MSSTAC5

Hardware Manual

- MSSTAC5-S-N-2V
- MSSTAC5-Q-N-2V
- MSSTAC5-S-E-2V
- MSSTAC5-Q-E-2V

Rev. 1.0

AMP & MOONS' Automation

Contents

Introduction

Thank you for selecting a MOONS' motor control product. We hope our dedication to performance, quality and economy will make your motion control successful.

If there's anything we can do to improve our products or help you use them better, please call or fax. We'd like to hear from you. Our phone number is (021) 52634688, or you can reach us by fax at (021) 62968682. You can also email to info@moons.com.cn

Features

- Programmable, microstepping digital step motor driver in compact package
- MSSTAC5-2V models operate from 94-265VAC
- Ethernet 10/100 MBit communication
- Operates in velocity or position mode
- Accepts analog signals, digital signals, and Ethernet commands
- Accept incremental encoder feedback signal. Single-ended or Differential. (Optional)
- MSSTAC5-2V provides motor current up to 2.55 amps/phase (peak of sine)
- Communications:

  Ethernet
- ±10 volt analog input for speed and position control. Can also be configured for 0 to 10V, ±5V or 0 to 5V signal ranges.

List of MSSTAC5 Model Numbers

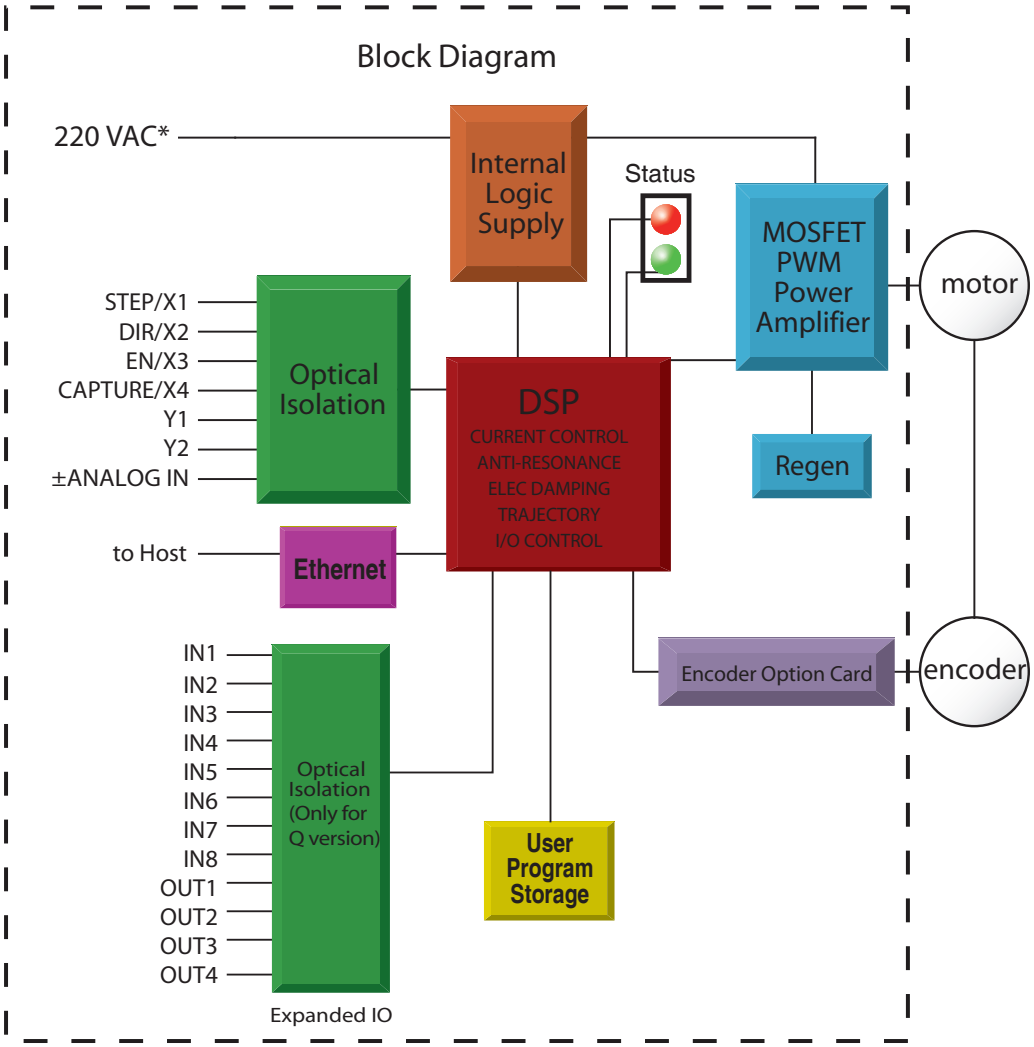
Model	Control	Current	Voltage	Encoder	Expand I/O
MSSTAC5-S-N-2V	S	0.5-2.55A	94-265VAC		
MSSTAC5-S-E-2V				√	
MSSTAC5-Q-N-2V	Q				√
MSSTAC5-Q-E-2V				√	√

An "E" in the model number indicates the inclusion of the models operate Encoder Feedback connector.

An "N" in the model number indicates no encoder feedback connector on the drive.

Block Diagram

MSSTAC5 Ethernet Step Motor Drive



Getting Started

This manual describes the use of all different drive models. What you need to know and what you must have depends on the drive model. For all models, you'll need the following:

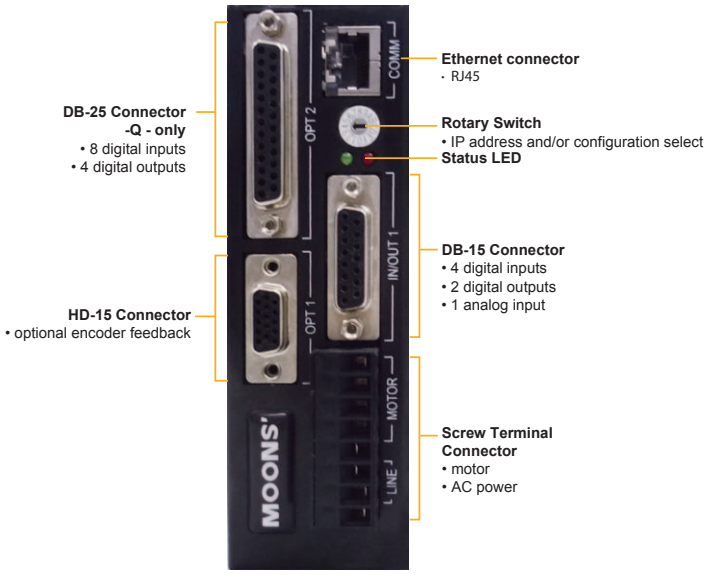
- 94-265VAC power.
- a compatible step motor
- a small flat blade screwdriver for tightening the connectors (included).
- a personal computer running Microsoft Windows XP, or Windows 7
- A CAT5 Ethernet cable (not included).

Installing Software

If you've never used a MSSTAC5 drive before you'll need to get familiar with the drive and the set up software before you try to deploy the system in your application. We strongly recommend the following:

1. For -S drives, download and install the ST Configurator software
   For -Q drives, download and install the ST Configurator and Q Programmer
2. Launch the software by clicking Start...Programs...MOONS'...ST Configurator.
3. Connect the drive to your PC using Ethernet and set the IP address
4. Connect the drive to the motor (see Connecting the Motor).
5. Connect the drive to the AC power (see Connecting AC Power).
6. Apply power to the drive.
7. Set the IP address of the software to match the drive

The connectors and other points of interest are illustrated below. Depending on your drive model and application, you'll need to make connections to various parts of the drive. These are detailed later in the manual.



