M2 Series DC Servo System
Quick Setup Guide Manual

SHANGHAI AMP&MOONS' AUTOMATION CO.,LTD.

About This Manual

This manual describes the M2DC Servo Drive.
It provides the information required for installation, configuration and basic operation of the M2DC series servo drive.
This document is intended for persons who are qualified to transport, assemble, commission, and maintain the equipment described herein.

Documentation Set for the M2DC Series Servo Drive
This manual is part of a documentation set. The entire set consists of the following:
- • M2DC Quick Start Guide: Basic setup and operation of the drive
- • M2DC Hardware Manual: Hardware installation, configuration and operation
- • M Servo Suite Software User Manual: How to use the M Servo Suite software

Safety

Only qualified persons may perform the installation procedures. The following explanations are for procedures that must be observed in order to prevent harm to people and damage to property.

 The M2DC utilizes hazardous voltages. Be sure the drive is properly grounded.

Before you install the M2DC, review the safety instructions in this manual.
Failure to follow the safety instructions may result in personal injury or equipment damage.

Safety Symbols

Safety symbols indicate a potential for personal injury or equipment damage if the recommended precautions and safe operating practices are not followed.
The following safety-alert symbols are used on the drive and in the documentation:

 Caution   Warning - Dangerous voltage

 Protective earth   Caution - Hot surface

Safety Instructions

Installation

⚠️	**DO NOT** subject the product to water, corrosive or flammable gases, or combustibles.
	DO NOT use the motor in a place subject to excessive vibration or shock.
	Never connect the motor directly to the AC power supply.
	DO NOT use cables soaked in water or oil.
	DO NOT extrude or pull off the cable, or damage the cables as electrical shocks or damage may result
	DO NOT block the heat dissipating holes. Prevent any metal filings from dropping into the drive during installation.
	DO NOT switch the power supply on and off repeatedly.
	DO NOT touch the rotating shaft when the motor is running.
	DO NOT strike the motor when during indtallation as the motor shaft or encoder may be damaged.
	To prevent accidents, the initial trial run for the servo motor should be conducted under a no-load condition (separate the motor from its couplings and belts).
	Starting system operation without first matching the correct parameters may result in servo drive or motor damage, or damage to the mechanical system.
	DO NOT touch the drive heat sink, motor, or the regeneration resistor during operation as they may be very hot.
	DO NOT hold the motor by the cable during transportation or installation.

Wiring

⚠️	**DO NOT** connect any power supply to the U, V, or W terminals.
	Install the encoder cable in a separate conduit from the motor power cable to avoid signal noise.
	Use multi-stranded twisted-pair wires or multi-core shielded-pair wires for signal and encoder cables.
	A hazardous voltage charge may still remain in the drive even after the power has been removed - Do not touch the terminals when the charge led is still lit.
	Please observe the specified voltage(s).
	Make sure both the drive and the motor connect to a class 3 ground.
	Please ensure the grounding wires are securely connected before power up.

Standards Compliance

The M2DC Series Servo drive has been designed according to standards:

Electromagnetic compatibility	Electrical Safety: Low voltage directive
Standard EN 61800-3 (2004)	Standard IEC 61800-5-1 (2007)

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1. Product Description

1.1 System Checklist

A complete and workable M2DC servo system should include the following parts:

A matched servo drive and servo motor (see section 2.4 for recommended combinations)

1. A power cable with a 4-PIN connector to connect P1 (V+, V-, AUX+) to supply power to the drive
2. A motor cable with a 5-PIN connector to supply the servo motor with power from the drive and to connect a regenerative resistor through P2 (U, V, W)
3. An encoder cable with a 26-PIN connector to connect port CN3 for encoder feedback
4. A mini USB cable to connect port CN1 to a PC for communication
5. An I/O cable with a 50-PIN connector to connect port CN2 for I/O
6. Cables with RJ-45 connectors to connect ports CN6 and CN7 for RS-485 or CANopen communication

1.2 Servo Drive Model Introduction

1.2.1 Drive Name Plate Description

Model No.	Model No. M2DC-6D05X
Voltage	VOLT. INPUT 20-60VDC OUTPUT 0-60VDC
Output Current	F.L.C 6 A
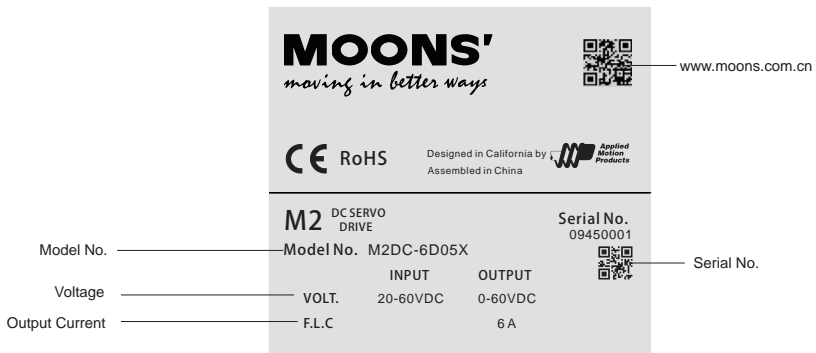
1.2.2 Drive Model Description

M2DC - 6D0 5 S *

M2 Series DC Servo Drive

Customized Specification (If Applicable)

Current Code	Continuous Current (RMS)	Boost Current (RMS)
6D0	6.0A	18.0A
10D	10.0A	30.0A

Voltage Code	Input Voltage
5	10-60VDC

Communication Code	Configuration type	Description	Communication type
S		Basic Type	- - - - - -
Q		Q Type	RS-232
R	Mini USB	Q Type (Modbus/RTU)	RS-485
C		CANopen Type	CANBus
D		eSCL Type	Ethernet
IP		EtherNet/IP Type	Ethernet

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1.2.3 Drive specifications

Input Power	M2DC-6D0 M2DC-10D	Main Circuit	20 - 60VDC
		Control Circuit	10- 60VDC
Environment	Temperature		Ambient temperature: 0°C to 50°C (if the ambient temperature of the servo drive is greater than 40°C, please install the drive in a well-ventilated location) Storage temperature: -20°C to 65°C
	Humidity		Both operating and storage: 10 to 85%RH or less
	Altitude		Lower than 1000m
	Vibration		5.88m/s2 or less, 10 to 60Hz (do not use continuously at resonance frequency)
Control method			IGBT PWM Sinusoidal wave drive
Encoder feedback			2500 ppr optical encoder with shared commutation signals
I/O	Control Signal	Input	8 optically isolated multi function inputs, 5-24VDC, 20mA 2 optically isolated multi function high speed inputs, 5-24VDC, 20mA
		Output	6 optically isolated multi function outputs, 5-24VDC, 20mA
	Analog signal	Input	2 inputs (12Bit A/D: 2 input)
	Pulse signal	Input	1 photocoupler input compatible with both line driver I/F and open collector I/F 1 line receiver input compatible with line driver I/F
		Output	3 line driver outputs, 1 open collector output
Communication	Mini USB		Connection with PC or 1 : 1 communication to a host.
	RS-232		RS-232 communication
	RS-485		RS-485 communication & Modbus/RTU
	CANbus		CANopen communication
	Ethernet		EtherNET/IP or eSCL
Front panel			4 keys (MODE, UP, DOWN, SET), LED (5-digit)
Regeneration Resistor			Built-in regenerative resistor (external resistor is also enabled)
Dynamic Brake			Built-in
Control modes			(1) Position mode (2) Analog velocity mode (3) Analog position mode (4) Position mode (5) Velocity change mode (6) Command torque mode (7) Command velocity mode
Control inputs			(1) Servo-ON input (2) Alarm clear input (3) CW/CCW Limit (4) Pulse& Direction or CW/CCW input (5) Gain Switch (6) Control mode Switch (7) Pulse Inhibition (8) General Input
Control outputs			(1) Alarm output (2) Servo-Ready output (3) External brake release (4) Speed arrival output (5) Torque arrival output (6) Tach out (7) General output (8) Position arrival output
Certification			RoHS, EN 61800-3:2004, EN 61800-5-1:2007

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1.3 Servo Motor Model Introduction

1.3.1 Motor Name Plate Description

Mode NO.

Series NO.

Input

Ouyput Power

Rated Torque,speed

Max. Speed

Ins.Class

MOON'S
AC SERVO MOTOR

Model: SM0601GE4-KCF-NNV

Serial.   1512190027

Input: 3 Phase VAC Typ.
              Source VDC Typ.48
              10A Rated 10A Stall
Ouput: 200W
              0.64Nm 3000r/m
Max.Speed: 8000r/min
Ins.Class: B Ambiant:40°C IP65
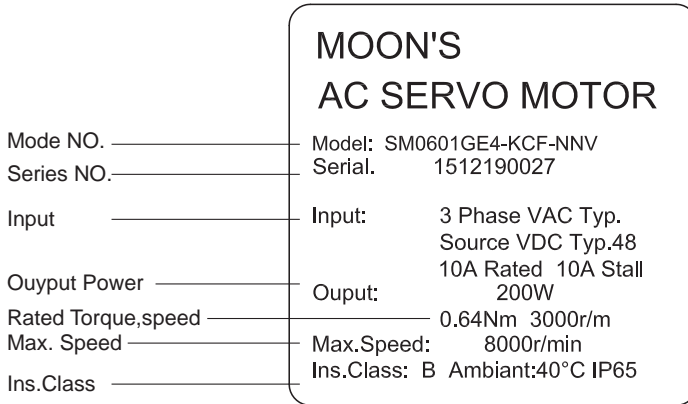
1.3.2 Motor Model Description

S M 06 02 F E4 - K C F - N N V **

Servo Motor

Frame Size	
04	40mm
06	60mm
08	80mm

Wattage code	Motor Length (mm)		
	40	60	80
01	60W	200W	
02	100W	400W	300W
03			550W

Input Voltage(DC)	
E	80V
F	60V
G	48V
H	36V

Customized Specification (If Applicable)

Brake Option	
N	No Brake
B	24VDCBrake

Shaft and Lead/Connector Style	
KCD	300mm Shielded Cable with non-Sealed Connectors - For Winings up to 6.5Amps
KCF	300mm Shielded Cable with non-Sealed Connectors - For Winings 6.6 to 12.5 Amps

Feedback	
E4	2500 ppr optical encoder with shared commutation signals

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2 Installation

2.1 Storage Conditions

Store properly packaged in a clean and dry environment,away from direct sunlight
Store in an ambient temperature range of -10°C to +85°C
Store where the relative humidity range is 10% to 85% with non-condensing
DO NOT store in a place exposed to corrosive gases

2.2 Installation Conditions

Temperature range of 0°C to 50°C. If the ambient temperature of the servo drive is greater than 40°C, please install it in a well-ventilated location.
The ambient temperature of the servo drive for long-term reliability should be less than 45°C.
The servo drive and motor will generate heat; if they are installed in a control panel, please ensure sufficient space around the units for heat dissipation.
Operate where the relative humidity range is 10% to 85% and non-condensing
Install where the vibration is lower than 5.88m/s^2, 10Hz-60Hz (DO NOT use the drive for extended periods of time at the resonance point.)
DO NOT install the servo drive and motor in a location subjected to corrosive or flammable gases, or combustibles.
Install the servo drive and motor in an indoor electric control cabinet.
DO NOT install the servo drive and motor in a location subject to airborne dust.

2.3 Drive Dimensions (Unit: mm)

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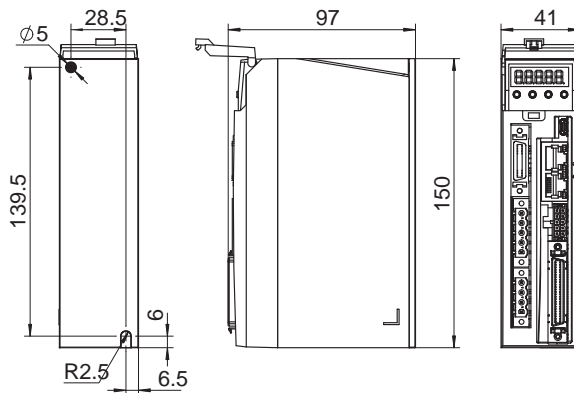
2.4 Installation Space

Incorrect installation may result in a drive malfunction or premature failure of the drive and/or motor.
Please follow the guidelines in this manual when installing the servo drive and motor.
The M2DC servo drive should be installed perpendicular to the wall or in a control panel.
In order to ensure the drive is well ventilated, make sure ventilation holes are not obstructed, there is sufficient free space around the servo drive, and a cooling fan is mounted in the control panel.
Ensure the grounding wires are securely connected

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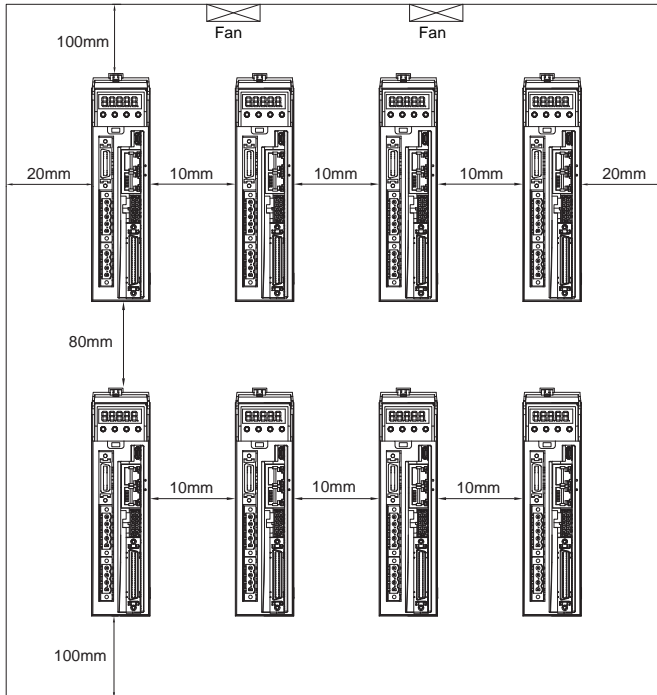
2.5 Motor Installation

DO NOT strike the motor when installing it as the motor shaft or encoder may be damaged.

