 24 volt single-ended or differential signals, up to 2MHz. The maximum voltage that can be applied to the input is 28V.

The motor executes one step when the STEP input closes.

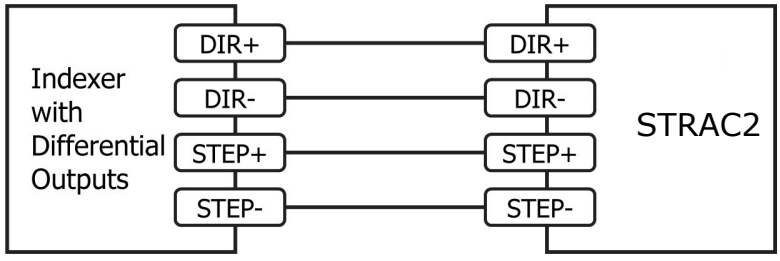
The direction of rotation is controlled by the DIR input state. A closed input (logic "0") will result in clockwise rotation, and an open input (logic "1") will result in counterclockwise rotation.



Connecting to Indexer with Sinking Outputs



Connecting to Indexer with Sourcing Outputs



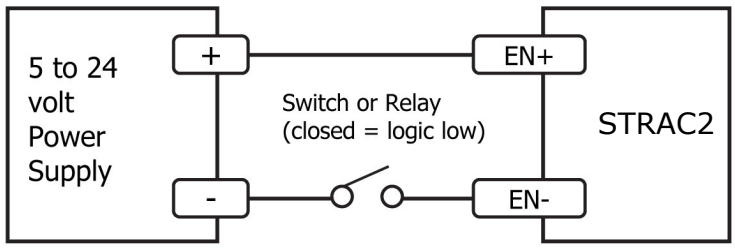
Connecting to Indexer with Differential Outputs
Many high-speed indexers have differential outputs

3.3.2 EN input

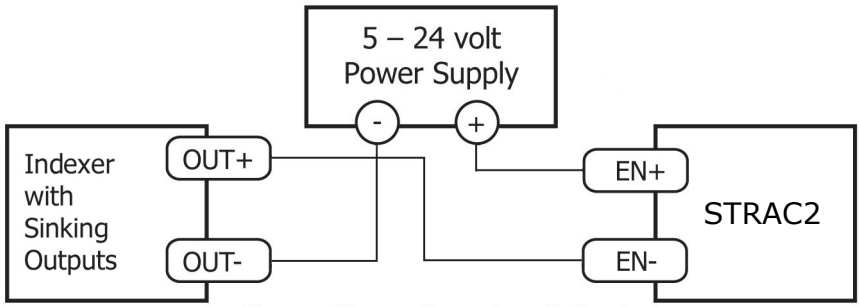
The EN input enables or disables the drive amplifier. It is an optically isolated input that accepts a 5 to 24 volt single-ended or differential signal. The maximum voltage that can be applied to the input is 28V.

When EN input is closed, the driver amplifier is deactivated, all the MOSFETs will shut down, and the motor will be free. When EN input is open, the drive is activated.

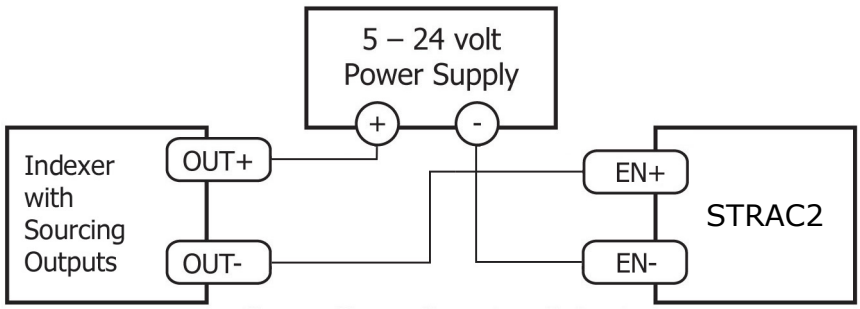
When the drive has encountered an error and the fault is removed from the system, a falling signal into the EN input will reset the error status and activate the drive amplifier again.



