Motionnet Stepper Driver

SVR-M111 User Manual
SVR-M112 User Manual

To properly use the product, read this manual thoroughly is necessary.

Part No.: 81-00SVR12-010

Revision History

Date	Revision	Description
2019.03.01	1.0	Document created.

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Electrical safely

■ To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

■ When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. Disconnect all power cables from the existing system before you add a device.

■ Before connecting or removing signal cables from motherboard, ensure that all power cables are unplugged.

■ Seek professional assistance before using an adapter or extension card. These devices could interrupt the grounding circuit.

■ Make sure that your power supply is set to the voltage available in your area.

■ If the power supply is broken, contact a qualified service technician or your retailer.

Operational safely

■ Please carefully read all the manuals that came with the package, before installing the new device.

■ Before use ensure all cables are correctly connected and the power cables are not damaged. If you detect and damage, contact the dealer immediately.

■ To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.

■ Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.

■ If you encounter technical problems with the product, contact a qualified service technician or the dealer.

Contents

1. Introduction

SVR-M112 is a 2-phase high speed Motionnet interfaced closed-loop stepping motor driver. Encoder support and high precision position drive simplifies the control of motion.

1.1. Precautions

1.1.1. Safety precautions

When you operate a stepper motor, you must take the utmost care to keep people from entering the zone in which components are being moved by the motor. In addition, provide an emergency stop mechanism to stop the motor operation instantly if a person is in danger.

1.1.2. Handling precautions

● Inputting power
Do not connect or disconnect connectors and signal lines while this board or peripheral circuits are supplied with power.

● Static electricity
This board uses a CMOS device. Therefore this board must be stored in a package in which it was shipped until you actually use it, in order to prevent damage from static electricity.

● Switch settings
This board is equipped with switches to set details for serial communications and input/outputs. Be sure to shut off the power supply to the board before changing these switches.

● Connections to electrically noisy devices
Interference from excessively noisy devices or from power surges on the power and I/O circuits may cause the board to malfunction. To connect to a device, which may generate electrical noise, we recommend taking countermeasures, such as attaching a protective circuit to the input/output circuits. However, it is best not to share the same power supply with noise generating sources.

1.2. Naming Rule

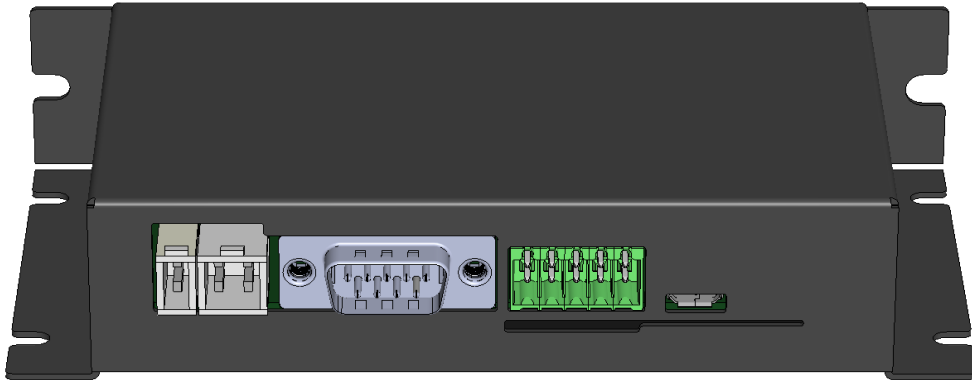| S	V	R	-	M	1	1	1
Close-Loop Driver				Motionnet	Motionnet Series	1-Axis	2-phase 2.8A
S	V	R	-	M	1	1	2
Close-Loop Driver				Motionnet	Motionnet Series	1-Axis	2-phase 4.2A