DO NOT use cables that have been soaked with water or oil.
Avoid a stress application to the cable outlet and connecting portion by bending.
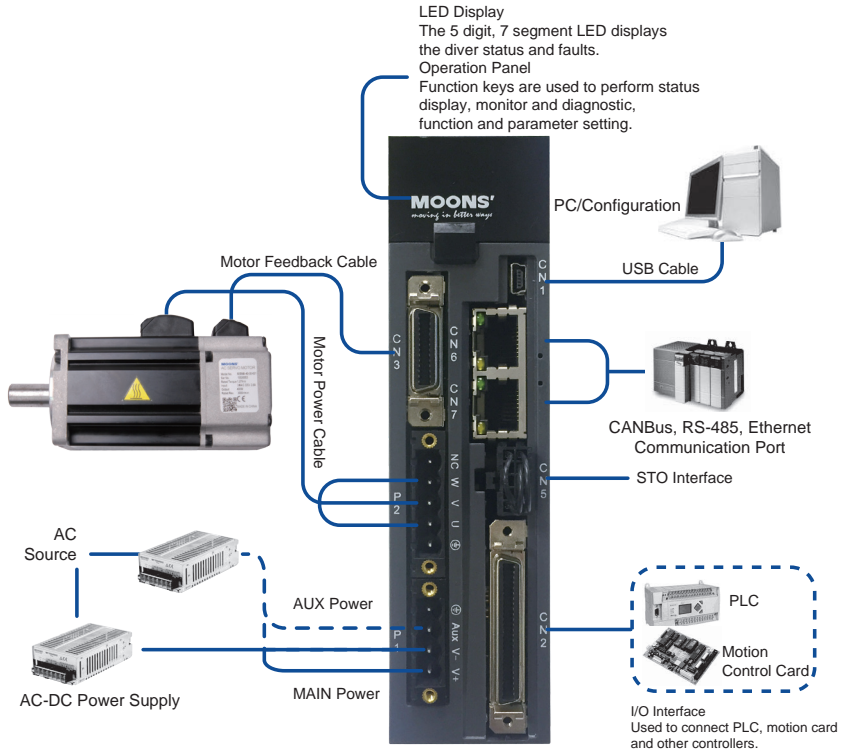Use flexible cables when using a cable carrier, and make sure the minimum cable bending diameter is 200mm.
The shaft through hole and cable end connector are not IP65 designed. Be careful to prevent any liquid or oil from getting into the motor at these areas.

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3. Connections and Wiring

3.1 Connecting to Peripheral Devices

3.1.1 System Configuration

LED Display
The 5 digit, 7 segment LED displays the diver status and faults.
Operation Panel
Function keys are used to perform status display, monitor and diagnostic, function and parameter setting.

PC/Configuration

USB Cable

Motor Feedback Cable

Motor Power Cable

CANBus, RS-485, Ethernet Communication Port

STO Interface

AC Source

AUX Power

PLC

Motion Control Card

I/O Interface
Used to connect PLC, motion card and other controllers.

AC-DC Power Supply

MAIN Power

3.1.2 Servo Drive Connectors and Terminals

| Terminal Identification	Description	Details		
P1	V+, V-	Used to connect DC main circuit power		
	AUX	Used to connect an auxiliary circuit power		
	⏚	Ground		
P2	U, V, W	Used to connect servo motor		
		Terminal Symbol	Wire color	Description
		U	Red	Connects to servo motor
		V	Yellow	
		W	Blue	
	⏚	Ground		
CN1	Communication Port	User to connect PC		
CN2	I/O Connector	Used to connect external controllers		
CN3	Encoder Feedback Connector	Used to connect servo motor encoder		
CN4	Reserved			
CN5	STO Connector	Used to connect STO (Safe Torque Off)		
CN6	RS-485/CANopen Port Ethernet Port *RS-232 Communication Port	RJ45 connector, Daisy Chain, Used for RS-485/CANopen/ Ethernet *RS-232 Communication Port (-Q Type Only)		
CN7	RS-485/CANopen Port Ethernet Port Communication Port	RJ45 connector, Daisy Chain, Used for RS-485/CANopen / Ethernet Communication		

3.1.3 Connections and Wiring Notes

• Ensure the grounding wires are securely connected. Wire with a cross section of more than 2.0mm^2 is recommended.

• Grounding method must be single point grounding.

• Ensure V+ and V- are correctly wired, and voltage supplies are within the specified range.

• Auxiliary power V+ connects to drive AUX connector, auxiliary power V- connects to drive V-.

• Ensure U/V/W is wired following the order of RED/YELLOW/BLUE.

• An isolation transformer or EMI filter is recommended on drive's power supply to ensure the drive's safety and improve its anti-interference level.

• Set up emergency stop circuitry to switch off the power supply when a fault occurs.

• DO NOT touch the drive or motor's connector terminals for at least 5 minutes after the drive and motor have been powered off. There are electrical charge components in the circuitry which discharge slowly.

• Install the encoder cables in a separate conduit from the motor power cables to avoid signal noise. Separate the conduits by at least 30cm (11.8 inches).

• Use multi-stranded twisted-pair wires or multi-core shielded-pair wires for the encoder feedback cables.

• The maximum length of the signal input/output cable should be no more 5 meters, and the encoder (PG) feedback cable no more than 15 meters.

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3.1.4 Wiring Methods for P1 Power Supply Connector

Power for the M2DC servo drives comes from 2 different sources

	Pin	Function	Input Power
Main power supply	V+, V-	Drive's main power input	20 - 60VDC
Control circuitry power/auxiliary power	AUX, V-	When the main power supply is off, the AUX power will keep the logic circuitry alive, allowing the drive to remember its current state data (motor position, etc.) The motor is then able to resume operation without running a homing routine while the main power is switch-on again.	10 - 60VDC

M2DC Servo Drive
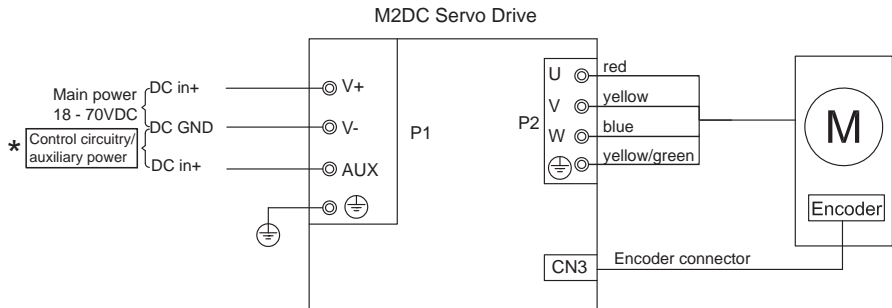
*Note: For optimized motion performance, make sure the main power input voltage is higher than the motor winding voltage by at least 2VDC.

3.2 Wiring to the P2 Connector

⚠️ **Please follow Chart 5.3 before power up.**

3.2.1 Motor Power Cable Configuration

P2 interface of the drive

Motor power extension cable connector

Motor lead wire connector

W
V
U
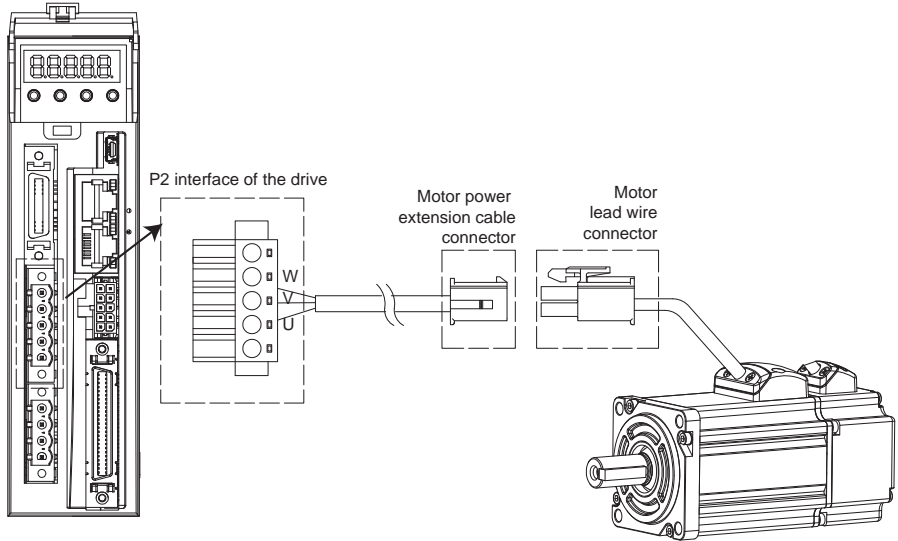
3.2.2 Motor Power Cable Connector(-CD Winding ,6Amps)

A PIN Assignment

View A

A

B

View B
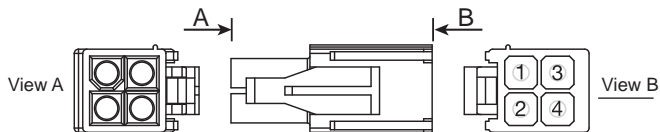
Pin	1	2	3	4
Signal	U	V	W	PE
Color	Red	Yellow	Blue	Yellow/Green

B Motor Connector Specifications

Type	Motor side (plug)	Plug-in (housing)
Housing	AMP 172167-1	AMP 172159-1
Terminal	AMP 170360-1	AMP 170362-1

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3.2.3 Motor Extension Cable Wiring Diagram

Housing: 172159-1(AMP)
Terminal: 170362-1(AMP)
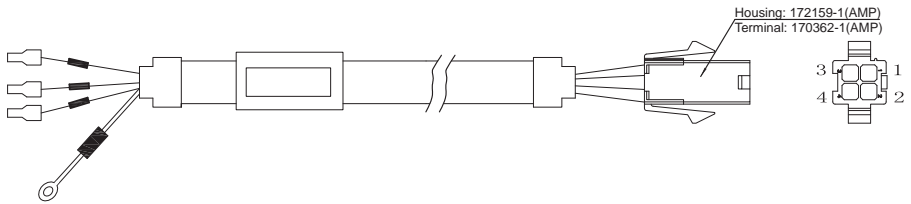
Drive side (P2)	Signal	Color	Motor side (housing)
5452571(Phoenix)			AMP 172159-1
U	U	Red	1
V	V	Yellow	2
W	W	Blue	3
⏚	PE	Yellow/Green	4

3.2.4 Motor Power Cable Connector(-CF Winding,10Amps)

3.2.4.1 PIN Assignment

Cover：350780-1(AMP)
Pin：350536-1(AMP)

A side view   B side view
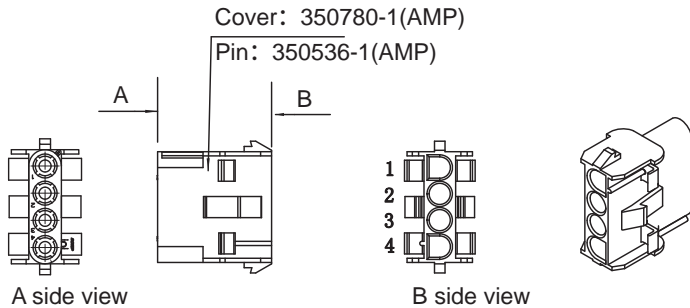
Pin	1	2	3	4
Signal	U	V	W	PE
Color	Red	Yellow	Blue	Yellow/Green

Motor Connector Specifications

Type	Motor side (plug)	Plug-in (housing)
Housing	AMP 350-779-1	AMP 350780-1
Terminal	AMP 350218-1	AMP 350536-1

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3.2.4.2 Motor Extension Cable Wiring Diagram
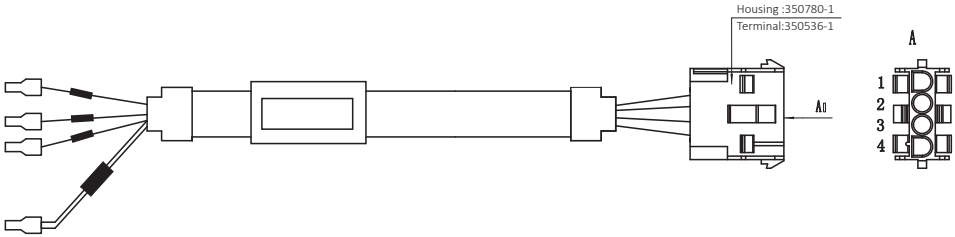
Drive side (P2)	Signal	Color	Motor side (housing)
5452571 (Phoenix)			AMP 350780-1
U	U	Red	1
V	V	Yellow	2
W	W	Bleu	3
⏚	PE	Yellow/Green	4

Ensure U/V/W is wired in the order of RED/YELLOW/BLUE.

