STF-R/C

Stepper Motor Drive
Hardware Manual

STF03/06-R STF03/06-C
STF05/10-R STF05/10-C
STF05/10-R-FC STF05/10-C-FC

SHANGHAI AMP & MOONS' AUTOMATION CO.,LTD.

Rev. 1.0
03/27/2024

Contents

1 Introduction

Thank you for selecting the MOONS' STF series stepper drive. The STF series are high performance fieldbus control stepper drive which also integrates with built-in motion controller. The drives can be controlled by SCL, Modbus/RTU or CANopen in real time. Motion profiles can also be programmed and stored in drives (Q Program) and then be triggered by SCL, Modbus/RTU or CANopen commands. The drives support RS-485/422 or CANopen communication.

This document contains mainly descriptive information about the stepper servo drive:

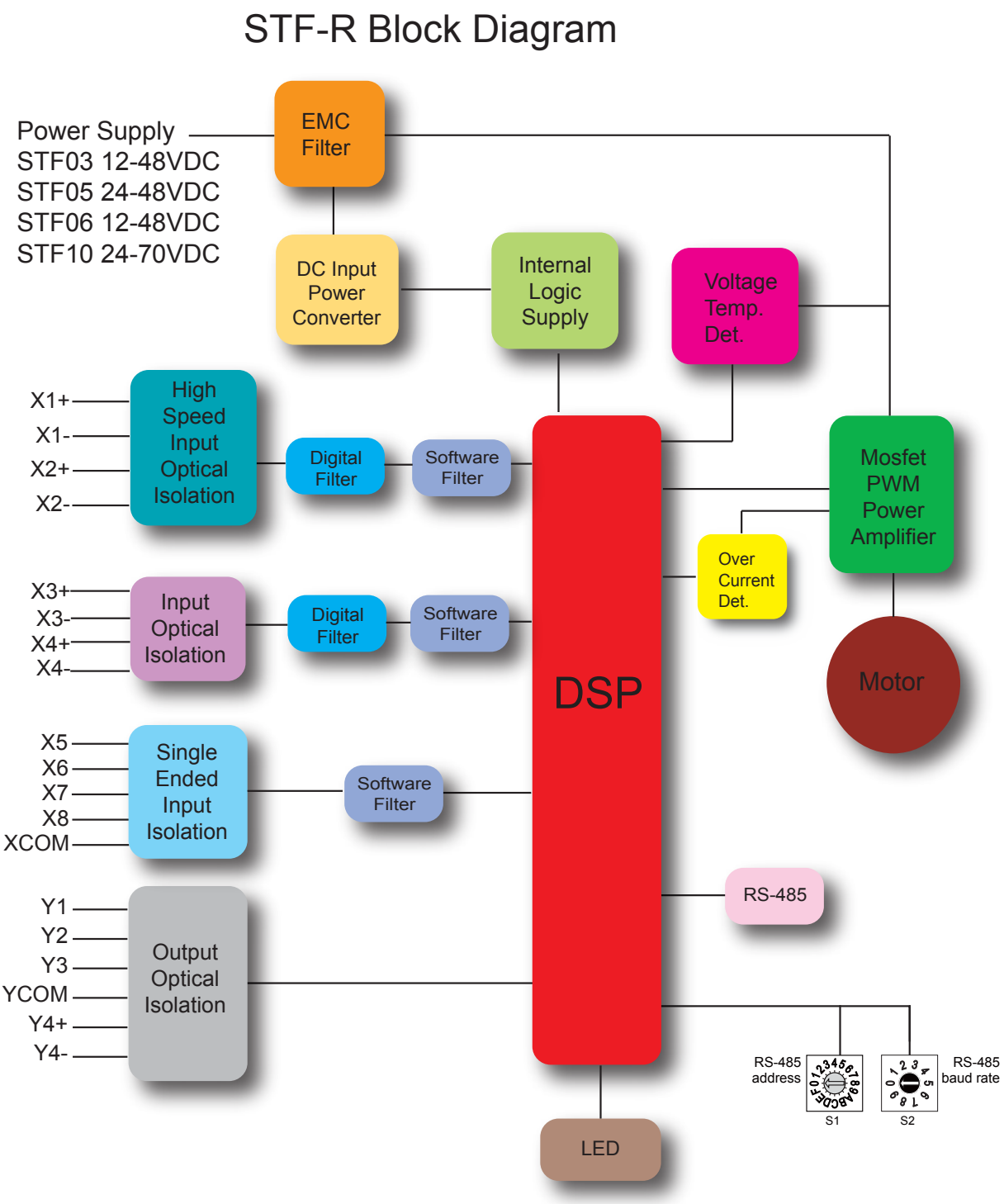
Mode	
STF03/06-C	-
STF03/06-R	-
STF05/10-C	★ STF05/10-C-FC
STF05/10-R	★ STF05/10-R-FC

★: Conforms to UL certification.

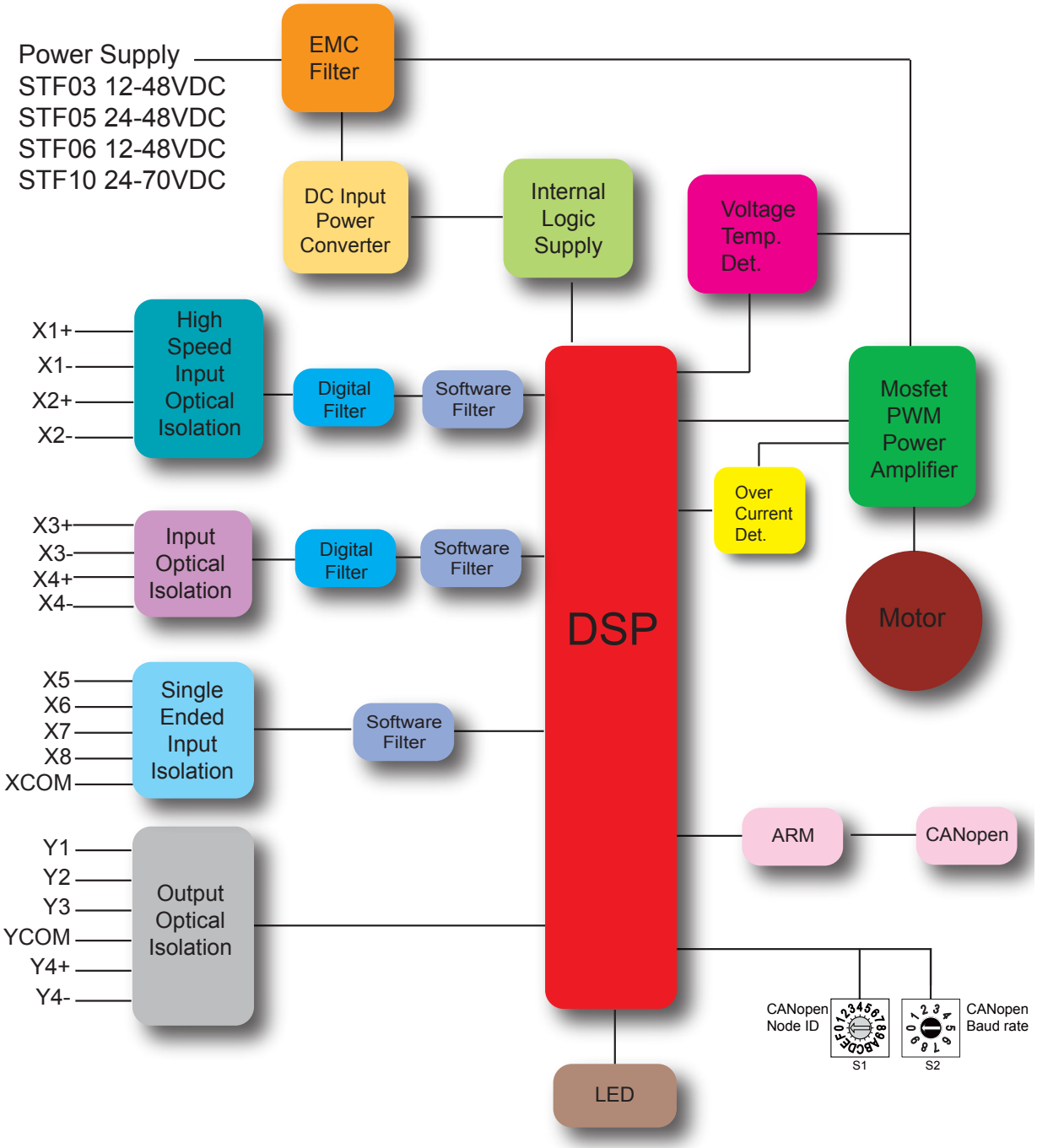
1.1 Features

- Programmable, filed bus controlled stepper motor drive in compact package
- Operating DC voltage range:
  - STF03 12-48V
  - STF05 24-48V
  - STF06 12-48V
  - STF10 24-70V
- Control Mode
  - SCL
    - * Serial Communication Command
  - Q program
    - * Stand-Alone operation mode
  - Modbus/RTU (-R model only)
  - CANopen(-C model only)
    - * Compliant with CiA301 and CiA402 standard
- Communication
  - -R: Dual port RS-485/422
  - -C: Dual port CANopen, RS-232 included
- STF03 output current: max 3A/phase (peak-of-sine)
- STF05 output current: max 5A/phase (peak-of-sine)
- STF06 output current: max 6A/phase (peak-of-sine)
- STF10 output current: max 10A/phase (peak-of-sine)
- I/O
  - 8 optically isolated digital inputs, 5-24VDC high level voltage
  - 4 optically isolated digital outputs, max30V/100mA

1.2 Block Diagram



STF-C Block Diagram



1.3 Safety Instructions

Only qualified personnel should transport, assemble, install, operate, or maintain this equipment. Properly qualified personnel are persons who are familiar with the transport, assembly, installation, operation, and maintenance of motors, and who meet the appropriate qualifications for their jobs.

To minimize the risk of potential safety problems, all applicable local and national codes regulating the installation and operation of equipment should be followed. These codes may vary from area to area and it is the responsibility of the operating personnel to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. MOONS' does not guarantee the products described in this publication are suitable for a particular application, nor do they assume any responsibility for product design, installation, or operation.

