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SureStep® Stepper Systems

Complete SureStep system in 4 components: Power Supply, Stepper Drive, Motor Extension Cable, Motor. Standard Drives (pulse and direction input; DIP-switch configuration) and Advanced Drives (communication/analog control and setup) are available.

Complete SureStep system in 2 components: Power Supply and Integrated Stepper Motor/Drive. Standard Motor/Drives (pulse and direction input; DIP-switch configuration) and Advanced Motor/Drives (communication/analog control and setup) are available.

SureStep® Stepping System Overview

High-performance microstepping drives with high-torque stepping motors

SureStep stepping systems provide simple and accurate control of position and speed. Pulses (or "step" and "direction" signals) from an AutomationDirect PLC or other indexer and motion controller are "translated" by the microstepping drive into precise movement of the stepping motor shaft. The SureStep stepping motors use 2-phase technology with 200 full steps per revolution or 1.8° per full step. Older type stepping motor drives, which operate stepping motors in full step mode, can result in stalling or lost motion due to potential problems with low speed mechanical vibration (usually between 100 to 200 RPM). To minimize this vibration problem, the SureStep microstepping drives use advanced microstepping technology to smooth the motor motion and stepping response. The SureStep family has options for open loop control (no encoder), position monitoring (external encoder feedback), and inclusive position verfication (integrated motor/drives with internal encoder). Inclusive position verification provides for stall prevention and detection along with position completion after a temporary stall.

SureStep stepper drives support a wide range of selectable microstep resolutions, from 200 steps per revolution (full step) to 51,200 (full step ÷ 256) steps per revolution, depending on model.

The advanced drives can operate with traditional high-speed inputs, but can also be commanded via 0–5V analog input. They have an internal indexer that can accomplish point-to-point moves controlled via ASCII communication.

FREE configuration software!

SureMotion Pro software is available that makes setting parameters a snap for the advanced drives and advanced integrated motor/drives! SureMotion Pro replaces SureStep Pro configuration software. Download free from our website:

http://support.automationdirect.com/products/suremotion.html

Standards and Agency Approvals CE

How fast can my system go?

Maximum Potential Speed Chart (rpm) *					
PLC		SureStep Drive Steps/Rev Selection **			
Model	Max Output (kHz)	400 Steps/Rev	1000 Steps/Rev	2000 Steps/Rev	10,000 Steps/Rev
DL05, DL105	7	1,050	420	210	42
DL06	10	1,500	600	300	60
H0/H2/H4/T1H -CTRIO	25	>2,500***	1,500	750	150
H2-CTRIO2	250	>2,500***			1,500
P2-HSO	1000	>2,500***			
P3-HSO	1000	>2,500***			
BRX	250	>2,500***			1,500

** These speeds are theoretical maximums. See torque curves of specific motors for their rpm limits.*

*** Full step (200 steps/rev) will allow higher top speed. Full stepping, however, can create vibration at low speed.*

**** Typical stepper systems do not run faster than 2500 rpm.*

Stepping Motor RPM = (A÷B) x (60 seconds/minute)

Where: A = PLC output frequency (pulses per second)
B = microstepping resolution selection (steps/revolution)

Maximum RPM =		Steps/Sec A		Steps/Rev B		Sec/Min
Example 1:	1,500 =	10,000	÷	400	x	60
DL06 with 10 kHz Built-in Pulse Output						
Example 2:	3,750 =	25,000	÷	400	x	60
Hx-CTRIO with 25 kHz Pulse Output						

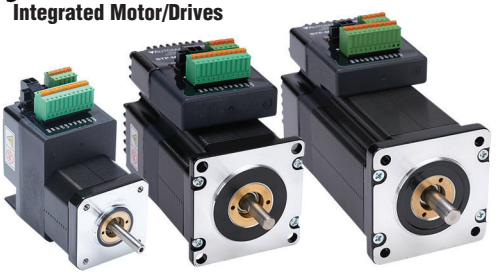
SureStep® Stepping System Overview

Two or Four components to make a complete system

Choose an integrated motor/drive and power supply

Integrated Motor/Drives

Integrated Motor/Drives

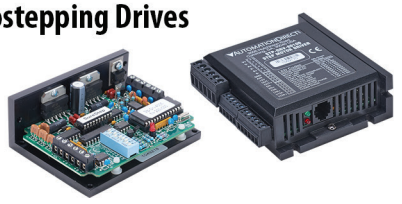


Step Motor Power Supplies

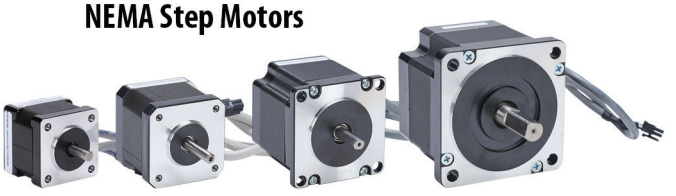
OR . . .

Choose a separate drive, motor, motor extension cable and power supply

Microstepping Drives

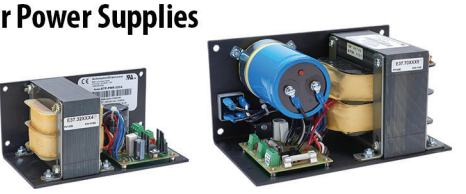


NEMA Step Motors



Step Motor Extension Cables

Step Motor Power Supplies



Stepping System : Head to Head

AutomationDirect VS. Competition

Hey - I can do the math! - AutomationDirect

A complete 2-axis *Sure*Step™ Stepping System for less than just the competition's stepping drives.

***Sure*Step™ NEMA 23 System**

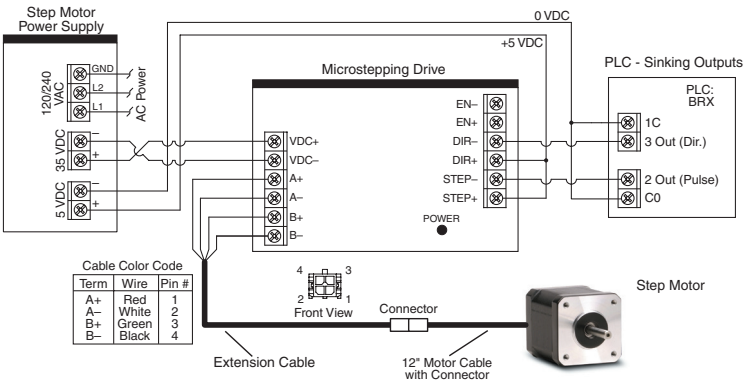
$426
Complete
2 Axis System

Ours includes:

- Two Microstepping Drives (STP-DRV-6575)
- Two Stepper Motors (STP-MTR-23079)
- One Power Supply (STP-PWR-3204)
- Two Extension Cables (STP-EXT-020)

VS. **Parker**
E-DC
$798
for 2 drives

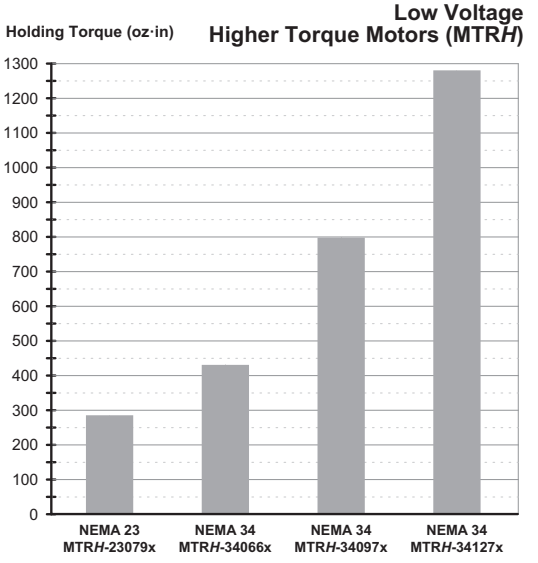
All prices are U.S. published prices. AutomationDirect prices as of August 2018 Price List. Parker prices are from http://buy.compumotor.com 8/13/2018.

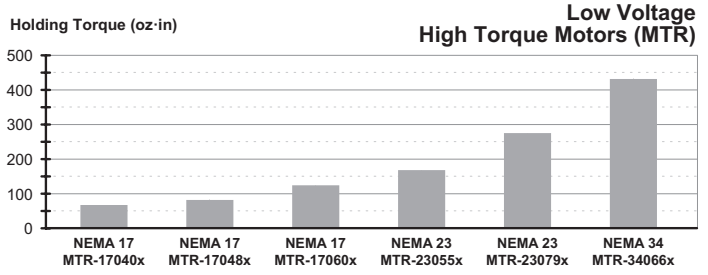


SureStep® Stepping System Overview

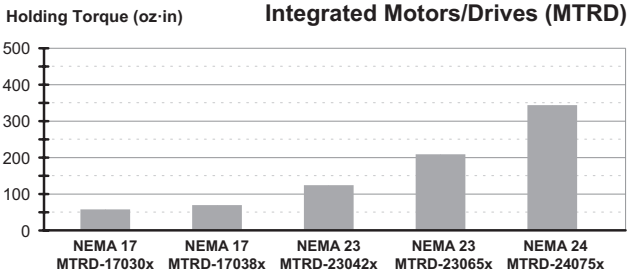
NEMA frame stepping motors

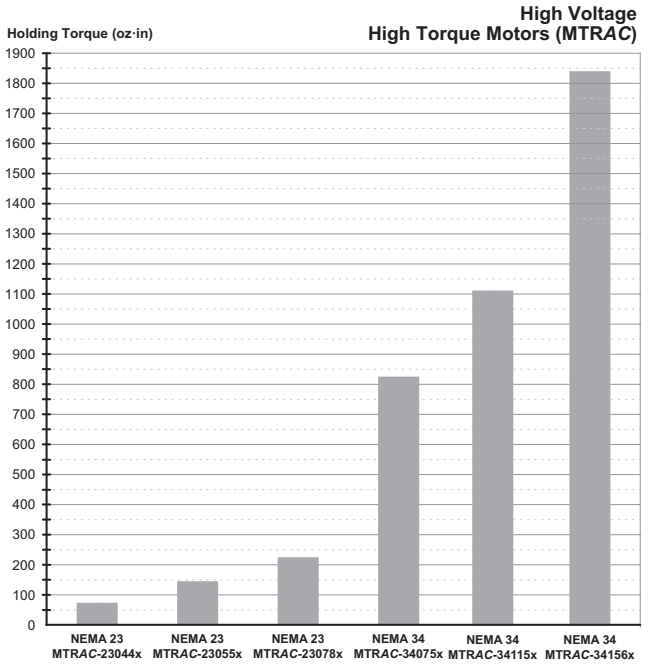
The SureStep stepping family has a wide variety of high-torque motors to handle a wide range of automation applications such as woodworking, assembly, and test machines. The motors are available in both single-shaft and dual-shaft configurations, with or without an encoder. Our square frame or "high-torque" style stepping motors are the latest in bipolar technology, resulting in very high torque to volume ratios. We have NEMA 14, 17, 23, and 34 size motors with holding torque ranging from 8 to 1841 oz·in. Wash down "W" motors (IP65) are also available. Optional 6, 10, or 20-foot extension cables with locking connectors are available to interface any of the stepping motors to the microstepping drive, except STP-MTRAC-x motors. The MTRAC motors have an integrated 10-foot pigtail cable. The extension cables can be easily cut to length, if desired. Integrated motor/drives and separate motors with an "E" in their part number include an encoder for position feedback. The MTRAC motors are designed to work with 115 or 230 VAC powered drives and can withstand high voltages. This allows higher torque, especially at higher speeds.

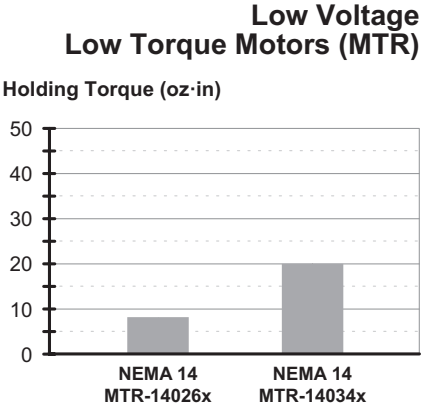




Note that the integrated/motor drive systems have a lower maximum torque due to heat constraints with the drive connected to the motor. For solutions requiring the highest torque, use the systems with our NEMA MTRH (low voltage, higher torque) or MTRAC (high voltage, high torque) motors.







SureStep® Stepping System Overview

High-performance microstepping drives

SureStep microstepping drives

(STP-DRV-4035,-4830,-4845,-6575, & STP-MTRD-x)

- Standard high-speed pulse input (pulse and direction)
- On-board or removable screw terminals for easy hook-up
- Optically-isolated inputs ready for +5VDC logic from AutomationDirect PLCs, or 5–24 VDC (depending on model)
- No software or add-on resistors required for drive configuration; dipswitch and/or rotary-dial setup
- Dipswitch used for built-in self-test, microstep resolution selection, current level selection, and optional idle current reduction.
- Optional external encoder feedback for integrated models

SureStep high bus voltage microstepping drives

(STP-DRVAC-24025)

- Auto-setup measures motor parameters and configures motor current control and anti-resonance gain settings
- Uses universal AC input 90 to 240 VAC, AC input voltage must be selected by switch
- Switch selectable microstep resolution, 16 settings from 200 to 25600 steps/rev
- Switch configurable running current, anti-resonance, input signal filter, step smoothing filter, and self test
- Motor selection via 16-bit rotary switch

SureStep advanced microstepping drives

(STP-DRV-4850, STP-DRV-80100, & STP-MTRD-xR)

All the features of the standard high-performance drive, plus:

- Software configurable
- 200 - 51,200 microsteps (software selectable)
- High-speed pulse input (Quadrature, cw/ccw, pulse/direction)
- Analog velocity mode (0-5v or potentiometer)
- Internal indexer (point-to-point moves via ASCII command)
- AB quadrature/encoder following for all advanced models
- Advanced "E" integrated models contain a built-in encoder (encoder is not accessible and not available for signaling outside the drive)

Power supplies

- SureStep linear power supplies, 32V @ 4A, 48V @ 5A, 48V @ 10A, 70V @ 5A
- Input and output fuses included on power supplies
- Includes 5 VDC Logic supply for all low voltage signals
- Switching power supplies also available (12V, 24V, 48V)

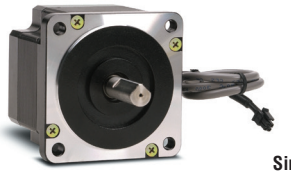
SureStep® Choose your SureStep System

1. Choose a motor

Determine the torque and speed required by your application. Then look at the motor speed-torque curves in the Motors and Standard Integrated and Advanced Integrated sections of this catalog chapter. Choose a standalone or integrated motor that can run your application with plenty of speed and torque reserve (most stepper systems should have a 100% safety margin for torque). If encoder feedback is desired, be sure to choose an "E" model motor. If an IP65 rating is desired, choose a "W" motor. *[If you chose an Integrated motor/drive, you can skip to "Choose a Power Supply". If you chose an STP-MTRAC motor, you are done. The MTRAC motors use the STP-DRVAC-24025 drive, have no motor extension cable (10' leads on the motor), and require no power supply (the drive uses AC input power).]*

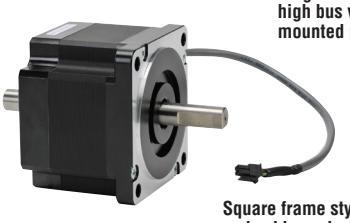
NEMA 14, 17, 23 and 34 mounting flanges

Variety of bipolar step motors to cover a wide range of applications



Holding torque ranges from 8 to 1841 oz-in

Single-shaft, Dual-shaft, IP65, high bus voltage, and encoder-mounted models available

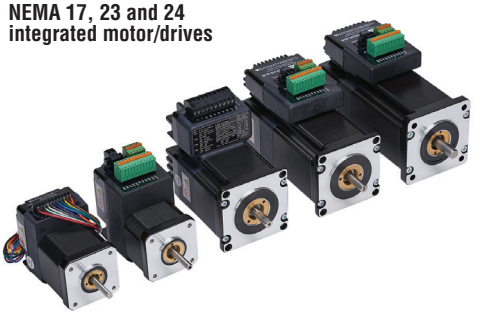


1-ft cable with locking connector on the end

(MTRAC motors have 10' leads)

Square frame style produces high torque and achieves best torque-to-volume ratio

NEMA 17, 23 and 24 integrated motor/drives



2. Choose a motor extension cable

[If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply", an extension cable is not required.]

Our 6-, 10-, and 20-ft motor extension cables have a locking connector that mates up to the motor cable. The extension cables allow you to quickly connect the motor to the drive without having to splice wires or cut any cables. All STP-MTRAC-x motors have integrated 10-foot cables and don't need an extension cable.

If you chose an STP-MTR-xxxx motor, select an STP-EXT-0xx cable.

If you chose an STP-MTR**L**-xxxx motor, select an STP-EXT**L**-0xx cable.

If you chose an STP-MTR**H**-xxxx motor, select an STP-EXT**H**-0xx cable (The "**H**" motors and cable can handle higher motor current).

If you chose an STP-MTR-xxxx**W** motor, select an STP-EXT**W**-0xx cable.

If you chose an STP-MTR**H**-xxxx**W** motor, select an STP-EXT**HW**-0xx cable.

If you chose an STP-MTR**AC**-xxxx motor, no cable is required.

20-foot extension cable with locking connector

Choose your SureStep System

3. Choose a drive

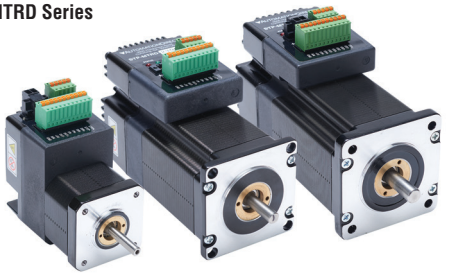
[If you chose an Integrated motor/drive in Step 1, skip to "Choose a Power Supply" . . . you have already chosen your drive. If you chose STP-MTRAC, you are done - the STP-MTRAC motors use the STP-MTRAC-24025 drive and don't require an extension cable or power supply.]

The chart below is a quick selection guide. For a full list of features, check out the Technical Info later in this chapter. The requirements for what you will need from a drive are determined by your applications. Deciding whether you plan to operate the drive via high speed pulses, analog control, encoder following, or communication commands is an important factor. The voltage supplied to the drive as determined by the speed torque curves is another important factor to consider when choosing a drive. If you need to select a drive based on RMS step motor phase current, please see the next page.

- Standard and Advanced Drives and Integrated Motor/Drives can accept high speed pulse input control.
- Advanced Drives and some Integrated Motor/Drives can also accept serial communication control.
- STP-MTRAC and STP-DRVAC motors and drives are designed for use with high voltages. These components are not designed to work at low voltages (12V, 32V, 48V, 70V).

STP-DRV Series

STP-MTRD Series



What you need	STP-DRV-4035	STP-DRV-4845	STP-DRV-4850	STP-DRV-6575	STP-DRV-80100	STP-MTRD-17x(E)	STP-MTRD-23x(E)	STP-MTRD-17xR(E)	STP-MTRD-23xR(E)	STP-MTRD-24xRV(E)
12V Speed-Torque Curve (from Step 1)	–	–	–	–	–	√	√	√	√	√
32V Speed-Torque Curve (from Step 1)	√	√	√	√	√	√	√	√	√	√
48V Speed-Torque Curve (from Step 1)	–	√	√	√	√	–	√	–	√	√
70V Speed-Torque Curve (from Step 1)	–	–	–	–	√	–	√	–	√	√
More than 3.5A/motor phase	–	√	√	√	√	–	–	–	–	–
More than 5A/motor phase ("H" motors)	–	–	–	√	√	–	–	–	–	–
Supply voltage	12-32	24-48	24-48	24-65	24-80	12-48	12-70	12-48	12-70	12-70
Digital Input Voltage	5V (12V*, 24V*)	5-24V	5V (12V*, 24V*)	5-24V	5V (12V*, 24V*)	5-24V	5-24V	5-24V	5-24V	5-24V
Internal Indexing (Drive can move from Point A to Point B with a serial communication command)	–	–	√	–	√	–	–	√	√	√
High speed pulse input	√	√	√	√	√	√	√	√	√	√
Analog Velocity Input	–	–	√	–	√	–	–	√	√	√
Position Verification (internal encoder)	–	–	–	–	–	–	–	E models only	E models only	E models only
External encoder	–	–	–	–	–	E models only	E models only	–	–	–
RS-232 communication (ASCII)	–	–	√	–	√	–	–	–	–	–
RS-485 communication (ASCII)	–	–	–	–	–	–	–	√	√	√
Variable I/O (I/O can be either a digital input or digital output)	–	–	–	–	–	–	–	–	–	√

**** External dropping resistor required for 12V and 24V I/O use. See Product Data Sheet for wiring details and resistor values.***

Choose your SureStep System

3a. Using RMS Step Motor Phase Current to Select an Appropriate Stepper Drive Rated in Peak Phase Current

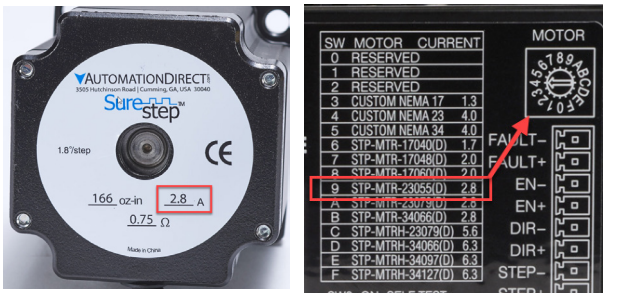
$$(\text{Drive Amps})_{peak} = 1.2 \times (\text{Motor Amps})_{RMS}$$

Generic stepper drives usually have output current specified in peak phase current while stepper motors will have their phase current specified in RMS phase current. This can cause sub-optimal drive to motor pairing unless this is understood. There is no need to understand this difference if you are selecting a system that uses the SureStep drives that are tuned for specific SureStep motors. These drives will have a rotary switch setting (STP-DRV-6575 and STP-MTRAC-24025) or a motor selection in the SureMotion Pro software (STP-DRV-4850 and STP-DRV-80100). These drives when properly paired with a SureStep motor will output 1.2 times the motor rated phase current.

When choosing a drive that only has current selections instead of motor specific selections you will want to select a peak current that is 1.2 times the motor's listed RMS current. The true peak drive current value would be 1.4 times the RMS motor value but this amount of current will cause a lot of motor heating and the torque at higher speeds will actually suffer with due to higher back electro-magnetic force caused by the inductive field of the coils changing polarity quickly.

Example of a SureStep matched stepper system

To use an STP-MTR-23055 motor with a STP-DRV-6575 drive, the drive's rotary switch should be positioned to selection 9 (STP-MTR-23055x). The STP-MTR-23055 has a phase current of 2.8 A (RMS), so the drive will actually output 1.2 x 2.8 A (RMS) = 3.36 A (peak). You do not need to calculate peak or RMS current with a pre-configured SureStep motor and drive system.

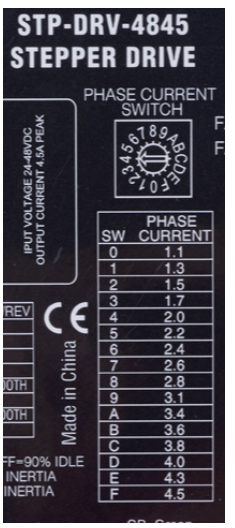


Matched stepper system

Example of an adjustable current stepper drive

To use an STP-MTR-23055 motor with a STP-DRV-4845 drive, you should calculate the correct phase current setting for the drive. The motor phase current is 2.8 A (RMS).

- If you do not understand peak vs RMS current, you would select phase current position #8, the 2.8 A selection on the drive (blue box). This setting will work (and the motor will run very cool) but will provide slightly less than the motor's rated torque.
- If a true peak current value is selected (1.4 x 2.8 A = 3.92 A) then the rotary switch selection would be set to the C position (red box). This will cause excessive motor heating and a lack of performance at higher speeds.
- The optimal phase current selection for stepper motors is 1.2 times the motor RMS phase current (1.2 x 2.8 A (RMS) = 3.36 A (peak)). This will be the rotary switch selection A (green box)



STP-DRV-4845 Motor Selection Ta (A/Phase)(Peak of Sine A)			
Rotary Switch Position	SW1 & SW2 @100%	SW1 & SW2 @90%	SW1 & @80
0	1.1	1.0	0.9
1	1.3	1.2	1.(
2	1.5	1.4	1.2
3	1.7	1.5	1.4
4	2.0	1.8	1.(
5	2.2	2.0	1.8
6	2.4	2.2	1.9
7	2.6	2.3	2.1
8	2.8	2.5	2.2
9	3.1	2.8	2.5
A	3.4	3.1	2.7
B	3.6	3.2	2.9
C	3.8	3.4	3.(
D	4.0	3.6	3.2
E	4.3	3.9	3.4
F	4.5	4.1	3.(

Matching an adjustable stepper drive with any step motor

SureStep® Choose your SureStep System

4. Choose a power supply

Since all low voltage SureStep (non-integrated) motors can operate at 32V, 48V, and 70V, the selection of a power supply is dependent on the selected speed-torque curve of the motor and on the selection of drive. If using an integrated motor/drive, then the power supply is dictated by the specifications of the integrated product. If using an STP-MTRAC drive, then no DC power supply is needed since the drive is powered directly from 115 to 230 VAC. Choose a power supply that matches the desired speed-torque curve and stays within the voltage limit of the selected drive. Each SureStep linear power supply has incoming AC and outgoing DC fusing. The linear supplies have an electronic overload protected 5V supply for all your logic needs. Stepper applications without large fluctuations in load, without aggressive deceleration, and without regeneration (where the load pushes the motor) can often use a switching power supply instead.

Permissible Drive/Power Supply Combinations

DC Powered Drive	Linear Power Supply				Switching Power Supply		
	STP-PWR-3204	STP-PWR-4805	STP-PWR-4810	STP-PWR-7005	PSB12-xxxS	PSB24-xxxS	PSB48-xxxS
STP-DRV-4035 12-32 VDC input (42V max)	√	–	–	–	√	√	–
STP-DRV-4830 12-48 VDC input (53V max)	√	√	√	–	√	√	√
STP-DRV-4845 24-48 VDC input (60V max)	√	√	√	–	–	√	√
STP-DRV-4850 24-48 VDC input (53V max)	√	√	√	–	–	√	√
STP-DRV-6575 24-65 VDC input (85V max)	√	√	√	–	–	√	√
STP-DRV-80100 24-80 VDC input (88V max)	√	√	√	√	–	√	√
STP-MTRD-17 12-48 VDC input (55V max)	√	√	√	–	√	√	√
STP-MTRD-23, -24 12-70 VDC input (75V max)	√	√	√	√	√	√	√
Supply current calculation	*For systems that use multiple steppers and only one power supply, the power supply current must be at least the sum of 2/3rds of the combined motor currents:* *I(ps) ≥ 2/3 x (I_motor1 + I_motor2 + I_motor 3 + . . .)*				*For systems that use multiple steppers and only one power supply, the power supply current must be at least the sum of 2/3rds of the combined motor currents:* *I(ps) ≥ 0.66 x (I_motor1 + I_motor2 + I_motor 3 + . . .)*		

Linear Power Supply

120 or 240 VAC, 50/60 Hz power input (switch selectable)

Screw terminal AC input and DC output connections

32V, 48V and 70V linear supplies

Power ON LEDs

Unregulated linear supplies perfect for stepper systems

Input and output fusing included

5 VDC ±5% at 500 mA regulated logic power

Switching Power Supply

85–264 VAC (DC input range 120–375 VDC)

Rugged plastic or aluminum housings with integral 35mm DIN rail mounting adapters

Adjustable output voltage

Output voltage status LED

DC Output Overload and Short-Circuit Protected

Note: For detailed information on the switching power supplies, please see:
https://cdn.automationdirect.com/static/specs/rhinopsbc1d2.pdf

SureStep® Stepping System Components

SureStep® System

Step Motor Power Supply

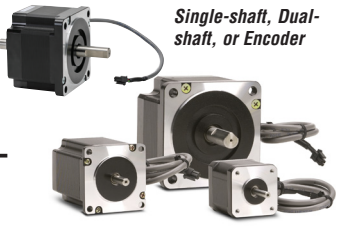
+

Standard or Advanced Microstepping Drive

+

Extension Cable

+



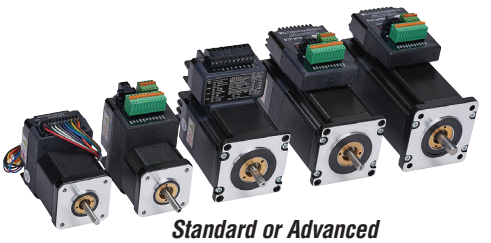
Single-shaft, Dual-shaft, or Encoder

Connectorized Step Motor

or

Step Motor Power Supply

+



Standard or Advanced Integrated Motor/Drive

or

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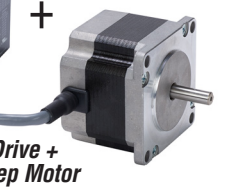


Standard AC Microstepping Drive + High-voltage Step Motor

SureStep stepping family includes:

- Linear step motor power supplies
- DIP-switch configurable microstepping drives
- Software-configurable advanced microstepping drives
- Motor extension cables
- NEMA 14, 17, 23, and 34 frame size step motors in single shaft, dual-shaft, IP65, high bus voltage, or encoder mounted configurations
- NEMA 17, 23, and 24 frame size integrated motor/drives
- Variety of step motor accessories including encoders, control cables, and connector kits
- SureStep PC adapter, USB to RS-485
- SureMotion Pro software for advanced drive and integrated motor/drive systems

Motor features

- Low voltage, high torque, 2-phase, bipolar, 1.8° per step, 4-lead
- High voltage, high torque, 2-phase, bipolar, 1.8° per step, 8-lead
- Available in single-shaft and dual-shaft models
- Connectorized pigtails or integrated 10' cable (STP-MTRAC only)
- Optional encoder feedback (STP-MTR-xxxx**E**)
- IP65 versions available (STP-MTR-xxxx**W**)
- High bus voltage versions available (STP-MTR**AC**-xxxx)
- Wide variety of NEMA 14 , 17, 23, and 34 motors

Power supply features

- Linear, unregulated DC power supplies
- 120/240 VAC selectable input
- 32V, 48V, 70V DC output models available
- All linear models have additional 5VDC, 500mA regulated logic supply
- Fusing included for both incoming AC and outgoing DC
- 5V supply has electronic overload protection

NOTE: If a switching power supply is desired, we recommend the PSB12-xxxS, PSB24-xxxS, or PSB48-xxxS series.

Standard stepper drive features

(STP-DRV-4035, -4830, -4845, -6575, STP-MTRD-x, STP-DRVAC-24025)

- Low cost, digital step motor driver in compact package
- Operates from Step and Direction signals, or Step CW and Step CCW (jumper selectable).
- Fault output and Enable input
- Optically isolated I/O
- Digital filters prevent position error from electrical noise on command signals; jumper selectable: 150 kHz or 2MHz
- Rotary or DIP switch easily selects from many popular motors
- Electronic damping and anti-resonance
- Automatic idle current reduction to reduce heat when motor is not moving; switch selectable: 50% or 90% of running current
- Switch-selectable step resolution: 200–25,600 steps per revolution depending on drive
- Switch-selectable microstep emulation provides smoother, more reliable motion in full- and half-step modes
- Automatic self test (switch selectable)
- Optional external encoder feedback (integrated models)
- Operates from a 24–65 VDC or 12–40 VDC power supply, depending upon model. STP-DRVAC drive operates off AC voltage.
- Running current from 0.35–7.5A

Advanced stepper drive features

(STP-DRV-4850, STP-DRV-80100, STP-MTRD-xR, & STP-MTRD-xRE)

- Max 5A, 48V and max 10A, 80V models available
- Software configurable
- Programmable microsteps
- Internal indexer (via ASCII commands)
- Self test feature
- Idle current reduction
- Anti-resonance
- Torque ripple smoothing
- Step, analog, and serial communication inputs
- Serial communications allow point-to-point positioning
- AB quadrature/encoder following (integrated models)
- Optional internal encoder feedback (integrated models)
- RS-485 communications (integrated models)
- Four 5 to 24 volt digital "Variable I/O" points (NEMA 24 integrated models)
- Controllable via streaming SCL commands

SureStep® Stepping System Components

SureStep Power Supply / DC Input Drive Compatibility

Drive(1)(2)	Recommended Linear Power Supply(1)(2)(5)			
Model #	STP-PWR -3204	STP-PWR -4805	STP-PWR -4810	STP-PWR -7005
STP-DRV-4035	√	No	No	No
STP-DRV-4830	√	√	√	No
STP-DRV-4845	√	√	√	No
STP-DRV-4850	√	√	√	No
STP-DRV-6575	√	√	√	No
STP-DRV-80100	√	√	√	√
STP-MTRD-17(4)	√	√	√	No
STP-MTRD-23(4)	√	√	√	√
STP-MTRD-24(4)	√	√	√	√

1) Do NOT use a power supply that exceeds the drive's input voltage range. If using a linear power supply, ensure that the unloaded voltage does not float above the drive's maximum input range.

2) For best performance, use the lowest voltage power supply that supplies the required speed and torque.

3) An unloaded STP-PWR-7005 can float above the allowable input voltages of some drives if it is fed with a high AC input voltage (greater than 120VAC).

4) Integrated motor/drives are included here because they include a drive as well as a motor.

5) STP-DRVAC-x drives are AC powered and cannot be powered by DC power supplies.

SureStep Power Supply / DC Input Drive Compatibility

Drive(1)(2)	Recommended Switching Power Supply(1)(2)(4)		
Model #	PSB12-xxxS	PSB24-xxxS	PSB48-xxxS
STP-DRV-4035	√	√	No
STP-DRV-4830	√	√	√
STP-DRV-4845	No	√	√
STP-DRV-4850	No	√	√
STP-DRV-6575	No	√	√
STP-DRV-80100	No	√	√
STP-MTRD-17(3)	√	√	√
STP-MTRD-23(3)	√	√	√
STP-MTRD-24(3)	√	√	√

1) Do NOT use a power supply that exceeds the drive's input voltage range.

2) For best performance, use the lowest voltage power supply that supplies the required speed and torque.

3) Integrated motor/drives are included here because they include a drive as well as a motor.

4) STP-DRVAC-x drives are AC powered and cannot be powered by DC power supplies.

SureStep AC Motor/Drive Compatibility

Model #	STP-DRVAC-24025	
	Series Wired Motor	Parallel Wired Motor
STP-MTRAC-23044(x)	√	No
STP-MTRAC-23055(x)	√	No
STP-MTRAC-23078(x)	√	No
STP-MTRAC-34075(x)	√	No
STP-MTRAC-34115(x)	√	No
STP-MTRAC-34156(x)	√	No

NOTE: STP-MTRAC-34156(x) motors have a 5/8" front shaft

SureStep DC Input Drive / Motor Compatibility(3)

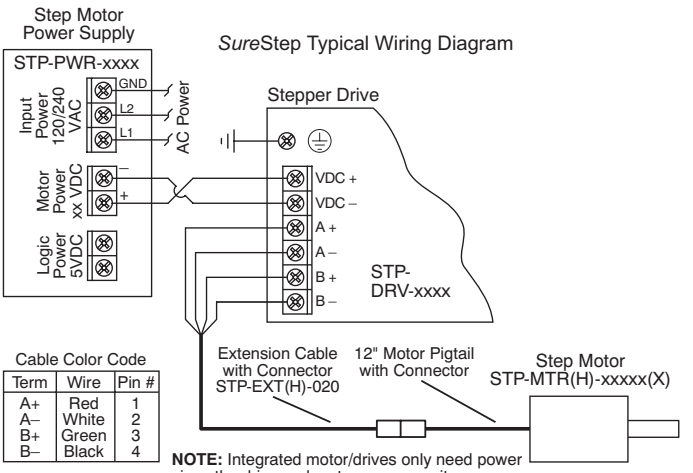
Motor(1)(2)			Recommended Drive(1)					
Model #(1)(2)	Rated Amps	Extension Cable(2)	STP-DRV-4035(1)	STP-DRV-4830	STP-DRV-4845	STP-DRV-4850(1)	STP-DRV-6575(1)	STP-DRV-80100(1)
STP-MTRL-14026(x)	0.35	STP-EXTL-0xx	√	√	–	√	–	–
STP-MTRL-14034(x)	0.8		√	√	√	√		
STP-MTR-17040(x)	1.7	STP-EXT-0xx	√	√	√	√	√	√
STP-MTR-17048(x)	2.0		√	√	√	√	√	√
STP-MTR-17060(x)	2.0		√	√	√	√	√	√
STP-MTR-23055(x)	2.8		√	√	√	√	√	√
STP-MTR-23079(x)	2.8		√	√	√	√	√	√
STP-MTR-34066(x)	2.8		√	√	√	√	√	√
STP-MTRH-23079(x)	5.6	STP-EXTH-0xx	–				√	√
STP-MTRH-34066(x)	6.3						√	√
STP-MTRH-34097(x)	6.3						√	√
STP-MTRH-34127(x)	6.3						√	√

1) The combinations above will perform according to the published speed/torque curves. Using a motor with a current rating higher than the drive's output rating will proportionally limit the motor torque.

2) MTR motors have connectors compatible with the EXT extension cables. MTRL motors have connectors compatible with the EXTL extension cables. MTRH motors have connectors compatible with the EXTH extension cables. W-series motors have connectors compatible with the EXTW and EXTHW extension cables.

3) Not applicable to integrated motor/drives as drives and motors are already paired.

Typical Wiring Diagram



NOTE: Integrated motor/drives only need power since the drive and motor are one unit. MTRAC motors do not need an extension cable, they have 10' leads coming from the motor.

NOTE: STP-MTRAC motors and STP-DRVAC drives are designed to work with AC input power to the drive. They are not designed to work with DC input power.

