UIROBOT®
United Intelligence Robot Technology

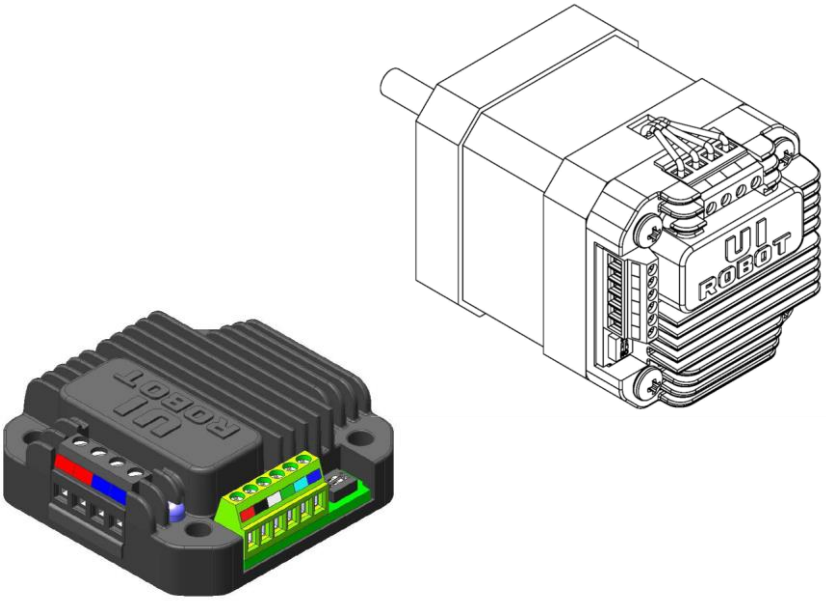
User Manual

UIM240XX Series

Parallel Signal Control

Miniature Integrated Stepper Motor Driver

V1.2



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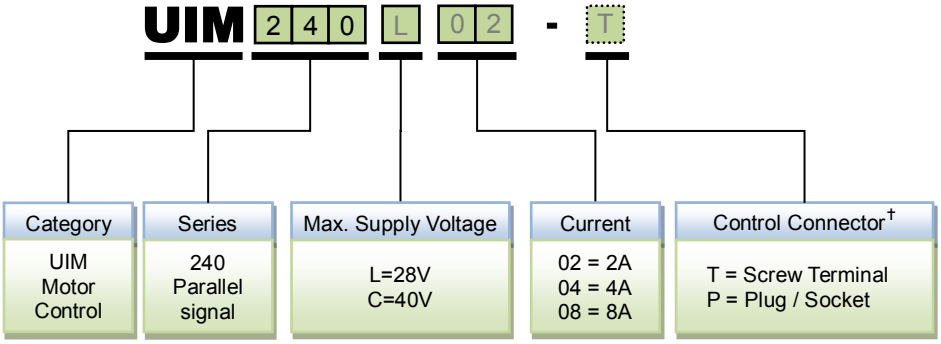
[UIM240XX Ordering Information]

In order to serve you quicker and better, when you order UIM240XX series controller, please provide the product number in following format.

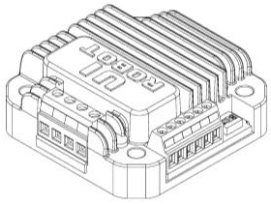
UIM240XX PART NUMBERING SYSTEM



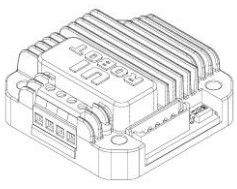
Note: † Optional. Default control connector is T (screw terminal) if not selected.

Examples: UIM24004, UIM24004P, UIM24008P, etc.