3.3 Encoder Connector CN3

3.3.1 Motor Encoder Feedback Cable Configuration
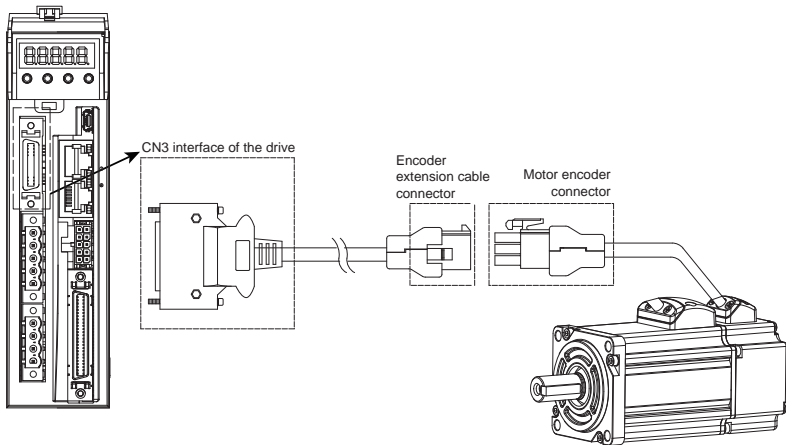
3.3.2 Layout of CN3 Connector

View B   View A
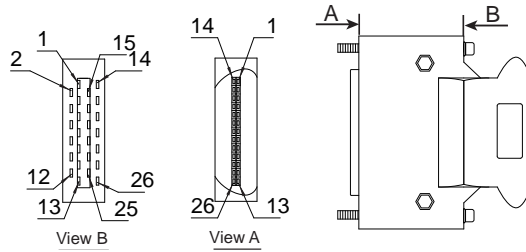
Pin NO.	Symbol	Description
1	A+	Encoder A+
2	B+	Encoder B+
3	Z+	Encoder Z+
4	U+	Hall U+
5	W+	Hall W+
6	U-	Hall U-
7	W-	Hall W-
11	Encoder +5V	Encoder power supply +5V
13	Encoder +5V	Encoder power supply +5V
14	A-	Encoder A-
15	B-	Encoder B-
16	Z-	Encoder Z-
17	V+	Hall V+
19	V-	Hall V-
24	GND	Encoder power supply ground
26	Shield	Shield

3.3.3 Connection to Motor Encoder
Connect to 2500ppr Increment Encoder (9PIN AMP connector)

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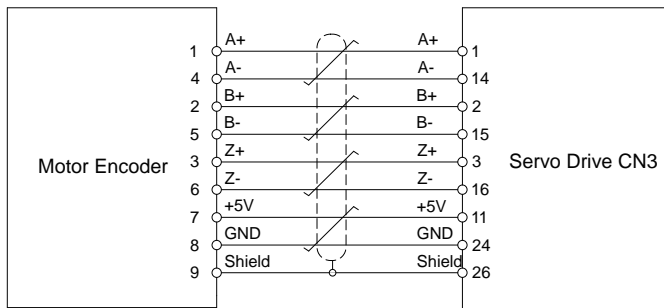
3.3.4 Specifications of Encoder Connector

A. -E4 Encoder Connector PIN Assignment

View A
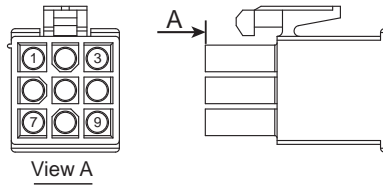
PIN#	Signal	Colour
1	U+/A+	Blue
2	V+/B+	Green
3	W+/Z+	Yellow
4	U-/A-	Yellow/Black
5	V-/B-	Green/Black
6	W-/Z-	Yellow/Black
7	+5V	Red
8	GND	Black
9	Shield	Shield

NOTE: The HALL signal U/V/W ONLY appears for short time after the encoder is powered on, it will then covert to A/B/Z signals.

B. -E4 Encoder Connector Specifications

Type	Motor Plug	Housing for the motor
Housing	AMP 172169-1	AMP 172161-1
Terminal	AMP 770835-1	AMP 770834-1

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3.3.5 Motor Encoder Extension Cable Wiring Diagram

-E4 Encoder Encoder Cable Diagram
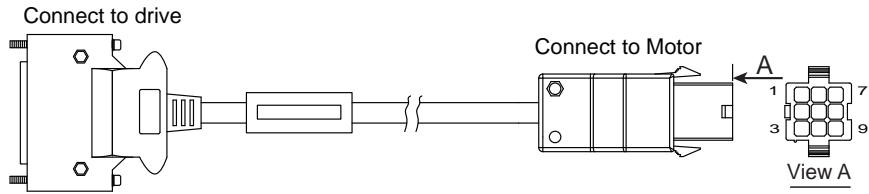
Drive Side	Signal	Color	Housing for the motor
TYCO 3-22322346-1			AMP 172161-1
1	A+/U+	Blue	1
2	B+/V+	Green	2
3	Z+/W+	Yellow	3
14	A-/U-	Yellow/Black	4
15	B-/V-	Green/Black	5
16	Z-/W-	Yellow/Black	6
11	+5V	Red	7
24	GND	Black	8
26	Shield	Shield	9

3.4 Electromagnetic Brake

When the motor drives the vertical axis, a brake should be used to hold and prevent the load from fallingby gravity when the power is removed.
NOTE: Use only a servo motor brake for holding a load when the motor is disabled or the power is off. Never use a servo motor brake to stop a load in motion. This may cause damage to the servo motor.

3.4.1 Wiring Diagram
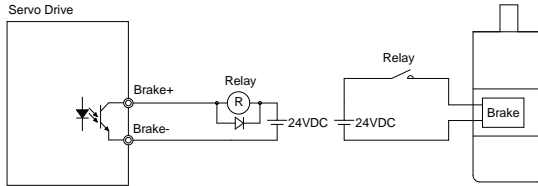
3.4.2 Brake Motor

● When no power is applied to the electromagnetic brake, it is in a locked position. Therefore, the motor shaft will not be able to rotate.
● The brake coil has no polarity.
● During the brake/release action, you might hear a clicking sound. This is normal and does not affect the use of brake.
● Specifications of the brakes are as follows:

	Motor Power				
Type	60W	100W	200W	400W	550W
Holding torque (N•m)	0.35		2		4.5
Working current (A)	0.25		0.38		0.61
Rated voltage (V)	24V±10%				
Release time	<25ms				
Engage time	<25ms				
Release voltage (V)	Release voltage18.5VDC				

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3.4.3 Timing Charts of the Electromagnetic Brake

In order to prevent damage to the brake, there are delay sequences during the brake operation. Please be cautious with brake operation sequence.
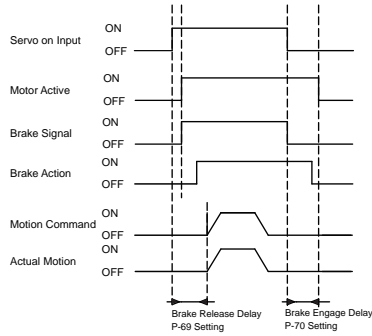
Brake engage/disengage delay time can be set through M Servo Suite software, or on the drive directly through the P function: P-69 (BD) or P-70 (BE).

3.5 Regeneration Resistor

In M2DC series servo drives, there is a pre-installed 20W regeneration resistor. In some applications, the pre-installed regeneration resistor might not be enough to absorb all foldback current. In these cases, a larger wattage regeneration resistor needs to be connected externally, to prevent drive over voltage warnings.

3.6 Recommended Cable Specifications

● Select wires with sufficient allowance for parameters such as operating current and ambient temperature.
● Recommended wire selections are as follows:

Servo Drive And Corresponding Motor Model	Wire Width mm^2 (AWG)	
	V+/V-	U/V/W
M2DC-6D05	1.5 (AWG15)	.75 (AWG18)
M2DC-10D5	2.5 (AWG13)	1.25 (AWG16)

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3.7 Connecting to the Host Computer - CN1

Port CN1 is used to connect the drive with a PC. Use M Servo Suite software to set the control mode, change parameter values, use the auto-tuning function, etc.

PIN	Symbol	Function
1	+5V	+5V Power Supply
2	D-	Data -
3	D+	Data +
4	—	Reserved
5	GND	Ground

3.8 Input and Output Signal Interface Connector - CN2

3.8.1 Input and Output Interface Specifications and Diagram

Port CN2 on the M2DC series servo drives is used for input/output signals. Details are shown in table below:

I/O Signals	Digital Signal	Inputs	8 Configurable optically isolated general inputs, 5-24VDC, 20mA 4 Configurable optically isolated high speed inputs
		Outputs	4 Configurable optically isolated general outputs, max 30VDC, 20mA 1 Alarm output, max 30VDC, 20mA 1 motor brake control output, max 30VDC, 20mA
	Analog Signal	Inputs	2 Analog inputs, with 12 bit resolution
	Pulse Signal	Inputs	2 optically isolated high speed inputs 500KHz (open collector) 2 high speed differential inputs 2MHz
		Outputs	4 high speed encoder feedback outputs (3 line driver A/B/Z, and 1 open collector output Z)

3.8.2 Layout of CN2 Connector

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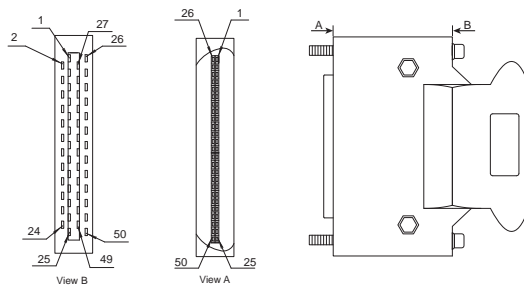
3.8.3 Signal Description of Connector CN2

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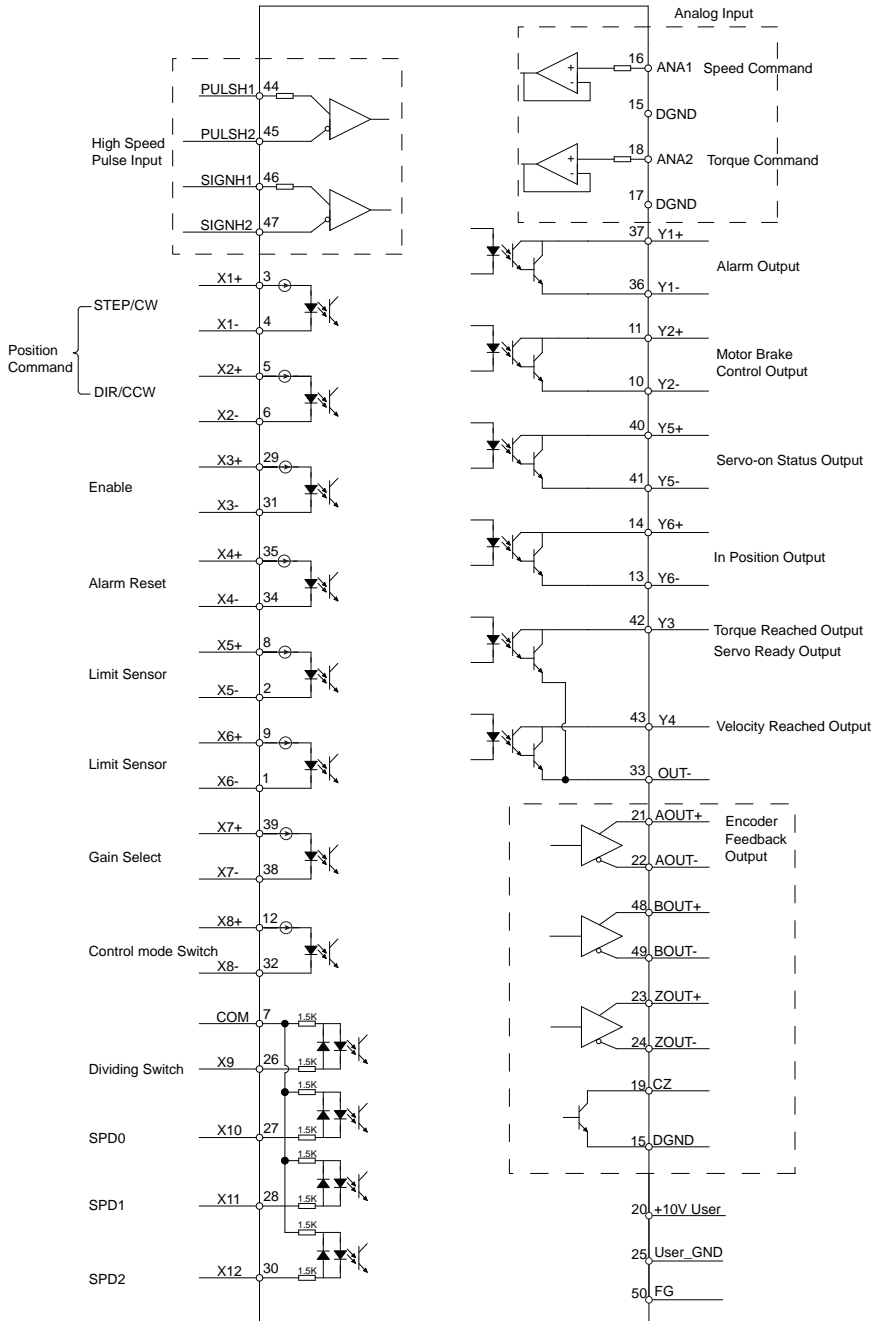
3.8.3.1 Input Signals

The M2DC series servo drive has 12 programmable digital inputs as well as 2 analog inputs.
Each of the inputs can be specified with different functions via the parameter settings. The functions are as follows:
- Specified function signals: i.e. STEP/DIR signal, motor enable/disable signals.
- General purpose signal: In velocity mode, torque mode, Q program mode, or SCL mode, it is used as general purpose signal with no specified functions.