1.3. Dimension
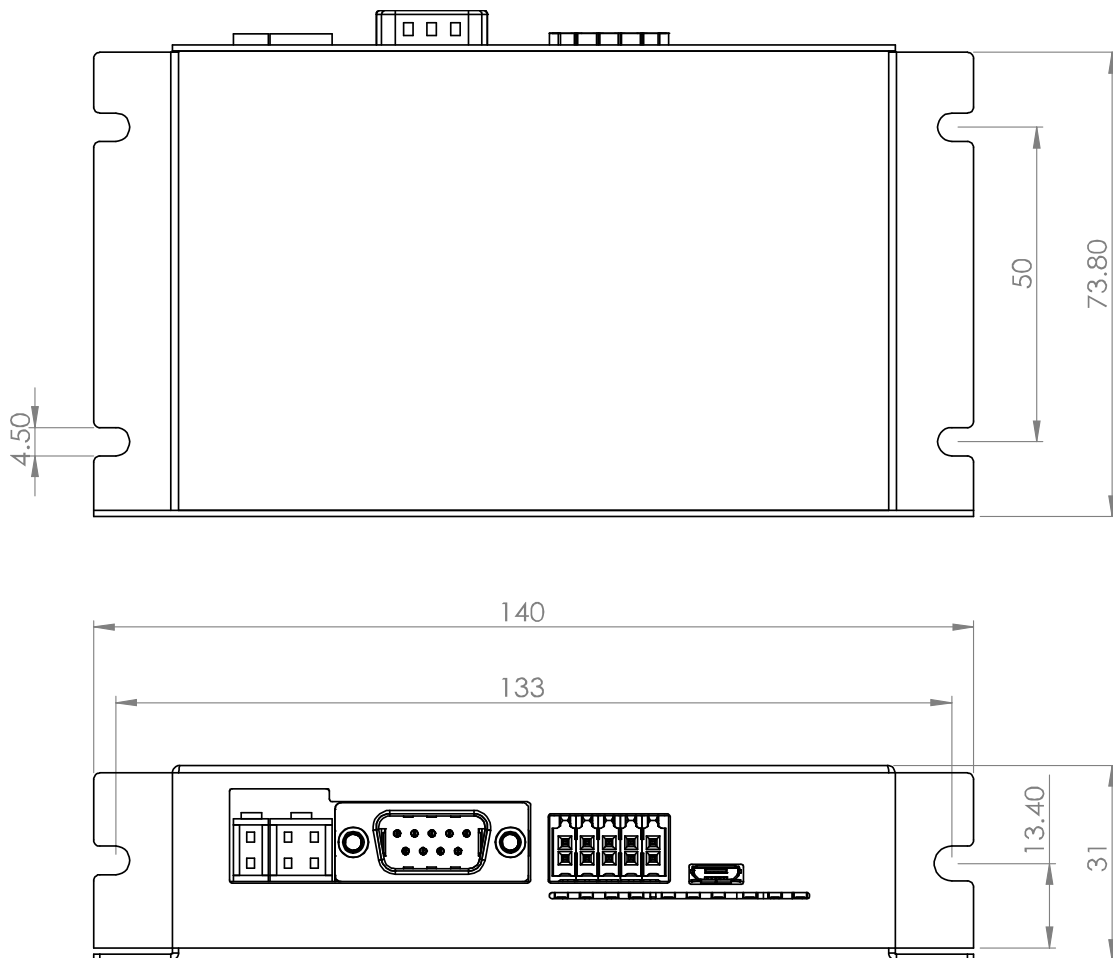
2. Hardware Specifications

2.1. Features

2.1.1. Motionnet Communications

Motionnet is a high-speed serial communication system. This serial communication system is a complete system affording remote operation of emulating a CPU and handling CPU message communications by serial communication at transfer speeds of 20 Mbps as well as I/O control.

SVR-M112 is equipped with G9103B, which is one of the motion control LSIs in Motionnet. G9103B can perform all of the pulse-train input controls such as constant speed operation, linear acceleration/deceleration, S-curve acceleration/deceleration, as well as a preset positioning operation, and an origin return operation, which are required by motion controls.

Two-axis circular interpolation or linear interpolation of maximum 32 axes among each motor can be achieved.
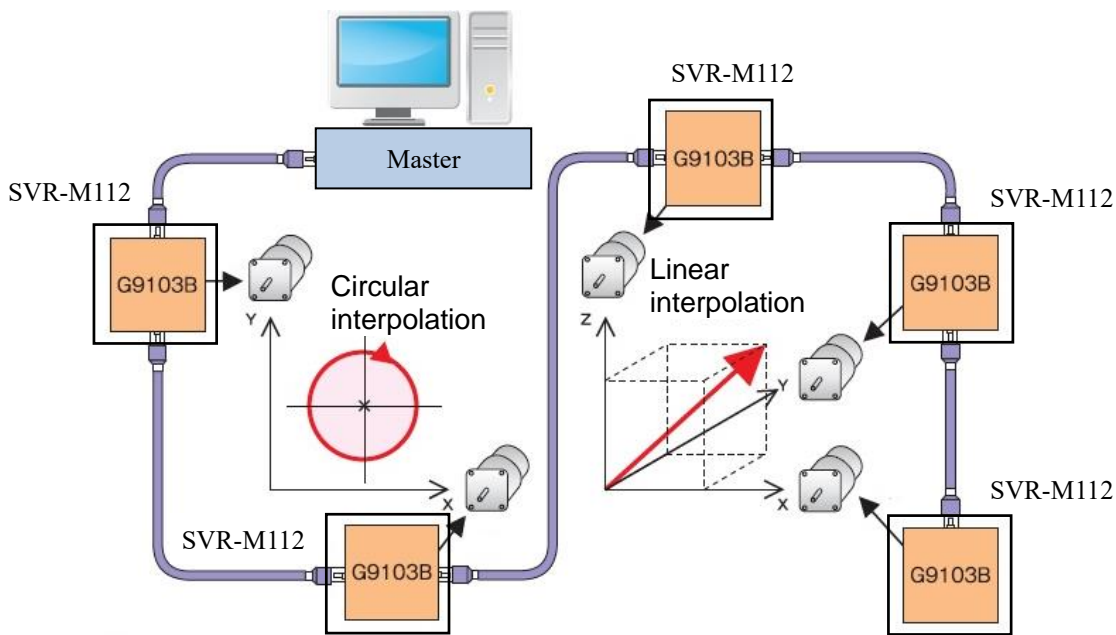
- Data transfer speed
  Maximum is 20 Mbps. Default speed is 10Mbps.

- Number of devices that can be connected
  Maximum 32 devices / ring

- Connection method
  Multi-drop connections using LAN cables

- The maximum total extension distance
  - Max. 100 m (Transfer speed; 20 Mbps with 32 local boards connected)
  - Max. 50 m (Transfer speed; 20 Mbps with 64 local boards connected)
  - Max. 100 m (Transfer speed; 10 Mbps with connecting 64 local boards connected)
  - Minimum cable length: 60 cm long.

2.1.2. Motion control

- Command pulse output
  Support 1P signal - Pulse / Dir mode.

- Acceleration/deceleration control
  Both linear and S-curve acceleration/deceleration is available. The S-curve acceleration/deceleration also allows use of linear acceleration/deceleration parts.