SureStep® Stepping System Drives

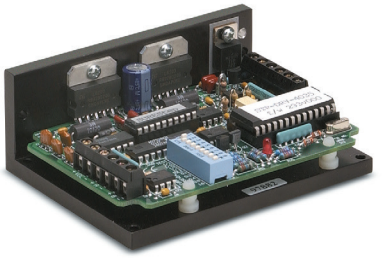
SureStep® Microstepping Drives Overview

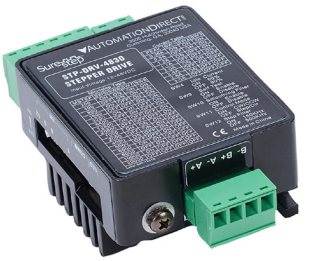
SureStep Series – Microstepping Drives Features Comparison										
Drive Model		**Standard Microstepping Drives**						**Advanced Microstepping Drives**		
		STP-DRVAC-24025	**STP-DRV-4830**	**STP-DRV-4845**	**STP-DRV-6575**	**STP-MTRD-x**	**STP-DRV-4035**	**STP-DRV-4850**	**STP-DRV-80100**	**STP-MTRD-xR**
Price		$199.00	$69.00	$79.00	$94.00	See Integrated Motor/Drives section	$174.00	$243.00	$291.00	See Integrated Motor/Drives section
Drive Type		Microstepping drive with pulse input				Integrated stepper motor/drive	Micro-stepping drive with pulse input	Advanced microstepping drive with pulse or analog input, serial communication;includes programming/communication cable STP-232RJ11-CBL		Advanced integrated stepper motor/drive with internal encoder
		enclosed				enclosed	open-frame	enclosed		enclosed
Output Current		0.6–2.5 A/phase	0.35–3.0 A/phase	0.8–4.5 A/phase	0.5–7.5 A/phase	–	0.4–3.5 A/phase	0.1–5 A/phase	0.1–10 A/phase	–
Input Voltage		nominal: 120/240 VAC range: 90–240 VAC	nominal: 12–48 VDC range: 10–53 VDC	nominal: 24–48 VDC range: 20–60 VDC	nominal: 24–75 VDC range: 20–85 VDC	nominal: 12-48 VDC (NEMA 17) 12-70 VDC (NEMA 23) range: 10-55 VDC (NEMA 17) 11-74 VDC (NEMA 23)	nominal: 12–32 VDC range: 12–42 VDC	nominal: 24–48 VDC range: 18– 53 VDC	nominal: 24–80 VDC range: 18–88 VDC	nominal: 12-48 VDC (NEMA 17) 12-70 VDC (NEMA 23, 24) range: 10-55 VDC (NEMA 17) 11-74 VDC (NEMA 23) 10-75 VDC (NEMA 24)
Configuration Method		rotary dial, dip switches, jumpers				dip switches		SureMotion Pro software (SM-PRO: free download)		
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant				Dual H-bridge, 4 quadrant	MOSFET, dual H-bridge, bipolar chopper	MOSFET, dual H-bridge, 4-quadrant		Dual H-bridge, 4 quadrant
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 16 kHz	4-state PWM @ 20 kHz		4-state PWM @ 16 kHz	4-state PWM @ 20 kHz			
Microstep Resolution		dipswitch selectable						software selectable		
		200 to 25,600 steps/rev		200 to 20,000 steps/rev		200 to 25,600 steps/rev	400 to 10,000 steps/rev	200 to 51200 steps/rev		
Modes of Operation	**Step & Dir**	YES	YES	YES	YES	YES	YES	YES	YES	YES
	CW/CCW	YES	YES	YES	YES	YES	n/a	YES	YES	YES
	A/B Quad	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
	Oscillator	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
	Serial Indexing	n/a	n/a	n/a	n/a	n/a	n/a	YES	YES	YES
Digital Input Signals	**Step/Pulse**	step & direction, CW/CCW step				step & direction, CW/CCW step	step & direction	step & direction, CW/CCW step, A/B quadrature, run/stop & direction, jog CW/CCW, CW/CCW limits		
	Direction									
	Enable	motor disable				motor enable	motor disable	motor enable, alarm reset, speed select (oscillator mode)		
Analog Input		n/a	n/a	n/a	n/a	n/a	n/a	speed control		signal range, offset, dead band, and filtering
Output Signal		fault	n/a	fault	fault	fault	n/a	fault, motion, tach		brake, fault, motion, tach
Communication Interface		n/a	n/a	n/a	n/a	n/a	n/a	YES (programming/communication cable included)		
Non-volatile Memory Storage		n/a	n/a	n/a	n/a	n/a	n/a	YES		
Idle Current Reduction		YES								
Self Test		YES								
Additional Features		Step pulse noise filter, accepts AC power input	Step pulse noise filter	Load inertia (anti-resonance & damping feature to improve motor performance) Step pulse noise filter			n/a	Anti-resonance (Electronic Damping) Auto setup Microstep emulation Torque ripple smoothing (allows for fine adjustment of phase in the range 0.25 to 1.5 rps) Waveform (command signal) smoothing		

Refer to Specifications Tables for detailed specifications.

SureStep® Stepping System Drives

SureStep® Standard Microstepping Drives





SureStep Series Specifications – Standard Microstepping Drives			
Microstepping Drive		***STP-DRV-4035***	***STP-DRV-4830***
Drive Type		Microstepping drive with pulse input	Microstepping drive with pulse input
Output Current		Selectable from 0.4 to 3.5 A/phase (maximum output power is 140W)	Selectable from 0.35 to 3.0 A/phase (peak of sine)
Input Voltage (external p/s required)		Nominal: 12–32 VDC Range: 12–42 VDC (including ripple voltage)	Nominal: 12–48 VDC Range: 10–53 VDC
Configuration Method		DIP switches	DIP switches
Amplifier Type		MOSFET, dual H-bridge, bipolar chopper	MOSFET, dual H-bridge, 4-quadrant
Current Control		4-state PWM @ 20 kHz	4-state PWM @ 16 kHz
Protection		n/a	n/a
Recommended Input Fusing		Fuse: 4A fast-acting; ADC # ACG4; Holder: ADC # DN-F6L110	Fuse: 3A fast-acting; ADC #AGC3; Holder: ADC # DN-F6L110
Input Signals	***Input Circuit***	Opto-coupler input with 440Ω resistance (5 to 15 mA input current); Logic Low is input 0.8 VDC or less; Logic High is input 4VDC or higher.	5–24 VDC nominal (range: 4–30 VDC); optically isolated, differential.
	Step/Pulse	Motor steps on falling edge of pulse and minimum pulse width is 0.5 µs (1MHz)	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 500kHz (user selectable).
	Direction	Needs to change at least 2 microseconds before a step pulse is sent	FUNCTIONS: step & direction, CW/CCW step
	Enable	Logic 1 will disable current to the motor (current is enabled with no hook-up or logic 0)	FUNCTION: disable motor when closed
	Analog	n/a	n/a
Output Signal		n/a	n/a
Features	***Current Reduction***	n/a	n/a
	Idle Current Reduction	0% or 50% reduction (Idle current setting is active if motor is at rest for 1 second or more)	90% or 50% of running current. (Holding torque is reduced by the same %.)
	Microstep Resolution	400 (200x2), 1,000 (200x5), 2,000 (200x10), or 10,000 (200x50) steps/rev	200, 400, 800, 1000, 1600, 2000, 3200, 4000, 5000, 6000, 6400, 8000, 10000, 12800, 20000, 25600
	Phase Current Setting	0.4 to 3.5 A/phase with 32 selectable levels	(peak)(0.35–3.0) (0.25–2.3) RMS
	Self Test	Uses half-step to rotate 1/2 revolution in each direction at 100 steps/second.	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.
	Step Pulse Noise Filter	n/a	Select 150kHz or 500kHz
	Load Inertia	n/a	n/a
Connectors		Screw terminal blocks with AWG 18 maximum wire size	DEGSON 15EDGK-5.08-02P-14-00AH 2-pin power connector DEGSON 15EDGK-3.1.04P-14-00A(H) 4-pin motor connector DEGSON 15EDGK-3.5-06P-14-00A(H) 6-pin I/O connector ADC part STP-CON-5 contains replacement connectors
Maximum Humidity		90% non-condensing	90% non-condensing
Storage/Ambient Temperature		-20 to 80 °C [-4 to 176 °F]	0 to 40 °C [32 to 104 °F] (mount to suitable heat sink)
Operating Temperature		0 to 55 °C [32 to 131 °F] recommended; 70 °C [158 °F] maximum	0 to 85 °C [32 to 185 °F] (interior of electronics section)
Drive Cooling Method		Natural convection (mount drive to metal surface to dissipate heat)	Natural convection (mount drive to metal surface)
Mounting		(4) #4 screws to mount on wide side; (2) #4 screws to mount on narrow side	(2) #6 screws to mount to metal surface
Weight		9.3 oz. [264 g]	3.0 oz [85.9 g]
Agency Approvals		CE	CE

SureStep® Stepping System Drives

SureStep® Standard Microstepping Drives, continued

SureStep Series Specifications – Standard Microstepping Drives			
Microstepping Drive		**STP-DRV-4845**	**STP-DRV-6575**
Drive Type		Microstepping drive with pulse input	
Output Current		Selectable from 0.8–4.5 A/phase (peak of sine)	Selectable from 1.0–7.5 A/phase (peak of sine)
Input Voltage (external p/s required)		Nominal: 24–48 VDC Range: 20–60 VDC	Nominal: 24–65 VDC Range: 20–85 VDC
Configuration Method		Rotary dial, DIP switches, jumpers	
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant	
Current Control		4-state PWM @ 20 kHz	
Protection		n/a	
Recommended Input Fusing		Fuse: 4A fast-acting; ADC #AGC4; Holder: ADC # DN-F6L110	Fuse: 7A fast-acting; ADC #AGC7; Holder: ADC # DN-F6L110
Input Signals	**Input Circuit**	5–24 VDC nominal (range: 4–30 VDC); optically isolated, differential.	
	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 2MHz (user selectable).	
	Direction	FUNCTIONS: step & direction, CW/CCW step	
	Enable	FUNCTION: disable motor when closed	
	Analog	n/a	
Output Signal		30 VDC / 80 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.	
Features	**Current Reduction**	Reduce power consumption and heat generation by limiting motor running current to 100%, 90%, 80%, or 70% of maximum. Current should be increased to 100% if microstepping. (Torque is reduced/increased by the same %.)	Reduce power consumption and heat generation by limiting motor running current to 100%, 90%, or 80% of maximum. Current should be increased to 120% if microstepping. (Torque is reduced/increased by the same %.)
	Idle Current Reduction	90% or 50% of running current. (Holding torque is reduced by the same %.)	
	Microstep Resolution	200, 200 smooth, 400, 400 smooth, 2000, 5000, 12800, 20000	
	Phase Current Setting	(peak)(1.1–4.5) x 70%–100% DIP switch selectable (0.79–3.2) RMS	(1.3–6.3) x 80%–120% DIP switch selectable
	Self Test	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.	
	Step Pulse Noise Filter	Select 150kHz or 2MHz	
	Load Inertia	Set motor and load inertia range to 0–4x or 5–10x.	
Connectors		Removable screw terminal blocks. Motor & Power Supply: 30–12 AWG; Signals: 30–14 AWG ADC part STP-CON-1 contains replacement connectors	
Maximum Humidity		90% non-condensing	
Storage/Ambient Temperature		0 to 50 °C [32 to 122 °F] (mount to suitable heat sink)	
Operating Temperature		0 to 85 °C [32 to 185 °F] (interior of electronics section)	
Drive Cooling Method		Natural convection (mount drive to metal surface)	
Mounting		(2) #6 screws to mount to metal surface	
Weight		10.8 oz [306g]	
Agency Approvals		CE, $_{c}$UR$_{us}$	

SureStep® Stepping System Drives

SureStep® Advanced Microstepping Drives

SureStep Series Specifications – Advanced Microstepping Drives			
Microstepping Drive		**STP-DRV-4850**	**STP-DRV-80100**
Drive Type		Advanced microstepping drive with pulse or analog input, serial communication (serial communication allows indexing capability)	
Output Current		0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)
Input Voltage (external p/s required)		24-48 VDC (nominal) (range: 18-53 VDC)	24-80 VDC (nominal) (range: 18-88 VDC)
Configuration Method		*Sure*Motion Pro software (included)	
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant	
Current Control		4-state PWM @ 20 kHz	
Protection		Over-voltage, under-voltage, over-temperature, external output faults (phase-to-phase & phase-to-ground), inter-amplifier shorts	
Recommended Input Fusing		Fuse: 4A 3AG delay (ADC #MDL4) Fuse Holder: ADC #DN-F6L110	Fuse: 6.25A 3AG delay (ADC #MDL6-25) Fuse Holder: ADC #DN-F6L110
Input Signals	**Input Circuit**	Opto-coupler input with 5 to 15 mA input current; Logic Low is input 0.8 VDC or less; Logic High is input 4 VDC or higher.	
	Step/Pulse	Optically isolated, differential, 5V, 330Ω; Min pulse width = 250 ns Max pulse frequency = 2MHz Adjustable bandwidth digital noise rejection feature FUNCTIONS: step & direction, CW/CCW step, A/B quadrature, run/stop & direction, jog CW/CCW, CW/CCW limits	
	Direction		
	Enable	Optically isolated, 5-12V, 680Ω; FUNCTIONS: motor enable, alarm reset, speed select (oscillator mode)	
	Analog	Range: 0–5 VDC; Resolution: 12 bit; FUNCTION: speed control	
Output Signal		Optically isolated, 24V, 10mA max; FUNCTIONS: fault, motion, tach	
Communication Interface		RS-232; RJ11 (6P4C) receptacle	
Non-volatile Memory Storage		Configurations are saved in FLASH memory on-board the DSP.	
Features	**Idle Current Reduction**	Reduction range of 0-90% of running current after delay selectable in ms	
	Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev	
	Modes of Operation	Step & direction, CW/CCW, A/B quadrature, oscillator, joystick, serial commands	
	Phase Current Setting	0.1-5.0 A/phase (in 0.01A increments)	0.1-10.0 A/phase (in 0.01A increments)
	Self Test	Checks internal & external power supply voltages, diagnoses open motor phases	
	Additional Features	Anti-resonance (Electronic Damping) Auto setup Microstep emulation Torque ripple smoothing (allows for fine adjustment of phase in the range 0.25 to 1.5 rps) Waveform (command signal) smoothing	
Connectors		Communication: RJ11 (6P4C); programming/communication cable STP-232RJ11-CBL included Other: removable screw terminal blocks; Motor & Power Supply: 26–12 AWG; Signals: 28–16 AWG	
Maximum Humidity		90% non-condensing	
Storage Temperature		-20 to 80 °C [-4 to 176 °F]	
Operating Temperature		0 to 55 °C [32 to 131 °F]; (mount to suitable heat sink)	
Drive Cooling Method		Natural convection (mount to suitable heat sink)	
Mounting		#6 mounting screws (mount to suitable heat sink)	
Weight		8 oz [227g] (approximate)	
Agency Approvals		CE	

Stepping System Drives

SureStep® High Bus Voltage Microstepping Drives

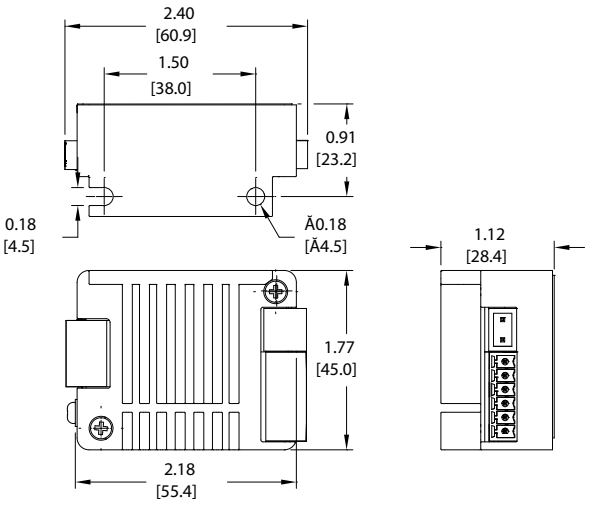
SureStep Series Specifications – Standard Microstepping Drives		
Microstepping Drive		***STP-DRVAC-24025***
Price		$199.00
Drive Type		Microstepping drive with pulse input
Output Current		Selectable from 0.6–2.5 A/phase (peak of sine)
Input Voltage		90–240 VAC
Configuration Method		Rotary dial, DIP switches, jumpers
Amplifier Type		MOSFET, dual H-bridge, 4-quadrant
Current Control		4-state PWM @ 20 kHz
Protection		Over temp, over voltage, under voltage, over current, excess regen, open circuit
Recommended Input Fusing		Fuse: 4A fast-acting; ADC #AGC4; Holder: ADC # DN-F6L110
Input Signals	***Input Circuit***	5–24 VDC nominal (range: 4–28 VDC); optically isolated, differential.
	Step/Pulse	Minimum pulse width = 1µs. Maximum pulse frequency = 150kHz or 2MHz (user selectable).
	Direction	FUNCTIONS: step & direction, CW/CCW step
	Enable	FUNCTION: disable motor when closed
	Analog	n/a
Output Signal		30 VDC / 100 mA max, optically isolated photodarlington, sinking or sourcing. Function = closes on drive fault.
Features	***Current Reduction***	n/a
	Idle Current Reduction	90% or 50% of running current. (Holding torque is reduced by the same %.)
	Microstep Resolution	200, 400, 800, 1000, 1600, 2000, 3200, 4000, 5000, 6000, 6400, 8000, 10000, 12800, 20000, 25600
	Phase Current Setting	0.6–2.5 Amps RMS
	Self Test	Automatically rotates the motor back and forth two turns in each direction in order to confirm that the motor is operational.
	Step Pulse Noise Filter	Select 150kHz or 2MHz
	Load Inertia	Set motor and load inertia range to 0–4x or 5–10x.
Connectors		DEGSON 2EDGK-7.62-02P-14-00A(H) 2-pin power connector DEGSON 2EDGK-5.08-04P-14-00A(H) 4-pin motor connector DEGSON 15EDGK-3.81-08P-14-00A(H) 8-pin I/O connector ADC part STP-CON-6 contains replacement connectors
Maximum Humidity		90% non-condensing
Storage/Ambient Temperature		0 to 40 °C [32 to 104 °F]
Operating Temperature		0 to 85 °C [32 to 185 °F] (interior of electronics section)
Drive Cooling Method		Natural convection (mount drive to metal surface)
Mounting		(2) M4 screws to mount to metal surface
Weight		1 lb 15 oz [0.88 kg]
Agency Approvals		CE, $_{C}UR_{US}$

Stepping System Drives

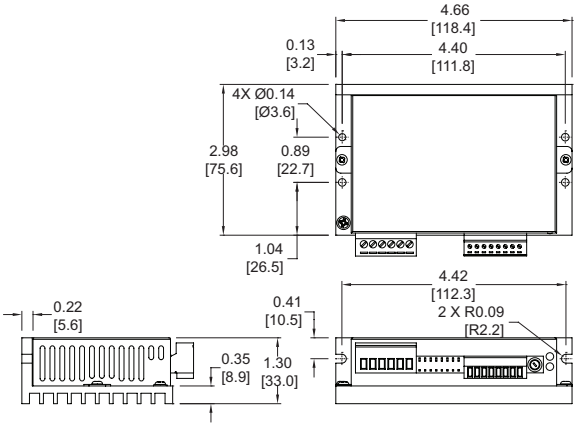
SureStep® Microstepping Drives Dimensions

Dimensions = in [mm]

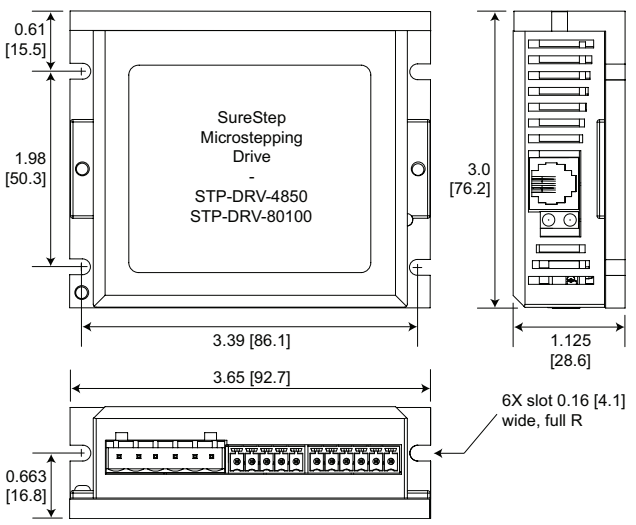
STP-DRV-4830



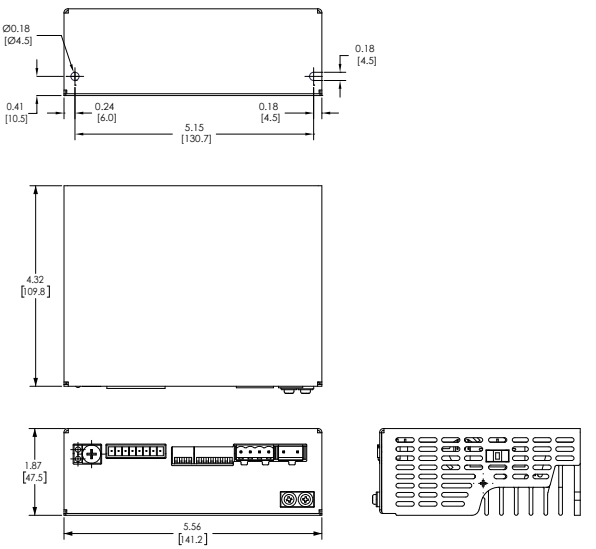
STP-DRV-4845 & -6575



STP-DRV-4850 & -80100



STP-DRVAC-24025

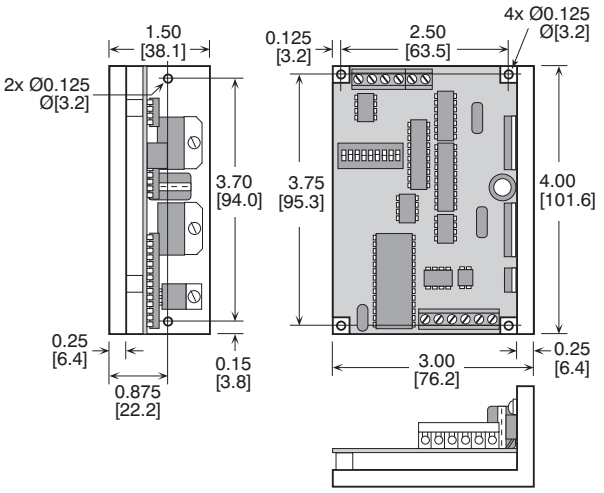


Stepping System Drives

SureStep® Microstepping Drives Dimensions

Dimensions = in [mm]

STP-DRV-4035



Sure-step® Stepping System Motors

SureStep® Stepping Motors

SureStep Series Part Numbers – Connectorized Bipolar Stepping Motors*				
Bipolar Stepping Motors	Price	Shaft Type	Torque Level	Encoder Mounting
STP-MTRL-14026	$22.50	single	low	not available
STP-MTRL-14026D	$27.00	dual		optional
*STP-MTRL-14026E***	$97.00	dual		pre-installed
STP-MTRL-14034	$28.50	single		not available
STP-MTRL-14034D	$32.50	dual		optional
*STP-MTRL-14034E***	$101.00	dual		pre-installed
STP-MTR-17040	$19.00	single	high	not available
STP-MTR-17040D	$23.00	dual		optional
*STP-MTR-17040E***	$92.00	dual		pre-installed
*STP-MTR-17040W****	$132.00	single		not available
STP-MTR-17048	$23.00	single		not available
STP-MTR-17048D	$27.50	dual		optional
*STP-MTR-17048E***	$97.00	dual		pre-installed
*STP-MTR-17048W****	$135.00	single		not available
STP-MTR-17060	$37.50	single		not available
STP-MTR-17060D	$42.00	dual		optional
*STP-MTR-17060E***	$111.00	dual		pre-installed
*STP-MTR-17060W ****	$175.00	single		not available
STP-MTR-23055	$37.50	single		not available
STP-MTR-23055D	$42.50	dual		optional
*STP-MTR-23055E***	$112.00	dual		pre-installed
*STP-MTR-23055W ****	$163.00	single		not available
STP-MTR-23079	$49.00	single		not available
STP-MTR-23079D	$54.00	dual		optional
*STP-MTR-23079E***	$123.00	dual		pre-installed
*STP-MTR-23079W ****	$177.00	single		not available
STP-MTR-34066	$116.00	single		not available
STP-MTR-34066D	$132.00	dual		not available
*STP-MTR-34066W ****	$211.00	single		not available
STP-MTRH-23079	$55.00	single	higher	not available
STP-MTRH-23079D	$59.00	dual		optional
*STP-MTRH-23079E **	$129.00	dual		pre-installed
*STP-MTRH-23079W ****	$263.00	single		not available
STP-MTRH-34066	$130.00	single		not available
STP-MTRH-34066D	$145.00	dual		not available
*STP-MTRH-34066W ****	$299.00	single		not available
STP-MTRH-34097	$147.00	single		not available
STP-MTRH-34097D	$162.00	dual		not available
*STP-MTRH-34097W ****	$335.00	single		not available
STP-MTRH-34127	$174.00	single		not available
STP-MTRH-34127D	$191.00	dual		not available
*STP-MTRH-34127W ****	$366.00	single		not available

Motors listing continued on next page

** For integrated motor/drives part numbers and pricing, see the integrated motor/drives section.*

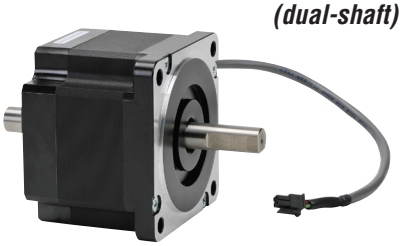
*** E model motors come with a STP-MTRA-ENC9 encoder pre-installed. Requires STP-CBL-EBxx for encoder wiring. To change from the default 400ppr, use STP-USBENC-CBL-1. See the SureStep Stepping System Encoders section for more details.*

**** W models are IP65 washdown rated. All others are IP40.*

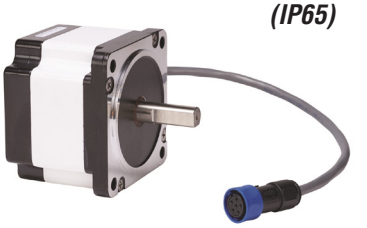
STP-MTR-xxxxx (single-shaft)

STP-MTR-xxxxxE (encoder mount)

STP-MTR-xxxxxD (dual-shaft)



STP-MTR-xxxxxW (IP65)



SureStep® Stepping System Motors

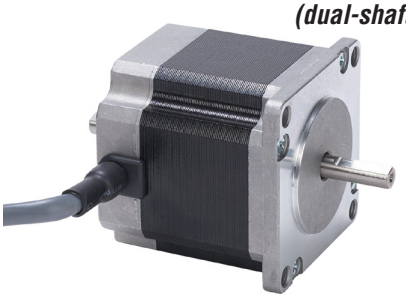
SureStep® Stepping Motors

SureStep Series Part Numbers – Non-connectorized Bipolar Stepping Motors				
Bipolar Stepping Motors	**Price**	**Shaft Type**	**Torque Level**	**Encoder Mounting**
Motors listing continued from previous page				
STP-MTRAC-23044	$57.00	single	High voltage High torque	not available
STP-MTRAC-23044D	$58.00	dual		optional
STP-MTRAC-23055	$63.00	single		not available
STP-MTRAC-23055D	$64.00	dual		optional
STP-MTRAC-23078	$88.00	single		not available
STP-MTRAC-23078D	$89.00	dual		optional
STP-MTRAC-34075	$235.00	single		not available
STP-MTRAC-34075D	$236.00	dual		optional
STP-MTRAC-34115	$245.00	single		not available
STP-MTRAC-34115D	$246.00	dual		optional
STP-MTRAC-34156	$265.00	single		not available
STP-MTRAC-34156D	$265.00	dual		optional

NOTE: STP-MTRAC-34156(x) motors have a 5/8" front shaft

STP-MTRAC-xxxxx
(single-shaft)

STP-MTRAC-xxxxxD
(dual-shaft)



*Sure*Step® Stepping Motors Mounting Accessory

Mounting Accessory – for NEMA 17 SureStep Series Bipolar Stepping Motors		
Part Number	**Price**	**Description**
STP-MTRA-RB-85	$8.50	Reducer bushing, 8mm OD to 5mm ID, 16mm length, aluminum alloy. Connects NEMA size 17 stepper motors to Koyo TRD-NH and TRD-SH hollow shaft encoders.

SureStep® Stepping System Motors

SureStep® Stepping Motors

SureStep Series Specifications – Connectorized Bipolar Stepping Motors													
		Low Voltage Low Torque		Low Voltage High Torque						Low Voltage Higher Torque			
Bipolar Stepping Motors		STP-MTRL-14026(x)	STP-MTRL-14034(x)	STP-MTR-17040(x)	STP-MTR-17048(x)	STP-MTR-17060(x)	STP-MTR-23055(x)	STP-MTR-23079(x)	STP-MTR-34066(x)	STP-MTRH-23079(x)	STP-MTRH-34066(x)	STP-MTRH-34097(x)	STP-MTRH-34127(x)
NEMA Frame Size		14	14	17	17	17	23	23	34	23	34	34	34
Maximum Holding Torque*	(lb·in)	0.5	1.25	3.81	5.19	7.19	10.37	17.25	27.12	17.87	27.12	50.00	80.50
	(oz·in)	8	20	61	83	115	166	276	434	286	434	800	1288
	(N·m)	0.06	0.14	0.43	0.59	0.81	1.17	1.95	3.06	2.02	3.06	5.65	9.10
Rotor Inertia	($oz·in^2$)	0.06	0.08	0.28	0.37	0.56	1.46	2.60	7.66	2.60	7.66	14.80	21.90
	($kg·cm^2$)	0.0003	0.00035	0.05	0.07	0.10	0.27	0.48	1.40	0.48	1.40	2.71	4.01
Rated Current (A/phase)		0.35	0.8	1.7	2.0	2.0	2.8	2.8	2.8	5.6	6.3	6.3	6.3
Resistance (Ω/phase)		8.5	7.66	1.6	1.4	2.0	0.75	1.1	1.11	0.4	0.25	0.3	0.49
Inductance (mH/phase)		5.77	6.92	3.0	2.7	3.3	2.4	3.8	6.6	1.2	1.5	2.1	4.1
Insulation Class		130°C [266°F] Class B; 300V rms											
Basic Step Angle		1.8°											
Shaft Runout (in)		0.002 in [0.051 mm]											
Max Shaft Radial Play @ 1lb load		0.001 in [0.025 mm]											
Perpendicularity		0.003 in [0.076 mm]											
Concentricity		0.003 in [0.076 mm]											
Maximum Radial Load (lb [kg])*		6.0 [2.7]					15.0 [6.8]		39.0 [17.7]	15.0 [6.8]		39.0 [17.7]	
Maximum Thrust Load (lb [kg])*		6.0 [2.7]					13.0 [5.9]		25.0 [11.3]	13.0 [5.9]		25.0 [11.3]	
Storage Temperature Range		-20°C to 100°C [-4°F to 212°F]											
Operating Temperature Range		-20°C to 50°C [-4°F to 122°F] (motor case temperature should be kept below 80°C [176°F])											
Operating Humidity Range		55% to 85% non-condensing											
Product Material		steel motor case; stainless steel shaft(s)											
Environmental Rating		IP40 (IP65 for "W" motors)											
Weight (lb [kg]) (E models)		0.25 [0.11] (0.3 [0.1])	0.35 [0.15] (0.4 [0.2])	0.6 [0.3] (0.7 [0.3])	0.7 [0.3] (0.8 [0.4])	0.9 [0.4] (0.9 [0.4])	1.5 [0.7] (1.5 [0.7])	2.2 [1.0] (2.4 [1.1])	3.9 [1.7]	2.4 [1.1] (2.4 [1.1])	3.9 [1.7]	5.9 [2.7]	8.4 [3.8]
Agency Approvals		CE											
Design Tips		Allow sufficient time to accelerate the load and size the step motor with a 100% torque safety factor. DO NOT disassemble step motors because motor performance will be reduced and the warranty will be voided. DO NOT connect or disconnect the step motor during operation. Mount the motor to a surface with good thermal conductivity, such as steel or aluminum, to allow heat dissipation. Use a flexible coupling with "clamp-on" connections to both the motor shaft and the load shaft to prevent radial and thrust loading on bearings from minor misalignment.												
Accessory Extension Cable		STP-EXT***L***-0xx		STP-EXT-0xx STP-EXT***W***-0xx (for "W" motors)						STP-EXT***H***-0xx STP-EXT***HW***-0xx (for "W" motors)			

**** For dual-shaft motors (STP-MTR-xxxxxD):***
The sum of the front and rear Torque Loads, Radial Loads, and Thrust Loads must not exceed the applicable Torque, Radial, and Thrust load ratings of the motor.

SureStep® Stepping System Motors

SureStep® Stepping Motors

SureStep Series Specifications – High Voltage Bipolar Stepping Motors							
Bipolar Stepping Motors			High Voltage High Torque				
			STP-MTRAC-23044(x)	STP-MTRAC-23055(x)	STP-MTRAC-23078(x)	STP-MTRAC-34075(x)	STP-MTRAC-34115(x)	STP-MTRAC-34156(x)**
NEMA Frame Size			23	23	23	34	34	34**
Maximum Holding Torque*		(lb·in)	4.69	9.31	14.19	51.31	69.48	115.06
		(oz·in)	75	149	227	821	1110	1841
		(N·m)	0.53	1.05	1.6	5.8	7.84	13
Rotor Inertia		($oz·in^2$)	0.66	1.64	2.62	7.38	14.74	24.06
		($kg·cm^2$)	120	300	480	1350	2700	4400
Rated Current (A/phase)		Series	0.71	0.71	0.71	2.15	2.05	2.55
		Parallel	1.41	1.41	1.41	4.3	4.1	5.1
Resistance (Ω/phase)		Series	12.4	14.4	18	4	4.8	4.8
		Parallel	3.1	3.6	4.5	1.0	1.2	1.375
Inductance (mH/phase)		Series	30.4	51.2	60.8	32	43.2	44.8
		Parallel	7.6	12.8	15.2	8.0	10.8	11.2
Insulation Class			B					
Steps per Revolution			200					
Basic Step Angle			1.8°					
Shaft Runout (in)			0.002 in 0.05 mm]					
Max Shaft Radial Play @ 1lb load			0.02 in [0.51 mm]			0.025 in [0.635 mm]		0.02 in [0.51 mm]
Max End Play @ 2.2-lb Axial load			0.08 in [2.03 mm]			0.075 in [1.91 mm]		0.08 in [2.03 mm]
Connectors			8 leads, 24AWG			8 leads, 22AWG		
Temperature Rise			80°C [176°F] max					
Storage Temperature Range			-40°C to 70°C [-40°F to 158°F]					
Operating Temperature Range			-20°C to 50°C [-4°F to 122°F]					
Operating Humidity Range			5% to 95% non-condensing					
Product Material			Steel motor case; stainless steel shaft(s)					
Environmental Rating			IP40					
Weight (lb [kg])			1.03 [0.47]	1.54 [0.7]	2.2 [1.0]	4.2 [1.9]	8.4 [3.8]	11.46 [5.2]
Agency Approvals			None			$_cUR_{us}$		

** For dual-shaft motors (STP-MTRAC-xxxxxD): The sum of the front and rear Torque Loads, Radial Loads, and Thrust Loads must not exceed the applicable Torque, Radial, and Thrust load ratings of the motor.*

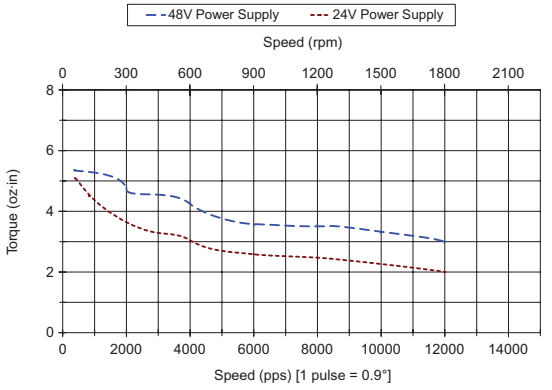
*** STP-MTRAC-24156(x) motors have a 5/8" front shaft*

SureStep® Stepping System Motors

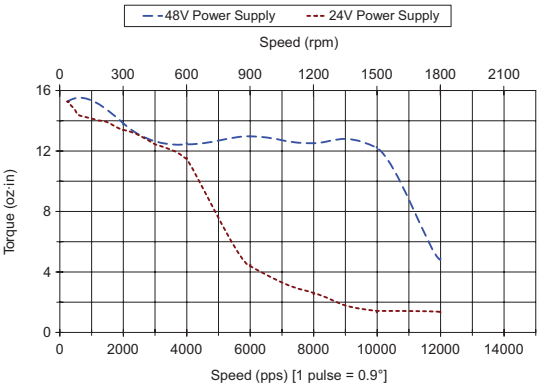
SureStep® Motor Running Torque vs. Speed Charts

STP-MTRL-14xxx(x) NEMA 14 Step Motors

STP-MTRL-14026(x) Torque vs Speed (1.8° step motor; 1/2 stepping, RMS phase current)



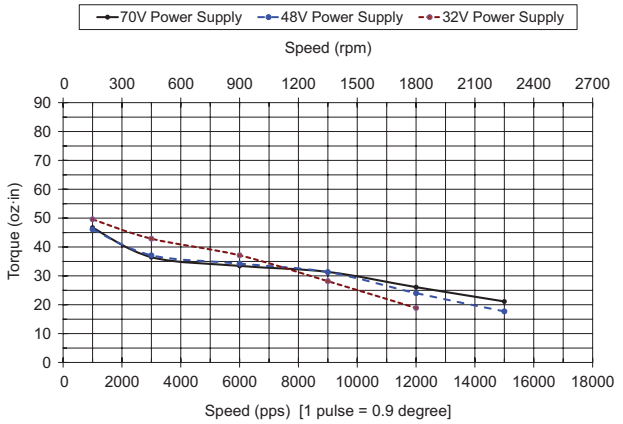
STP-MTRL-14034(x) Torque vs Speed (1.8° step motor; 1/2 stepping, RMS phase current)



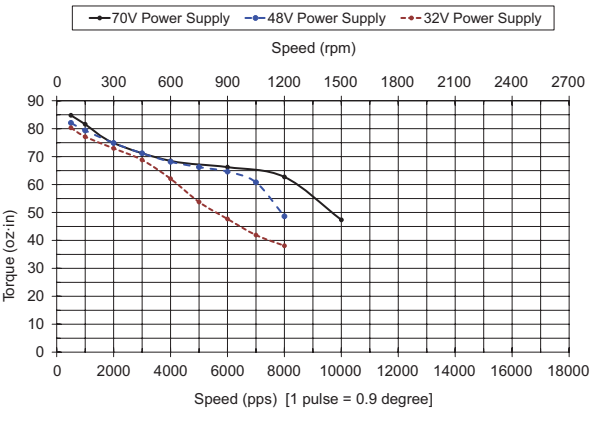
STP-MTR-17xxx(x) NEMA 17 Step Motors

Note: "W" series motors have 5% less running torque than other models

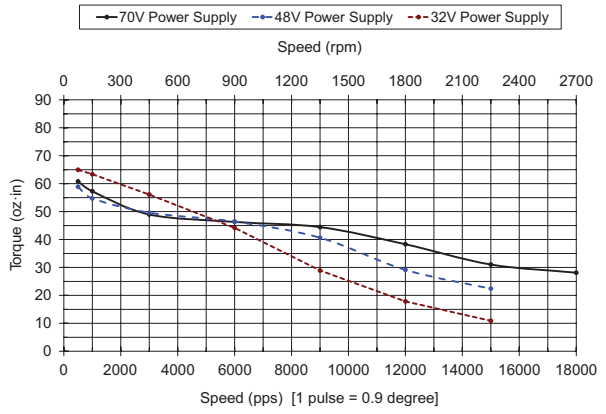
STP-MTR-17040(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTR-17060(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTR-17048(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