Connecting the Input to a Switch or Relay



Connecting the Input to Sinking Outputs

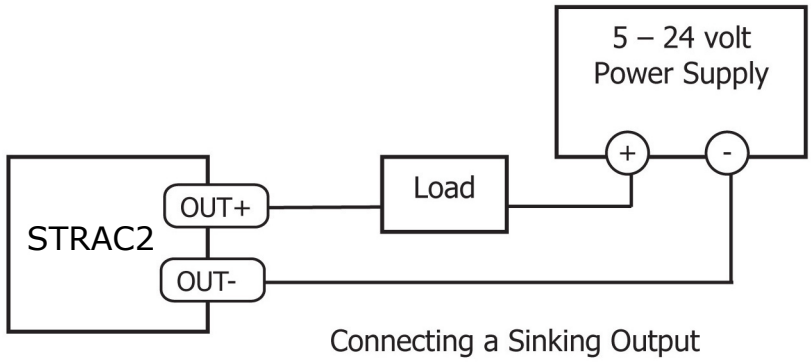


Connecting the Input to Sourcing Outputs

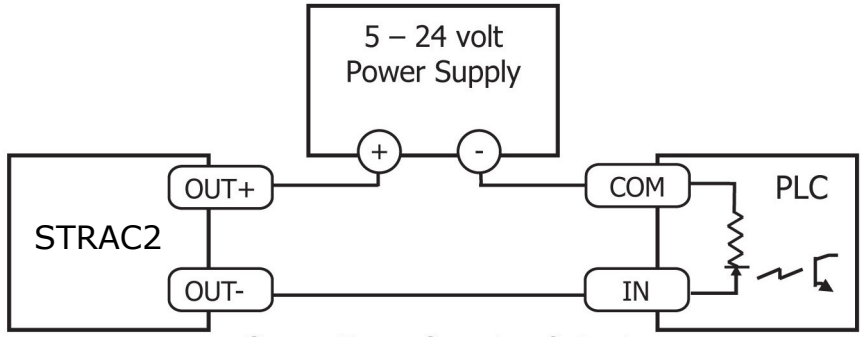
3.3.3 Fault Output

The FAULT Output is optically isolated. The maximum collector current is 100mA, and the maximum collector to emitter voltage is 30 volts. The output can be wired to sink or source current.

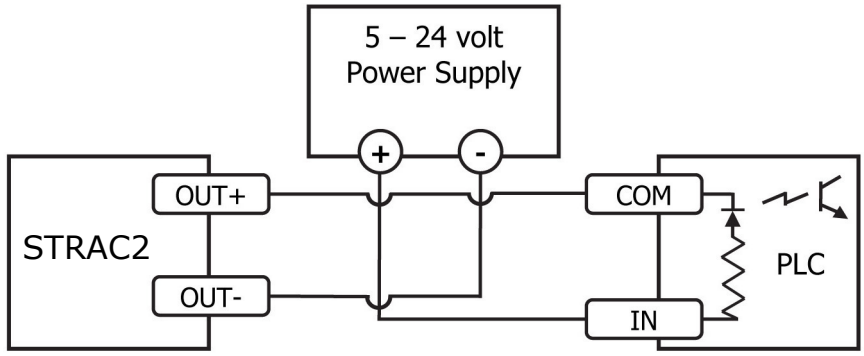
When drive is working normally, the output is open. When the drive encounters an error, the output closes.