- Read all available documentation before assembly and operation. Incorrect handling of the products referenced in this manual can result in injury and damage to persons and machinery. All technical information concerning the installation requirements must be strictly adhered to.
- It is vital to ensure that all system components are connected to earth ground. Electrical safety is impossible without a low-resistance earth connection.
- This product contains electrostatically sensitive components that can be damaged by incorrect handling. Follow qualified anti-static procedures before touching the product.
- During operation keep all covers and cabinet doors shut to avoid any hazards that could possibly cause severe damage to the product or personal health.
- During operation, the product may have components that are live or have hot surfaces.
- Never plug in or unplug the Integrated Motor while the system is live. The possibility of electric arcing can cause damage.

Be alert to the potential for personal injury. Follow recommended precautions and safe operating practices emphasized with alert symbols. Safety notices in this manual provide important information. Read and be familiar with these instructions before attempting installation, operation, or maintenance. The purpose of this section is to alert users to the possible safety hazards associated with this equipment and the precautions necessary to reduce the risk of personal injury and damage to equipment. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, or operational difficulty.

2 Getting Started

The following items are needed:

- An appropriate power supply, see the section below entitled “Choose a Power Supply” for help in choosing the right one.
- A compatible stepper motor, please see the section below entitled “Recommended Motor”
- A small flat blade screwdriver for tightening the connectors screw(included)
- A PC running Microsoft Windows XP / Vista / Windows 7/ Windows 8 / Windows 10(32-bit or 64-bit)operation system
- Optional I/O cable (Sold seperately)
- Install ***STF Configurator*** software (Available from MOONS’ website)
- -R model

  A network cable is included in the package. It is used for connection with the next drive in the RS-485 network. It can also be used for connection with PC for drive configuration.
- -C model

  A RS-232 programming cable(included in the package)

  A network cable is included in the package. It is used for connection with the next drive in the CANopen network.

TIP: When connecting the first drive in the RS-485 or CANopen network with PC or controller. you can cut the daisy chain cable or network cable into two: one half is used for connection with the RS-485 or CANopen port on the PC or controller, the other half can be used for connection with termination resistor, which can be put at the end of the network.

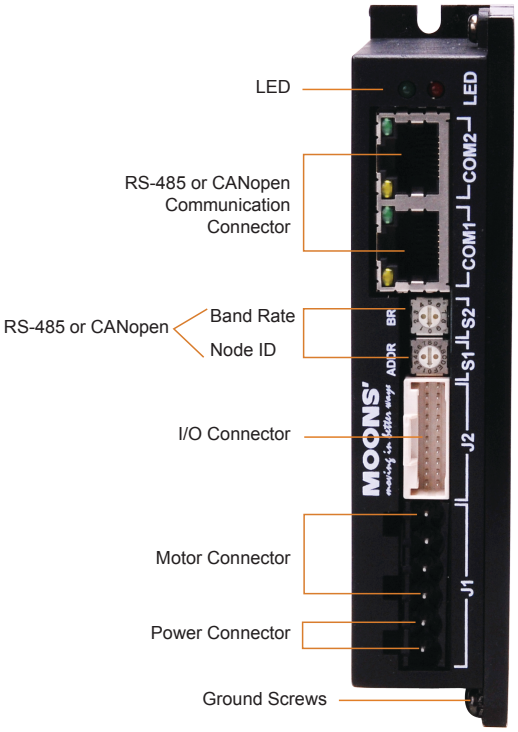
2.1 Installing Software

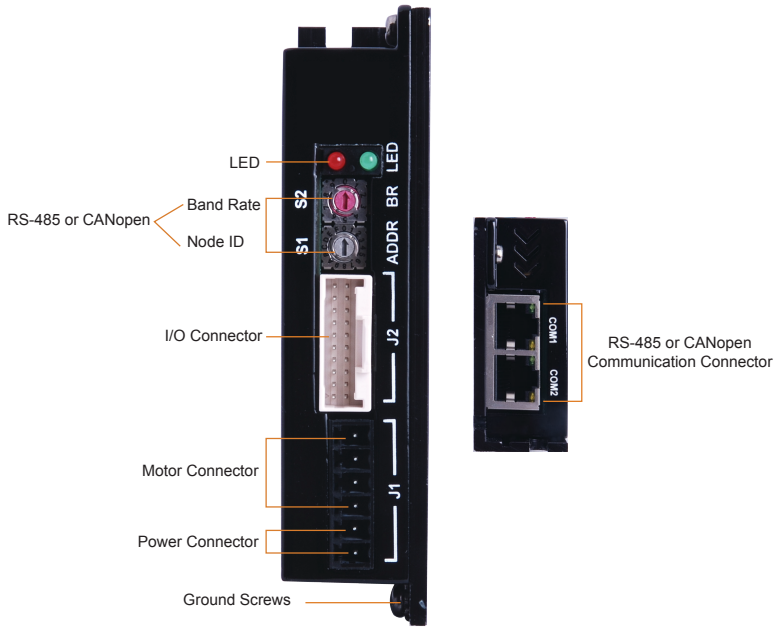
- Download the ***STF Configurator*** Software from the MOONS' website and install it.
- Launch the software by clicking Start-----Programs ----MOONS'
- Connect the drive to the PC using communication cable:

  Connect the -R model drive to the RS-485 port of the PC using the network cable included in the package

  Connect the -C model drive to the RS-232 port of the PC using the RS-232 cable included in the package

The connectors and other points of interest are illustrated below:



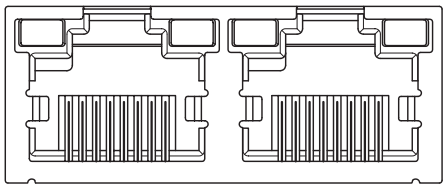


Model Number	
STF05-R	STF05-C
STF10-R	STF10-C
STF05-R-FC	STF05-C-FC
STF10-R-FC	STF10-C-FC

Model Number	
STF03-R	STF03-C
STF06-R	STF06-C

2.2 Connecting communication (-R model)

RS-485 Port



8 1 8 1

PIN	Signal	Wire Color
1	RX+	ORN/WHT
2	RX-	ORN
3	TX+	GRN/WHT
4.5	NC	BLU, BLU/WHT
6	TX-	GRN
7.8	GND	BRN/WHT, BRN

Connection STF drive with PC using RS-485 communication

Before using ***STF configurator*** for –R drive configuration, please connect COM1 or COM2 on the driver to host PC by network cable provided. Both 4 wire connection or 2 wire connection can be used.

RS-485 four-wire connection:

Drive	Connection
RX+	Connect to host's TX+
RX-	Connect to host's TX-
TX+	Connect to host's RX+
TX-	Connect to host's RX-
GND	Connect to host's GND

RS-485 two-wire connection:

Drive	Connection
RX+	Connect to host's +
RX-	Connect to host's -
TX+	Connect to host's +
TX-	Connect to host's -
GND	Connect to host's GND

NOTE: The RS-485 port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's RS-485 port must be connected together. The first drive's GND of the RS-485 port must be connected to the GND of RS-485 port on the host PC or controller.

RS-485 network connection

Multiple –R model drive network can be built via dual RS-485 communication port by network cable provided.

RS-485 Four-wire Configuration

RS-485 four-wire system utilize separate transmit and receive wires. One pair of wires connect the host's transmit signals(TX+/TX-) to each drive's RX+/RX- receive terminals. The other pair connects the drive's TX+/TX- terminals to the host's receive signals. A logical ground terminal is provided on each drive and can be used to keep all the drives at the same ground potential. The first drive's logical GND of the RS-485 bus must connect to host's ground.

Four-wire Connection

Connect the drive's RX+ to the TX+ terminal of the host controller,and connect the drive's RX- to the TX- terminal of the host controller . Connect the drive's TX+ to the RX+ terminal of the host controller,and connect the drive's TX- to the RX- terminal of the host controller .

Connect the drive's GND and the host's GND to a same ground.

NOTE: The RS-485 port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's RS-485 port must be connected together. The first drive's GND of the RS-485 port must be connected to the GND of RS-485 port on the host PC or controller.

RS-485 Tow-wire Configuration

In a two-wire system ,the data transmitting and receiving use a same cable. the host must stop its transmitting before receiving data. That means the host must stop transmit data before drive begins to answer a query which just come from the host, otherwise the host cannot receive any data witch sent from a drive. There is a transmit delay parameter that can be adjusted to compensate for a host that is slow to disable its transmitter. This adjustment can be set over the network using the TD command,it also can be set by using the ***STF Configurator*** software. Users can set a shorter transmit delay in a four-wire system.

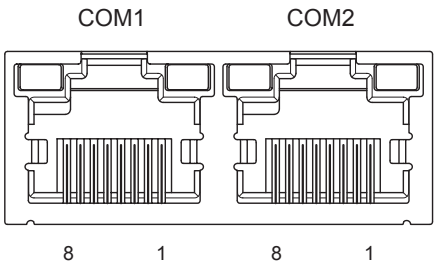
Two-wire connection

The RX+ and TX+ of the drive connect to the host's + in parallel. The RX- and TX- of the drive connect to the host's - in parallel. Connect the drive's GND and the host's GND to a same ground.

NOTE: The RS-485 port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's RS-485 port must be connected together. The first drive's GND of the RS-485 port must be connected to the GND of RS-485 port on the host PC or controller.

2.3 Connecting communication (-C model)

CANopen COM Port



PIN	COM1 Signal	COM2 Signal	Wire Color
1	CAN_H	CAN_H	ORG/WHT
2	CAN_L	CAN_L	ORG
3,7,8	GND	GND	GRN/WHT, BRN/WHT, BRN
4	RS-232_TX	NC	BLU
5	RS-232_RX	NC	BLU/WHT
6	NC	NC	GRN

PC connection with RS-232 cable

Before using ***STF configurator*** for –C drive configuration, please connect COM1 on the driver to host PC by RS-232 programming cable.

CANopen network connection

Multiple –C model drive network can be built via dual CANopen communication port by network cable provided.