Ethernet Version

Connecting the Drive to Your PC using Ethernet

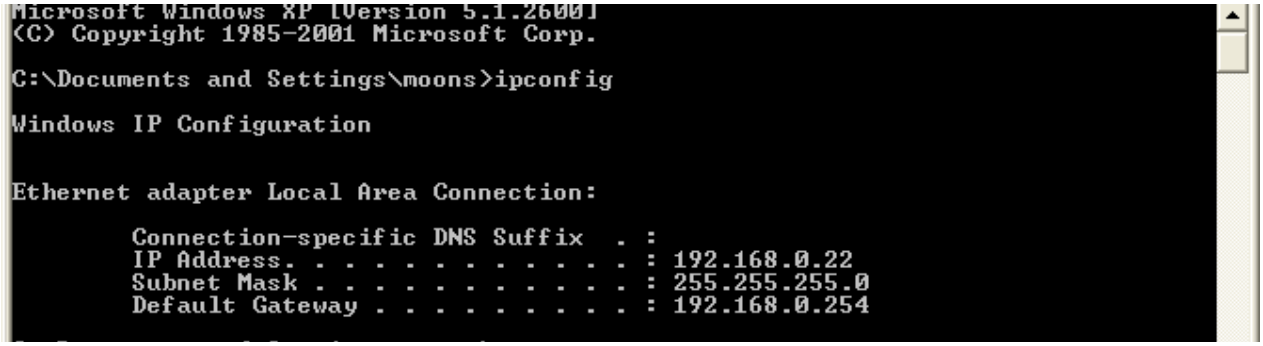
This process requires three steps:

- Physically connect the drive to your network (or directly to the PC)
- Set the drive's IP address
- Set the appropriate networking properties on your PC.

Addresses, Subnets, and Ports

Every device on an Ethernet network must have a unique IP address. In order for two devices to communicate with each other, they must both be connected to the network and they must have IP addresses that are on the same subnet. A subnet is a logical division of a larger network. Members of one subnet are generally not able to communicate with members of another unless they are connected through special network equipment (e.g. router). Subnets are defined by the choices of IP addresses and subnet masks.

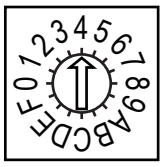
If you want to know the IP address and subnet mask of your PC, select Start…All Programs…Accessories…Command Prompt. Then type "ipconfig" and press Enter. You should see something like this:



If your PC's subnet mask is set to 255.255.255.0, a common setting known as a Class C subnet mask, then your machine can only talk to another network device whose IP address matches yours in the first three octets. (The numbers between the dots in an IP address are called octets.) For example, if your PC is on a Class C subnet and has an IP address of 192.168.0.20, it can talk to a device at 192.168.0.40, but not one at 192.168.1.40. If you change your subnet mask to 255.255.0.0 (Class B) you can talk to any device whose first two octets match yours. Be sure to ask your system administrator before doing this. You network may be segmented for a reason.

Your drive includes a 16 position rotary switch for setting its IP address. The factory default address for each switch setting is shown in the table to the right.

IP Address*	
0	10.10.10.10
1	192.168.1.10
2	192.168.1.20
3	192.168.1.30
4	192.168.0.40
5	192.168.0.50
6	192.168.0.60
7	192.168.0.70
8	192.168.0.80
9	192.168.0.90
A	192.168.0.100
B	192.168.0.110
C	192.168.0.120
D	192.168.0.130
E	192.168.0.140
F	DHCP



Settings 1 through E can be changed using the ST Configurator software Setting 0 is always "10.10.10.10", the universal recovery address. If someone were to change the other settings and not write it down or tell anyone then you will not be able to communicate with your drive. The only way to "recover" it is to use the universal recovery address.

Setting F is "DHCP", which commands the drive to get an IP address from a DHCP server on the network. The IP address automatically assigned by the DHCP server may be "dynamic" or "static"

depending on how the administrator has configured DHCP. The DHCP setting is reserved for advanced users.

Your PC, or any other device that you use to communicate with the drive, will also have a unique address.

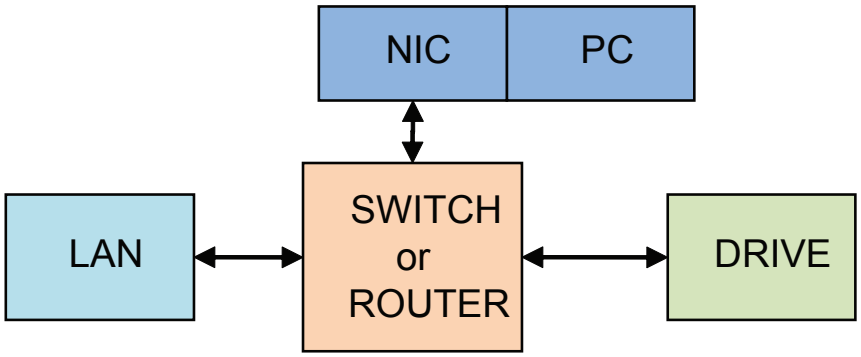
On the drive, switch settings 1 through E use the standard class B subnet mask (i.e. “255.255.0.0”). The mask for the universal recovery address is the standard class A (i.e. “255.0.0.0”). One of the great features of Ethernet is the ability for many applications to share the network at the same time. Ports are used to direct traffic to the right application once it gets to the right IP address. The UDP eSCL port in our drives is 7775. To send and receive commands using TCP, use port number 7776. You’ll need to know this when you begin to write your own application. You will also need to choose an open (unused) port number for your application. Our drive doesn’t care what that is; when the first command is sent to the drive, the drive will make note of the IP address and port number from which it originated and direct any responses there. The drive will also refuse any traffic from other IP addresses that is headed for the eSCL port. The first application to talk to a drive “owns” the drive. This lock is only reset when the drive powers down.

If you need help choosing a port number for your application, you can find a list of commonly used port numbers at http://www.iana.org/assignments/port-numbers.

One final note: Ethernet communication can use one or both of two “transport protocols”: UDP and TCP. eSCL commands can be sent and received using either protocol. UDP is simpler and more efficient than TCP, but TCP is more reliable on large or very busy networks where UDP packets might occasionally be dropped.

Option 1: Connect a Drive to Your Local Area Network

If you have a spare port on a switch or router and if you are able to set your drive to an IP address that is compatible with your network, and not used by anything else, this is a simple way to get connected. This technique also allows you to connect multiple drives to your PC. If you are on a corporate network, please check with your system administrator before connecting anything new to the network. He or she should be able assign you a suitable address and help you get going.



If you are not sure which addresses are already used on your network, you can find out using “Angry IP scanner”, which can be downloaded free from http://www.angryip.org/w/Download. But be careful: an address might appear to be unused because a computer or other device is currently turned off. And many networks use dynamic addressing where a DHCP server assigns addresses “on demand”.The address you choose for your drive might get assigned to something else by the DHCP server at another time.

Once you’ve chosen an appropriate IP address for your drive, set the rotary switch according the address table above. If none of the default addresses are acceptable for your network, you can enter a new table of IP addresses using Configurator. If your network uses addresses starting with

192.168.0, the most common subnet, you will want to choose an address from switch settings 4 through E. Another common subnet is 192.168.1. If your network uses addresses in this range, the compatible default selections are 1, 2 and 3. If your PC address is not in one of the above private subnets, you will have to change your subnet mask to 255.255.0.0 in order to talk to your drive. To change your subnet mask:

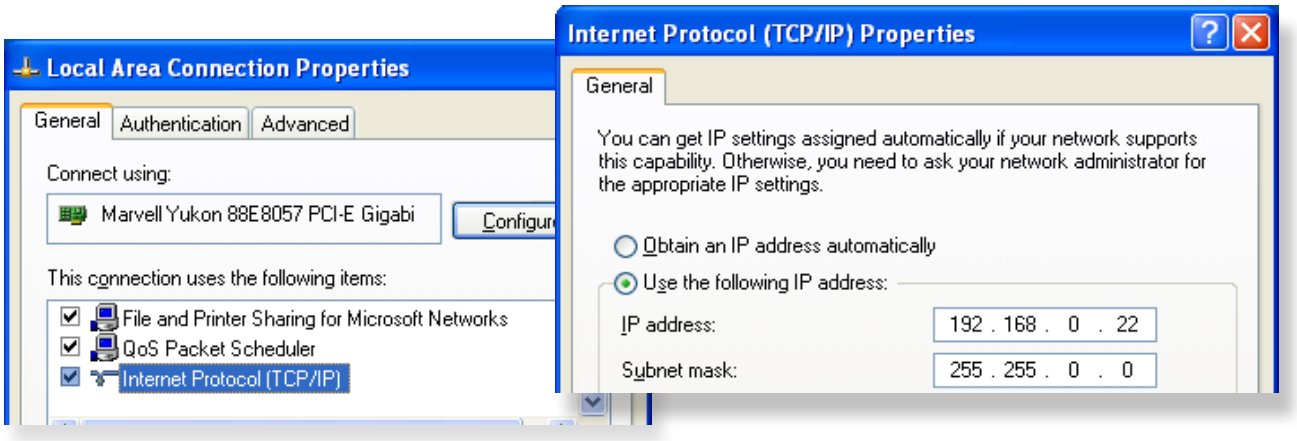
1. On Windows XP, right click on "My Network Places" and select properties. On Windows 7, click Computer. Scroll down the left pane until you see "Network". Right click and select properties. Select "Change adapter settings"