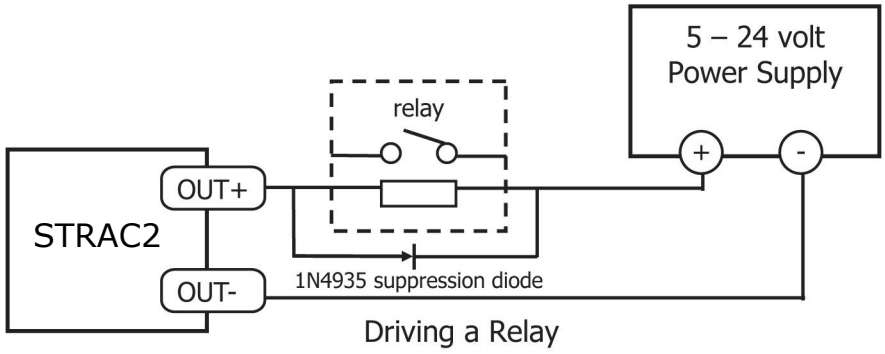
Connecting a Sinking Output



Connecting a Sourcing Output



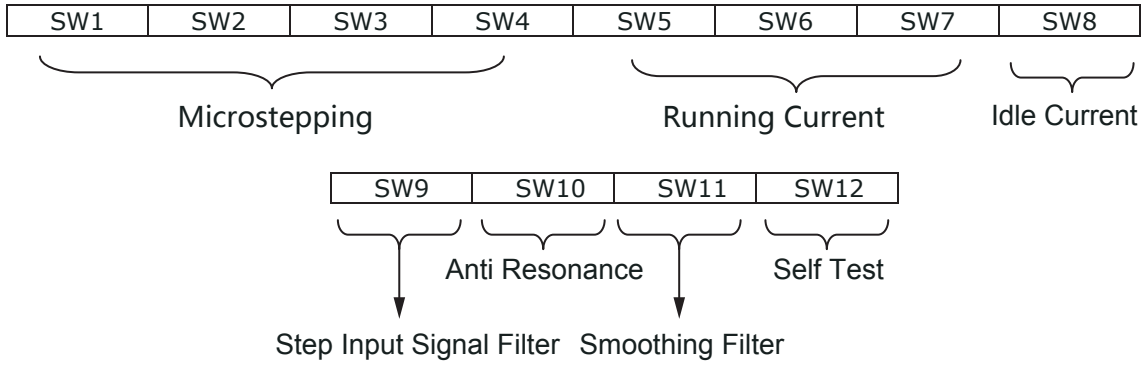
Connecting a Sourcing Output again



Driving a Relay

4 Switch Selection

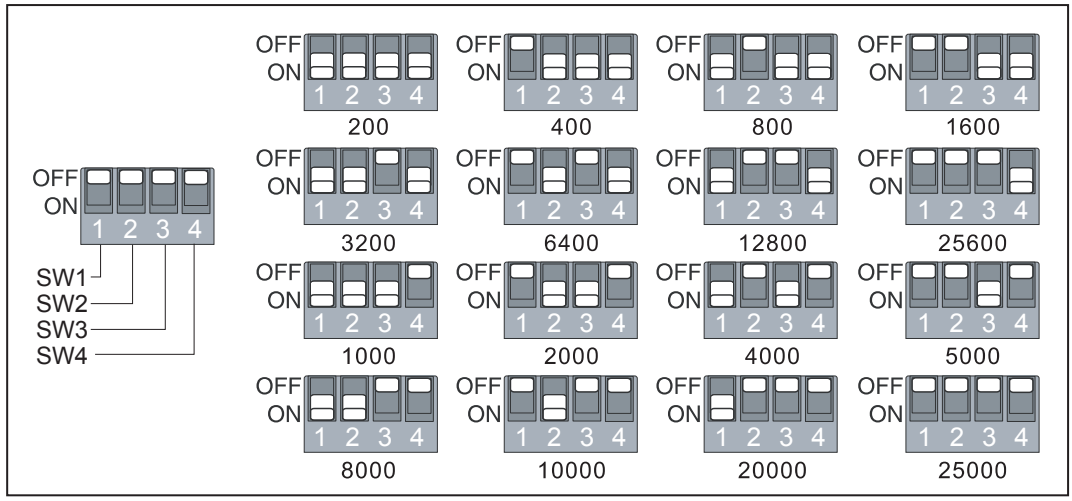
Many of the operational parameters of the STRAC2 can be set or changed by position switches - either by a single switch or a combination of ON/OFF settings of 2 or more switches.



