USAutomation®

Solutions in Motion

Linear Positioning

Intelligent Motors

Brushless Motors

Step Motors

SOLUTIONS IN MOTION

USAutomation designs, manufactures, and supports innovative and cost effective motion control solutions. Our goal is to help make our customers more profitable in an ever increasingly competitive global environment. We strive to manufacture all of our products in the United States, but we also search the globe for the most competitive solutions to our customers problems. We believe that we are partners in our customer's success and take it as a privilage to be selected as one of their suppliers.

Our solutions can go well beyond supplying the standards product you'll find in this catalog. We can create customized designs, sub-assemblies, and stocking programs to suit the needs of our customers. We do not believe that one size fits all. Our sales engineers and representatives work closely with our customers in an ongoing manner to insure that we meet every customer's need. We are constantly working on new designs and new projects. If what you are looking for is not shown in our catalog or on our website, please contact us. Some of our most innovative products have been developed in close cooperation with our valued customers.

RESOURCES

CATALOG:

- Hard copy reference
- Includes specifications, drawings, product descriptions
- Information always available at your fingertips

WEBSITE:

www.usautomation.com

- Full catalog information, including downloadable version
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CONTENTS

MICROSTAGE 28

USAutomation's Microstage™ series breaks new ground in positioning stage size, performance, versatility and price. The standard configuration Microstage comes complete with a 1.8° step motor and coupling. Options include limit switches and multiaxis configurations. A complete programmable positioning system is available by configuring the Microstage with the Accuriss™ integrated motor/control (see page 9).

Model[1] Number	Dynamic Axial Load (lbs)	Travel (mm)	Lead [1] (in)	Accuracy [2] (in/in)	Max Linear Speed (in/sec)	Lead Screw Efficiency (%)	Coefficient of Friction (Constant)	Drag Torque (in/oz)	Backlash [3] (in)	Motor Torque [4] (in/oz)	Weight [5] (oz)
USM28-010	5	10	.100	.0006	2.5	69	.09	<.5	0	8.3	3.4
USM28-025	5	25	.100	.0006	2.5	69	.09	<.5	0	8.3	3.9
USM28-040	5	40	.100	.0006	2.5	69	.09	<.5	0	8.3	4.4
USM28-055	5	55	.100	.0006	2.5	69	.09	<.5	0	8.3	5.0
USM28-070	5	70	.100	.0006	2.5	69	.09	<.5	0	8.3	5.5
USM28-085	5	85	.100	.0006	2.5	69	.09	<.5	0	8.3	6.0
USM28-100	5	100	.100	.0006	2.5	69	.09	<.5	0	8.3	6.5
USM28-115	5	115	.100	.0006	2.5	69	.09	<.5	0	13.2	7.1
USM28-130	5	130	.100	.0006	2.5	69	.09	<.5	0	13.2	7.6
USM28-145	5	145	.100	.0006	2.5	69	.09	<.5	0	13.2	8.1
USM28-160	5	160	.100	.0006	2.5	69	.09	<.5	0	13.2	8.7
USM28-175	5	175	.100	.0006	2.5	69	.09	<.5	0	13.2	9.2
USM28-190	5	190	.100	.0006	2.5	69	.09	<.5	0	13.2	9.7
USM28-205	5	205	.100	.0006	2.5	69	.09	<.5	0	13.2	10.2

1 Other non-stock leads and custom travel lengths are available for OEM applications.

2 Improved accuracies available for OEM applications - contact factory.

3 Self-adjusting anti-backlash nut.

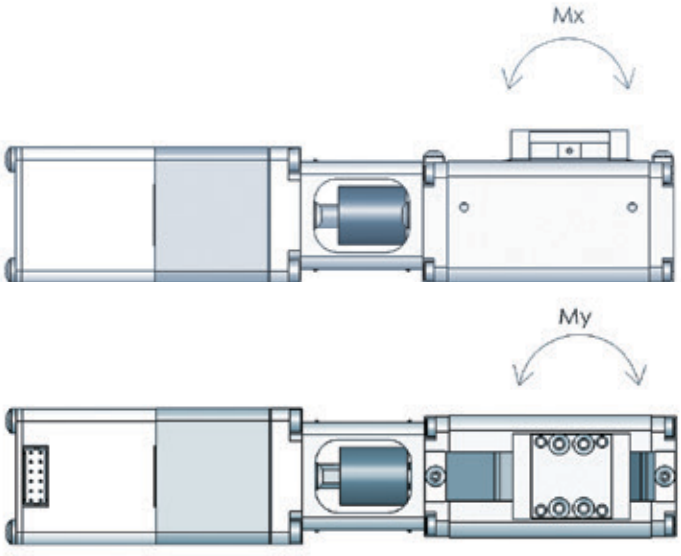
4 With standard 1.8° step motor included. Custom configurations available for OEM applications.

5 Including limits and standard motor.

CONFIGURE PART NUMBER

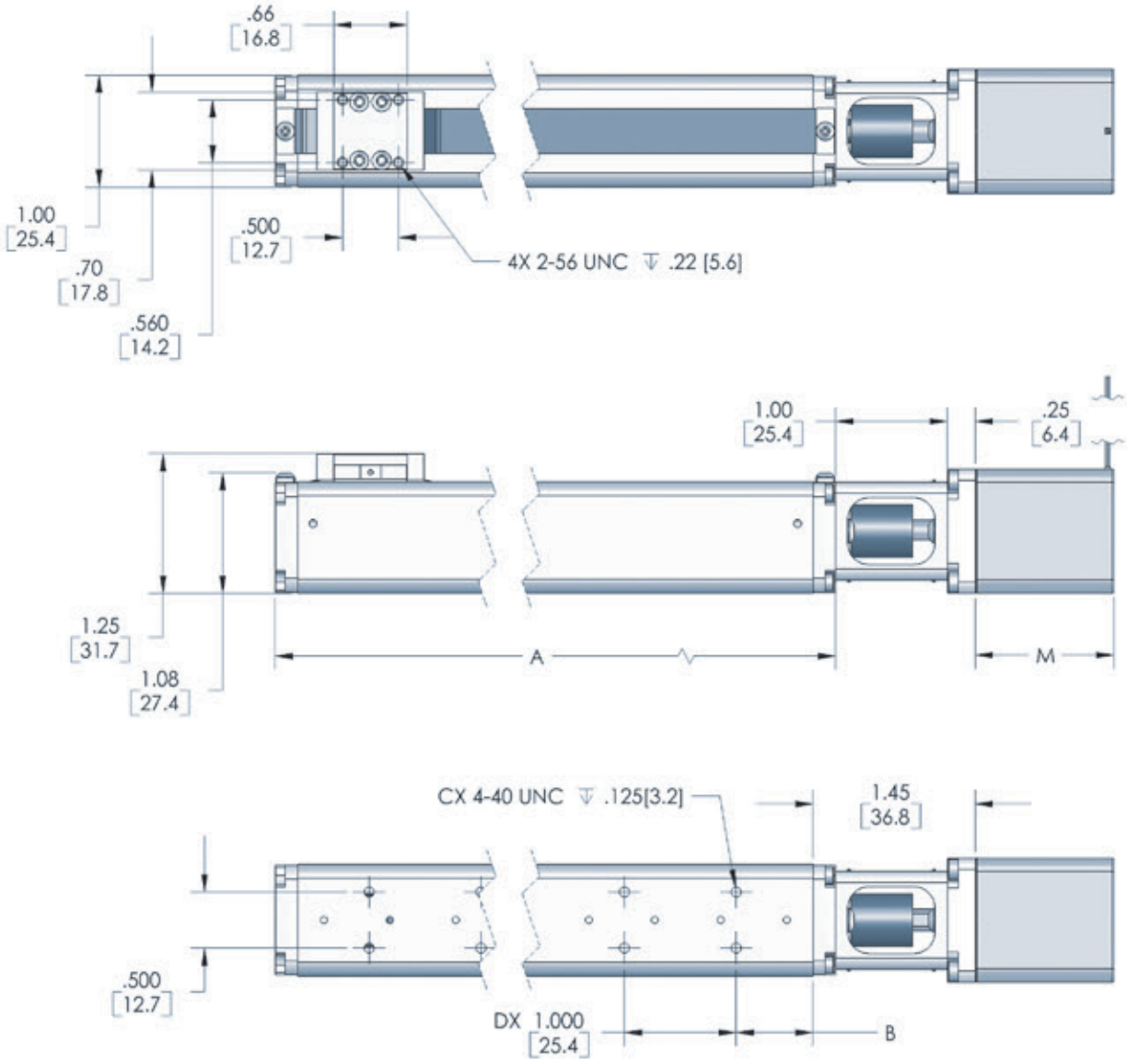
USM	XX	-	XXX	-	X	-	X	-	X
Microstage Series	Cross section 28mm		Travel in mm 10mm to 205mm		N		Motor Style S = Step motor N = No motor A = Accuriss		Limits 0 = No limits 1 = EOT/Home

MICROSTAGE 28 MOMENT LOAD LIMITS

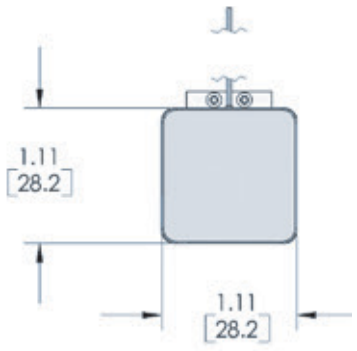


Maximum Static Moment

Mx	in-lb	5.0
My	in-lb	5.0
Mz	in-lb	10.0



TRAVEL	DIM "A"	DIM "B"	"C"	"D"
in (mm)	in (mm)	in (mm)	Qty	Qty
0.39 (10)	2.05 (52)	.325 (8.3)	4	1
0.98 (25)	2.64 (67)	.687 (17.4)	4	1
1.57 (40)	3.23 (82)	.325 (8.3)	6	2
2.17 (55)	3.82 (97)	.687 (17.4)	6	2
2.76 (70)	4.41 (112)	.325 (8.3)	8	3
3.35 (85)	5.00 (127)	.325 (8.3)	10	4
3.94 (100)	5.59 (142)	.687 (17.4)	10	4
4.53 (115)	6.18 (157)	.325 (8.3)	12	5
5.12 (130)	6.77 (172)	.687 (17.4)	12	5
5.71 (145)	7.36 (187)	.325 (8.3)	14	6
6.30 (160)	7.96 (202)	.687 (17.4)	14	6
6.89 (175)	8.55 (217)	.325 (8.3)	16	7
7.48 (190)	9.14 (232)	.325 (8.3)	18	8
8.07 (205)	9.73 (247)	.687 (17.4)	18	8



MOTOR P/N	DIM "M"
	in (mm)
Step Motors	
USS11T2102	1.25 (31.8)
USS11T2202	1.75 (44.5)
USS11T2302	2.00 (50.8)
Accuriss Motors	
USA28-2102	2.16 (54.9)
USA28-2202	2.67 (67.8)
USA28-2302	2.91 (73.9)

MICROSTAGE 42

USAutomation's Microstage™ series continues to break new ground in positioning stage size, performance, versatility and price. The standard configuration Microstage comes complete with a 1.8° step motor and coupling. Options include limit switches and multiaxis configurations.

Model[1] Number	Dynamic Axial Load (lbs)	Travel (mm)	Lead [1] (in)	Accuracy [2] (in/in)	Max Linear Speed (in/sec)	Lead Screw Efficiency (%)	Coefficient of Friction (Constant)	Drag Torque (in/oz)	Backlash[3] (in)	Motor Torque [4] (in/oz)	Weight [5] (oz)
USM42-040	20	40	.100	.0008	4.5	49	.09	1-3	0	50	17.6
USM42-080	20	80	.100	.0008	4.5	49	.09	1-3	0	50	21.0
USM42-120	20	120	.100	.0008	4.5	49	.09	1-3	0	50	24.3
USM42-160	20	160	.100	.0008	4.5	49	.09	1-3	0	50	27.7
USM42-200	20	200	.100	.0008	4.5	49	.09	1-3	0	50	31.0
USM42-240	20	240	.100	.0008	4.5	49	.09	1-3	0	50	34.4
USM42-280	20	280	.100	.0008	4.5	49	.09	1-3	0	50	37.8
USM42-320	20	320	.100	.0008	4.5	49	.09	1-3	0	50	41.1
USM42-360	20	360	.100	.0008	4.5	49	.09	1-3	0	50	44.5
USM42-400	20	400	.100	.0008	4.5	49	.09	1-3	0	50	47.8

1 Other non-stock leads and custom travel lengths are available for OEM applications.

2 Improved accuracies available for OEM applications - contact factory.

3 Self-adjusting anti-backlash nut.

4 With standard 1.8° step motor included. Custom configurations available for OEM applications.

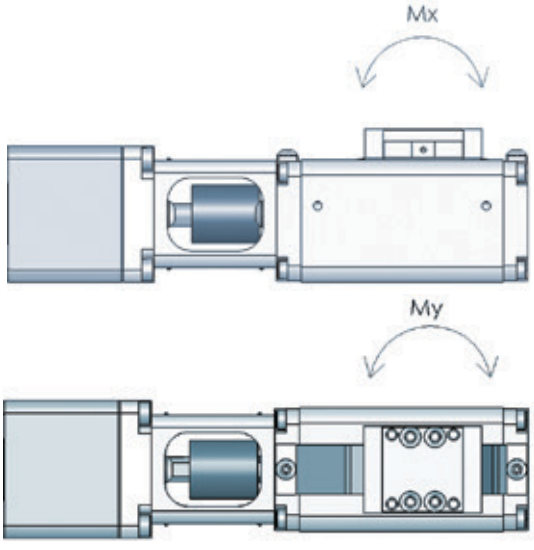
5 Including limits and standard motor.