Note: Motor torque vs speed charts for STP-MTRD series integrated motor/drives can be found in the integrated motor/drives section of the full catalog

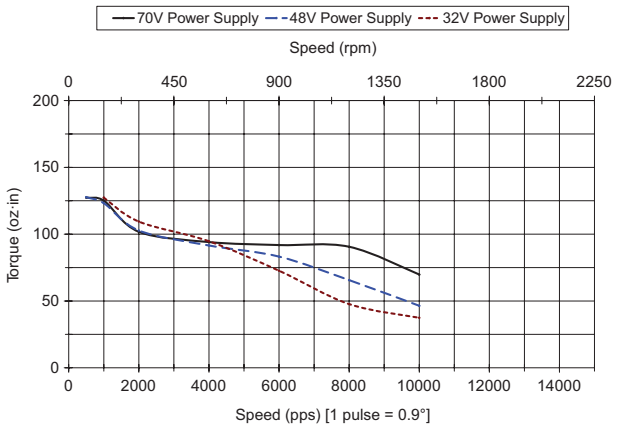
SureStep® Stepping System Motors

SureStep® Motor Torque vs. Speed Charts (continued)

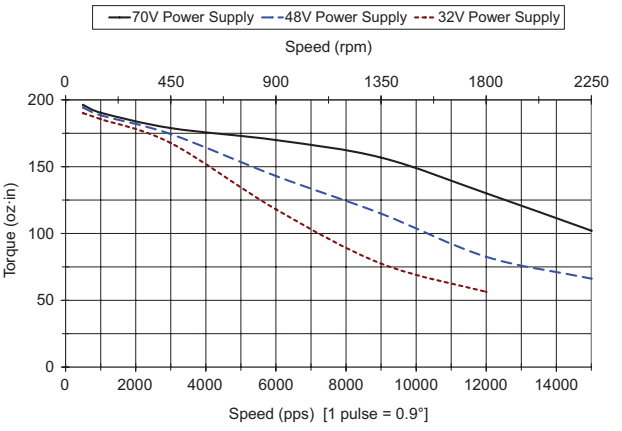
STP-MTR(H)-23xxx(x) NEMA 23 Step Motors

Note: "W" series motors have 5% less running torque than other models

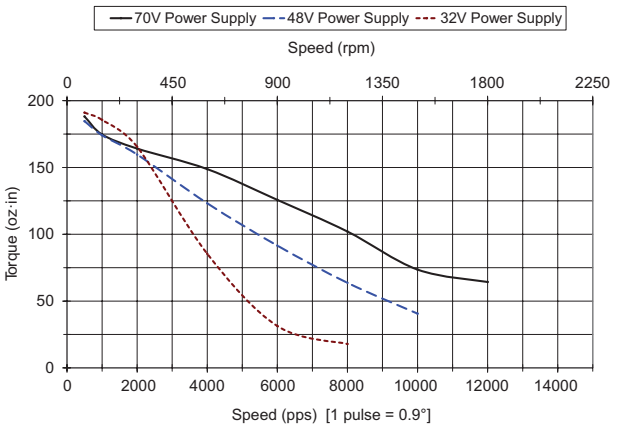
STP-MTR-23055(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



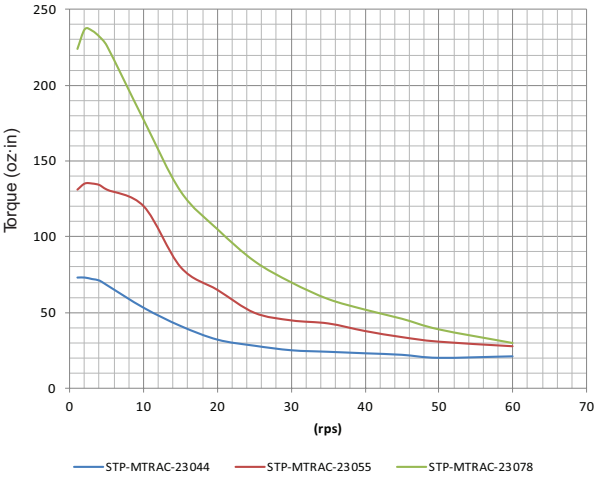
STP-MTR*H*-23079(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTR-23079(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTRAC-23xxxx Torque vs Speed @ 340VDC bus (1.8° step motor; 1/2 stepping)



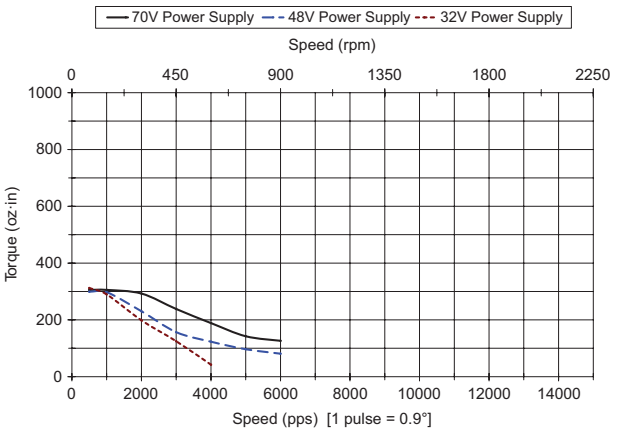
Stepping System Motors

SureStep® Motor Torque vs. Speed Charts (continued)

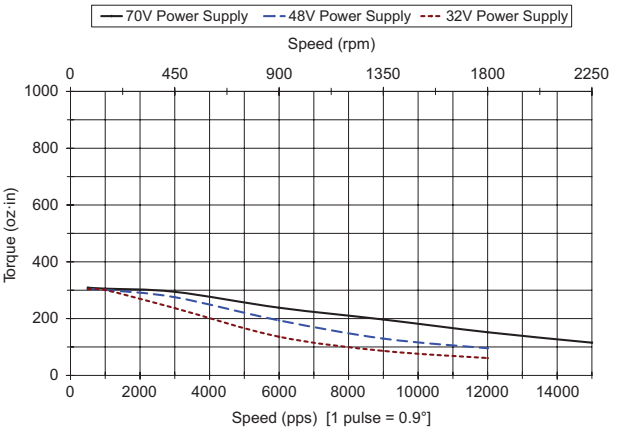
STP-MTR(H)-34xxx(x) NEMA 34 Step Motors

Note: "W" series motors have 5% less running torque than other models

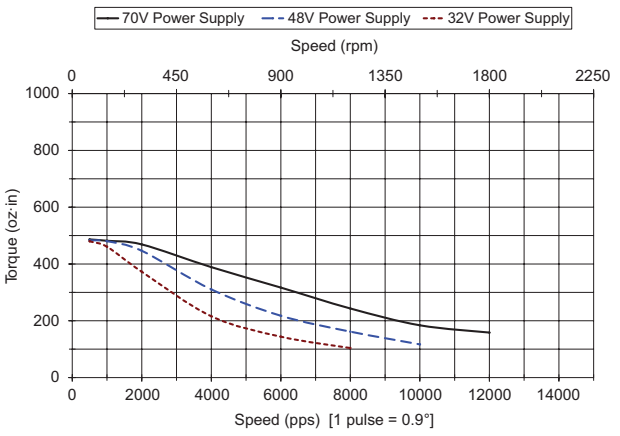
STP-MTR-34066(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



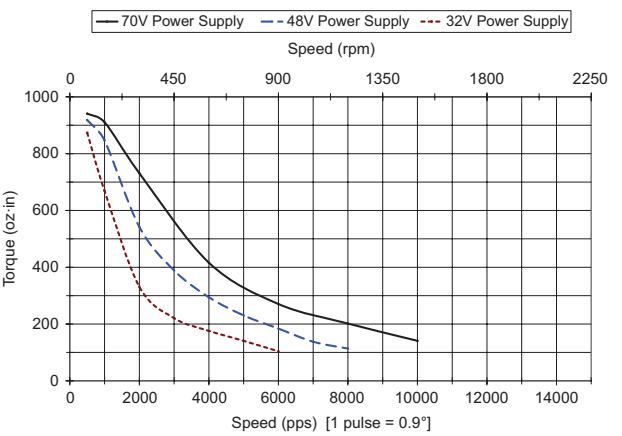
STP-MTR*H*-34066(x) Torque vs Speed (1.8° motor; 1/2 stepping)



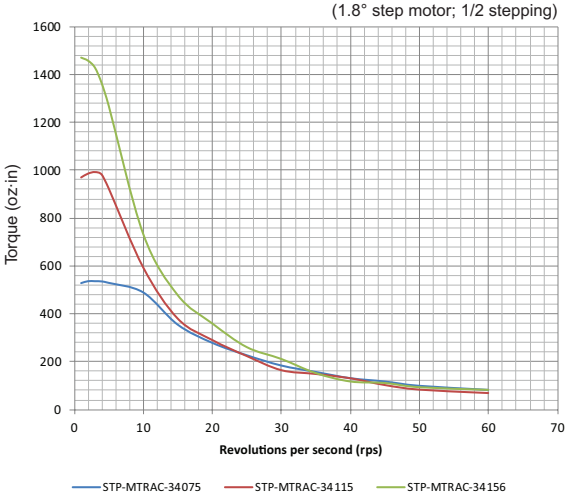
STP-MTR*H*-34097(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTR*H*-34127(x) Torque vs Speed (1.8° step motor; 1/2 stepping)



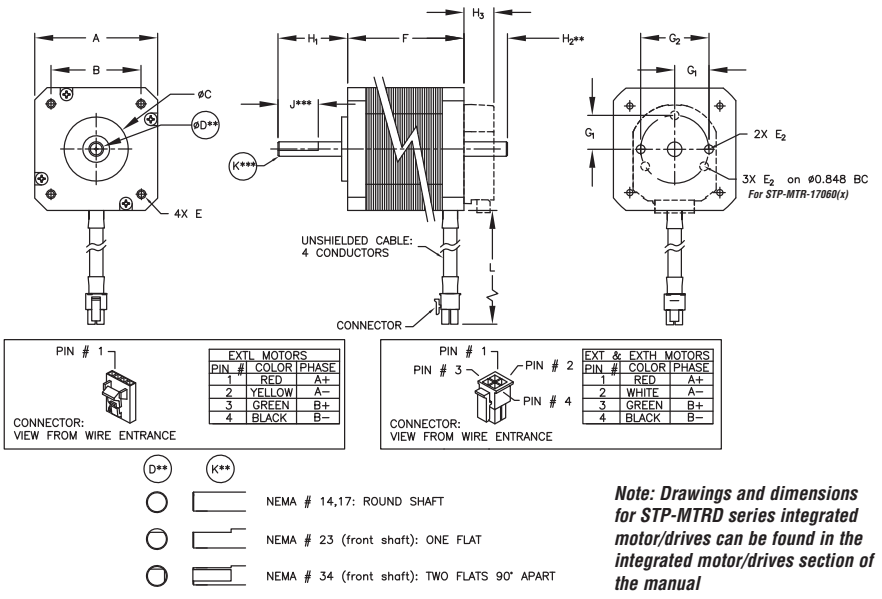
STP-MTRAC-34xxxx Torque vs Speed @ 340VDC bus
(1.8° step motor; 1/2 stepping)



SureStep® Stepping System Motors

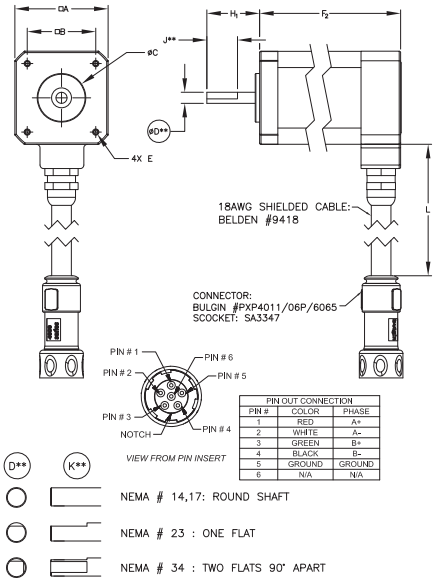
SureStep® Motor Dimensions and Cabling

STP-MTR(x)-xxxx(x) Motors



Note: Drawings and dimensions for STP-MTRD series integrated motor/drives can be found in the integrated motor/drives section of the manual

STP-MTR-xxxxxW Motors



SureStep Series Dimensions & Cabling – Connectorized Bipolar Stepping Motors

Dimen -sions* (in [mm]*)	Low Torque Motors		High Torque Motors						Higher Torque Motors			
	STP-MTRL -14026(x)	STP-MTRL -14034(x)	STP-MTR -17040(x)	STP-MTR -17048(x)	STP-MTR -17060(x)	STP-MTR -23055(x)	STP-MTR -23079(x)	STP-MTR -34066(x)	STP-MTRH -23079(x)	STP-MTRH -34066(x)	STP-MTRH -34097(x)	STP-MTRH -34127(x)
A	1.39 [35.3]	1.39 [35.3]	1.67 [42.3]			2.25 [57.2]		3.39 [86.1]	2.25 [57.2]	3.39 [86.1]		
B	1.02 [25.9]	1.02 [25.9]	1.22 [31.0]			1.86 [47.2]		2.74 [69.6]	1.86 [47.2]	2.74 [69.6]		
C	Ø 0.87 [22.1]					Ø 1.50 [38.1]		Ø 2.88 [73.0]	Ø 1.50 [38.1]	Ø 2.88 [73.0]		
D**	Ø 0.20 [5.0]					Ø 0.25 [6.4]		Ø 0.50 [12.7]	Ø 0.25 [6.4]	Ø 0.50 [12.7]		
E	0.15 DP	0.15 DP	M3 x 0.5 thread 0.15 [3.8] min depth			Ø 0.20 [5.1] through		Ø 0.26 [6.6] through	Ø 0.20 [5.1] through	Ø 0.26 [6.6] through		
E_2	M2.5 x 0.45 thread	M2.5 x 0.45 thread	M2.5 x 0.45 thread		M2 x 0.4 thread	4-40		n/a	4-40	n/a		
F_1**	1.02 [25.9]	1.34 [34.0]	1.58 [40.1]	1.89 [48.0]	2.34 [59.5]	2.22 [56.4]	3.10 [78.7]	2.64 [67.1]	3.10 [78.7]	2.64 [67.1]	3.82 [97.0]	5.00 [127.0]
F_2**	n/a		1.90 [48.3]	2.24 [56.9]	2.67 [67.8]	2.33 [59.1]	3.19 [81.0]	2.64 [67.1]	3.19 [81.0]	2.64 [67.1]	3.82 [97.0]	5.00 [127.0]
G_1	0.375	0.375	0.375	0.375	0.411	0.906	0.906	0.906	0.906	0.906	0.906	0.906
G_2	0.75	0.75	0.75	0.75	n/a	1.812	1.812	1.812	1.812	1.812	1.812	1.812
H_1	0.60 [15.2]	0.60 [15.2]	0.94 [24.0]			0.81 [20.6]		1.46 [37.1]	0.81 [20.6]	1.46 [37.1]		
H_2**	0.51 [13.0]	0.51 [13.0]	0.51 [13]			0.51 [13]		1.13 [28.7]	0.51 [13]	1.13 [28.7]		
H_3***	0.40							n/a	0.40	n/a		
J**	n/a					0.59 [15.0]		0.98 [25.0]	0.59 [15.0]	0.98 [25.0]		
K**	n/a					0.23 [5.8]		0.45 [11.4]	0.23 [5.8]	0.45 [11.4]		
L	12 [305]											
Conductor	(4) #26 AWG		(4) #20 AWG (5) #18 AWG (for W motors)						(4) #18 AWG (5) #18 AWG (for W motors)			
Connector	TE # 103653-3		Molex # 43025-0400 PXP4010/06S/6065 (for W motors)						Molex # 39-01-3042 PXP4010/06S/6065 (for W motors)			
Pin	TE # 1-104505-3 (LOOSE)		Molex # 43030-0007 Socket: SA3347 (for W motors)						Molex # 39-00-0039 Socket: SA3347 (for W motors)			

** mm dimensions are for reference purposes only.*

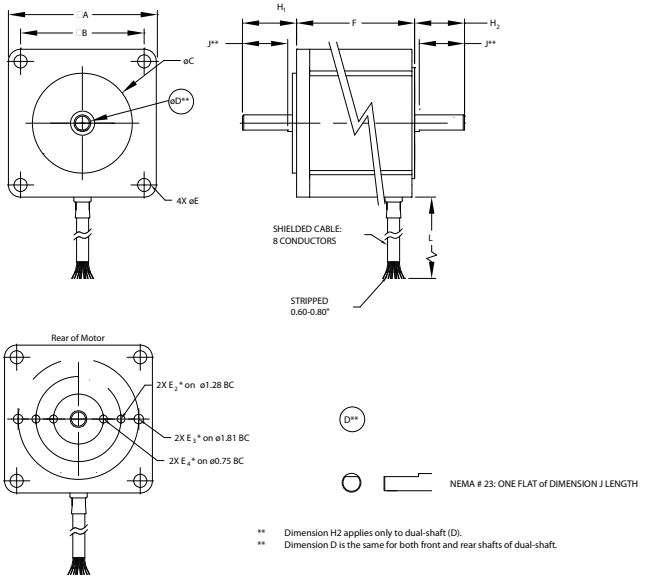
*** Dimension H_2 applies only to dual-shaft (D) and encoder (E) motors.*
Dimension D (shaft diameter) is the same for both front and rear shafts of dual-shaft (D) and encoder (E) motors.
Dimensions J & K do NOT apply to rear shafts of dual-shaft (D) and encoder (E) motors (all rear shafts are round style).
Dimension F_2 applies to IP65 (W) motors only.

**** Dimension H3 applies only to "E" models with the encoder pre-mounted.*

SureStep® Stepping System Motors

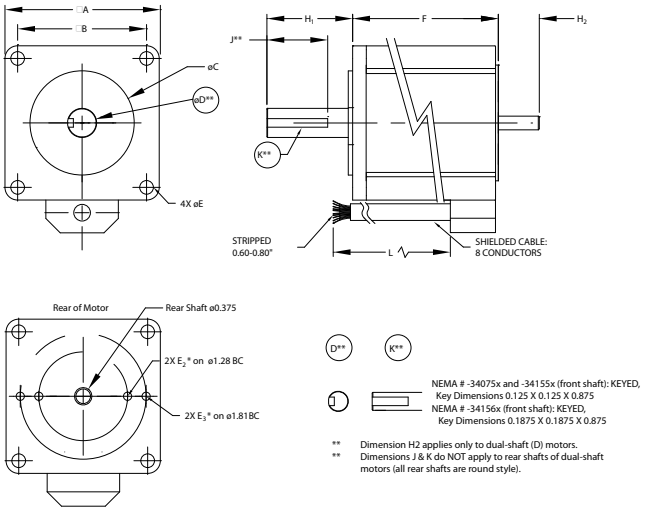
SureStep® Motor Dimensions and Cabling

STP-MTRAC-23xxx Motors



** Dimension H2 applies only to dual-shaft (D).
** Dimension D is the same for both front and rear shafts of dual-shaft.

STP-MTRAC-34xxx Motors



** Dimension H2 applies only to dual-shaft (D) motors.
** Dimensions J & K do NOT apply to rear shafts of dual-shaft motors (all rear shafts are round style).

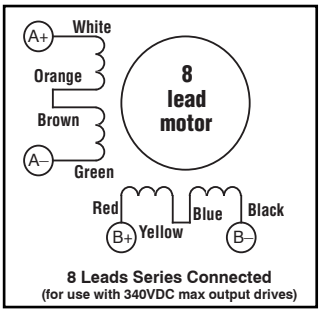
SureStep Series Dimensions & Cabling – High Voltage Bipolar Stepping Motors

Dimen -sions* (in [mm]*)	High Voltage High Torque					
	STP-MTRAC -23044(x)	STP-MTRAC -23055(x)	STP-MTRAC -23078(x)	STP-MTRAC -34075(x)	STP-MTRAC -34115(x)	STP-MTRAC -34156(x)
A	2.25 [57.15]	2.25 [57.15]	2.25 [57.15]	3.39 [86.1]	3.39 [86.1]	3.39 [86.1]
B	1.86 [47.24]	1.86 [47.24]	1.86 [47.24]	2.74 [69.6]	2.74 [69.6]	2.87 [72.9]
C	1.50 [38.1]	1.50 [38.1]	1.50 [38.1]	2.87 [72.9]	2.87 [72.9]	2.87 [72.9]
D**	0.25 [6.35]	0.25 [6.35]	0.25 [6.35]	0.5 [12.7]	0.5 [12.7]	0.625 [15.9]
E	0.2 [5.08]	0.2 [5.08]	0.2 [5.08]	0.25 [6.35]	0.25 [6.35]	0.25 [6.35]
E_2***	2-56 thru	2-56 thru	2-56 thru	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep
E_3***	4-40 UNC x 0.2 Deep	4-40 UNC x 0.2 Deep	4-40 UNC x 0.2 Deep	4-40 UNC Tap 0.2 Deep	4-40 UNC Tap 0.2 Deep	4-40 UNC Tap 0.2 Deep
E_4***	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	2-56 UNC Tap 0.2 Deep	–	–	–
F	1.71 [43.43]	2.16 [54.86]	3.05 [77.47]	2.95 [74.93]	4.52 [114.81]	6.14 [155.96]
H_1	0.81 [20.57]	0.81 [20.57]	0.81 [20.57]	1.25 [31.75]	1.25 [31.75]	1.25 [31.75]
H_2***	0.63 [16.0]	0.63 [16.0]	0.63 [16.0]	1.12 [28.45]	1.12 [28.45]	1.12 [28.45]
J	0.60 [15.24]	0.60 [15.24]	0.60 [15.24]	0.87 [22.1]	0.87 [22.1]	0.87 [22.1]
L	120 [3048]	120 [3048]	120 [3048]	120 [3048]	120 [3048]	120 [3048]

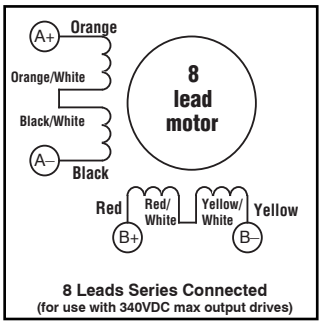
** mm dimensions are for reference purposes only.*

*** Dimension D (shaft diameter) is the same for both front and rear shafts of NEMA 23 dual-shaft motors. See diagrams for NEMA 34.*

**** Dimension applies only to dual-shaft (D) motors.*



STP-MTRAC-230xx(x), 34156(x) Motor Wiring



STP-MTRAC-34075(x), 34115(x) Motor Wiring

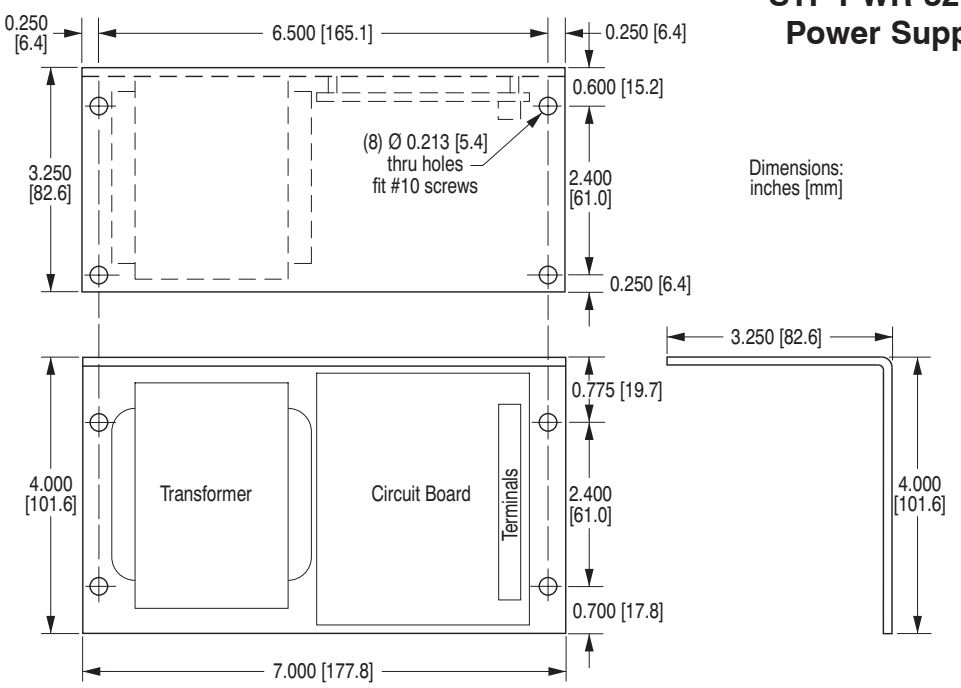
SureStep® Stepping System Power Supplies

SureStep® Power Supplies

SureStep Series Specifications – Stepping System Power Supplies				
Power Supply	***STP-PWR-3204***	***STP-PWR-4805***	***STP-PWR-4810***	***STP-PWR-7005***
Price	$132.00	$155.00	$200.00	$200.00
Input Power (fuse protected *)	1-phase, 120/240 VAC, 50/60 Hz, 150 VA Fuse*: 3A	1-phase, 120/240 VAC, 50/60 Hz, 350 VA Fuse*: 5A	1-phase, 120/240 VAC, 50/60 Hz, 650 VA Fuse*: 8A	1-phase, 120/240 VAC, 50/60 Hz, 500 VA Fuse*: 7A
Input Voltage Range (switch selectable)	120/240 VAC ±10% (Voltage range switch is set to 240 VAC from factory)			
Inrush Current	120 VAC < 12 A / 240 VAC < 14 A	120 VAC < 20A / 240 VAC < 24A	120 VAC < 40A / 240 VAC < 50A	
Motor Supply Output (linear unregulated, fuse protected *, and power on LED indicator)	32 VDC @ 4A (fully loaded) 35 VDC @ 1A load 41 VDC @ no load Fuse*: 6A (Electrically isolated from Logic Supply Output)	46.5 VDC @ 5A (fully loaded) 52 VDC @ 1A load 57.5 VDC @ no load Fuse*: 8A	46.5 VDC @ 10A (fully loaded) 50 VDC @ 1A load 57.5 VDC @ no load Fuse*: 15A	70 VDC @ 5A (fully loaded) 79 VDC @ 1A load 86.5 VDC @ no load Fuse*: 8A
Logic Supply Output (regulated and power on LED indicator)	5 VDC ±5% @ 500 mA (Electronically Overload Protected) (Electrically isolated from Motor Supply Output)			
Watt Loss	13W	25W	51W	42W
Storage Temperature Range	-55 to 85 °C [-67 to 185 °F]			
Operating Temperature Range	0 to 50 °C [32 to 122 °F] full rated; derate current 1.1% per degree above 50°C; 70 °C [158 °F] maximum			
Humidity	95% (non-condensing) relative humidity maximum			
Cooling Method	Natural convection (mount power supply to metal surface if possible)			
Mounting	Mount on either wide or narrow side with machine screws per dimension diagrams			
Weight (lb [kg])	6.5 [2.9]	11 [4.9]	18 [8.3]	16 [7.2]
Connections	Screw Terminals			
Agency Approvals	UL (file # E181899), CSA, CE			
**** Fuses to be replaced by qualified service personnel only. Use (1-1/4 x 1/4 in) ceramic fast-acting fuses (Edison type ABC from AutomationDirect, or equivalent).***				

Power Supply Dimensions

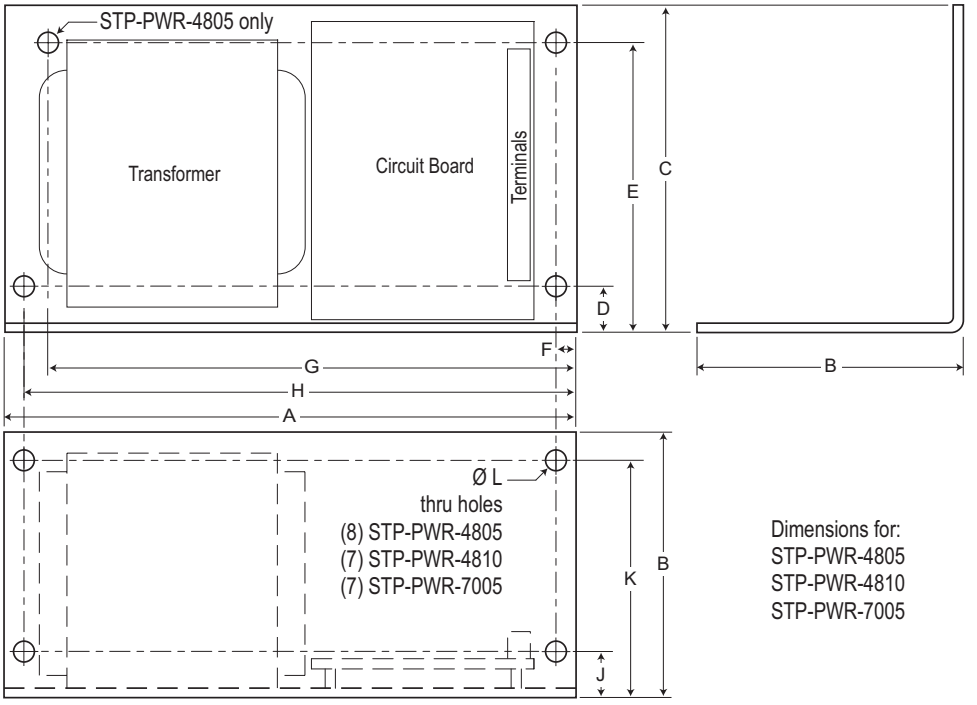
STP-PWR-3204 Power Supply



Sure step® Stepping System Power Supplies

SureStep® Power Supply Dimensions (continued)

STP-PWR-4805, -4810, -7005 Power Supplies



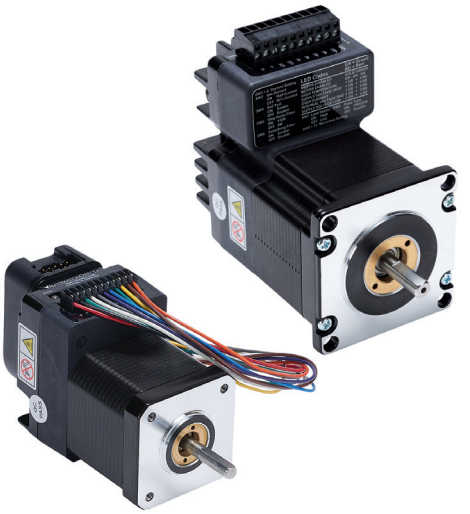
SureStep Series Dimensions – 48V & 70V Power Supplies												
Power Supply Part Number	Dimensions* (in [mm]*)											Mtg Screw
	A	B	C	D	E	F	G	H	J	K	L	
STP-PWR-4805	8.10 [205.7]	3.88 [98.6]	5.00 [127.0]	0.87 [22.1]	4.67 [118.6]	0.25 [6.4]	7.15 [181.6]	7.75 [196.9]	0.50 [12.7]	3.53 [89.7]	0.200 [5.1]	#10
STP-PWR-4810 STP-PWR-7005	9.00 [228.6]	4.62 [117.3]	5.62 [142.7]	1.56 [39.6]	4.06 [103.1]	0.35 [8.9]	n/a	8.59 [218.2]	0.50 [12.7]	4.27 [108.5]	9/32 [7.1]	1/4
**** mm dimensions are for reference purposes only.***												

SureStep® Integrated Microstepping Motors and Drives

SureStep® Integrated Motors System

General integrated motor/drive features

- DC power supply required (12-48 VDC or 12-70 VDC)
- Pulse/Direction or CW Pulse/CCW Pulse
- Digital input filtering
- "E" models include an encoder
- Three optically isolated digital inputs, 5 to 24 volts
- Step input signal smoothing (microstep emulation), performs high resolution stepping by synthesizing coarse steps into fine microsteps
- Dynamic smoothing, software-configurable filtering for use in removing spectral components from command sequence, reduces jerk, limiting excitation of system resonance
- Anti-resonance (electronic damping): raises the system-damping ratio to eliminate midrange instability and allow stable operation throughout the speed range of the motor
- Idle current reduction range of 0-90% of running current after a delay selectable in milliseconds (Standard models = 50/90%, DIP switch selectable)
- Configurable hardware digital noise filter, software noise filter
- Non-volatile storage, configurations are saved in FLASH memory on-board the DSP
- Dynamic current control, software configurable for running current, accel current, idle current, to make motion smoother and the motor run cooler



Standard NEMA 17 and 23 motor/drives

Standard integrated motor/drive features

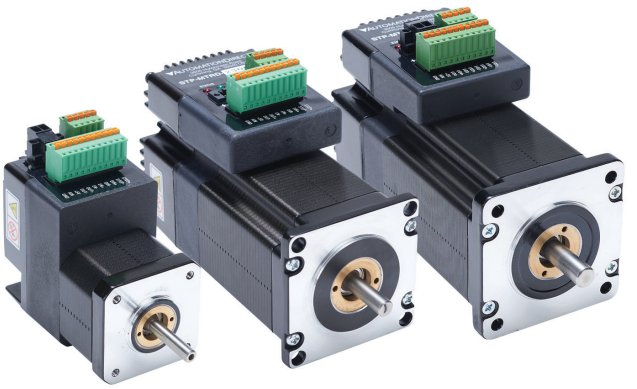
(STP-MTRD-x)

- "E" models have an externally wireable encoder which can provide feedback to an external controller
- Configurable via DIP switches
- Available torque from 68 to 210 oz-in

Advanced integrated motor/drive features

(STP-MTRD-xR)

- Step and Direction, CW/CCW, and AB Quadrature/Encoder following
- Velocity (Oscillator) and position mode
- Control via streaming SCL commands
- RS-485 ASCII (2- or 4-wire) communications
- On "E" models, the internal encoder provides improved position and speed control
- Four "Variable I/O" points, 5 to 24 volts (NEMA 24 models)
- Analog input for speed and position, 0 to 5 VDC
- Configurable via SureMotion Pro software
- Available torque from 54 to 340 oz-in



Advanced NEMA 17, 23, and 24 motor/drives

SureStep Series Part Numbers
Standard Integrated Motor/Drives

Integrated Motor/Drive	NEMA Size	Price
STP-MTRD-17038	17	$102.00
STP-MTRD-17038E	17	$177.00
STP-MTRD-23042	23	$156.00
STP-MTRD-23042E	23	$232.00
STP-MTRD-23065	23	$164.00
STP-MTRD-23065E	23	$238.00

Note: Standard Integrated motor/drives with an "E" have an external encoder that can be wired to an external controller.

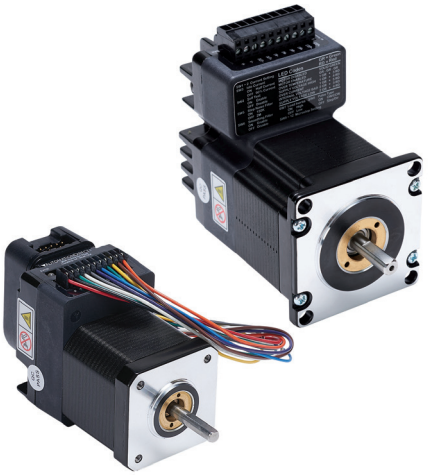
SureStep Series Part Numbers
Advanced Integrated Motor/Drives

Integrated Motor/Drive	NEMA Size	Price
STP-MTRD-17030R	17	$239.00
STP-MTRD-17030RE	17	$308.00
STP-MTRD-17038R	17	$252.00
STP-MTRD-17038RE	17	$336.00
STP-MTRD-23042R	23	$259.00
STP-MTRD-23042RE	23	$358.00
STP-MTRD-23065R	23	$269.00
STP-MTRD-23065RE	23	$365.00
STP-MTRD-24075RV	24	$365.00
STP-MTRD-24075RVE	24	$432.00

Note: Advanced Integrated motor/drives with an "E" have an internal encoder used for stall prevention (cannot be wired to an external PLC or controller).

SureStep® Integrated Microstepping Motors and Drives

SureStep® Standard Integrated Motor/Drives Specifications



SureStep Integrated Series Specifications – Standard					
Microstepping Drive/Motor			**STP-MTRD-17038 STP-MTRD-17038E**	**STP-MTRD-23042 STP-MTRD-23042E**	**STP-MTRD-23065 STP-MTRD-23065E**
Input Voltage (external p/s required)			12-48 VDC	12-70 VDC	12-70 VDC
Logic Supply Output			+4.8 - 5 volts at 50mA maximum		
Configuration Method			DIP switches		
Current Controller			Digital MOSFET, PWM @ 16kHz		
Encoder Feedback			"E" models only. External encoder must be wired to external feedback device.		
Encoder Specs ("E" models only)			1000 ppr, Line Driver, Supply Voltage (Typ: 5V, Max: 5.5 V, Min: 4.5 V). Detailed specs, other encoder options, and PLC compatibility are listed in Appendix A of the SureStep user manual.		
Motor/Drive Protection			Short circuit, over-voltage, under-voltage, over-temp		
Input Signals	**Step/Pulse**		5-24 VDC nominal (range 4-30VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated. Minimum pulse width = 3µs (at 2 MHz), 0.25µs (at 150kHZ), Maximum pulse frequency = 150kHz or 2MHz (switch selectable), Function = Step Input, Limit CW		
	Direction		5-24 VDC nominal (range 4-30VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated. Minimum pulse width = 3µs (at 2 MHz), 0.25µs (at 150kHZ), Maximum pulse frequency = 150kHz or 2MHz (switch selectable), Function = Direction Input, Limit CCW		
	Enable		5-24 VDC nominal (range 4-30VDC); (5mA @ 4V; 15 mA @ 30V); Optically isolated. Minimum pulse width = 3µs (at 2 MHz), 0.25µs (at 150kHZ), Maximum pulse frequency = 150kHz or 2MHz (switch selectable), Function = Enable Input		
Output Signal			30 VDC / 100mA max, photodarlington, voltage drop = 1.2V max at 100mA Function = Alarm Output		
Jumper Selectable Functions		**Step Pulse Type**	Step and Direction: Step signal = step/pulse; Direction signal = direction. Step CW & CCW: Step signal = CW step; Direction signal = CCW step.		
		Step Pulse Noise Filter	Selectable 150 kHz or 2MHz		
Features	**Current Reduction**		This is the percentage of full current that the motor will use when the shaft is rotating. 100%, 90%, 70%, and 50% current selections.		
	Idle Current Reduction		Reduce power consumption and heat generation by limiting motor idle current to 90% or 50% of running current. (Holding torque is reduced by the same %.)		
	Microstep Resolution		200-25000 (dip switch selectable)		
	Self Test		Automatically rotate the motor back and forth 2 1/2 turns in each direction in order to confirm that the motor is operational.		
	Load Inertia		Anti-resonance and damping feature improves motor performance. Set motor and load inertia range to 0–4x or 5–10x.		
Connectors		**Control**	Housing: Tyco 4-643498-1 Cover: Tyco 1-643075-1	Connector part number: Weidmuller 1610200000, included in STP-CON-3	
		Encoder	Two 5 pin inserts (Molex# 14-60-0058), one housing Molex# 15-04-5104		
Drive Cooling Method			Natural convection (mount to suitable heat sink)		
Status LEDs			One red/green		
Mounting			Four M3 screws	Four #6 screws	

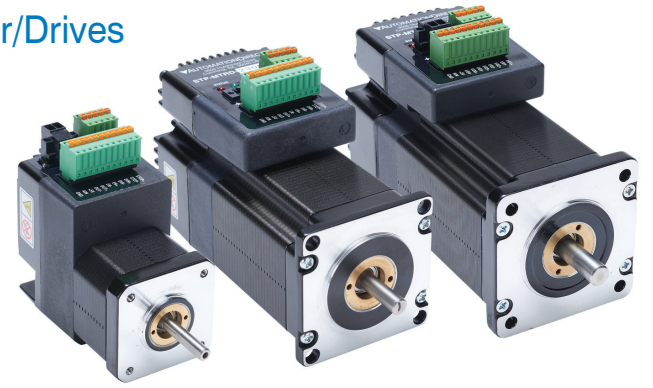
SureStep® Integrated Microstepping Motors and Drives

SureStep® Standard Integrated Motor/Drives Specifications

SureStep Integrated Series Specifications – Standard				
Integrated Stepping Motor/Drives		***STP-MTRD-17038 STP-MTRD-17038E***	***STP-MTRD-23042 STP-MTRD-23042E***	***STP-MTRD-23065 STP-MTRD-23065E***
NEMA Frame Size		NEMA 17	NEMA 23	NEMA 23
Maximum Holding Torque	(lb·in)	4.25	7.8125	13.125
	(oz·in)	68	125	210
	(N·m)	0.480189	0.8827	1.482936
Rotor Inertia	($oz \cdot in^2$)	0.448	1.420	2.515
	($kg \cdot cm^2$)	0.082	0.260	0.460
Insulation Class		Class B (130°C)		
Basic Step Angle		1.8 degrees		
Shaft Runout (in)		0.03	0.05	
Max Shaft Radial Play @ 1lb load		0.02		
Perpendicularity (mm)		0.08		
Concentricity (mm)		0.05		
**** Maximum Radial Load (lb [kg])***		6.7	13.9	
**** Maximum Thrust Load (lb [kg])***		34	63	
Storage Temperature Range		0-40°C (32-104°F)		
Operating Temperature Range		0-85°C		
Operating Humidity Range		90% max, non-condensing		
Product Material		Aluminum, steel, plastic, FR4, etc		
Environmental Rating		IP40		
Weight (oz [g])		14.7 [417]	30 [850]	42 [1200]
Agency Approvals		CE		
Design Tips		Allow sufficient time to accelerate the load and size the step motor with a 100% torque safety factor. DO NOT disassemble step motors because motor performance will be reduced and the warranty will be voided. DO NOT connect or disconnect the step motor during operation. Mount the motor to a surface with good thermal conductivity, such as steel or aluminum, to allow heat dissipation. Use a flexible coupling with "clamp-on" connections to both the motor shaft and the load shaft to prevent radial and thrust loading on bearings from minor misalignment and to prevent loosening due to vibration.		

