

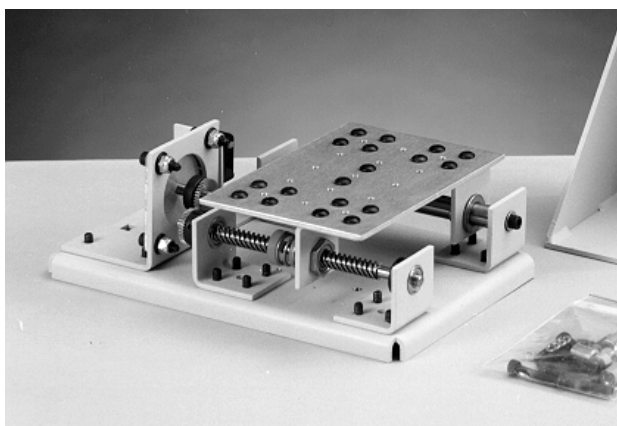
Z-2

Positioning Table

User's Guide

Revision B

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Description

The Z-2 positioning table is designed as a cost-effective alternative to expensive machined tables. When coupled with our MD-2 stepper motor controller and a personal computer, the user has complete programmable control over all motion. The aluminum top plate rides on polished steel shafts and bronze bearings to position payloads such as sensors or small tools. Home switches are included on each axis for position reference. The top plate has 15 tapped holes for mounting and will accept another Z-2 positioning table to achieve XY motion. A lead screw, steel gears, and an aluminum frame are used to create this rugged and cost effective product. Requires size a 23 motor and driver.

Specifications

Mechanical construction - Shafts: .500" polished steel +/- .0005".
Bearings: .501" flanged bronze +.001-0.
Lead Screw: .5" pitch, 3/8" dia.
Frame: .125" aluminum.
Fasteners: 10-32 threads.

Motor Requirement - NEMA frame size 23.
.25" dia shaft, .75" long.
1.86" square hole pattern, 10-32 screw.
25 oz/inch torque minimum.

Home Switch - Mechanical plunger type SPDT switch.
Used for home reference positioning.
1 amp contacts maximum.
Repeatability .0005"

Repeatability -	.002" The ability to return to the desired position repeatedly from the same direction.
Accuracy -	.005" per foot of travel The maximum difference between the actual and the desired position.
Resolution -	.00125" w/.9 degree motor steps. The minimum controllable motion interval that the top plate is capable of moving.
Speed -	.5" per second w/MD-2a & 2lb payload. The velocity of the top plate relative to the base.

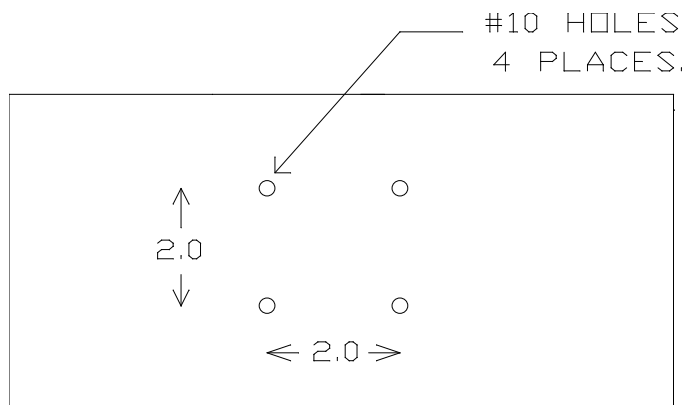
Specifications subject to change without notice

Unpacking

Open the box and remove the positioning table from the packaging material. Store the packaging material for future shipping use. Fill out the product registration card and return it to ARRICK ROBOTICS. The top plate should slide smoothly while turning the gear. A complete set of hex wrenches is included to preform installation and adjustment operations.