2. You should see an icon for your network interface card (NIC). Right click and select properties.

3. Scroll down until you see "Internet Properties (TCP/IP)". Select this item and click the Properties button. On Windows 7 and Vista, look for "(TCP/IPv4)"

4. If the option "Obtain an IP address automatically" is selected, your PC is getting an IP address and a subnet mask from the DHCP server. Please cancel this dialog and proceed to the next section of this manual: "Using DHCP".

5. If the option "Use the following IP address" is selected, life is good. Change the subnet mask to "255.255.0.0" and click OK.



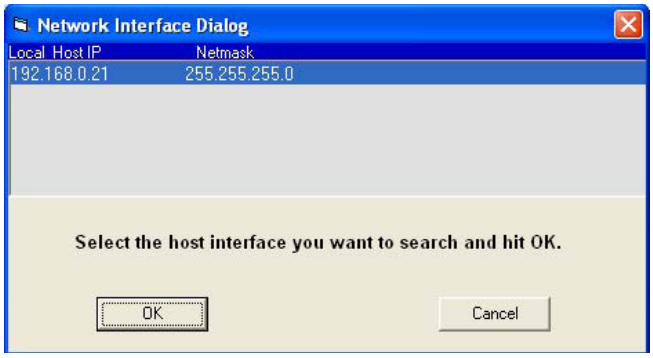
Using DHCP

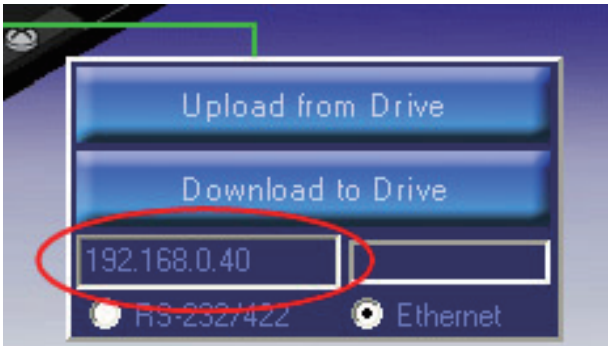
If you want to use your drive on a network that where all or most of the devices use dynamic IP addresses supplied by a DHCP server, set the rotary switch to “F”. When the drive is connected to the network and powered on, it will obtain an IP address and a subnet mask from the server that is compatible with your PC. The only catch is that you won’t know what address the server assigns to your drive. Ethernet Configurator can find your drive using the Drive Discovery feature, as long as your network isn’t too large. With the drive connected to the network and powered on, select Drive Discovery from the Drive menu.

You will see a dialog such as this:

Normally, Drive Discovery will only detect one network interface card (NIC), and will select it automatically. If you are using a laptop and have both wireless and wired network connections, a second NIC may appear. Please select the NIC that you use to connect to the network to which you’ve connected your drive. Then click OK. Drive Discovery will notify you as soon as it has detected a drive.

If you think this is the correct drive, click Yes. If you’re not sure, click Not Sure and Drive Discovery will look for additional drives on you network. Once you’ve told Drive Discovery which drive is yours, it will automatically enter that drive’s IP address in the IP address text box so that you are ready to communicate.





Option 2: Connect a Drive Directly to Your PC

It doesn't get much simpler than this:

1. Connect one end of a CAT5 Ethernet cable into the LAN card (NIC) on your PC and the other into the drive. You don't need a special "crossover cable"; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. Set the IP address on the drive to "10.10.10.10" by setting the rotary switch at "0".

3. To set the IP address of your PC:

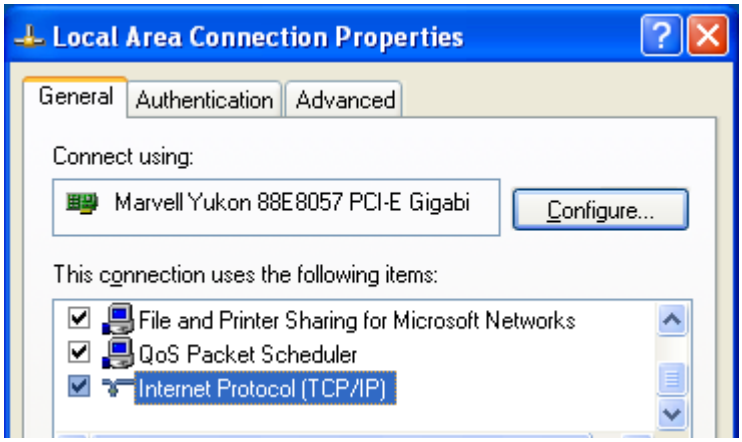
   a. On Windows XP, right click on "My Network Places" and select properties.

   b. On Windows 7, click Computer. Scroll down the left pane until you see "Network". Right click and select properties. Select "Change adapter settings"

4. You should see an icon for your network interface card (NIC). Right click and select properties.

   a. Scroll down until you see "Internet Properties (TCP/IP)". Select this item and click the Properties button.

   b. On Windows 7 and Vista, look for "(TCP/IPv4)"



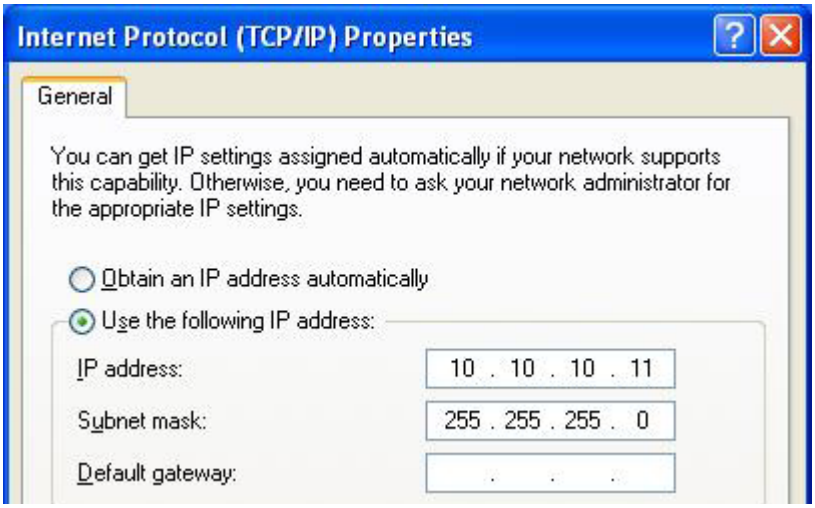
5. Select the option "Use the following IP address". Then enter the address "10.10.10.11". This will give your PC an IP address that is

on the same subnet as the drive. Windows will know to direct any traffic intended for the drive's IP address to this interface card.

6. Next, enter the subnet mask as "255.255.255.0".

7. Be sure to leave "Default gateway" blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying "The network cable is unplugged."



Option 3: Use Two Network Interface Cards (NICs)

This technique allows you to keep your PC connected to your LAN, but keeps the drive off the LAN, preventing possible IP conflicts or excessive traffic.

1. If you use a desktop PC and have a spare card slot, install a second NIC and connect it directly to the drive using a CAT5 cable. You don't need a special "crossover cable"; the drive will automatically detect the direct connection and make the necessary physical layer changes.