Signal	Symbol	Pin NO.	Details
X1	X1+	3	This input has three functions: ● Accept STEP pulse input such as STEP signals, CW pulse, A pulse in position mode ● Run/Stop input in torque or velocity mode ● General purpose input
	X1-	4	
X2	X2+	5	This input has three functions: ● Accept STEP pulse input such as Direction signals, CCW pulse, B pulse in position mode ● Direction input in torque or velocity mode ● General purpose input
	X2-	6	
X3	X3+	29	● Enable/Disable input ● General purpose input
	X3-	31	
X4	X4+	35	● Alarm reset input, used to reset drive alarm ● General purpose input
	X4-	34	
X5	X5+	8	● Limit sensor input ● General purpose input
	X5-	2	
X6	X6+	9	● Limit sensor input ● General purpose input
	X6-	1	
X7	X7+	39	● Gain select input in pulse position mode ● General purpose input
	X7-	38	
X8	X8+	12	● Switch control mode between main mode and second mode ● General purpose input
	X8-	32	
X9	X9	26	● Dividing switch, change the pulses per revolution for electronic gearing ● General purpose input
X10	X10	27	● Pulse inhibited input - ignores the pulse input when this input is activated in position mode ● Speed selecting input 1 in change speed mode ● General purpose input
X11	X11	28	● Speed selecting input 2 in change speed mode ● General purpose input
X12	X12	30	● Speed selecting input 3 in change speed mode ● General purpose input
COM	COM	7	X9-X12 COM point

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High-Speed Pulse Inputs	PULSH1	44	High-speed pulse inputs (+5VDC line drive input), the maximum input frequency 2MHz.Three pulse commands available:
	PULSH2	45	● Pulse & Direction
	SIGNH1	46	● CW Pulse and CCW Pulse
	SIGNH2	47	● A Quadrature B pulse (NOTE: DO NOT use with both X1 and X2)
Analog Input Signal 1	ANA1	16	In analog velocity control mode, the offset, dead band, and function of analog input 1 can be set by M Servo Suite or parameters P-52, P-56 and P-61. ● Sets or requests the analog input gain that relates to motor position when the drive is in analog position command mode ● Sets or requests the gain value used in analog velocity mode ● General analog input in Q mode
	DGND	15	Digital Ground for analog input
Analog Input Signal 2	ANA2	18	● In analog torque control mode, the offset, dead band, and function of analog input 2 can be set by M Servo Suite or parameters P-53, P-57 and P-61. ● General analog input in Q mode
	DGND	17	Digital ground for analog input

3.8.3.2 Input Function List

	1	2	3	4	5	6	7	8	9	10	11	12
Step	■											
DIR		■										
CW Limit					●							
CCW Limit						●						
Start/Stop	▲▼											
Direction		▲▼										
Servo enable			●									
Alarm clear				●								
Speed selection 1,2,3										▲	▲	▲
Global gain selection							■					
Control mode selection								●				
Pulse encoder Resolution selection									■			
Pulse Inhibit										■		
General Input	●	●	●	●	●	●	●	●	●	●	●	●

■– Position Mode   ▲– Velocity Mode   ▼ – Torque Mode   ● – All Modes

3.8.3.3 Output Signals

The M2DC series servo drive has 6 programmable digital output signals available; each of the outputs can be specified with a different function via parameter settings.

Signal	Symbol	Pin NO.	Details
Y1	Y1+	37	This output has two functions: ● Alarm Output ● General purpose output
	Y1-	36	
Y2	Y2+	11	This output has two functions: ● Motor brake control output ● General purpose output
	Y2-	10	
Y3	Y3+	42	Torque Reached Output ● Servo ready output- output servo ready signal when the drive is ready to be controlled and without alarm ● General purpose output
	Y3-	33	
Y4	Y4+	43	● Moving signal output - output signal when the dynamic position error is less than the set value in position mode ● Velocity reach output - output signal when the actual speed is the same as the target speed and the speed ripple less than the ripple range ● General purpose output
	Y4-	33	
Y5	Y5+	40	● Servo-on Status output --output signals when the motor is enabled. ● General purpose output
	Y5-	41	
Y6	Y6+	14	I● n position signal output - output signal when in position, and the position error is less than the set value in position mode ● Tach out output - produces pulses relative to the motor position with configurable resolution ● General purpose output
	Y6-	13	
Encoder pulse feedback Output	AOUT+	21	● The encoder feedback phase A line drive output
	AOUT-	22	
	BOUT+	48	● The encoder feedback phase B line drive output
	BOUT-	49	
	ZOUT+	23	● The encoder feedback phase Z line drive output
	ZOUT-	24	
	ZOUT	19	● The encoder feedback phase Z output (open collector)
+10V Output	+10V User	20	+10VDC user, max 100mA
	USER_GND	25	+10VDC user ground

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3.8.3.4 Output Function List

Output Pin		Y1	Y2	Y3	Y4	Y5	Y6
Function	Alarm Output	●					
	In Postion error						●
	Dynamic Postion error				■		
	Tach Out						●
	Brake		●				
	Torque Reach			●			
	Servo Ready			●			
	Servo-On Status					●	
	Velocity Reach				▲▼		
	General Output	●	●	●	●	●	●

■ – Position Mode   ▲ – Velocity Mode   ▼ – Torque Mode   ● – All Modes

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3.8.4 Encoder Feedback Output

The M2DC series servo drive can output encoder A/B/Z phase as differential output signals through the line driver. The output signal is 5V, A/B signals are 10000 pulse/rev, Z signal is 1 pulse/rev. The host must use the line receiver to receive these signals. Use twisted-pair wires for signal transfer.

3.8.4.1 A/B/Z Connection Diagram
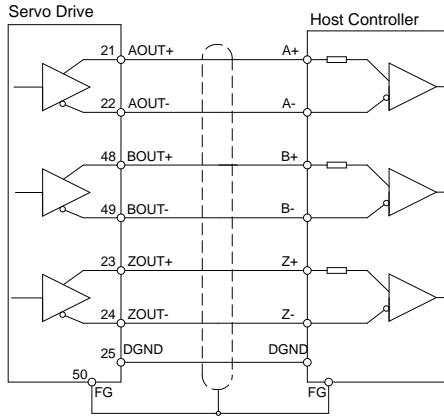
NOTE: Please make sure the host controller and the servo drive are connected to a common ground.

3.8.4.2 Z Phase Open Collector Output

On the M2 drives, encoder signal Z uses open collector output circuitry. Due to the narrow bandwidth of encoder signal Z, please use high speed opto-coulper circuitry for the host receiver.
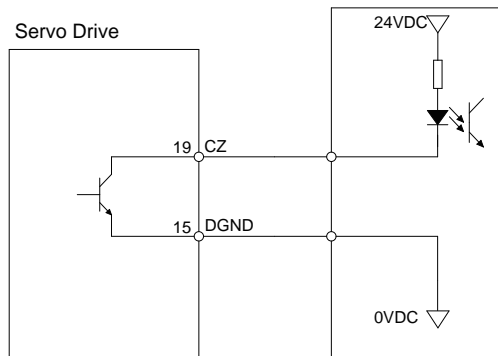
3.8.5 Input Signal Interface Connector, CN2

3.8.5.1 Position pulse signal input

The M2DC series servo has two high speed pulse intputs, STEP/DIR and PULSH/SIGNH. STEP/DIR supports 5-24VDC, up to 500KHz open collector input signal or differential input signal through the line driver. PULSH/SIGNH supports 5VDC, up to 2MHz with differential line driver input.

NOTE: STEP/DIR and PULSH/SIGNH CANNOT be used at the same time.

A. Open Collector Input Signal Diagram
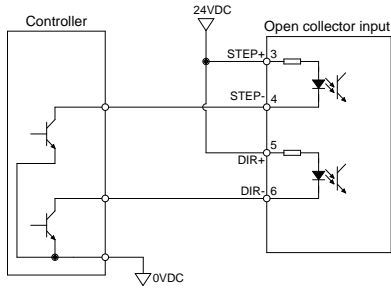
B. Differential Input Signal Diagram
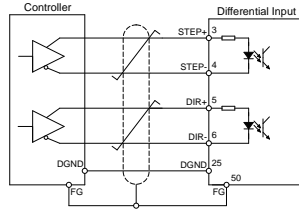
C. High Speed Differential Signal Input Diagram

Use ONLY 5V supply for PULSH/SIGNH input, DO NOT use 24V.

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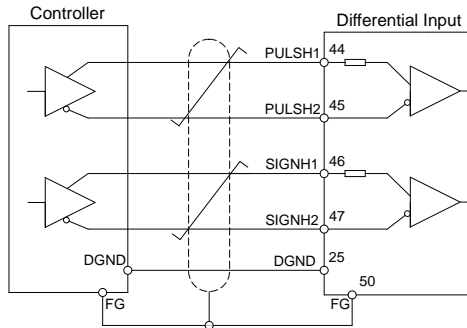
D. Pulse Input Description

STEP/DIR Pulse Input
When both STEP and DIR input signals are ON, the motor will rotate in one direction.
When STEP input signal is ON, and DIR input signal is OFF, the motor will rotate in the opposite direction.
The direction signal (DIR) can be configured via M Servo Suite software.
The following graph represents motor rotatation in CW direction when DIR input is ON.

Single Pulse Input
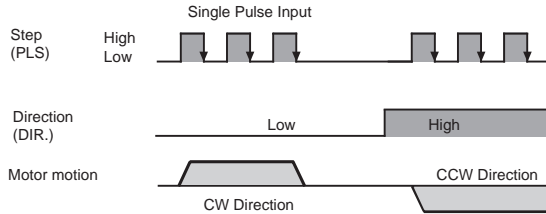
CW/CCW Pulse
When Pulse input goes into X1, the motor will rotate in one direction.
When Pulse input goes into X2, the motor will rotate in the opposite direction.
Motor direction can be configured via M Servo Suite software.

Dual Pulse Input
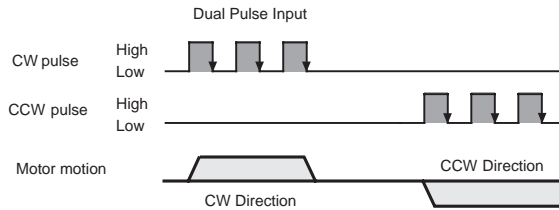
A/B Quadrature
In A/B Quadrature mode, the motor rotary direction is based on the leading signal between A and B.
Motor rotary direction can be configured via M Servo Suite software. Direction is defined by the leading input between X1/X2.
The following graph represents motor rotates in CW direction when X1 is leading X2.

A/B Quadrature Pulse Input

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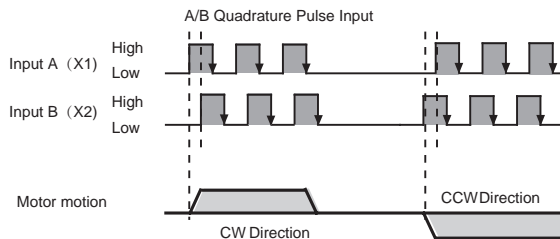
3.8.5.2 Analog Signal Input For Velocity And Torque Mode

The M2DC series servo drive has 2 single ended analog inputs OR 1 differential analog input. The input voltage range is -10V to +10V. Velocity and torque range can be configured via M Servo Suite software.

Single Ended Analog Input

Single Ended Analog Control Mode

Differential Analog Input

Differential Analog Control Mode
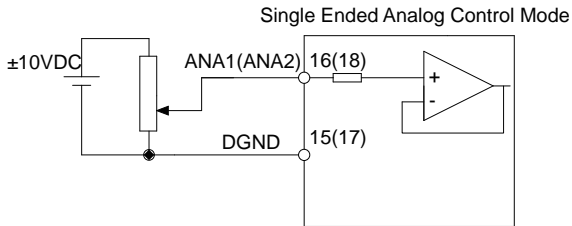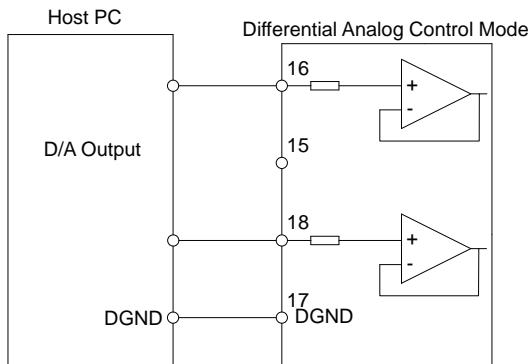
3.8.5.3 High Speed Input Ports X1, X2, X3, X4

High Speed Input Port
The M2DC has 4 optically isolated high speed digital inputs X1, X2, X3, and X4. These inputs allow input voltage from 5VDC to 24VDC with maximum current of 20mA, and up to 500KHz. They can be used for general purpose inputs, connecting sensor switch signals, PLC controllers or other types of controller output signals.

NOTE: When the drive is in position mode, X1, X2 can ONLY be set as STEP/DIR signal.

When the drive is NOT in position mode, X1, X2 can be set as general purpose signals.

X1, X2, X3, X4 circuits are as follows:
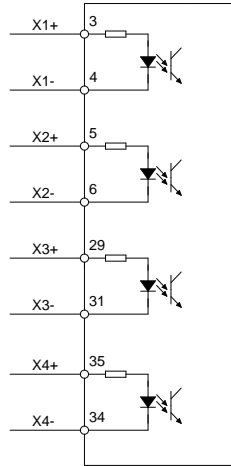
High Speed Input Connection Diagrams
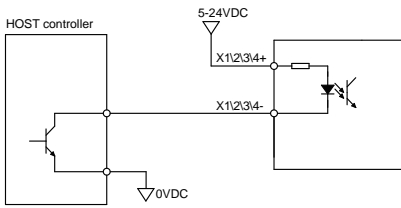
Host Sink Mode
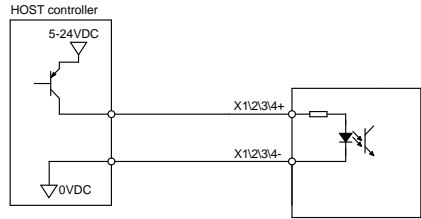
Host Sourcing Mode
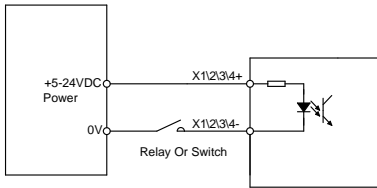
Sensor And Switch Connection
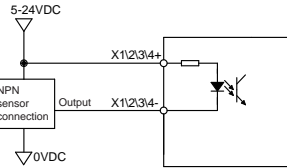
NPN Sensor Connection
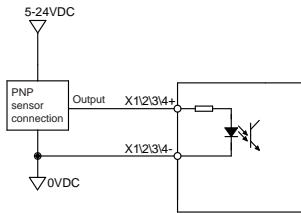
NPN Sensor Connection

3.8.5.4 General Digital Input X5, X6, X7, X8

The M2 has 4 optically isolated general digital inputs X5, X6, X7 and X8. These inputs allow input voltage from 5VDC to 24VDC, with maximum input current of 20mA up to 5KHz. Both single ended and differential signals are allowed.