Examples of Control Connector options:



Screw Terminal



Rectangular Plug / Socket

UIM24002/24004/24008
Parallel Signal Control
Miniature Integrated Stepper Motor Driver

FEATURES

- Miniature size 42.3mm*42.3mm*16.5mm
- Integral design
- Wide range input voltage 12-28VDC
- 0 - 2A / 1.5 - 4A / 3 - 8A adjustable output current
- 1 to 16th micro stepping
- Automatic Current Reduction
- Dual full H-bridge with PWM constant current control
- Enable/shutdown input for power saving
- Optical-isolated inputs
- Die-cast aluminum enclosure

DESCRIPTION

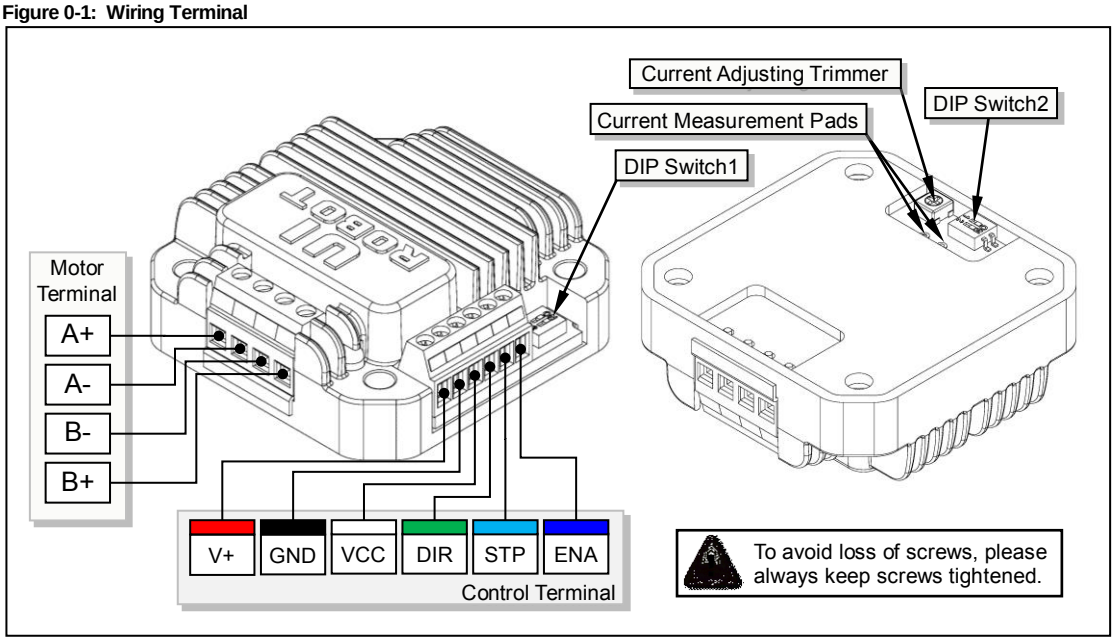
UIM240XX Miniature Stepper Motor Drivers are series miniature, high performance stepper motor controllers. They can be mounted onto NEMA 17 / 23 / 34 / 42 series stepper motor seamlessly through corresponding flanges. The thickness of these controllers is less than 15 mm.

The UIM240L02 outputs 0-2A adjustable current, the UIM 240C04 outputs1.5-4A adjustable current and the UIM240C08 outputs 3-8A adjustable current. Their mixed-decay current control reduces the back-EMF effect under high motor speed and improves the performance. Except that UIM240L02 takes 12-28VDC input, UIM240CXX series controllers work on 12 - 40VDC input.

The enclosure is made of die-cast aluminum which provides a rugged, durable protection and improves the heat dissipation.

TERMINAL DESCRIPTION

Figure 0-1: Wiring Terminal



Control Terminals

Terminal No.	Designator	Description
1	V+	Supply voltage, 12 - 40VDC
2	GND	Supply voltage ground
3	VCC	Opto-coupler common anode
4	DIR	Direction input(1)
5	STP	Stepping pulse input(2)
6	ENA	Enable the controller(3)

Note:

(1) Input is considered high level if this terminal is not connected.
(2) Low-level pulse duration should > 4μs.
(3) An active low-level input shuts down power supply to the motor. High-level input or left open makes the controller fully working. When awaken from shutdown mode, wait 1 millisecond before sending pulse.

Motor Terminals

Terminal No.	Designator	Description
1/2	A+ / A-	Connect to the stepper motor phase A
3/4	B- / B+	Connect to the stepper motor phase B

Warning: Incorrect connection of phase winds will permanently damage the controller.

Resistance between leads of different phases is usually > 100KΩ. Resistance between leads of the same phase is usually < 100Ω.

Warning: In addition to the port of power supply and motor, the voltage of rest port must be in the range of -0.3V ~ 5.3V, otherwise it will permanently damage the controller.