- Speed override
  The speed can be changed during any operation in all the modes.

- Overriding the target position
  The target position (feed amount) can be changed during positioning using the positioning mode function. When a feed operation has already passed the new target position, the motor will decelerate and stop (stop immediately when performing a constant speed operation), and start to feed in the opposite direction.

- Backlash correction
  The driver has a backlash correction function.
  The backlash correction function corrects feed amount each time the feed direction changes.

- 13 homing modes of zero return sequences

  Refer to "Motionnet Programming Manual" to get more detail information about motion control

2.2. Specifications

| Item	Specifications
Communication controller	Motionnet slave motion controller ASIC
Serial interface	RS-485 with transformer isolation
Cable type	CAT5 UTP/STP Ethernet cable
Transmission speed	2.5Mbps, 5Mbps, 10Mbps and 20Mbps
Surge protection	10KV
Multi Axes Drive	Max. 32 sets/Line
I/O input signal	PEL, MEL, ORG, and EMG
I/O output signal	CMP
Position control	Incremental mode / Absolute mode Data range : 28 bits
Homing mode	ORG, Z-phase, Limit Totally 13 types
Incremental encoder input	±EA, ±EB
Encoder index Signal input	±EZ
Software	Motion library (DLL) for Win XP/7/10
Input voltage	24 VDC±10% for main power. I/O isolated interface requires 24 VDC±10%.
Driver model	2-phase
Driving Current Setting	Current: 2.8A (M111) / 4.2A (M112) configured by software
Resolution	500~50000 pulse/revolution configured by software
LED indicator	PWR, RUN, ERR, PEL, MEL, ORG, ALM, EMG, INP, SV
Current consumption	3.1W typical (130mA/24V) no load
Ambient Temperature	In use: 0~50 °C In Storage: -20~70 °C
Humidity	In use: 35~85% (Non-condensing) In Storage: 10~90% (Non-condensing)
Vib. Reset	0.5G