2. If you use a laptop and only connect to your LAN using wireless networking, you can use the built-in RJ45 Ethernet connection as your second NIC.

3. Set the IP address on the drive to "10.10.10.10" by setting the rotary switch at "0".

4. To set the IP address of the second NIC:

a. On Windows XP, right click on "My Network Places" and select properties.

b. On Windows 7, click Computer. Scroll down the left pane until you see "Network". Right click and select properties. Select "Change adapter settings"

5. You should see an icon for your newly instated NIC. Right click again and select properties.

a. Scroll down until you see "Internet Properties (TCP/IP)". Select this item and click the Properties button.

b. On Windows 7 and Vista, look for "(TCP/IPv4)"

6. Select the option "Use the following IP address". Then enter the address "10.10.10.11". This will give your PC an IP address that is on the same subnet as the drive. Windows will know to direct any traffic intended for the drive's IP address to this interface card.

7. Next, enter the subnet mask as "255.255.255.0". Be sure to leave "Default gateway" blank. This will prevent your PC from looking for a router on this subnet.

8. Because you are connected directly to the drive, anytime the drive is not powered on your PC will annoy you with a small message bubble in the corner of your screen saying "The network cable is unplugged."

Connecting AC Power

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

Care should always be taken when working with high voltages.

In regions where the single-phase supply is higher, an auto transformer can be used to drop the voltage to the correct level.

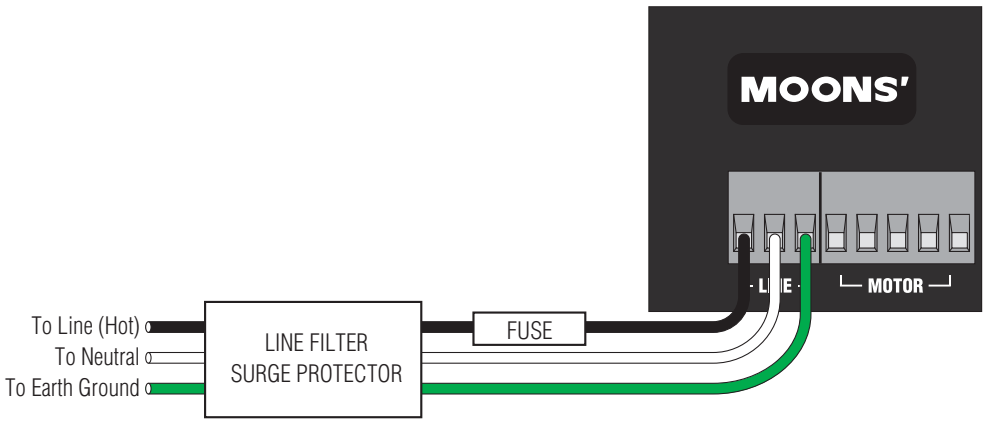
Fusing

The MSSTAC5-2V contains an internal 6.3A fast acting fuse. If an external fuse is desired, we recommend a 3A fast acting fuse for the MSSTAC5.

Line Filter

For applications requiring CE EMC compliance, a line filter is required in series with the AC input. Here are two choices.

1. Vendor: Tyco Electronics Corcom Part Number: 6ET1
2. Vendor: LCR Electronics, inc. Part Number: 092.00721.00



Connecting the Motor

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

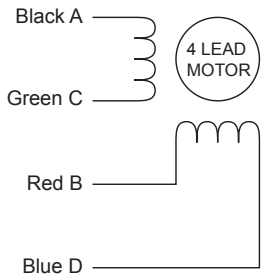
Note: it is highly recommended that you use a motor with a shielded cable with the MSSTAC5. Always connect the cable drain wire to the drive's ⏚ terminal (next to the A+terminal)

The recommended MOONS' motors for the MSSTAC5 include shielded cables. See the

Recommended Motors section for a list of part numbers.

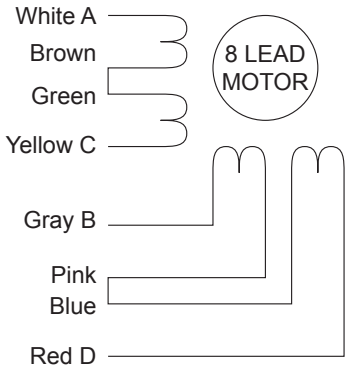
We can't stress enough the wisdom in using one of the recommended motors. We're not just trying to make money here, we want your application to be successful and the odds of that are highest when you have a high quality motor whose torque, rotor inertia and harmonic waveform content are precisely known. If you do want to connect other motors , here is some information that will help you.

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



4 Leads

Eight leads motors can also be connected in series. As with eight leads motor, series operation gives you less torque at high speeds, but may result in lower motor losses and less heating. Parallel operation is not recommend for 220VAC power.



8 Leads Series Connected

Eight leads motors can also be connected in parallel. As with eight leads motor, parallel operation gives you much more torque at high speeds, but may also result in much more heat generated that can cause danger to both motor and drive. You should contact us for more technical details of using parallel operation, make sure it will be safe in your application.

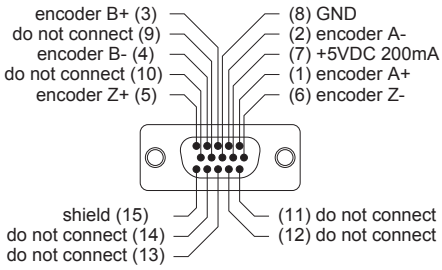
Connecting an Encoder (Requires the Encoder Feedback option)

The motors recommended for use with MSSTAC5 drives are available with rear-shaft mounted encoders.

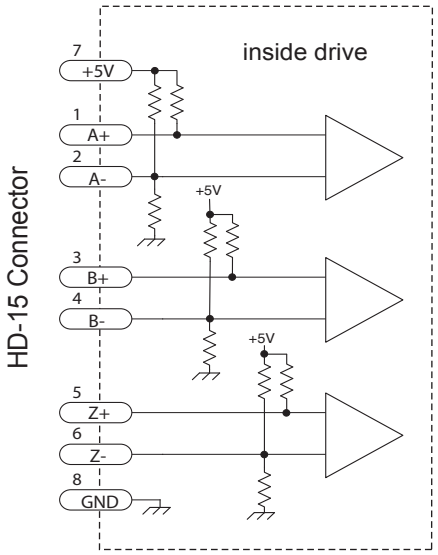
Note: remember to always order a double-shaft motor if you need an encoder option. The mating cables available for these encoders come with an HD-15 connector on one end that connects directly to the optional encoder connector on the MSSTAC5, and a mating connector on the other end that connects directly to the encoder. Simply connect the cable between the encoder and the drive and you're done. For applications where you might use your own encoder, you'll need to connect to the MSSTAC5 drive's encoder connector using the pin assignments below.

If you are using an encoder with single ended outputs, shame on you. Differential connections are far less sensitve to electrical interference and life is too short to waste time deciphering the bizarre problems that can occur with a poor quality encoder. That said, single ended encoders should be connected to the A+ and B+ terminals. Leave A- and B- unconnected. They are internally biased to the proper voltage for best results. You'll also need to select the "single ended" box in the encoder button of ST Configurator or the drive will think you have a broken encoder wire. That's another good reason to use a differential encoder, the MSSTAC5 can detect a broken wire or bad signal and alert you to the problem.

The encoder connections use a HD-15 connector, which you must connect to your encoder as shown below. Recommended mating connectors are listed at the back of the manual.



Front View
Pin Assignments (facing drive)



Internal Circuit

IO Functions

Standard IN/OUT1 Connector						
	X1	**X2**	**X3**	**X4**	**Y1**	**Y2**
Voltage range	5 - 24V	5 - 24V	5 - 24V	5 - 24V	30V max	30V max
Speed range	2 MHz	2 MHz	2 MHz	2 MHz	5KHz	5KHz
Digital filter option	Yes	Yes	Yes	Yes	N/A	N/A

	Expand IN/OUT2 Connector(OPT2)											
	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	OUT1	OUT2	OUT3	OUT4
Voltage range	5-24V	5-24V	12-24V	12-24V	12-24V	12-24V	5-24V	5-24V	30Vmax	30Vmax	30Vmax	30Vmax
Speed range	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz	5KHz
Digital filter option	Yes	Yes	No	No	No	No	Yes	Yes	N/A	N/A	N/A	N/A

Notes:

I/O functions are configured using ST Configurator software and/or SCL commands.