NOTE: The CANopen port on the drive is isolated from internal circuitry of the drive. So the GND of each drive's CANopen port must be connected together. The first drive's GND of the CANopen port must be connected to the GND of CANopen port on the controller.

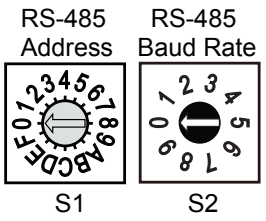
2.4 Setting bus address and baud rate

STF drives (-R model and -C model) have two rotary switches to set the bus address and baud rate.

2.4.1 RS-485 address and baud rate settings(-R model)

Set drive's RS-485 address by rotary switch S1

Set drive's RS-485 baud rate by rotary switch S2



S1 is used to set drive's RS-485 address, and the range is 0~F (0~15 in decimal). If you want to set the drive's RS-485 address range to 10~1F (16~31 in decimal), you need to configure it in ***STF Configurator*** software.

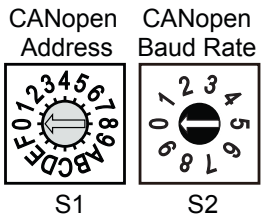
Upper/Lower addr	S1 position	SCL addr	Upper/Lower addr	S1 position	SCL addr
Lower(Axis 0~15)	0	0	Upper(Axis 16~31)	0	@
	1	1		1	!
	2	2		2	"
	3	3		3	#
	4	4		4	$
	5	5		5	%
	6	6		6	&
	7	7		7	'
	8	8		8	(
	9	9		9	)
	A	:		A	*
	B	;		B	+
	C	<		C	,
	D	=		D	-
	E	>		E	.
	F	?		F	/

S2 position	Baud Rate (bps)
0	9600
1	19200
2	38400
3	57600
4	115200
5-9	Reserved

2.4.2 CANopen address and baud rate settings(-C model)

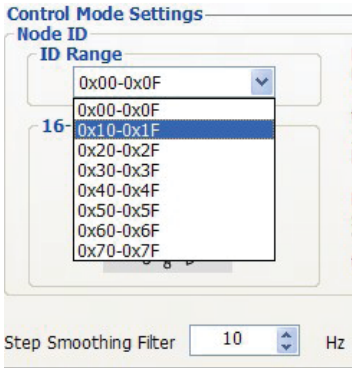
Set drive's CANopen address by rotary switch S1

Set drive's CANopen baud rate by rotary switch S2



Each node on a CANopen network must have a unique Node ID. Valid ranges for the Node ID are 0x01 through 0x7F (1~127). Node ID 0x00 is reserved in accordance with CiA301. The Node ID is selected using rotary switches and software; one sixteen position switch set the lower four bits (0~F) of node ID, while upper three bits of node ID are configured by ***STF Configurator*** software. Each time when Node ID is changed, a power cycle is required before the new Node ID is valid.

Please refer to the CANopen manual for more information.



CANopen Baud Rate

There are 8 types of baud rate supported by CANopen communication on STF drive. It is set via S2 switch on the drive

S2 position	Baud Rate (bps)
0	1M
1	800K
2	500K
3	250K
4	125K
5	50K
6	20K
7	12.5K
8-9	Reserved

2.5 Connecting the Power Supply

Connect power supply “+” terminal to the drive terminal labeled “V+”.

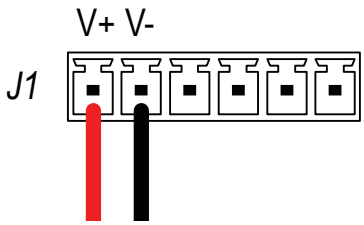
Connect power supply “-” terminal to the drive terminal labeled “V-”.

STF03 accepts DC voltage range from 12 – 48VDC
STF05 accepts DC voltage range from 24 – 48VDC
STF06 accepts DC voltage range from 12 – 48VDC

STF10 accepts DC voltage range from 24 – 70VDC

Warning: DO NOT reverse the wires

NOTE: DO NOT apply power until all connections to the drive have been made



Power Connector

Ensure a proper earth ground connection by using the screw on the left side of the chassis.

Please read “choosing a power supply” for more details.

2.6 Choosing A Power Supply

The main considerations when choosing a power supply are the voltage and current requirements of the application.

2.6.1 Voltage

The STF drive and motor is designed to give optimum performance between 24~48 Volts DC. Choosing the voltage depends on the performance needed and diver/motor heating that acceptable and/or does not cause a drive over-temperature. Higher voltage will give higher speed performance, but will cause the drive to produce higher temperatures. Using power supplies with voltage outputs that are near the drive maximum may significantly reduce the operational duty cycle.

The STF03/06 drive extended range of operation voltage can be as low as 11VDC minimum to as high as 53VDC maximum. When operation below 11VDC, the STF03/06 series will work unstable. The supply input cannot go blow 11VDC for reliable operation, otherwise under voltage alarm will be triggered. STF03/06 drive will stop working when this alarm is triggered.

The STF10 drive extended range of operation voltage can be as low as 18VDC minimum to as high as 75VDC maximum (18-53VDC for STF05 Drives). When operation below 18VDC, the STF05/10 series will work unstable. The supply input cannot go blow 18VDC for reliable operation, otherwise under voltage alarm will be triggered. STF05/10 drive will stop working when this alarm is triggered.

STF03/05/06

If a regulated power supply is used, and that is near the driver maximum voltage of 53VDC ,a voltage clamp may be required to prevent the voltage over 53VDC which will occurs a overvoltage fault. When using an unregulated power supply, make sure the no-load voltage of the supply does not exceed the maximum input voltage 53VDC.

STF10

If a regulated power supply is used, and that is near the driver maximum voltage of 75VDC ,a voltage clamp may be required to prevent the voltage over 75VDC which will occurs a overvoltage fault. When using an unregulated power supply, make sure the no-load voltage of the supply does not exceed the maximum input voltage 75VDC.

2.6.2 Current

When STF drives work with different motors, the recommended power supply output current capacity under different supply voltage is shown in below table. The STF drive power supply current is lower than the the winding currents because it uses switching amplifiers to convert a high voltage and low current into low voltage and high current. The more power supply voltage exceeds the motor voltage,the less current will be required from the power supply.

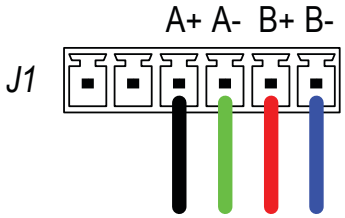
It is important to note that the current draw is significantly different at higher speeds depending on the torque load to the motor. Estimating how much current is necessary may require a good analysis of the load to the motor.

Drive	Motor	Voltage	Current
STF03 STF05 STF06	AM8	24V	above 1A
	AM11	24V	above 1A
	AM14	24V	above 1A
	AM17	24V	above 1.5A
		48V	above 1.5A
	AM23	24V	above 3A
		48V	above 4A
	AM24	24V	above 4.5A
		48V	above 4.5A

Drive	Motor	Voltage	Current
STF10	AM23	24V	above 3A
		48V	above 4A
		70V	above 4A
	AM24	24V	above 4.5A
		48V	above 4.5A
		70V	above 4.5A
	AM34	24V	above 6A
		48V	above 6A
		70V	above 6A

2.7 Connecting the motor

For MOONS' stepper motor, please connect black, green, red, blue wires to drive's A+, A-, B+ and B- correspondingly.



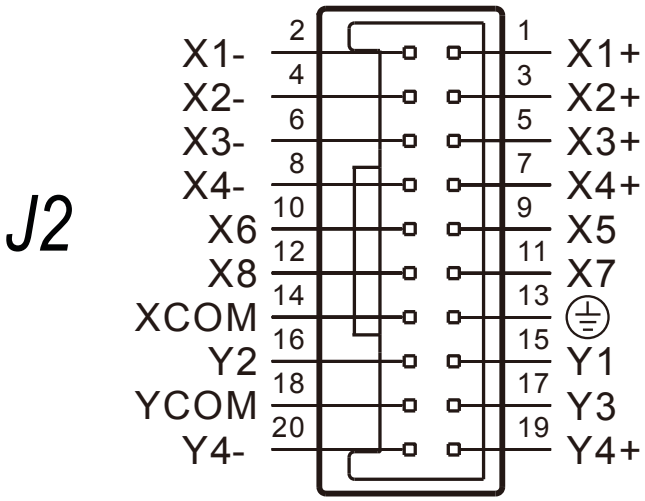
Motor Connector

If using a non-MOONS' motor, please refer to your motor specs for wiring information.

3 Inputs and Outputs

STF series drive inputs and outputs include:

- 8 optically isolated digital inputs, 5-24VDC for high level voltage
- 4 optically isolated digital outputs, maximum voltage 30V, maximum sinking or sourcing current 100mA



I/O Connector Diagram

3.1 Digital Inputs

3.1.1 X1, X2, X3, X4 digital input signal

X1, X2: optically isolated, differential, 5-24VDC, minimum pulse width 250ns, maximum pulse frequency 2MHz

X3, X4: optically isolated, differential, 5-24VDC, minimum pulse width 100μs, maximum pulse frequency 5KHz

X1 can be used as general purpose input.

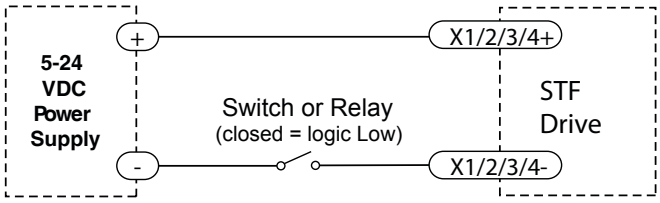
X2 can be used as general purpose input.

X3 can be used as CW limit input or general purpose input.

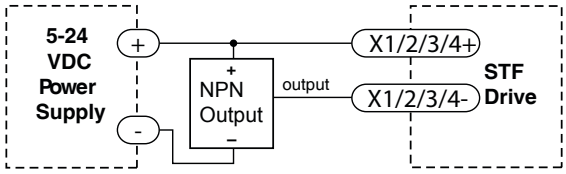
X4 can be used as CCW limit input or general purpose input.

Please use ***STF Configurator*** software for X1,X2,X3 and X4 function configuration.