X5, X6, X7, X8 circuits are as follows:

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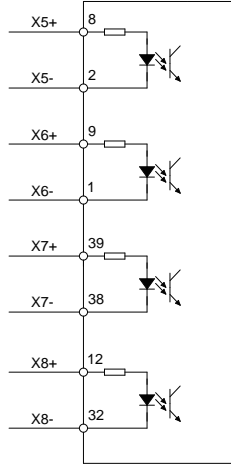
X5, X6, X7, X8 Input Port Connection Diagrams
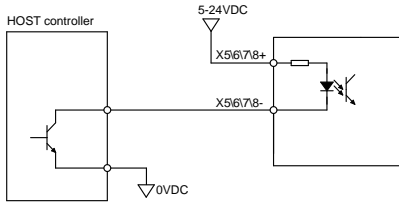
Host Sink Mode
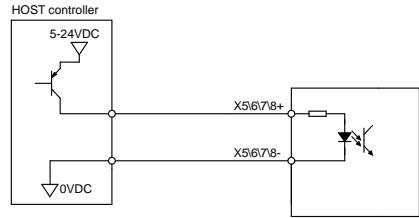
Host Sourcing Mode
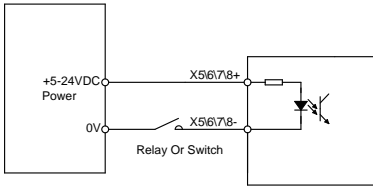
Sensor And Switch Connection
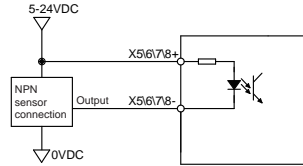
NPN Sensor Connection
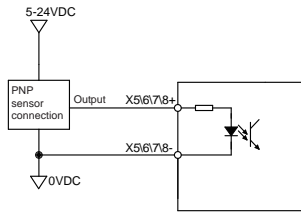
PNP Sensor Connection

3.8.5.5 X9, X10, X11, X12 Inputs with common COM Port

The M2 drives also have 4 single ended optically isolated inputs connected with a single common node named 'COM'. These inputs can be used with sourcing or sinking signals, 12-24V. This allows for 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 12-24V 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. If you are using sinking (NPN) signals, then COM must connect to the power supply +. If you are using sourcing (PNP) input signals, then you will want to connect COM to ground (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.

X9, X10, X11, X12 circuits are as follows:
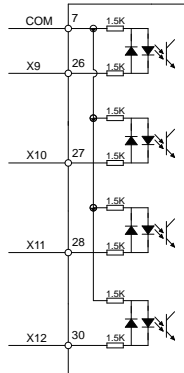
X9, X10, X11, X12 Input Port Connection Diagrams

Host Sink Mode

Host Sourcing Mode

PNP Sensor Connection

Sensor And Switch Connection

NPN Sensor Connection

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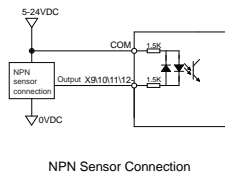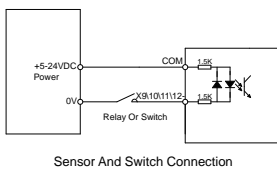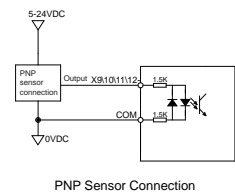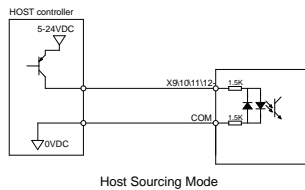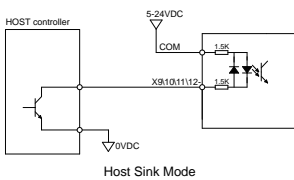
3.8.6 CN2 Output Signal Specification

The M2DC series servo drives feature 6 optically isolated digital outputs. They can be configured via M Servo Suite. Y1, Y2, Y5, and Y6 are differential output signals, they can be used for both sourcing or sinking signals. Y3 and Y4 are common ground outputs that can be used for sinking signals.
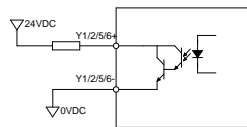
Y1, Y2, Y5, Y6 circuits are as follows:
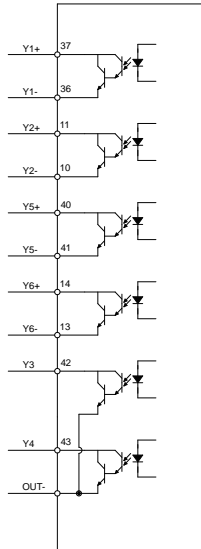
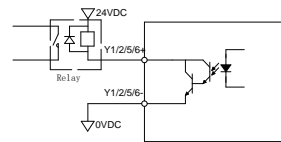Y1, Y2, Y5, Y6 Output Connection Diagrams

NOTE: Y1, Y2, Y3, Y4, Y5 and Y6 maximum outputs are 30VDC 30mA.
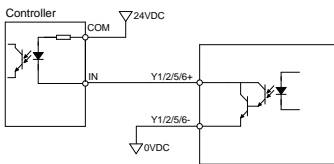
Opt Coupler Circuity   Connect To External Load   Connect To Relay Circuity

Y3, Y4 Connection Examples

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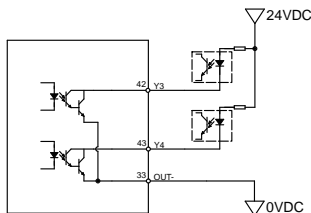
3.9 STO Connector

On the M2DC series servo drives, the STO (Safe Torque Off) function is connected via port CN5. The STO function shuts off the motor current turning off the motor output torque by forcibly turning off the signal of the servo driver power transistor. This is done internally through the STO Input/Output signal circuit.

3.9.1 Safety Precautions

• If the STO function does not trigger, make sure the STO connector is plugged into CN5 on the drive correctly.
• When using the STO function, perform an equipment risk assessment to ensure that the system conforms to the safety requirements.
• Even when the STO function is enabled, the servo motor may move due to external force (e.g. gravitational force on the vertical axis). Make sure a holding brake is used in applications where this is possible.
• When the STO function engages and removes the torque, the motor will be "free running", requiring more distance until the motion stops. Make sure this will not be a safety issue.
• When the STO function operates, it will turn off the current to the motor, but it does not turn off the power to the servo drive. Make sure to disconnect the power to the drive before performing any maintenance on it.
• After the STO function is triggered, the drive will have a fault alarm status(Alarm $\boxed{\text{r20to}}$ code:), and the motor will be disabled.
• After the STO signal return to normal, the drive will automatically clear the STO fault alarm, but the motor will remain disabled . To restore the system to normal operation, re-enable is needed.

3.9.2 STO Input/Output Signals

3.9.2.1 STO Internal Circuit Diagram
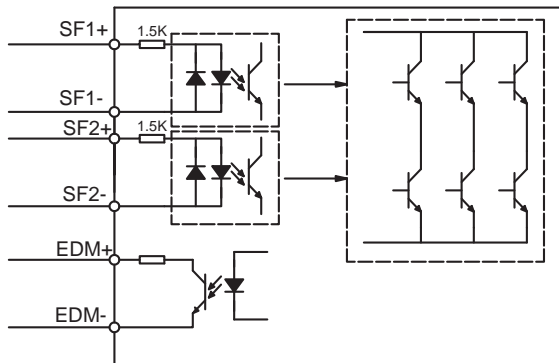
3.9.2.2 CN5 Connector diagram
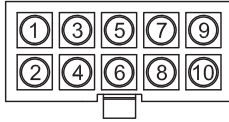
Item	Part number	Vendor
Housing	43025-1000	Molex
Crimp	43030-0005	Molex

3.9.2.3 STO Signal Definition

Signal	Symbol	Pin	Description	Control Mode
Safety Input SF1	SF1+	1	When SF1 has no input signal, e.g. the port is disconnected, SF1 will be considered OFF. The upper half of the internal power transistor will be shut off.	Compatible with all control modes
	SF1-	5		
Safety Input SF2	SF2+	3	When SF2 has no signal input, e.g. the port is disconnected, SF2 will be considered OFF. The upper half of the internal power transistor will be shut off.	
	SF2-	2		
Safety Output	EDM+	6	Output monitor signal used to check the safety function.	
	EDM-	4		
Ground	DGND	7, 8	+5VDC power ground	
+5V power	+5V	9, 10	+5VDC power supply	

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3.9.2.4 STO Connection Diagrams

● Connection to safety switch
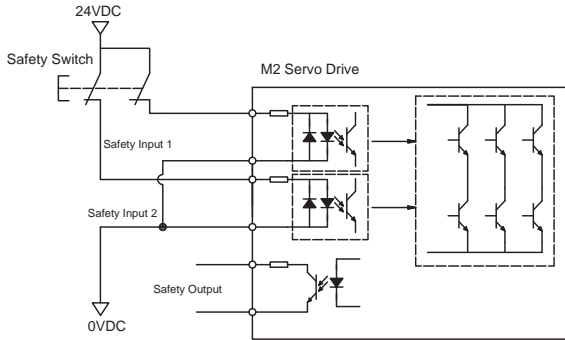
● Safety light curtain connection
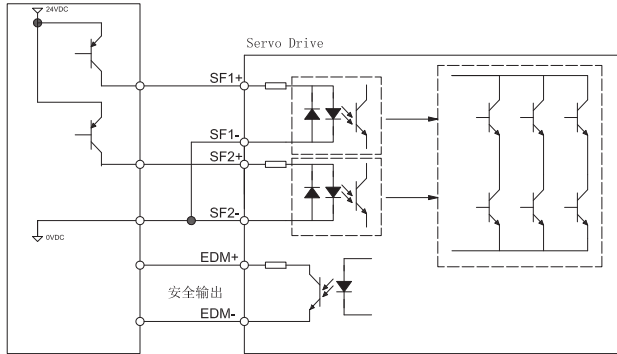
4. Display and Operation

4.1 Control Panel Description

Symbol	Name	Details
	LED Display	The LCD display (5 digits, 7 segments) shows the drive's operating condition, warning codes, parameters, and setting values.
(M)	MODE	Press and hold MODE button to switch the LED display mode a) Monitoring selection mode b) Function selection mode c) Parameter setting mode When editing the parameters, press the MODE button to move the cursor to the left and then change the parameters by using the UP/DOWN buttons.
▲ ▼	UP/DOWN	Press the UP and DOWN buttons to scroll through and change monitor codes, parameter groups and other parameter settings.
(S)	SET	Press to enter a mode Press and hold to save parameters/settings

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4.2 Mode Switch Control

• Pressing the (M) button and the (S) button changes between status monitoring, function control,

parameters setting and other modes.
• If no warnings or faults occur, the drive will not go into warning and fault display mode.
• If any warnings are detected by the drive, the LED display will switch into warning or fault display mode immediately. Pressing Mode/Set button will switch back to the previous display mode. Press UP/ DOWN button will switch other warning or fault display.
• If no button(s) on the control panel is pressed for 20 seconds, the display will switch back to the previous status monitoring display mode.
• In monitoring selection mode, function selection mode and parameter setting mode, to edit the values, press (M) to move the cursor to the left, then change parameters by using the (▲) (▼)

buttons.
• In status monitoring mode, press and hold the (S) button to lock the control panel. To unlock the

panel, press and hold the (S) button again.

Control mode switch flowchart:
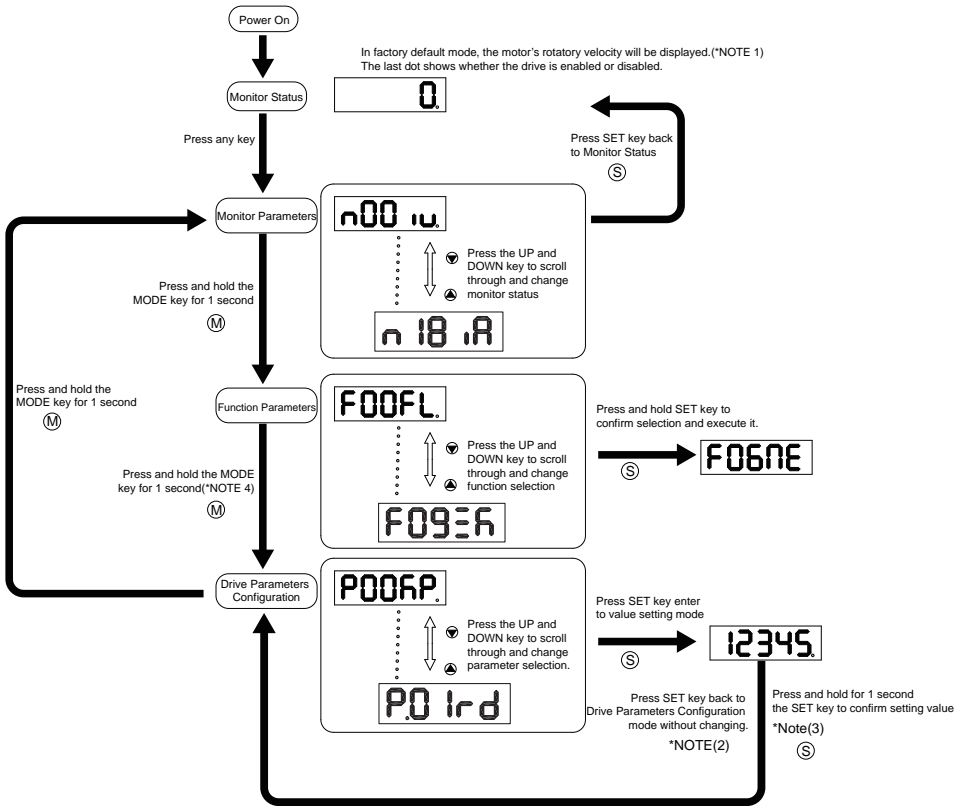
NOTE:

When power is applied, the drive's display will show the customer defined monitoring mode. In factory default mode, it will display the motor's rotary velocity.
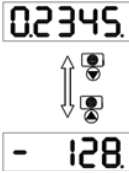
• When in parameter setting mode, pressing the (S) button will exit the parameter setting mode, and return back to parameter selection mode, without saving any changes.