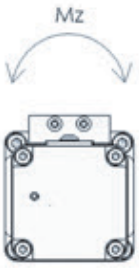
CONFIGURE PART NUMBER

USM XX - XXX - X - X - X

- USM: Microstage Series
- XX: Cross section 42mm
- XXX: Travel in mm 40mm to 400mm
- X: N
- X: Motor Style S = Step motor N = No motor
- X: Limits 0 = No limits 1 = EOT/Home

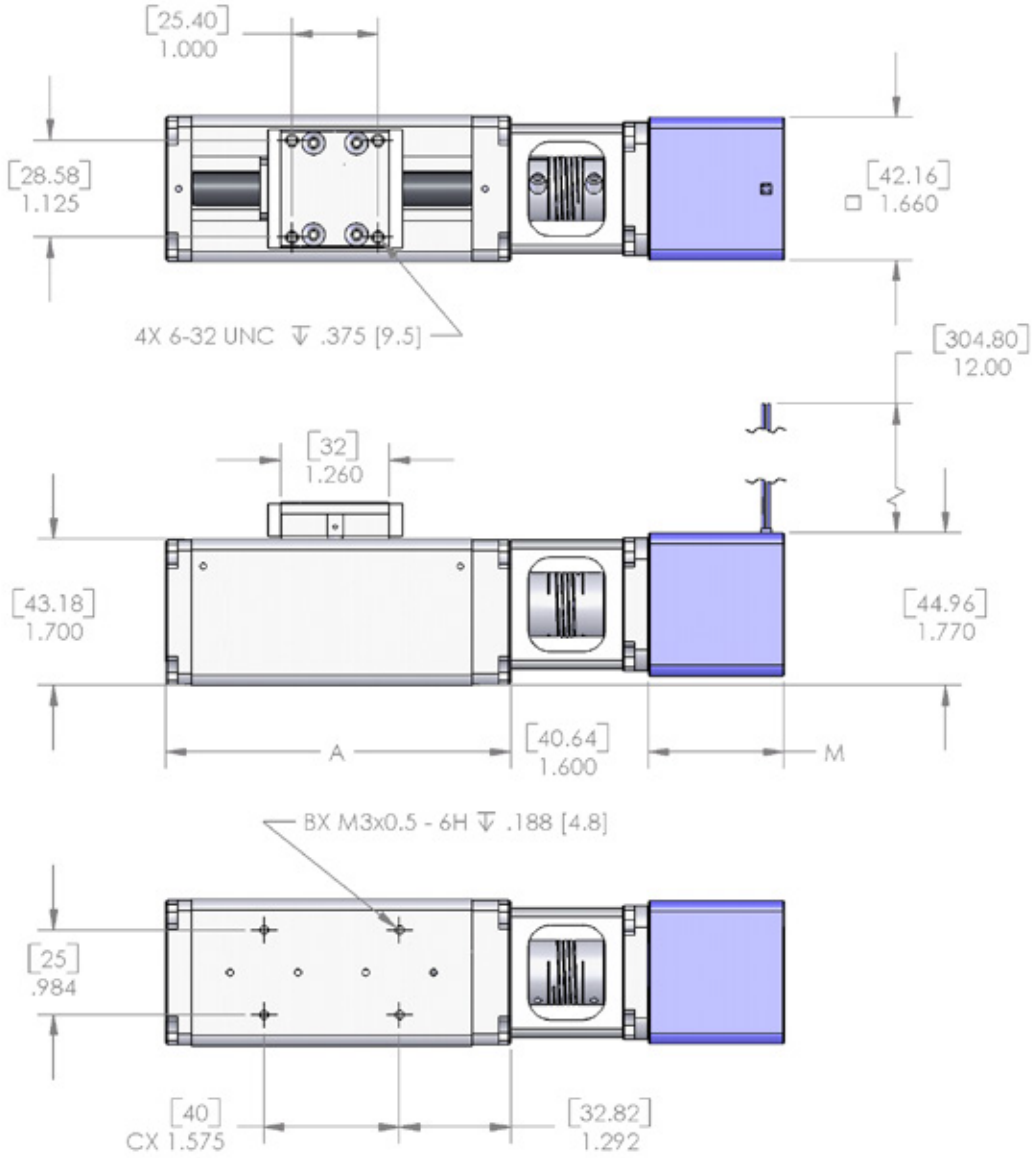
MICROSTAGE 42 MOMENT LOAD

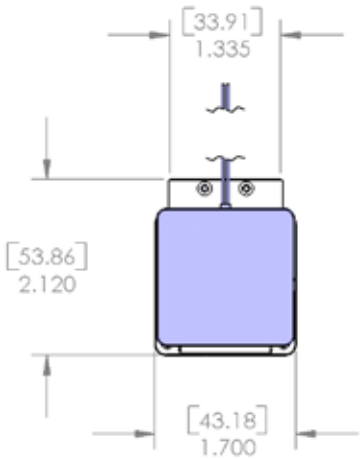




Maximum Static Moment

Mx	in-lb	18.0
My	in-lb	18.0
Mz	in-lb	30.0



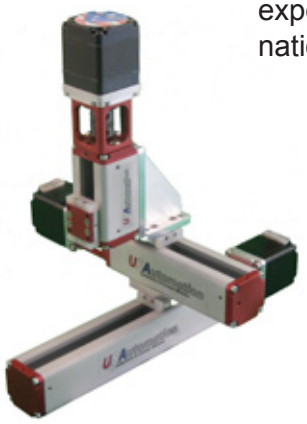


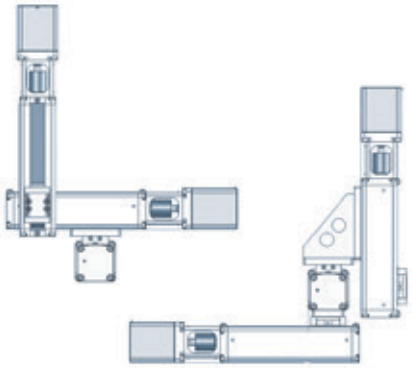
TRAVEL	DIM "A"	"B"	"C"
in (mm)	in (mm)	Qty	Qty
1.57 (40)	4.01 (102)	4	1
3.15 (80)	5.58 (142)	6	2
4.72 (120)	7.16 (182)	8	3
6.30 (160)	8.73 (222)	10	4
7.87 (200)	10.31 (262)	12	5
9.45 (240)	11.88 (302)	14	6
11.02 (280)	13.46 (342)	16	7
12.60 (320)	15.03 (382)	18	8
14.17 (360)	16.61 (422)	20	9
15.75 (400)	18.18 (462)	22	10

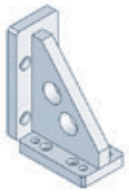
MOTOR P/N	DIM "M"
	in (mm)
Step Motors	
USS17T200X-4X	1.02 (26)
USS17T210X-4X	1.34 (34)
USS17T220X-4X	1.58 (40)
USS17T230X-4X	1.89 (48)
USS17T240X-4X	2.36 (60)

XY, XYZ, Configurations

There are many positioning applications which are best served by a multi-axis solution and USAutomation Microstage Series of positioning stages are well suited to fulfill that task with their modular design, configurability, and complement of available accessories. USAutomation has the engineering experience to work closely with each customer to design the optimal combination of axes, drive components, and accessories for a perfect solution.



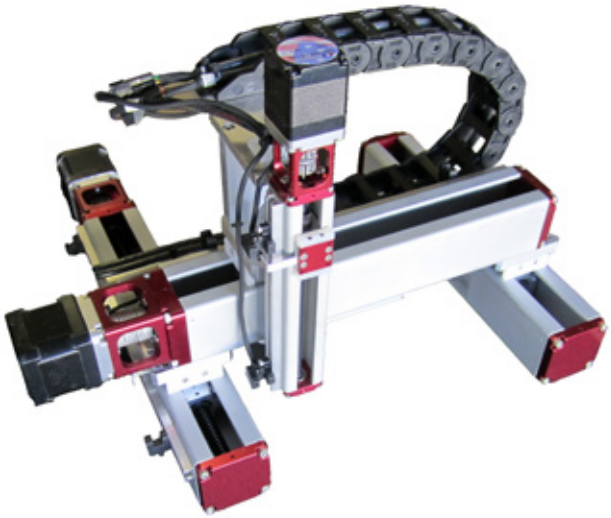




X-Z ADAPTER

X-Y ADAPTER

Gantry Systems



Gantry Systems are a further refinement of a multiaxis solution from USAutomation where a complete system is designed as a turnkey solution. Gantry systems generally consist of an underlying X axis, normally with two axis in parallel for moment loading considerations, a spanning Y axis, and a vertical Z axis holding the workpiece or load.

Both the USM42 and USM28 can be utilized in a gantry design depending on the required travel and loads. USAutomation engineering can size the appropriate motor (step, brushless, or intelligent), design required mounting brackets and cable carriers, supply needed accessories like encoders or limit switches, and test the complete system before shipment to the customer.

A separate brochure, “Configuring Gantry Systems”, is available to guide customers on how to supply information leading to a quote for a gantry solution.

To order multiaxis configurations and gantry systems, contact the factory.

TWINTRAC STAGES

The Twintrac™ series from **USAutomation** offers moderate load carrying capabilities with all the precision that many applications need. Load support is provided by dual 1/2" diameter round rails with long life ceramic bearings. The drive screw is an anti-backlash TFE coated leadscrew. T-slots are provided on the stage for mounting and threaded holes are provided in the top of the carriage for mounting a load. This cost effective positioning system includes a 1.8° NEMA 23 step motor and coupling. Limit switches (Home and EOT) are optional.

Model Number	Dynamic Load (lbs)	Travel (in)	Lead[1] (in)	Accuracy[2] (in/in)	Max Linear Speed (in/sec)	Lead Screw Efficiency (%)	Coefficient of Friction (Constant)	Drag Torque (in/oz)	Backlash[3] (in)
UST8020-06	200	6	.200	.0006	5	63	.09	<5	0
UST8020-12	200	12	.200	.0006	5	63	.09	<5	0
UST8020-18	200	18	.200	.0006	5	63	.09	<5	0
UST8020-24	200	24	.200	.0006	5	63	.09	<5	0
UST8050-06	200	6	.500	.0006	10	79	.09	<5	0
UST8050-12	200	12	.500	.0006	10	79	.09	<5	0
UST8050-18	200	18	.500	.0006	10	79	.09	<5	0
UST8050-24	200	24	.500	.0006	10	79	.09	<5	0

[1] Other non-stock leads and custom travel lengths are available for OEM applications.

[2] Improved accuracies available for OEM applications - contact factory.

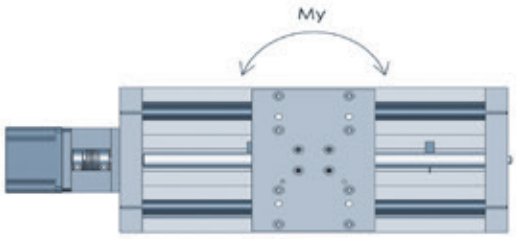
[3] Self-adjusting anti-backlash nut.

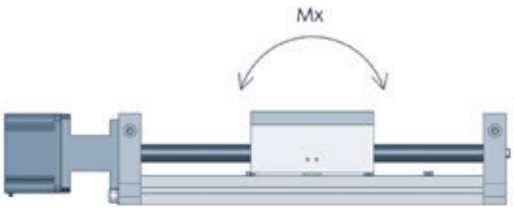
CONFIGURE PART NUMBER

UST X X X - X X X

- UST: Twintrac Series
- X: Screw diameter
- X: Screw lead
- X: Z = Anti-backlash lead screw with ceramic bushings
- X: Travel (inches)
- X: Motor style
  - S = Step motor
  - N = No motor
  - A = Accuriss
- X: Limits
  - 0 = No limits
  - 1 = EOT/Home

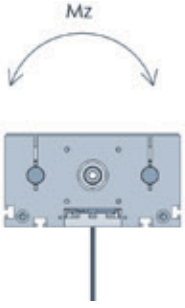
TWINTRAC MOMENT LOAD

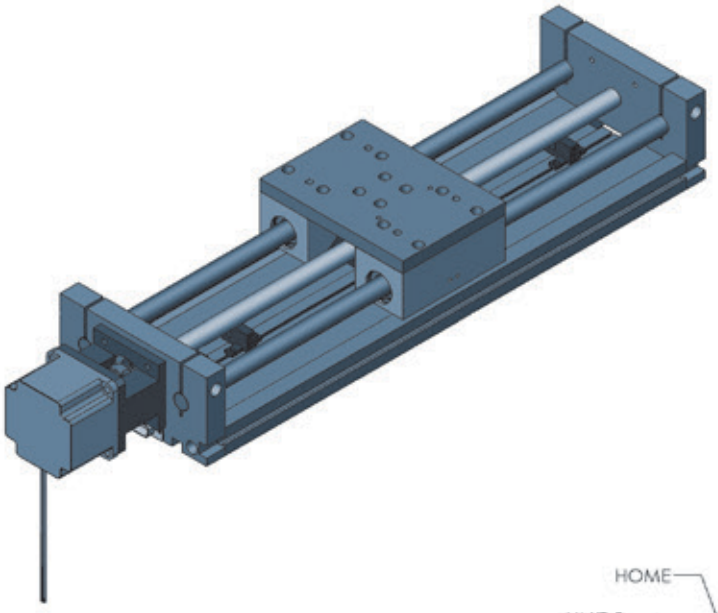


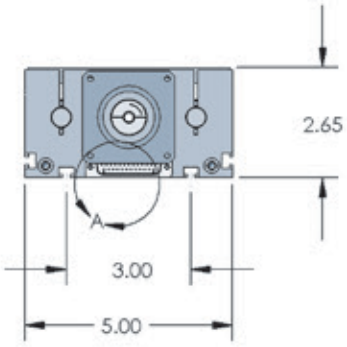


Maximum Static Moment

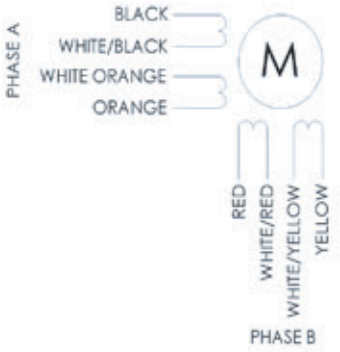
Mx	in-lb	30.0
My	in-lb	30.0
Mz	in-lb	20.0