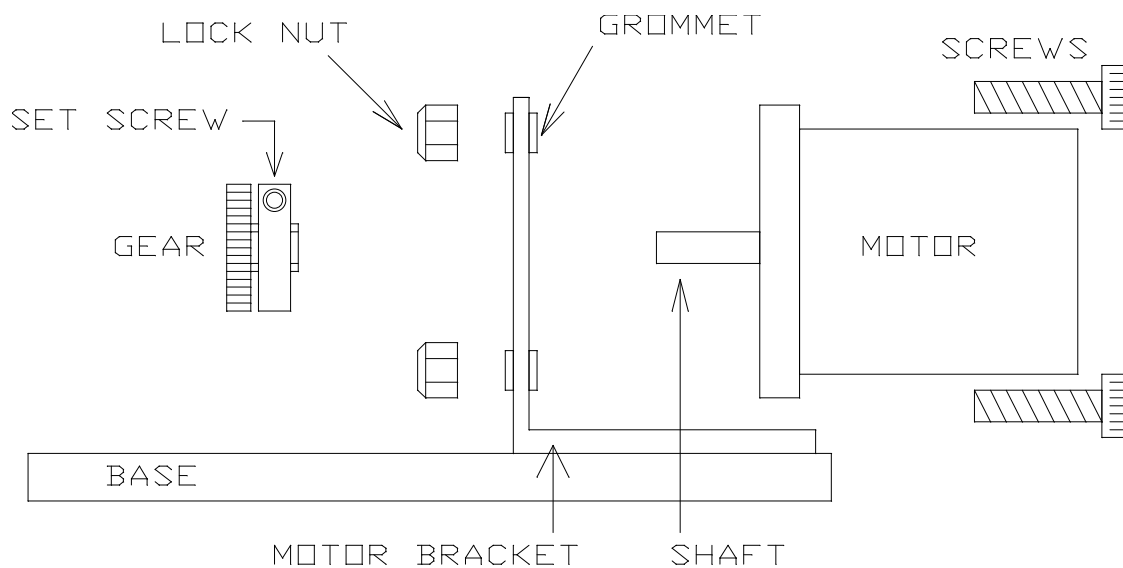
Mounting

The Z-2 can be mounted to a flat surface using 4 #10 screws. The Z-2 can also be mounted to other positioning tables vertically using the SK-4 spacer kit or horizontally using the BR-2 right angle bracket kit. Contact ARRICK ROBOTICS for more information on these products. Hole pattern dimensions:



Motor Installation

Motor installation is accomplished by first removing the gear on the false motor plate by unscrewing the shoulder bolt and sliding it off. Then remove the screws holding the false motor plate. Using a size #23 motor, put the shaft through the hole in the motor bracket and slip on the gear. Use the 4 screws and 4 lock nuts to attach the motor to the bracket. If the gears bind during assembly, loosen the motor bracket and slide it away so that the gears are apart. After the motor is attached to the bracket, slide the gear so that the teeth will mesh fully with the gear attached to the lead screw and tighten the set screw. Then adjust the motor bracket using the 4 screws on the bottom of the base plate. Mesh the gears and tighten the screws. If the gears are meshed too tight, wear will be increased.



Note:

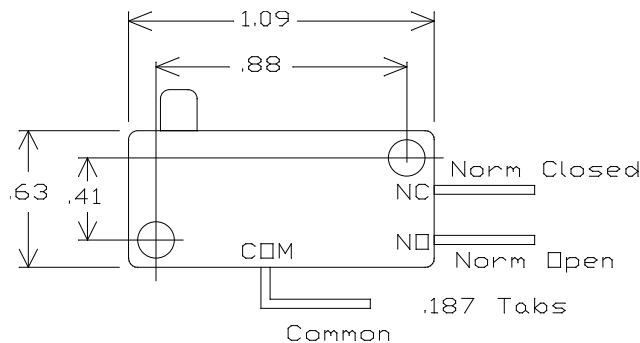
Do not oil the shafts. Doing so may increase friction and reduce performance. Keep dust from building up on the shafts by wiping them with a paper towel.

Gear Adjustment

Improper gear mesh will cause increased wear or decreased positioning accuracy. To adjust the gear mesh, loosen the screws which attach the motor bracket to the base plate. Slide the bracket so the gear teeth are meshed firmly and tighten the screws.

Home Switch

Home switch adjustment is accomplished by loosening the 2 screws connecting the switch bracket to the base plate. Manually slide the top plate completely to the end near the switch, move the switch bracket so the plunger is completely depressed and tighten the screws. To connect to the MD-2, simply attach the white wire to COMMON and the gray wire to NORMALLY OPEN.



Shaft Alignment

Shaft alignment is critical for a smoothly operating positioning table. Shaft alignment is performed at the factory and is normally not necessary in the field. Alignment may take some time, so make sure it is necessary before beginning.

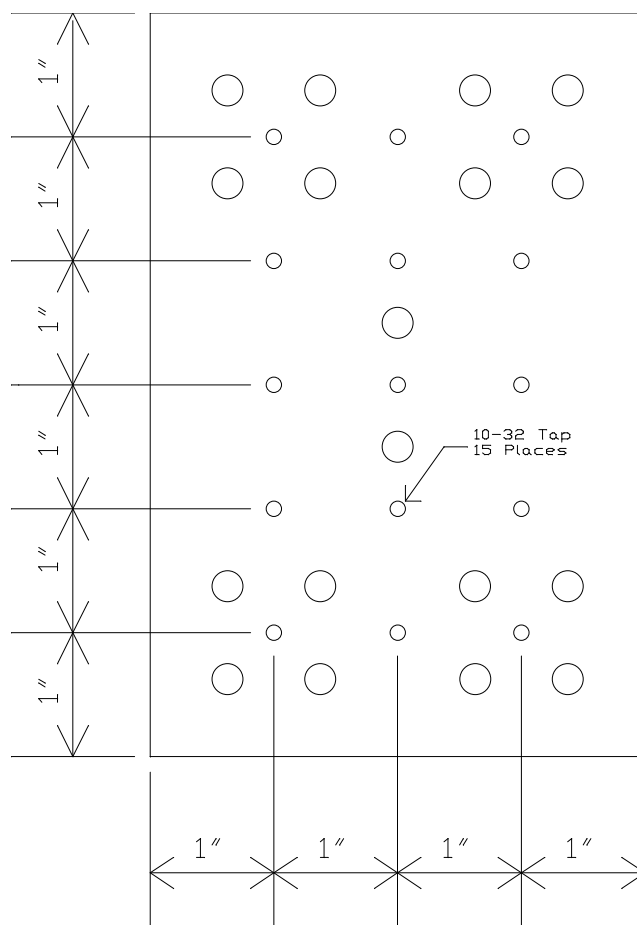
Begin by placing the positioning table on a flat surface. Remove the motor. Wipe the shafts with paper towels to remove any dust or oil. Loosen the screws on the shaft brackets which have green dots next to them. Slide the top plate back and forth repeatedly while slowly tightening the screws. When the screws are completely tight, the top plate should ride smoothly on the shafts. Repeating this procedure may be necessary for optimum alignment. Tapping the top plate lightly may help the alignment. After smooth operation is achieved, replace the motor.