• When in parameter setting mode, pressing and holding the (S) button will confirm and apply the current parameter setting. This will take effect immediately. However, this change will not save to drive's flash memory. To save the parameter, go to function mode **F04ΞA**, and then press and hold the (S) button.

• When the drive is connected to the host computer with M Servo Suite on, the parameter setting mode CANNOT be accessed directly on the drive's control panel.

4.3 LED display description

4.3.1 Decimal Point And Negative Sign Description

LED display	Description
negative sign motor enable sign	Negative sign: when the value to be displayed is a negative number ≥-9999, the highest digit will display as a negative sign. Decimal point: when the value to be displayed is a negative number ≤-10000, a decimal point will be displayed.

4.3.2 Parameter View Setting

LED display	Description
	There are only 5 digits on the LED display, when a value with more than 5 digits needs to be displayed, it will be displayed in 2 segments. When the highest digit of value is flashing, it means only the lower 5 digits are shown. Press to display the upper 5 digits. The graph is displaying '-12802345'

4.3.3 Parameter Save Setting

LED display	Description
ΞAuEd	In parameter setting mode, pressing and holding the (S) button will save the change. 'Saved' will also be displayed on the LED.
buΞY	In parameter setting mode when the motor is rotating and the is pressed and held, the LED display will read "busy" meaning that the current parameter change cannot be saved. Stop the current motor motion and save the parameter again.
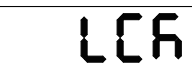
4.3.4 Point To Point Motion Mode

LED display	Description
P--C8	When the LED display reads "P-CW" it means the motor is rotating in a CW direction in the point-to-point mode.
P-CC8	When the LED display reads "P-CCW" it means the motor is rotating in a CCW direction in the point-to-point mode.

4.3.5 Jog Mode

LED display	Description
J--C8	When the LED display reads "J-CW" it means the motor is rotating in a CW direction in JOG mode.
J-CC8	When the LED display reads "J-CCW" it means the motor is rotating in a CCW direction in JOG mode.

4.3.6 Control Panel Lock

LED display	Description
LC6	This means the key panel is locked. Press and hold (S) for 1 second while in status monitoring mode to lock.
unLC6	When the control panel is locked, press and hold (S) for 1 second to unlock it.

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4.4 Status Monitoring Selection Mode

To change the status monitoring mode, press (M) to enter monitoring selection mode, and then use (▲)(▼) to make selections, and press (S) to confirm, as below:
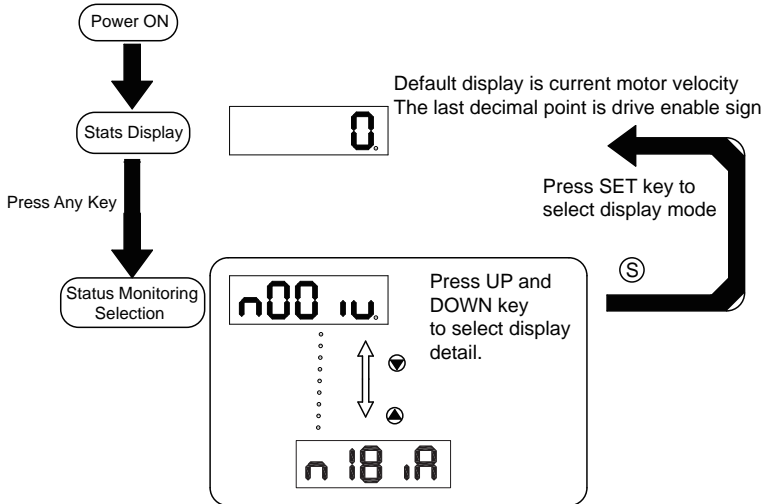
N mode selection and setting	LED display	Description	Unit
n-00	n00 ıυ.	Motor Rotation Speed	RPM
n-01	n01 ı५.	Position Error	Pulse
n-02	n02L≡.	Pulse Counter	counts
n-03	n03 ıE.	Encode Counter	counts
n-04	n04 ıP.	Command Position Counter	counts
n-05	n05 ıᶜ.	Drive Temperature	x 0.1°C

n-06	`n06 iU`	DC Bus Voltage	x0.1V
n-07	`n07dA`	Node ID (Drive Address)	
n-08	`n08AH`	Fault History 1	
n-09	`n09AH`	Fault History 2	
n-10	`n 10AH`	Fault History 3	
n-11	`n 11AH`	Fault History 4	
n-12	`n 12AH`	Fault History 5	
n-13	`n 13AH`	Fault History 6	
n-14	`n 14AH`	Fault History 7	
n-15	`n 15AH`	Fault History 8	
n-16	`n 16 iA`	Differential Analog Input	0.001VDC
n-17	`n 17 iA`	Analog Input 1	0.001VDC
n-18	`n 18 iA`	Analog Input 2	0.001VDC

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4.5 Function Control Mode

In function control mode (display F+ parameter number), you can select functions for preoperational

mode, restart the drive, enable or disable the drive, etc. In status monitoring mode, press and hold

(M) for 1 second to enter function control mode. Press (▲) (▼) to select function, and then

press and hold (S) to confirm or execute the function. (NOTE: F-00(FL) and F-01(CJ) excepted)
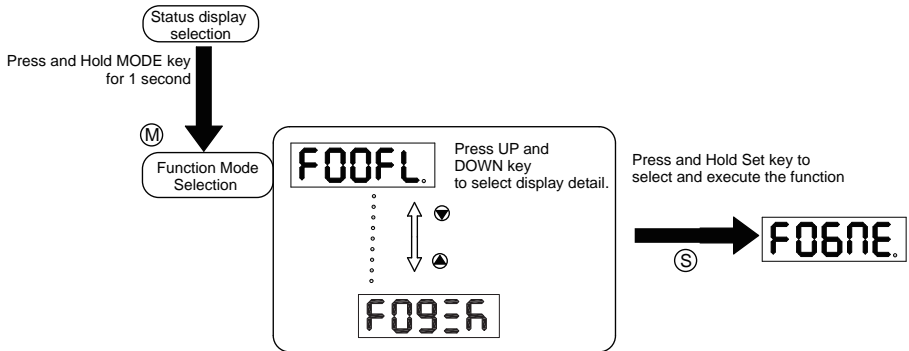
4.5.1 Function Mode Description

Function mode details are as follows:

Function mode number	LED display	Description
F-00	**F00FL.**	point to point position mode: rotating speed is1rps; travel distance is 1rev
F-01	**F01CJ**	JOG mode:JOG speed 1rps
F-02	**F02rE.**	Restart the drive
F-03	**F03Ar**	(F-03AR) Clear drive's current alarm
F-04	**F04SA.**	(F-04SA) Save parameter changes for P-00 to P-98
F-05	**F05Md.**	(F-05MD) Drive disable
F-06	**F06ME.**	(F-06ME) Drive enable
F-07	**F07MC.**	(F-07MC) Select motor specification
F-08	**F08Az**	(F-08AZ) Analog auto tunning
F-09	**F09SK**	(F-09SK)Motion Stop/Q Stop

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4.5.2 Operation Flow Chart

status monitoring selection

press and hold MODE key for 1 second

Ⓜ function selection mode

F-00 point to point mode `F00FL.`

press and hold SET key Ⓢ

`P-P.` `P--CW.` `P-CCW.`

press ▲, motor rotate 1 rev in CW direction
press ▼, motor rotate 1 rev in CCW direction
press Ⓢ to stop the motor
press Ⓜ to return back

Ⓜ press M key

NOTE: In P-P mode, rotary velocity is 1rps, and 1 rev per time.

Press UP and DOWN key to select display detail.

F-01 JOG mode `F0 1CJ`

press and hold SET key Ⓢ

`JoG.` `J--CW.` `J-CCW.`

press ▲, motor rotate in CW direction
Press ▼, motor rotate in CCW direction
press Ⓢ stop motor
press Ⓜ to return back

Ⓜ press M key

NOTE: In JOG mode, rotary velocity is 1rps

Press UP and DOWN key to select display detail.

F-02 Restart the drive `F02rE.`

press and hold SET key Ⓢ

Drive restart, and back to status monitoring mode `0`

Press UP and DOWN key to select display detail.

F-03 Alarm clear `F03Ar`

press and hold SET key Ⓢ

clear current drive warning `F03Ar`

Press UP and DOWN key to select display detail.

F-04 save parameter `F04ΞR`

press and hold SET key Ⓢ

To save parameter changes for P-00 to P-98 permanently.
`ΞRuEd.` SAVE means success operation.

display after 1 second

Press UP and DOWN key to select display detail.

F-05 motor disable `F05Nd`

press and hold SET key Ⓢ

To disable the drive `F05Nd`

Press UP and DOWN key to select display detail.

F-06 motor enable `F06NE`

press and hold SET key Ⓢ

If no alarm has occurred, enable the drive immediately `F06NE.`

Press UP and DOWN key to select display detail.

F-07 motor configuration `F07NC`

press SET key Ⓢ

select current motor model
`200-9`
`100-9`
:
`50-9`

press ▲▼ to select motor type

press and hold SET key to confirm Ⓢ

Press UP and DOWN key to select display detail.

F-08 Analog Input Auto-offset `F08AⰜ`

press SET key Ⓢ

Analog Input Auto-offset `F08AⰜ`

Press UP and DOWN key to select display detail.

F-09 Motion Stop/Q stop `F09Ξ�
`

press SET key Ⓢ

Stop current movement
Stop current Q program
`F09Ξ
`

4.6 Parameter Setting Mode

4.6.1 Parameter Setting Description

The parameter setting mode (P+parameter number) allows you to select, display and edit the required

parameter. In function control mode, press and hold (M) for 1 second to enter parameter setting

mode. Use (▲) (▼) to select required parameter, and press (S) to view or edit the parameter.

Press (S) again to quit and no change will be saved. Press and hold (S) for 1 second to save

the parameter change. However this change will NOT be saved at the next power on.
If you want to save parameter PERMANENTLY, go into function control mode (F+parameter number),
and use F-04SA function.

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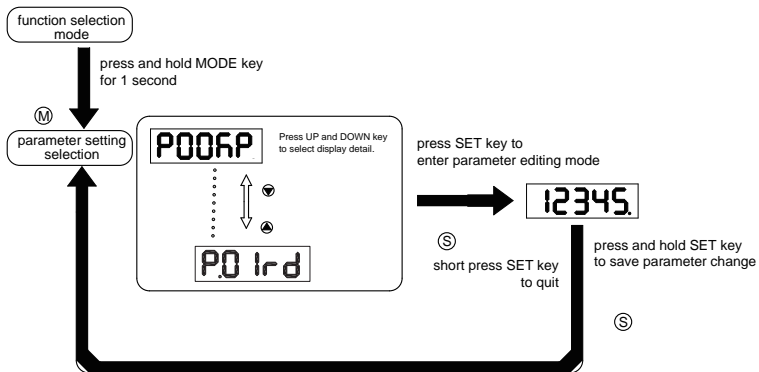
4.6.2 Parameter Editing Examples

P006P. First digit flash

Press ▲ | Press ▼

PO 1R0.

Press up or down to increase or decrease value

M — Press mode to shift flashing digit

P006P. Second digit flashing

Press ▲ | Press ▼

P 10RE.

Press SET key to enter parameter editing mode (S)

10000. First digit

Press ▲ | Press ▼

1000 1.

press UP or DOWN to increase or decrease value

M — Press mode to shift flashing digit

1000 1. Second digit flashing

Press ▲ | Press ▼

100 1 1.

press UP or DOWN to increase or decrease value

Press and hold set key to save parameter (S)

5Et.

Set display for 1 second, means save successfully

Setafter 1 second return to parameter selection page

The parameter change is only saved for current operation, it will back to original after next power up

P 10RE.

Press and hold mode key (M)

Function mode selection

F00FL.

▼ Press up and down key to select display detail. ▲

F04=A. F-04 to save parameter

Press and hold set key (S)

Save parameter

5AuEd. Saved means operation successful

Saved display for 1 second and return back to previous page

F04=A.

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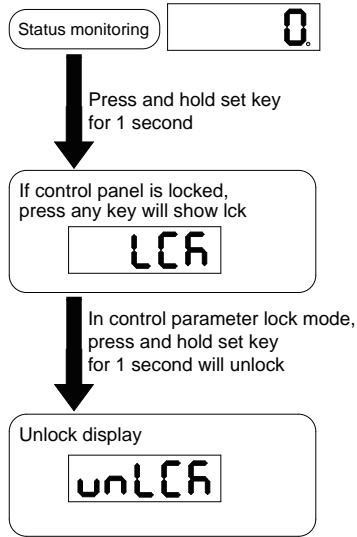## 4.7 Control Panel Lock

To prevent unauthorized use of the key panel, a key panel lock is featured on all M2DC servo drives. When the panel is locked, no function can be changed directly on drive's control panel.

Status monitoring

0.