SureStep® Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives



SureStep Integrated Series Specifications – Advanced					
Integrated Motor/Drive		**STP-MTRD-17030R STP-MTRD-17030RE**	**STP-MTRD-17038R STP-MTRD-17038RE**	**STP-MTRD-23042R STP-MTRD-23042RE**	**STP-MTRD-23065R STP-MTRD-23065RE**
Input Voltage (external p/s required)		12-48 VDC		12-70 VDC	
Configuration Method		SureMotion Pro software (SM-PRO: free download)			
Supply Output		+4.8 - 5 volts @ 50mA maximum			
Current Controller		Dual H-Bridge, 4 Quadrant, 4 state PWM @ 16kHz		Dual H-Bridge, 4 Quadrant, 4 state PWM @ 20kHz	
Encoder Feedback		"E" models only. Encoder is internal and provides position verification and stall prevention control by default.			
Motor/Drive Protection		Short circuit, over-voltage, under-voltage, over-temp			
Input Signals	**Step/Pulse**	5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Step Input, Jog CW, Limit CW, Start/Stop, General Purpose			
	Direction	5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Direction Input, Jog CCW, Limit CCW, General Purpose			
	Enable	5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA Function = Enable Input, Reset Input, Change Speed, General Purpose			
	Analog	0-5 VDC nominal (AIN referenced to GND). Input impedance: 30K ohms minimum, resolution = 12 bits Function = analog control modes and general purpose analog usage; programmable for signal range, offset, dead band, and filtering			
Output Signal		30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Alarm Output, Motion Output, Tach Output, General Purpose			
Communication Interface		RS-485 ASCII			
Non-volatile Memory Storage		Configurations are saved in FLASH memory on-board the DSP			
Features	**Current Reduction**	Selectable in SureMotion Pro software			
	Idle Current Reduction	Reduction range of 0–90% of running current after delay selectable in ms			
	Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev			
	Modes of Operation	Pulse (step) & direction, CW/CCW, A/B quadrature, velocity (oscillator), SCL streaming commands			
	Self Test	Checks internal and external power supply voltages. Diagnoses open motor phases and motor resistance changes > 40%			
Connectors	**DC Power**	2-position screw terminal: Weidmuller 1615780000			
	I/O	11-position spring cage: Phoenix 1881419			
	Comm	5-position spring cage: Phoenix 1881354			
Drive Cooling Method		Natural convection (mount to suitable heat sink)			
Status LEDs		1 red, 1 green			
Mounting		Four M3 screws		Four #6 screws	

SureStep® Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives

SureStep Integrated Series Specifications – Advanced Variable I/O		
Integrated Motor/Drive		***STP-MTRD-24075RV / STP-MTRD-24075RVE***
Input Voltage (external p/s required)		12-70 VDC
Configuration Method		SureMotion Pro software (SM-PRO: free download)
Supply Output		+4.8 - 5 volts @ 50mA maximum
Current Controller		Dual H-Bridge, 4 Quadrant, 4 state PWM @ 20kHz
Encoder Feedback		"E" models only. Encoder is internal and provides position verification and stall prevention control by default.
Motor/Drive Protection		Short circuit, over-voltage, under-voltage, over-temp
Variable I/O	***I/O 1 (Step/Pulse)***	INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Step Input, Jog CW, Enable Input, Start/Stop, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose
	I/O 2 (Direction)	INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Direction Input, Jog CCW, Alarm Reset Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose
	I/O 3	INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Limit CW Input, Enable Input, Change Speed Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose
	I/O 4	INPUT: 5-24 VDC nominal. Optically isolated. Minimum pulse width = 250ns (at 3 MHz). Maximum pulse frequency = 3MHz, max current draw = 12mA, Function = Limit CCW Input, Alarm Reset Input, General Purpose OUTPUT: 30VDC, 40mA maximum. Optically isolated, open collector. Maximum pulse frequency 10kHz. Functions = Brake Output, Fault Output, Motion Output, Tach Output, General Purpose
Analog		0-5 VDC nominal (AIN referenced to GND). Input impedance: 30K ohms minimum, resolution = 12 bits, Function = analog control modes and general purpose analog usage; programmable for signal range, offset, dead band, and filtering
Communication Interface		RS-485 ASCII (2- or 4-wire)
Non-volatile Memory Storage		Configurations are saved in FLASH memory on-board the DSP
Features	***Current Reduction***	Selectable in SureMotion Pro software
	Idle Current Reduction	Reduction range of 0–90% of running current after delay selectable in ms
	Microstep Resolution	Software selectable from 200 to 51200 steps/rev in increments of 2 steps/rev
	Modes of Operation	Pulse (step) & direction, CW/CCW, A/B quadrature, velocity (oscillator), SCL streaming commands
	Self Test	Checks internal and external power supply voltages. Diagnoses open motor phases and motor resistance changes > 40%
Connectors	***DC Power***	2-position screw terminal: Weidmuller 1615780000
	I/O	11-position spring cage: Phoenix 1881419
	Comm	5-position spring cage: Phoenix 1881354
Drive Cooling Method		Natural convection (mount to suitable heat sink)
Status LEDs		1 red, 1 green
Mounting		Four #6 screws

SureStep® Integrated Microstepping Motors and Drives

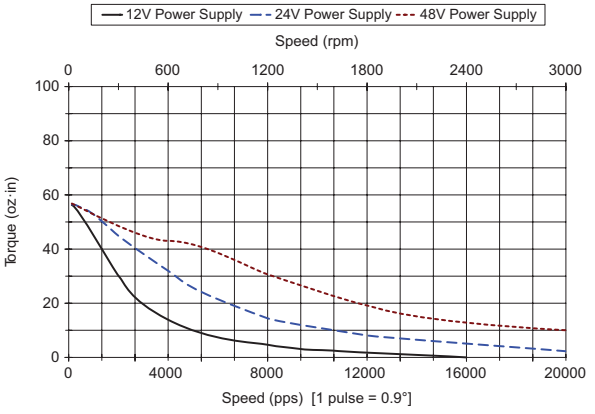
SureStep® Advanced Integrated Motor/Drives

SureStep Integrated Series Specifications – Advanced						
Integrated Motor/Drive		***STP-MTRD-17030R STP-MTRD-17030RE***	***STP-MTRD-17038R STP-MTRD-17038RE***	***STP-MTRD-23042R STP-MTRD-23042RE***	***STP-MTRD-23065R STP-MTRD-23065RE***	***STP-MTRD-24075RV STP-MTRD-24075RVE***
NEMA Frame Size		NEMA 17	NEMA 17	NEMA 23	NEMA 23	NEMA 24
**** Maximum Holding Torque***	(lb·in)	3.375	4.25	7.8125	13.125	21.25
	(oz·in)	54	68	125	210	340
	(N·m)	0.381326	0.480189	0.8827	1.482936	2.400944
Rotor Inertia	($oz \cdot in^2$)	0.310	0.448	1.420	2.515	4.900
	($kg \cdot cm^2$)	0.057	0.082	0.260	0.460	0.897
Insulation Class		Class B (130°C)				
Basic Step Angle		1.8 degrees				
Shaft Runout (in)		0.03		0.05		
Max Shaft Radial Play @ 1lb load		0.02				
Perpendicularity (mm)		0.08				
Concentricity (mm)		0.05				
**** Maximum Radial Load (lb [kg])***		6.7		13.9		
**** Maximum Thrust Load (lb [kg])***		34		63		
Storage Temperature Range		0-40°C (32-104°F)				
Operating Temperature Range		0-85°C				0-70°C
Operating Humidity Range		90% max, non-condensing				
Product Material		Aluminum, steel, plastic, FR4, etc.				
Environmental Rating		IP40				
Weight (oz [g])		12.7 [360]	15.6 [441]	30 [850]	42 [1191]	56 [1580]
Agency Approvals		CE*				
Design Tips		Allow sufficient time to accelerate the load and size the step motor with a 100% torque safety factor. DO NOT disassemble step motors because motor performance will be reduced and the warranty will be voided. DO NOT connect or disconnect the step motor during operation. Mount the motor to a surface with good thermal conductivity, such as steel or aluminum, to allow heat dissipation. Use a flexible coupling with "clamp-on" connections to both the motor shaft and the load shaft to prevent radial and thrust loading on bearings from minor misalignment and to prevent loosening due to vibration.				
**** For NEMA 24 motors, an EMI filter (RES10F03) is needed on the power supply for CE compliance.***						

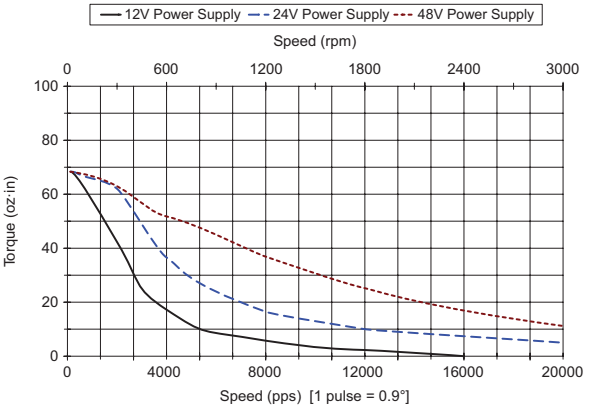
Integrated Microstepping Motors and Drives

SureStep® Integrated Motor/Drives Motor Torque vs. Speed

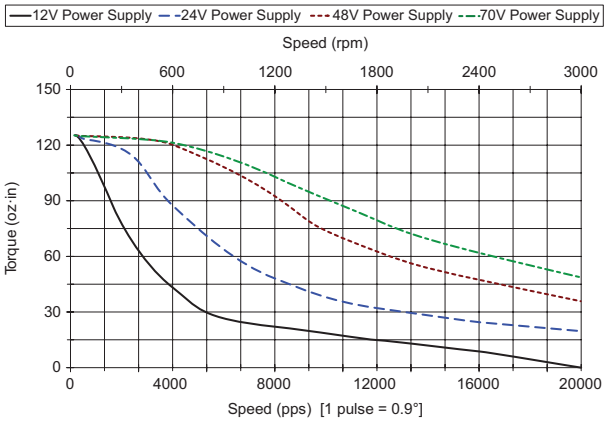
STP-MTRD-17030 Torque vs Speed (1.8° step motor; 1/2 stepping)



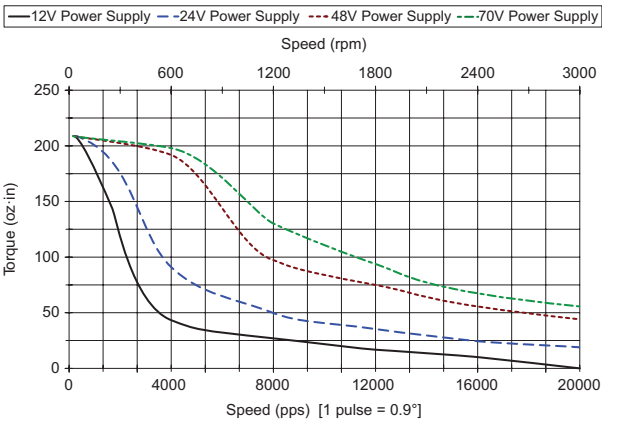
STP-MTRD-17038 Torque vs Speed (1.8° step motor; 1/2 stepping)



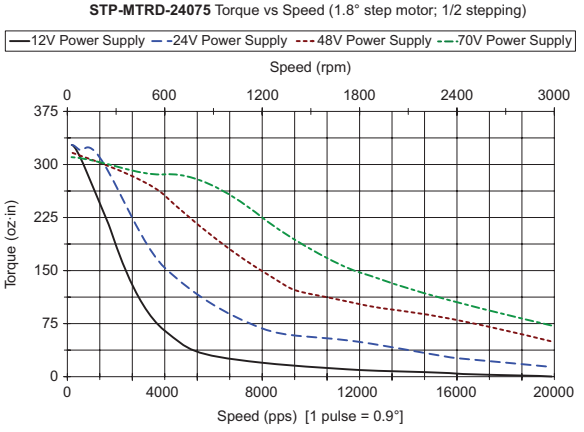
STP-MTRD-23042 Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTRD-23065 Torque vs Speed (1.8° step motor; 1/2 stepping)



STP-MTRD-24075 Torque vs Speed (1.8° step motor; 1/2 stepping)

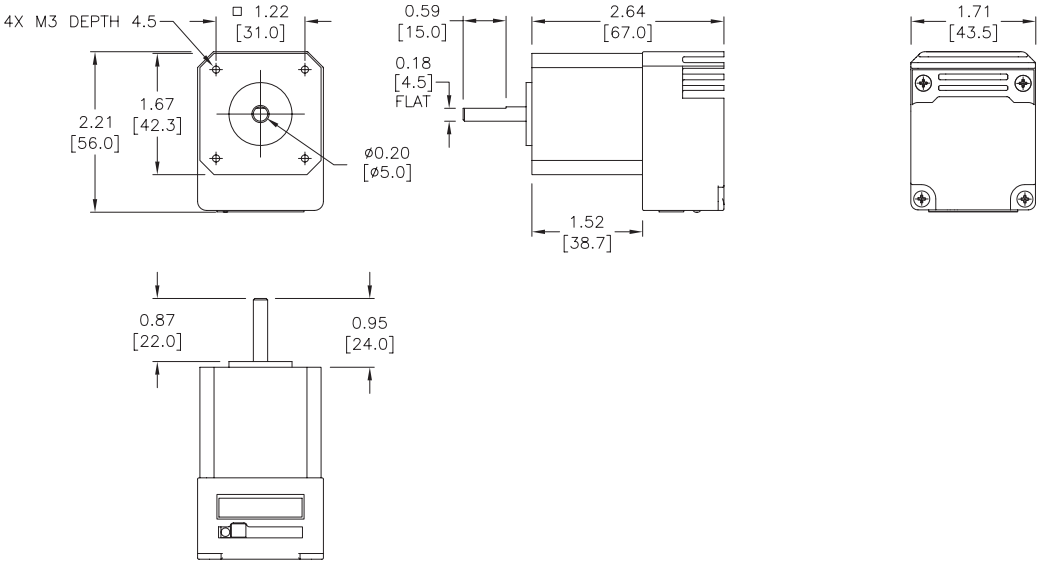


SureStep® Integrated Microstepping Motors and Drives

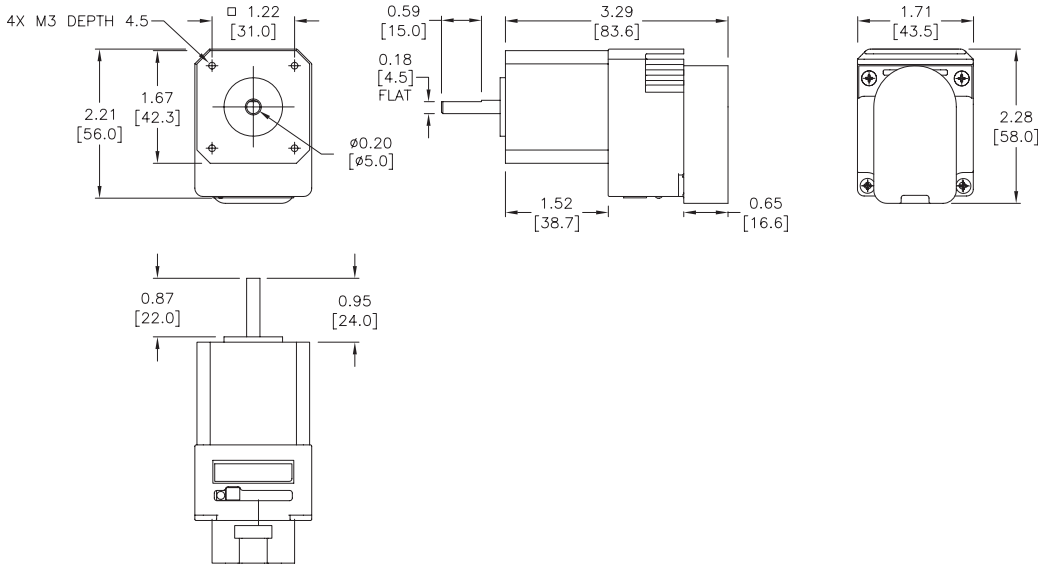
SureStep® Standard Integrated Motor/Drives Dimensions

Dimensions = in [mm]

STP-MTRD-17038



STP-MTRD-17038E

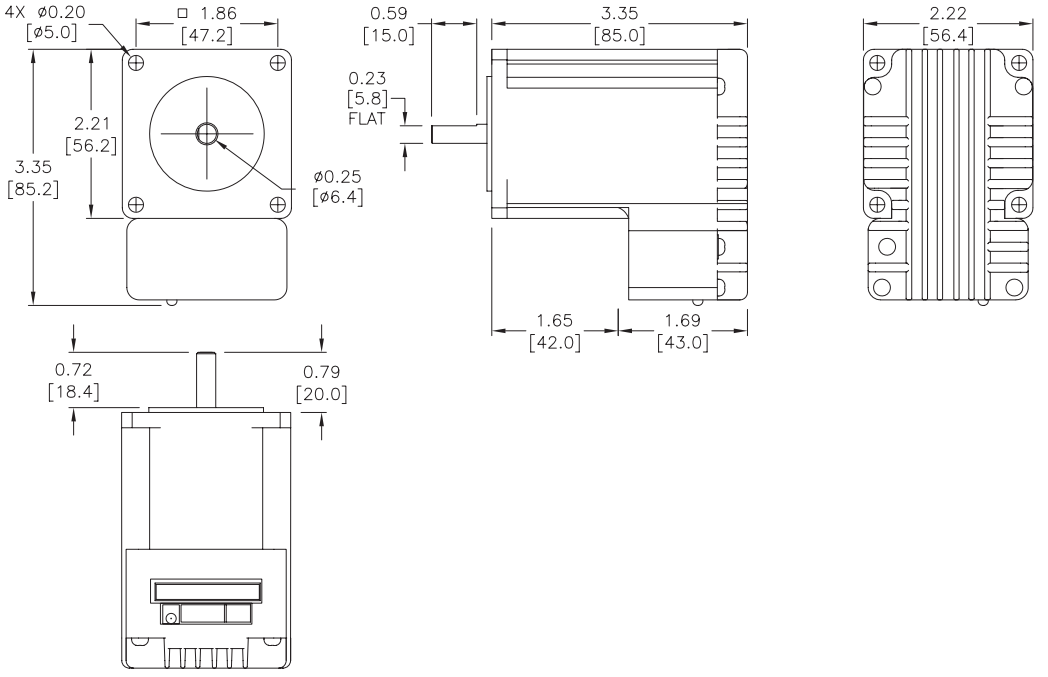


SureStep® Integrated Microstepping Motors and Drives

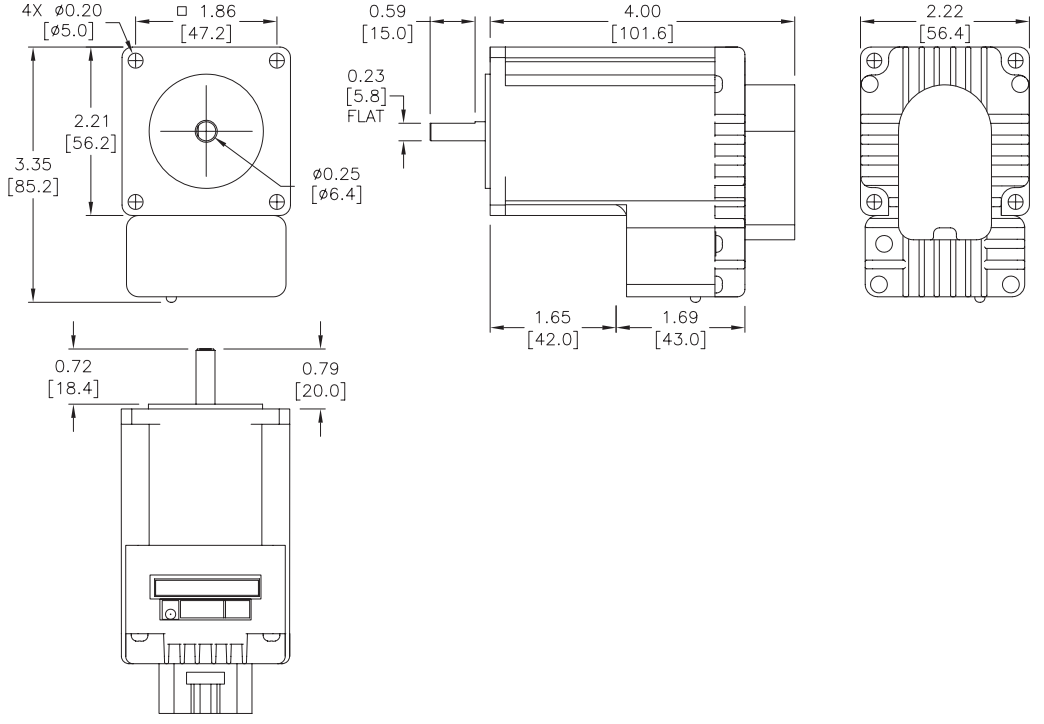
SureStep® Standard Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23042



STP-MTRD-23042E

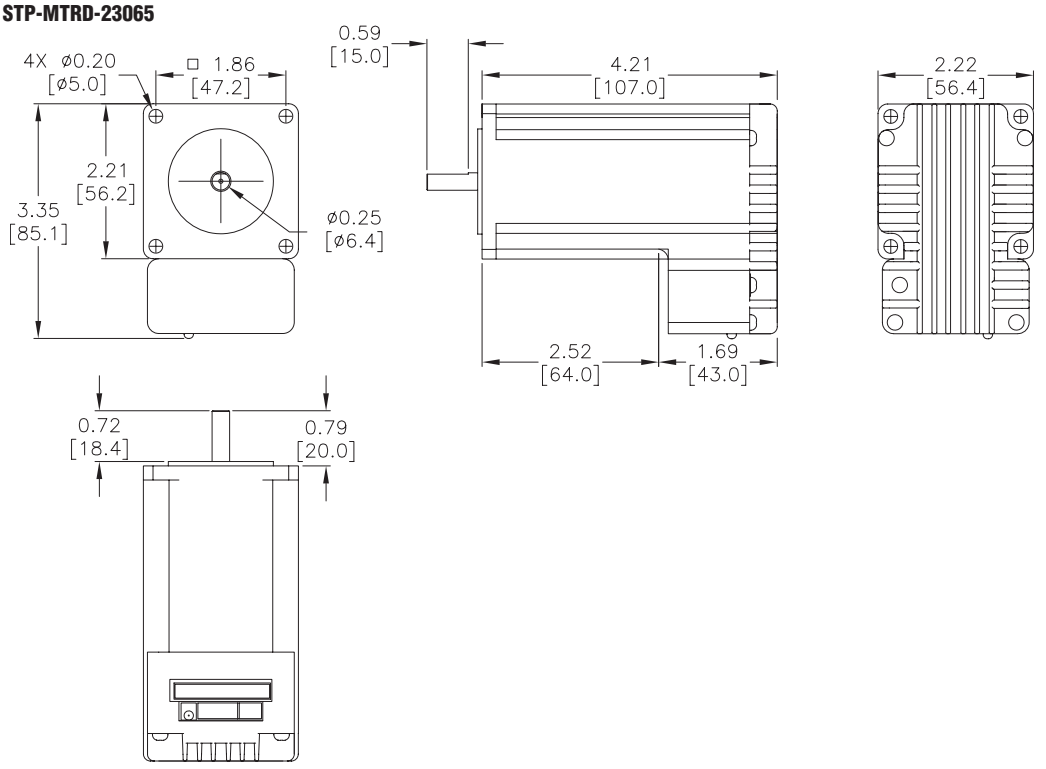


SureStep® Integrated Microstepping Motors and Drives

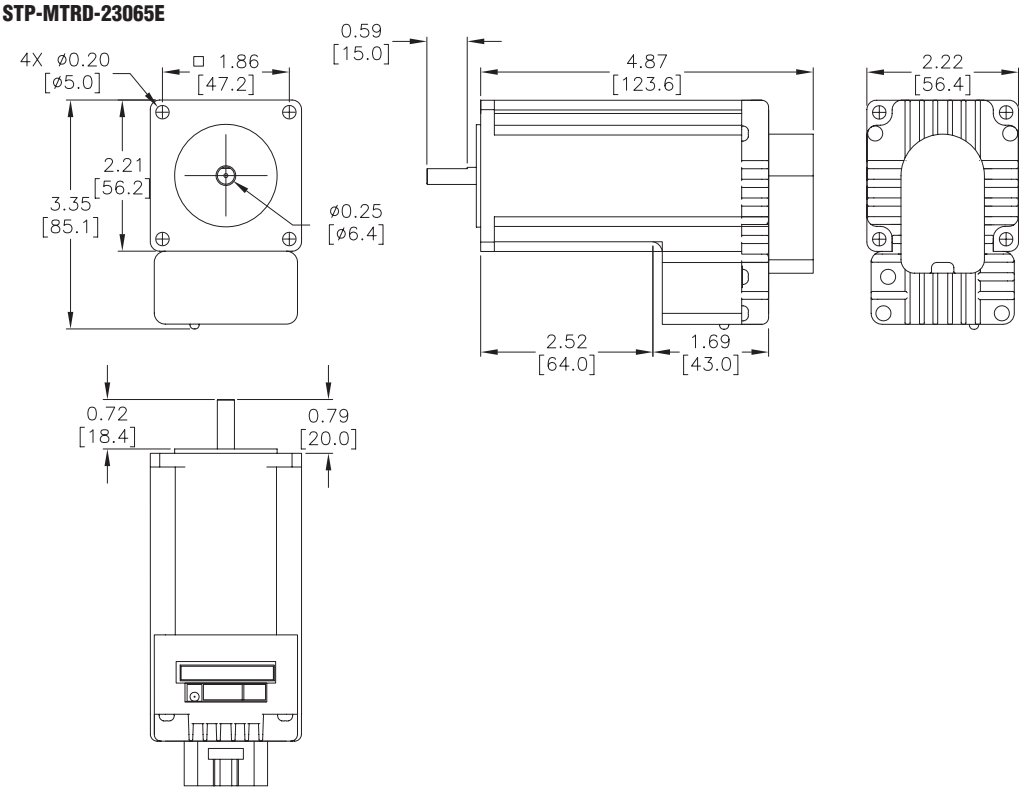
SureStep® Standard Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-23065



STP-MTRD-23065E

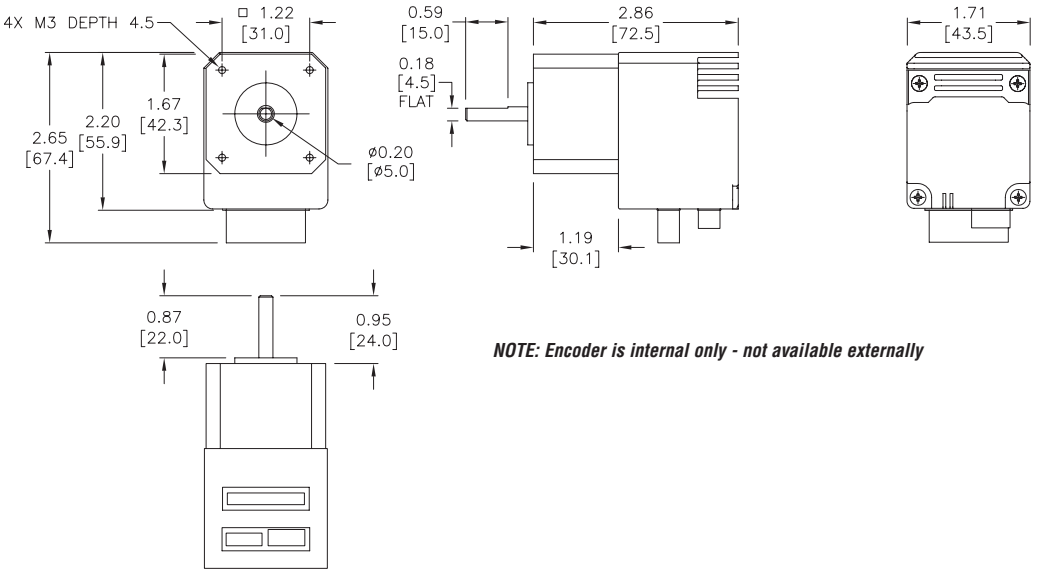


Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives Dimensions

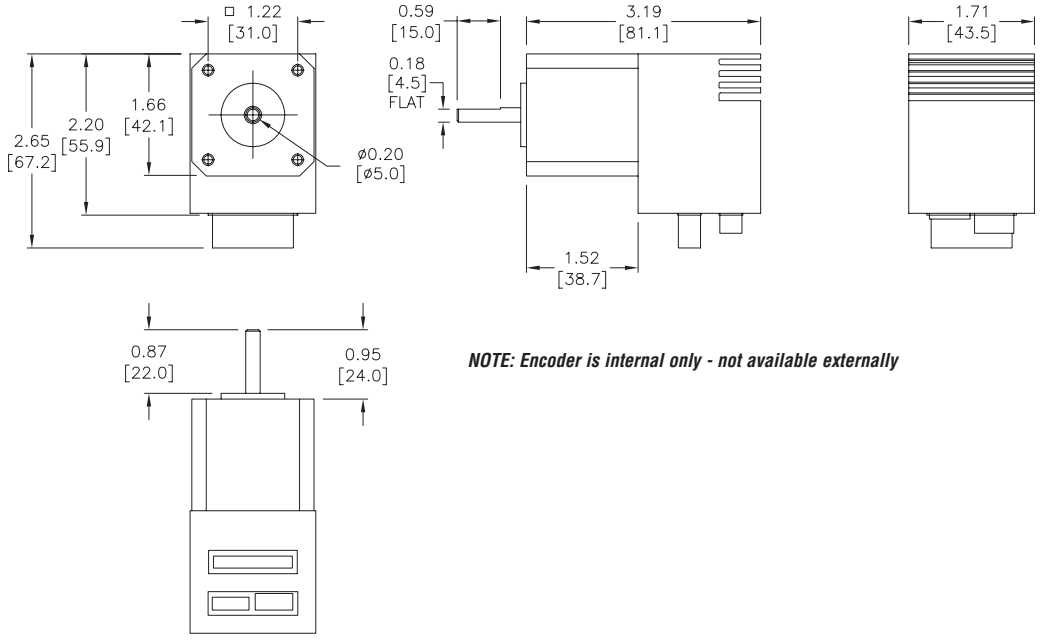
Dimensions = in [mm]

STP-MTRD-17030R / STP-MTRD-17030RE



NOTE: Encoder is internal only - not available externally

STP-MTRD-17038R / STP-MTRD-17038RE



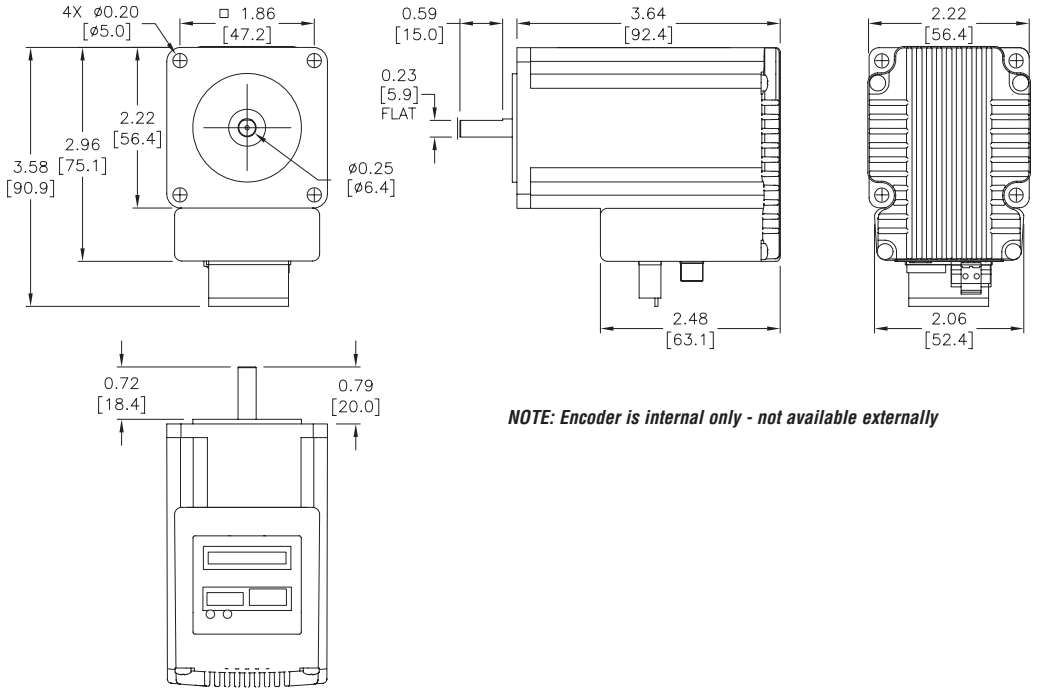
NOTE: Encoder is internal only - not available externally

Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives Dimensions, continued

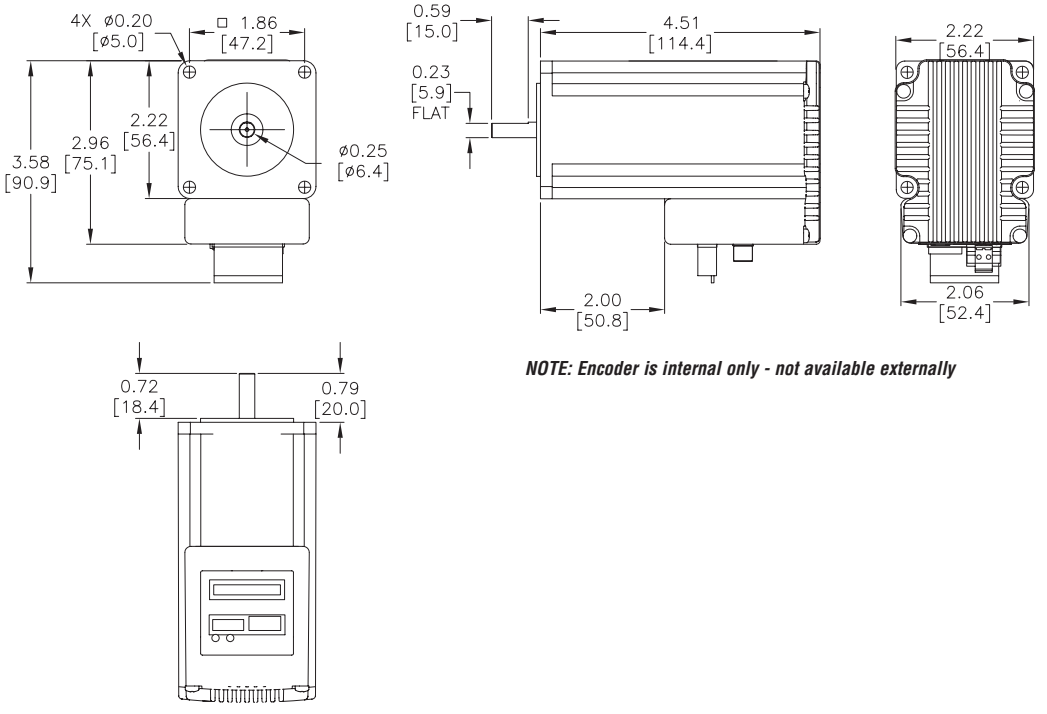
Dimensions = in [mm]

STP-MTRD-23042R / STP-MTRD-23042RE



NOTE: Encoder is internal only - not available externally

STP-MTRD-23065R / STP-MTRD-23065RE



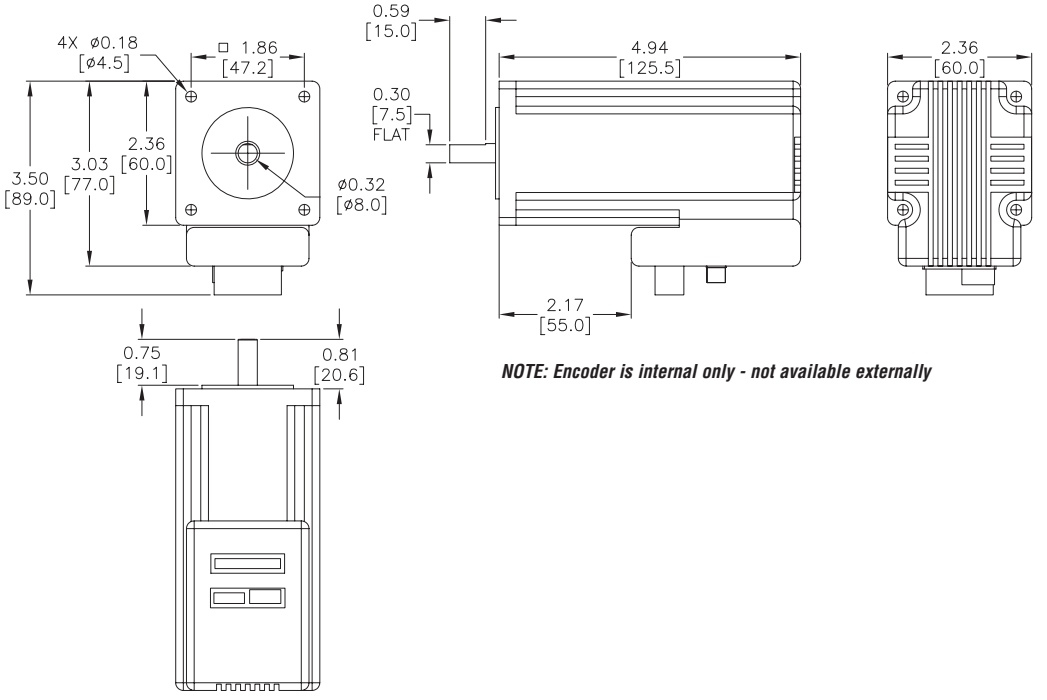
NOTE: Encoder is internal only - not available externally

Integrated Microstepping Motors and Drives

SureStep® Advanced Integrated Motor/Drives Dimensions, continued

Dimensions = in [mm]

STP-MTRD-24075RV / STP-MTRD-24075RVE



NOTE: Encoder is internal only - not available externally

Sure step® Stepping System Accessories

SureStep® Microstepping Drives Accessories

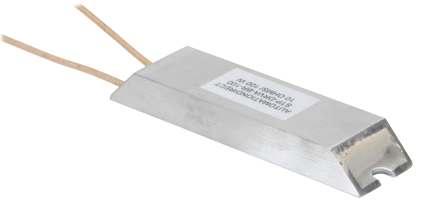
Braking Accessories

As a load rapidly decelerates from a high speed, much of the kinetic energy of that load is transferred back to the motor. This energy is then pushed back to the drive and power supply, resulting in increased system voltage. If there is enough overhauling load on the motor, the DC voltage will go above the drive and/or power supply limits. In general, the more torque the motor is capable of producing then the more energy it can push back into the drive.