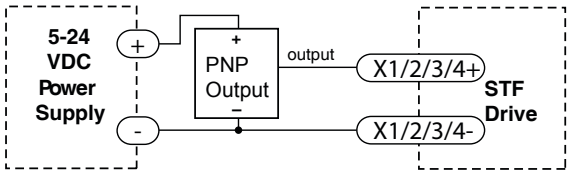
Following graphs shows some common connection methods for the inputs:



Connecting the inputs to a Switch or Relay



Connecting the inputs to a NPN type output



Connecting the inputs to a PNP type output

3.1.2 X5, X6, X7, X8 digital input signal

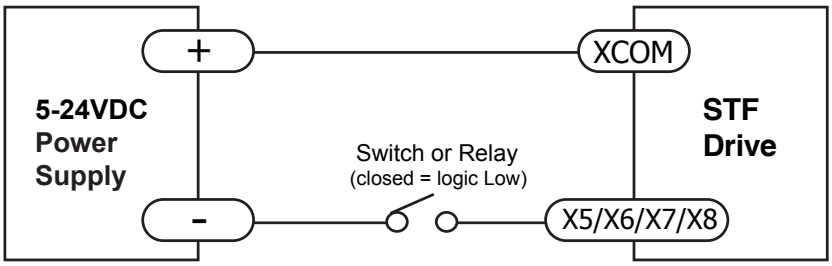
X5,X6,X7,X8: optically isolated, single-ended, 5-24VDC, minimum pulse width 100μs, maximum pulse frequency 5KHz

X5 can be used as enable input or general purpose input.
X6 can be used as alarm reset input or general purpose input.
X7 can be used as general purpose input.
X8 can be used as general purpose input.

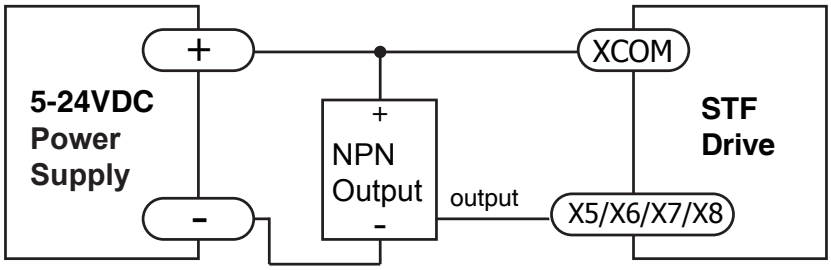
Because the input is an optically isolated circuit, a 5-24V power supply is needed. For example, you can use the power supply of the PLC when you are using a PLC control system, but if you want to connect a relay or mechanical switch to the input , you must need a power supply.

XCOM is an electronics term for a single-ended signal connection to a common voltage. In the case of STF series, if you are using a sourcing (PNP) input signals, you need to connect XCOM to the ground (power supply -), if you are using a sinking(NPN) input signals ,the XCOM need to connect to the power supply +.

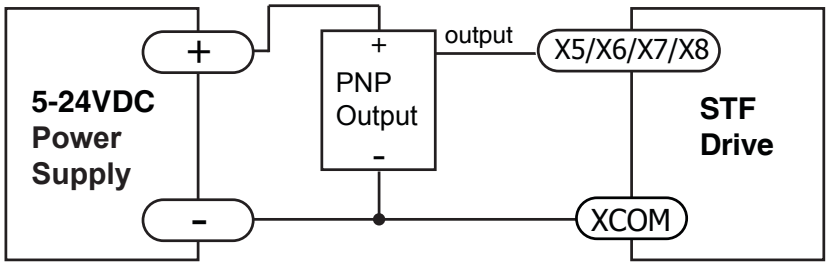
Please use ***STF Configurator*** software for X5,X6,X7 and X8 function configuration. Following graphs shows some common connection methods for the inputs:



Connecting the inputs to a Switch or Relay



Connecting the inputs to a NPN type output



Connecting the inputs to a PNP type output

3.2 Digital Outputs

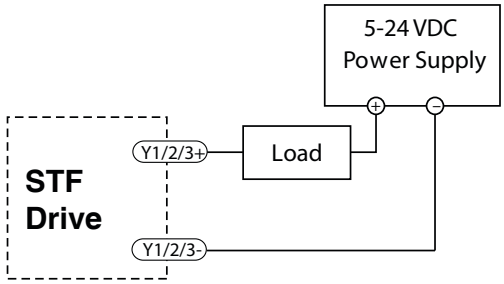
3.2.1 Y1, Y2, Y3 Digital Outputs

Y1 can be used as alarm output, motion status output or general purpose output.
Y2 can be used as brake output, motion status output or general purpose output.
Y3 cab be used as tach-out, timing signal output(50pulse/rev), motion status output or general purpose output.

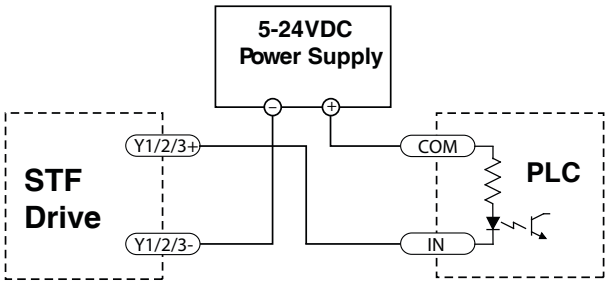
Please use ***STF Configurator*** software for Y1,Y2 and Y3 function configuration.

Following graphs shows some common connection methods for the outputs:

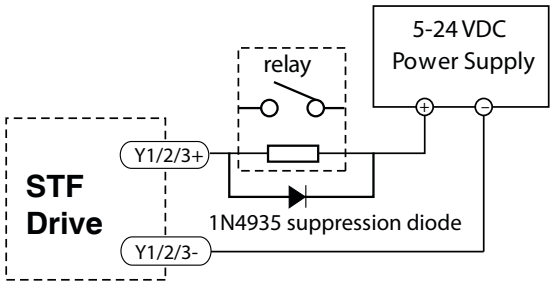
NOTE: Do not connect the outputs to more than 30VDC power supply. And the current of each output terminal must not exceed 100mA.



Connecting a sinking output



Connecting a sinking output with PLC's input



Driving a relay

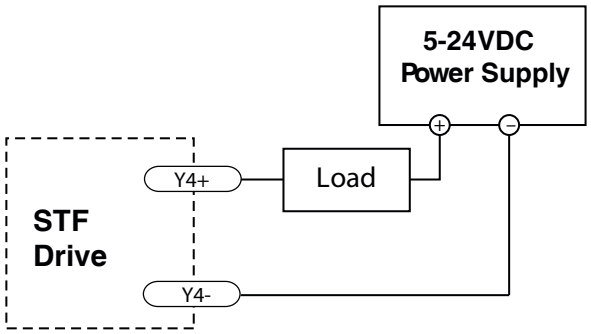
3.2.2 Y4 Digital Output

Y4 can be used as motion state output or general purpose output.

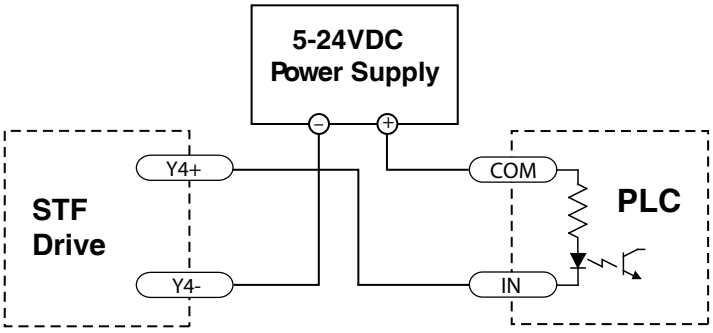
Please use ***STF Configurator*** software for Y4 function configuration.

Following graphs shows some common connection methods for the outputs:

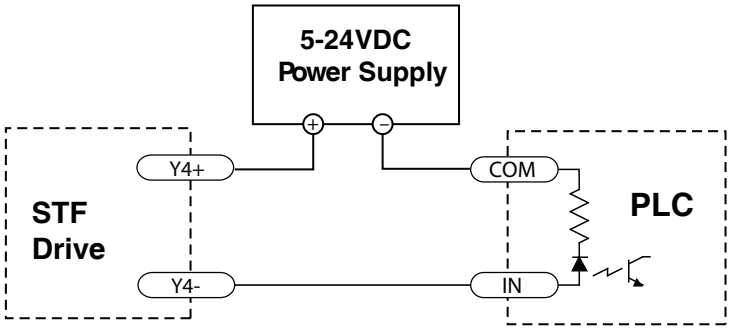
NOTE: Do not connect the outputs to more than 30VDC power supply. And the current of each output terminal must not exceed 100mA.



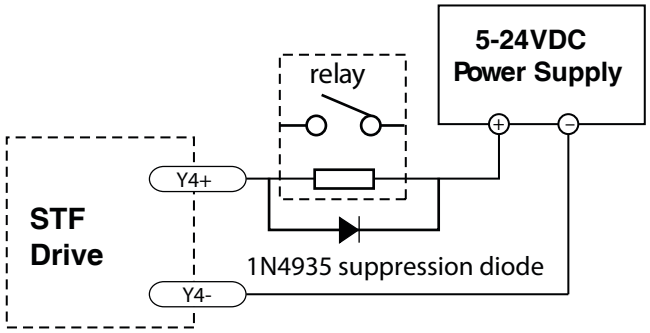
Connecting a sinking output



Connecting a sinking output with PLC's input



Connecting a sourcing output with PLC's input



Driving a relay

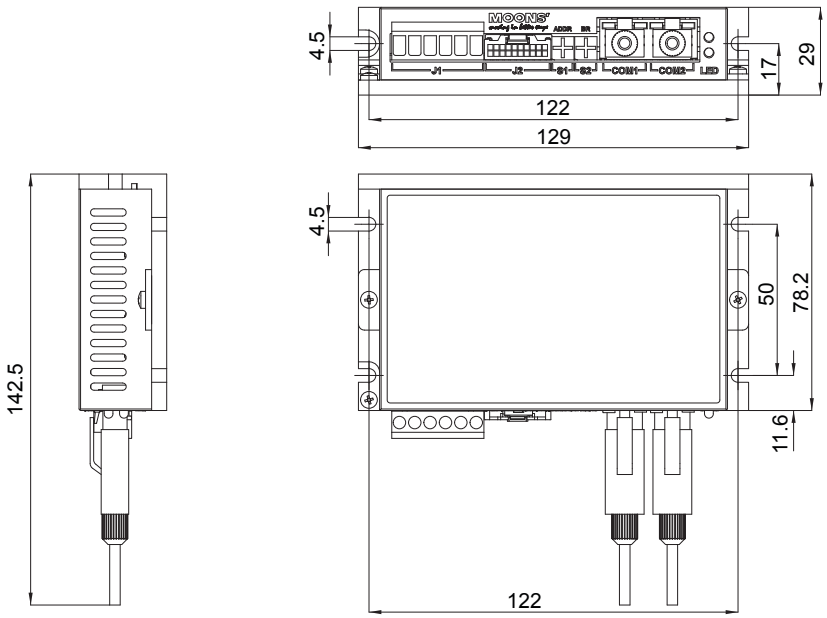
4 Mounting the Drive

Use the M3 or M4 screw to mount the STF series drive .The drive should be securely fastened to a smooth ,flat metal surface the will help conduct heat away from the chassis. If this is not possible, forced airflow from a fan maybe required to prevent the drive from overheating.