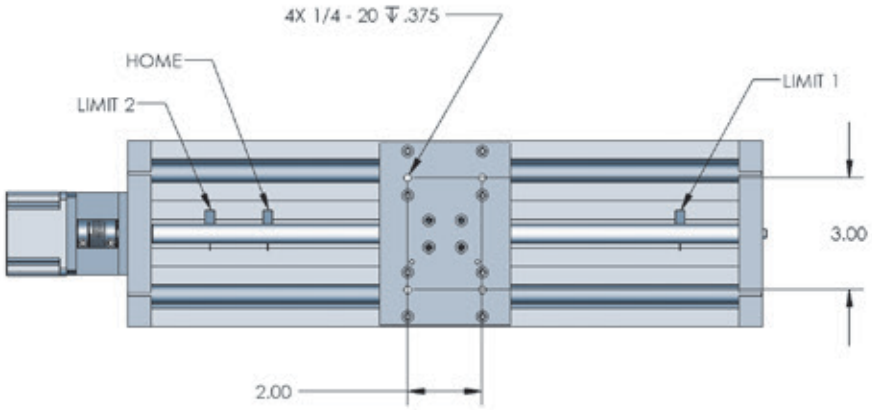


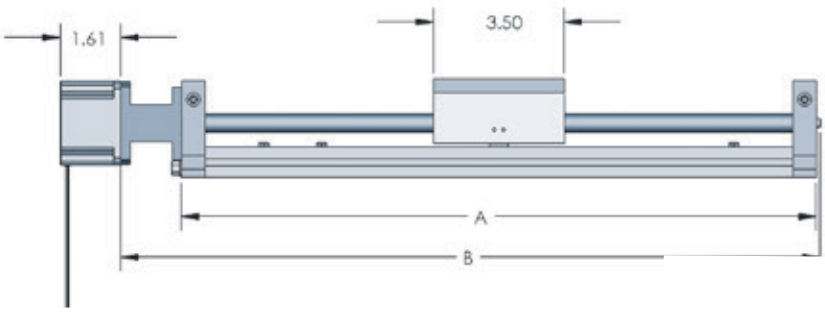




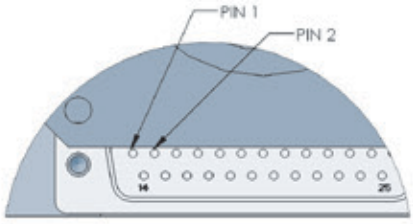
MOTOR WIRE DIAGRAM







PIN	CONNECT
1	V +
2	COMMON
3	LIMIT 1 OUTPUT
4	HOME OUTPUT
5	LIMIT 2 OUTPUT



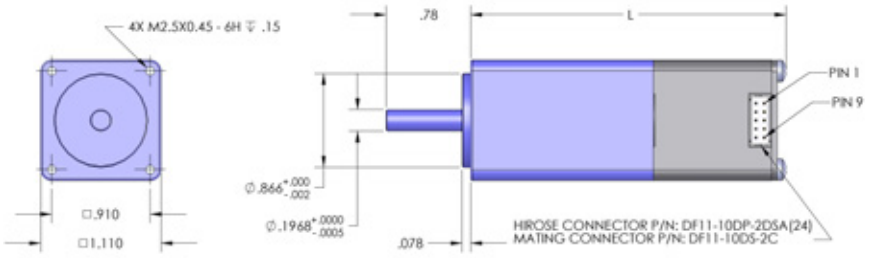
TRAVEL	DIM "A"	DIM "B"
in (mm)	in (mm)	in (mm)
6 (152.4)	11.1 (281.9)	12.75 (323.9)
12 (304.8)	17.01 (432.1)	18.75 (476.3)
18 (457.2)	23.01 (584.5)	24.75 (628.7)
24 (609.6)	29.01 (736.9)	30.75 (781.1)

USAutomation's Accuriss™ motors offer a complete motor/drive/control and I/O in a compact package. With a 1.8° step motor as a foundation, the integrated intelligent controller microsteps the motor to eliminate resonance and increase positioning resolution. The controller includes a high level command structure to program both motion and I/O. The Accuriss series can be daisy chained to up to 16 units via a single RS485 or USB communication port and can be easily controlled on the fly or preprogrammed to operate on power-up or via input selection. A start-up kit is available which contains everything needed to get an Accuriss up and running quickly for prototype or breadboard testing.

Model Number	Holding Torque (oz in)	Max Current (A)	Max Voltage (V)	Rotor Inertia (oz in sec^2)	Shaft Diameter (in)	I/O (input/output)	Weight (lbs)	Length "L" (in)
USA28-2102	8	0.7	30.0	.00013	0.197	2/2	.28	2.16
USA28-2202	13	0.7	30.0	.00017	0.197	2/2	.41	2.67
USA28-2302	17	0.7	30.0	.00025	0.197	2/2	.47	2.91
USA42-2106	45	2.0	40.0	.00050	0.197	4/2	.62	2.46
USA42-2206	68	2.0	40.0	.00076	0.197	4/2	.76	2.70
USA42-2306	85	2.0	40.0	.00109	0.197	4/2	.91	3.01
USA42-2406	106	2.0	40.0	.00161	0.197	4/2	1.1	3.48
USA57-2106	160	2.0	40.0	.0042	0.250	4/2	1.7	2.96
USA57-2206	240	2.0	40.0	.0068	0.250	4/2	2.5	3.75

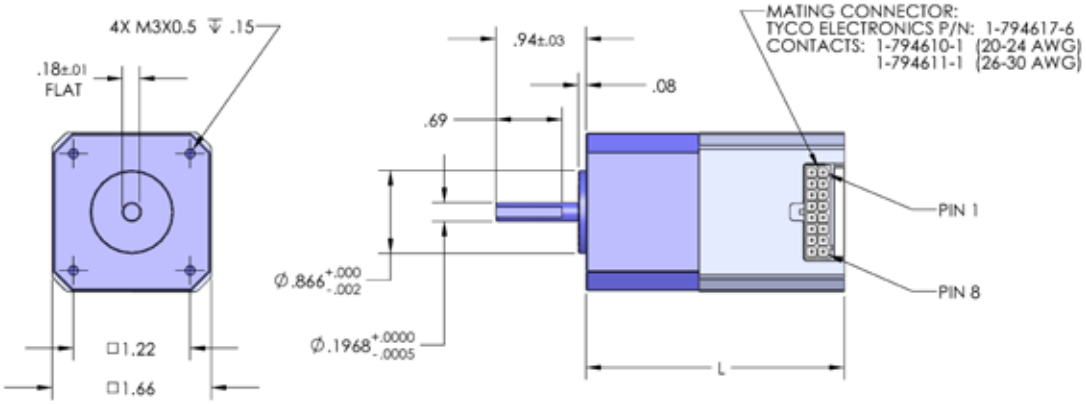
CONFIGURE PART NUMBER

USA	XX	-	XXXX	-	X
Accuriss	Frame size (mm) 28, 42, 57		Stack length & winding		Hex address 1,2,3....E,F



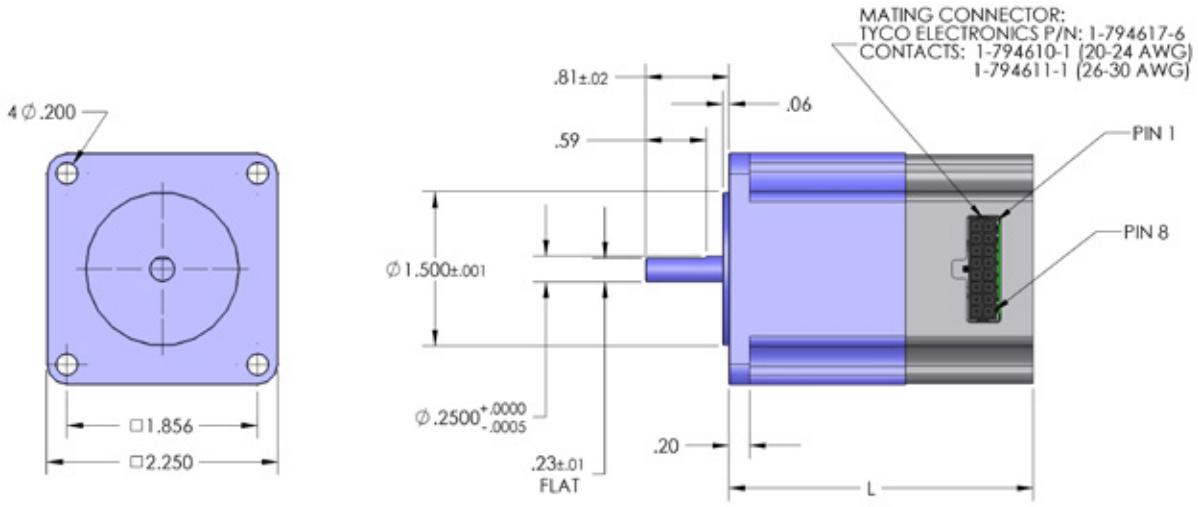
USA28

PIN #	USA28 PINOUTS
1	+9 to +30 VDC
2	Ground (-V)
3	Input #1 or Output #2
4	Input #3
5	RS485 B
6	Input #2 or Output #1
7	RS485 A
8	Optosensor LED (Power out)
9	Input #4

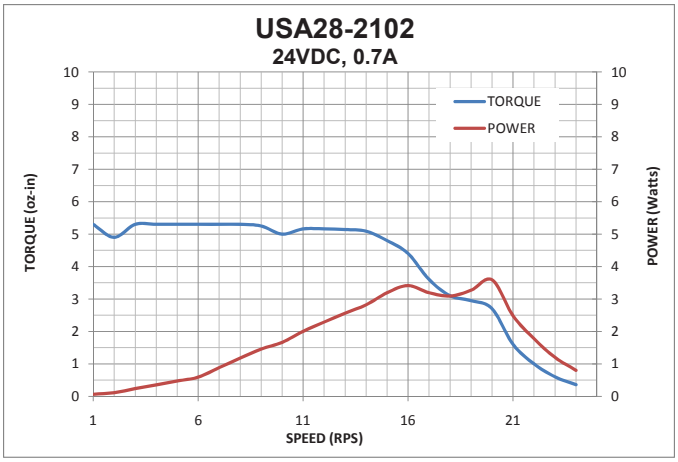


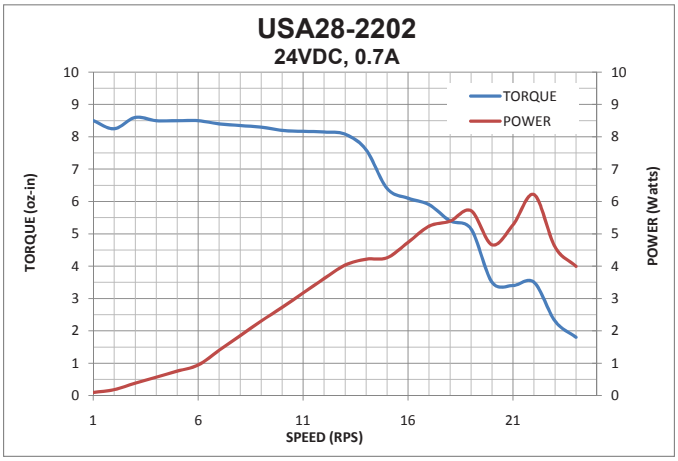
USA42

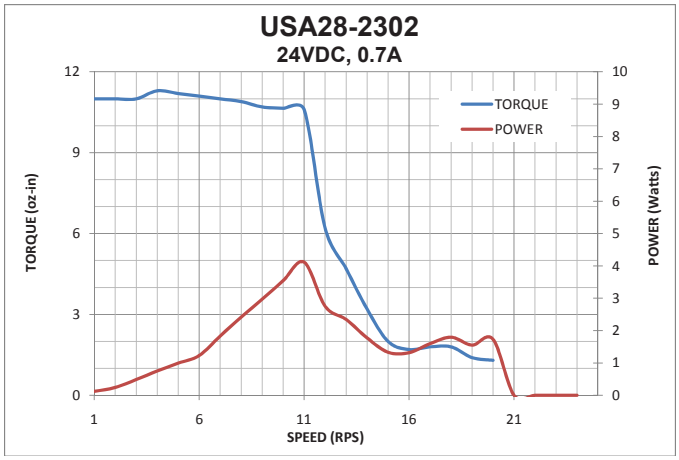
PIN #	USA42 and USA57 PINOUTS
1	Ground (-V)
2	Output #2
3	Direction Input
4	Opto +5V Input
5	Input #2
6	Opto Power Out
7	Input #3
8	RS485 A
9	+12V to +40 VDC
10	Output #1
11	Step Input
12	Signal Gound
13	Input #1
14	Input #4
15	RS485 B
16	N/C

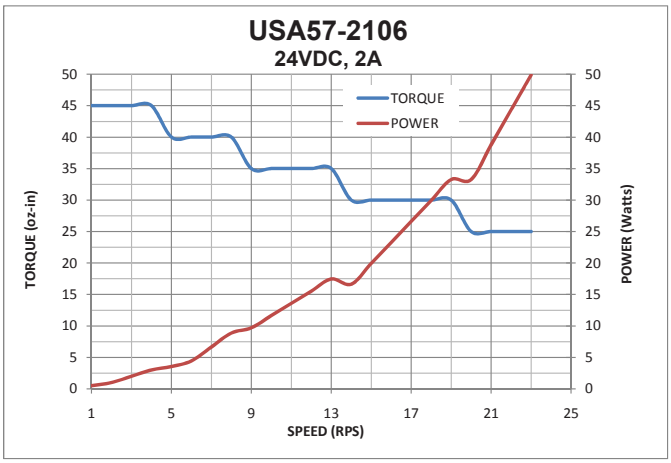


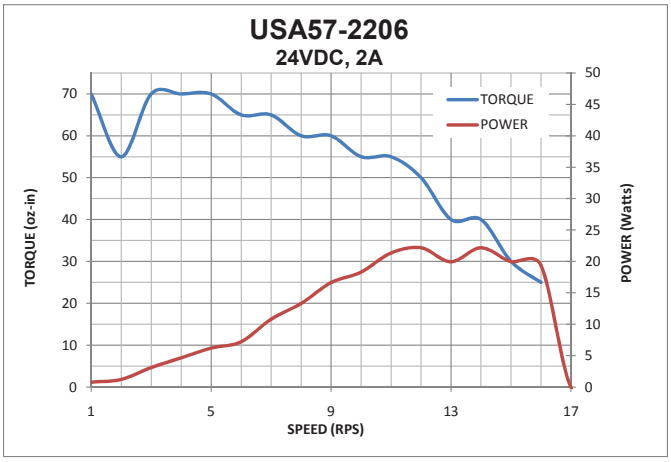
USA57


USA28-2102
24VDC, 0.7A
TORQUE
POWER
TORQUE (oz-in)
POWER (Watts)
SPEED (RPS)


USA28-2202
24VDC, 0.7A
TORQUE
POWER
TORQUE (oz-in)
POWER (Watts)
SPEED (RPS)


USA28-2302
24VDC, 0.7A
TORQUE
POWER
TORQUE (oz-in)
POWER (Watts)
SPEED (RPS)


USA57-2106
24VDC, 2A
TORQUE
POWER
TORQUE (oz-in)
POWER (Watts)
SPEED (RPS)


USA57-2206
24VDC, 2A
TORQUE
POWER
TORQUE (oz-in)
POWER (Watts)
SPEED (RPS)

ACCURISS COMMAND SUMMARY

Commands to the Accuriss are single alpha characters normally followed by a numeric value. The alpha character represents “what to do” and the numeric value represents “how much to do it”. You can set values for desired velocities, accelerations, and positions. Commands can be issued one at a time or sent in a group. This allows the setting of all move parameters in one command. You can also create loops in the strings and cause the Accuriss to become a stand-alone device that responds to switch inputs. Or, storing strings into the onboard EEPROM allows the Accuriss to power up into a mode of your choice so that it can act with no computer attached. Commands can be issued by a terminal program such as “Hyperterminal” or the Accuriss Windows Terminal program. See User’s Manuals for command details for each model.