2.3. I/O Interfaces
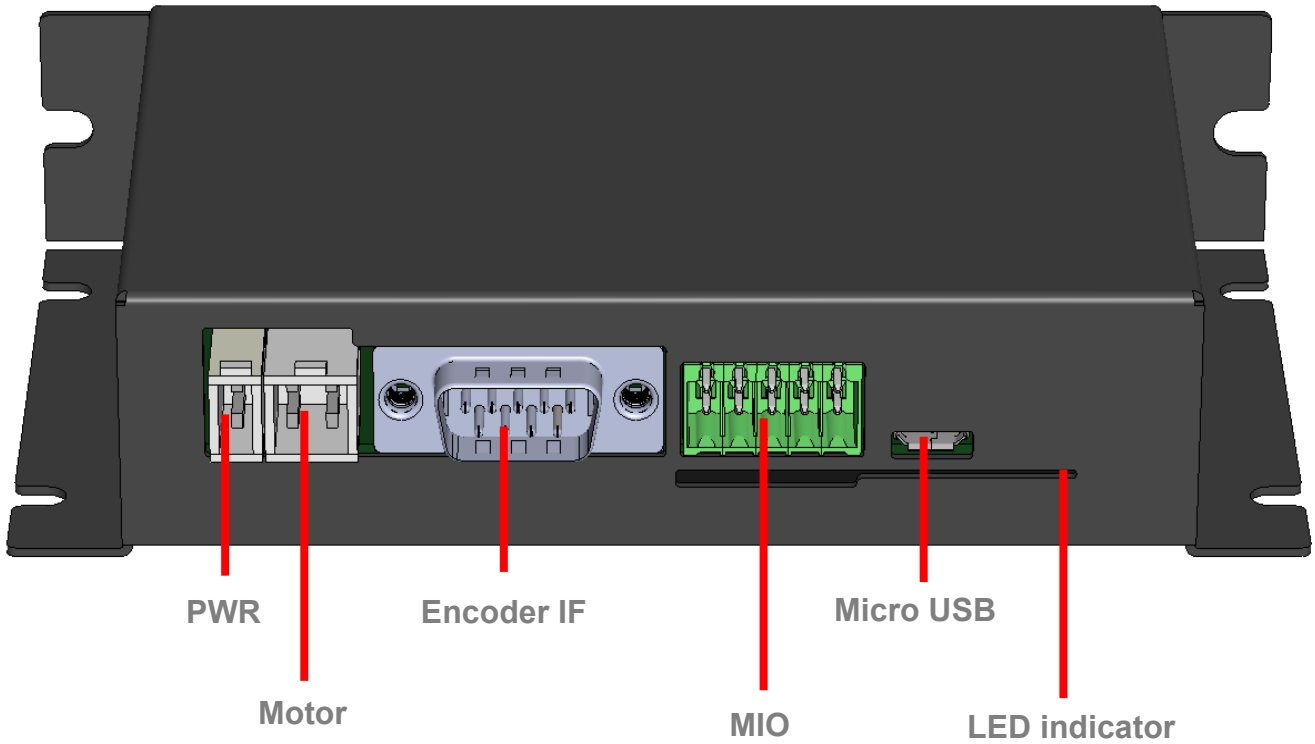
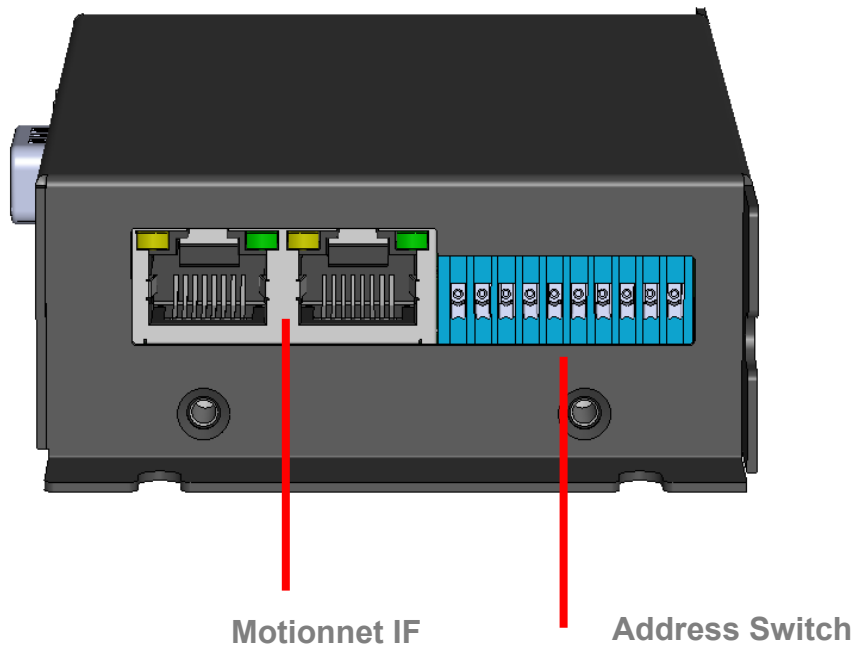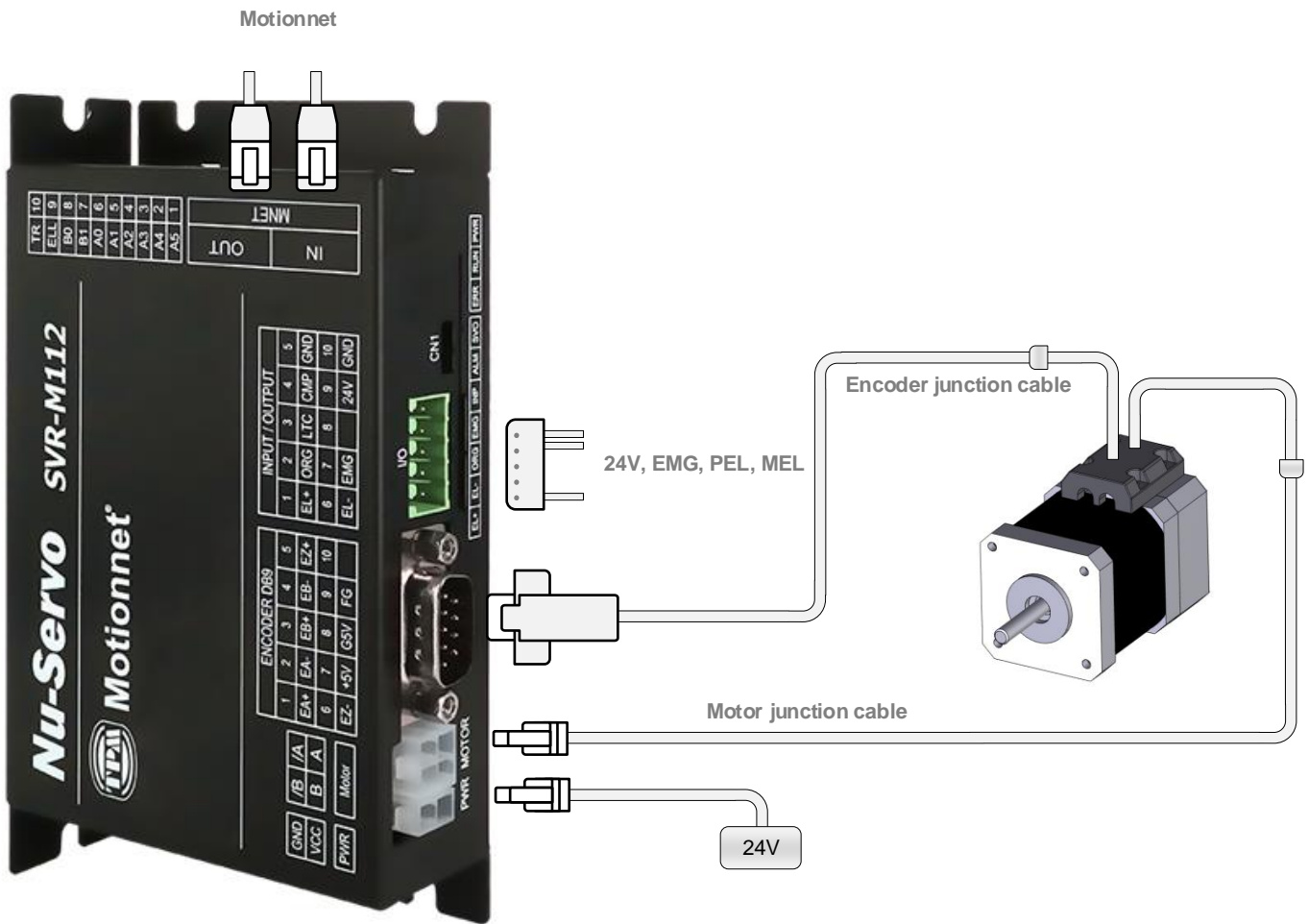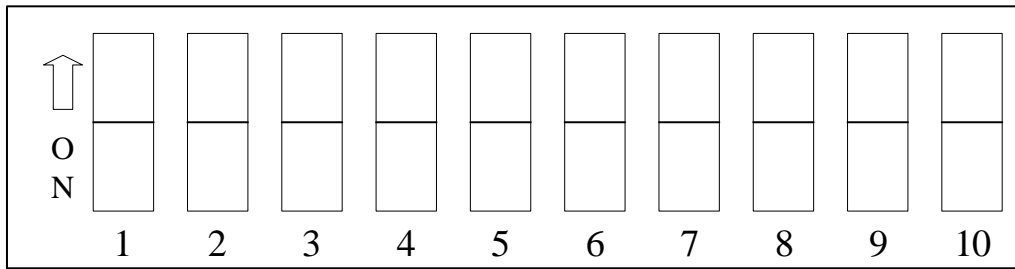