- Never use the drive in a place where there is no air flow or the surrounding air is more than 40℃.
- Never put the drive where it can get wet or where metal or other electrically conductive particle particles can get on the circuity.
- Always provide air flow around the drive. When mounting multiple STF drives near each other, maintain at least 2cm of space between drives.

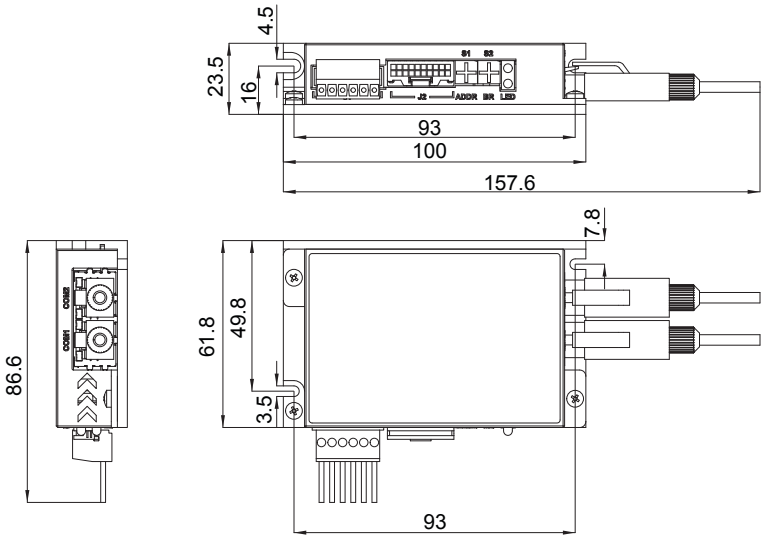
5 Reference Materials

5.1 Drive Mechanical Outlines



Unit: mm

Model	
STF05/10-R	STF05/10-C
STF05/10-R-FC	STF05/10-C-FC



Unit: mm

Model	
STF03-R	STF03-C
STF06-R	STF06-C

5.2 Technical Specifications

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PWM at 20KHz
Output Current	STF03: 0.1 - 3.0A/phase(Peak-of-Sine) in 0.01Amp increment
	STF05: 0.1 - 5.0A/phase(Peak-of-Sine) in 0.01Amp increment
	STF06: 0.1 - 6.0A/phase(Peak-of-Sine) in 0.01Amp increment
	STF10: 0.1 - 10.0A/phase(Peak-of-Sine) in 0.01Amp increment
Rated input voltage	STF03: 12 - 48VDC
	STF05: 24 - 48VDC
	STF06: 12 - 48VDC
	STF10: 24 - 70VDC
Absolute maximum input voltage range	STF03: 11 - 53VDC
	STF05: 18 - 53VDC
	STF06: 11 - 53VDC
	STF10: 18 - 75VDC
Protection	Over voltage, under voltage, over temp, over current, open winding, communication cable disconnection
Idle Current Reduction	Reduction range of 0 - 90% of running current after a delay selectable in milliseconds
Controller	
Anti-Resonance	Raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor
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
Auto Test & Auto Setup	Auto test and setup at power on (ie. motor resistance, and capacitance) to optimize your system performance.
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
Operation Mode	R: SCL, Q, Modbus C: Compliant with CiA301 and CiA402 standard
Digital Input	8 digital inputs
	X1, X2: Optically isolated, differential, 5-24VDC for high level voltage, minimum pulse width = 250ns, maximum pulse frequency = 2MHz
	X3, X4: Optically isolated, differential, 5-24VDC for high level voltage, minimum pulse width = 100 μ s, maximum pulse frequency = 5KHz
	X5 ~ X8: Optically isolated, single-ended, 5-24VDC for high level voltage, minimum pulse width = 100 μ s, maximum pulse frequency = 5KHz
Digital Output	4 digital outputs Y1 ~ Y4: Optically isolated, maximum voltage 30V, maximum sinking or sourcing current 100mA
Communication Interface	R model: dual port RS-485 (RJ45 connector)
	C model: dual port CANopen (RJ45 connector) RS-232 included
Physical	
Ambient Temperature	0-40°C (32-104°F)(when mounted to a suitable heat sink)
Humidity	90% non-condensing

5.3 Recommended Motor

Standard type step motor

Model	Features	Lead number	Length(mm)	Holding Torque(N.m)	Current(A)	Rotor Inertia(g.cm²)	Mass(Kg)	Mass Dielectric Strength
AM8HY2050-01N	Single Shaft	4	31.5	0.015	0.5	2	0.05	500VAC/1Minute
AM8HY2050-02N	Double Shaft	4						
AM8HY4043-01N	Single Shaft	4	47	0.037		4.2	0.09	
AM8HY4043-02N	Double Shaft	4						
AM11HS1008-07	Single Shaft	4	31	0.05	1.6	9	0.1	
AM11HS3007-02	Single Shaft	4	40	0.08		12	0.15	
AM11HS5008-01	Single Shaft	4	51	0.12		18	0.2	
AM14HYB401-03	Single Shaft	4	40	0.2	1	20	0.21	
AM17HD4452-02N	Single Shaft	4	34.3	0.25	1.8	38	0.23	
AM17HD4452-01N	Double Shaft	4						
AM17HD2438-02N	Single Shaft	4	39.8	0.4	1.8	57	0.28	
AM17HD2438-01N	Double Shaft	4						
AM17HD6426-06N	Single Shaft	4	48.3	0.5	1.8	82	0.36	
AM17HD6426-05N	Double Shaft	4						
AM17HDB410-01N	Single Shaft	4	62.8	0.85	1.6	123	0.6	
AM23HS0420-01	Single Shaft	4	41	0.6	2.2	135	0.42	
AM23HS0420-02	Double Shaft							
AM23HS2449-01	Single Shaft	4	54	1.2	2.2	260	0.6	
AM23HS2449-02	Double Shaft	4						
AM23HS3454-01	Single Shaft	4	76	1.8	2.2	460	1	
AM23HS3454-02	Double Shaft	4						
AM23HS0421-01	Single Shaft	4	41	0.6	4.5	135	0.42	
AM23HS0421-02	Double Shaft	4						
AM23HS2450-01	Single Shaft	4	54	1.2	4.5	260	0.6	
AM23HS2450-02	Double Shaft	4						
AM23HS3455-01	Single Shaft	4	76	1.8	4.5	460	1	
AM23HS3455-02	Double Shaft	4						
AM23HS04A0-01	Single Shaft	4	39	0.82	2.2	120	0.4	
AM23HS04A0-02	Double Shaft	4						
AM23HS84A0-01	Single Shaft	4	55	1.5	2.2	220	0.6	
AM23HS84A0-02	Double Shaft	4						
AM23HSA4A0-01	Single Shaft	4	77	2.3	2.2	390	1	
AM23HSA4A0-02	Double Shaft	4						
AM23HS04B0-01	Single Shaft	4	39	0.82	4.5	120	0.4	
AM23HS04B0-02	Double Shaft	4						
AM23HS84B0-01	Single Shaft	4	55	1.5	4.5	220	0.6	
AM23HS84B0-02	Double Shaft	4						
AM23HSA4B0-01	Single Shaft	4	77	2.3	4.5	390	1	
AM23HSA4B0-02	Double Shaft	4						
AM23HS04B0-03	Single Shaft	4	39	0.82	4.5	120	0.4	
AM23HS04B0-04	Double Shaft	4						
AM23HS84B0-03	Single Shaft	4	55	1.5	4.5	220	0.6	
AM23HS84B0-04	Double Shaft	4						
AM23HSA4B0-03	Single Shaft	4	77	2.3	4.5	390	1	
AM23HSA4B0-04	Double Shaft	4						
AM24HS2402-08N	Single Shaft	4	54	1.2	4.5	450	0.83	
AM24HS2402-11N	Double Shaft	4						
AM24HS5401-10N	Single Shaft	4	85	2.5	4.5	900	1.4	
AM24HS5401-24N	Double Shaft	4						
AM34HD0404-08	Single Shaft	4	66.5	3	7	1100	1.6	
AM34HD0404-09	Double Shaft	4						
AM34HD1404-06	Single Shaft	4	96	5	7	1850	2.7	
AM34HD1404-07	Double Shaft	4						
AM34HD2403-07	Single Shaft	4	125.5	7.1	7	2750	3.8	
AM34HD2403-08	Double Shaft	4						

IP65 type motor

Model	Features	Lead number	Length(mm)	Holding Torque(N.m)	Current(A)	Rotor Inertia(g.cm²)	Mass(Kg)	Mass Dielectric Strength
AM23HS2450-03	IP65 Motor	4	61.7	1.2	4.5	260	0.6	500VAC/1Minute
AM23HS3455-05	IP65 Motor	4	83.7	1.8		460	1	
AM24HS5401-44N	IP65 Motor	4	94.5	2.5		900	1.4	
AM34HD1404-13	IP65 Motor	4	98	5	7	1850	2.7	
AM34HD2403-13	IP65 Motor	4	127.5	7.1		2750	3.8	