4.1 Microstep Resolution

The microstep resolution is set by the **SW1, SW2, SW3 and SW4** switches. There are 16 settings

Microstep(steps/rev)	SW1	SW2	SW3	SW4
200	ON	ON	ON	ON
400	OFF	ON	ON	ON
800	ON	OFF	ON	ON
1600	OFF	OFF	ON	ON
3200	ON	ON	OFF	ON
6400	OFF	ON	OFF	ON
12800	ON	OFF	OFF	ON
25600	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	OFF	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
25000	OFF	OFF	OFF	OFF

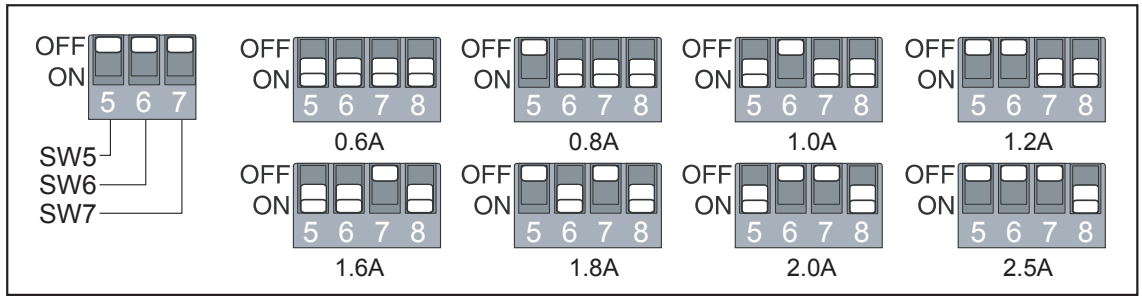


4.2 Running Current

The output current is set by the **SW5, SW6 and SW7** switches. There are 8 settings.

NOTE: Drive's running current will be limited by the lower value between motor selection rotary switch or the dip current switch

Current (Peak)	SW5	SW6	SW7
0.6A	ON	ON	ON
0.8A	OFF	ON	ON
1.0A	ON	OFF	ON
1.2A	OFF	OFF	ON
1.6A	ON	ON	OFF
1.8A	OFF	ON	OFF
2.0A	ON	OFF	OFF
2.5A	OFF	OFF	OFF



4.3 Idle Current

The running current of the STRAC2 drive is automatically reduced whenever the motor isn't moving. The **SW8** switches control the percentage of the running current the idle current is reduced to. The 90% setting is useful when a high holding torque is required. To minimize motor and drive heating it is highly recommended that the idle current reduction feature be set as low as the application can tolerate.

Idle	SW8
50%	ON
90%	OFF

4.4 Step Input Signal Filter

STRAC2 Drive selects the digital signal filter frequency by **SW9**. Setting switch to "OFF" will select high frequency 2MHz, and setting switch to "ON" will select low frequency 150 KHz.

Note: The power must be cycled each time the position of SW9 is changed.

4.5 Anti Resonance

The **SW10** switches select the load inertia. There are 2 settings. The inertia selection can help the STRAC2 drive to calculate the current control parameter. If the load inertia is close to that of the motor rotor, the low setting should be selected. If the load inertia is higher than that of the rotor, a proportionally higher setting should be selected.

Option	SW10	Inertia
0	ON	Low
1	OFF	High

4.6 Step Smoothing Filter

Command signal smoothing can soften the effect of immediate changes in velocity and direction, making the motion of the motor less jerky. An added advantage is that it can reduce the wear on mechanical components. **SW11** selects this function - ON enables it, OFF disables it.

This function can cause a small delay in following the control signal, and it should be used with that in mind.

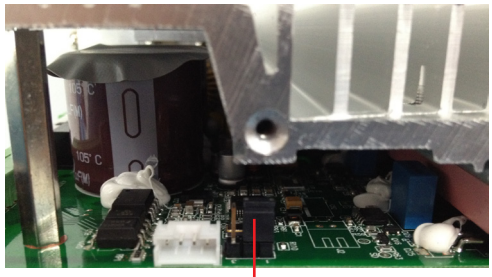
Note: The power must be cycled each time the position of SW11 is changed.

4.7 Self Test

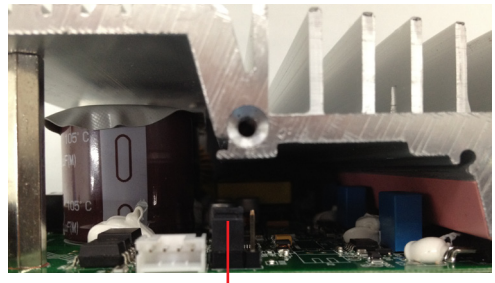
Setting **SW12** to ON after the drive is powered up, will cause the drive to perform a Self Test move of 2 revolutions both CW and CCW at .5 rps. Setting SW16 to OFF will disable this feature.