Command (case sensitive)	Operand	Description
A	0 - (2^{31})	Move motor to absolute position (microsteps or quadrature encoder ticks - 32 bit positioning).
P	0 - (2^{31})	Move motor relative in negative direction (microsteps or quadrature encoder ticks).
D	0 - (2^{31})	Move motor relative in positive direction (microsteps or quadrature encoder ticks).
Z	0 - (2^{31})	Home/initialize motor.
z	0 - (2^{31})	Change current position without moving.
f	0 or 1	Home flag polarity.
F	0 or 1	Change direction of rotation considered positive.
V	1 - (2^{24})	In position mode - set max/slew speed of motor.
L	0 - 5000	Set acceleration factor (accel = microsteps / sec^2).
g		Beginning of a repeat loop marker.
G	0 - 30000	End of a repeat loop marker. Loops can be nested up to 4 levels.
H		Halt current command string and wait until condition specified.
S		Skip next instruction depending on status of switch.
s	0 - 15	Stores a program 0-3 or 0-15 depending on model. Program 0 is executed on power up.
e	0 - 15	Executes stored program 0-15.
R		Run the command string that is currently in the execution buffer.
X		Repeat run the current command string.
m	0 - 100	For steppers - “ move” current on a scale of 0 to 100% of max current.
h	0 - 50	Sets “hold” current on a scale of 0 to 50% of max current.
j	*	Sets resolution in micro-steps per step. * USA28 @ 1,2,4,8 USA57 @ 1,2,4,8,16,32,64,128,256
n	**	Sets modes – interpret as combination of binary bits. ** See User’s Manual for details
b		Sets baud rate.
o	0 - 3000	Allows the user to correct any unevenness in microstep size.
M	0 - 30000	Wait a number of milliseconds.
J	0 - 3	Output control – interpret as 2 bit binary value, i.e. - “2” = Binary 01 = Output 1 ON and Output 2 OFF
T		Terminate current command or loop.
?	0	Returns the current commanded motor position.
?	2	Returns the current slew/max speed for position mode.
?	4	Returns the status of all four inputs, 0-15 representing a 4 bit binary pattern.
?	6	Returns the current step size in microsteps per full step.
?	9	Erases all stored commands in EEPROM.
&		Returns the current firmware revision and date.
Q		Query current status of Accuriss
n		The n mode works in both immediate mode and in strings.

VERSADRIVE™

USAutomation VersaDrive™ leadscrew step motors are the most versatile linear positioning motors on the market. They are available in thru-screw and fixed screw versions with a variety of drive nut and support bushing options. VersaDrive motors are robust and can be easily configured to solve the most difficult application problems. Integration of a leadscrew with a motor saves space, eliminates components, and reduces cost. While many standard configurations are available, custom modifications for OEM customers are welcome.

FEATURES:

- Three sizes - NEMA 11, 17 and 23
- Selection of motor windings
- Selection of screw leads
- Anti-backlash, self-compensating nut option
- Unique centering bushing option
- Optional cover only on shaft extension
- Nuts and bushings can be mounted on either front or back of motor
- Motor can be full, half or microstepped

BENEFITS:

- Wide range of forces and speeds
- Choice of winding best matched to drive
- Wide range of positioning resolutions
- Zero backlash operation (no axial play)
- Eliminate radial play, reduce noise
- Protect shaft and cosmetically enhance
- Versatility to configure drive nuts and centering bushing most ideal for each individual application
- Potential for very high linear positioning resolutions

VersaDrive 11

VersaDrive 17

VersaDrive 23

SPECIFICATIONS

Model Number	Series Voltage V	Series Current A	Series Resistance Ohms	Power Watts	Series Inductance mH	Rotor Inertia oz in sec^2 (gm cm^2)	Number of Leads	Weight (Motor only) oz (g)	Length in (mm)
USV11-110XXXXXX	2.1	1.0	2.4	2.4	1.2	1.28 x 10^{-4} (9)	4	3.9 (110)	1.26 (32.0)
USV17-105XXXXXX	6.8	0.5	13.6	3.4	16.8	4.96 x 10^{-4} (35)	4	8.0 (227)	1.30 (33.0)
USV17-110XXXXXX	3.6	1.0	3.6	3.6	4.5	4.96 x 10^{-4} (35)	4	8.0 (227)	1.30 (33.0)
USV17-115XXXXXX	2.5	1.5	1.7	3.8	2.1	4.96 x 10^{-4} (35)	4	8.0 (227)	1.30 (33.0)
USV23-110XXXXXX	5.3	1.0	5.3	5.3	13.4	1.70 x 10^{-3} (120)	4	18.3 (521)	1.75 (44.5)
USV23-120XXXXXX	3.6	2.0	1.8	7.2	3.3	1.70 x 10^{-3} (120)	4	18.3 (521)	1.75 (44.5)
USV23-130XXXXXX	2.4	3.0	.8	7.2	1.4	1.70 x 10^{-3} (120)	4	18.3 (521)	1.75 (44.5)

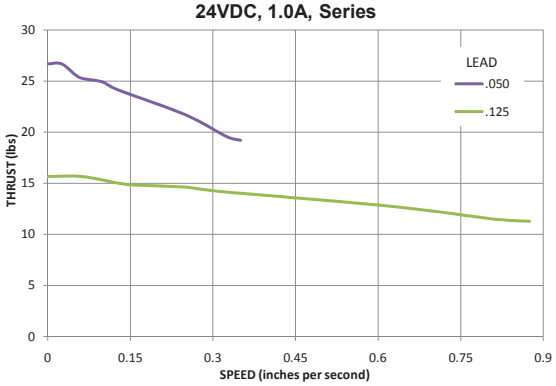
CONFIGURE PART NUMBER

USV - XX - X XX - XX - XX - XX

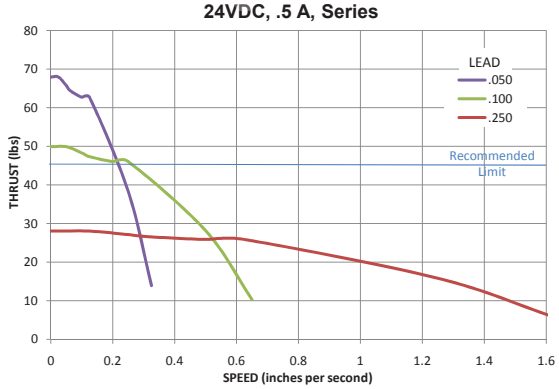
- USV: Versa Drive
- XX: Frame size: 11, 17, 23
- X: Stack length 1
- XX: Winding 10=1.0A, 15=1.5A, etc.
- XX: Attachment Front/Rear: A=Antibacklash, S=Standard nut, C=Cover, B=Bushing, F=Fixed screw, E=Encoder
- XX: Lead 05=.050", 25=.250", etc.
- XX: Leadscrew Length 06=6", 12=12", etc.

FORCE VS SPEED PERFORMANCE

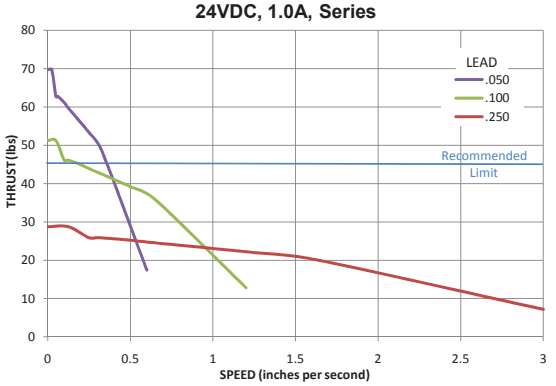
USV11-110
24VDC, 1.0A, Series



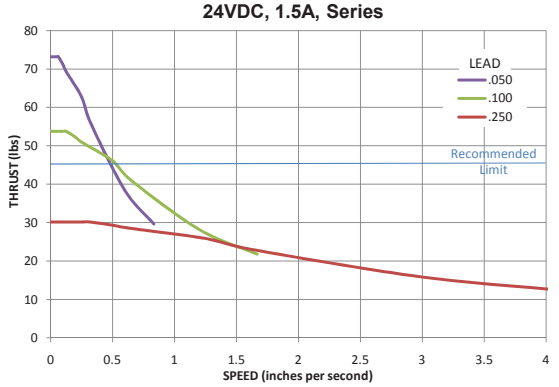
USV17-105
24VDC, .5 A, Series



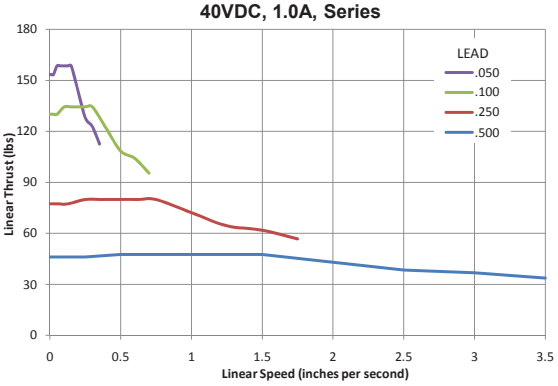
USV17-110
24VDC, 1.0A, Series



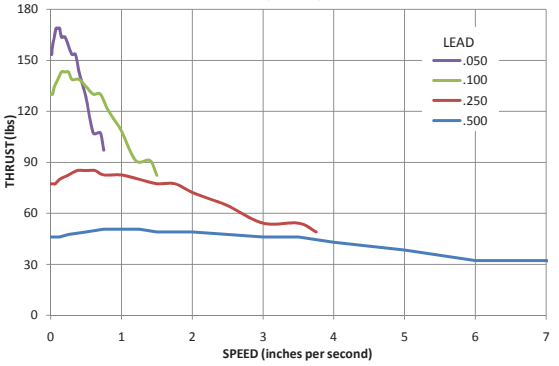
USV17-115
24VDC, 1.5A, Series



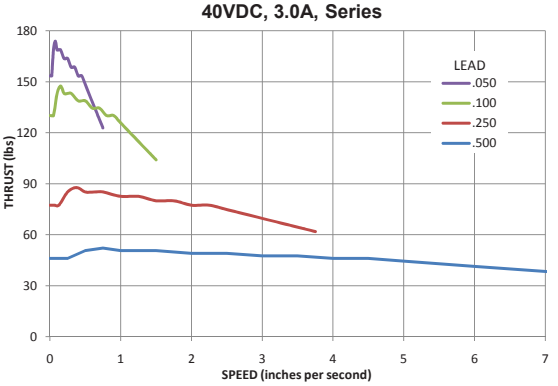
USV23-110
40VDC, 1.0A, Series



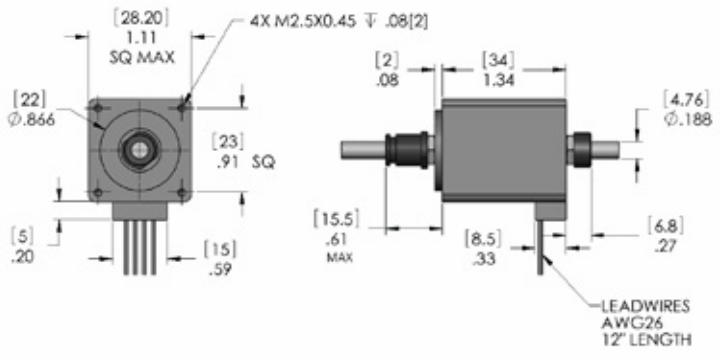
USV23-120
40VDC, 2.0A, Series



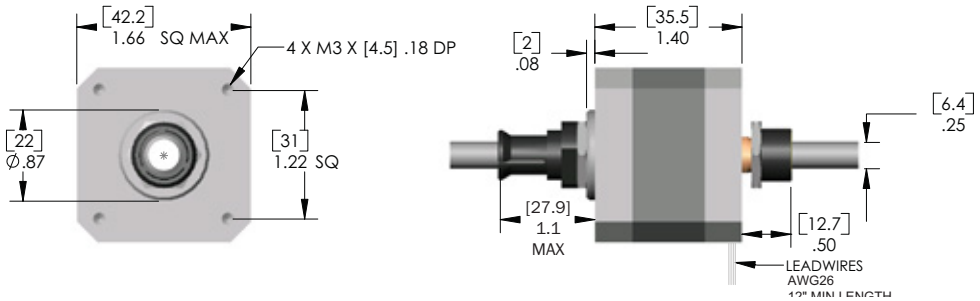
USV23-130
40VDC, 3.0A, Series



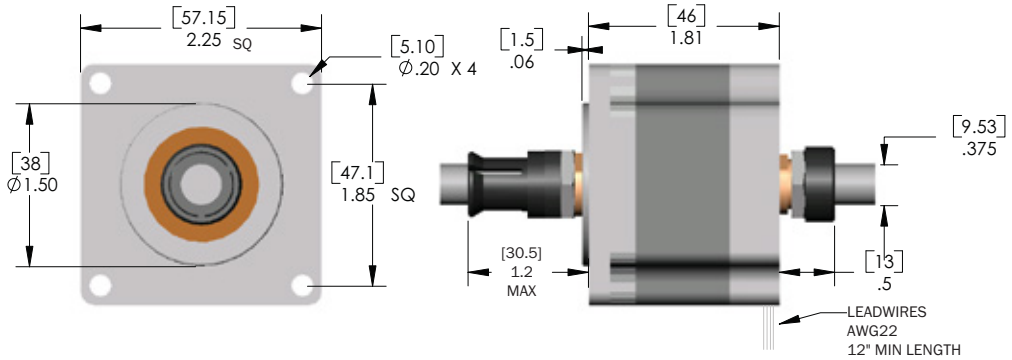
VERSADRIVE™ DRAWINGS



USV11 DIMENSIONS
Travel = Screw length - 2.2”