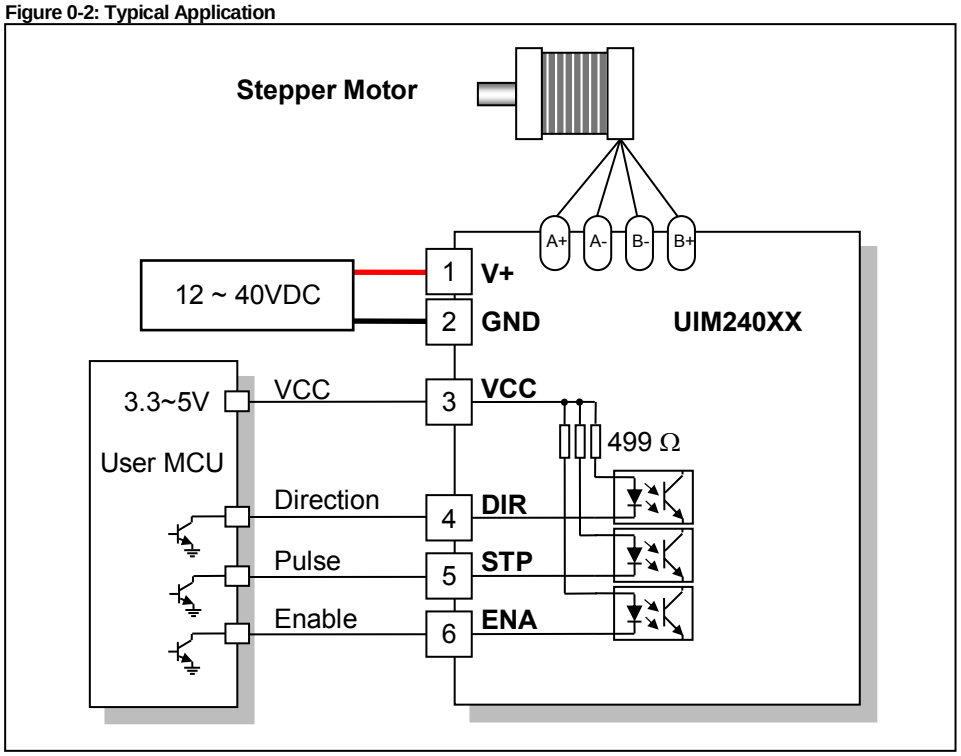
Attention:

If no special instructions, users use UIROBOT controllers must strictly follow the specification that one controller can only drive one motor. Be careful to avoid connecting more than one motor to the controller. The user should be responsible for the loss caused by that error operation, our company will be not responsible for it.

TYPICAL APPLICATION

UIM240xx controller's wiring is very straightforward as shown in following Figure. Terminal 6 (EN) can be left open if offline is not needed.

Figure 0-2: Typical Application

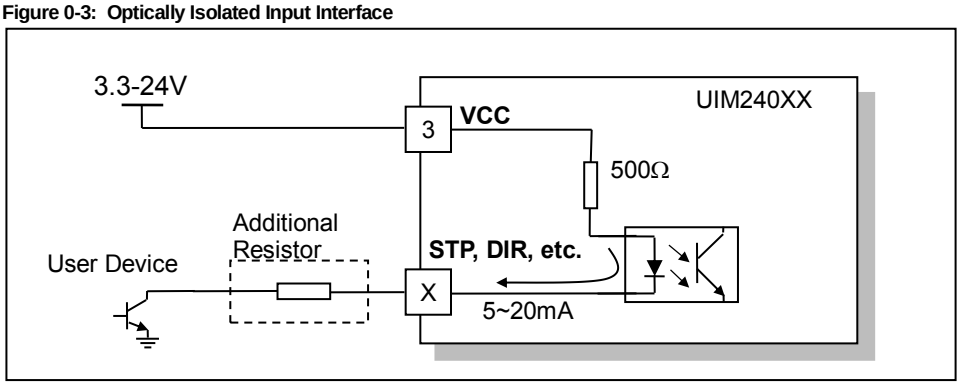


OPTICALLY ISOLATED INPUT INTERFACE

UIM240xx controllers' logic control inputs are all optically isolated. All opto-isolators share one common anode (VCC) as shown in above schematic diagram. Typically, VCC is 5V. However, 3.3V or voltages higher than 5V are also acceptable, so long as the current through the opto-isolator's emitter is between 5~20mA.