Connecting Input Signals

The MSSTAC5 drives have four types of inputs.

- High speed digital inputs for step & direction commands or encoder following, 5-24 volt logic. These inputs, X1/STEP and X2/DIR are available on all models. They can also be used to connect sensors and other types of devices. The connection can be sourcing, sinking or differential.

  High speed digital inputs for enable motor or alarm reset or high speed capture, 5-24 volt logic. These inputs, X3/EN/AR and X4/Capture are available on all models. They can also be used to connect sensors and other types of devices. The connection can be sourcing, sinking or differential.

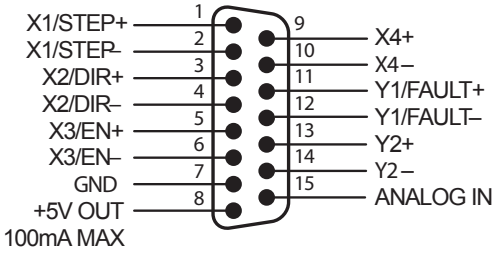
- Lower speed digital inputs for other signals, 5 - 24 volt logic, -Q drive only. The model include four differential inputs, IN1, IN2, IN7 and IN8.

- 12-24V lower speed single ended inputs which accept sourcing or sinking inputs. These four inputs, IN3-IN6 are only present on on -Q models.

- Analog input for analog speed and positioning modes, included on all drives. Can be configured for 0-10V, 0-5V, ±10V or ±5V, with or without offset.

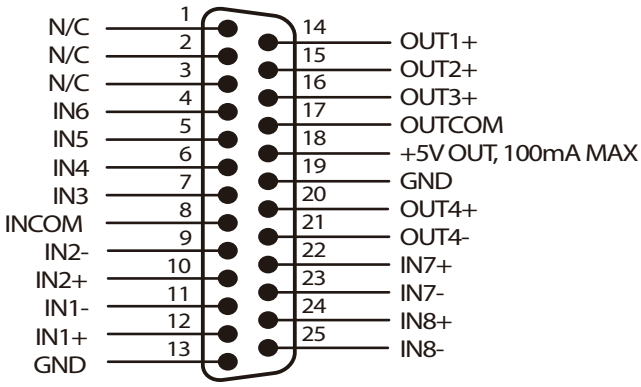
Connector Pin Diagrams

IN/OUT 1



This connector is included on all models.

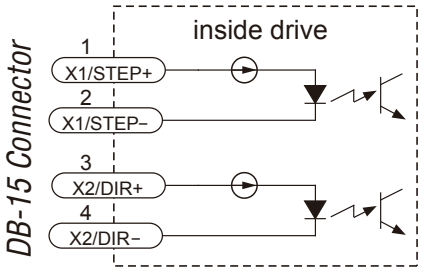
IN/OUT 2



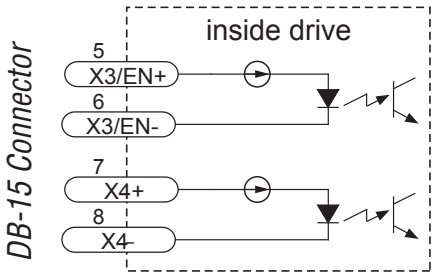
This connector is standard on -Q models.

High Speed Digital Inputs

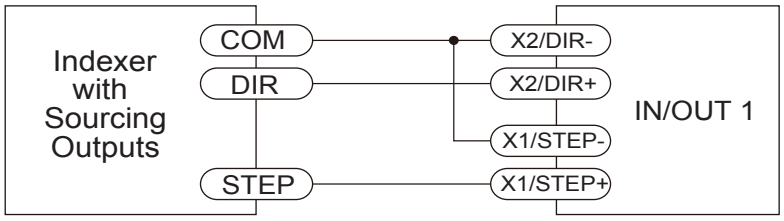
All MSSTAC5 drives include two high speed inputs called X1/STEP and X2/DIR. They accept 5-24 volt single-ended or differential signals, up to 2 MHz. Normally these inputs connect to an external controller that provides step & direction command signals. You can also connect a master encoder to the high speed inputs for encoder following applications. Or you can use these inputs with Wait Input, If Input, Feed to Sensor, Seek Home and other such commands.



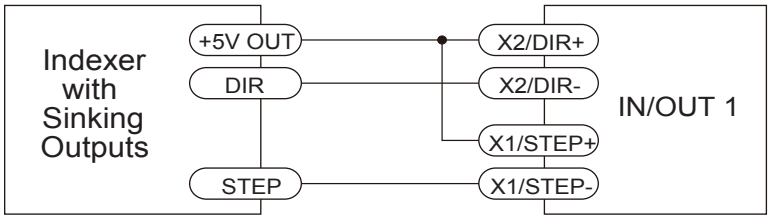
All MSSTAC5 drives include two high speed inputs called X3/EN/AR and X4/Capture. They accept 5-24 volt single-ended or differential signals, You can use these inputs with Wait Input, If Input, Feed to Sensor, Seek Home and other such commands.



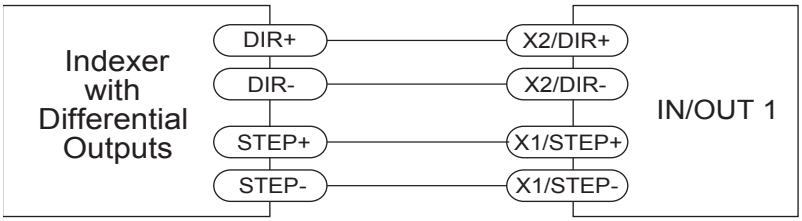
Connection diagrams follow.



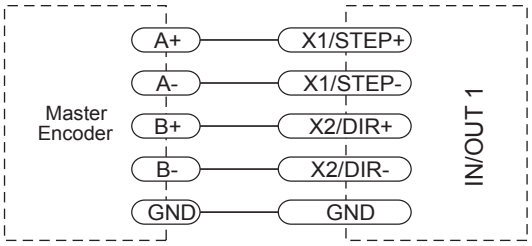
Connecting to indexer with Sourcing Outputs



Connecting to Indexer with Sinking Outputs



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

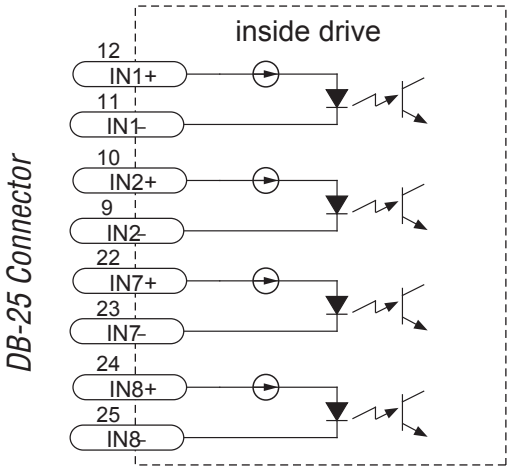


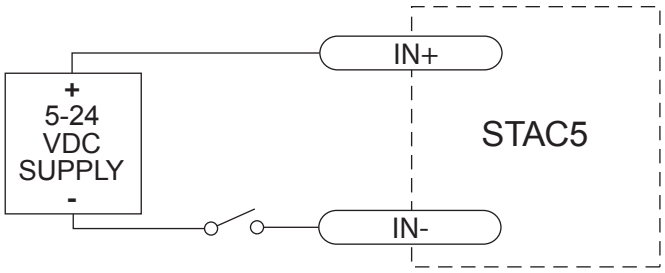
Wiring for Encoder Following
(Encoder power can be supplied from the +5V OUT terminal on IN/OUT 1 if the encoder requires no more than 100mA)

Lower Speed, Differential Digital Inputs

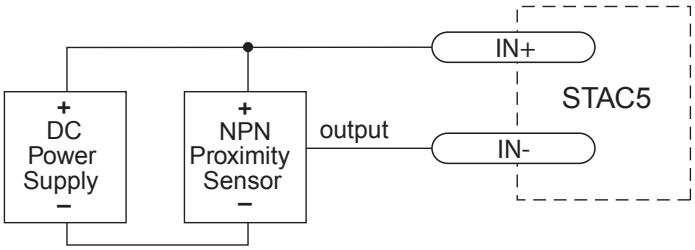
-Q models include four additional differential inputs on the IN/OUT2 (OPT2) connector called IN1, IN2, IN7 and IN8. IN1 and IN2 can be used for connection to sensors and other devices. IN7 and IN8 are normally used for end of travel limit switches, but can be used for registration sensors, etc.