Figure 2-1: front side connectors of SVR-K112

Figure 2-2: Left side connectors of SVR-M112

2.4. Wring Diagram

Motionnet

Encoder junction cable

24V, EMG, PEL, MEL

Motor junction cable

24V

2.4.1. Address Switch

Figure 2-3: Module Address configuration by dip switches

Number	Name	Description
1-6	A0-A5	Device IP address IP = 1*A0 + 2*A1 + 4*A2 + 8*A3 + 16*A4
7, 8	B0, B1	Setting of transfer rate. Default value is 10Mbps.<table><tr><td>B0</td><td>B1</td><td>Transfer rate</td></tr><tr><td>OFF</td><td>OFF</td><td>20Mbps</td></tr><tr><td>ON</td><td>OFF</td><td>10Mbps</td></tr><tr><td>OFF</td><td>ON</td><td>5Mbps</td></tr><tr><td>ON</td><td>ON</td><td>2.5Mbps</td></tr></table>
9	ELL	Setting the logic of positive and negative limits. Default setting is off.<table><tr><td>EL</td><td>Logic</td></tr><tr><td>OFF</td><td>Normal open.</td></tr><tr><td>ON</td><td>Normal close.</td></tr></table>
10	TR	Setting of the terminal resistance. Default setting is off.<table><tr><td>TR</td><td>Logic</td></tr><tr><td>OFF</td><td>No terminal resistance added.</td></tr><tr><td>ON</td><td>Added a terminal resistance.</td></tr></table>

2.4.2. Motionnet IF

● **Communication IN and OUT**
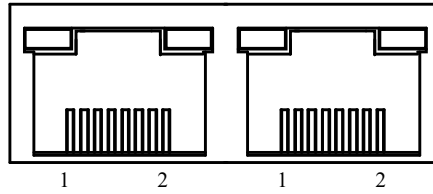
Figure 2-4: Motionnet extension connector

Pin	Pin Mark	Pin Description
1	NC	Reserved
2	NC	Reserved
3	RS485+	Motionnet protocol +
4	NC	Reserved
5	NC	Reserved
6	RS485-	Motionnet protocol -
7	NC	Reserved
8	NC	Reserved

Table 2-1: pin definition of the Motionnet

2.4.3. LED Indicators

| EL+ | EL- | ORG | EMG | INP | ALM | SVO | ERR | RUN | PWR |
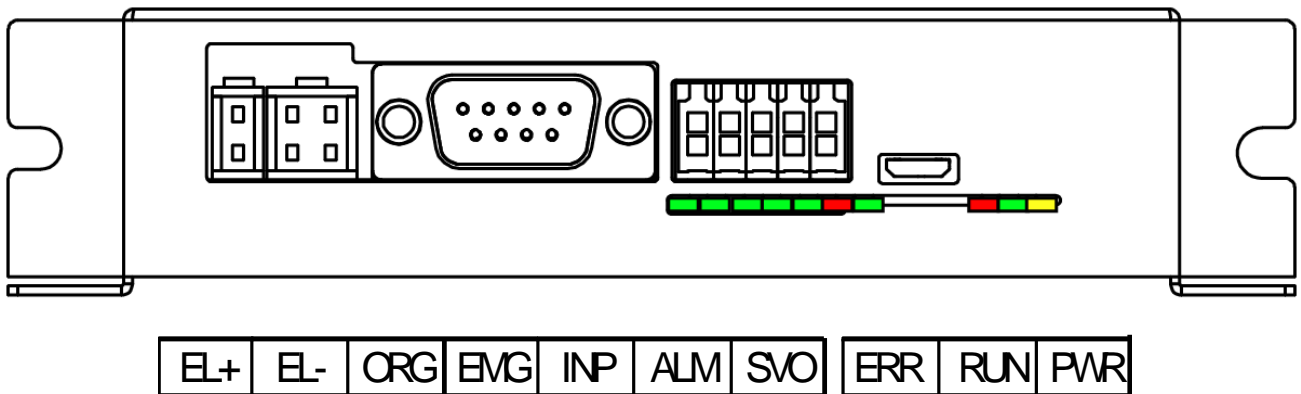
Figure 2-5: LED of SVR-M112

LED	Color	Description	Function
PWR	Yellow	Power On	Lights on when power is on.
RUN	Green	Slow Down On	Lights on when Motionnet runs.
ERR	Red	Emergency On	Lights on when Motionnet error occurs.
SVO	Green	Servo On	Lights on when Servo on.
ALM	Red	Alarm On	Lights on when Alarm on.
INP	Green	In-Position On	Lights on when INP on.
EMG	Green	Emergency On	Lights on when connected to GND.
ORG	Green	ORG On	Lights on when connected to GND.
EL-	Green	Negative limit	Lights on when connected to GND.
EL+	Green	Positive limit	Lights on when connected to GND.