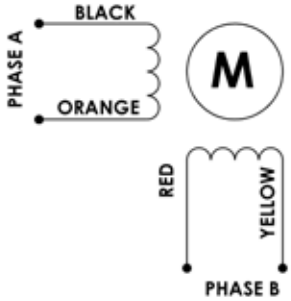


USV17 DIMENSIONS
Travel = Screw length - 2.8”



USV23 DIMENSIONS
Travel = Screw length - 3.4”

WIRING DIAGRAM



STEP	BLACK	ORANGE	RED	YELLOW
1	+	-	+	-
2	-	+	+	-
3	-	+	-	+
4	+	-	-	+

Switching sequence for motor nut to rotate in CW direction when facing output shaft of motor

LINEAR TRAVEL PER STEP

Model Number	Screw Lead in (mm)	Static Force lb (N)	Dynamic Force [1] lb (N)	Travel per Full Step [2] in (µM)	Travel per Microstep [3] in (µM)	Positioning Accuracy [4] in/in (mm/mm)
USV11-1XXXX05XX	.050 (1.27)	32 (143)	27 (120)	.00025 (6.35)	.98 x 10^{-6} (.0248)	.0004 (.0004)
USV11-1XXXX12XX	.125 (3.18)	20 (89)	16 (71)	.00063 (15.8)	2.44 x 10^{-6} (.0620)	.0004 (.0004)
USV17-1XXXX05XX	.050 (1.27)	82 (365)	70 (311)	.00025 (6.35)	.98 x 10^{-6} (.0248)	.0004 (.0004)
USV17-1XXXX10XX	.100 (2.54)	82 (365)	50 (222)	.00050 (12.7)	1.95 x 10^{-6} (.0496)	.0004 (.0004)
USV17-1XXXX25XX	.250 (6.35)	82 (365)	28 (125)	.00125 (31.8)	4.88 x 10^{-6} (.1240)	.0004 (.0004)
USV23-1XXXX05XX	.050 (1.27)	165 (734)	150 (667)	.00025 (7.35)	.98 x 10^{-6} (.0248)	.0004 (.0004)
USV23-1XXXX10XX	.100 (2.54)	165 (734)	128 (569)	.00050 (12.7)	1.95 x 10^{-6} (.0496)	.0004 (.0004)
USV23-1XXXX25XX	.250 (6.35)	165 (734)	76 (338)	.00125 (31.8)	4.88 x 10^{-6} (.1240)	.0004 (.0004)
USV23-1XXXX50XX	.500 (12.7)	165 (734)	45 (200)	.00250 (63.5)	9.77 x 10^{-6} (.2480)	.0004 (.0004)

[1] Max dynamic force at low speeds. See Force vs. Speed curves.

[2] Assuming 200 steps per revolution.

[3] Assuming a microstep resolution of 51,200 per revolution.

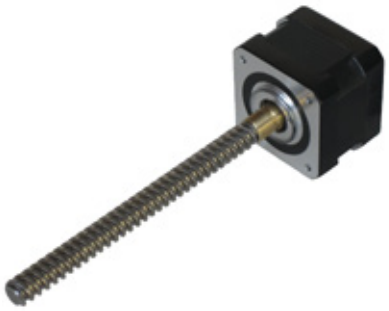
[4] Using anti-backlash nut.

MODIFICATIONS - OPTIONS

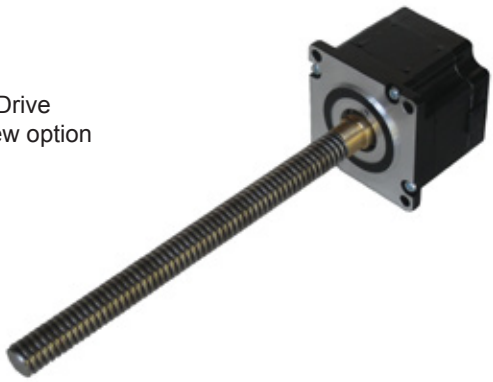
USAutomation welcomes the opportunity to customize VersaDrive motors for our OEM customers to better meet your requirements or supply a drop-in solution. Contact us with your ideas and we'll generate the necessary drawings, product specifications and quotes. Here are just a few options we have had experience with:

- Custom motor windings
- Alternate lead configurations - 6 lead, 8 lead
- Longer motor stack lengths
- Custom cabling and/or connectors
- Encoder feedback
- Alternate screw leads
- Machined screw journals to print
- Teflon coating on screw
- Custom drive nut materials or designs
- Subassemblies - VersaDrive as a component

VersaDrive
Encoder option



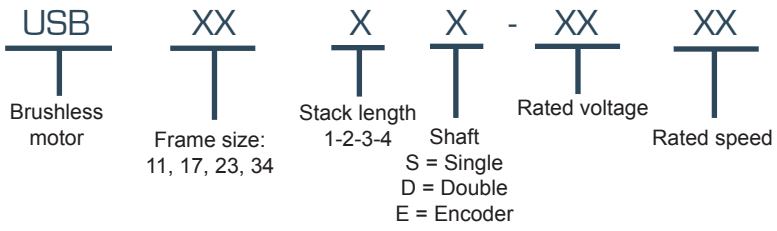
VersaDrive
Fixed screw option



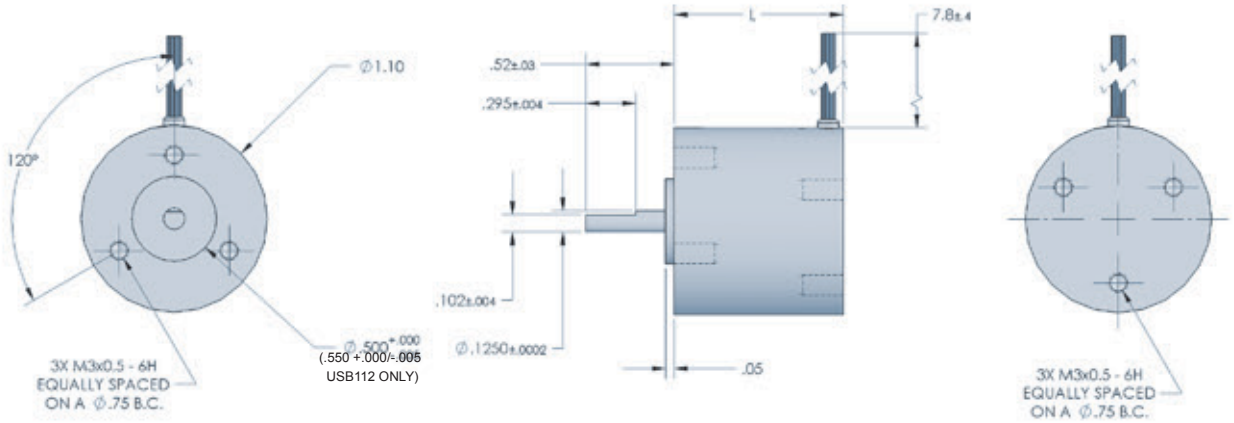
USAutomation brushless motors offer a very cost effective alternative to step motors where improved control, torque or speed are desired. Competitively priced and a drop in replacement for NEMA step motor sizes, our brushless motors are offered in a wide range of sizes and stack lengths. All motors include hall effect sensors, and mounted encoders are a standard option.

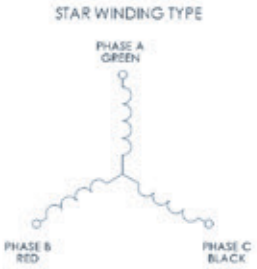
Model Number	Rated Voltage (V)	Rated Speed (RPM)	Rated Power (W)	Cont Torque (oz in)	Cont Current (A)	Peak Torque (oz in)	Peak Current (A)	Resis-tance (ohms)	Induc-tance (mH)	Torque Constant (oz in/A)	Back EMF (V/kRPM)	Rotor Inertia (oz in sec^2)	Weight (lbs)
USB110S-1580	15	8000	6	1.0	.5	3	2.5	8.0	2.0	1.94	1.6	$1.7X10^{-5}$	0.1
USB111S-2410	24	10000	15	2.0	.9	6	2.8	4.6	1.7	2.26	1.9	$3.0X10^{-5}$	0.2
USB112S-2437	24	3700	16	5.8	.8	21	3.0	4.7	3.5	7.08	3.9	$8.5X10^{-5}$	0.6
USB171S-2440	24	4000	30	10.1	2.0	27	5.4	1.8	2.1	5.0	3.7	0.00034	1.6
USB171S-1780	17	8000	42	7.1	3.6	21	10.0	0.2	0.3	2.0	1.1	0.00034	1.6
USB172S-2440	24	4000	55	18.6	3.7	54	11.0	0.8	1.2	5.0	3.7	0.00068	2.4
USB172S-1795	17	9500	69	9.8	6.5	30	20.0	0.1	0.1	1.5	0.9	0.00068	2.4
USB173S-2440	24	4000	80	27.0	5.4	80	16.0	0.6	0.8	5.0	3.8	0.00102	2.8
USB174S-2440	24	4000	110	37.2	7.4	110	20.0	0.3	0.5	5.0	3.9	0.00136	3.9
USB231S-3640	36	4000	25	8.5	1.1	25	3.5	4.1	10.0	7.5	5.5	0.00042	1.8
USB232S-3640	36	4000	50	16.9	1.9	55	7.0	1.5	4.2	9.0	6.6	0.00106	2.2
USB233S-3640	36	4000	95	32.1	3.6	100	15.0	0.7	2.2	9.0	6.6	0.00169	3.0
USB234S-3640	36	4000	135	45.6	5.1	145	18.0	0.45	1.4	9.0	6.6	0.00245	3.7
USB235S-3640	36	4000	180	60.9	6.8	185	22.5	0.35	1.0	9.0	6.6	0.00326	4.5
USB342S-2430	24	3000	220	99.2	13.1	300	40.0	0.04	0.1	7.6	4.4	0.0113	4.1
USB342S-3030	30	3000	220	99.2	9.8	300	30.0	0.07	0.2	10.1	6.0	0.0113	4.1
USB343S-3030	30	3000	440	198.3	18.7	600	57.0	0.08	0.1	10.6	5.8	0.0227	5.7
USB341S-4832	48	3200	110	46.5	3.3	150	11.0	1.05	2.2	14.0	10.5	0.0057	3.3
USB342S-4832	48	3200	220	93.0	5.8	300	19.0	0.36	1.1	16.0	11.5	0.0113	4.1
USB343S-4832	48	3200	440	185.9	10.3	600	33.0	0.20	0.5	18.0	13.5	0.0227	5.7
USB344S-4832	48	3200	660	278.9	16.4	900	55.0	0.16	0.3	17.0	11.5	0.0340	8.8

CONFIGURE PART NUMBER



USB11 SERIES

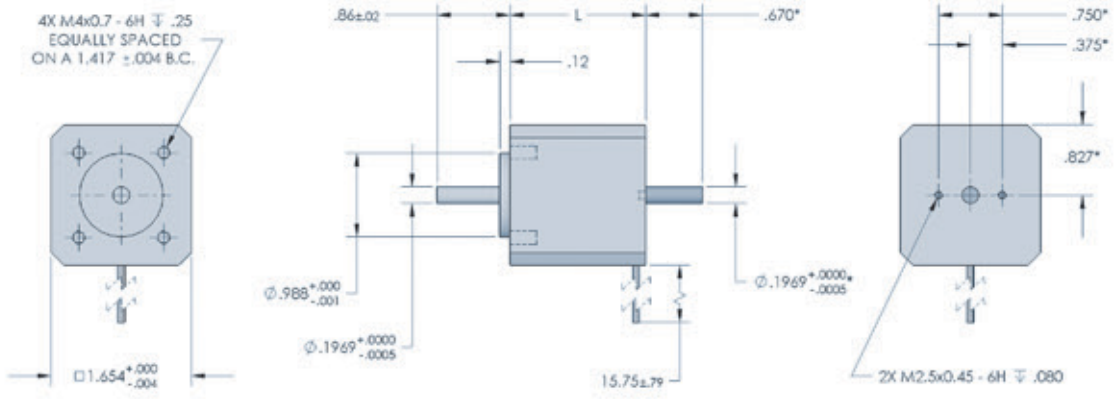




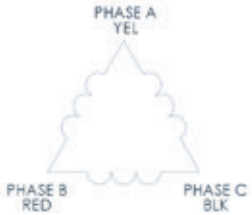
WIRE COLOR	DESCRIPTION
YELLOW	HALL +V
BLUE	HALL A
ORANGE	HALL B
BROWN	HALL C
WHITE	HALL GROUND
GREEN	PHASE A
RED	PHASE B
BLACK	PHASE C

MOTOR P/N	DIM "L"
	in (mm)
USB110S-1580	1.00 (25.4)
USB111S-2410	1.50 (38.1)
USB112S-2437	3.03 (77.0)