Press and hold set key for 1 second

If control panel is locked, press any key will show lck

LCK

In control parameter lock mode, press and hold set key for 1 second will unlock
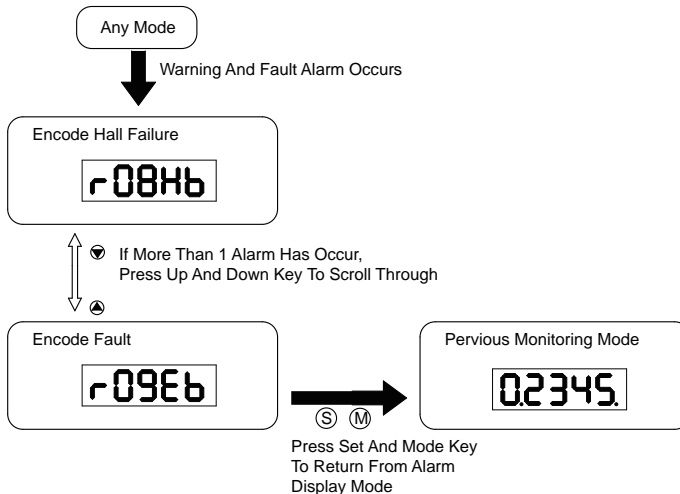
Unlock display

unLCK

4.8 Warning And Fault Display

When power is applied, if any warnings are detected by the drive, the LED display on the drive will switch into warning or fault display mode immediately.

If more than one warning is detected, pressing the ⬆ ⬇ buttons will scroll through the warnings.

Press the Ⓜ or Ⓢ button to clear the warning display and return to the previous display mode.

Any Mode

Warning And Fault Alarm Occurs

Encode Hall Failure

r08Hb

⬇ If More Than 1 Alarm Has Occur, Press Up And Down Key To Scroll Through
⬆

Encode Fault

r09Eb

Pervious Monitoring Mode

0.2345.

Ⓢ Ⓜ
Press Set And Mode Key To Return From Alarm Display Mode

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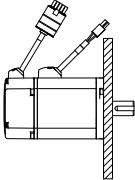| LED display	Description	LED display	Description
r01 Iot	Drive over temperature	r 14cL	CW limit is activated
r02ur	Internal voltage fault	r 15 JL	CCW limit is activated
r03uH	Over voltage	r 16CL	Current limit
r04HC	Over current	r 17CE	Communication error
r05LC		r 18EF	Parameter save failed
r06rC		r20to	STO is activated
r08Hb	Bad hall sensor	r21 rF	Regeneration failed
r09Eb	Encoder error	r22uU	Low voltage
r 10PL	Position error	r239E	Q program is empty
r 11Lu	Low voltage	r24dd	Motion command received while motor in disabled
r 12ou	Velocity limited		
r 13Lt	CW limit or CCW limit activated		

5. Preoperational mode

When using preoperational mode, disconnect the servo motor from any mechanical system to prevent damages and accidents. Preoperational mode should be used only under a no load condition.

5.1 Inspection Before Trial Run

To avoid any accidents and damages to the servo drive and mechanical systems, the following safety checks are recommend before the drive is turned on.
- •   Connection inspections
  - Ensure secure wiring for power connector P1, motor connector P2, encoder connector CN3, and communication connector CN1. Check the wiring connections, and that wires are correctly insulated (to avoid short circuits) for all connectors.
  - Make sure the ground wire from power connector P1, and motor connector P2 are securely connected to the shield ground.
- •   Power supply inspection - Ensure the power supply to V+ and V- meet the drive's power supply specifications.
- •   Check that the servo drive and motor are securely installed.
- •   Make sure no load is connected to the servo motor.

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5.2 Trial Run Procedure

Step	Details	Description
1	Install the motor securely. 	- The motor can be installed on the machine. - Ensure no load is installed on the servo motor.
2	Make sure the wiring between the drive and motor is correct.	- The terminals on connector P2 must be connected in the order of U - Red,　　 V - Yellow, U - Blue, FG - Yellow/Green. If the terminals are not connected to the specified wire, the drive will not be able to control the motor. - Ensure the encoder cable is connected to CN2 correctly.
3	Make sure the main power circuit is wired correctly.	Refer to Section 3.1 Connecting to Peripheral Devices to confirm the correct main power circuit wiring.
4	Supply power	Do not apply more than 75V power supply to the servo system.
5	If there are no alarms the LED Display will read: If an alarm occurs, it will display: 	- When the power is on, the normal display should be shown without any alarm codes and the drive is disabled. - If the display shows alarm codes such as r-08 and r-09 the encoder feedback connection is incorrect. Check the encoder wiring to the servo motor to see if it is loose or incorrect. - See Section 6 for a list of alarm codes.
6	Set up a motor brake control circuit if using an electromagnetic brake motor.	Please refer to Section 3.4 for more details about the Electromagnetic Brake.
7	Motor Configuration	Configure the drive for the correct motor through M Servo Suite or the operation panel. See Section 5.3 Motor Configuration.
8	JOG Trial Run without load	The system is ready to run JOG trial if all the above steps are completed.

5.3 Motor Configuration

Before using JOG mode, the drive needs to be properly configured for the connected motor. This can be done through the drive control panel or the M Servo Suite software. For more details about motor specifications, refer to Section 2.3.

5.3.1 Using the Drive Control Panel for configuration

Motor information and LED display list:

LED display	Motor Model Number	LED display	Motor Model Number
60-9	SM0401HE4-KCD-*NV	60L9	SM0401EE4-KCD-*NV
100-9	SM0402FE4-KCD-*NV	200L9	SM0601EE4-KCD-*NV
200-9	SM0601GE4-KCF-*NV		
400-9	SM0602FE4-KCF-*NV		
300-9	SM0801GE4-KCF-*NV		
550-9	SM0802EE4-KCF-*NV		

To set up a drive for model: SM0402FE4-KCD-NNV motor follow these steps:

Step	LED display	Description
1	F00FL.	Press (M) to enter Function Parameters mode when in Monitor Status mode
2	F07MC	Press the (▲) and (▼) key to select F07 (MC)
3	200-9	Press (S) to enter the value setting mode
4	100-9	Press (▲) or (▼) key to change the value
5	＝AuEd.	Press and hold (S) key for 1 second to confirm motor configuration
6	F07MC	
		Parameter will take effect only after the servo drive is restarted.

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5.3.2 Using M Servo Suite Software for configuration

Run the M Servo Suite software on a PC, and (1) select the correct communication port.
Use the drive configuration tab (2) to set up the motor.
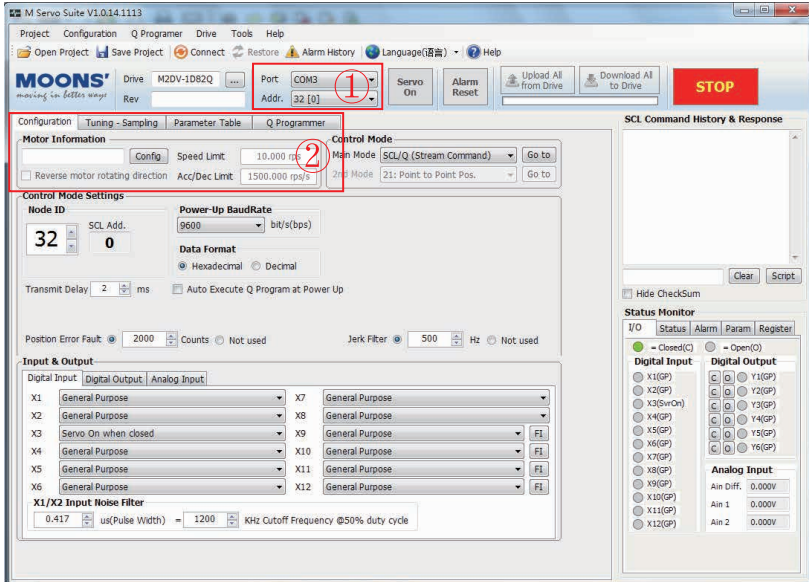
Click the Config button to bring up the Motor Select screen:
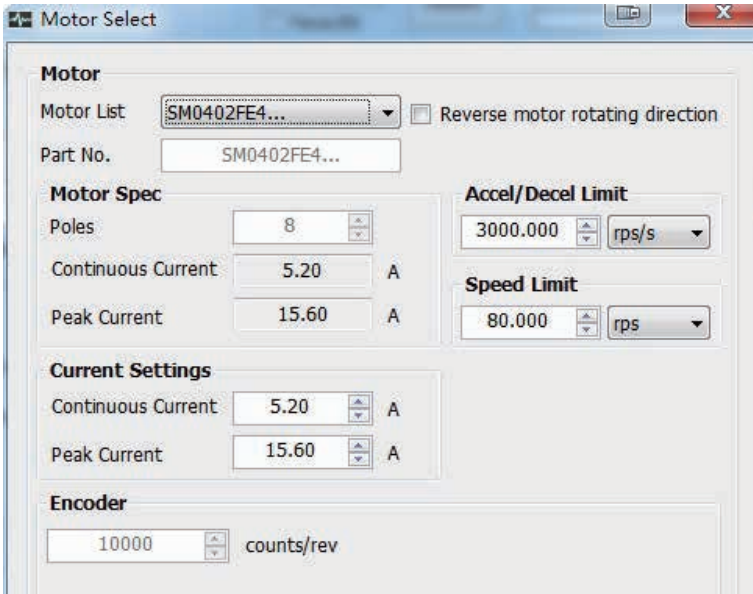
After setting the required parameters, click OK and then Download All to Drive to save the settings to the drive.

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5.4 Operations of JOG Mode

| Step	LED display	Description
1	P006P	Press (M) to switch from Monitor Status mode to the Drive Parameters Configuration mode
2	P6 1E,	Scroll with the (▼) (▼) keys to select parameter P62 (SI)
3	2	Press (S) key to enter the value setting mode
4	3	Scroll with the (▲) (▼) keys to change values
5	SEt	Press and hold the (S) key for 1 second to confirm the set value
6	F00FL	Press the (M) key to enter Function Operation mode
7	F06ME	Scroll with the (▲) (▼) keys to select Function F06 (MC) to enable the motor
8	F06ME.	Press and hold SET key for 1 second, to enable the drive. The last dot will appear to show the drive is enabled.
9	F0 1CJ	Scroll with the (▲) (▼) keys to find function F01 (CJ) to run JOG mode.
10	JoG.	Press the (S) key to enter JOG mode
11	J--CW.	Press the (▲) key and the motor will rotate in a CW direction at 1rps.
12	J-CCW.	Press the (▼) key and the motor will rotate in a CCW direction at 1rps.
13	JoG.	Press the (S) key to stop the motor
14	F0 1CJ	Press the (M) key to get back to the Function Operation mode.

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5.5 Configuration by Personal Computer

To ensure the M2DC servo drive and motor meet operational requirements, it is recommended that the M Servo Suite software is used for the following configuration setups:
- Servo motor model selection and configuration
- Operational mode selection
- Defining the drive's input/output mode
- Applying the auto tuning function on PID parameters for optimized motor performance.

For more information on the M Servo Suite's capabilities, please refer to the software manual.

Connecting to a PC:
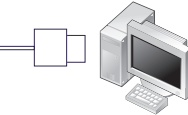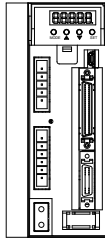
Please download and install M Servo Suite
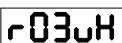from our website:
http://www.moons.com.cn

M Servo Suite Interface

Configuration Steps	Details
Step 1	Motor Configuration
Step 2	Select Control Mode
Step 3	Further configuration
Step 4	I/O configuration
Step 5	Tuning

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6.Drive alarm causes and solutions

LED display	Description	Alarm type	Processing method
`r0 lot`	Drive over temperature	Temperature of the heat sink or power device has been risen over the specified temperature. 1. Ambient temperature has risen over the specified temperature. 2. Over-load	1. Improve the ambient temperature and cooling condition. 2. Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load
`r02ur`	Internal voltage fault	Drive internal voltage failure.	1. Please check supply power voltage 2. Please replace the drive with a new one, and contact MOONS
`r03uH`	Over voltage	Drive DC bus voltage is too high M2DC series : Higher than 90VDC 1. Power supply voltage has exceeded the permissible input voltage. 2. Disconnection of the regeneration discharge resistor 3. External regeneration discharge resistor is not appropriate and could not absorb the regeneration energy. 4. Failure	1. Enter correct voltage. 2. Measure the resistance of the internal regeneration resistor. 3. please measure the external resistor, Replace the external resistor if the value is ∞. 4. Please contact MOONS or replace the driver with a new one.