When using a regulated/switching power supply, this can trip the overvoltage protection of the power supply or drive, and cause it to shut down.

To solve this problem, AutomationDirect offers a regeneration clamp and a braking resistor as optional accessories. The regen clamp has a built-in 50W braking resistor. For additional braking power (larger overhauling loads), an optional 100W braking resistor is also available with the STP-DRVA-RC-050. The STP-DRVA-RC-050A does not have the ability to use an external resistor.

Regeneration Clamp STP-DRVA-RC-050



Braking Resistor

Regeneration Clamp Features

Common Features

- Built-in 50W power resistor for more continuous current handling
- Mounted on a heat sink
- Voltage range: 24–80 VDC; no user adjustments required
- Power: 50W continuous; 800W peak
- Indicators (LED):
  Green = power supply voltage is present
  Red = clamp is operating (usually when stepper is decelerating)
- Protection: The external power supply is internally connected to an "Input Diode" in the regen clamp that protects the power supply from high regeneration voltages. This diode protects the system from connecting the power supply in reverse. If the clamp circuit fails, the diode will continue to protect the power supply from over-voltage.

STP-DRVA-RC-050 Features

- External 100W resistor available
- Multiple drives in parallel up to 20A total output current
- Non-removable terminal blocks
- Uses 12-18 AWG wires for connections

STP-DRVA-RC-050A Features

- Three drive connections, 7A max per channel, 15A total output current
- Removable terminal blocks (replacement kit STP-CON-4)
- Uses 18-20 AWG wire for connections

SureStep Damper

A step motor inertia damper can smooth out steps in a typical step motor resulting in a quieter and smoother motion when rotating between steps. Reducing the resonance and possible micro oscillations when moving from step to step is the main purpose of a "hockey puck" style damper, but it can also be used as a hand wheel to directly rotate the position of the rotor when power is removed from the motor. The damper is a properly sized machined piece of aluminum encased in plastic. It is sized and weighted for general damping of the respective frame size motor.

Regeneration Clamp STP-DRVA-RC-050A

Sure Step Series Specifications – Microstepping Drives Optional Accessories

Part Number	*Price*	*Description*
STP-DRVA-RC-050*	$94.00	Regen Clamp: 50W, for DC input stepper and servo drives, non-enclosed, optional 100W external resistor
STP-DRVA-RC-050A*	$55.00	Regen Clamp: 50W, for DC input stepper and servo drives, enclosed
STP-DRVA-BR-100	$68.00	Braking Resistor: use with STP-DRVA-RC-050 regen clamp; 100W, 10Ω
STP-MTRA-17DMP	$13.50	SureStep damper, metal body. For use with NEMA 17 stepper motors with 5mm shafts. Mounting set screw included.
STP-MTRA-23DMP	$31.00	SureStep damper, metal body. For use with NEMA 23 stepper motors with 1/4 inch shafts. Mounting set screw included.

**** Do not use the regeneration clamp in an atmosphere containing corrosive gases.***

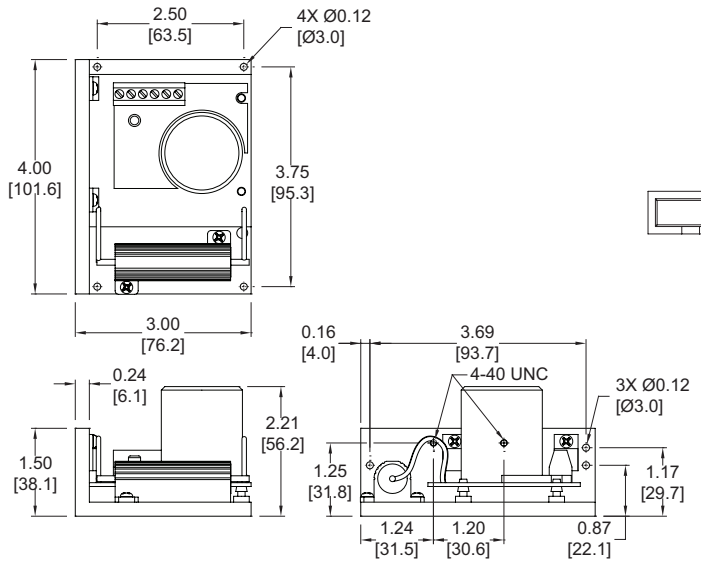
Damper

Stepping System Accessories

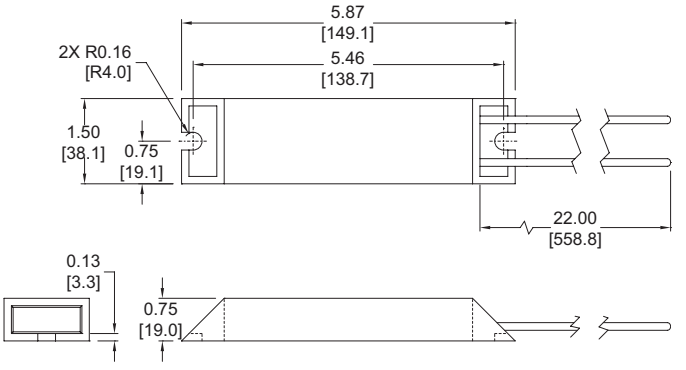
SureStep® Microstepping Drives Accessories

Dimensions = in [mm]

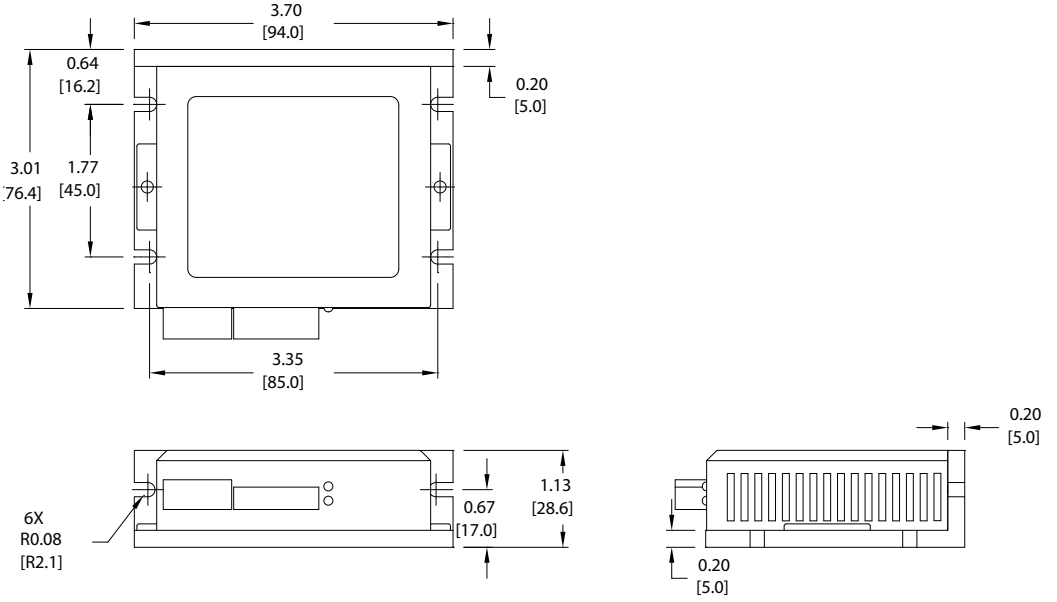
STP-DRVA-RC-050



STP-DRVA-BR-100



STP-DRVA-RC-050A



SureStep® Stepping System Accessories

SureStep® Microstepping Drives Accessories

USB to RS-485 Adapter

The STP-USB485-4W is a USB to RS-232/RS-485 converter that can be used in 2-wire or 4-wire serial networks. Serial communication can be wired up via the 9-pin D-sub connector or through the 6-screw terminals.

The STP-USB485-4W can be set for several different configurations. These modes are set up by the 4 DIP switches on the outside of the case (RS-232/RS-485, full/half duplex) and by the 7 jumpers located inside the case (termination/bias resistors).

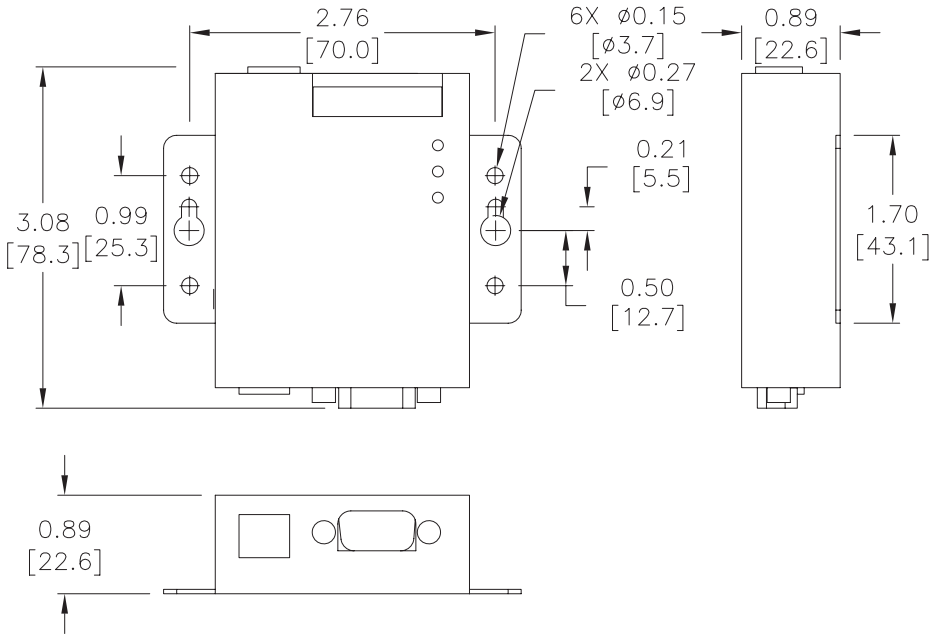
SureStep Advanced Drives communicate via RS-232 (for control and for configuration via SureMotion Pro).

The Advanced Integrated motor/drives use RS-485. While the Advanced Integrated motor/drives can be wired for either 2- or 4-wire networks, 4-wire is require for use with SureMotion Pro due to the Firmware Download utility and the Status Monitor Screen.

Depending on the host controller's RS-485 implementation, either 2- or 4-wire RS-485 can be used for control. All RS-485 PLCs that have 2-wire capability (Productivity, BRX, Click, DirectLogic, etc.) can control the Advanced Integrated steppers.

SureStep PC Adapter - STP-USB485-4W	
Price	$104.00
Communications	2-wire RS-232 2- or 4-wire RS-485
Configure With	Internal jumpers and external DIP switches
Compatible Cables	STP-232RJ11-CBL STP-485DB9-CBL-2 USB

Dimensions = in [mm]



Stepping System Accessories

SureStep® Stepping System Encoders

Replacement Encoders

The STP-MTRA-ENC1 is a replacement for the encoder that comes standard with the STP-MTRD-17038E, STP-MTRD-23042E, and STP-MTRD-23065E integrated motor/drives. Note that the encoder included with (E) model advanced integrated motor/drives is internal and cannot be replaced.

The STP-MTRA-ENC9 is a replacement for the encoder that comes standard with the STP-MTR(x)-xxxxE stand alone step motors.

Installation tool and mounting hardware is included with all replacement encoders. For more information and details on how to wire the replacement encoders, please see the SureStep User Manual.

STP-MTRA-ENC2

STP-MTRA-ENC9

Optional Encoders

Optional encoders can be purchased separately for standard integrated motor/drives and standalone dual-shaft motors in all NEMA 14, 17, and 23 sizes, and also for STP-MTRAC-34xxxD motors (currently not available for STP-MTRx-34xxxD motors). All (D) model (dual-shaft) step motors come with pre-drilled holes in the rear end cap for easy encoder mounting. Pre-installed encoders on standalone dual-shaft motors and standard integrated motor/drives can be retrofitted with an appropriate optional encoder if desired. Please see the chart on the following page for encoder compatibility.

STP-MTRA-ENC11

Features:

- Fixed resolutions include 400ppr or 1000ppr
- Configurable models have up to 4096ppr (default = 400ppr)
- Choose line driver or push-pull (totem) output signals

Sure Step Series Specifications – Encoders		
Part Number	***Price***	***Description***
STP-MTRA-ENC1	$68.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC2	$58.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC3	$59.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC4	$49.50	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 5mm rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC5	$68.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC6	$58.00	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC7	$59.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC8	$49.50	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 1/4 inch rear shaft. Installation tool and mounting hardware included.
STP-MTRA-ENC9*	$57.00	SureStep incremental (quadrature) modular encoder, 5VDC, line driver (differential) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 SureStep dual-shaft motors. Installation tool and mounting hardware included.
STP-MTRA-ENC10*	$43.50	SureStep incremental (quadrature) modular encoder, 5VDC, Push-pull (totem) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 SureStep dual-shaft motors. Installation tool and mounting hardware included.
STP-MTRA-ENC11	$66.00	SureStep incremental (quadrature) modular encoder, 5 VDC, line driver (differential) output, 1000 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EAxx cable.
STP-MTRA-ENC12	$56.00	SureStep incremental (quadrature) modular encoder, 5 VDC, push-pull (totem) output, 1000 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EDxx cable.
STP-MTRA-ENC13	$57.00	SureStep incremental (quadrature) modular encoder, 5 VDC, line driver (differential) output, 400 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EAxx cable.
STP-MTRA-ENC14	$48.00	SureStep incremental (quadrature) modular encoder, 5 VDC, push-pull (totem) output, 400 ppr. For use with SureStep stepper motors with 3/8in rear shaft. Installation hardware included. Requires STP-CBL-EDxx cable.

**** ENC9 and ENC10 encoders come with multiple adapter sleeves to accomodate different motor shaft diameters. See the dimensional drawing for details.***

Sure step® Stepping System Accessories

SureStep® Stepping System Encoders

Sure Step Series Encoder Compatibility						
Part Number	***PPR***	***Bore Diameter***	***Output Type***	***Encoder Cable***	***PLC Compatibility***	***Motor Compatibility***
STP-MTRA-ENC1	1000	5mm	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-14xxxD STP-MTRx-14xxxE STP-MTRx-17xxxD STP-MTRx-17xxxE Standard STP-MTRD-xxxxxE
STP-MTRA-ENC2			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC3	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC4			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC5	1000	0.25 inch	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-23xxxD STP-MTRx-23xxxE STP-MTRAC-23xxxD
STP-MTRA-ENC6			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC7	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC8			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC9	48 to 4096 configurable** (default = 400)	2mm - 8mm	Line Driver	STP-CBL-EBxx (signal) STP-USBENC-CBL-1 (configuration)	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRx-14xxxD STP-MTRx-14xxxE STP-MTRx-17xxxD STP-MTRx-17xxxE STP-MTRx-23xxxD STP-MTRx-23xxxE STP-MTRAC-23xxxD Standard STP-MTRD-xxxxxE
STP-MTRA-ENC10			Push-pull (totem)		BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC11	1000	0.375 inch	Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	STP-MTRAC-34xxxD
STP-MTRA-ENC12			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC13	400		Line Driver	STP-CBL-EAxx	P2-HSI, P3-HSI, BRX*, CLICK C0-1xDxE-D*	
STP-MTRA-ENC14			Push-pull (totem)	STP-CBL-EDxx	BRX*, CLICK C0-1xDxE-D*	

**** Requires FC-ISO-C***

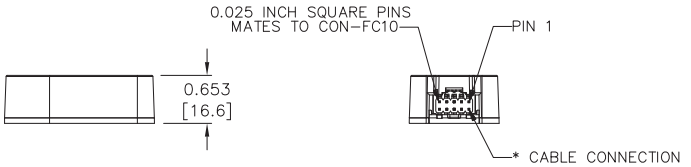
***** Cable STP-USBENC-CBL-1 required for configuration***

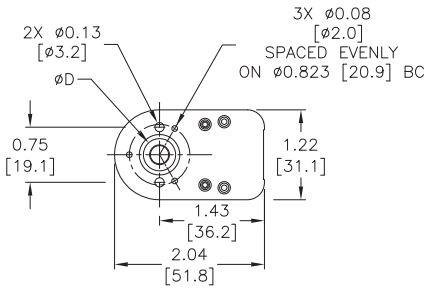
SureStep® Stepping System Accessories

SureStep® Stepping System Encoders

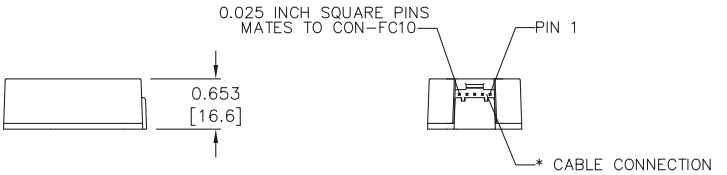
Dimensions = in [mm]

STP-MTRA-ENC1, 3, 5, 7

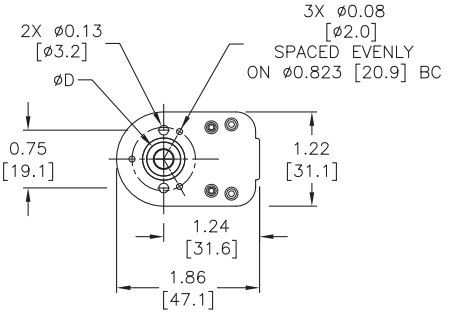




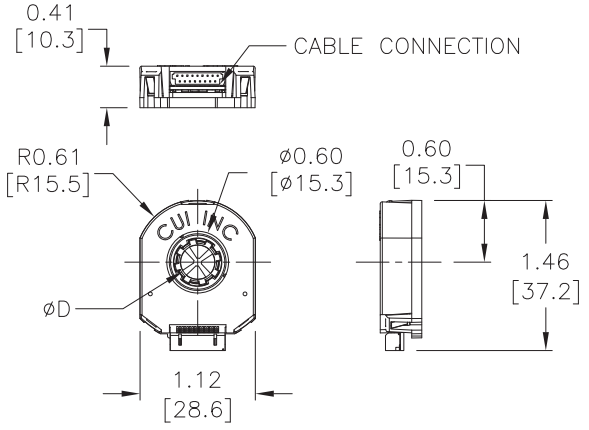
STP-MTRA-ENC2, 4, 6, 8



Bolt Hole Circles for Mounting	
Encoder	**Holes**
ENC1, ENC2, ENC3, ENC4, ENC5, ENC6, ENC7, ENC8	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823")
ENC9, ENC10	2 holes @ 16mm, 19.05mm, 32.44mm, 46.02 mm 3 holes @ 20.9mm, 21.55mm, 22mm 4 holes @ 25.4mm



STP-MTRA-ENC9, 10



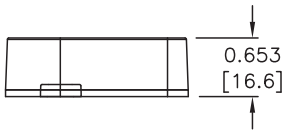
STP-MTRA-ENC9, 10 Additional Dimensions	
Location	**Dimensions**
D*	2mm, 3mm, 1/8 inch, 4mm, 3/16 inch, 5mm, 6mm, 1/4 inch, 8mm
**** The dimension of D varies based on which sleeve is used. Values listed represent the different sleeves available for this encoder.***	

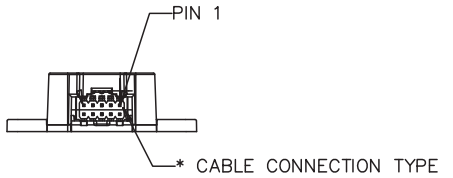
SureStep® Stepping System Accessories

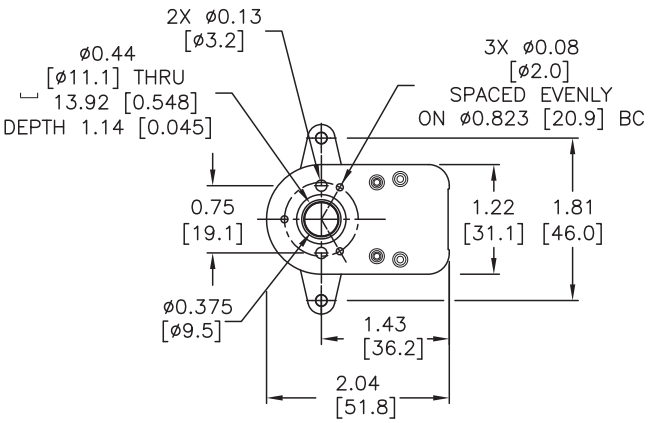
SureStep® Stepping System Encoders

Dimensions = in [mm]

STP-MTRA-ENC11, 13

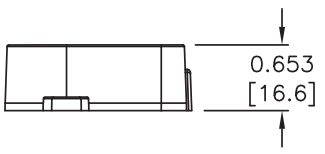


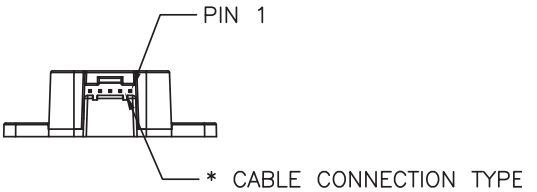


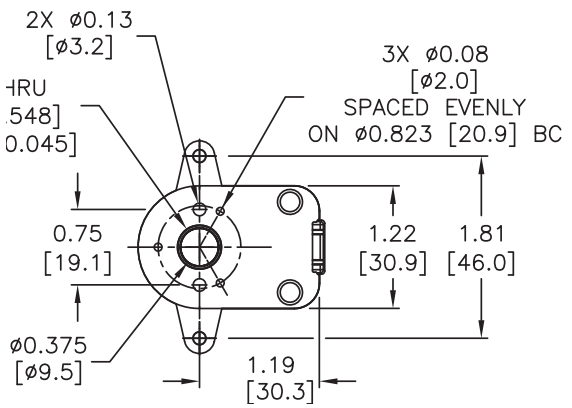


Bolt Hole Circles for Mounting	
Encoder	**Holes**
ENC11, ENC12, ENC13, ENC14	2 holes @ 19.05mm (.75") 3 holes @ 20.9mm (.823") 2 holes @ 46.02mm (1.812")

STP-MTRA-ENC12, 14





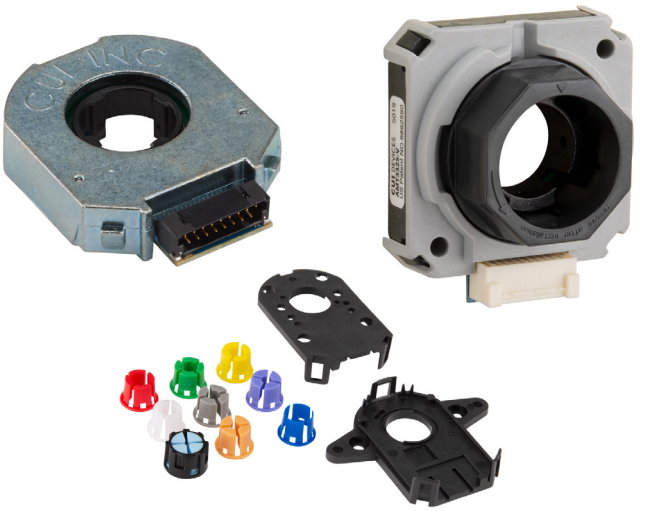


Sure-step® Stepping System Accessories

AMT Series Stepping System Encoders

CUI Devices' AMT series encoders are award-winning technologically advanced capacitive encoders with a variety of uses. Small, configurable, robust, and inexpensive, AMT encoders have won Product of the Year from Electronic's Weekly and from Electronic Products magazines.

AMT series encoders are typically mounted to the back of a stepper motor, but they can be used in many other applications. Instead of manufacturing many different encoders with different resolutions, CUI Devices offers the AMT series encoders with configurable pulses per revolution (PPR). The PPR can be set for most models using the free AMT Viewpoint software (available at https://support.automationdirect.com/products/surestep.html). The AMT10 family of encoders are configured using DIP switches.



CUI Devices AMT Series Encoders

Encoder Model Overview

AMT series encoders include six distinct model lines (families) designed to meet specific needs.

- **AMT10 – DIP switch configurable incremental quadrature encoders. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors.**
- **AMT11 – SW configurable resolution incremental quadrature encoders. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors (motor shaft sizes 2mm, 3mm, 1/8", 4mm, 3/16", 5mm, 6mm, 1/4", 8mm).**
- **AMT13 – Similar to AMT11, but these are larger sized and good for NEMA 34 and NEMA 42 motors (motor shaft sizes 9mm, 3/8", 10mm, 11mm, 12mm, 1/2", 13mm, 14mm, 5/8").**
- **AMT31 – A modified version of AMT11 with additional Hall-effect sensor outputs for commutation. This is needed for motors that don't have Hall-effect sensors mounted inside the motor. Typically "commutation encoders" are used with brushless DC (BLDC) motors and drives. Good for NEMA 14, NEMA 17, and NEMA 23/24 size motors.**
- **AMT33 – Same encoder + commutation features as the AMT31 family, but larger size for use with NEMA 34 and NEMA 42 motors.**

Capacitive Encoders

A capacitive encoder is comprised of three main components: a rotor, a stationary transmitter, and a stationary receiver. The rotor contains a sinusoidal pattern and, as it rotates, the high frequency reference signal of the transmitter is modulated in a predictable way. The encoder detects the changes in capacitance-reactance on the receiver board and translates them, using a demodulation algorithm, into increments of rotary motion.

Advantages of Capacitive Encoders

Derived from the same principles used in digital calipers, capacitive encoders have an excellent track record. The AMT series has proven to be both highly reliable and accurate. A capacitive encoder is more rugged than an optical encoder, tolerating a range of environmental contaminants such as dust, dirt, and oil. Capacitive encoders also hold-up much better to vibration and temperature extremes. Further, with no LED, it has a longer lifetime, a smaller footprint, and lower current consumption (6 to 18 mA) than an optical encoder. Immune to magnetic interference and electrical noise, it is as rugged as a magnetic encoder, but delivers greater accuracy and higher resolution.

Given their digital nature, capacitive encoders also offer increased flexibility, allowing users to change the encoder's resolution while a typical optical or magnetic encoder must be swapped out each time a different resolution is needed. The programmable resolutions available in capacitive encoders are not only useful for system optimization, particularly when designing the PID control loop, but can reduce inventory holding, as one model can be used across multiple applications. Capacitive technology also allows the ability to digitally set the index pulse and alignment of the encoder for BLDC commutation, while its built-in diagnostic capabilities provide designers access to valuable system data for quick troubleshooting in the field.

AMTx x x x - V

Installation Kit
Models with -V include an installation kit

Output
S = Single-ended signals
Q = Line Driver (differential) encoder signals
D = Line Driver encoder + Line Driver commutation signals
F = Absolute encoder: 14-bit single-turn encoder
H = Absolute encoder: 14-bit multi-turn encoder

Connector Orientation
2 = radial
3 = axial

Encoder Series
10 = DIP switch configurable incremental
11 = SW configurable incremental
13 = NEMA 34/42 SW configurable incremental
31 = SW configurable incremental with commutation signals
33 = NEMA 34/42 SW configurable incremental with commutation signals

AMT series name

SureStep® Stepping System Accessories

AMT Series Stepping System Encoders

Replacement Encoders

The AMT112Q-V is a replacement for the encoder that comes pre-mounted on the STP-MTR(x)-xxxxE step motors. Step motor part numbers that end in "E" have encoders pre-mounted on the rear shaft. Models that end in "D" are the same motors, without the pre-mounted encoders. If you would like a different encoder then should purchase the "D" model motor and the encoder separately.

Installation tools and mounting hardware are included with all CUI Devices brand AMT series replacement encoders. For more information and details on how to wire the replacement encoders, please see the SureStep User Manual.

PPR

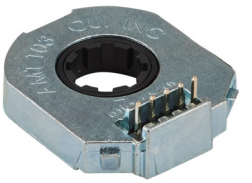
CUI Devices defines PPR, pulses per revolution, as the number of high pulses per channel per revolution. CPR, the number of counts that a controller could determine from a quadrature encoder (both channels have a rising and a falling edge), is 4 x PPR.

For more information regarding PPR, CPR, or LPR (Lines Per Revolution) view https://www.cuidevices.com/blog/what-is-encoder-ppr-cpr-and-lpr.

Optional Encoders

Optional encoders can be purchased separately for standard integrated motor/drives and standalone dual-shaft motors in all NEMA 14, 17, 23, 34, and 42 motors. All "D" model (dual-shaft) step motors come with pre-drilled holes in the rear end cap for easy modular encoder mounting. Pre-installed encoders on standalone dual-shaft motors and standard integrated motor/drives can be retrofitted with an appropriate optional encoder if desired. Please see the chart on the following page for encoder compatibility.

AMT102-V



AMT103-V

AMT Series Encoders		
Part Number	***listprice***	***Description***
AMT102-V	$24.25	CUI Devices incremental (quadrature) modular encoder, 5 VDC, radial, push-pull (totem) output, DIP switch configurable up to 2048 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.
AMT103-V	$24.25	CUI Devices incremental (quadrature) modular encoder, 5 VDC, axial, push-pull (totem) output, DIP switch configurable up to 2048 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.
AMT112S-V	$33.00	CUI Devices incremental (quadrature) modular encoder, 5 VDC, radial, push-pull (totem) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.
AMT112Q-V	$36.75	CUI Devices incremental (quadrature) modular encoder, 5 VDC, radial, line driver (differential) output, configurable up to 4096 ppr. For use with NEMA 14, 17, and 23 dual shaft motors.
AMT312D-V	$43.00	CUI Devices incremental (quadrature)/commutation modular encoder, 5 VDC, radial, line driver (differential) encoder output, configurable up to 4096 ppr, line driver (differential) commutation output. For use with NEMA 14, 17, and 23 dual shaft motors.
AMT312S-V	$36.75	CUI Devices incremental (quadrature)/commutation modular encoder, 5 VDC, radial, push-pull (totem) encoder output, configurable up to 4096 ppr, push-pull (totem) commutation output. For use with NEMA 14, 17, and 23 dual shaft motors.
See Accessories section for configuration and signal cables. CUI Devices Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.		

AMT112S-V

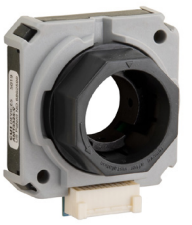
AMT312D-V

Sure step® Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoders, continued		
Part Number	***Price***	***Description***
AMT132S-V	$33.50	CUI Devices incremental (quadrature) modular encoder, 5 VDC, radial, push-pull (totem) output, configurable up to 4096 ppr. For use with NEMA 34 and 42 dual shaft motors.
AMT132Q-V	$37.50	CUI Devices incremental (quadrature) modular encoder, 5 VDC, radial, line driver (differential) output, configurable up to 4096 ppr. For use with NEMA 34 and 42 dual shaft motors.
AMT332S-V	$37.25	CUI Devices incremental (quadrature)/commutation modular encoder, 5 VDC, radial, push-pull (totem) encoder output, configurable up to 4096 ppr, push-pull (totem) commutation output. For use with NEMA 34 and 42 dual shaft motors.
AMT332D-V	$43.75	CUI Devices incremental (quadrature)/commutation modular encoder, 5 VDC, radial, line driver (differential) encoder output, configurable up to 4096 ppr, line driver (differential) commutation output. For use with NEMA 34 and 42 dual shaft motors.
See Accessories section for configuration and signal cables. CUI Devices Datasheets provide detailed encoder specifications. These datasheets can be found on each encoder's web page at www.automationdirect.com.		

AMT132S-V



AMT332S-V

AMT Series Encoder Accessories		
Part Number	***listprice***	***Description***
CUI-KIT-1	$6.00	CUI Devices encoder accessory kit, replacement. For use with CUI Devices AMT102 encoders. Includes (1) AMT102 base, (1) AMT102 wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).
CUI-KIT-2	$6.00	CUI Devices encoder accessory kit, replacement. For use with CUI Devices AMT103 encoders. Includes (1) AMT standard base, (1) AMT standard wide base, and (1) AMT10 sleeve kit (9 sleeves sized from 2-8mm).
CUI-KIT-3	$6.00	CUI Devices encoder accessory kit, replacement. For use with CUI Devices AMT11, AMT21, and AMT31 encoders. Includes (1) AMT standard base, (1) AMT standard wide base, and (1) AMT standard sleeve kit (9 sleeves sized from 2-8mm).
CUI-KIT-4	$6.00	CUI Devices encoder sleeve kit, replacement. For use with CUI Devices AMT13 and AMT33 encoders. Includes (8) sleeves sized from 9-14mm.
STP-MTRA-SCRWKT-1	$5.00	SureStep encoder mounting screw kit, for use with all stepper encoders.

CUI-KIT-1

CUI-KIT-2

CUI-KIT-3

CUI-KIT-4

STP-MTRA-SCRWKT-1

SureStep® Stepping System Accessories

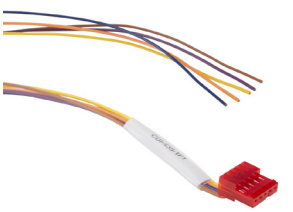
AMT Series Stepping System Encoders

AMT Series Encoder Compatibility							
Part Number	**Max PPR**	**Bore Diameter**	**Output Type**	**PLC Compatibility**	**Encoder Cable**	**Configuration Cable**	**Motor Compatibility**
AMT102-V	2048	2mm, 3mm, 1/8", 4mm, 3/16", 5mm, 6mm, 1/4", 8mm	push-pull (totem) *(radial connector)*	BRX[1], CLICK C0-1xDxE-D2	CUI-3131-x CUI-3132-1FT	n/a	NEMA 14, 17, 23 dual-shaft
AMT103-V	2048		push-pull (totem) *(axial connector)*		CUI-435-x CUI-3934-6FT		
AMT112S-V	4096		push-pull (totem)		AMT-17C-1-x	AMT-PGRM-17C	
AMT112Q-V	4096		line driver (differential)	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x		
AMT312D-V	4096		line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x	AMT-PGRM-17C	
AMT312S-V	4096		push-pull (totem) encoder+commutation	BRX[1], CLICK C0-1xDxE-D2	AMT-17C-1-x		
AMT132S-V	4096	9mm, 3/8", 10mm, 11mm, 12mm, 1/2", 13mm, 14mm, 5/8"	push-pull (totem)		AMT-18C-3-x	AMT-PGRM-18C	NEMA 34 and 42 dual-shaft (Does not fit STP-MTR**AC**-34 motors)
AMT132Q-V	4096		line driver (differential)	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-18C-3-x		
AMT332S-V	4096		push-pull (totem) encoder+commutation	BRX[1], CLICK C0-1xDxE-D2	AMT-18C-3-x		
AMT332D-V	4096		line driver (differential) encoder+commutation	P2-HSI, P3-HSI, BRX[1], CLICK C0-1xDxE-D2	AMT-18C-3-x		

Note: For specific AutomationDirect PLC and step motor model compatibility, please see Appendix A in the SureStep User Manual.

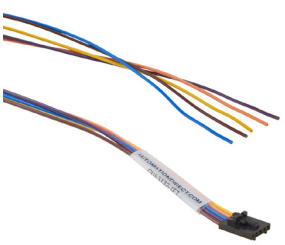
1 - Requires FC-ISO-C (see wiring diagrams for DIP switch settings).

AMT Series Encoder Signal Cables		
Part Number	**Price**	**Description**
CUI-3132-1FT	$4.50	CUI Devices encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with CUI Devices AMT102 encoders.
CUI-3131-6FT	$9.50	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT102 encoders.
CUI-3131-10FT	$28.00	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with CUI Devices AMT102 encoders.
CUI-3131-20FT	$45.00	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 20ft cable length. For use with CUI Devices AMT102 encoders.
CUI-435-1FT	$5.00	CUI Devices encoder cable, 5-pin connector to pigtail, 1ft cable length. For use with CUI Devices AMT103 encoders.
CUI-3934-6FT	$24.50	CUI Devices encoder cable, 5-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT103 encoders.
CUI-435-10FT	$20.00	CUI Devices encoder cable, 5-pin connector to pigtail, 10ft cable length. For use with CUI Devices AMT103 encoders.
CUI-435-20FT	$28.00	CUI Devices encoder cable, 5-pin connector to pigtail, 20ft cable length. For use with CUI Devices AMT103 encoders.