Should a voltage higher than 5V be applied to VCC, an additional resistor is needed for every terminal to ensure that the current through each emitter does not exceed 20mA.

Figure 0-3: Optically Isolated Input Interface



Note, in most situations, VCC can also be used as common cathode connection. This is because the opto-isolators used in UIM240 are bidirectional (AC&DC) type.

CHARACTERISTICS

Absolute Maximum Ratings (†)

Supply Voltage..... 10V to 40V
Ambient temperature under bias……..... -40°C to +85°C
Storage temperature..... -50°C to +150°C

†NOTICE: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics (Ambient Temperature 25°C)

Supply Power Voltage	12 – 40VDC (10 – 28VDC for UIM240L02)
Motor Output Current	Max 2A/4A/8A per phase (Adjustable through on-board trimmer)
Driving Mode	PWM constant current
Stepping Resolution	Full, 1/2 step, 1/4 step, 1/8 step, and 1/16 step
Insulation Resistance	>100MΩ
Dielectric Strength	0.5KV in one minute

Communication (Ambient Temperature 25°C)

Parallel Communication	3-wire interface: Pulse, Direction, Shutdown
Micro Step Resolution	1, 1/2, 1/4, 1/8, 1/16 set through on-board DIP switch 1 and switch 2

Environment Requirements

Cooling	Free air
Working environment	Avoid dust, oil mist and corrosive gases
Working temperature	-40°C ~ 85°C
Humidity	<80%RH，no condensation, no frosting
Vibration	3G Max
Storage temperature	-50°C ~ 150°C

Size and Weight

Size	42.3mm x 42.3mm x 16.5mm (L*W*H)
Wight	0.1 kg

FUNCTIONAL DESCRIPTION

Supply Voltage

UIM240xx controllers accept a wide range input voltage from 12 to 40VDC. (UIM240L02 takes 12 – 28 VDC) In general, higher supply voltage improves motor performance under high speed situation, but also increases the power loss and temperature raise.

Automatic Current Reduction (ACR)

UIM240XX controller is featured of Auto Current Reduction. If this function is enabled, when the motor stops running, the phase current will be cut to 50% of the set value. As soon as the motor goes back to working, the current will go back to the set value. This function is enabled by turn the DIP1 (figure 0-4) of the DIP switch 2 to the ON position.

Adjust Output Current

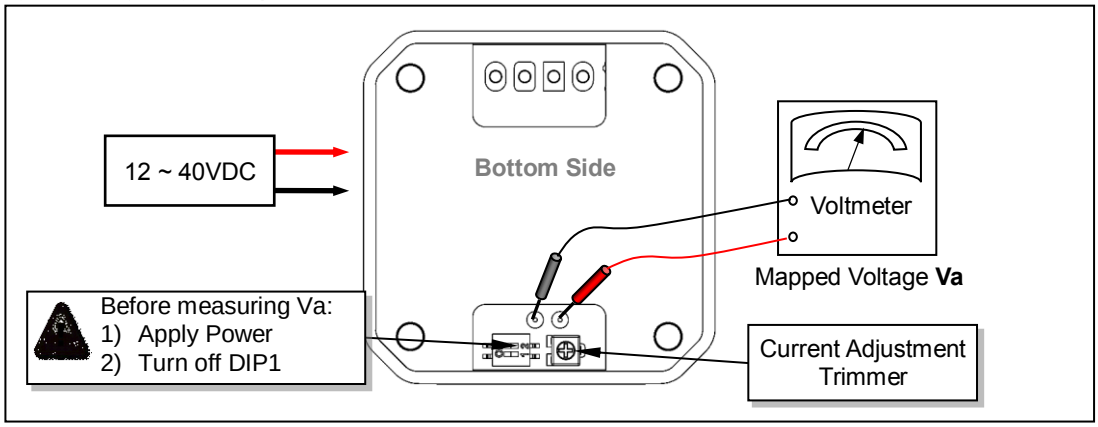
UIM24002/04/08 is capable of providing maximum2A / 4A / 8A per phase output current respectively. In specific application, the peak output current needs to be adjusted to meet the rated motor current. A trimmer (potentiometer) is provided to serve this purpose at the bottom of the controller, as shown in the following figure. Measuring the mapped voltage (Va) when tuning the trimmer provides a easy way to set the output current.