Attaching Payloads

Payloads can be attached to the top plate by using the 15 tapped holes provided which have 10-32 threads. Do not over tighten these screws since stripping of the threads may occur. Do not use long screws that may come in contact with the shaft. Make sure the payload does not come in contact with the motor bracket, the home switch or other nearby parts - damage to the payload or the table may occur. Center the payload as much as possible to minimize stress on the bearings. Accuracy, repeatability, and other specifications are affected by the weight and mounting of the payload. As the payload increases the speed may need to be decreased since stepper motors have high torque at low speeds and low torque at higher speeds.

It is possible in some circumstances for the payload to back-drive through the lead-screw and spin the stepper motor. Normally the detent torque of the stepper motor will prevent this even when power is removed. Check this to insure safe operation.

Top Plate Hole Pattern



MD-2 System Usage

This section discusses the use of the MD-2 dual stepper motor system with the Z-2 positioning table. Reverse motion will move the top plate or base towards the home switch and forward motion will move it away. When using the MD-2 Program, set the parameters as follows:

Backlash	.0
Home Direction:	Reverse
Home Offset:	.1
Forward Limit:	2
Reverse Limit:	0
Minimum Speed:	.25
Maximum Speed:	1
Motor Name:	"Z Axis"
Slope:	.25
Unit Name:	Inches
Units:	800

It may be necessary to fine tune the Minimum Speed, Maximum Speed, and Slope parameters for best performance with your payload. Consult the MD-2 manual and the on-line help within the MD-2 Program for more information.

Typical Applications

Many applications requiring computer controlled positioning are candidates for the Z-positioning table. Some of these applications include:

Sensor positioning

Automation simulation

Test probe positioning

Adhesive dispensing

Automated drilling, routing or grinding

Camera positioning

Pick and place machine

Automated soldering

The Z-2 can be used in conjunction with our XY positioning tables to create a complete 3-axis robotics workcell. Contact ARRICK ROBOTICS for more information on these and other automation products.

Troubleshooting

The Z-2 positioning table is a relatively simple device than can normally be repaired using simple hand tools. A list of common problems with solutions can be found below.

Note: Do not oil the shafts. Doing so may increase friction and reduce performance or result in erratic behavior.

1. If the accuracy or repeatability does not match the specifications, check the weight of the payload as performance will degrade as the payload is increased. A loose gear, or nut can also be a source of positioning error.
2. If the table does not slide smoothly, see the section on shaft alignment. Make sure the shafts are dry and have no oil or dust accumulations. A scratched or dented shaft can cause the top plate to bind and miss the target position. Locate the bad spot on the shaft and sand smooth with very fine emery cloth. If the shaft is damaged beyond repair, see the warranty section for more information.
3. When using stepper motors to drive the table at high speeds with large payloads, lost steps can result. The torque of a stepper motors will decrease as the speed is increased and cause lost steps or erratic behavior. Experiment with slower speeds and lighter payloads. Counter-balance the payload with weights or springs to reduce motor torque requirements.
4. Mounting the table on an uneven surface can result in binding and lost steps.
5. Mounting the table in a vertical position requires the motors to move against gravity thus lowering the payload capacity and/or speed. Counter-balance the payload with weights or springs to reduce motor torque requirements.

Warranty Information

Arrick Robotics warrants this product to be in good working order for a period of 1 year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, repair or replace the product at no charge except shipping and insurance charges. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, misuse, abuse, or modification. To obtain warranty service, contact us at (817) 571-4528 to receive shipping instructions.

You agree to prepay shipping charges and to insure the product or assume the risk of loss or damage in transit. All express or implied warranties for this product including the warranties of merchantability and fitness for a particular purpose are limited in duration to a period of 1 year from the date of purchase, and no warranties, whether express or implied, will apply after this period.

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event will Arrick Robotics be liable for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of or inability to use this product.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

Note:

Using inadequate packaging techniques may result in a damaged product. Before shipping the unit, contact ARRICK ROBOTICS for detailed instructions and shipping information.

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