Table 2-2: LED status

2.4.4. Mechanical Input (MIO)
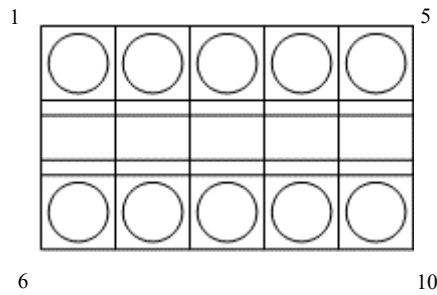
**Figure 2-6: mechanical input connector**

■ PIN Definition

Pin	Name	Function	I/O
1	EL+	Positive limit	I
2	ORG	Home position	I
3	DI0	Digital Input 0	I
4	CMP	Comparator output	O
5	GND	DC 24V Input Ground	I
6	EL-	Negative limit	I
7	EMG	Emergency Stop	I
8	DI1	Digital Input 1	I
9	24V	DC 24V Input	I
10	GND	DC 24V Input Ground	I

Note

1. EMG signal needs to be inactive to drive the motor. Otherwise the driver will be in the emergent stop state.

2. MIO needs DC24V power input to drive isolated interface.

2.4.5. Encoder Input
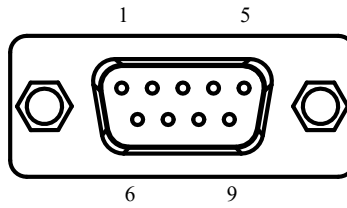

Figure 2-7: encoder source DB9 connector

Pin	Name	Function	I/O	Pin	Name	Function	I/O
1	EA+	Encoder phase A input (+)	I	2	EA-	Encoder phase A input (-)	I
3	EB+	Encoder phase B input (+)	I	4	EB-	Encoder phase B input (-)	I
5	EZ+	Encoder phase Z input (+)	I	6	EZ-	Encoder phase Z input (-)	I
7	+5V	+5V DC Output	O	8	GND	Ground	O
9	FG	Frame ground	-				

Note

1. The current of 5V DC output is 150mA.

2.4.6. Motor Connector

■ PIN Definition
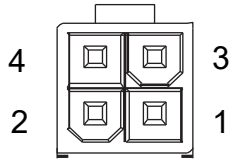
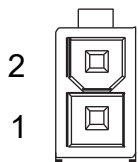| Pin No.	Function
1	Phase A
2	Phase B
3	Phase /A
4	Phase /B

■ Connector for Cable

Manufacturer: MOLEX

Housing: 5557-04R

Terminal: 5556T2
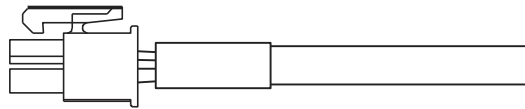
2.4.7. Power Input
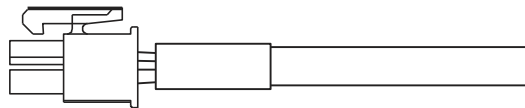
■ PIN Definition

Pin No.	Function
1	Power input: 24 VDC
2	Power input: GND

■ Connector for Cable

Manufacturer: MOLEX

Housing: 5557-02R

Terminal: 5556T2

2.4.8. Interface

The SVR-M112 not only controls the stepper motors, but also supports encoder feedback signals. The wiring definition is illustrated in the following figure.
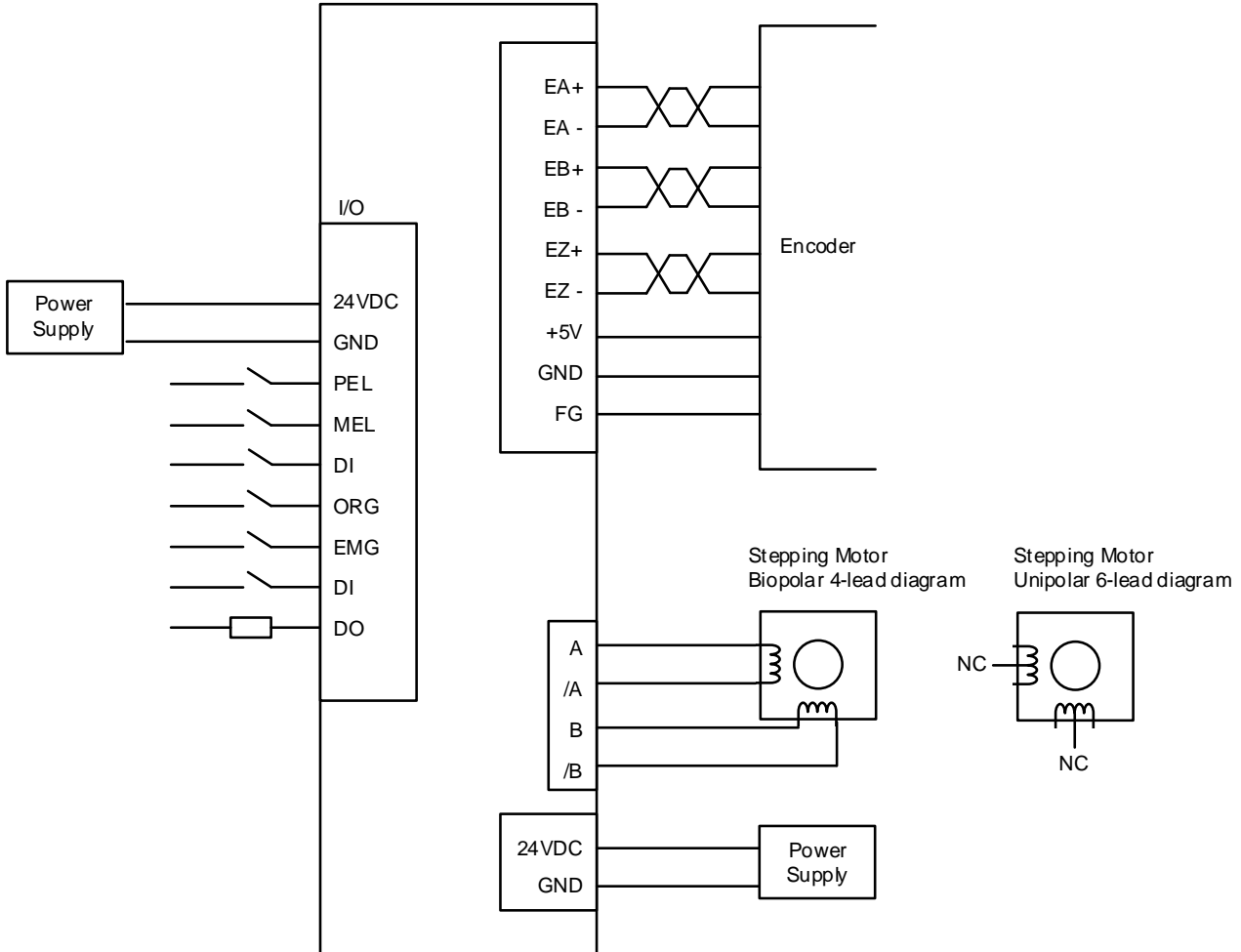