Connection diagrams follow.

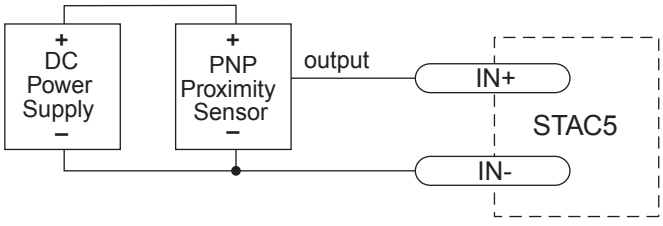




Connecting a Mechanical Switch to Low Speed Differential Inputs



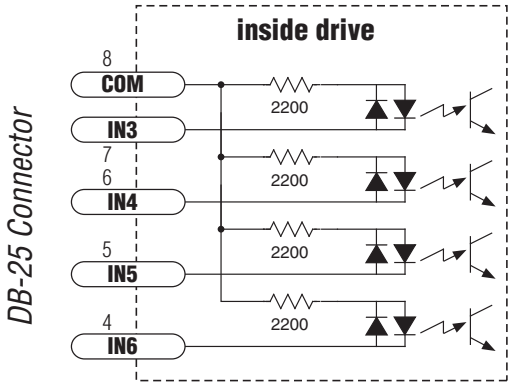
Connecting an NPN Proximilty Sensor to Low Speed Differential Inputs



Connecting a PNP Proximilty Sensor to Low Speed Differential Inputs

Single Ended Digital Inputs

The -Q drives include four single ended, optically isolated input circuits that can be used with sourcing or sinking signals, 12 to 24 volts. This allows connection to PLCs, sensors, relays and mechanical switches. Because the input circuits are isolated, they require a source of power. If you are connecting to a PLC, you should be able to get power from the PLC power supply. If you are using relays or mechanical switches, you will need a 12-24 V power supply.

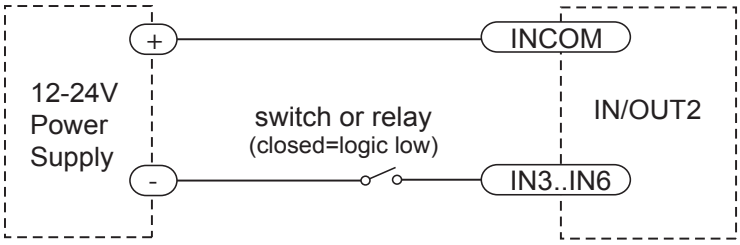


What is COM?

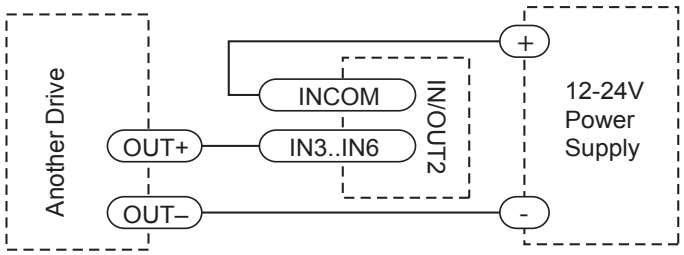
“Common” is an electronics term for an electrical connection to a common voltage. Sometimes “common” means the same thing as “ground”, but not always. In the case of the MSSTAC5 drives, if you are using sourcing (PNP) input signals, then you will want to connect COM to ground (power supply -). If you are using sinking (NPN) signals, then COM must connect to power supply +.

Note: If current is flowing into or out of an input, the logic state of that input is low or closed. If no current is flowing, or the input is not connected, the logic state is high or open.

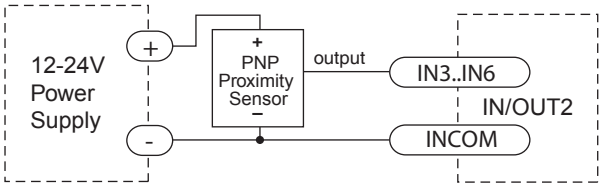
The diagrams on the following pages show how to connect the inputs to various commonly used devices.



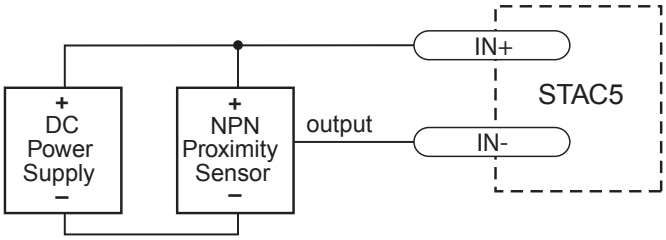
Connecting an Input to a Switch or Relay



Connecting another drive to the STAC5
(When output closes, input goes low).



Connecting a PNP Type Proximity Sensor to a an input
(When prox sensor activates, input goes low).

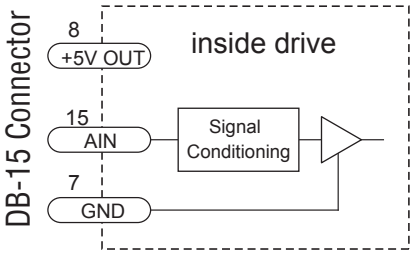


Connecting an NPN Proximilty Sensor to Low Speed Differential Inputs

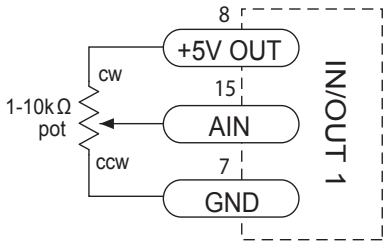
Analog Input

The MSSTAC5 drives feature one analog input. It can accept a signal range of 0 to 5 VDC, ±5 VDC, 0 to 10 VDC or ±10 VDC. The drive can be configured to operate at a speed or position that is proportional to the analog signal.

Use the ST Configurator software to set the signal range, offset, deadband and filter frequency.

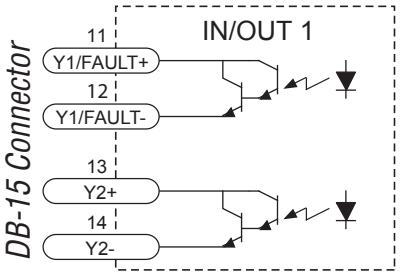


Connecting a Potentiometer to the Analog Input

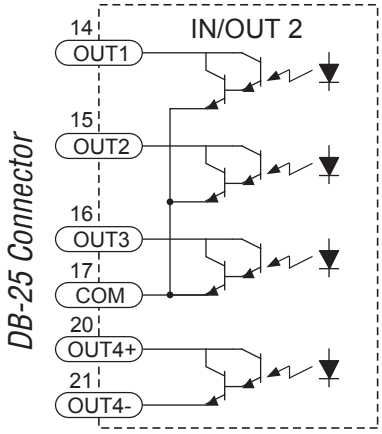


Programmable Outputs

The MSSTAC5-S drives feature two digital outputs.
These outputs can be set to automatically control a motor brake, to signal a fault condition, to indicate when the motor is moving or to provide an output frequency proportional to motor speed (tach out). Or the outputs can be turned on and off by program instructions like Set Output. MSSTAC5-Q drives include four additional programmable outputs.