- For UIM24002, a mapped voltage “Va” of 0 - 2V proportionally represents 0 ~ 2A.
- For UIM24004, a mapped voltage “Va” of 0 - 4V proportionally represents 0 ~ 4A.
- For UIM24008, a mapped voltage “Va” of 0 - 4V proportionally represents 0 ~ 8A.

Note:

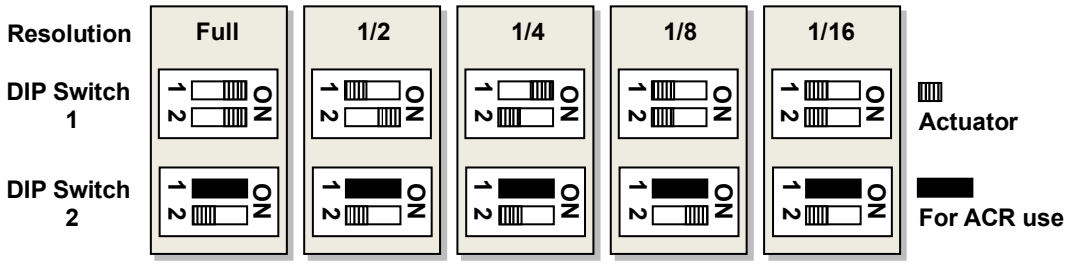
1. The controller needs to be powered before mapped voltage “Va” can be measured. (Motor is not required to be connected at this time.)
2. DIP1 (on the bottom side DIP switch 2) needs to be turned off to shut down the ACR Function.
3. After adjustment, user can choose to turn on the DIP1 to enable the automatic current reduction.

Figure 0-4: Adjusting the Output Current

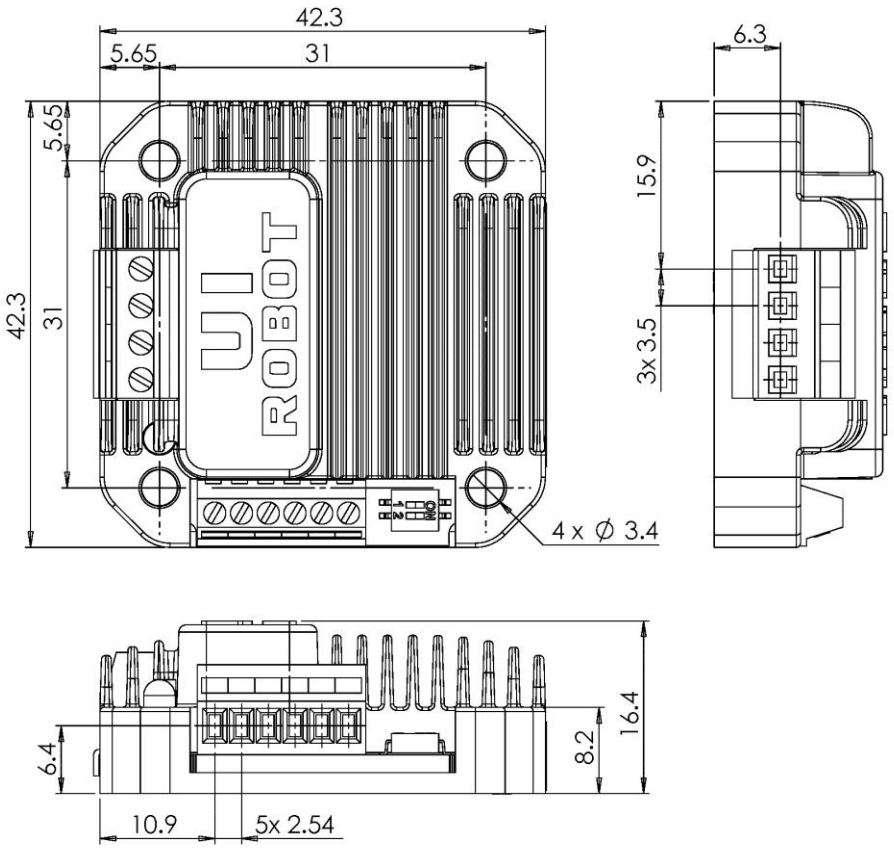


Micro Stepping Resolution

The micro stepping resolution is set by both DIP switch 1 and DIP switch 2 located at top and bottom side of the driver as shown in following figure. UIM240xx controller can provide micro-stepping control at full-step, 1/2, 1/4, 1/8 and 1/16 step resolutions.