Brake type motor

Model	Features	Lead number	Length(mm)	Holding Torque(N.m)	Current(A)	Rotor Inertia(g.cm²)	Mass(Kg)	Mass Dielectric Strength
AM17HD4452-BR01	Brake Motor	4+2	60.3	0.25	1.8	38	0.38	500VAC/1Minute
AM17HD2438-BR01	Brake Motor	4+2	65.8	0.4		57	0.43	
AM17HD6426-BR01	Brake Motor	4+2	74.3	0.5		82	0.51	
AM17HDB410-BR01	Brake Motor	4+2	88.8	0.85		123	0.75	
AM23HS2449-BR01	Brake Motor	4+2	95	1.2	2.2	260	0.8	
AM23HS2450-BR01	Brake Motor	4+2	95	1.2		260	0.8	
AM23HS04B0-BR01	Brake Motor	4+2	80	0.82	4.5	120	0.62	
AM23HS84B0-BR01	Brake Motor	4+2	96	1.5		220	0.8	
AM23HSA4B0-BR01	Brake Motor	4+2	118	2.3		390	1.2	
AM24HS2402-BR01	Brake Motor	4+2	95	1.2	4.5	450	1.03	
AM24HS5401-BR01	Brake Motor	4+2	126	2.5		900	1.6	
AM34HD0404-BR01	Brake Motor	4+2	118.5	3	7	1100	2.2	
AM34HD1404-BR01	Brake Motor	4+2	148	5		1850	3.3	
AM34HD2403-BR01	Brake Motor	4+2	177.5	7.1		2750	4.4	

Encoder type motor

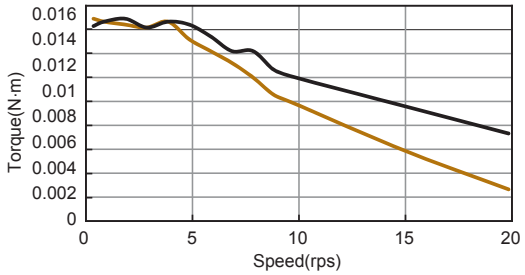
Model	Features	Lead number	Length(mm)	Holding Torque(N.m)	Current(A)	Rotor Inertia(g.cm²)	Mass(Kg)	Mass Dielectric Strength
AM17HD4452-E1000D	Encoder motor	4	34.3	0.25	1.8	38	0.23	500VAC/1Minute
AM17HD2438-E1000D	Encoder motor	4	39.8	0.4		57	0.28	
AM17HD6426-E1000D	Encoder motor	4	48.3	0.5		82	0.36	
AM23HS0420-E1000D	Encoder motor	4	41	0.6	2.2	135	0.42	
AM23HS2449-E1000D	Encoder motor	4	54	1.2		260	0.6	
AM23HS3454-E1000D	Encoder motor	4	76	1.8		460	1	
AM23HS0421-E1000D	Encoder motor	4	41	0.6	4.5	135	0.42	
AM23HS2450-E1000D	Encoder motor	4	54	1.2		260	0.6	
AM23HS3455-E1000D	Encoder motor	4	76	1.8		460	1	
AM23HS5412-E1000D	Encoder motor	4	111	3.2		750	1.5	
AM24HS2402-E1000D	Encoder motor	4	54	1.2		450	0.83	
AM24HS5401-E1000D	Encoder motor	4	85	2.5		900	1.4	
AM34HD0404-E1000D	Encoder motor	4	66.5	3	7	1100	1.6	
AM34HD1404-E1000D	Encoder motor	4	96	5		1850	2.7	
AM34HD2403-E1000D	Encoder motor	4	125.5	7.1		2750	3.8	

Gearbox type motor

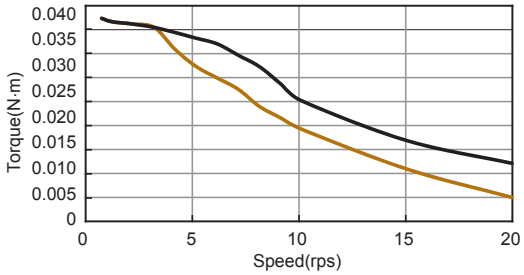
Model	Features	Lead number	Length(mm)	Holding Torque(N.m)	Current(A)	Rotor Inertia(g.cm²)	Mass(Kg)	Mass Dielectric Strength
AM17HD4452-PG05	5 speed reducer motor	4	101.8	1.25	1.8	950	0.55	500VAC/1Minute
AM17HD4452-PG10	10 speed reducer motor	4	101.8	2.5	1.8	3800	0.55	
AM17HD4452-PG20	20 speed reducer motor	4	114.8	5	1.8	15200	0.63	
AM17HD2438-PG05	5 speed reducer motor	4	107.3	2	1.8	1425	0.6	
AM17HD2438-PG10	10 speed reducer motor	4	107.3	4	1.8	5700	0.6	
AM17HD2438-PG20	20 speed reducer motor	4	120.3	8	1.8	22800	0.68	
AM17HD6426-PG05	5 speed reducer motor	4	115.8	2.5	1.8	2050	0.68	
AM17HD6426-PG10	10 speed reducer motor	4	115.8	5	1.8	8200	0.68	
AM17HD6426-PG20	20 speed reducer motor	4	128.8	10	1.8	32800	0.76	
AM17HDB410-PG05	5 speed reducer motor	4	130.3	4.25	1.6	3075	0.92	
AM17HDB410-PG10	10 speed reducer motor	4	130.3	8.5	1.6	12300	0.92	
AM17HDB410-PG20	20 speed reducer motor	4	143.3	17	1.6	49200	1	
AM23HS04B0-PG05	5 speed reducer motor	4	112.5	4.1	4.5	2625	1.23	
AM23HS04B0-PG10	10 speed reducer motor	4	112.5	8.2	4.5	10500	1.23	
AM23HS04B0-PG20	20 speed reducer motor	4	125.5	16.4	4.5	42000	1.44	
AM23HS84B0-PG05	5 speed reducer motor	4	128.5	7.5	4.5	5375	1.43	
AM23HS84B0-PG10	10 speed reducer motor	4	128.5	15	4.5	21500	1.43	
AM23HS84B0-PG20	20 speed reducer motor	4	141.5	30	4.5	86000	1.64	
AM23HSA4B0-PG05	5 speed reducer motor	4	150.5	11.5	4.5	9125	1.83	
AM23HSA4B0-PG10	10 speed reducer motor	4	150.5	23	4.5	36500	1.83	
AM23HSA4B0-PG20	20 speed reducer motor	4	163.5	46	4.5	146000	2.07	
AM24HS2402-PG05	5 speed reducer motor	4	127.5	6	4.5	11250	1.66	
AM24HS2402-PG10	10 speed reducer motor	4	127.5	12	4.5	45000	1.66	
AM24HS2402-PG20	20 speed reducer motor	4	140.5	24	4.5	180000	1.87	
AM24HS5401-PG05	5 speed reducer motor	4	158.5	12.5	4.5	22500	2.23	
AM24HS5401-PG10	10 speed reducer motor	4	158.5	25	4.5	90000	2.23	
AM24HS5401-PG20	20 speed reducer motor	4	171.5	50	4.5	360000	2.44	
AM34HD0404-PG05	5 speed reducer motor	4	170.5	15	7	27500	3.71	
AM34HD0404-PG10	10 speed reducer motor	4	170.5	30	7	110000	3.71	
AM34HD0404-PG20	20 speed reducer motor	4	188.5	60	7	440000	4.21	
AM34HD1404-PG05	5 speed reducer motor	4	210	25	7	46250	4.81	
AM34HD1404-PG10	10 speed reducer motor	4	210	50	7	185000	4.81	
AM34HD1404-PG20	20 speed reducer motor	4	218	100	7	740000	5.31	
AM34HD2403-PG05	5 speed reducer motor	4	229.5	35.5	7	68750	5.91	
AM34HD2403-PG10	10 speed reducer motor	4	229.5	71	7	275000	5.91	
AM34HD2403-PG20	20 speed reducer motor	4	247.5	142	7	1100000	6.41	

5.4 Torque Curves

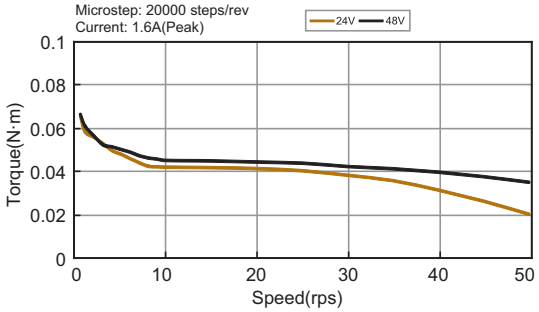
AM8HY2050
Microstep: 20000 steps/rev
Current: 0.5A(Peak)



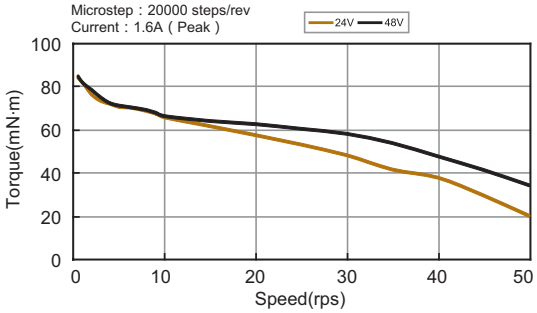
AM8HY4043
Microstep: 20000 steps/rev
Current: 0.5A(Peak)



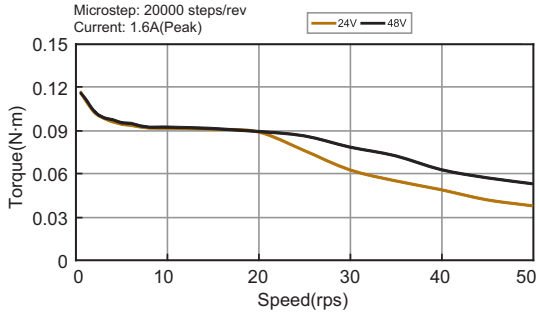
AM11HS1008
Microstep: 20000 steps/rev
Current: 1.6A(Peak)