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`r04HC` `r05LC` `r06rC`	Over current	1. Failure of servo driver (failure of the circuit, IGBT or other components) 2. Short of the motor wire (U, V and W) 3. Burnout of the motor 4. Poor contact of the motor wire. 5. Input pulse frequency is too high. 6. Motor is over load, command output torque is larger than maximum torque, for a long operating time. 7. Poor gain adjustment cause motor vibration, and abnormal nosie. 8. Machine has collided or the load has gotten heavy. Machine has been distorted. 9. Welding of contact of dynamic braking relay due to frequent servo ON/OFF operations.	1. Turn to Servo-ON, while disconnecting the motor. If error occurs immediately, replacement with a new driver is needed. 2. Check that the motor wire (U, V and W) is not shorted, and check the branched out wire out of the connector. Make a correct wiring connection. 3. Measure the insulation resistance between motor wires, U, V and W and earth wire. In case of poor insulation, replace the motor. 4. Check the balance of resister between each motor line, and if unbalance is found, replace the motor. 5. Check the loose connectors. If they are, or pulled out, fix them securely. 6. Adjust gain value settings. 7. Measuring brake voltage 8. Check drive and motor encoder and power wires. 9. please contact MOONS.
`r08Hb`	Bad hall sensor	Hall sensor fault	1. please check encoder connection 2. please check your drive motor configurations.
`r09Eb`	Encoder error	Encoder signal fault	please check encoder connection.
`r 10PL`	Position error	Position error value exceeds the position error range set by parameter P-44 (PF).	1. Please check parameter P-44 (PF). 2. Please check drive gain value settings. 3. Please check the load factor of the regeneration resistor, increase the capacity of the driver and the motor, and loosen the deceleration time
`r 11Lu`	Low voltage	1. Power supply voltage is low than 12VDC.Instantaneous power failure has occurred 2. Lack of power capacity...Power supply voltage has fallen down due to inrush current at the main power-on. 3. Failure of servo driver (failure of the circuit)	1. Increase the power capacity. Change the power supply. 2. please check power connections . Please refer to 3.1.5 drive power connection 3. please contact MOONS

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|			
`r 12ou`	Position error	Motor rotary velocity exceeds parameter P-20 (VM) setting value.	Please check motor velocity command if it is within the P-20 (VM) range. 1. Avoid high velocity command 2. Check the command pulse input frequency and division/multiplication ratio. 3. Make a gain adjustment when an overshoot has occurred due to a poor gain adjustment. 4. Make a wiring connection of the encoder as per the wiring diagram.
`r 13Lt`	CW limit or CCW limit activated	CW and CCW limit is ON	1. External limit switch is triggered. 2. Check x5 and x6 limit settings,
`r 14cL`	CW limit is activated	CCW limit triggered	1. External limit switch is triggered.
`r 15JL`	CCW limit is activated	CW limit triggered	2. Check x5 and x6 limit settings.
`r 16CL`	Current limit	Driver's output current exceeds setting value P-19 (CP) 1. Load was heavy and actual torque has exceeded the rated torque and kept running for a long time. 2. Oscillation and hunching action due to poor gain adjustment. Motor vibration, abnormal noise. 3. Machine has collided or the load has gotten heavy. Machine has been distorted.	1. Make a gain re-adjustment. 2. Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load. 3. Check motor wirings for U/V/W as red/yellow/bule.
`r 17CE`	Communication error	Drive and host communication error.	Please check wiring connection, and drive's communication address and baud rate setting.
`r 18EF`	Parameter save failed	Saving parameter failure.	1. Please try to save again. 2. if problems is not solved, please contact MOONS
`r20to`	STO is activated	Safety torque off function is activated. Either or both safety input 1 or 2 is ON.	Please confirm safety input 1 and 2 wiring configuration. Please check Safety sensor setting.

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		Regenerative energy has exceeded the capacity of regenerative resistor. 1. Due to the regenerative energy during deceleration caused by a large load inertia, converter voltage has risen, and the voltage is risen further due to the lack of capacity of absorbing this energy of the regeneration discharge resistor. 2. Regenerative energy has not been absorbed in the specified time due to a high motor rotational speed.	1. Internal resistor value is smaller than required, cannot absorb the regeneration energy. 2. Please check external regeneration resistor connections. 3. Reduce rotary velocity and decrease acceleration and deceleration value.
`r2 IrF`	Regeneration failed		
`r22ub`	Voltage warning	Drive voltage lower than 12VDC 1) Power supply voltage is low. Instantaneous power failure has occurred 2) Lack of power capacity...Power supply voltage has fallen down due to inrush current at the main power-on. 3) Failure of servo driver (failure of the circuit)	1) Increase the power capacity. Change the power supply. 2) Please check power connections, please refer to 3.1.5 P1 drive power connection. 3) please contact moons.
`r239E`	Q program is empty	Drive in Q mode, but Q program is empty.	1. Please check Q program. 2. Please check operation mode correction. 3. Please check Q program coding, make sure no faults to stop the program running.
`r24dd`	Move when the drive is disabled.	Motion command is received while motor is disabled.	Please enable the motor, and send the command again.

7. Position Mode

## 7.1 Digital Pulse Position Mode Connection Diagram

Position mode is widely used in applications where precise positioning is required. In M2DC servo drives there are 3 types of position mode: digital pulse position mode, analog position mode and position table mode.

### Digital Pulse Position Mode Connection Diagram

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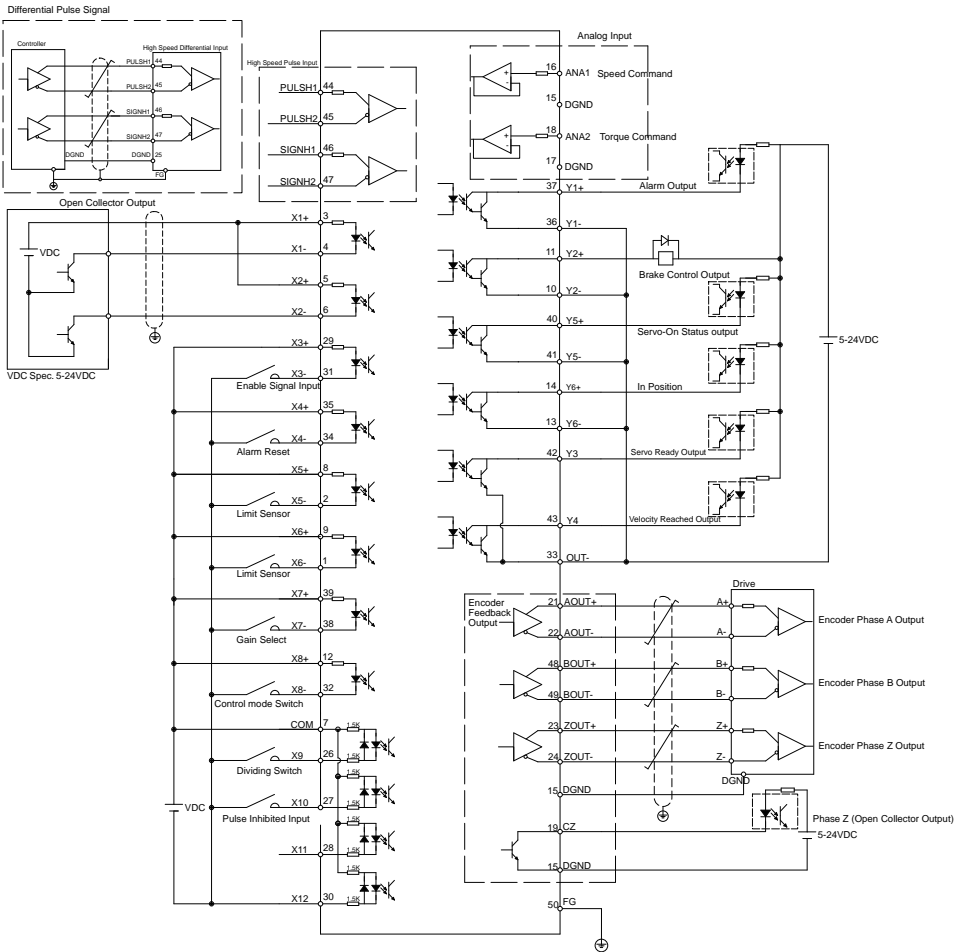
7.2 Velocity Mode Connection Diagram

The velocity control mode is used for applications that require precise velocity control. For M2DC Servo drives, they are 4 types of velocity control mode: fixed-speed mode, analog command mode, SCL control mode and multi-velocity control mode. Fixed-speed mode will set the motor running at a constant speed. For analog command mode, velocity is controlled by external voltage input. SCL is a unique software command tool of MOONS'. For multi-velocity control mode, the drive uses external inputs to set up different velocity values. There are up to 8 different velocity values that can be set.

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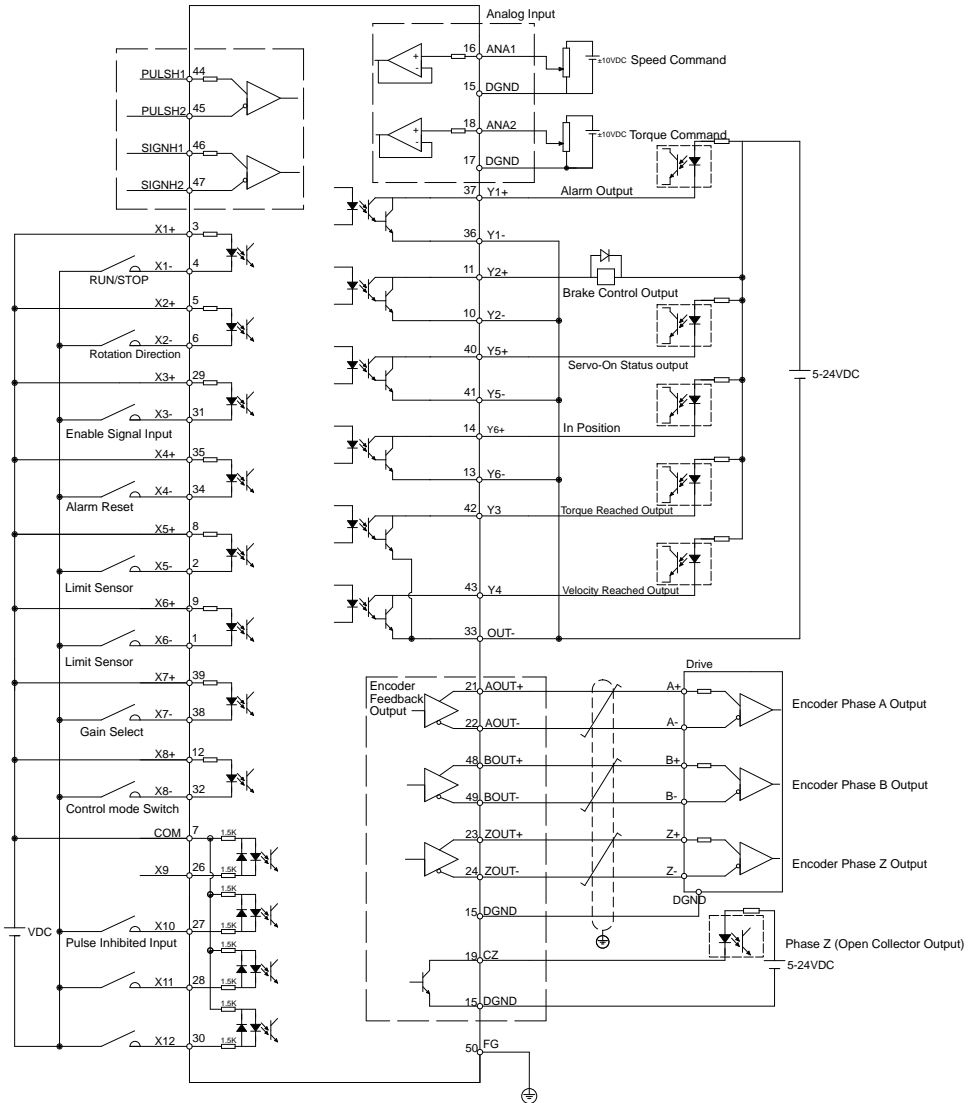
7.3 Analog Torque Mode Connection Diagram

Orque mode is normally used for applications that require precise torque control. For M2DC servo drives, there are 2 types of torque control mode: analog input torque mode and SCL command mode. For analog command mode, torque is controlled by external voltage input. SCL is a unique software tool from MOONS', that uses serial communication commands to control the motor.
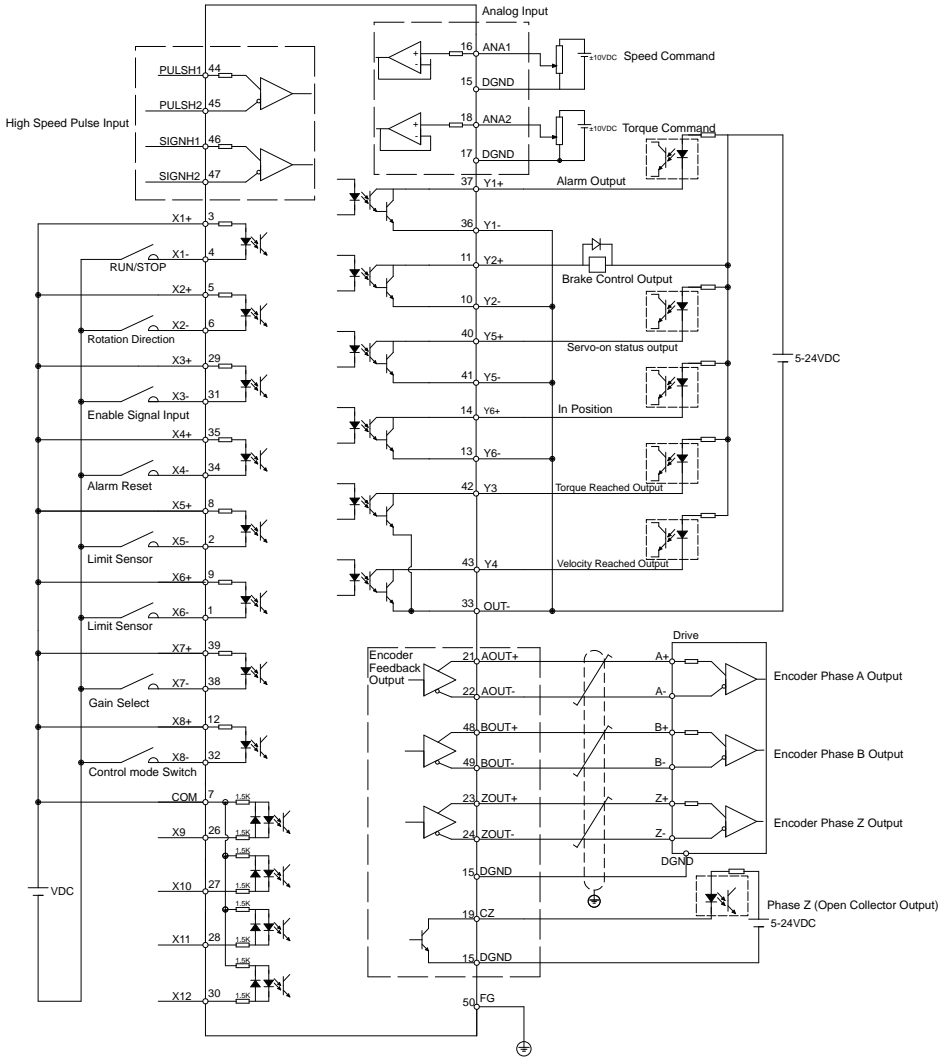
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M2DC Quick Setup Guide Manual
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