4.8 Step/Direction Mode and CW/CCW Mode Jumper

Most indexers and motion controllers provide motion commands in the “Step and Direction“ format. The Step signal pulses once for each motor step and the direction signal commands direction. However, a few PLCs use a different type of command signal: one signal pulses once for each desired step in the clockwise direction (called STEP CW), while a second signal pulses for counterclockwise motion (STE[CCW). The STRAC2 drives can accept this type of signal if you remove the drive cover and move jumper J10 from the “1-2“ position to the “2-3” position CCW mode, the CW signal should be connected to the STEP input an DIR input.



1-2： Step & Direcion



2-3： Step CW & Step CCW

5 Motor selection

Each position of the 16-bit rotary switch selects a different motor, and automatically sets the configuration parameters in the drive. The STRAC2 drive comes programmed with up to 16 typical motors as factory defaults. Drives can be customized with specially selected motors when required.

NOTE: Drive's running current will be limited by the lower value between motor selection rotary switch and the dip current switch

When the motor selection is changed, the drive power supply will need to be cycled.

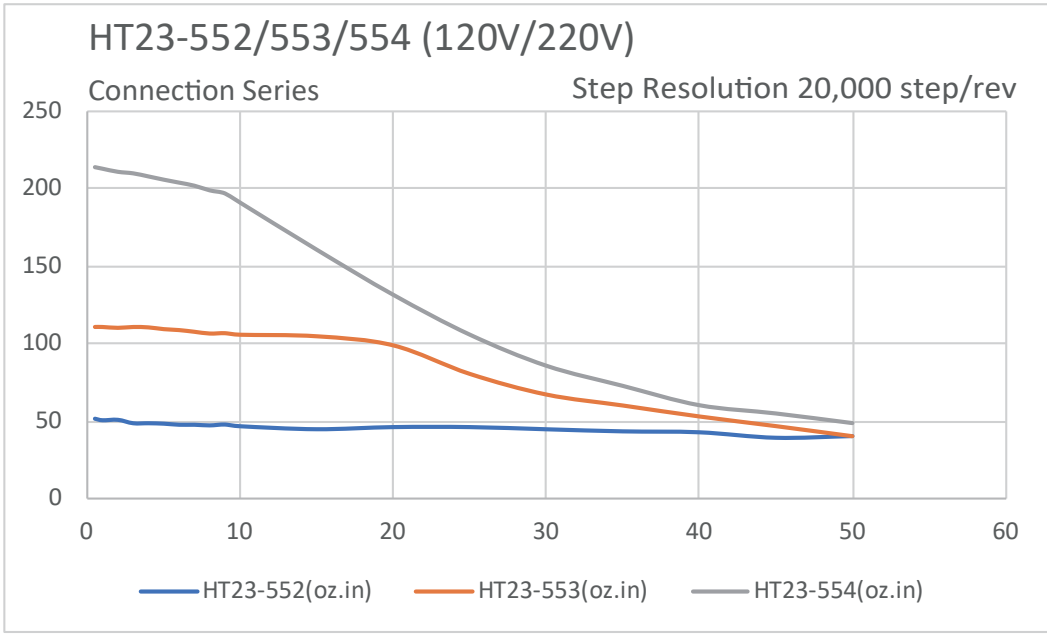
BDC Position	Motor	Wiring	Up-limit current setting(A)
0	Reserved		0
1	Reserved		0
2	Reserved		0
3	Reserved		0
4	Reserved		0
5	Reserved		0
6	Reserved		0
7	HT23-552	Series Connected	0.75
8	HT23-553	Series Connected	0.75
9	HT23-554	Series Connected	0.9
A	HT34-495/695	Series Connected	2.5
B	HT34-496/696	Series Connected	2.5
C	HT34-497/697	Series Connected	2.5
D	HT34-506C	Series Connected	2.5
E	Custom Motor		2.5
F	Custom Motor		2.5