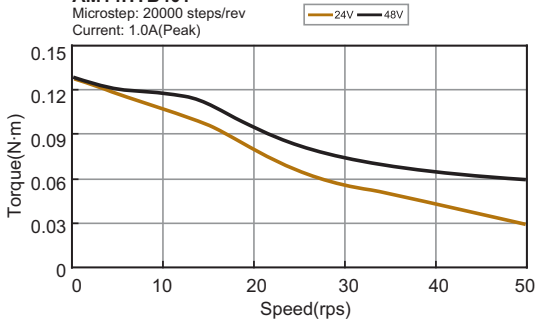
AM11HS3007
Microstep : 20000 steps/rev
Current : 1.6A (Peak)



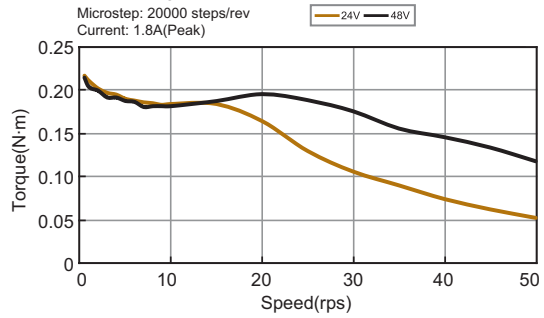
AM11HS5008
Microstep: 20000 steps/rev
Current: 1.6A(Peak)



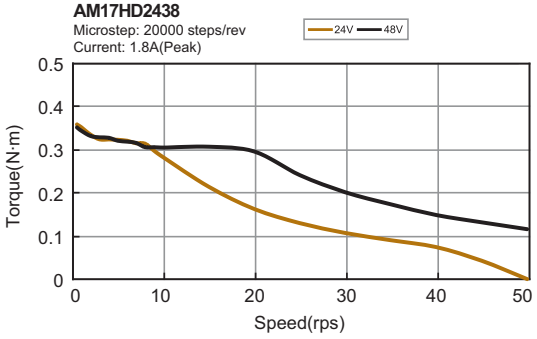
AM14HYB401
Microstep: 20000 steps/rev
Current: 1.0A(Peak)



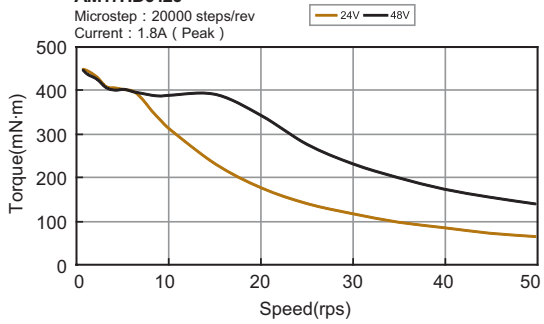
AM17HD4452
Microstep: 20000 steps/rev
Current: 1.8A(Peak)



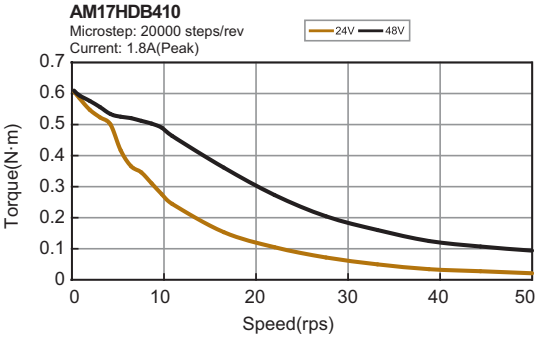
AM17HD2438
Microstep: 20000 steps/rev
Current: 1.8A(Peak)



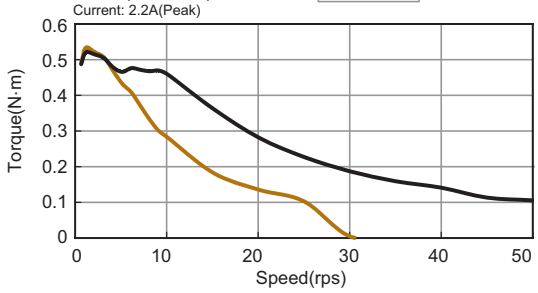
AM17HD6426
Microstep : 20000 steps/rev
Current : 1.8A (Peak)



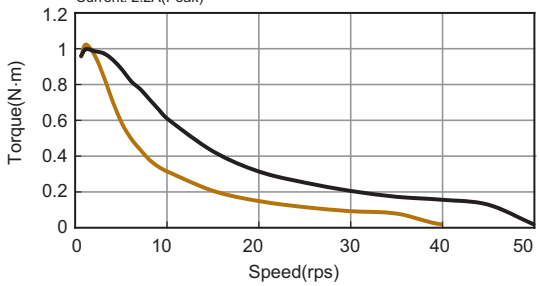
AM17HDB410
Microstep: 20000 steps/rev
Current: 1.8A(Peak)



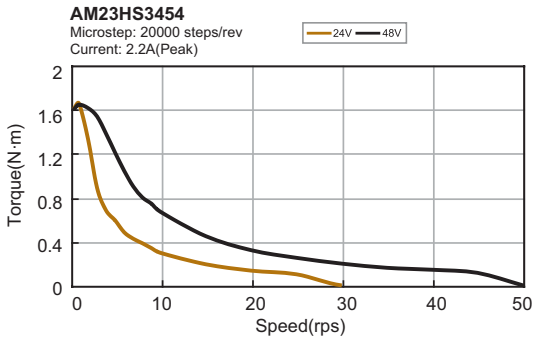
AM23HS0420
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



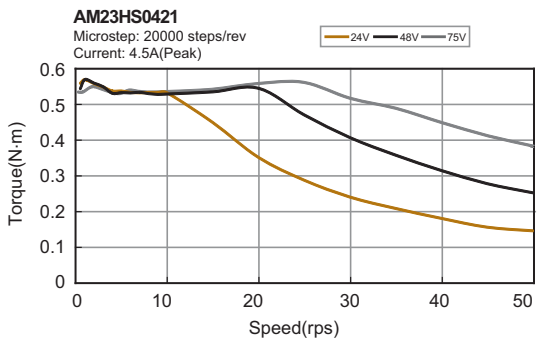
AM23HS2449
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



AM23HS3454
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



AM23HS0421
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



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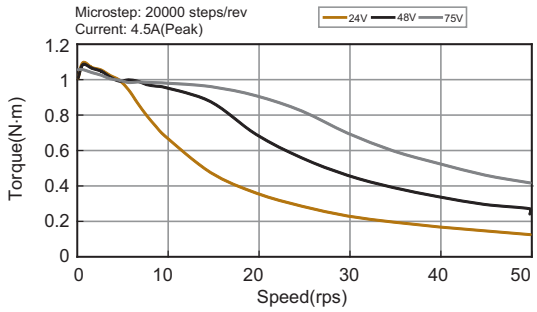
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



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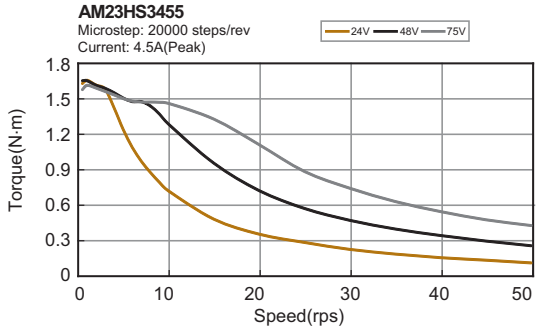
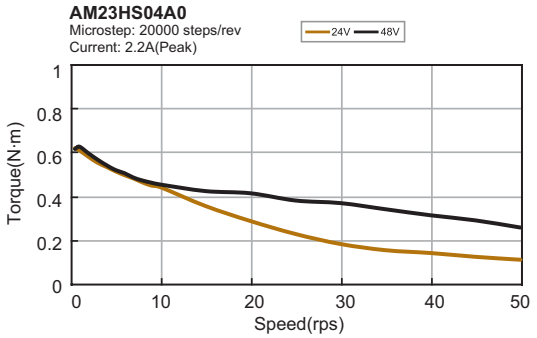
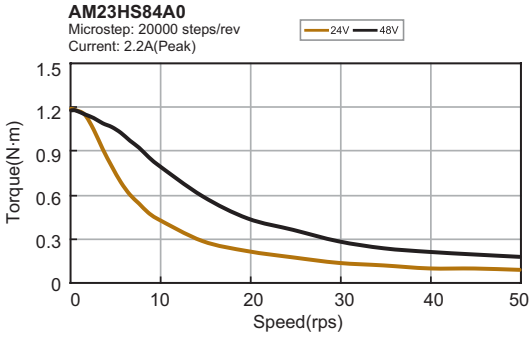
Current: 4.5A(Peak)



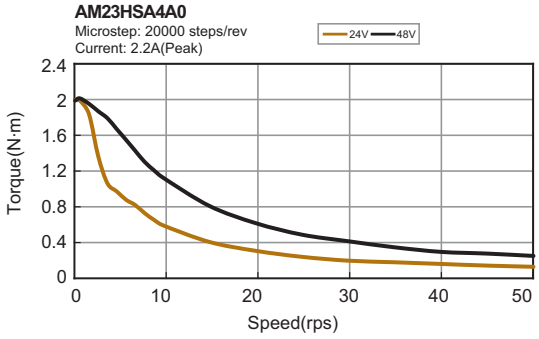
AM23HS04A0
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



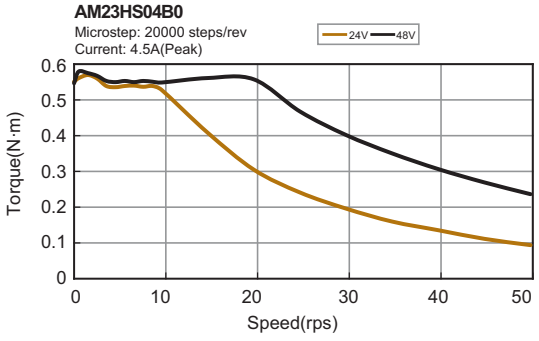
AM23HS84A0
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