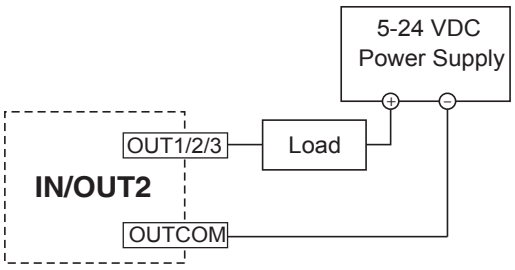
The outputs can be used to drive LEDs, relays and the inputs of other electronic devices like PLCs and counters. For Y1, Y2 and OUT4, the “+” (collector) and “-” (emitter) terminals of each transistor are available at the connector. This allows you to configure each output for current sourcing or sinking. OUT1, OUT2 and OUT3 can only sink current. The COM terminal must be tied to power supply (-).



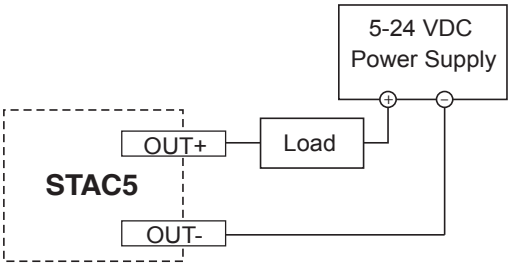
Diagrams of each type of connection follow.

Do not connect the outputs to more than 30VDC.

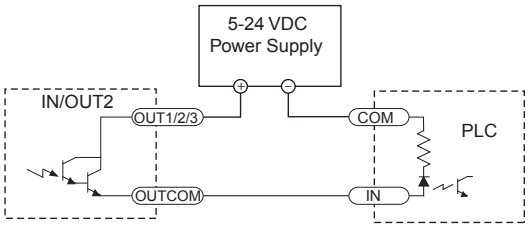
The current through each output terminal must not exceed 100 mA.



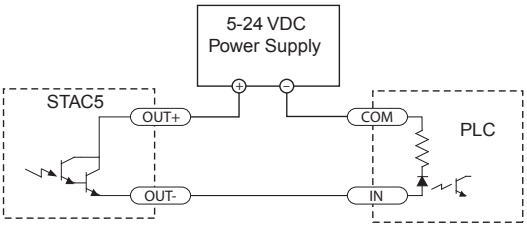
Sinking Output Using OUT1, OUT2 or OUT3



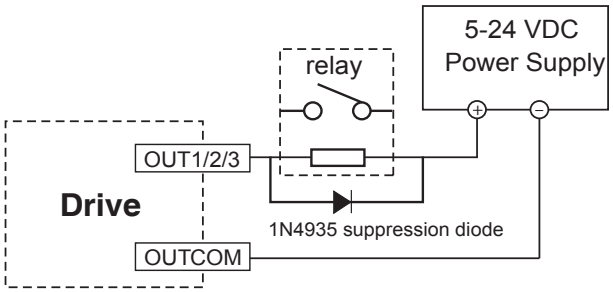
Sinking Output Using Y1, Y2 or OUT4



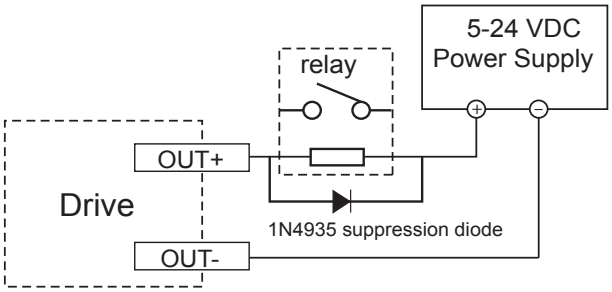
Sourcing Output Using OUT1, OUT2 or OUT3



Sourcing Output Using Y1, Y2 or OUT4



Driving a Relay Using OUT1,OUT2 or OUT3



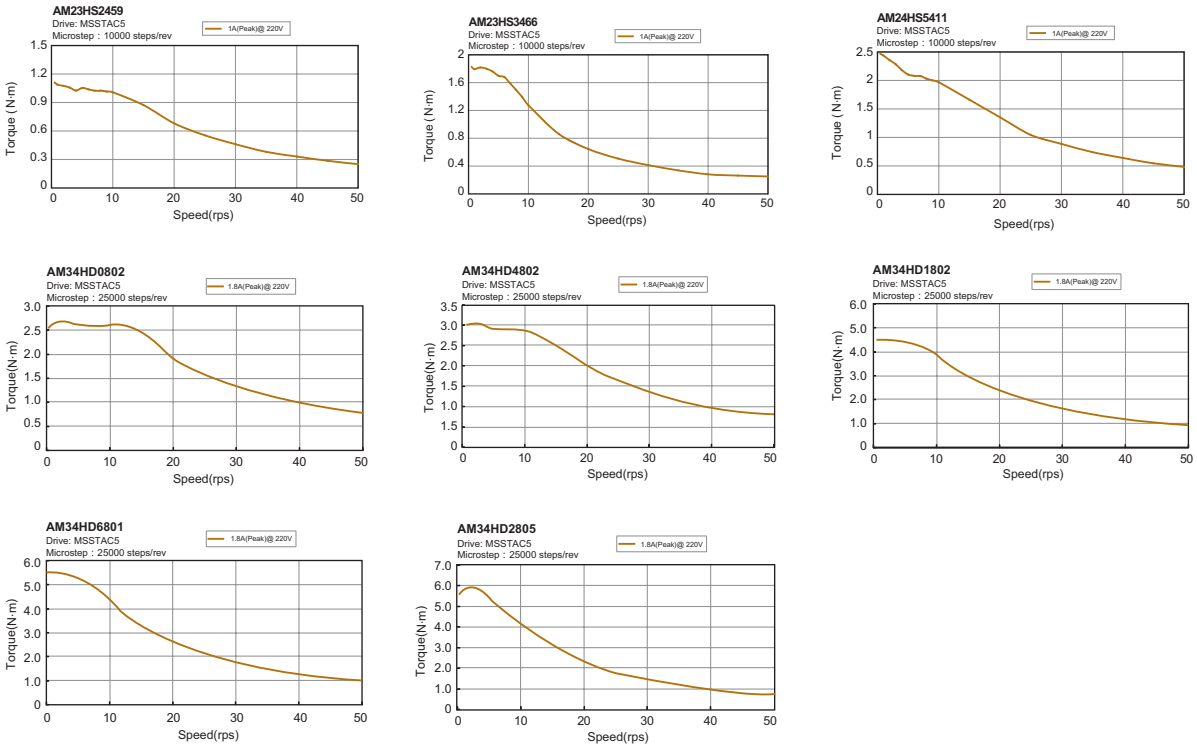
Driving a Relay Using Y1, Y2, or OUT4

Recommended Motors

Model	Shaft	Wiring	Length"L"	Holding Torque	Current	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	A/Phase	Ω/Phase	g·cm^2	Kg	
AM23HS2459-01	Single Shaft	4 Leads	54	1.1	1	16.6	260	0.6	1500V AC 1 minute
AM23HS3466-01			76	1.8		25.4	460	1.0	
AM24HS5411-01N	Single Shaft		85	2.5		15.4	900	1.4	
AM34HD0802-01	Single Shaft	8 Leads Series Connected	66.5	3	1.8	3.4	1100	1.6	
AM34HD0802-02	Double Shaft								
AM34HD4802-01	Single Shaft		75	3.5		3.6	1350	1.9	
AM34HD1802-01	Single Shaft		96	5		3.6	1850	2.7	
AM34HD1802-03	Double Shaft								
AM34HD6801-01	Single Shaft		115	6.5		4	2400	3.5	
AM34HD2805-01	Single Shaft		125.5	7.1		4.2	2750	3.8	
AM34HD2805-03	Double Shaft								

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.