Figure 2-8: wiring configuration illustration

■ **EMG (Emergency Stop / Digital Input Signal)**
EMG is Normal-Close type signals from external switch.

■ **PEL and MEL (End Limit / Digital Input Signal)**
There are two end-limit signals called PEL and MEL for each axis. Usually they are Normal-Close type signals from external sensors. PEL indicates the limit of motion in the plus direction and MEL indicates the limit of motion in the minus direction.

■ **ORG (Origin / Digital Input Signal)**
The origin signal is necessary when the position feedback is incremental type or without any feedback encoders. They are used to indicate the origin of the system.
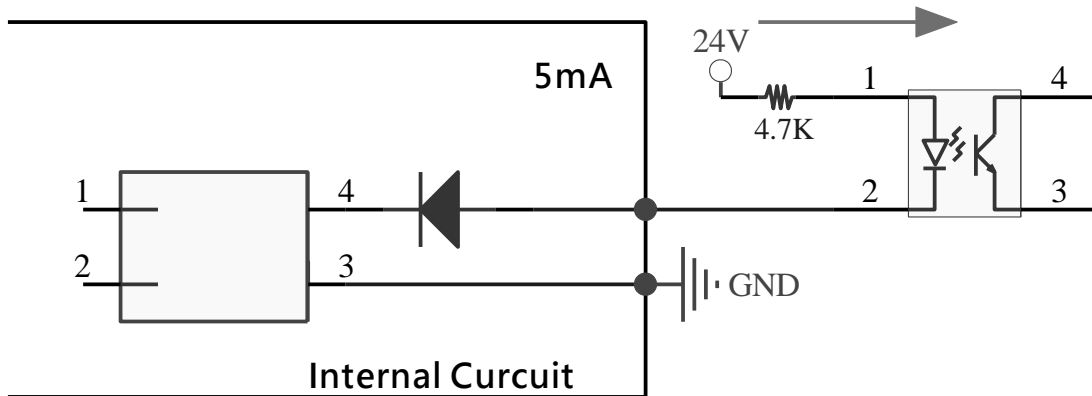
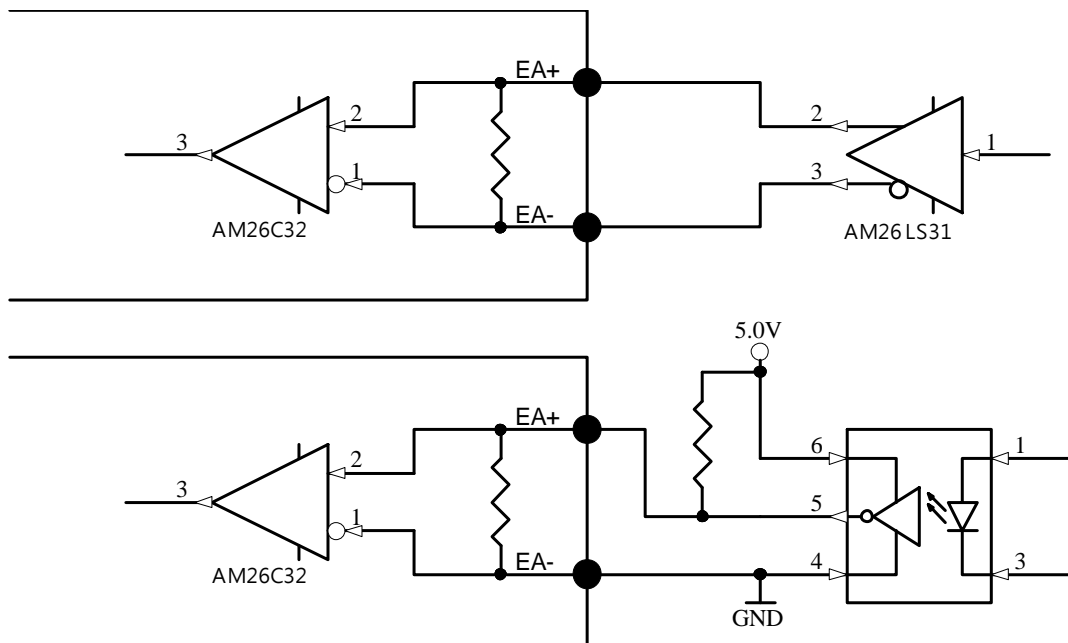**Digital Input Signal**