APPENDIX A DIMENSIONS

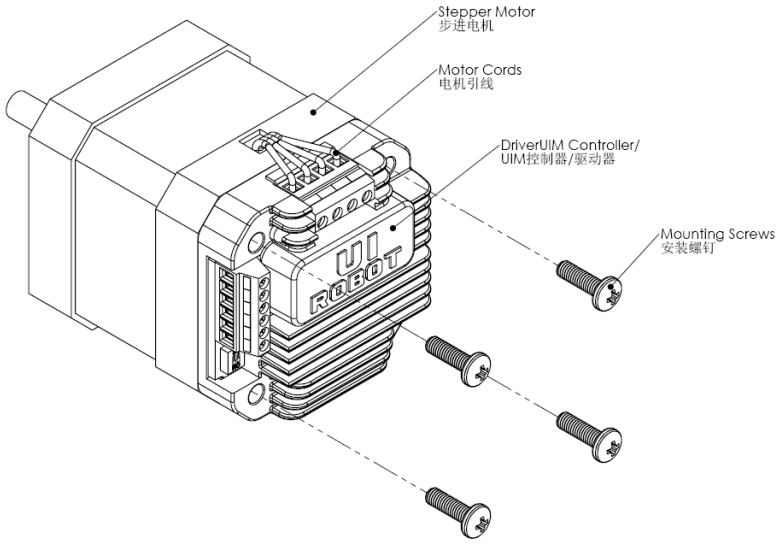


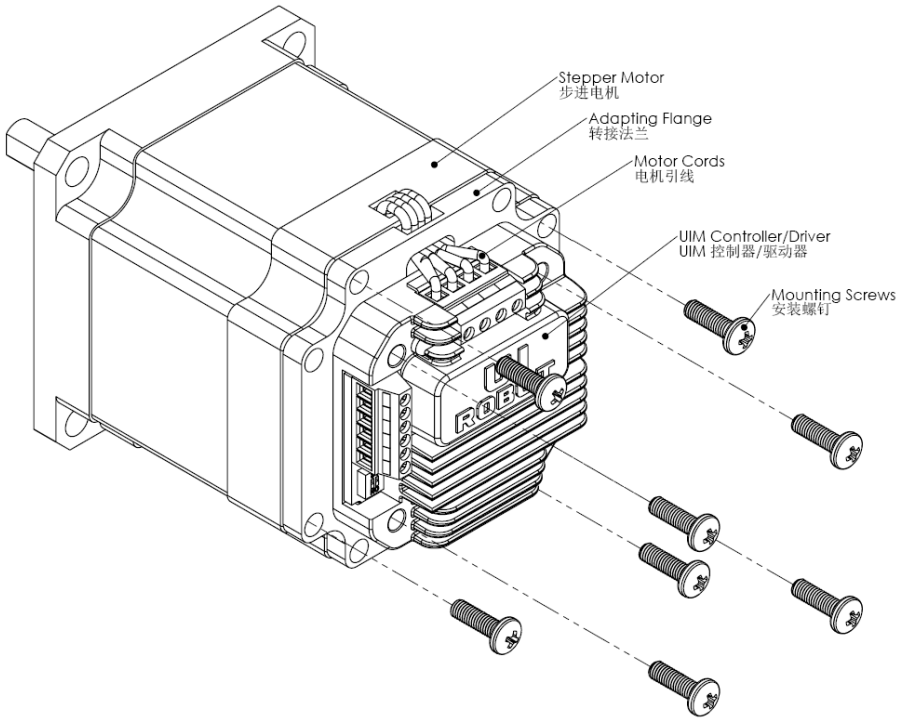
Units: mm

APPENDIX B INSTALLATION

NEMA 17 Stepper Installation (without adapting flange)

1. Screw mount UIM controller / driver onto the motor
2. Wire the motor leads.



NEMA 23 and Larger Stepper Installation (with adapting flange)

1. Screw mount the adapting flange onto the motor
2. Screw mount UIM controller / driver onto the adapting flange
3. Wire the motor leads.