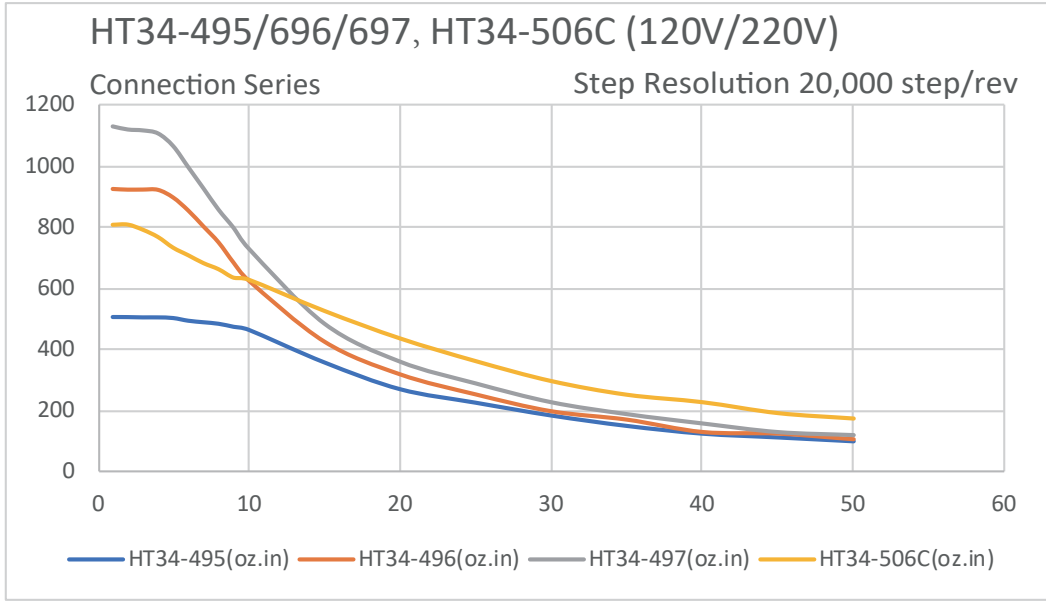
5.1 Recommended motors

Model Number	Connection	Length	Holding Torque	Series Current	Parallel Current	Rotor Inertia
HT23-552	Series	1.71	84.4	0.71	1.41	0.0017
HT23-553	Series	2.17	167	0.71	1.41	0.00425
HT23-554	Series	3.05	255	0.71	1.41	0.0068
HT34-495/695	Series	3.11	555	2.15	4.3	0.0227
HT34-496/696	Series	4.63	1110	2.05	4.1	0.0453
HT34-497/697	Series	6.14	1694	2.55	5.1	0.068
HT34-506C	Series	4.94	1260	2.8	5.6	0.0387

Note: The "Drive Current Setting" shown here differs from the rated current of each motor because the rated current is RMS and the drive current setting is peak sine. If you are using a motor not listed here, for best results set the drive current at the motor's rated current x 1.2.