CUI-435-1FT
CUI-435-10FT
CUI-435-20FT

CUI-3131-6FT
CUI-3131-10FT
CUI-3131-20FT



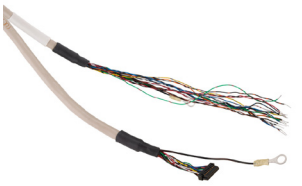
CUI-3132-1FT

CUI-3934-6FT

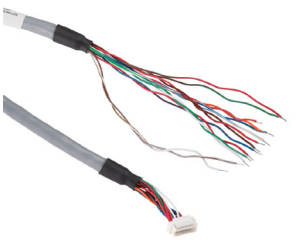
Sure-step® Stepping System Accessories

AMT Series Stepping System Encoders

AMT Series Encoder Signal Cables		
Part Number	***Price***	***Description***
AMT-17C-1-036	$37.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.
AMT-17C-1-072	$75.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.
AMT-17C-1-120	$112.00	CUI Devices encoder cable, 17-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.
AMT-18C-3-036	$25.50	CUI Devices encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 3ft cable length. For use with AMT13 and AMT33 encoders.
AMT-18C-3-072	$62.00	CUI Devices encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 6ft cable length. For use with AMT13 and AMT33 encoders.
AMT-18C-3-120	$88.00	CUI Devices encoder cable, 18-pin connector to pigtail, shielded, twisted pair, 10ft cable length. For use with AMT13 and AMT33 encoders.



AMT-17C-1-036
AMT-17C-1-072
AMT-17C-1-120



AMT-18C-3-036
AMT-18C-3-072
AMT-18C-3-120

AMT Series Encoders Programming Cables		
Part Number	***Price***	***Description***
AMT-PGRM-17C	$25.00	CUI Devices programming cable, miniB-USB to 17-pin connector, 1ft cable length. For use with CUI Devices AMT112 and AMT312 encoders.
AMT-PGRM-18C	$22.75	CUI Devices programming cable, miniB-USB to 18-pin connector, 1ft cable length. For use with CUI Devices AMT13 and AMT33 encoders.

AMT-PGRM-17C

AMT-PGRM-18C

Sure-step® Stepping System Accessories

AMT Series Stepping System Encoders

Line Driver Encoder Wiring Colors				
Encoder	**AMT112Q-V AMT312D-V STP-MTRA-ENC9**		**AMT132Q-V AMT332D-V**	
Pin Function	**Pin #**	**STP-CLB-EBx AMT-17C-1-xxx Wire Color**	**Pin #**	**AMT-18C-3-xxx Wire Color**
+5V	6	RED/BLK	6	RED/GRN
GND	4	BLK/RED	4	GRN/RED
A	10	WHT/BLK	8	BRN/WHT
$\bar{A}$	11	BLK/WHT	9	WHT/BRN
B	8	GRN/BLK	10	GRN/WHT
$\bar{B}$	9	BLK/GRN	11	WHT/GRN
Z	12	BLU/BLK	12	BLU/WHT
$\bar{Z}$	13	BLK/BLU	13	WHT/BLU

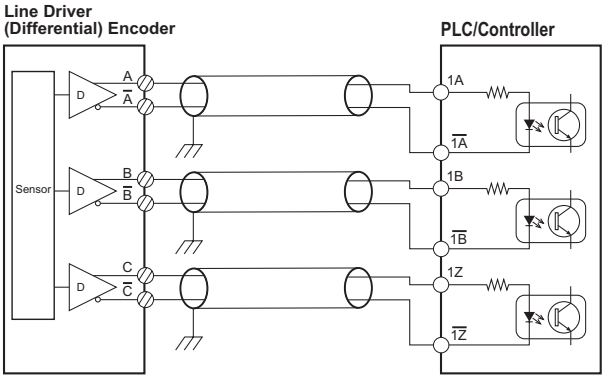
Single Ended (Push-pull/Totem) Encoder Wiring Colors										
Encoder	**AMT112S-V AMT312S-V STP-MTRA-ENC10**		**AMT132S-V AMT332S-V**		**AMT102-V**			**AMT103-V**		
Pin Function	**Pin #**	**STP-CLB-EBx AMT-17C-1-xxx Wire Color**	**Pin #**	**AMT-18C-3-xxx Wire Color**	**Pin #**	**CUI-3131-xxx Wire Color**	**CUI-3132-1FT Wire Color**	**Pin #**	**CUI-435-xxx Wire Color**	**CUI-3934-6FT Wire Color**
+5V	6	RED/BLK	6	RED/GRN	5V	RED	ORG	5V	ORG	RED
GND	4	BLK/RED	4	GRN/RED	G	BLACK	BRN	G	BRN	BLACK
A+	10	WHT/BLK	8	BRN/WHT	A	WHT	BLU	A	BLU	WHT
B+	8	GRN/BLK	10	GRN/WHT	B	BRN	YEL	B	YEL	BRN
Z+	12	BLU/BLK	12	BLU/WHT	X	GRN	PUR	X	PUR	GRN

Single Ended (Push-pull/Totem) Commutation Wiring Colors				
Encoder	**AMT312S-V**		**AMT332S-V**	
Pin Function	**Pin #**	**AMT-17C-1-xxx Wire Color**	**Pin #**	**AMT-18C-3-xxx Wire Color**
+5V	6	RED/BLK	6	RED/GRN
GND	4	BLK/RED	4	GRN/RED
U+	3	BRN/BLK	3	BRN/RED
W+	5	ORG/BLK	5	ORG/RED
V+	7	RED/WHT	7	BLU/RED

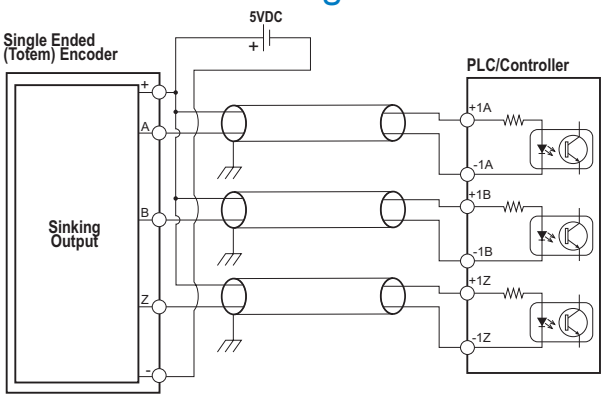
Stepping System Accessories

AMT Series Encoders – PLC Connectivity

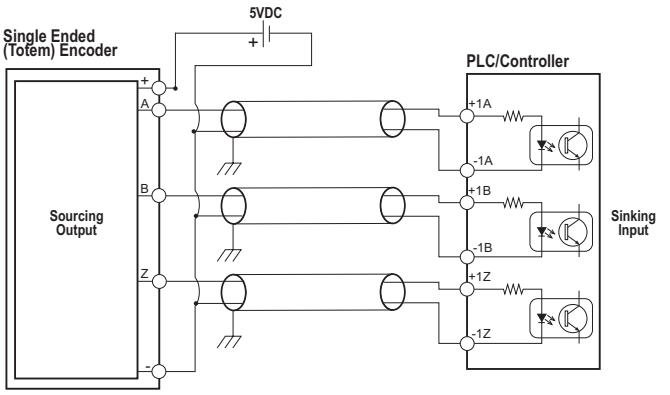
Line Driver Encoder to Line Driver PLC Input



Single Ended (Push-pull/Totem) Encoder to Sourcing PLC



Single Ended (Push-pull/Totem) Encoder to Sinking PLC



Stepping System Accessories

SureStep® Microstepping Drives Accessories

SureMotion Pro Drive Configuration Software - for Advanced Stepper Drives and Advanced Integrated Motor/Drives

Free Download

SureMotion Pro configuration software is available as a free download from our website for SureStep advanced components (STP-DRV-4850, -80100, & STP-MTRD-xxxxxR).

- Completely replaces SureStep Pro. Required for integrated motor/drives.
- Used for easy configuration and setup of the drive, including drive, motion control mode, I/O, motor.
- Open, Save, Upload, Download configuration files to Advanced Drives and Drive/Motors.
- Status Monitor screen aids in troubleshooting alarms and faults.
- Self Test Mode verifies motor wiring and functionality.
- SCL Terminal window allows testing/verification of SCL (serial ASCII) commands before PLC programming begins.
- Help files include technical data, application information, advanced setup, serial command instructions.
- Runs on 32-bit/64-bit Windows operating systems.

SureStep Drive Configuration Software - for Advanced Stepper Drives		
Part Number	***Price***	***Description***
SM-PRO	$9.25	SureMotion Pro Windows configuration software, USB drive or free download. For use with SureStep stepper drives with serial port. Requires PC serial port, USB-RS232 or STP-USB485-4W serial adapters.
**** Available for purchase on USB or can be downloaded for free from the AutomationDirect Web site (www.AutomationDirect.com).***		

Stepping System Cables

SureStep® Cables

SureStep Series – Stepping System Cables					
Cable	**Price**	**Purpose**	**Length**	**Use With**	**Cable End Connectors**
STP-EXT-006	$10.50	motor to drive extension	6 ft	STP-MTR-xxxxx(x)	pigtail / Molex 43020-0401 connector
STP-EXT-010	$12.00		10 ft		
STP-EXT-020	$16.00		20 ft		
STP-EXTH-006	$22.50		6 ft	STP-MTR***H***-xxxxx(x)	pigtail / Molex 39-01-2041 connector
STP-EXTH-010	$27.00		10 ft		
STP-EXTH-020	$31.50		20 ft		
STP-EXTHW-006	$45.50		6 ft	STP-MTR***HW***-xxxxx(x)	Bulgin # PXP4011/06P/6065
STP-EXTHW-010	$50.00		10 ft		
STP-EXTHW-020	$63.00		20 ft		
STP-EXTL-006	$10.00		6 ft	STP-MTR***L***-xxxxx(x)	pigtail / Molex 105308-22004 connector
STP-EXTL-010	$12.00		10 ft		
STP-EXTL-020	$15.50		20 ft		
STP-EXTW-006	$45.50		6 ft	STP-MTR***W***-xxxxx(x)	Bulgin # PXP4011/06P/6065
STP-EXTW-010	$50.00		10 ft		
STP-EXTW-020	$63.00		20 ft		
STP-232RJ11-CBL*	$9.50	programming/communication	10 ft	STP-DRV-4850, STP-DRV-80100	DB9 female / RJ11(6P4C)
STP-232HD15-CBL-2**	$11.50	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL06, D2-250-1, D2-260	HD 15-pin male / RJ12 6-pin plug
STP-232RJ12-CBL-2**	$7.00	communication	6.6 ft	STP-DRV-4850, STP-DRV-80100 DL05, CLICK	RJ12 6-pin plug / RJ12 6-pin plug
STP-CBL-CA6	$17.00	control cable	6 ft	STP-MTRD-17038 STP-MTRD-17038E	11-pin / pigtail
STP-CBL-CA10	$20.00	control cable	10 ft		11-pin / pigtail
STP-CBL-CA20	$29.50	control cable	20 ft		11-pin / pigtail
STP-CBL-EA6	$17.00	encoder cable	6 ft	STP-MTRD-xxxxxE STP-MTRA-ENC1, STP-MTRA-ENC3 STP-MTRA-ENC5, STP-MTRA-ENC7 STP-MTRA-ENC11, STP-MTRA-ENC13 (for line driver encoders)	10-pin / pigtail
STP-CBL-EA10	$20.00	encoder cable	10 ft		10-pin / pigtail
STP-CBL-EA20	$29.50	encoder cable	20 ft		10-pin / pigtail
STP-CBL-EB3	$24.50	encoder cable	3 ft	STP-MTRA-ENC9 STP-MTRA-ENC10 (for both line driver and push-pull (totem) encoders)	17-pin / pigtail
STP-CBL-EB6	$40.50	encoder cable	6 ft		17-pin / pigtail
STP-CBL-EB10	$61.00	encoder cable	10 ft		17-pin / pigtail
STP-CBL-EB20	$112.00	encoder cable	20 ft		17-pin / pigtail
STP-CBL-ED6	$16.50	encoder cable	6 ft	STP-MTRA-ENC2, STP-MTRA-ENC4 STP-MTRA-ENC6, STP-MTRA-ENC8 STP-MTRA-ENC12, STP-MTRA-ENC14 (for push-pull (totem) encoders)	5-pin / pigtail
STP-CBL-ED10	$19.50	encoder cable	10 ft		5-pin / pigtail
STP-CBL-ED20	$29.00	encoder cable	20 ft		5-pin / pigtail
STP-CON-1	$16.00	replacement connector kit	n/a	STP-DRV-4845 & -6575	-
STP-CON-2	$16.00	replacement connector kit	n/a	STP-DRV-4850 & 80100	-
STP-CON-3	$31.50	replacement connector kit	n/a	STP-MTRD-xxxxxR	-
STP-CON-4	$15.00	replacement connector kit	n/a	STP-DRVA-RC-050**A**	-
STP-CON-5	$15.00	replacement connector kit	n/a	STP-DRV-4830	-
STP-CON-6	$21.00	replacement connector kit	n/a	STP-DRVAC-24025	-
STP-485DB9-CBL-2	$37.00	4-wire programming cable	6.5 ft	STP-MTRD-xxxxxR	DB9 / Phoenix 5-conductor plug
STP-USBENC-CBL-1	$39.50	USB programming cable	3 ft	STP-MTRA-ENC9,ENC10	17-pin / USB

**** Programming/communication cable STP-232RJ11-CBLis available for spare or replacement purposes. (One cable is included with each software programmable drive.)***

***** Refer to the ZIPLinks Wiring Solutions section for complete information regarding cables STP-232HD15-CBL-2 and STP-232RJ12-CBL-2.***

Stepping System Cables

SureStep® Cables

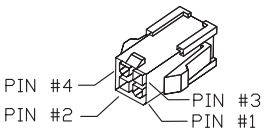
STP-EXT(x)-0xx Extension Cable Wiring Diagram

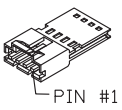
EXT & EXTH CABLES

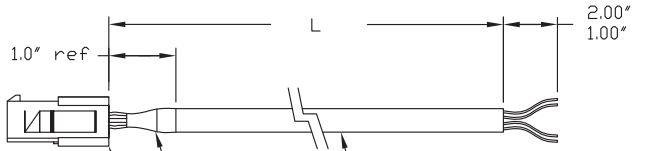
PIN#	COLOR
1	RED
2	WHITE
3	GREEN
4	BLACK

EXTL CABLES

PIN#	COLOR
1	RED
2	WHITE
3	GREEN
4	BLACK





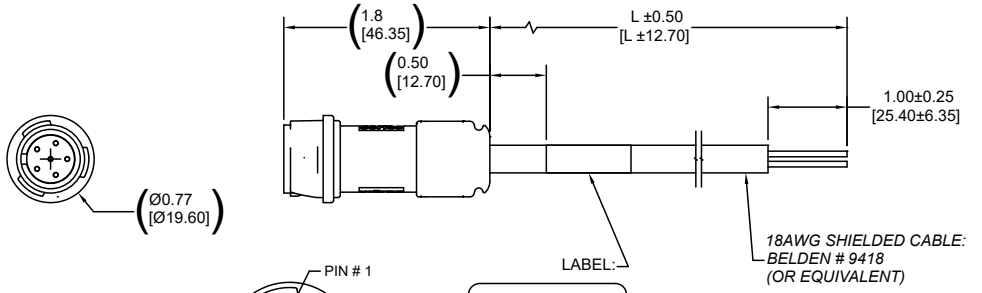


CONNECTORS:
EXT: Molex #43020-0401
EXTH: Molex #39-01-2041
EXTL: TE #103653-3

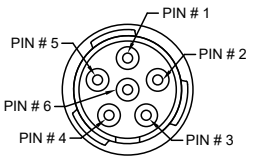
HEAT SHRINK

UNSHIELDED CABLE:
(4) 20 AWG cond
(4) 18 AWG cond
(4) 24 AWG cond

STP-EXTW-0xx and STP-EXTHW-0xx Extension Cable Wiring Diagram

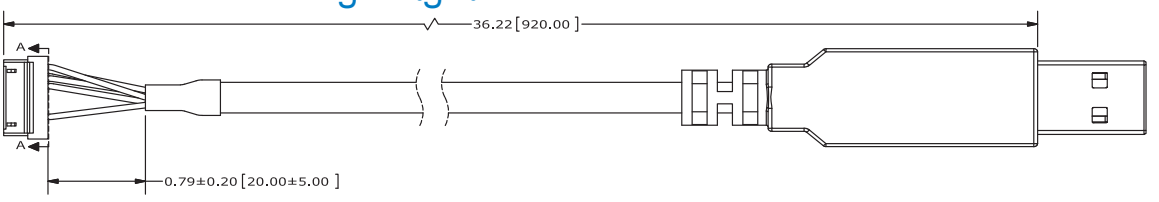


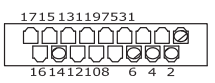
PIN OUT CONNECTION		
PIN #	COLOR	PHASE
1	RED	A+
2	WHITE	A-
3	GREEN	B+
4	BLACK	B-
5	GROUND	GROUND
6	N/A	N/A



VIEW FROM PIN CONNECTION
Connector: Bulgin # PXP4011/06P/6065

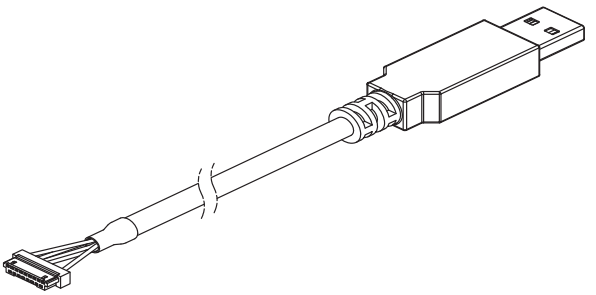
STP-USBENC-CBL-1 Wiring Diagram





(Back of Connector Housing)

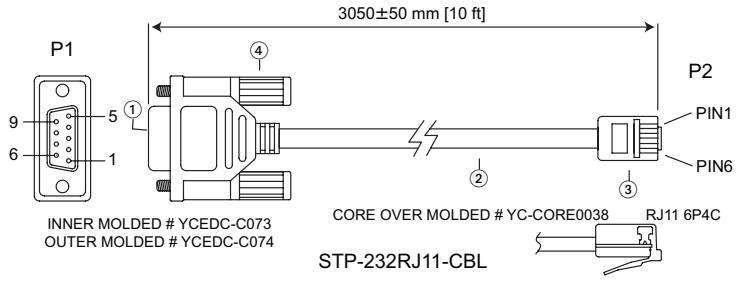
Connector Pinout	
#FunctionColor	Pin
TX_ENC+Yellow	1
RX_ENC+Orange	2
GNDBlack	4
+5VRed	6
MCLRBGreen	14



Stepping System Cables

SureStep® Cables, continued

STP-232RJ11-CBL Programming Cable Wiring Diagram



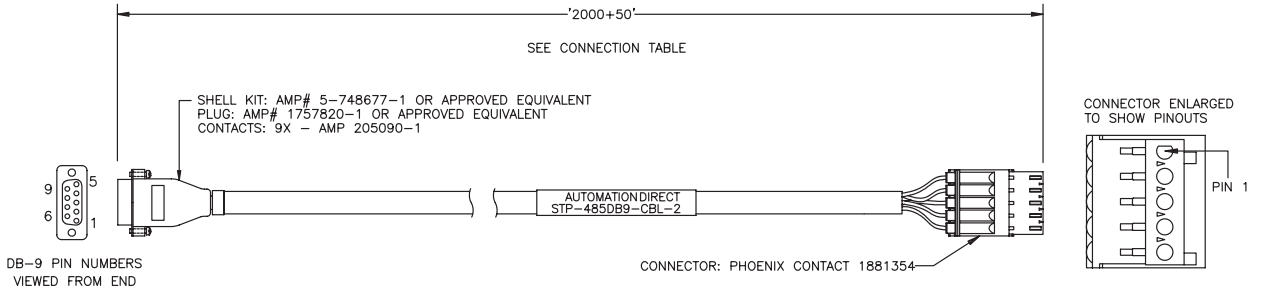
WIRE CONNECTION

(DB9) P1		P2 (RJ11 6P4C)
2	RX — TX	3
3	TX — RX	5
4	nc — nc	4
5	GND — GND	2

①	DB 9P FEMALE CONNECTOR SHELL: FRONT NICKEL BACK TIN INSULATOR COLOR: BLACK
②	CABLE: CAT-5 UTP 24AWG (7/0.203BA*2PR) 100MHz COLOR: BLACK OD: 4.5mm
③	RJ11 6P4C PLATED GOLD 3U"
④	SCREW: #4-40UNC PD40*175TNP COLOR: BLACK

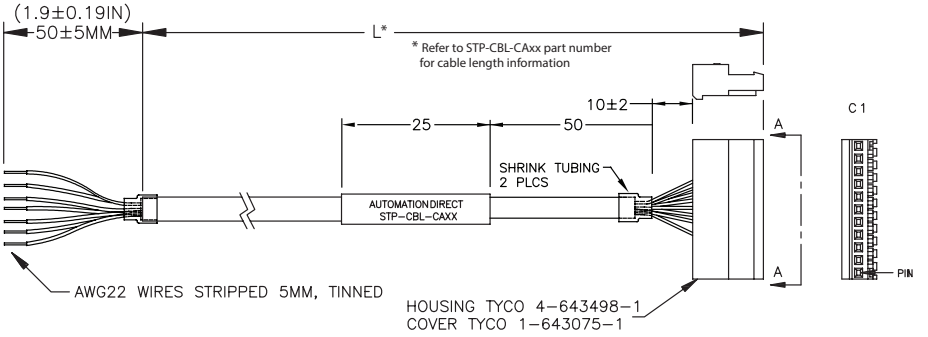
STP-485DB9-CBL-2 4-wire Programming Cable Wiring Diagram

CONNECTION CHART				
DB−9 CONN PIN	DB9 SIGNAL	WIRE COLOR	PHOENIX PIN	PHOENIX SIGNAL
2	TX+	RED	5	RX+
1	TX−	ORANGE	4	RX−
3	RX+	BLACK	3	TX+
4	RX−	BROWN	2	TX−
5	GND	YELLOW	1	GND
METAL HOUSING	SHIELD	SHIELD	N/C	N/C



STP-CBL-CAxx Control Cable Wiring Diagram

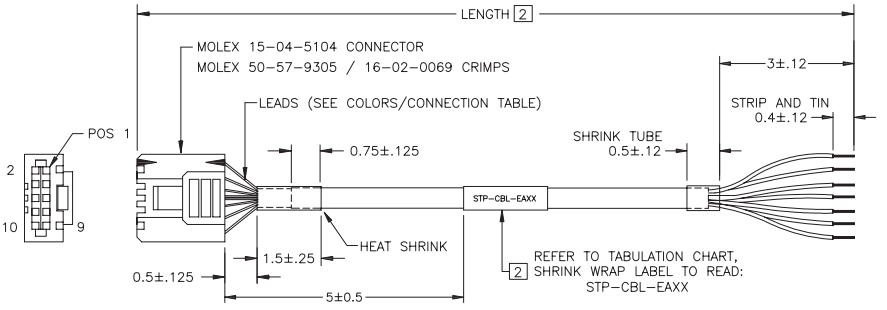
C1		
PIN NO:	SIGNAL	WIRE COLOR
1	STEP+	ORANGE
2	STEP−	BROWN
3	DIR+	YELLOW
4	DIR−	GREEN
5	EN+	BLUE
6	EN−	TAN
7	OUT+	GRAY
8	OUT−	WHITE
9	N.C.	PINK
10	V−	BLACK
11	V+	RED
12	N/C	PURPLE − CUT



Stepping System Cables

SureStep® Cables, continued

STP-CBL-EAxx Encoder Cable Wiring Diagram



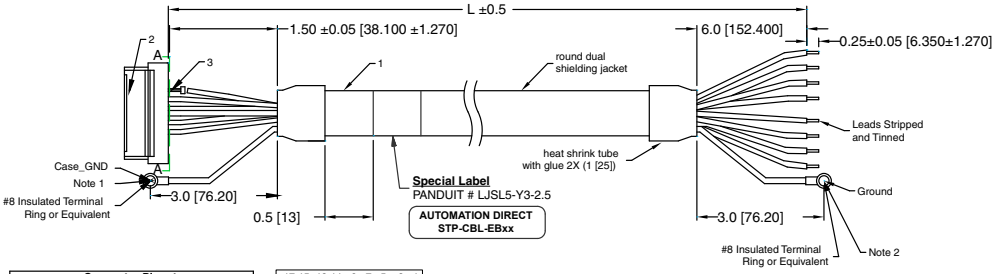
CONN	CONNECTION TABLE		
PIN	LEAD COLOR	SIGNAL	
2	GREEN/WHITE	GROUND	
7	GREEN	POWER+	TWISTED PAIR
3	ORANGE/WHITE	I–	
4	ORANGE	I+	TWISTED PAIR
5	BLUE/WHITE	A–	
6	BLUE	A+	TWISTED PAIR
9	BROWN/WHITE	B–	
10	BROWN	B+	TWISTED PAIR
1	N/C	N/A	
8	N/C	N/A	NO CONNECTION

WIRE: 24AWG, CABLE: UL2464.

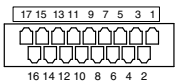
STP-CBL-EBxx Encoder Cable Wiring Diagram

NOTE:
1. Case_GND is connected internally to GND (BLACK/RED)
2. Ground connected internally to cable shielding-customer ref. only
3. Tolerance: ± 0.2" [5] unless otherwise specified
4. All meterials must be ROHS compliant

TABLE INFORMATION	
CABLE NUMBER	CABLE LENGTH L
STP-CBL-EB3	3 Feet
STP-CBL-EB6	6 Feet
STP-CBL-EB10	10 Feet
STP-CBL-EB20	20 Feet



Connector Pinout			
#	Function	Color	
		Primary	Stripe
4	GND	Black	Red
6	+5V	Red	Black
8	B+	Green	Black
9	B-	Black	Green
10	A+	White	Black
11	A-	Black	White
12	Z+	Blue	Black
13	Z-	Black	Blue



SECTION A-A
SCALE 3:1
(Back of Connector Housing)

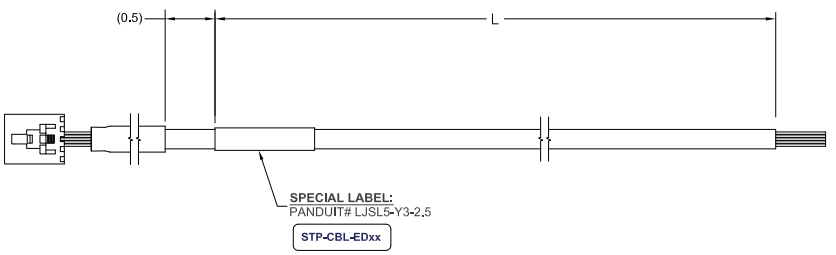
PARTS LIST			
#	PART	DESCRIPTION	QTY
1	CABLE	3M # 3600B/14	1
2	CONNECTOR	JAE # FI-W175	1
3	CRIMP PINS	JAE #FI-C3-A1-15000	8

STP-CBL-EDxx Encoder Cable Wiring Diagram

STP-EDxx CABLES

PIN#	Function
1	Ground
2	Index
3	A Channel
4	+5VDC Power
5	B Channel

TABLE INFORMATION	
CABLE NUMBER	CABLE LENGTH L
STP-CBL-ED6	6 Feet
STP-CBL-ED10	10 Feet
STP-CBL-ED20	20 Feet



SureStep® Stepping Systems with PLCs

Controller Compatibility

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep® Stepping Systems			
PLC Series	*Starting at $197.00*	*Starting at $247.00*	*Starting at $299.00*
	BX-DM1x-10	**BX-DM1x-18**	**BX-DM1x-36**
Maximum Number of Axes	2	3	3
Output Signal Type	Sink/Source		
Maximum Pulse Rate (pulses/sec)	250,000		
Position Control	Trapezoidal Profiles (linear and S-curve ramps)		
Velocity Control	Dynamic Velocity (controlled accel/decel)		

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep™ Stepping Systems				
1–16 axis control depending on base size and power supply budget **				
PLC Series	*CPUs starting at $273.00*		*CPUs starting at $476.00*	
	P2000		**P3000**	
I/O Modules Pulse Outputs	**P2-HSO**		**P3-HSO**	
Maximum Number of Axes	2 per module, 22 per PLC rack, 44 per PLC system			
Output Signal Type	Line Driver	Sink/Source	Line Driver	Sink/Source
Maximum Pulse Rate (pulses/sec)	1,000,000	500,000	1,000,000	500,000
Position Control	Trapezoidal Profiles (linear and S-curve ramps)			
Velocity Control	Dynamic Velocity (controlled accel/decel)			
Maximum Number of Modules	11 per PLC rack, 22 per PLC system			

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep® Stepping Systems			
PLC Series	*Starting at $227.00*	*Starting at $132.00*	*Starting at $264.00*
	DL105	**DL05**	**DL06**
Built-In PLC Pulse Outputs	1 axis pulse output included with the PLC base unit		
Maximum Number of Axes	1 axis control**	1-2 axis control***	1-5 axis control***
Maximum Pulse Rate (pulses/sec)	7,000		10,000
Position Control	Trapezoidal Profiles (linear only)		
Velocity Control	Velocity Levels (no ramps available when changing velocity)		
I/O Modules Pulse Outputs	Not Applicable for DL105	**H0-CTRIO2 (1 axis per module)**	
Maximum Pulse Rate (pulses/sec)		65,000	
Position Control		Trapezoidal Profiles (linear & S-curve ramps)	
Velocity Control		Dynamic Velocity (controlled accel/decel)	
Maximum Number of Modules		1	4

**** Any PLC capable of RS-232 ASCII communication can write serial commands to the STP-DRV-4850, -80100 Drives. Any PLC capable of RS-485 ASCII communication can write serial commands to the Advanced Integrated drives. Most AutomationDirect PLCs will communicate using either RS-232 or RS-485 communications, however we recommend using either Click, Productivity, or BRX (DoMore) as they are modern PLCs. DirectLogic will also work but is older technology.***

***** When using DC output models only. *** When using either DC output model or H0-CTRIO option module.***

SureStep® Stepping Systems with PLCs

Controller Compatibility (continued)

High Speed Pulse Motion Control with AutomationDirect PLCs* and SureStep™ Stepping Systems				
1–16 axis control depending on base size and power supply budget **				
PLC Series	*CPUs starting at $302.00*		*CPUs starting at $303.00*	
	DL205		Do-more	
I/O Modules Pulse Outputs	D2-CTRINT (1 axis per module)	H2-CTRIO2 (2 axes)	T1H-CTRIO (2 axes per module)	H2-CTRIO2 (2 axes)
Maximum Pulse Rate (pulses/sec)	5,000	65,000	25,000	250,000
Position Control	Trapezoidal Profiles (linear and S-curve ramps)			
Velocity Control	Dynamic Velocity (controlled accel/decel)			
Maximum Number of Modules	1	1-8		

**** Any PLC capable of RS-232 ASCII communication can write serial commands to the STP-DRV-4850, -80100 Drives. Any PLC capable of RS-485 ASCII communication can write serial commands to the Advanced Integrated drives. Most AutomationDirect PLCs will communicate using either RS-232 or RS-485 communications, however we recommend using either Click, Productivity, or BRX (DoMore) as they are modern PLCs. DirectLogic will also work but is older technology.***

***** using D2-CITRANT or Hx-CTRIO modules.***

Leadshine Stepping Drives

Leadshine 2-phase Digital Stepper Drives

Leadshine has been an industry leading motion control supplier since 1997, and is one of the largest stepper drive manufacturers in the world. Leadshine steppers offer high quality products (Leadshine factories are ISO9001 certified) at very affordable prices. Leadshine steppers are simple, easy to use, long-lasting, and reliable.

AutomationDirect sells a wide range of linear and switching power supplies, stepper motors, cables, and PLCs with hi-speed outputs that are compatible with Leadshine stepper drives.

Features:

- 2-phase digital stepper drives
- Anti-resonance for optimal torque, extra smooth motion, low motor heating and noise
- Motor auto-config on power up
- All drives support step and direction control, some models support CW/CCW as well
- Micro-stepping for smooth motor movement
- DIP switch configurable
- Wide range of input voltages supported (12-110 VDC, 18-80 VAC)
- Pulse input frequency up to 200kHz
- Soft-start with no "jump" when powered on
- Automatic idle-current reduction
- Protections for over-voltage and over-current
- NEMA 11, 14, 17, 23, 24, 34 and 42 frame size step motors supported

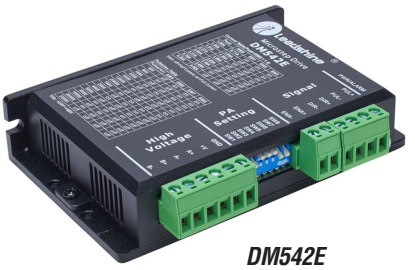
Leadshine Series – Drives Features Comparison[1]

Drive Model	DM322E	DM542E	DM556E	DM860E	DMA860E	DM805-AI	EM542S	EM556S
Price	$25.50	$36.00	$40.00	$49.50	$63.00	$105.00	$46.50	$57.00
Drive Type	2-phase digital stepper drive							
Supply Voltage	12–30 VDC (24 VDC typical)	20–50 VDC (24–48 VDC typical)		24–74 VDC (48–68 VDC typical)	24–110 VDC (48–90 VDC typical) or 18–80 VAC (36–70 VAC typical)	20–80 VDC (30–60 VDC typical)	20–50 VDC (24–48 VDC typical)	
Pulse Input Type	Single-ended[2]	Differential, Single-ended				Single-ended[2]	Differential, Single-ended	
Step Input Modes	Step & Direction			Step & Direction, CW & CCW		Step & Direction, Analog input	Step & Direction, CW & CCW	
Digital Input Voltage	5V (add a 1K resistor to accept +12V input, or a 2K resistor to accept +24V input)						DIP switch selectable for 5V or 24V	
PPR Range	400–12800	400–25600		400–51200		200-12800	200–25600	
Motor Output Current Range	0.3–2.2 A peak (0.2–1.6 RMS)	1.0–4.2 A peak (0.7–3.0 RMS)	1.8–5.6 A peak (1.3–4.0 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)		2.6–7.0 A peak (0.3–5.0 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)	
Digital Output	No						+24VDC (Brake and Fault Detection)	
Self-test Capable	No	No	No	No	No	Yes	Yes	Yes
Special Features	Soft-start, motor auto-config				Accepts a DC or an AC power supply, soft-start, motor auto-config	Built-in pulse generator, command source	Auto-tuning, soft-start, fault and brake outputs, shaft lock	

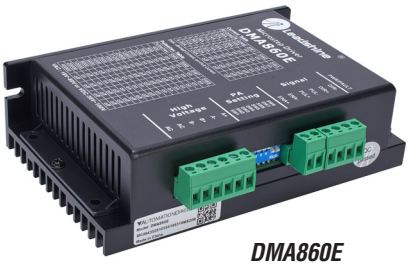
1 - Refer to Specifications Tables for detailed specifications.

2 - See the User Manual or Quick Start Guide for instructions on wiring Single-Ended drives to a Differential (Line Driver) controller.

Leadshine Stepping Drives



DM542E



DMA860E

DM542E, DM556E, DM860E, DMA860E

The DM542E and DM556E drives are capable of pulse and direction operation, with auto-motor config on power up.

The DM860E and DMA860E drives possess the same capabilities but can also do CW and CCW pulse operation. The main difference between these models are output current range to the motor and supply voltage.