Torque-Speed Curves

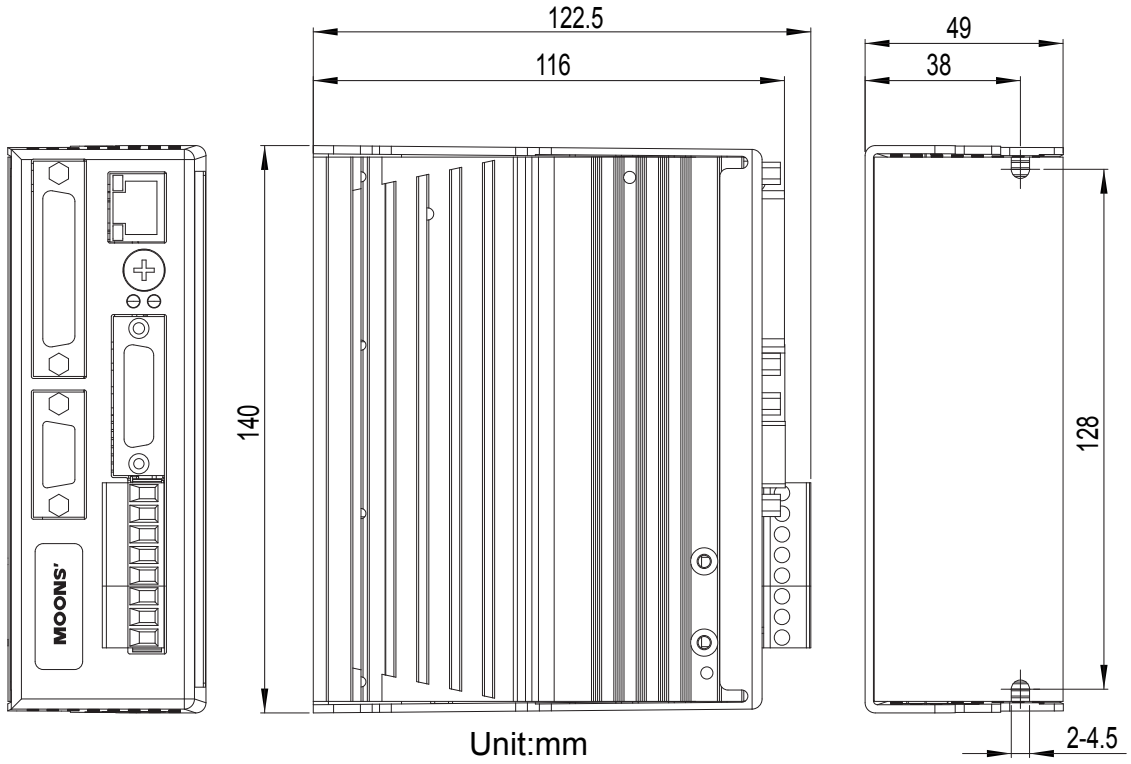


Mounting the Drive

Use M4 screws to mount your drive. If possible, the drive should be securely fastened to a smooth, flat metal surface that will help conduct heat away from the chassis. If this is not possible, then forced airflow from a fan may be required to prevent the drive from overheating.

- Never use your drive in a space where there is no air flow or where other devices cause the surrounding air to be more than 40°C.
- Never put the drive where it can get wet or where metal or other electrically conductive particles can get on the circuitry.
- Always provide air flow around the drive. When mounting multiple MSSTAC5 drives near each other, maintain at least one half inch of space between drives.

Mechanical Outline



Technical Specifications

AMPLIFIER TYPE	Digital MOSFET, dual H-bridge, 4 quadrant
CURRENT CONTROL	4 state PWM at 16 KHz
OUTPUT CURRENT	MSSTAC5-2V: 0.5-2.55 amps/phase (peak of sine) in 0.01 amp increments
POWER SUPPLY	MSSTAC5-2V: 94-265 VAC, 50/60Hz
PROTECTION	Over-voltage, under-voltage, over-temp, motor/wiring shorts (phase-to-phase, phase-to-ground), internal amplifier shorts
MOTOR REGENERATION	Built-in regeneration circuit, 10 watts max.
IDLE CURRENT REDUCTION	Reduction range of 0-90% of running current after delay selectable in milliseconds
MICROSTEP RESOLUTION	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
MICROSTEP EMULATION	Performs high resolution stepping by synthesizing fine microsteps from coarse steps. Reduces jerk and extraneous system resonances. (Step & direction mode only).
ANTI-RESONANCE (Electronic Damping)	Raises the system damping ratio to eliminate midrange instability and allow stable operation throughout the speed range and improves settling time.
TORQUE RIPPLE SMOOTHING	Allows for fine adjustment of phase current waveform harmonic content to reduce low-speed torque ripple in the range of 0.25 to 1.5 rps.
ENCODER INTERFACE	For connecting to motor-mounted encoder. Used to provide stall detection and stall prevention with static position maintenance. Differential line receivers, up to 2 MHz.
INPUTS/OUTPUTS: S and Q models	X1, X2 inputs: Optically isolated, differential, 5-24 VDC logic (2.5V switching threshold), minimum pulse width = 250 nsec, maximum pulse frequency = 2 MHz, 2 usec minimum set up time for direction signal, maximum current = 10 mA. X3, X4 inputs: Optically isolated, differential, 5-24 VDC logic (2.5V switching threshold), minimum pulse width = 250 nsec, maximum pulse frequency = 2 MHz, maximum current = 10 mA. Y1, Y2 outputs: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max, voltage drop = 1.2V max at 100 mA. Analog input: Single-ended. Range is software selectable 0-5, +/-5, 0-10, or +/-10 VDC. Software configurable offset, deadband, and filtering. Resolution is 12 bits (+/- 10 volt range), 11 bits (+/-5 or 0-10 volt range), or 10 bits (0-5 volt range). 100 kohms internal impedance.

INPUTS/OUTPUTS: Q models only	Q models have the same I/O as above plus the following: IN1, IN2, IN7, IN8 inputs: Optically isolated, differential, 5-24 VDC logic (2.5V switching threshold), 100 usec minimum pulse width, maximum current = 10 mA. IN3-IN6 inputs: Optically isolated, single-ended, shared common, sinking or sourcing, 12-24 VDC logic, 2200 ohms, maximum current = 10 mA. OUT1-OUT3 outputs: Optical darlington, single-ended, shared common, sinking, 30 VDC max, 100 mA max, voltage drop = 1.2V max at 100 mA. OUT4 output: Optical darlington, sinking or sourcing, 30 VDC max, 100 mA max, voltage drop = 1.2V max at 100 mA.
NON-VOLATILE STORAGE	Drive configuration and Q program are stored in FLASH memory onboard the DSP.
AGENCY APPROVALS	“RoHS CE EN61800-3:2004 UL 508c”
HUMIDITY	90% max, non-condensing
AMBIENT TEMPERATURE	0 to 40 ºC (32 to 104 ºF) with adequate ventilation
DIMENSIONS	122.5×128×49mm
WEIGHT	22.4 oz (630 g)

Mating Connectors and Accessories

Mating Connectors

Power supply: Weidmuller P/N 1526510000
Motor: Weidmuller P/N 1526710000
IN/OUT1: DB-15 male. OUPIIN P/N 7907-15MTBC00A. Shell Kit OUPIIN P/N DP-15CP. Included.
IN/OUT2: DB-25 male. OUPIIN P/N 7907-25MTBC00A. Shell Kit OUPIIN P/N DP-25CP. Included.
Optional encoder feedback: DB-15 male. OUPIIN P/N 7917-15MTBC00A. Shell Kit OUPIIN P/N DP-09CP. Included.

Alarm Codes

In the event of an error, the green LED on the main board will flash one or two times, followed by a series of red flashes. The pattern repeats until the alarm is cleared.

Code		Error
	Solid green	no alarm,motor disabled
	Flashing green	no alarm,motor enabled
	1 red,1 green	motor stall (optional encoder only)
	2 red,1 green	ccw limit
	2 red,2 green	cw limit
	3 red,1 green	drive overheating
	3 red,2 green	internal voltage out of range
	3 red,3 green	blank Q segment
	4 red,1 green	power supply overvoltage or excess regen
	4 red,2 green	power supply undervoltage
	4 red,3 green	flash memory backup error
	5 red,1 green	Over current/short circuit
	6 red,1 green	Open motor winding
	6 red,2 green	bad encoder signal (optional encoder only)
	7 red,1 green	communication error
	7 red,2 green	flash memory error

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