USB17 SERIES



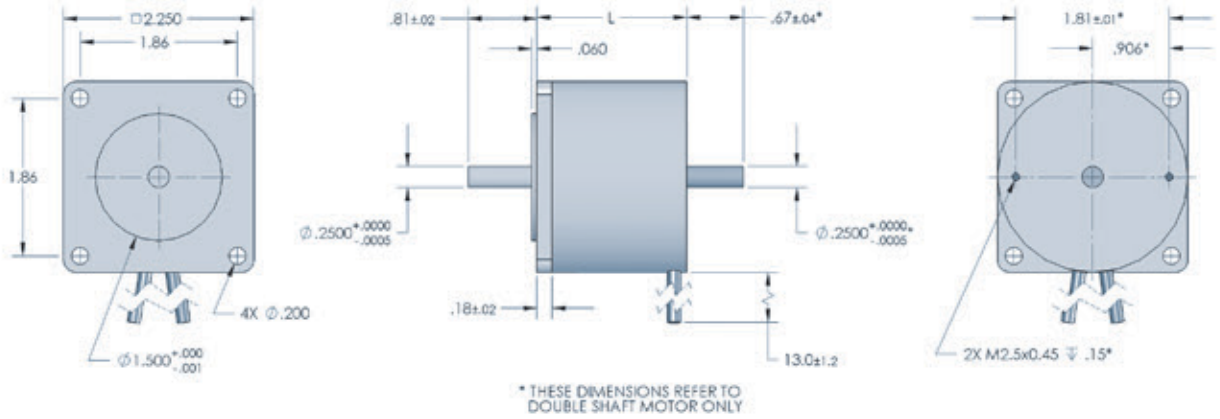
* THESE DIMENSIONS REFER TO DOUBLE SHAFT MOTOR ONLY

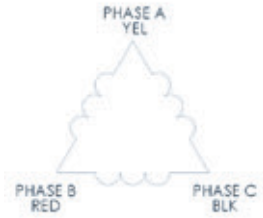


WIRE COLOR	DESCRIPTION
RED	HALL +V
BLUE	HALL A
GREEN	HALL B
WHITE	HALL C
BLACK	HALL GROUND
YELLOW	PHASE A
RED	PHASE B
BLACK	PHASE C

MOTOR P/N	DIM "L"
	in (mm)
USB171S-2440	1.60 (40.6)
USB171S-1780	1.60 (40.6)
USB172S-2440	2.40 (61.0)
USB172S-1795	2.40 (61.0)
USB173S-2440	3.20 (81.3)
USB174S-2440	3.90 (99.1)

USB23 SERIES

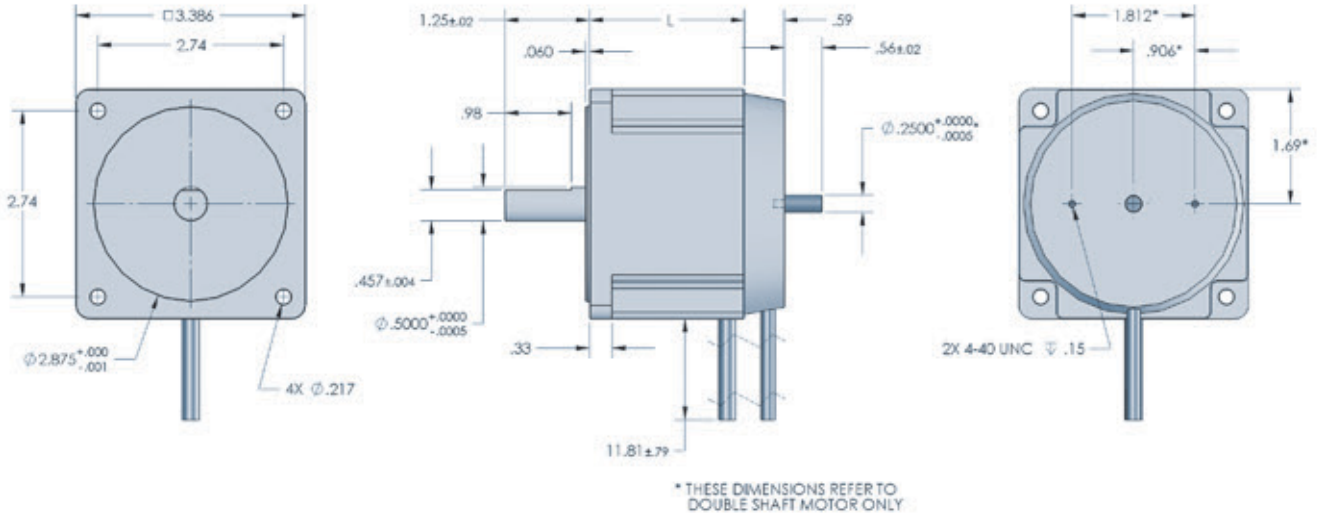


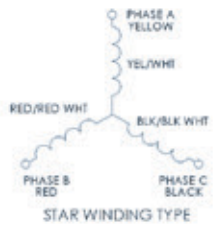


WIRE COLOR	DESCRIPTION
RED	HALL +V
BLUE	HALL A
GREEN	HALL B
WHITE	HALL C
BLACK	HALL GROUND
YELLOW	PHASE A
RED	PHASE B
BLACK	PHASE C

MOTOR P/N	DIM "L"
	in (mm)
USB231S-3640	1.77 (45.0)
USB232S-3640	2.16 (54.9)
USB233S-3640	2.95 (74.9)
USB234S-3640	3.74 (95.0)
USB235S-3640	4.53 (115.1)

USB34 SERIES





WIRE COLOR	DESCRIPTION
RED	HALL +V
BLUE	HALL A
GREEN	HALL B
WHITE	HALL C
BLACK	HALL GROUND
YEL - YEL/WHT	PHASE A
RED - RED/WHT	PHASE B
BLK - BLK/WHT	PHASE C

MOTOR P/N	DIM "L"
	in (mm)
USB341S-4832	2.28 (57.9)
USB342S-4832	2.80 (71.1)
USB342S-2430	2.80 (71.1)
USB342S-3030	2.80 (71.1)
USB343S-4832	3.86 (98.0)
USB343S-3030	3.86 (98.0)
USB344S-4832	4.92 (125.0)

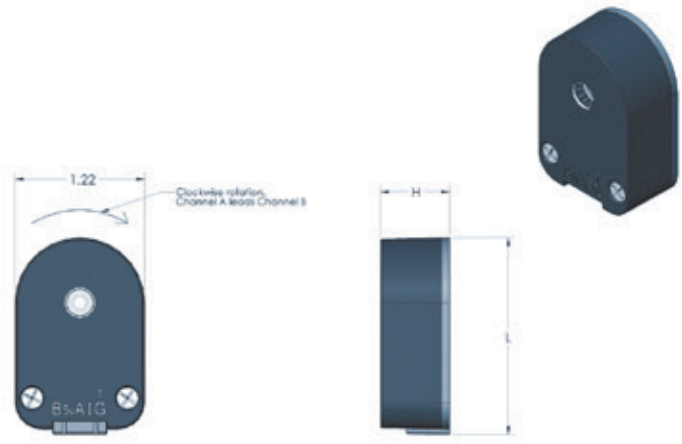
ENCODERS

USAutomation offers a line of optical encoders which can be mounted to any of our step motors or brushless motors. When mounted on a step motor, encoders provide a means of “position maintenance” if the drive used accepts encoder inputs. When mounted on a brushless motor an encoder provides the position information necessary for a velocity and/or position servo loop. When added in the part number as a standard option to a motor the encoder supplied will have a resolution of 1000 lines (before quadrature), differential outputs, and an index pulse. Other encoder configurations are available.

Motor Series	Part Number Designator	Encoder Line Count	Encoder Resolution	Added Length of Encoder to Motor	Differential Output	Index Pulse	Housing	Cable P/N (3 ft)
USS11	USS11TXXX-4E	1000	4000	.65	Yes	Yes	Polycarbonate	E1-CBL3
USB11	USB11XE-XXXX	1000	4000	.65	Yes	Yes	Polycarbonate	E1-CBL3
USS17	USS17TXXX-4E	1000	4000	.65	Yes	Yes	Polycarbonate	E1-CBL3
USB17	USB17XE-XXXX	1000	4000	.65	Yes	Yes	Polycarbonate	E1-CBL3
USS23	USS23TXXX-4E	1000	4000	.65	Yes	Yes	Polycarbonate	E2-CBL3
USB23	USB23XE-XXXX	1000	4000	.65	Yes	Yes	Polycarbonate	E2-CBL3
USS34	USS34TXXX-4E	1000	4000	.65	Yes	Yes	Polycarbonate	E2-CBL3
USB34	USB34XE-XXXX	1000	4000	.65	Yes	Yes	Polycarbonate	E2-CBL3

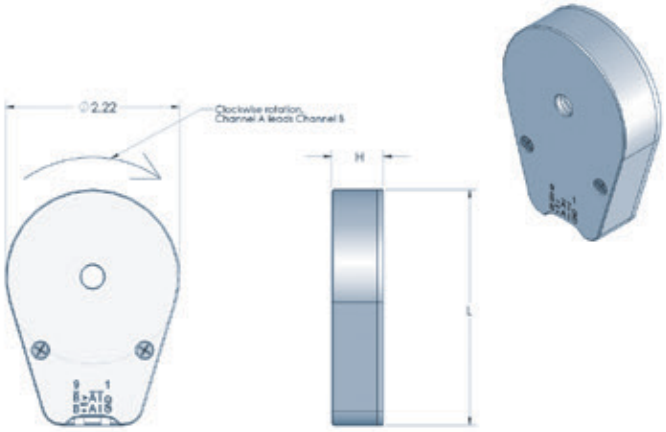
E1 ENCODER

Used on NEMA 11 and 17



E2 ENCODER

Used on NEMA 23 and 34



USAutomation step motors solve almost any application calling for precise open loop positioning. Our wide range of sizes are among the most competitive offered anywhere. Most sizes are available in prototype quantities off the shelf. OEM custom configurations are encouraged.

Model Number	Bipolar Torque (oz in)	Series Voltage (V)	Series Current (A)	Series Resistance (Ohms)	Series Inductance (mH)	Rotor Inertia (oz in sec^2)	Shaft Diameter (in)	Number of Leads	Weight (lbs)	Length (in)
USS08T2102-4S	2.5	3.9	0.60	6.50	1.7	.000028	0.1575	4	0.13	1.18
USS08T2302-4S	4.2	4.3	0.80	5.40	1.5	.000051	0.1575	4	0.18	1.65
USS11T2102-4S	8.3	3.8	0.67	5.60	3.4	.00013	0.197	4	0.24	1.26
USS11T2202-4S	13.2	4.6	0.67	6.80	4.9	.00017	0.197	4	0.31	1.77
USS11T2302-4S	16.7	6.2	0.67	9.20	7.2	.00025	0.197	4	0.44	2.01
USS17T2001-4S	24	9.6	0.40	24.00	30.0	.00028	0.197	4	0.33	1.02
USS17T2101-4S	31	13.3	0.28	48.00	60.0	.00050	0.197	4	0.50	1.32
USS17T2102-4S	31	5.6	0.67	8.40	10.0	.00050	0.197	4	0.50	1.32
USS17T2201-4S	50	17.1	0.28	60.00	100.0	.00076	0.197	4	0.60	1.58
USS17T2202-4S	50	5.6	0.85	6.60	12.8	.00076	0.197	4	0.60	1.58
USS17T2301-4S	62	17.1	0.28	60.00	100.0	.00096	0.197	4	0.80	1.89
USS17T2302-4S	62	5.6	0.85	6.60	11.2	.00096	0.197	4	0.80	1.89
USS17T2402-4S	100	10.1	0.85	12.00	28.0	.00143	0.197	4	1.10	2.36
USS23T2002-8S	76	8.1	0.70	11.40	21.6	.0017	0.250	8	1.00	1.61
USS23T2004-8S	76	4.1	1.40	2.80	5.6	.0017	0.250	8	1.00	1.61
USS23T2006-8S	76	2.7	2.10	1.26	2.4	.0017	0.250	8	1.00	1.61
USS23T2104-8S	175	5.1	1.40	3.60	10.0	.0042	0.250	8	1.55	2.20
USS23T2106-8S	175	3.4	2.10	2.20	4.4	.0042	0.250	8	1.55	2.20
USS23T2206-8S	262	4.3	2.10	2.00	6.4	.0068	0.250	8	2.21	3.00
USS23T2210-8S	262	2.6	3.50	.70	1.6	.0068	0.250	8	2.21	3.00
USS23T2306-8S	425	5.9	2.80	2.10	10.0	.0103	0.250	8	3.31	4.52
USS34T2004-8S	467	7.1	1.40	5.30	45.2	.014	0.500	8	3.70	2.56
USS34T2006-8S	467	3.3	3.00	2.40	15.6	.014	0.500	8	3.70	2.56
USS34T2008-8S	467	3.6	2.80	1.30	3.9	.014	0.500	8	3.70	2.56
USS34T2010-8S	467	2.9	3.50	.96	6.0	.014	0.500	8	3.70	2.56
USS34T2104-8S	637	10.0	1.40	7.20	56.8	.020	0.500	8	5.10	3.15
USS34T2108-8S	637	5.0	2.80	1.68	15.2	.020	0.500	8	5.10	3.15
USS34T2112-8S	637	3.3	4.30	.78	6.8	.020	0.500	8	5.10	3.15
USS34T2207-8S	1200	7.2	2.50	2.60	33.2	.038	0.500	8	8.40	4.65
USS34T2214-8S	1200	3.6	5.00	.82	8.0	.038	0.500	8	8.40	4.65
USS34T2307-8S	1700	8.8	2.50	3.60	50.0	.057	0.625	8	12.00	6.14
USS34T2314-8S	1700	4.4	5.00	.90	14.0	.057	0.625	8	12.00	6.14