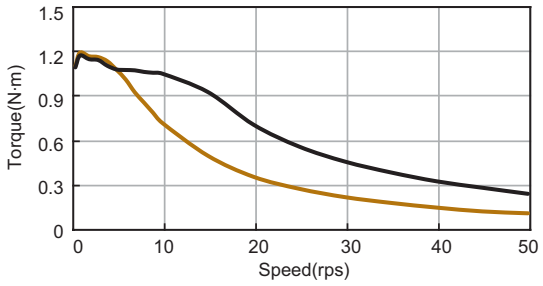
AM23HSA4A0
Microstep: 20000 steps/rev
Current: 2.2A(Peak)



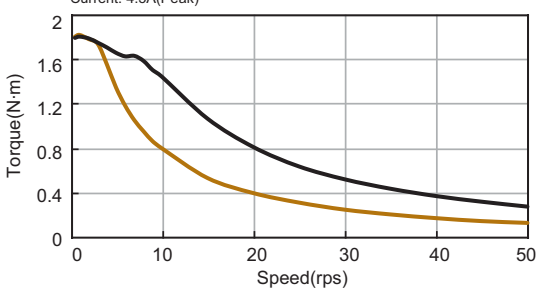
AM23HS04B0
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



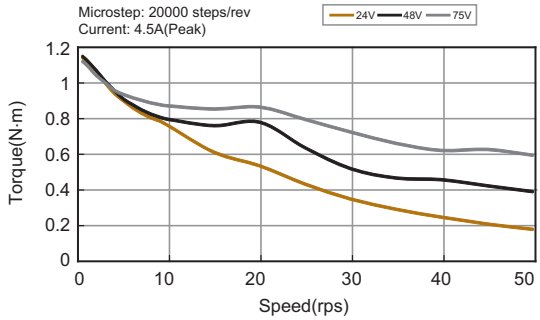
AM23HS84B0
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



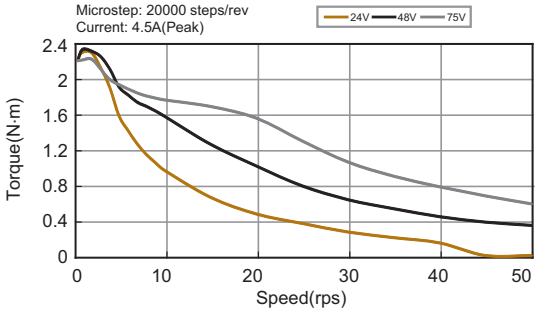
AM23HSA4B0
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



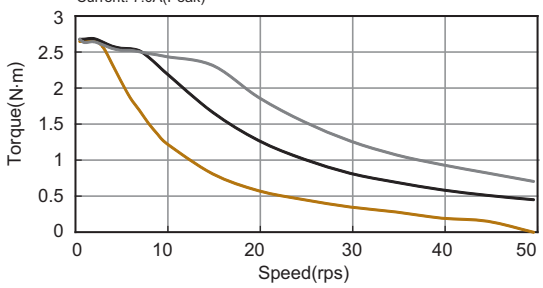
AM24HS2402
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



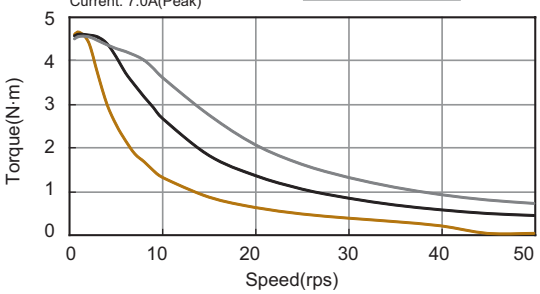
AM24HS5401
Microstep: 20000 steps/rev
Current: 4.5A(Peak)



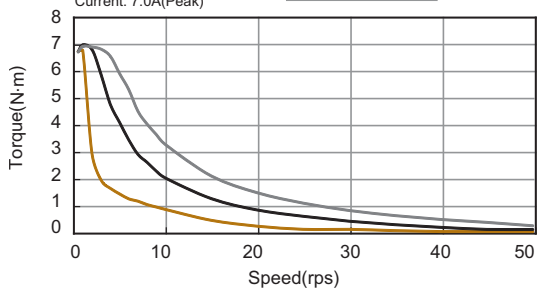
AM34HD0404
Microstep: 20000 steps/rev
Current: 7.0A(Peak)



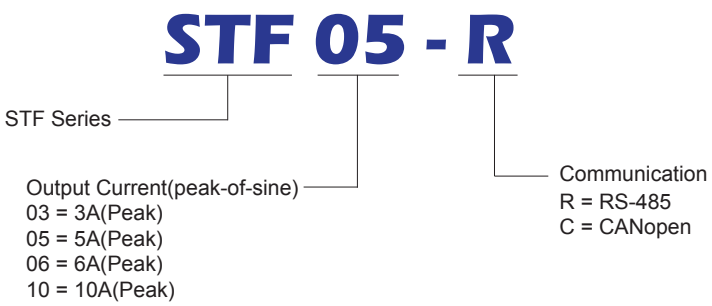
AM34HD1404
Microstep: 20000 steps/rev
Current: 7.0A(Peak)



AM34HD2403
Microstep: 20000 steps/rev
Current: 7.0A(Peak)



5.5 Numbering System



5.6 Ordering Information

Model	Current	Voltage	RS-485	Modbus/RTU	CANopen	Q Program
STF03-R	0.1 - 3.0 A	12 - 48 VDC	√	√		√
STF05-R	0.1 - 5.0 A	24 - 48 VDC	√	√		√
STF06-R	0.1 - 6.0 A	12 - 48 VDC	√	√		√
STF10-R	0.1 - 10.0 A	24 - 70 VDC	√	√		√
STF03-C	0.1 - 3.0 A	12 - 48 VDC			√	√
STF05-C	0.1 - 5.0 A	24 - 48 VDC			√	√
STF06-C	0.1 - 6.0 A	12 - 48 VDC			√	√
STF10-C	0.1 - 10.0 A	24 - 70 VDC			√	√

5.7 Alarm Code

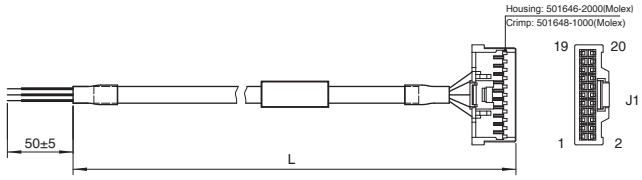
Code		Error
🟢	solid green	no alarm,motor disabled
🟢🟢	flashing green	no alarm,motor enabled
🔴🟢🟢	1 red, 2 green	move while disabled
🔴🔴🟢	2 red, 1 green	CCW limit
🔴🔴🟢🟢	2 red, 2 green	CW limit
🔴🔴🔴🟢	3 red, 1 green	***drive over temperature***
🔴🔴🔴🟢🟢	3 red, 2 green	***internal voltage bad***
🔴🔴🔴🟢🟢🟢	3 red, 3 green	blank Q segment
🔴🔴🔴🔴🟢	4 red, 1 green	***over voltage***
🔴🔴🔴🔴🟢🟢	4 red, 2 green	under voltage
🔴🔴🔴🔴🔴🟢	5 red, 1 green	***over current***
🔴🔴🔴🔴🔴🔴🟢	6 red, 1 green	***open motor winding***
🔴🔴🔴🔴🔴🔴🔴🟢	7 red, 1 green	communication error

NOTE: Items in ***bold italic*** represent Drive Faults, which automatically disable the motor.

6 Accessories (Sold Separately)

I/O Cable

P/N	Length
1015-030	0.3m
1015-100	1m
1015-200	2m

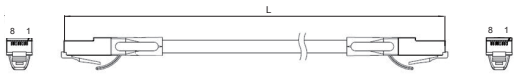


Pin No.	Assignment	Description	Color	Pin No.	Assignment	Description	Color
1	X1+	X1 Digital Input	Blue/White	11	X7	X7 Digital Input	Yellow
2	X1-		Blue/Black	12	X8	X8 Digital Input	Green
3	X2+	X2 Digital Input	Green/White	13	SHIELD	Shield	Shield
4	X2-		Green/Black	14	XCOM	X5-X8 Digital Input COM	Red
5	X3+	X3 Digital Input	Yellow/White	15	Y1	Y1 Digital Output	Brown
6	X3-		Yellow/Black	16	Y2	Y2 Digital Output	Gray
7	X4+	X4 Digital Input	Orange/White	17	Y3	Y3 Digital Output	White
8	X4-		Orange/Black	18	YCOM	Y1-Y3 Digital Output COM	Black
9	X5	X5 Digital Input	Blue	19	Y4+	Y4 Digital Output	Purple/White
10	X6	X6 Digital Input	Purple	20	Y4-		Purple/Black

RS-485/CANopen Communication Cable

Common Type	Shielded Type	Length
2012-030 *	2013-030	0.3m
2012-300	2013-300	3m

* 2012-030 is included in the drive package.



RC-880 Regeneration Clamp

RC-880 is used to limit increase in power supply voltage when the motor is decelerating under load. This is commonly referred to as "regeneration".

RC-880 can clamp the regeneration and prevent the power supply and/or drive being damaged or destroyed. Connect the RC-880 between the power supply and the drive.

Max. Supply Voltage: 80V
Max. Output Current: 8A(rms)
Continuous Power: 50W

Mating Connector (included in drive package)

STF05/10

Part	Description	Part Number	Vendor	Qty
J1	Power & Motor Connector	2EDGK-5.08-06P-13-1000AH	DEGSON	1
J2	I/O Connector Housing	501646-2000	Molex	1
J2	I/O Connector Crimp	501648-1000	Molex	20

STF03/06

Part	Description	Part Number	Vendor	Qty
J1	Power & Motor Connector	BCP-381-6 BK	Phoenix	1
J2	I/O Connector Housing	501646-2000	Molex	1
J2	I/O Connector Crimp	501648-1000	Molex	20

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