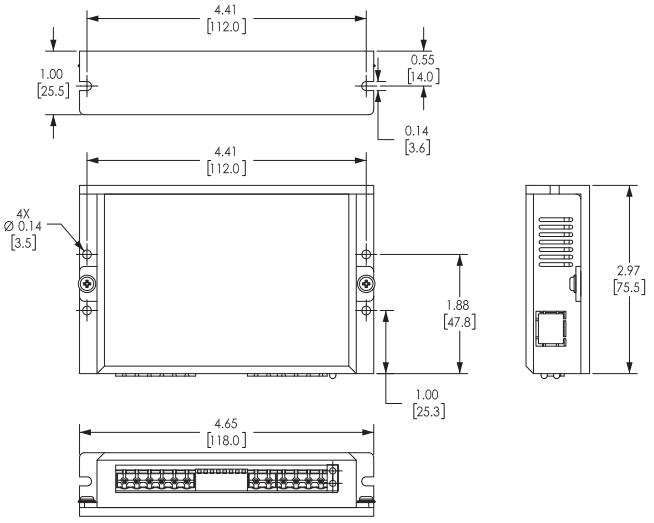
Leadshine DM542E, DM556E, DM860E, DMA860E Specifications					
Drive Model		***DM542E***	***DM556E***	***DM860E***	***DMA860E***
Output Current		1.0–4.2 A peak (0.7–3.0 RMS)	1.8–5.6 A peak (1.3–4.0 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)
Input Voltage		20–50 VDC (24–48 VDC typical)		24–74 VDC (48–68 VDC typical)	24–110 VDC (48–90 VDC typical) or 18–80 VAC (36–70 VAC typical)
Logic Signal Current		7–16 mA (10mA typical)			
Pulse Input Frequency		0–200 kHz			
Minimal Pulse Width		2.5 µs			
Minimal Direction Setup		5.0 µs			
Isolation Resistance		500mΩ			
Connector P1 Functions	***PUL+***	**Pulse signal:** 5V signal, differential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals.			
	PUL-				
	DIR+	**Direction signal:** 5V signal, differential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals.			
	DIR-	**Direction Function:** requires 5µs setup time. CW/CCW Function (DM860E and DMA860E only): see DIP switch SW14.			
	ENA+	**Enable signal:** 5V signal, differential input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals.			
	ENA-	**Enable Function:** Close (pull low) to disable the drive.			
Replacement Connectors		Power = DN-6PLUG, I/O = DN-4PLUG, Enable = DN-2PLUG			
Cooling		Natural cooling or forced cooling			
Ambient Temperature		0°C to 65°C (32°F to 149°F)			
Humidity		40–90% relative humidity			
Operating Temperature		0°C to 50°C (32°F to 122°F)			
Vibration		10–50 Hz / 0.15 mm			
Storage Temperature		-20°C to 65°C (-4°F to 149°F)			
Self Test		No			
Weight		227g (8 oz)	300g (10.6 oz)	510g (1.13 lbs)	510g (1.13 lbs)

Leadshine Stepping Drives

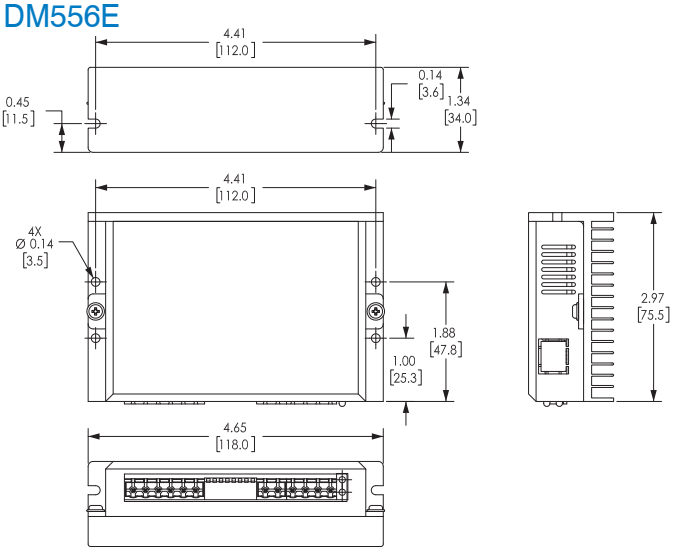
Leadshine Drive Dimensions

Dimensions = in [mm]

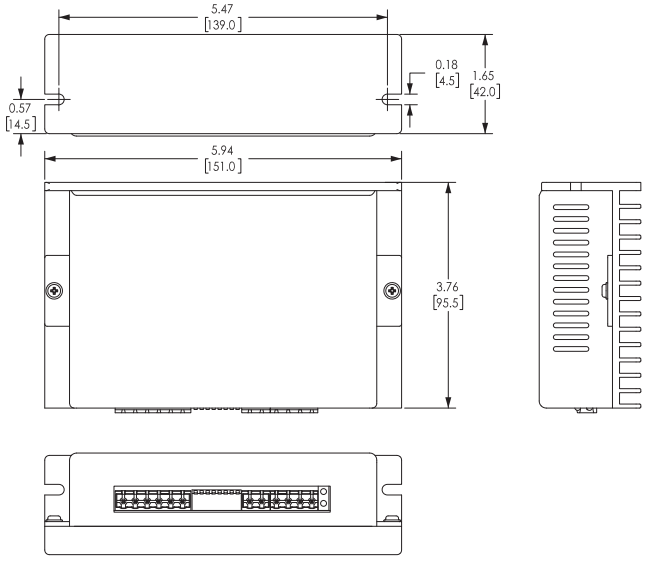
DM542E



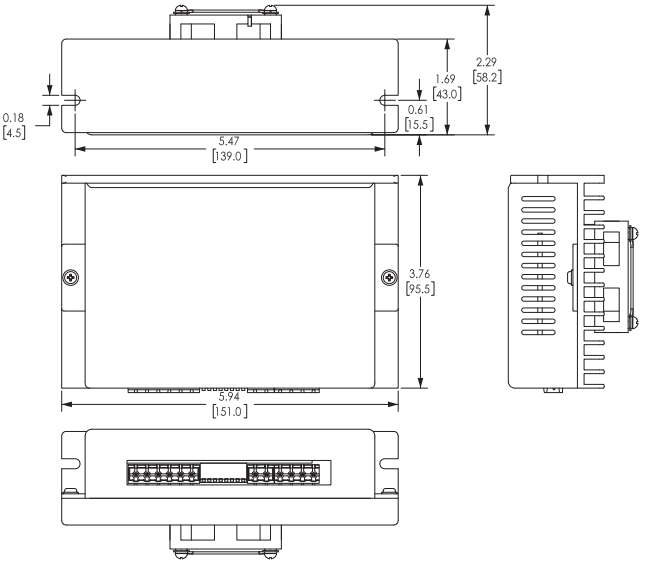
DM556E



DM860E



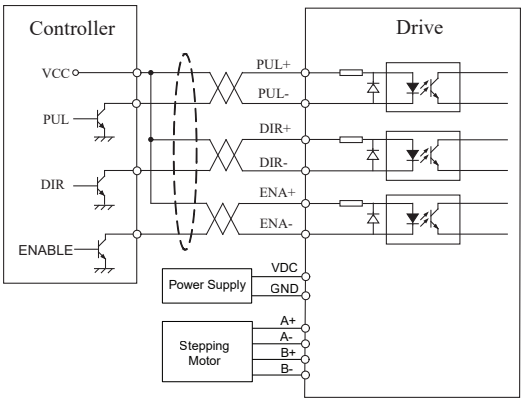
DMA860E



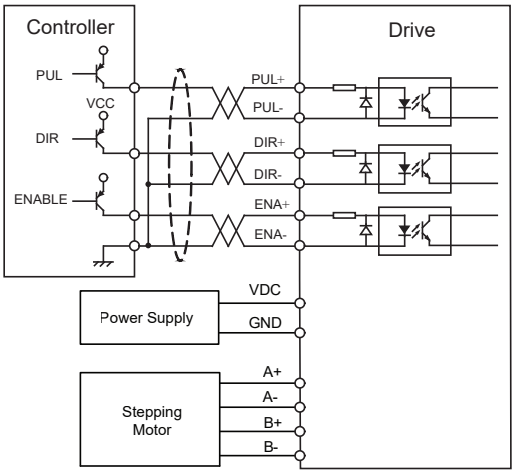
Leadshine Stepping Drives

Leadshine Drive Wiring

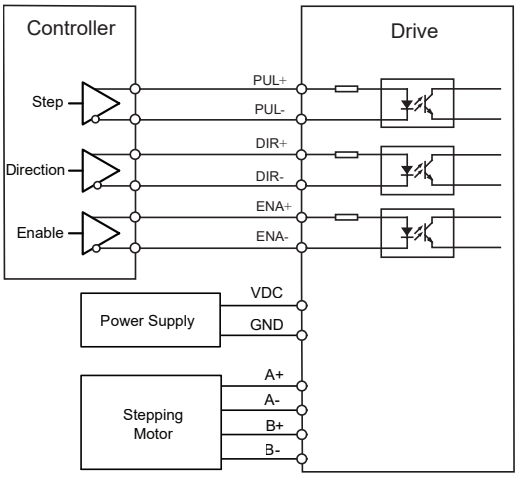
DM542E, DM556E, DM860E, DMA860E Connection to Open Collector Signal



DM542E, DM556E, DM860E, DMA860E Connection to PNP Signal



DM542E, DM556E, DM860E, DMA860E Connection to Differential Signal



Leadshine Stepping Drives

DM332E

The DM322E is a compact drive capable of pulse and direction operation, with motor auto-configuration on power up.

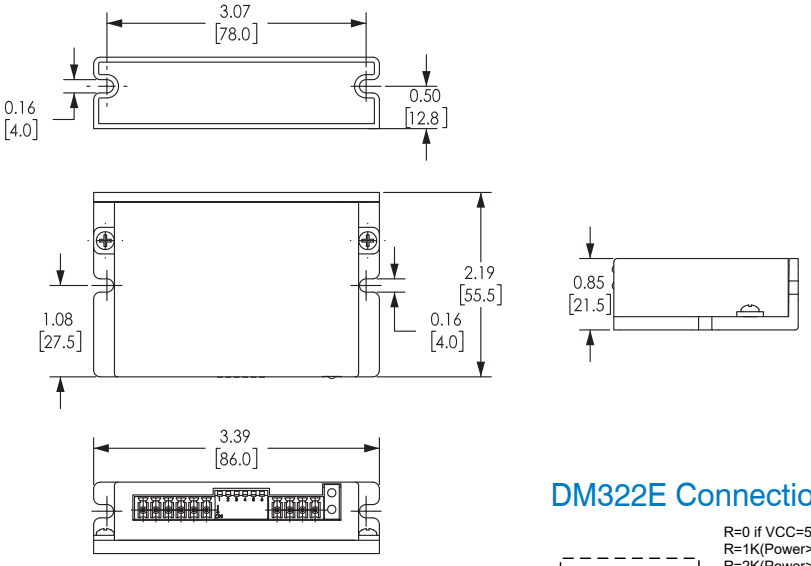
DM322E

Leadshine DM322E Specifications		
Drive Model		***DM322E***
Output Current		0.3–2.2 A peak (0.2–1.6 RMS)
Input Voltage		12–30 VDC (24 VDC typical)
Logic Signal Current		7–16 mA (10mA typical)
Pulse Input Frequency		0–70 kHz
Minimal Pulse Width		7.5 µs
Minimal Direction Setup		7.5 µs
Isolation Resistance		100mΩ
Connector P1 Functions	***PUL***	**Pulse signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals.
	DIR	**DIR signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals. **Direction Function:** requires 5µs setup time. **CW/CCW Function:** see DIP switch SW14.
	OPTO	This input is the voltage supply for the Pulse, Direction, and Enable opto-couplers. Connect 5VDC (or +12V, +24V with appropriate resistors on Pulse, Direction, and Enable inputs).
	ENA	**Enable signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals. **Enable Function:** Close (pull low) to disable the drive.
Replacement Connectors		Power = 6-pin from STP-CON-4; I/O = 4-pin from STP-CON-5
Cooling		Natural cooling or forced cooling
Ambient Temperature		0°C to 65°C (32°F to 149°F)
Humidity		40–90% relative humidity
Operating Temperature		0°C to 50°C (32°F to 122°F)
Vibration		10–50 Hz / 0.15 mm
Storage Temperature		-20°C to 65°C (-4°F to 149°F)
Self Test		No
Weight		90g (3.5 oz)

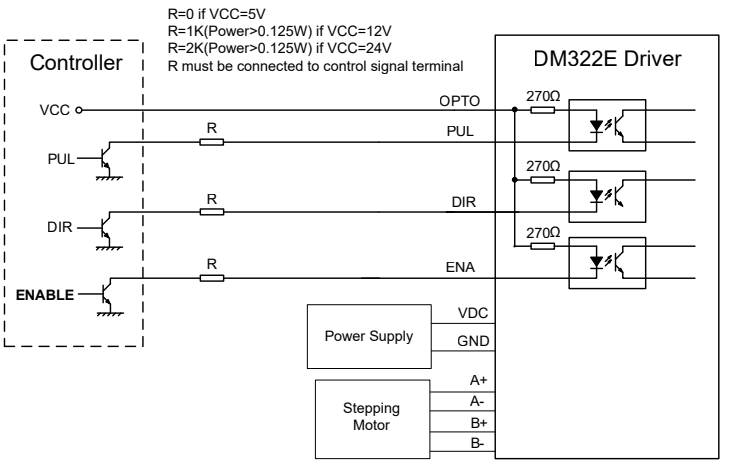
Leadshine Stepping Drives

DM322E Dimensions and Wiring

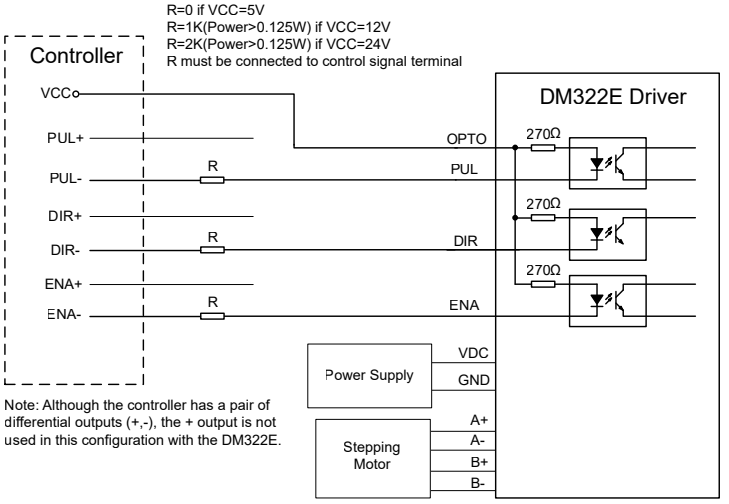
Dimensions = in [mm]



DM322E Connection to Open Collector Signal



DM322E Connection to Differential Control Signal

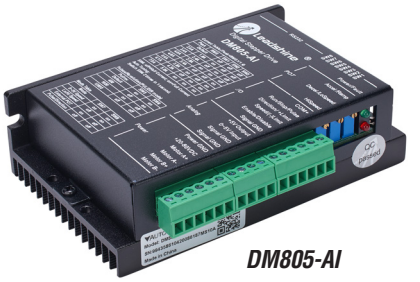


Note: Although the controller has a pair of differential outputs (+,-), the + output is not used in this configuration with the DM322E.

Leadshine Stepping Drives

DM805-AI

The DM805-AI is capable of pulse and direction as well as analog input and speed control, with motor auto-configuration on power up and motor self-test capability. Comes with built in potentiometers for adjusting accel and decel rates and can be controlled via an external potentiometer.

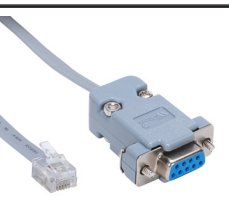


DM805-AI

Leadshine DM805-AI Specifications		
Drive Model		***DM805-AI***
Output Current		2.6–7.0 A peak (0.3–5.0 RMS)
Input Voltage		20–80 VDC (60VDC typical)
Logic Signal Current		7–16 mA (10mA typical)
Pulse Input Frequency		0–200 kHz
Minimal Pulse Width		2.5 µs
Minimal Direction Setup		5.0 µs
Isolation Resistance		500mΩ
Pin Functions	***Run/Stop or Pulse***	**Pulse signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1Ω resistor for +12V signals, 2kΩ for +24V signals. **Run/Stop Function:** Close (pull low) to enable the motor.
	Direction or +Limit	**DIR signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals. **Direction Function:** requires 5µs setup time. **(+)Limit Function:** Close (pull low) to stop motor movement in the positive direction.
	Speed or (-)Limit	**Speed:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals. **Speed Function (Low Speed/High Speed Mode):** Close (pull low) to select Lo Speed pot setpoint. Open (float high) to enable Hi Speed pot setpoint. **(-)Limit Function:** Close (pull low) to stop motor movement in the negative direction.
	Enable/Disable	**Enable signal:** 5V signal, single-ended input. High input is 4-5V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs. Add a 1kΩ resistor for +12V signals, 2kΩ for +24V signals. **Enable Function:** Close (pull low) to disable the drive.
Replacement Connectors		Power = 6-pin from STP-CON-4; I/O = 6-pin from STP-CON-4; Analog = 4-pin from STP-CON-4
Cooling		Natural cooling or forced cooling
Ambient Temperature		0°C to 50°C (32°F to 122°F)
Humidity		40–90% relative humidity
Operating Temperature		70°C (158°F) max
Vibration		4.9 m/s2 max
Storage Temperature		-20°C to 65°C (-4°F to 149°F)
Self Test		Yes
Configuration Cable		1.4.4-0609505-B3
Weight		264g (9.3 oz)

Leadshine Series Drive Cables		
Optional Configuration Cable	**Compatible With**	**Price**
1.4.4-0609505-B3	DM805-AI	$5.00

Note: Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like USB-RS232.

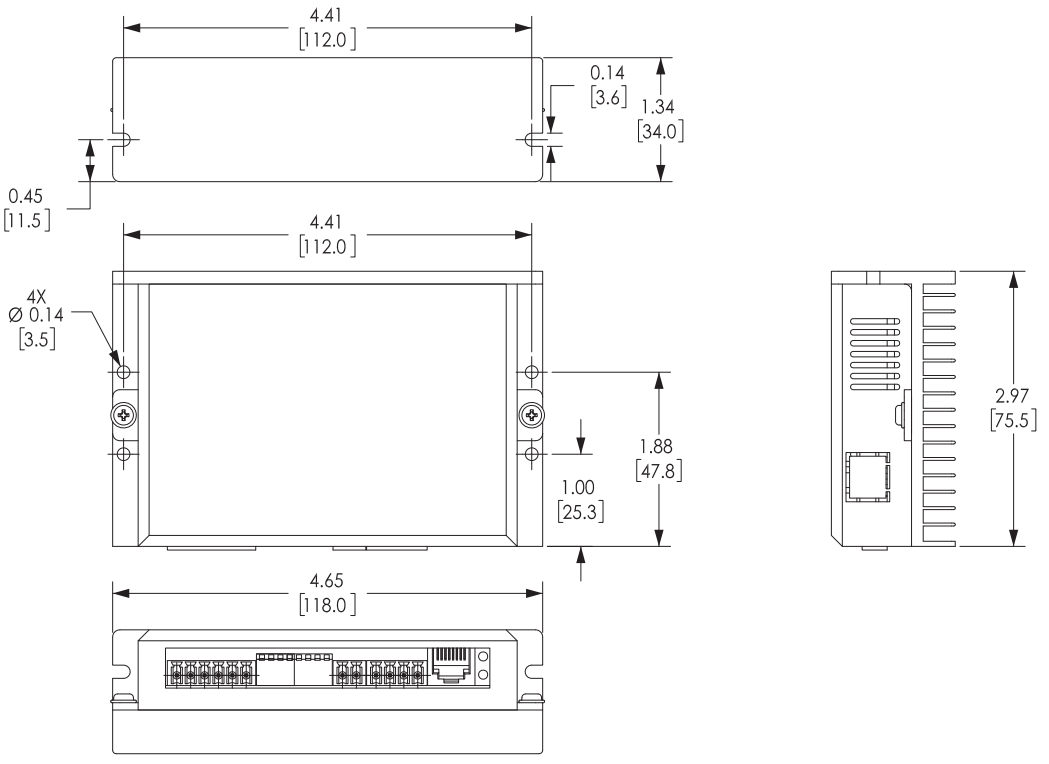


1.4.4-0609505-B3

Leadshine Stepping Drives

DM805-AI Dimensions

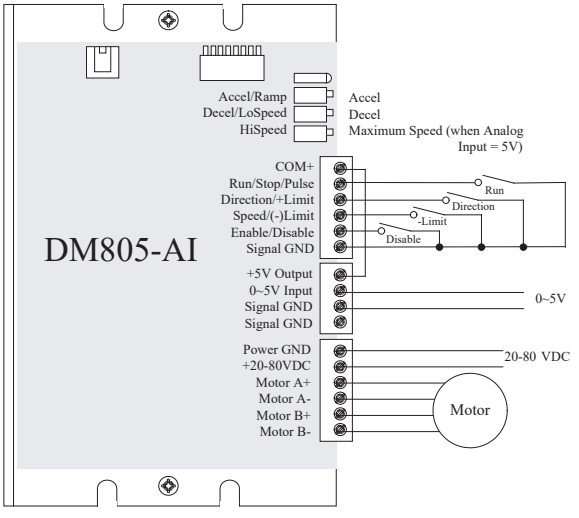
Dimensions = in [mm]



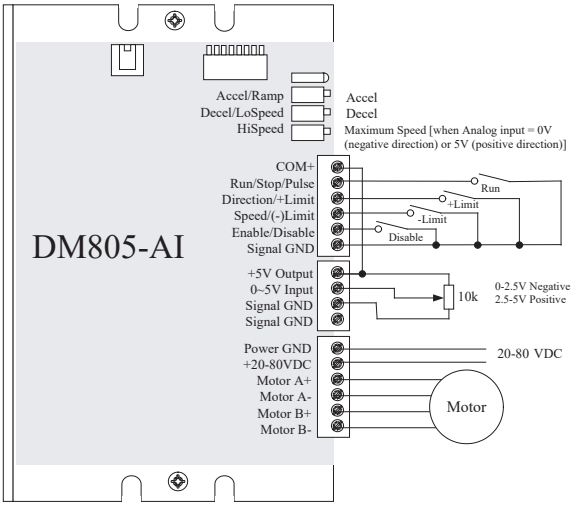
DM805-AI Wiring

The DM805-AI has four different operation modes that can be selected through DIP SW7 and SW8, and can also be wired to a differential controller.

DM805-AI Wiring for Analog Speed Mode

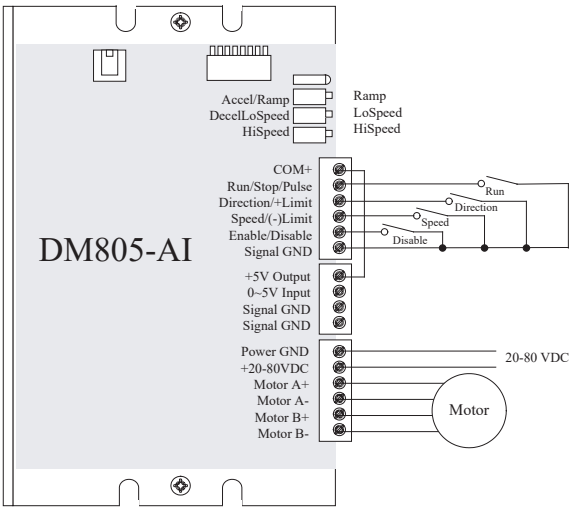


DM805-AI Wiring for External Pot Mode

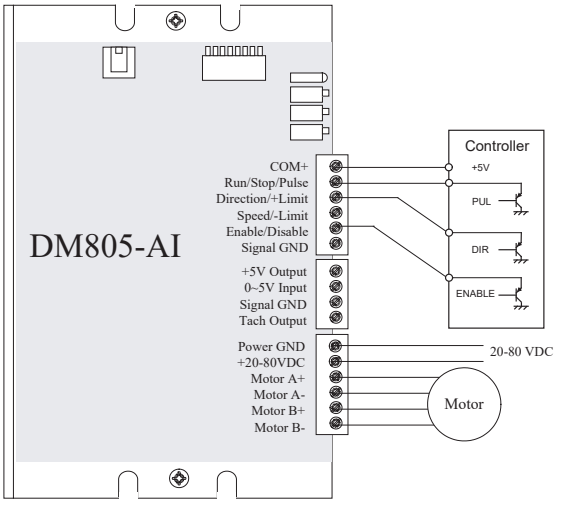


Leadshine Stepping Drives

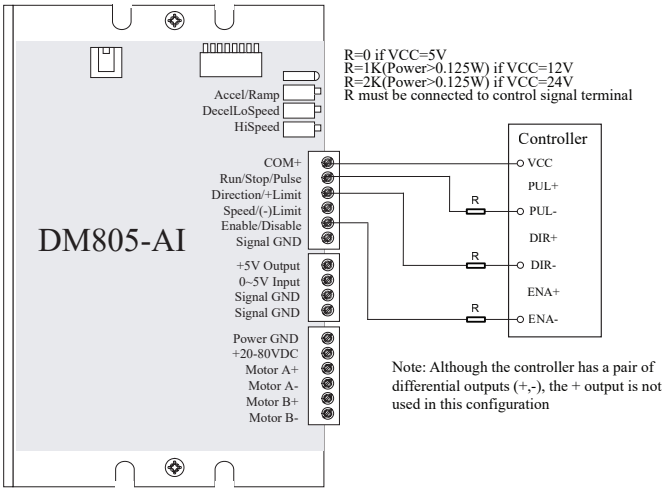
DM805-AI Wiring for Low/High Speed Mode



DM805-AI Wiring for Pulse/Direction Mode



DM805-AI Wiring for Differential Control Signal



Note: Although the controller has a pair of differential outputs (+,-), the + output is not used in this configuration

Leadshine Stepping Drives

EM542S, EM556S

The EM542S and EM556S are digital stepper drives capable of pulse and direction as well as CW and CCW operation, with motor auto-configuration on power up and self-test capability. EM542S and EM556S have a built-in current-limiting resistor (on a switch) to allow either 5V or 24V input pulses. They also include a fault and a brake output, and a shaft lock feature. The brake output can be used with an external holding brake to hold the motor in place if power fails or the drive is disabled - you lose power, the brake engages. The shaft lock is set via DIP switch and will lock the motor into position using phase current, but only works when the drive has power.

EM542S

Leadshine EM542S, EM556S Specifications			
Drive Model		***EM542S***	***EM556S***
Output Current		2.4–7.2 A peak (1.7–5.1 RMS)	2.4–7.2 A peak (1.7–5.1 RMS)
Input Voltage		20–50 VDC (24–48 VDC typical)	
Logic Signal Current		7–16 mA (10mA typical)	
Pulse Input Frequency		0–200 kHz	
Minimal Pulse Width		2.5 µs	
Minimal Direction Setup		5.0 µs	
Isolation Resistance		500mΩ	
Connector P1 Functions	***PUL+***	**Pulse signal:** 5V or 24V signal (Switch S3 determines voltage), differential input. High input is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs.	
	PUL-	Switch S3 factory default = 24V position. **WARNING!** If switch S3 is in the 5V position and 24V is applied, the drive will be damaged.	
	DIR+	**DIR signal:** 5V or 24V signal (Switch S3 determines voltage), differential input. High input is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs.	
	DIR-	**Direction Function:** requires 5µs setup time. **CW/CCW Function:** see DIP switch SW14. **WARNING!** If switch S3 is in the 5V position and 24V is applied, the drive will be damaged.	
	ENA+	**Enable signal:** 5V or 24V signal (Switch S3 determines voltage), differential input. High input is 4-5V or 22-24V, Low input is 0-0.5 V. Minimum pulse width = 2.5 µs.	
	ENA-	**Enable Function:** Close (pull low) to disable the drive. **WARNING!** If switch S3 is in the 5V position and 24V is applied, the drive will be damaged.	
Fault and Brake Output Connector	***ALM***	Optional output connection. Maximum of 30V/100mA output, sinking or sourcing.	
	BR		
	COM-		
Replacement Connectors		Incoming Power = DN-2PLUG; Motor Power = DN-4PLUG; I/O = 6-pin from STP-CON-4	
Cooling		Natural cooling or forced cooling	
Ambient Temperature		0°C to 65°C (32°F to 149°F)	
Humidity		40–90% relative humidity	
Operating Temperature		0°C to 50°C (32°F to 122°F)	
Vibration		10–50 Hz / 0.15 mm	
Storage Temperature		-20°C to 65°C (-4°F to 149°F)	
Self Test		Yes	
Configuration Cable		1.4.4-0409505-B3	
Weight		250g (8.8 oz)	250g (8.8 oz)

Leadshine Series Drive Cables		
Optional Configuration Cable	**Compatible With**	**Price**
1.4.4-0409505-B3	EM542S, EM556S	$5.00

Note: Configuration cable only required if using optional configuration software. Software configuration not necessary unless DIP switch settings and auto-tuning aren't sufficient for your application. Requires an RS232 port on your PC, or a USB to RS232 converter, like USB-RS232.

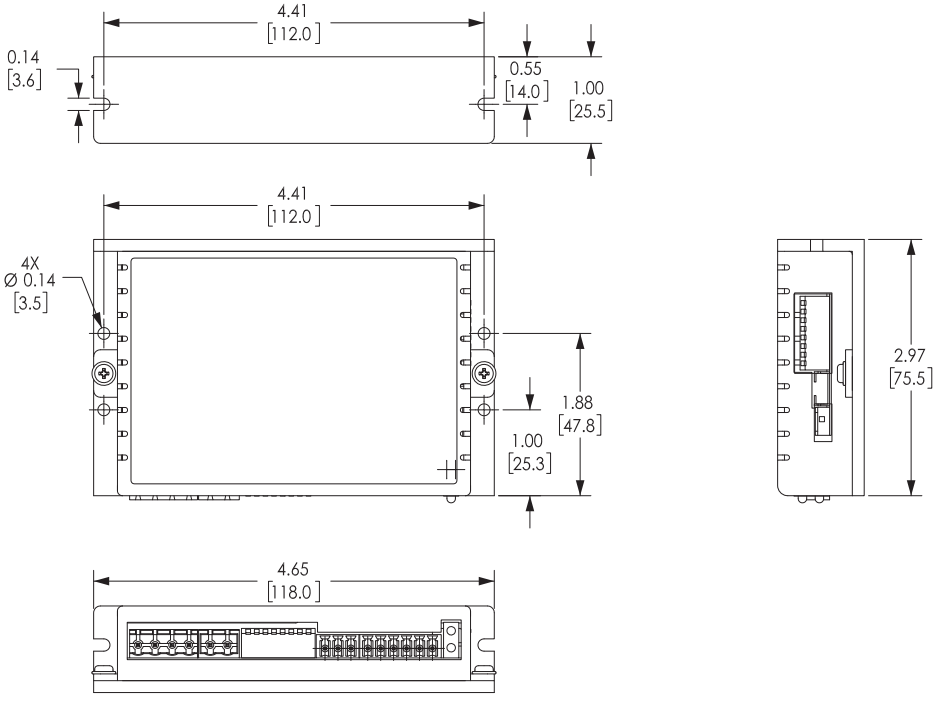
1.4.4-0409505-B3

Leadshine Stepping Drives

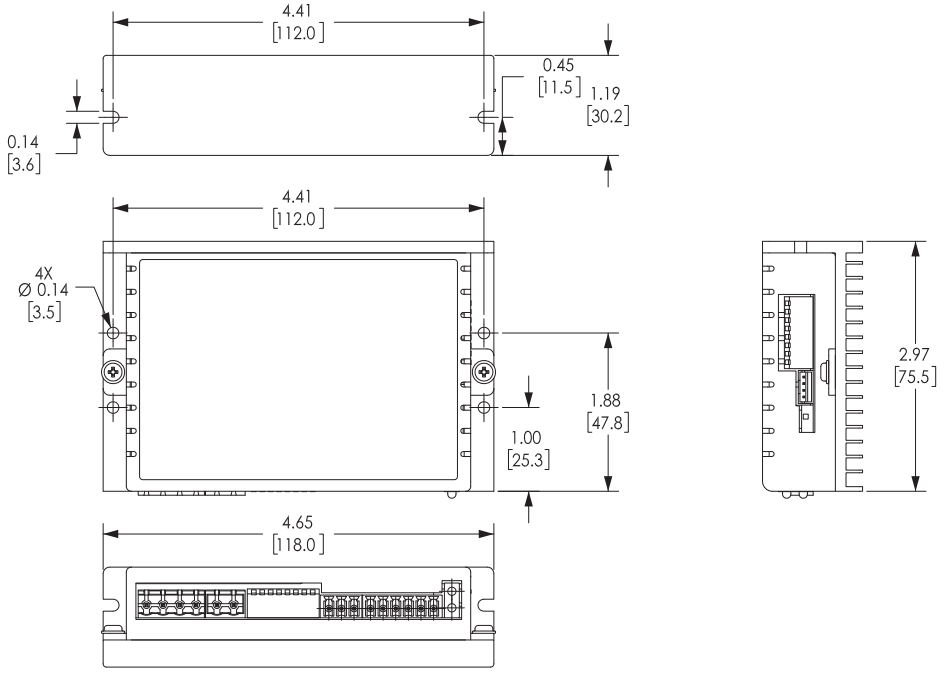
EM542S, EM556S Dimensions

Dimensions = in [mm]

EM542S



EM556S

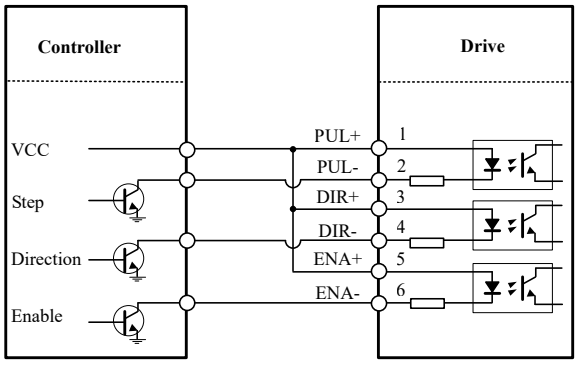


Leadshine Stepping Drives

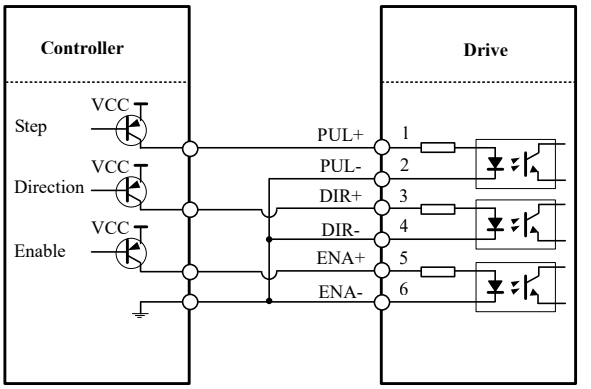
EM542S, EM556S Wiring

Note: These drives can accept Vcc of 24V or 5V. Set switch S3 before applying power.

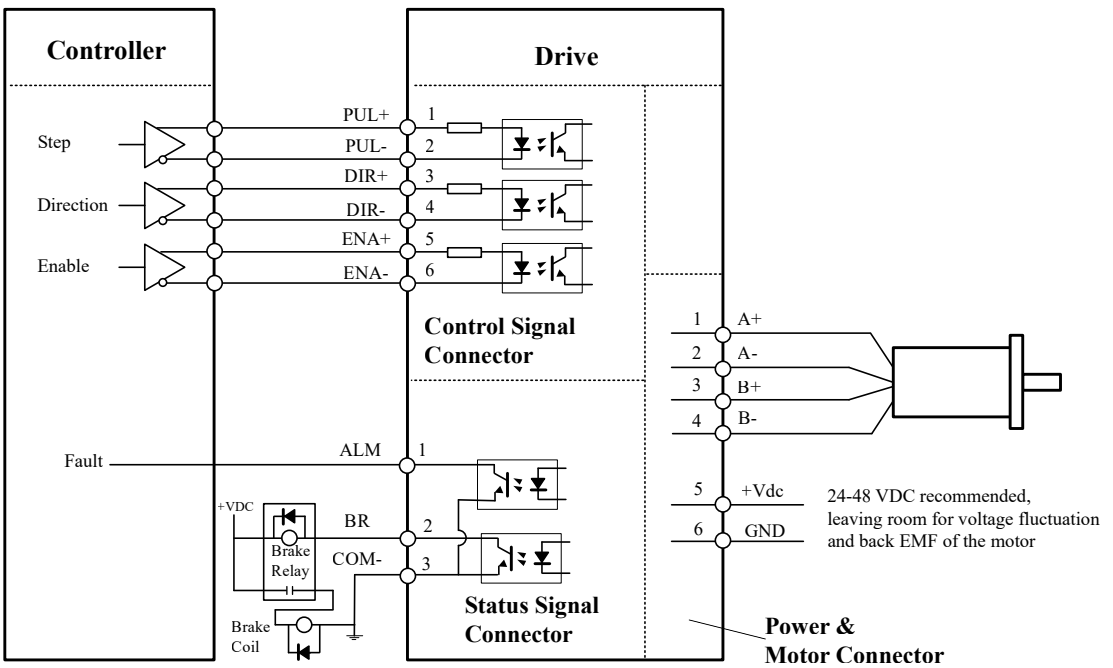
EM542S, EM556S Connection to Open-Collector Signal



EM542S, EM556S Connection to PNP Signal



EM542S, EM556S Connection to Differential Signal; Typical Connection with Brake and Fault Outputs



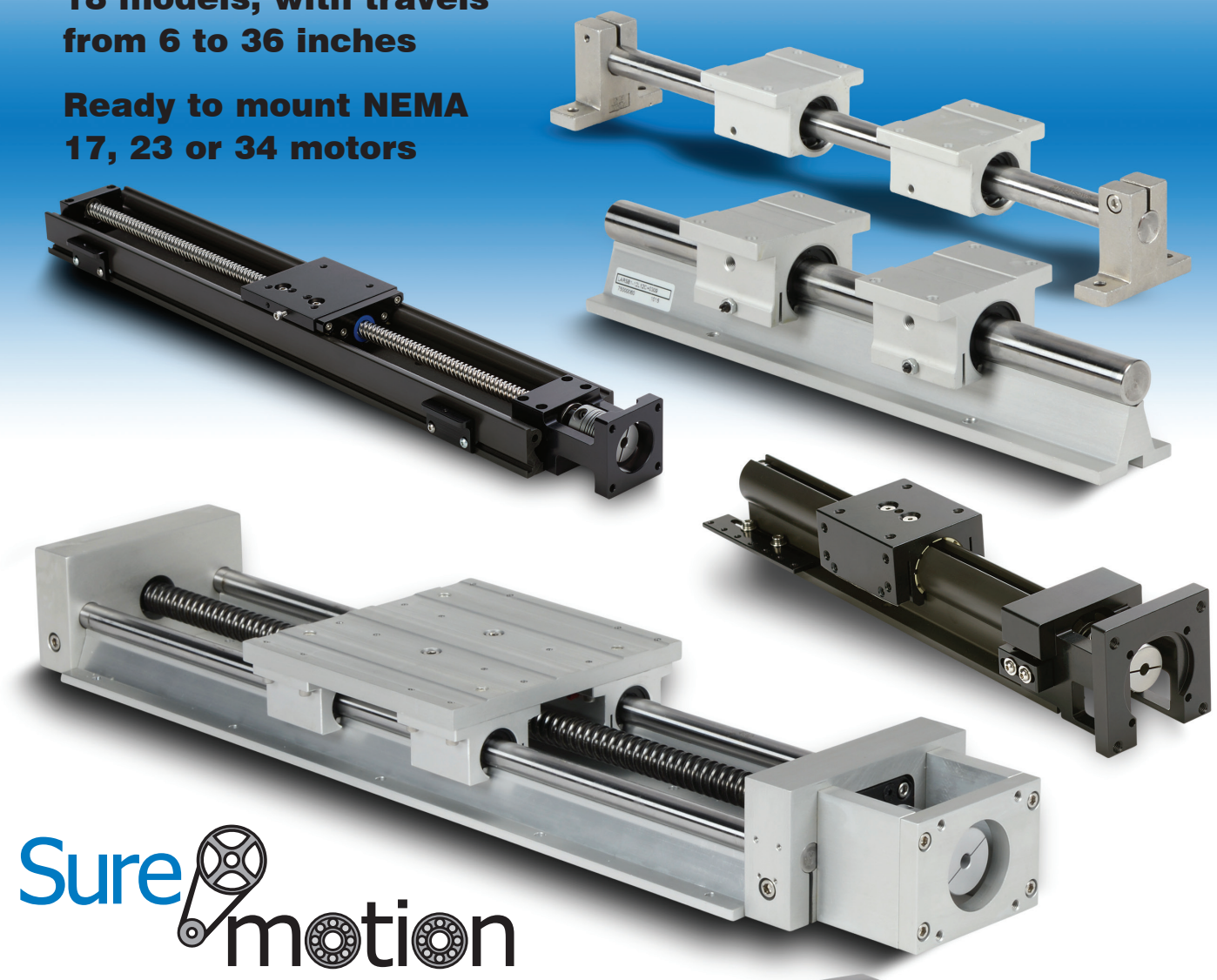
Linear Motion Slides and Components

The three SureMotion families of linear slide actuators easily mate to SureStep motors and other NEMA motors. Everything you need to mount your SureStep motor is included!

These units are an excellent solution for many applications such as pick and place, packaging, assembly automation and other motion control operations.

18 models, with travels from 6 to 36 inches

Ready to mount NEMA 17, 23 or 34 motors



SureMotion

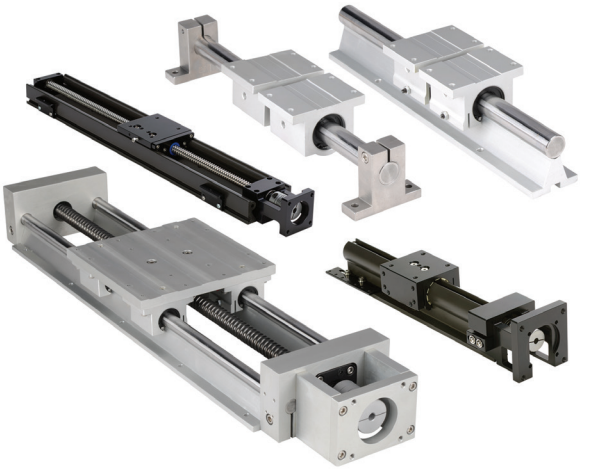
Sliding components in a range of sizes to help you build larger sliding assemblies

Linear Motion Products

Product Overview

Actuator Overview

SureMotion linear motion offers both motor-ready actuator assemblies, and a versatile assortment of sliding components and accessories to provide a wide variety of motion control solutions.