CONFIGURE PART NUMBER

USS — Step motor

XX — Frame size: 8, 11, 17, 23, 34

X — T = 1.8 degree; Y = .9 degree *

XXXX — Stack length & winding

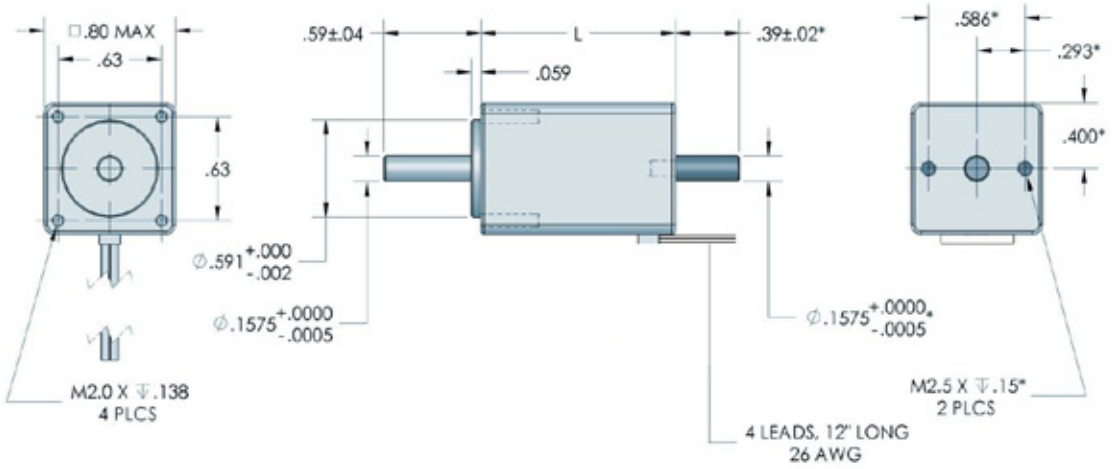
\-

X — # of lead wires

X — Shaft: S = Single, D = Double, E = Encoder

* Contact the factory for more details

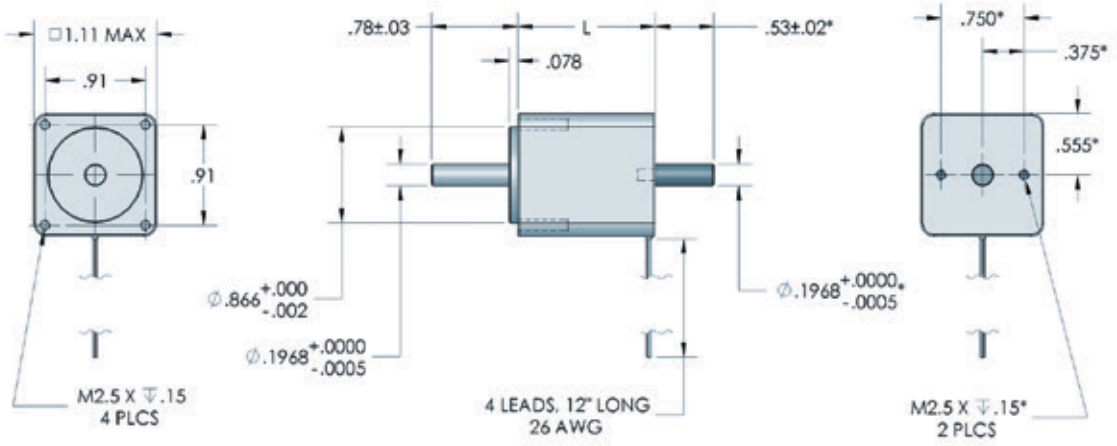
USS08T SERIES



* THESE DIMENSIONS REFER TO DOUBLE SHAFT VERSION ONLY

MOTOR P/N	DIM "L"
	in (mm)
USS08T2102-4S	1.18 (30.0)
USS08T2302-4S	1.65 (41.9)

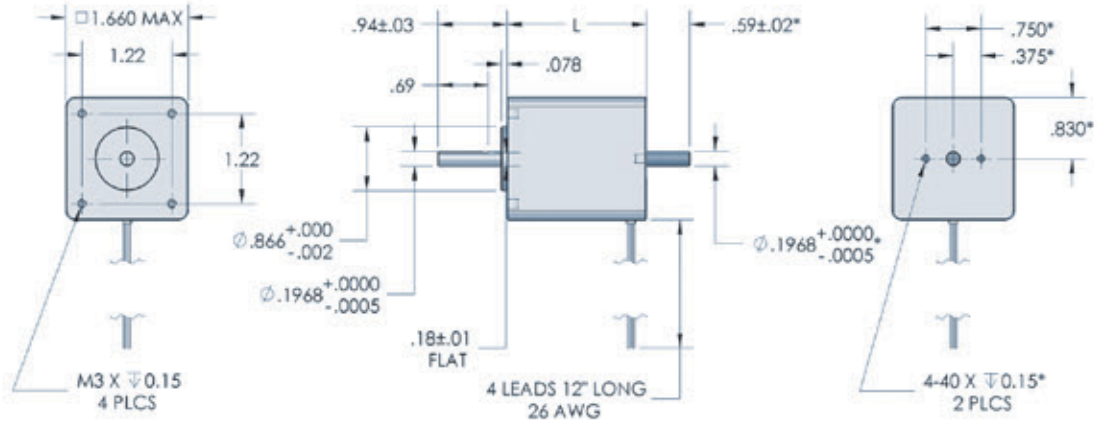
USB11T SERIES



THESE DIMENSIONS REFER TO DOUBLE SHAFT VERSION ONLY

MOTOR P/N	DIM "L"
	in (mm)
USS11T2102-4S	1.25 (31.8)
USS11T2202-4S	1.75 (44.5)
USS11T2302-4S	2.00 (50.8)

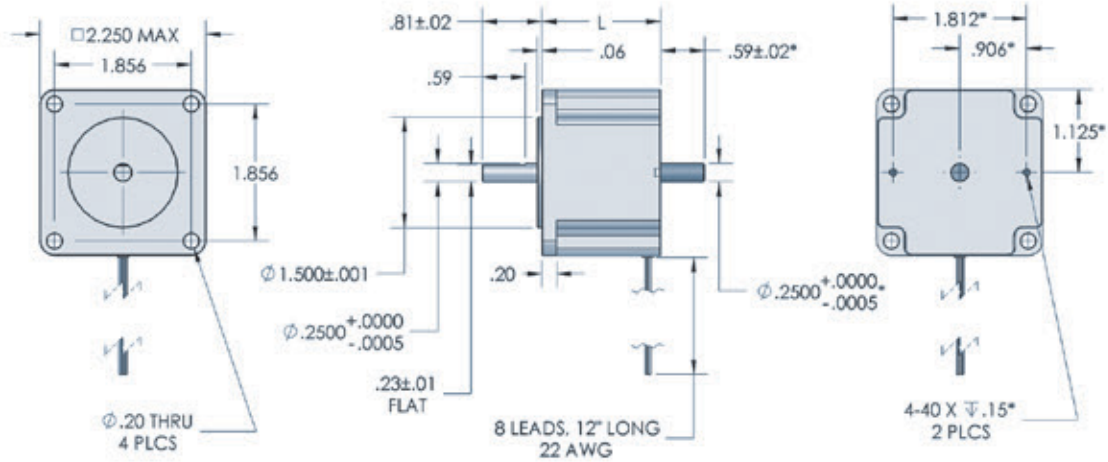
USS17T SERIES



* THESE DIMENSIONS REFER TO DOUBLE SHAFT VERSION ONLY

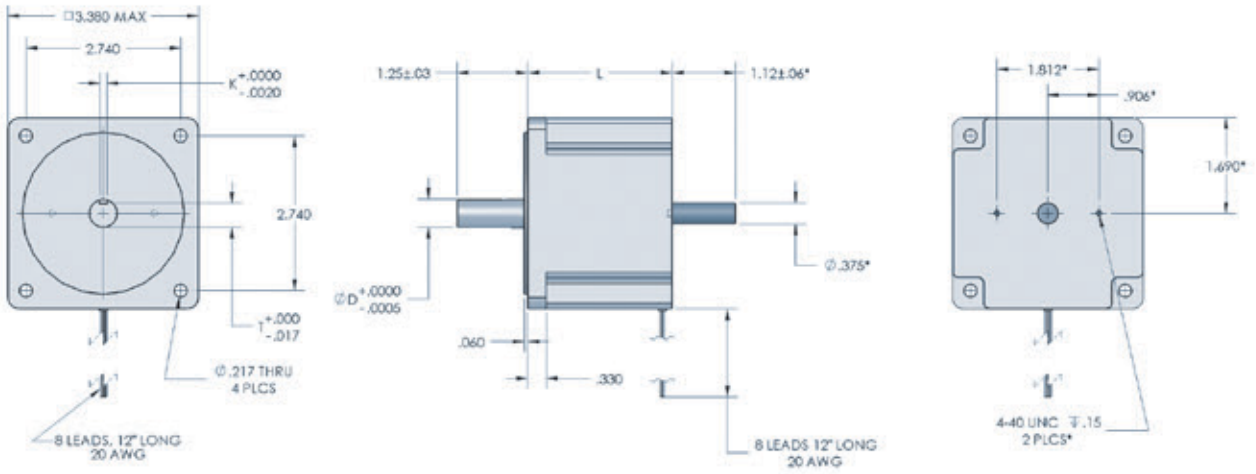
MOTOR P/N	DIM "L"
	in (mm)
USS17T2001-4S	1.02 (25.9)
USS17T2101-4S	1.34 (34.0)
USS17T2102-4S	1.34 (34.0)
USS17T2201-4S	1.58 (40.1)
USS17T2202-4S	1.58 (40.1)
USS17T2301-4S	1.89 (48.0)
USS17T2302-4S	1.89 (48.0)
USS17T2402-4S	2.36 (59.9)

USB23T SERIES



* THESE DIMENSIONS REFER TO DOUBLE SHAFT VERSIONS ONLY

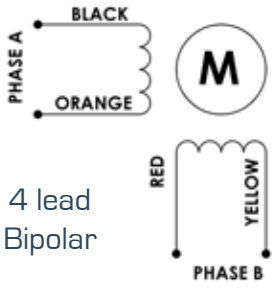
MOTOR P/N	DIM "L"
	in (mm)
USS23T2002-8S	1.62 (41.2)
USS23T2004-8S	1.62 (41.2)
USS23T2006-8S	1.62 (41.2)
USS23T2104-8S	2.21 (56.1)
USS23T2106-8S	2.21 (56.1)
USS23T2206-8S	3.00 (76.2)
USS23T2210-8S	3.00 (76.2)
USS23T2306-8S	4.52 (114.8)



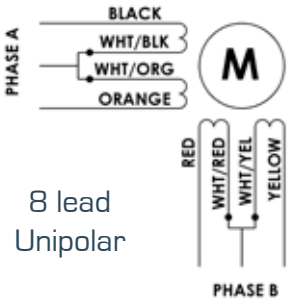
* THESE DIMENSIONS REFER TO DOUBLE SHAFT VERSION ONLY

MOTOR P/N	DIM "D"	DIM "K"	DIM "I"	DIM "L"
	in (mm)	in (mm)	in (mm)	in (mm)
USS34T2004-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	2.56 (65.0)
USS34T2006-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	2.56 (65.0)
USS34T2008-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	2.56 (65.0)
USS34T2010-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	2.56 (65.0)
USS34T2104-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	3.15 (80.0)
USS34T2108-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	3.15 (80.0)
USS34T2112-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	3.15 (80.0)
USS34T2207-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	4.65 (118.1)
USS34T2214-8S	.500 (12.7)	.125 (3.2)	.430 (10.9)	4.65 (118.1)
USS34T2307-8S	.625 (15.9)	.188 (4.8)	.518 (13.2)	6.14 (156.0)
USS34T2314-8S	.625 (15.9)	.188 (4.8)	.518 (13.2)	6.14 (156.0)

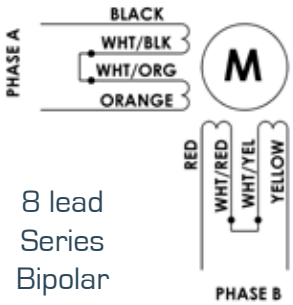
STEP MOTOR WIRING DIAGRAMS



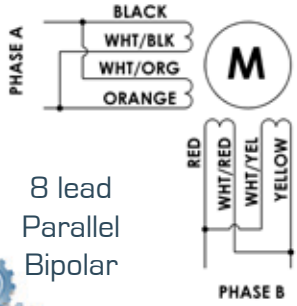
4 lead Bipolar



8 lead Unipolar



8 lead Series Bipolar



8 lead Parallel Bipolar

STEP	BLACK	ORANGE	RED	YELLOW
1	+	-	+	-
2	-	+	+	-
3	-	+	-	+
4	+	-	-	+

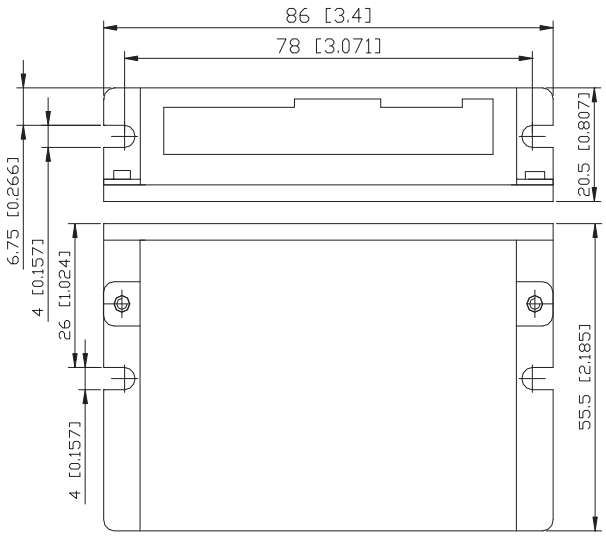
Switching sequence for motor shaft to rotate in CW direction when facing output shaft of motor

USAutomation's USSD2240 is a compact high performance DSP based digital microstepping drive utilizing an advanced control algorithm to minimize resonances, optimize system smoothness and maximize available torque. A built-in self test feature can recognize the motor being driven and internally set the operating parameters for optimal performance. The result is that overall motor performance is smoother, noise and vibration are minimized, and less heat is generated.

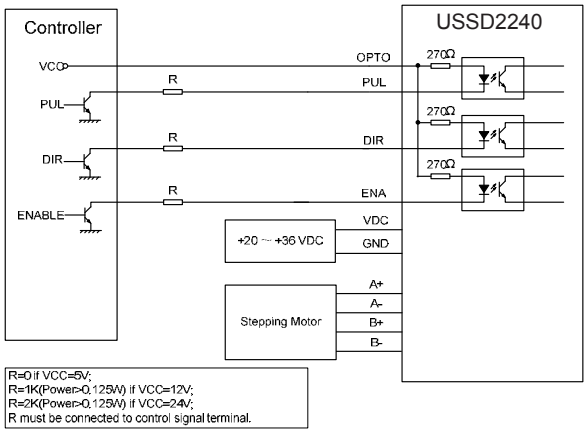
The USSD2240 includes Pulse/Direction inputs and can drive a wide variety of hybrid step motors from NEMA 08 to NEMA 23 at up to 2.2A per phase current rating. The drive creates microsteps up to 6,400 discrete steps per revolution. Suitable applications include medical equipment, lab automation, XY positioning systems, vision systems, etc.