5.2 Torque-Speed Curves





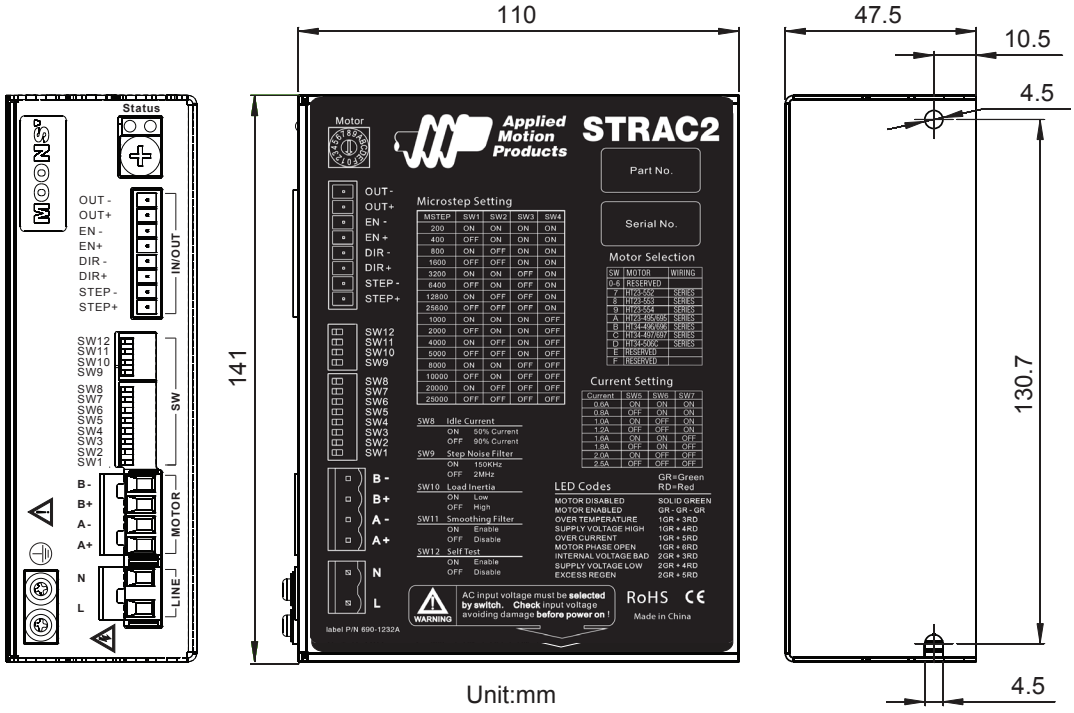
6 Error Codes

The STRAC2 Drive has two LEDs to indicate status. When the motor is enabled the green LED flashes slowly, when the green LED is solid the motor is disabled. If the red LED flashes, an error has occurred. Errors are indicated by combinations of red and green flashes as shown below:

Code		Error
🟢	Solid green	Motor Disabled
🟢🟢	Flashing green	Motor Enabled
🔴🔴🔴🟢	3 red, 1 green	Over Temperature
🔴🔴🔴🟢🟢	3 red, 2 green	Bad Internal Voltage
🔴🔴🔴🔴🟢	4 red, 1 green	Supply Voltage High
🔴🔴🔴🔴🟢🟢	4 red, 2 green	Supply Voltage Low
🔴🔴🔴🔴🔴🟢	5 red, 1 green	Over Current
🔴🔴🔴🔴🔴🟢🟢	5 red, 2 green	Excess Regen
🔴🔴🔴🔴🔴🔴🟢	6 red, 1 green	Open Motor Phase

7 Reference Materials

7.1 Mechanical Outline



Unit:mm

7.2 Specifications

7.2.1 Electrical Specifications

Electrical Specifications				
Parameter	Min.	Typ.	Max.	Unit
Power Supply	90	-	240	VAC
Output Current (Peak)	0.6	-	2.5	A
Step Frequency	2	-	2M	Hz
STEP Minimum Pulse Width Hi and Low	250	-	-	ns
DIR Minimum Pulse Width	62.5	-	-	us
Under Voltage Protection	-	75*/135*	-	VAC
Over Voltage Protection	-	145*/295*	-	VAC
STEP/DIR Input Signal Voltage	4.0	-	28	V
OUT mxinmum output current	-	-	100	mA
OUT maximum voltage	-	-	30	V

* **Note:** when the input switch is on 115V status, under voltage protection point is 75VAC, over voltage protection point is 145VAC.

When the input switch is on 230V status, under voltage protection point is 135VAC, over voltage protection point is 295VAC.

7.2.2 Environmental Specifications

Environmental Specifications	
Heat Sinking Method	Natural cooling or fan-forced cooling
Surrounding Air Conditions	Avoid dust, oily mist and corrosive air
Operating Temperature	0 - 40°C (32 - 104°F)
Maximum Ambient Humidity	90% non-condensing
Shock	5.9m/s² maximum
Storage Temperature	-10 - 70°C (14 - 158°F)

7.3 Matting Connectors

Part number	Manuf.	Desc.
2EDGK-7.62-02P-14-00A(H)	DEGSON	2 pin power connector
2EDGK-5.08-04P-14-00A(H)	DEGSON	4 pin motor connector
15EDGK-3.81-08P-14-00A(H)	DEGSON	8 pin I/O connector

8 Contacting Applied Motion Products

Applied Motion Products
A MOONS' COMPANY

404 Westridge Dr.
Watsonville, CA 95076, USA
1-800-525-1609
www.applied-motion.com