General-purpose digital input.
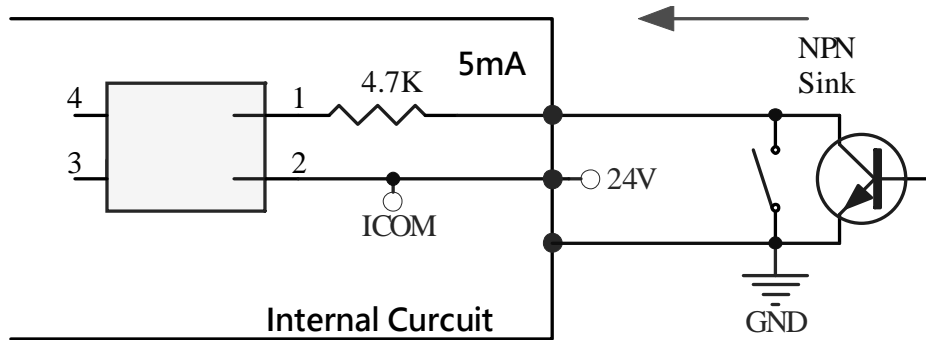
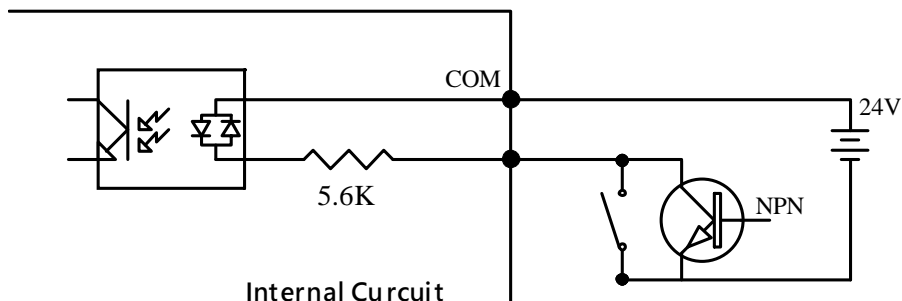**Digital Output Signal**

General-purpose digital output.

■ **Encoder Input**
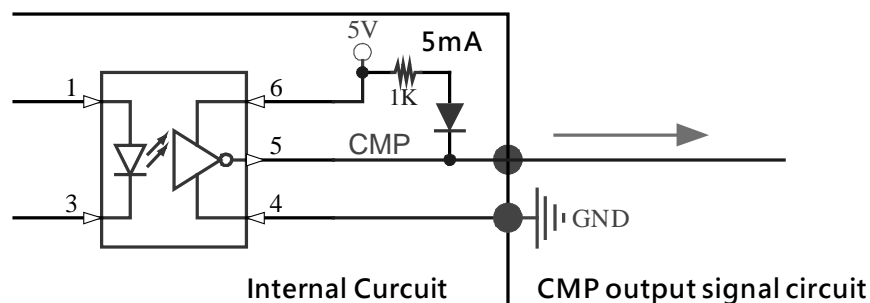
■ LTC (Counter Latch, Option)

LTC is used to latch the value in the counter when the LTC input is active.
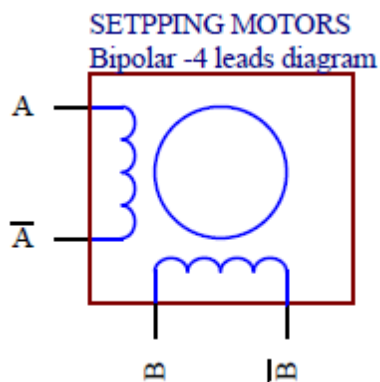
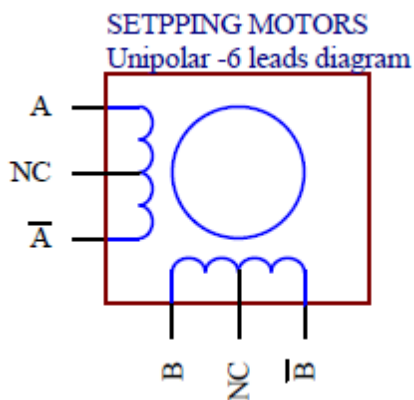NPN wiring

■ CMP (Position Compare / Output Signal)

CMP signals are used to make a comparison between target value and actual value and generate a trigger signal output. Trigger signal width is fixed at 33 micro-second.

●   Bipolar wiring illustration   ●   Unipolar wiring illustration

2.5. Mounting Direction and Spacing

It is recommended to reserve enough surrounding space for effective cooling.

Make sure that if the fans installed in the cabinet have sufficient space to take in and exhaust the cooling air.

In addition pay attention to the direction of air flow through internally installed fans.

Cabinet

50mm
or
more

10mm
or
more

10mm
or
more

10mm
or
more

10mm
or
more

10mm
or
more

Direction of air flowing