SPECIFICATIONS:

Microstep resolutions	1600, 3200, 6400
Current rating	Up to 2.2A per phase
Supply voltage range	+20VDC to +40VDC
Logic inputs	Pulse, Direction, Enable
Protection	Over-voltage, Over-current
LED Indicators	Power and Fault Status



Outline dimensions



Typical connection diagram

FEATURES:

- DIP switch selectable microstep resolutions
- DIP switch selectable current settings
- Self-testing of motor
- Pulse/Direction inputs
- LED status indicators
- Automatic current reduction at standstill

BENEFITS:

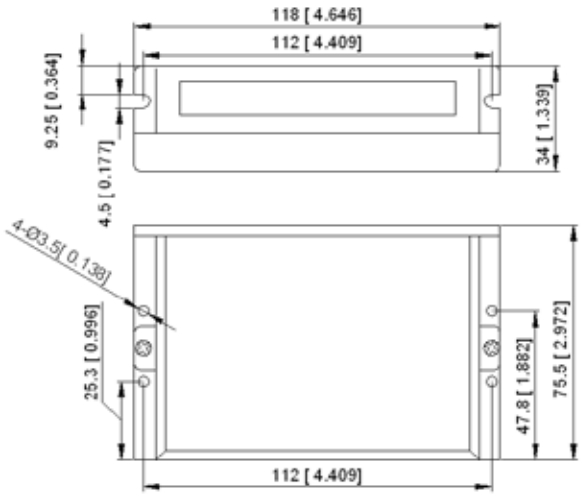
- Smoother motion, improved resolution
- Optimize current and torque for different motors
- Automatically sets internal motor parameters
- Allows drive to be used with a variety of controllers
- Visual indication of power and alarm signals
- Motor runs cooler

USAutomation's USSD4250 is a compact high performance microstepping drive based on a sinusoidal current profile to minimize resonances, optimize system smoothness and maximize available torque. The result is that overall motor performance is smoother, noise and vibration are minimized, and less heat is generated.

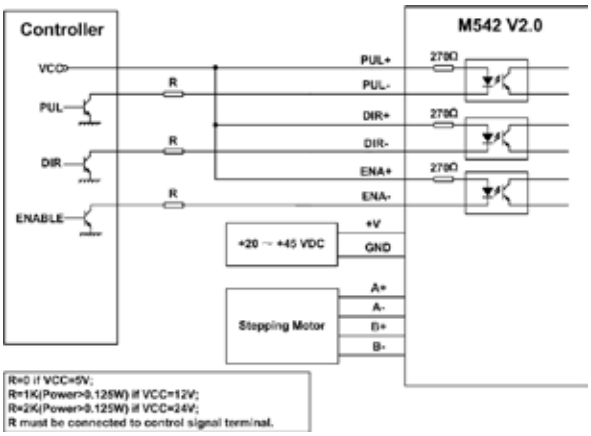
The USSD2240 includes Pulse/Direction or Dir+/Dir- inputs and can drive a wide variety of hybrid step motors from size NEMA 11 to NEMA 34 at up to 4.2A per phase current rating. The drive can microstep up to 25,000 discrete steps per revolution. Suitable applications include medical equipment, lab automation, XY positioning systems, pick-and-place systems, etc.

SPECIFICATIONS:

Microstep resolutions	15 selectable - 400 to 25,000
Current rating	Up to 4.2A per phase
Supply voltage range	+20VDC to +50VDC
Logic inputs	Pulse, Direction, Enable
Protection	Over/Under-voltage, Over-current
LED Indicators	Power and Fault Status



Outline dimensions



Typical connection diagram

FEATURES:

- DIP switch selectable microstep resolutions
- DIP switch selectable current settings
- Pulse/Direction (or Dir+/Dir-) inputs
- LED status indicators
- Automatic current reduction at standstill

BENEFITS:

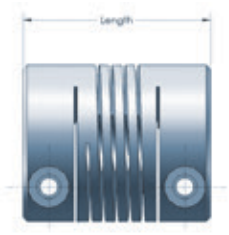
- Smoother motion, improved resolution
- Optimize current and torque for different motors
- Allows drive to be used with a variety of controllers
- Visual indication of power and alarm signals
- Motor runs cooler

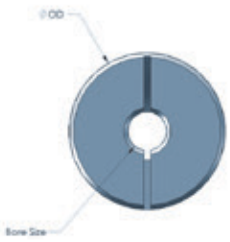
HELICAL COUPLINGS

USAutomation offers flexible couplings made by the industry leader to our customers as a convenience. Helical has developed specific models which optimize the performance of selected USAutomation motors.

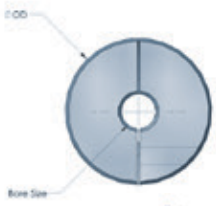
Motor Series Number	Suggested Coupling Part Number	OD	Length	Bore Size	Momentary Dynamic Torque	Torsional Rate	Inertia	Clamp Screw Size	Seating Torque
Step Motors		*in*	*in*	*in*	*in lb*	*degree/in lb*	*in lb sec²*		*in lb*
USS08T (All)	ACR062-4mm-4mm	.625	.800	4mm	3.7	.98	0.11	1-72	4
USS11T (All)	ACR062-5mm-5mm	.625	.800	5mm	3.7	.98	0.11	1-72	4
USS17T200X	ACR062-5mm-5mm	.625	.800	5mm	3.7	.98	0.11	1-72	4
USS17T210X	ACR062-5mm-5mm	.625	.800	5mm	3.7	.98	0.11	1-72	4
USS17T220X	ACR062-5mm-5mm	.625	.800	5mm	3.7	.98	0.11	1-72	4
USS17T230X	ACR062-5mm-5mm	.625	.800	5mm	3.7	.98	0.11	1-72	4
USS17T240X	ACR075-5mm-5mm	.750	.900	5mm	10.0	.30	0.66	4-40	10
USS23T200X	ACR100-8-8	1.00	1.25	.250	27.0	.17	3.0	6-32	19
USS23T210X	ACR100-8-8	1.00	1.25	.250	27.0	.17	3.0	6-32	19
USS23T220X	ACR100-8-8	1.00	1.25	.250	27.0	.17	3.0	6-32	19
USS23T230X	ACR100-8-8	1.00	1.25	.250	27.0	.17	3.0	6-32	19
USS34T200X	ACR125-16-16	1.25	1.62	.500	39.0	.20	9.3	10-24	60
USS34T210X	DSAC125-16-16	1.25	1.75	.500	47.0	.12	0.98	10-24	50
USS34T220X	DSAC150-16-16	1.50	2.25	.500	115.0	.042	2.7	10-24	50
USS34T230X	DSAC200-20-20	2.00	2.50	.625	215.0	.020	9.5	1/4-20	120
Brushless Motors		*mm*	*mm*	*in*	*Nm*	*degree/Nm*	*kg cm sec² x10⁴*	*mm*	*Nm*
USB11 (All)	XCA15-4-4	15	24	.125	.30	1.13	0.028	M2.5-.45	1.1
USB171	XCA20-5mm-5mm	20	28	5mm	.50	.046	0.11	M3-.5	2.0
USB172	XCA20-5mm-5mm	20	25	5mm	.5	.046	0.11	M3-.5	2.0
USB173	XCA25-5mm-5mm	25	30	5mm	1.00	.22	0.30	M3-.5	2.0
USB174	XCA25-5mm-5mm	25	30	5mm	1.00	.22	0.30	M3-.5	2.0
USB231	XCA25-8-8	25	30	.250	1.00	.22	0.30	M3-.5	2.0
USB232	XCA25-8-8	25	30	.250	1.00	.22	0.30	M3-.5	2.0
USB233	XCA25-8-8	25	30	.250	1.00	.22	0.30	M3-.5	2.0
USB234	XCA25-8-8	25	30	.250	1.00	.22	0.30	M3-.5	2.0
USB235	XCA30-8-8	30	38	.250	1.00	.22	0.30	M3-.5	2.0
USB341	XCA40-16-16	40	60	.500	5.00	.066	3.90	M5-.8	9.5
USB342	XCA40-16-16	40	60	.500	5.00	.066	3.90	M5-.8	9.5
USB343	XCA40-16-16	40	60	.500	5.00	.066	3.90	M5-.8	9.5
USB344	XCA50-16-16	50	65	.500	10.00	.029	10.50	M6-1.0	10.0

ACR & DSAC DIMENSIONS





XCA DIMENSIONS



CUSTOM SUBASSEMBLIES

The staff of *USAutomation* have been modifying motors and mechanical assemblies for over 20 years. Thousands of subassemblies have been shipped to customers who are assured of receiving a high quality product, delivered on time, and meeting their exact specifications and standards. Our customers include Fortune 500 companies, medical device manufacturers requiring FDA approval, and aerospace companies. Our documented quality program, process documentation, and work standards meet or exceed the highest standards our customers expect.

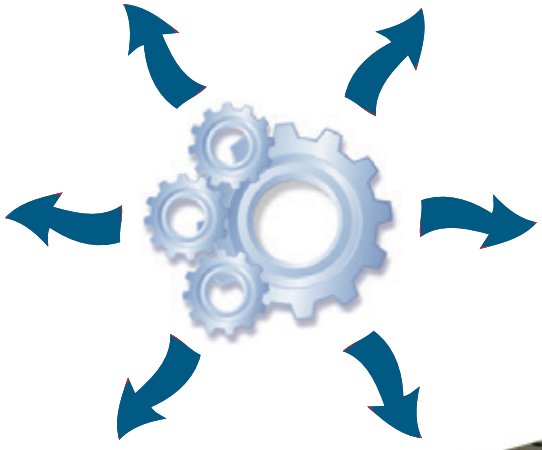
There are many benefits to using a customized subassembly - reduced inventory, lower purchasing costs, improved production line flow, and increased quality. New modifications and applications are being developed every day. The opportunities for our customers to save money and reduce inventory seem limitless to us. If you have subassembly idea that you think would benefit you, contact us. If you can imagine it, we can do it.

Here are some examples of subassemblies and their features that we are currently supplying to some of our OEM customers:

- Integral leadscrews
- Connectors

- Leadscrew and ballscrew assemblies

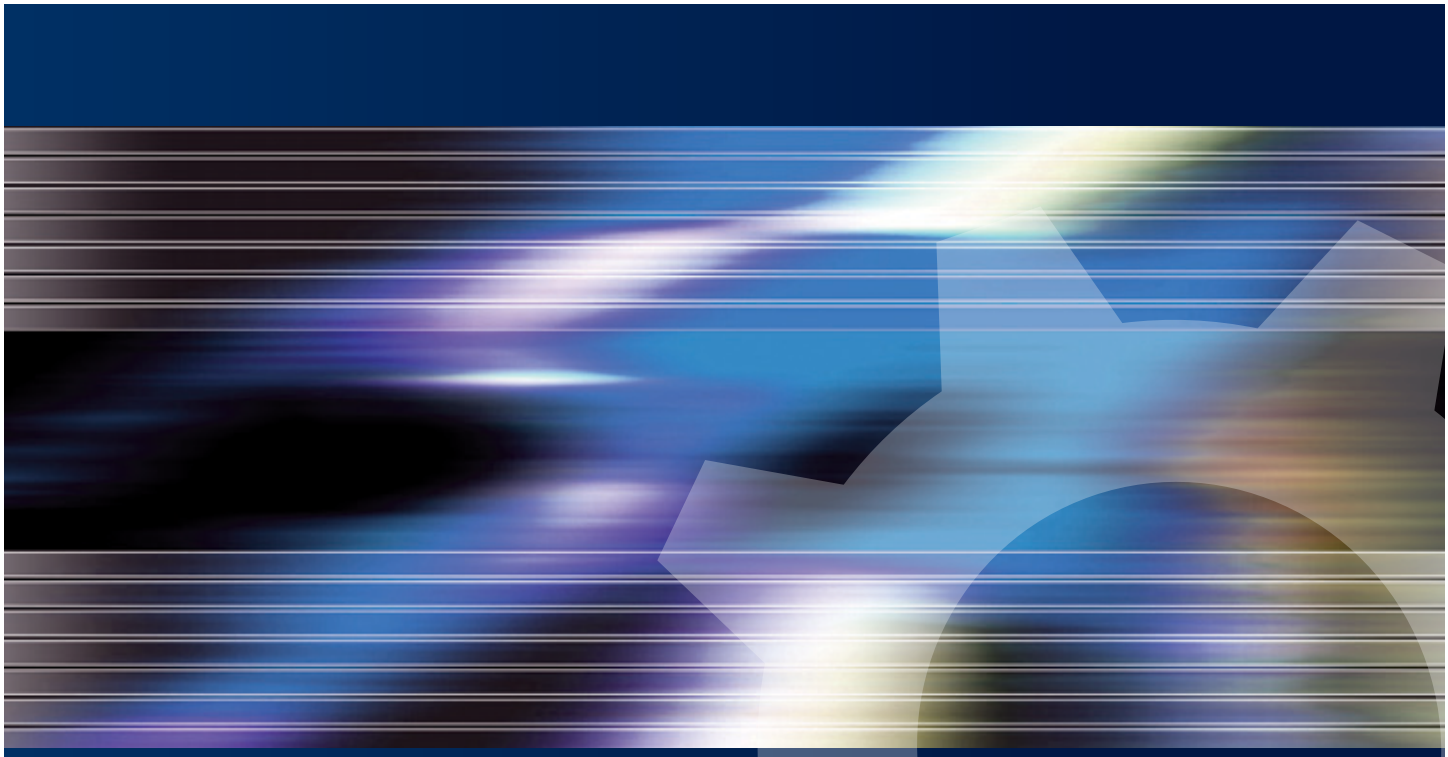
- Sheilded cables
- Gears, pulleys



- Gearbox assemblies

- Encoders, resolvers
- Special labeling

- Mechanical subassemblies



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