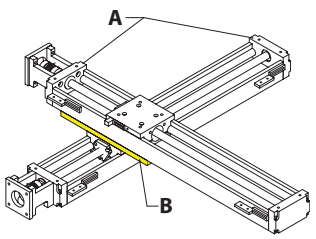


Linear Slide Actuator Comparisons

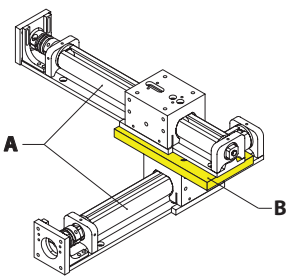
Actuator Series Comparisons						
Actuator Series	***Actuator Type***	***Drive Type***	***Max Load Capacity (lb)***	***Max Speed (in/s)***	***Travel (in)***	***Relative Price***
LARSD2	Twin Round Shaft	Ball Screw	920	6	12, 24	$$$$
LACP2	Compact Slide	Lead Screw	125	20	6, 12, 24, 36	$$
LAVL2	Value Slide	Lead Screw	110	15	6, 12, 18, 24	$

Available Multi-Axis Configurations

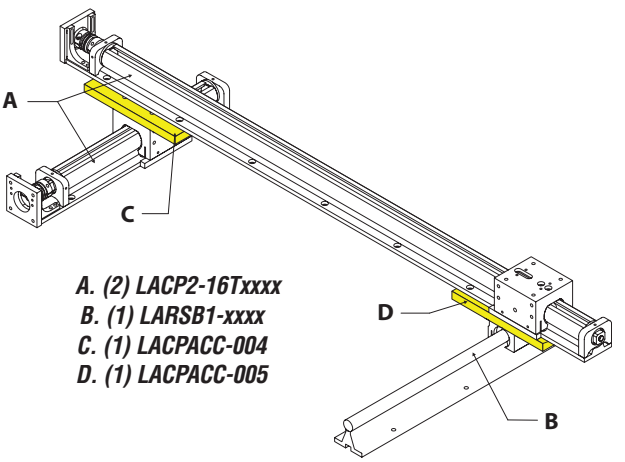
X-Y Axis Configurations



A. (2) LAVL2-60Txxxx
B. (1) LAVLACC-004

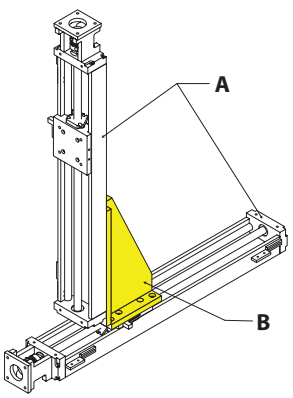


A. (2) LACP2-16Txxxx
B. (1) LACPACC-004



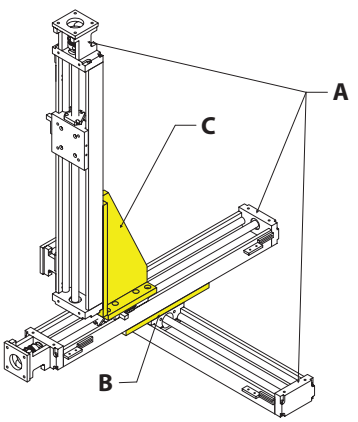
A. (2) LACP2-16Txxxx
B. (1) LARSB1-xxxx
C. (1) LACPACC-004
D. (1) LACPACC-005

X-Z Axis Configuration

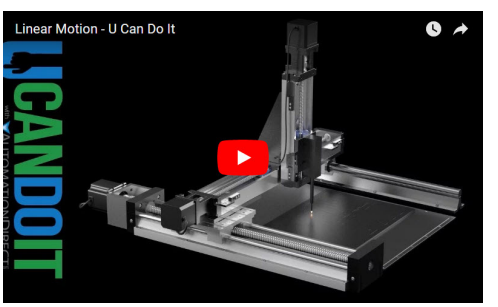


A. (2) LAVL2-60Txxxx
B. (1) LAVLACC-005

X-Y-Z Axis Configuration



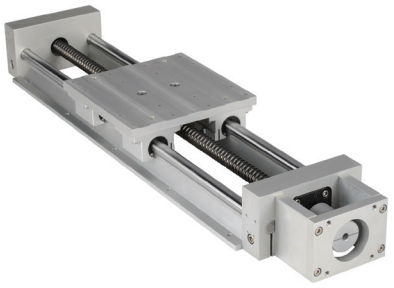
A. (3) LAVL2-60Txxxx
B. (1) LAVLACC-004
C. (1) LAVLACC-005



Click on the above video link for a short visual example of how our products can be used.

Linear Motion Products

Twin Round Shaft Slide Actuators



LARSD2-08T12BP2C

Description

Continuously-supported round rail slide with ball screw actuation provides a very robust precision linear motion. Units are complete except for a drive motor.

Features

- High-accuracy ball screw
- Continuously-supported guide rails
- Replacement components available
- Ready for NEMA 23 motor
- AISI 1566 Carbon Steel, 60 RC Round Shafts
- AISI 1045 Carbon Steel , 56 RC Ball Screw

Applications

- Positioning systems
- Heavy loads

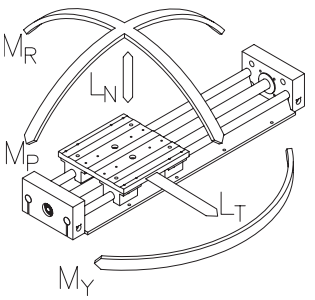
Twin Round Shaft Slide Actuator Specifications

Part Number	Price	Drive Type	Drive Pitch	Drive Screw Efficiency (%)	Payload Inertia Factor (in^2)	Constant System Inertia (lb_m-in^2)	Travel	Weight (lb)	Fits Motor
LARSD2-08T12BP2C	$2,592.00	Ball screw	0.2 in	83	0.001	0.11	12in	10.5	NEMA 23
LARSD2-08T24BP2C	$2,798.00					0.16	24in	14.0	

System Inertia Calculation:

To calculate the inertia reflected to the motor in a particular actuator, multiply the carriage payload by the payload inertia factor and then add the constant system inertia value for that actuator. The constant system inertia value for each system includes the inertia of the shaft coupler, carriage, and lead/ball screw.

- The payload must be in units of lb_m.



Load rating diagram

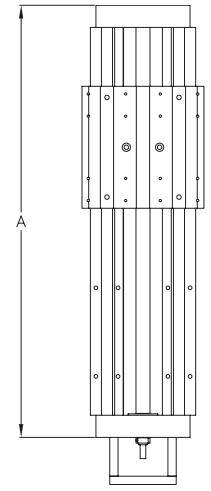
Twin Round Shaft Slide Actuator Load/Moment Ratings

Part Number	Load (lb)				Moment (lb·in)		
	Actuator Thrust	Normal – L_N		Transverse	Roll	Pitch	Yaw
		Down	Up	L_T	M_R	M_P	M_Y
LARSD2-08TxxBP2C	200	920	644	920	1046	1210	1730

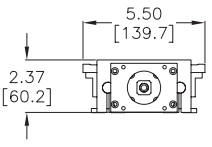
Linear Motion Products

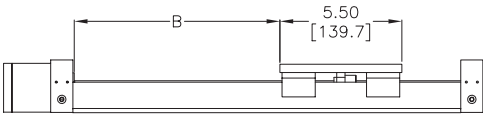
Twin Round Shaft Slide Actuators

Dimensions (in [mm])



PART NUMBER	A	B (TRAVEL)
LARSD2–08T12BP2C	19.50 [495.3]	12.00 [304.9]
LARSD2–08T24BP2C	31.5 [800.1]	24.00 [609.8]



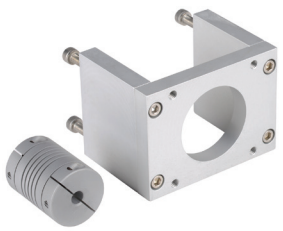


LARSD2-08TxxBP2C

See our website www.AutomationDirect.com for complete Engineering drawings.

Accessories

Twin Round Shaft Slide Actuator Accessories			
Part Number	***Price***	***Description***	***Weight (lb)***
LARSACC-010	$26.00	SureMotion linear ball bushing, open type, 1/2 inch inside diameter, with seals, self-aligning.	0.5
LARSACC-013*	$691.00	SureMotion repair kit, for use with LARSD2-08T12BP2C actuators. Ballscrew, ballnut, end bearings and grease tube included.	3.0
LARSACC-014*	$681.00	SureMotion repair kit, for use with LARSD2-08T24BP2C actuators. Ballscrew, ballnut, end bearings and grease tube included.	5.0
LARSACC-015*	$259.00	SureMotion motor adapter, NEMA 23 frame. For use with LARSD2-08 series actuators. 1/4 x 1/4 inch coupler included.	1.0
LARSACC-016*	$312.00	SureMotion motor adapter, NEMA 34 frame. For use with LARSD2-08 series actuators. 1/2 x 1/4 inch coupler included.	1.0
**** Repair kits and NEMA 23/34 motor adapter contain replacement components that are the same as the original components in the actuator assemblies.***			



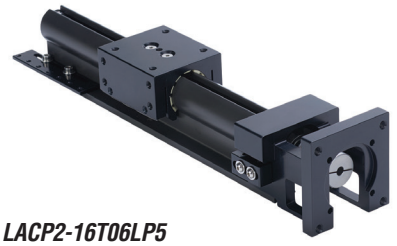
LARSACC-015(16)

LARSACC-013(014)

Some accessories not shown see www.AutomationDirect.com for additional product photos.

Linear Motion Products

Compact Slide Actuators - Generation 2



LACP2-16T06LP5

Description

Self-contained linear actuator designed for light loads in harsh or wet conditions in a very small package. The base is a single piece design with integrated slide surfaces, and is hard anodized all over.

Generation 2 actuators have a reduced part count for more reliable operation, integral wireway through the body and more robust motor mount that fits both NEMA 17 and 23 motors.

Features

- Compact design
- Replacement components available
- Ready for NEMA 17 motor (NEMA 23 motor requires new coupling)
- End-of-travel switch mounts
- AISI 6061-T6 Aluminum Alloy base, Hard Anodized on all surfaces to a depth of 0.0005 to 0.0015"
- AISI 303 Stainless Steel Lead Screw

Applications

- Space-limiting applications
- Harsh or wet environments
- Light loads
- Speeds up to 20 inches per second

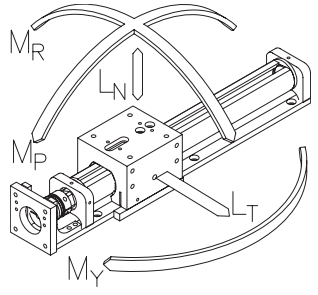
Compact Slide Actuator Specifications

Part Number	Price	Drive Type	Drive Pitch	Drive Screw Efficiency (%)	Payload Inertia Factor (in^2)	Constant System Inertia (lb_m-in^2)	Travel	Weight (lb)	Fits Motor
LACP2-16T06LP5	$1,219.00	Lead screw	0.5 in	52	0.0063	0.016	6in	1.8	NEMA 17
LACP2-16T12LP5	$1,285.00					0.017	12in	2.3	
LACP2-16T24LP5	$1,695.00					0.020	24in	3.5	
LACP2-16T36LP5	$2,020.00					0.024	36in	4.5	
LACP2-16T06L1	$1,219.00		1in	44	0.025	0.022	6in	1.8	
LACP2-16T12L1	$1,285.00					0.023	12in	2.3	
LACP2-16T24L1	$1,695.00					0.026	24in	3.5	
LACP2-16T36L1	$2,020.00					0.030	36in	4.5	

System Inertia Calculation:

To calculate the inertia reflected to the motor in a particular actuator, multiply the carriage payload by the payload inertia factor and then add the constant system inertia value for that actuator. The constant system inertia value for each system includes the inertia of the shaft coupler, carriage, and lead/ball screw.

- The payload must be in units of lb_m.



Load rating diagram

Compact Slide Actuator Load/Moment Ratings

Part Number	Load (lb)*				Moment (lb·in)**		
	Actuator Thrust	Normal – L_N		Transverse	Roll	Pitch	Yaw
		Down	Up	L_T	M_R	M_P	M_Y
LACP2-16TxxLP5	51	125	60	125	12	15	33
LACP2-16TxxL1	28	125	60	125	12	15	33

** 30lb is the recommended maximum load capacity if the carriage is not externally supported against rolling. The higher load capacities are possible if the carriage is externally supported.*

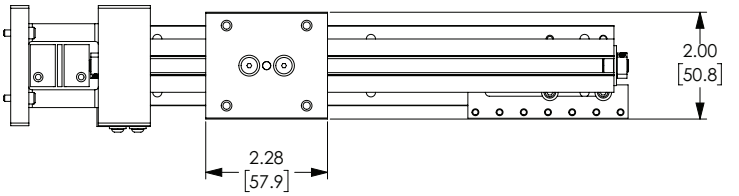
*** It is recommended that offset loads be located 5 inches or less from the center of the carriage. When the loads are offset at greater distances, the carriage can vibrate during travel.*

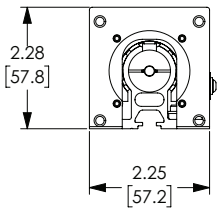
Linear Motion Products

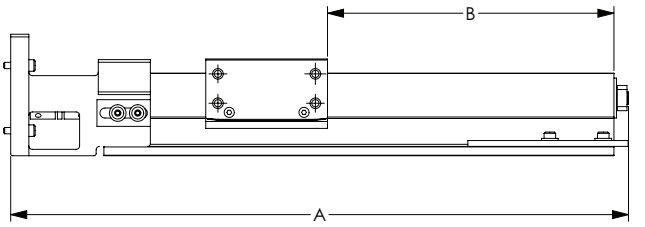
Compact Slide Actuators - Generation 2

Dimensions (in [mm])

PART NUMBER	A	B (TRAVEL)
LACP2-16T06LP5	11.57 [293.8]	6.40 [162.6]
LACP2-16T12LP5	17.57 [446.2]	12.40 [315.0]
LACP2-16T24LP5	29.57 [751.0]	24.40 [619.8]
LACP2-16T36LP5	41.57 [1055.8]	36.40 [924.6]
LACP2-16T06L1	11.57 [293.8]	6.40 [162.6]
LACP2-16T12L1	17.57 [446.2]	12.40 [315.0]
LACP2-16T24L1	29.57 [751.0]	24.40 [619.8]
LACP2-16T36L1	41.57 [1055.8]	36.40 [924.6]







LACP2-16TxxLxx

See our website www.AutomationDirect.com for complete Engineering drawings.

Accessories

Compact Slide Actuator Accessories			
Part Number	***Price***	***Description***	***Weight (lb)***
LAVLACC-003*	$259.00	SureMotion motor adapter, NEMA 23 frame. For use with LAVL2-60 series actuators. 1/4 inch x 5 mm coupler included.	1.0
LACPACC-002[1]	$702.00	SureMotion repair kit, for use with LACP-16TxxLP5 actuators. Nut, bushings, end bearings and oil syringe included.	0.5
LACPACC-003[1]	$702.00	SureMotion repair kit, for use with LACP-16TxxL1 actuators. Nut, bushings, end bearings and oil syringe included.	0.5
LACPACC-004	$79.00	SureMotion mounting plate, XY type. For use with LACP2-16 series actuators.	0.5
LACPACC-005	$101.00	SureMotion mounting plate, XY type. For use with LACP2-16 and LARSB1 series actuators.	0.5
LACPACC-006[2]	$702.00	SureMotion repair kit, for use with LACP2-16TxxLP5 actuators. Nut, bushings, end bearings and oil syringe included.	1.0
LACPACC-007[2]	$702.00	SureMotion repair kit, for use with LACP2-16TxxL1 actuators. Nut, bushings, end bearings and oil syringe included.	1.0

**** Use the coupling and motor mount screws from this kit to adapt any LACP2 actuator assembly to accept a NEMA 23 motor.***
[1] These repair kits contain parts to rebuild Generation 1 (LACP series) acutator assemblies.
[2] These repair kits contain parts to rebuilt current Generation 2 (LACP2 series) actuator assemblies.

LAVLACC-003

LACPACC-002(003)

LACPACC-004(005)

Some accessories not shown see www.AutomationDirect.com for additional product photos.

Linear Motion Products

Value Linear Slide Actuators - Generation 2

LAVL2-60T06LP2

Description

Low-cost linear actuator using the latest in sliding element technology. The base is a single piece design with integrated slide surfaces, and is hard anodized all over. This versatile unit can be mounted horizontally, vertically, or inverted without loss of load capacity.

Generation 2 actuators have a reduced part count for more reliable operation, integral sensor mount grooves on both sides and a more robust motor mount.

Features

- Small footprint
- Adjustable carriage pre-load
- Replacement components available
- Ready for NEMA 17 motor
- T-slots enable limit switches to be positioned anywhere
- AISI 6061-T6 Aluminum Alloy base, hard anodized on all surfaces to a depth of 0.0005 to 0.0015"
- AISI 304 Stainless Steel Lead Screw

Applications

- Harsh or wet environments
- X-Y-Z positioning systems

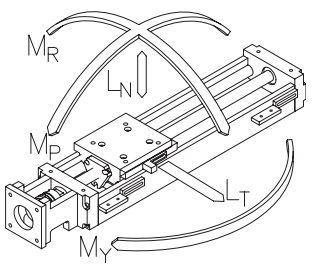
Value Linear Slide Actuator Specifications

Part Number	Price	Drive Type	Drive Pitch	Drive Screw Efficiency (%)	Payload Inertia Factor (in^2)	Constant System Inertia (lb_m-in^2)	Travel	Weight (lb)	Fits Motor
LAVL2-60T06LP2	$853.00	Lead screw	0.2 in	47	0.001	0.017	6in	2.0	NEMA 17
LAVL2-60T12LP2	$1,069.00					0.020	12in	2.8	
LAVL2-60T18LP2	$1,296.00					0.023	18in	3.5	
LAVL2-60T24LP2	$1,512.00					0.027	24in	4.2	
LAVL2-60T06LP5	$853.00		0.5 in	57	0.0063	0.019	6in	2.0	
LAVL2-60T12LP5	$1,069.00					0.022	12in	2.8	
LAVL2-60T18LP5	$1,296.00					0.025	18in	3.5	
LAVL2-60T24LP5	$1,512.00					0.028	24in	4.2	

System Inertia Calculation:

To calculate the inertia reflected to the motor in a particular actuator, multiply the carriage payload by the payload inertia factor and then add the constant system inertia value for that actuator. The constant system inertia value for each system includes the inertia of the shaft coupler, carriage, and lead/ball screw.

- The payload must be in units of lb_m.



Load rating diagram

Value Linear Slide Actuator Load/Moment Ratings

Part Number	Load (lb)				Moment (lb·in)*		
	Actuator Thrust	Normal – L_N		Transverse	Roll	Pitch	Yaw
		Down	Up	L_T	M_R	M_P	M_Y
LAVL2-60TxxLP2	70	110	110	110	50	32	32
LAVL2-60TxxLP5	50	110	110	110	50	32	32

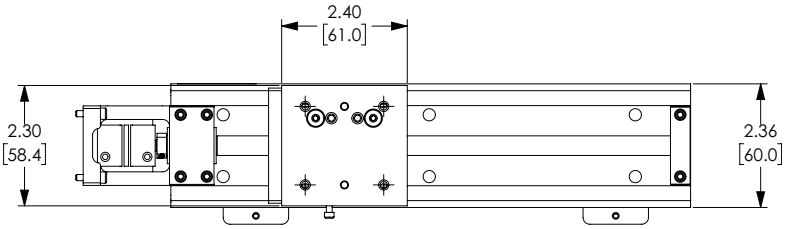
** It is recommended that offset loads be located 5 inches or less from the center of the carriage. When the loads are offset at greater distances, the carriage can vibrate during travel.*

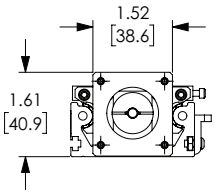
Linear Motion Products

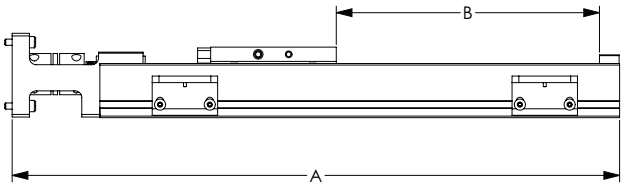
Value Linear Slide Actuators - Generation 2

Dimensions (in [mm])

PART NUMBER	A	B (TRAVEL)
LAVL2-60T06LP2	11.61 [294.8]	6.03 [153.1]
LAVL2-60T12LP2	17.61 [447.2]	12.03 [305.6]
LAVL2-60T18LP2	23.61 [599.6]	18.03 [458.0]
LAVL2-60T24LP2	29.61 [752.0]	24.03 [610.3]
LAVL2-60T06LP5	11.61 [294.8]	6.03 [153.1]
LAVL2-60T12LP5	17.61 [447.2]	12.03 [305.6]
LAVL2-60T18LP5	23.61 [599.6]	18.03 [458.0]
LAVL2-60T24LP5	29.61 [752.0]	24.03 [610.3]







LAVL2-60TxxLPx

See our website www.AutomationDirect.com for complete Engineering drawings.

Accessories

Value Linear Slide Actuator Accessories			
Part Number	***Price***	***Description***	***Weight (lb)***
LAVLACC-001*	$312.00	SureMotion repair kit, for use with LAVL-60TxxLP2 actuators. Nut, bushings, end bearings and oil syringe included.	0.5
LAVLACC-002*	$312.00	SureMotion repair kit, for use with LAVL-60TxxLP5 actuators. Nut, bushings, end bearings and oil syringe included.	0.5
LAVLACC-003	$259.00	SureMotion motor adapter, NEMA 23 frame. For use with LAVL2-60 series actuators. 1/4 inch x 5 mm coupler included.	1.0
LAVLACC-004	$121.00	SureMotion mounting plate, XY type. For use with LAVL2-60 series actuators.	0.5
LAVLACC-005	$271.00	SureMotion mounting plate, XZ type. For use with LAVL2-60 series actuators.	1.0
LAVLACC-006*	$312.00	SureMotion repair kit, for use with LAVL2-60TxxLP2 actuators. Nut, bushings, end bearings and oil syringe included.	1.0
LAVLACC-007*	$312.00	SureMotion repair kit, for use with LAVL2-60TxxLP5 actuators. Nut, bushings, end bearings and oil syringe included.	1.0
**** Repair kits contain replacement components that are the same as the original components in the actuator assemblies.***			

LAVLACC-003

LAVLACC-001(002)

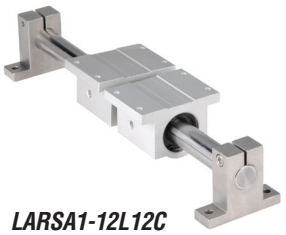
LAVLACC-004

LAVLACC-005

Some accessories not shown see www.AutomationDirect.com for additional product photos.

Linear Motion Products

Round-Shaft Slide Elements



LARSA1-12L12C

LARSB1-12L12C

Description

Round-shaft sliding elements can be combined with other elements to build a huge variety of machine mechanisms. Available in both end- and continuously-supported shafts.

Features

- Linear ball bearings
- High quality clear anodized aluminum blocks
- AISI 1566 Carbon Steel, 60 RC Round Shafts

Slide Rail Systems Load Ratings

Part Number	Normal (lb)		Transverse (lb)
	Down	Up	
Pillow Blocks / Bushings for LARSA1			
LARSACC-001/007	230		
LARSACC-002/008	470		
LARSACC-003/009	850		
LARSA1 Linear Slide Assemblies			
LARSA1-08LxxC	460		
LARSA1-12LxxC	940		
LARSA1-16LxxC	1700		
Pillow Blocks / Bushings for LARSB1			
LARSACC-004/010	230	161	230
LARSACC-005/011	470	268	470
LARSACC-006/012	850	485	850
LARSB1 Linear Slide Assemblies			
LARSB1-08LxxC	460	322	460
LARSB1-12LxxC	940	536	940
LARSB1-16LxxC	1700	970	1700

End-Supported Slide Rail Systems and Accessories

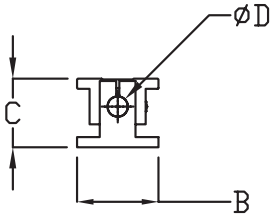
Part Number	Price	Description		Weight (lb)
LARSA1-08L12C	$291.00	SureMotion, linear slide assembly, end supported, round shaft, 1/2 in diameter, 12 inch length, carbon steel. (2) single pillow blocks included.		1.5
LARSA1-08L24C	$301.00	SureMotion, linear slide assembly, end supported, round shaft, 1/2 in diameter, 24 inch length, carbon steel. (2) single pillow blocks included.		2.0
LARSA1-08L36C	$322.00	SureMotion, linear slide assembly, end supported, round shaft, 1/2 in diameter, 36 inch length, carbon steel. (2) single pillow blocks included.		2.7
LARSA1-12L12C	$366.00	SureMotion, linear slide assembly, end supported, round shaft, 3/4 in diameter, 12 inch length, carbon steel. (2) single pillow blocks included.		3.0
LARSA1-12L24C	$388.00	SureMotion, linear slide assembly, end supported, round shaft, 3/4 in diameter, 24 inch length, carbon steel. (2) single pillow blocks included.		4.5
LARSA1-12L36C	$409.00	SureMotion, linear slide assembly, end supported, round shaft, 3/4 in diameter, 36 inch length, carbon steel. (2) single pillow blocks included.		6.0
LARSA1-16L12C	$490.00	SureMotion, linear slide assembly, end supported, round shaft, 1 in diameter, 12 inch length, carbon steel. (2) single pillow blocks included.		6.0
LARSA1-16L24C	$523.00	SureMotion, linear slide assembly, end supported, round shaft, 1 in diameter, 24 inch length, carbon steel. (2) single pillow blocks included.		8.5
LARSA1-16L36C	$551.00	SureMotion, linear slide assembly, end supported, round shaft, 1 in diameter, 36 inch length, carbon steel. (2) single pillow blocks included.		11.0
LARSACC-001*	$58.00	SureMotion single pillow block, closed type, linear ball bushing, 1/2 in inside diameter.		0.3
LARSACC-002*	$72.00	SureMotion single pillow block, closed type, linear ball bushing, 3/4 in inside diameter.		0.6
LARSACC-003*	$103.00	SureMotion single pillow block, closed type, linear ball bushing, 1 in inside diameter.		1.2
LARSACC-007*	$22.00	SureMotion linear ball bushing, closed type, 1/2 in inside diameter, with seals, self-aligning.		0.1
LARSACC-008*	$26.00	SureMotion linear ball bushing, closed type, 3/4 in inside diameter, with seals, self-aligning.		0.2
LARSACC-009*	$42.00	SureMotion linear ball bushing, closed type, 1 in inside diameter, with seals, self-aligning.		0.3
Continuously-Supported Slide Rail Systems and Accessories				
LARSB1-08L12C	$301.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1/2 in diameter, 12 in length, carbon steel. (2) single pillow blocks included.		2.0
LARSB1-08L24C	$374.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1/2 in diameter, 24 in length, carbon steel. (2) single pillow blocks included.		3.0
LARSB1-08L36C	$466.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1/2 in diameter, 36 in length, carbon steel. (2) single pillow blocks included.		4.5
LARSB1-12L12C	$376.00	SureMotion, linear slide assembly, continuously supported, round shaft, 3/4 in diameter, 12 in length, carbon steel. (2) single pillow blocks included.		4.0
LARSB1-12L24C	$490.00	SureMotion, linear slide assembly, continuously supported, round shaft, 3/4 in diameter, 24 in length, carbon steel. (2) single pillow blocks included.		6.2
LARSB1-12L36C	$601.00	SureMotion, linear slide assembly, continuously supported, round shaft, 3/4 in diameter, 36 in length, carbon steel. (2) single pillow blocks included.		9.0
LARSB1-16L12C	$487.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1 in diameter, 12 in length, carbon steel. (2) single pillow blocks included.		6.5
LARSB1-16L24C	$630.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1 in diameter, 24 in length, carbon steel. (2) single pillow blocks included.		10.5
LARSB1-16L36C	$760.00	SureMotion, linear slide assembly, continuously supported, round shaft, 1 in diameter, 36 in length, carbon steel. (2) single pillow blocks included.		14.5
LARSACC-004*	$62.00	SureMotion single pillow block, open type, linear ball bushing, 1/2 in inside diameter.		0.2
LARSACC-005*	$80.00	SureMotion single pillow block, open type, linear ball bushing, 3/4 in inside diameter.		0.5
LARSACC-006*	$112.00	SureMotion single pillow block, open type, linear ball bushing, 1 in inside diameter.		1.0
LARSACC-010*	$26.00	SureMotion linear ball bushing, open type, 1/2 in inside diameter, with seals, self-aligning.		0.1
LARSACC-011*	$32.00	SureMotion linear ball bushing, open type, 3/4 in inside diameter, with seals, self-aligning.		0.1
LARSACC-012*	$54.00	SureMotion linear ball bushing, open type, 1 in inside diameter, with seals, self-aligning.		0.2

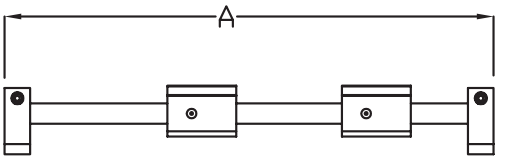
**** Bushings and pillow blocks are replacement components that are the same as the original components in the slide assemblies.***

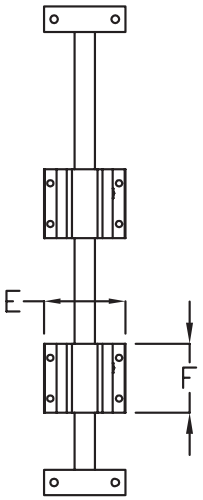
Linear Motion Products

Round-Shaft Slide Elements

Dimensions (in [mm])







LARSA1-xxLxxC
& LARSB1-xxLxxC*

PART #	A	B	C	ØD	E	F
LARSA1-08L12C	12.0 [304.8]	2.00 [50.8]	1.70 [42.9]	0.50 [12.7]	2.00 [50.8]	1.69 [42.9]
LARSA1-08L24C	24.0 [609.6]					
LARSA1-08L36C	36.0 [914.4]					
LARSA1-12L12C	12.0 [304.8]	2.50 [63.5]	2.19 [55.6]	0.75 [19.0]	2.75 [69.9]	2.06 [52.4]
LARSA1-12L24C	24.0 [609.6]					
LARSA1-12L36C	36.0 [914.4]					
LARSA1-16L12C	12.0 [304.8]	3.06 [77.8]	2.69 [68.3]	1.00 [25.4]	3.25 [82.6]	2.81 [71.5]
LARSA1-16L24C	24.0 [609.6]					
LARSA1-16L36C	36.0 [914.4]					
LARSB1-08L12C*	12.0 [304.8]	1.50 [38.1]	1.81 [46.0]	0.50 [12.7]	2.00 [50.8]	1.50 [38.1]
LARSB1-08L24C*	24.0 [609.6]					
LARSB1-08L36C*	36.0 [914.4]					
LARSB1-12L12C*	12.0 [304.8]	1.75 [44.5]	2.44 [61.9]	0.75 [19.0]	2.75 [69.9]	1.88 [47.6]
LARSB1-12L24C*	24.0 [609.6]					
LARSB1-12L36C*	36.0 [914.4]					
LARSB1-16L12C*	12.0 [304.8]	2.13 [54.0]	2.94 [74.6]	1.00 [25.4]	3.25 [82.6]	2.63 [66.7]
LARSB1-16L24C*	24.0 [609.6]					
LARSB1-16L36C*	36.0 [914.4]					

LARSA1-xxLxxC is shown in drawing. LARSB1-xxLxxC has different appearance, but same dimensions as shown in this table.

See our website www.AutomationDirect.com for complete Engineering drawings.

Sure motion Shaft Supports

Low Profile - Aluminum

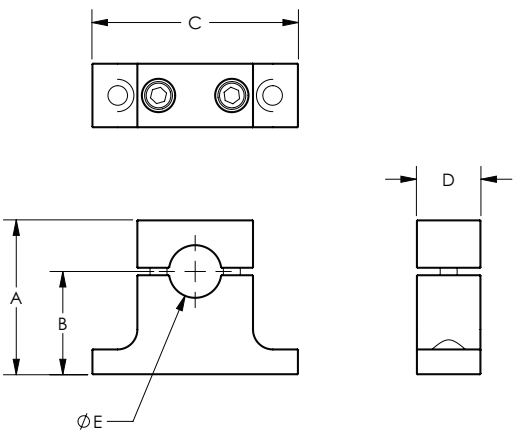
Features

- Removable top design allows easy removal of shaft
- Maintains alignment while servicing shafts and bearings
- Lowest base to shaft height available
- Parallel and perpendicular surfaces for easy alignment
- Material: Aluminum - 6061 T6 Gray, Hard Anodized
- Fasteners: Alloy Steel, Black Oxide
- Superior shaft holding strength

MADE IN USA

Low Profile Aluminum Shaft Supports									
Part Number	**Measurement**	**ØE**	**A**	**B**	**C**	**D**	**HSCS Screw Size**	**Price**	**Weight (lb)**
TMSSL-04	inches	0.250	0.87	0.562	1.63	0.38	#6	$10.00	0.04
TMSSL-06		0.375	1.00	0.625	1.75	0.38		$10.50	0.04
TMSSL-08		0.500	1.19	0.750	2.00	0.50	#8	$14.50	0.07
TMSSL-10		0.625	1.44	0.938	2.63	0.50	#10	$16.00	0.11
TMSSL-12		0.750	1.56	1.000	2.75	0.50		$17.00	0.12
TMSSL-16		1.000	1.94	1.250	3.19	0.75	1/4	$21.00	0.27
TMSSL-20		1.250	2.31	1.500	3.75	0.75	5/16	$26.50	0.37
TMSSL-24		1.500	2.69	1.750	4.00	0.75		$29.50	0.45
TMSSL-32		2.000	3.31	2.125	5.00	1.25	3/8	$39.50	1.11
TMSSL-08M	mm	8.0	21.0	12.0	44.0	10.0	M4	$14.00	0.04
TMSSL-10M		10.0	25.0	14.0	46.0	12.0		$17.00	0.05
TMSSL-12M		12.0	25.0	14.0	48.0	12.0		$19.00	0.05
TMSSL-16M		16.0	31.0	18.0	62.0	13.0	M5	$21.00	0.10
TMSSL-20M		20.0	36.0	22.0	65.0	13.0		$24.00	0.12
TMSSL-25M		25.0	44.0	27.0	80.0	16.0	M6	$28.50	0.20
TMSSL-30M		30.0	52.0	32.0	96.0	20.0	M8	$35.00	0.35
TMSSL-35M		35.0	60.0	34.0	100.0	20.0		$38.50	0.41
TMSSL-40M		40.0	66.0	40.0	108.0	22.0		$41.50	0.53
TMSSL-50M		50.0	75.0	45.0	120.0	22.0		$45.50	0.66

Dimensions



Standard Steel Bolt/Screw Torque Specifications				
Bolt/Screw			**Torque***	
Size	**Pitch**	**Type**	**lb·in**	**lb·ft**
6	32	Low Carbon Steel	8.7	–
8	32		17.8	
10	24		20.8	
1/4	20	SAE Grade 5 Med. Carbon Steel	–	10
5/16	18			19
3/8	16			33
7/16	14			54
1/2	13			78

** It is recommended to use 50% of listed torque when using steel threads into aluminum material.*

Metric Steel Bolt/Screw Torque Specifications			
Bolt/Screw			**Torque***
Size	**Pitch**	**Type**	**N·m**
M3	0.5	Standard 5D Med. Carbon Steel	0.6
M4	0.7		1.5
M5	0.8		3.0
M6	1.0		5.2
M8	1.25		12.5
M10	1.50		24.0

** It is recommended to use 50% of listed torque when using steel threads into aluminum material.*

See our website www.AutomationDirect.com for complete Engineering drawings.

Sure motion Shaft Supports

Standard Profile - Aluminum

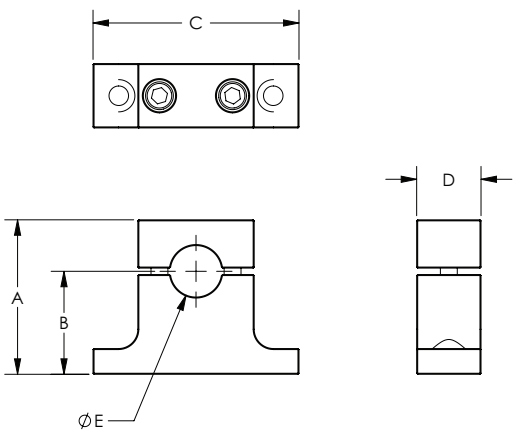
Features

- Removable top design allows easy removal of shaft
- Maintains alignment while servicing shafts and bearings
- Parallel and perpendicular surfaces for easy alignment
- Material: Aluminum - 6061 T6 Black, Hard Anodized
- Fasteners: Alloy Steel, Black Oxide
- Superior shaft holding strength
- Interchangable with industry standard supports

MADE IN USA

Standard Profile Aluminum Shaft Supports									
Part Number	**Measurement**	**ØE**	**A**	**B**	**C**	**D**	**HSCS Screw Size**	**Price**	**Weight (lb)**
TMSS-04	inches	0.250	1.00	0.687	1.50	0.50	#6	$20.00	0.05
TMSS-06		0.375	1.13	0.750	1.63	0.56		$21.00	0.06
TMSS-08		0.500	1.50	1.000	2.00	0.63	#8	$22.00	0.11
TMSS-10		0.625	1.50	1.000	2.50	0.69	#10	$23.00	0.15
TMSS-12		0.750	1.81	1.250	2.75	0.75		$25.00	0.21
TMSS-16		1.000	2.19	1.500	3.25	1.00	1/4	$27.50	0.40
TMSS-20		1.250	2.63	1.750	4.00	1.13	5/16	$33.00	0.66
TMSS-24		1.500	3.00	2.000	4.75	1.25		$37.00	0.96
TMSS-32		2.000	3.75	2.500	6.00	1.50	3/8	$49.50	1.79
TMSS-08M	mm	8.0	23.0	15.0	32.0	10.0	M2.5	$21.00	0.03
TMSS-12M		12.0	30.0	20.0	40.0	12.0	M3	$22.00	0.05
TMSS-16M		16.0	38.0	25.0	50.0	16.0	M4	$23.00	0.11
TMSS-20M		20.0	45.0	30.0	60.0	20.0	M5	$25.00	0.19
TMSS-25M		25.0	55.0	35.0	74.0	25.0	M6	$27.50	0.35
TMSS-30M		30.0	63.0	40.0	84.0	28.0	M8	$30.50	0.50
TMSS-40M		40.0	80.0	50.0	108.0	32.0	M10	$42.50	0.92

Dimensions



Standard Steel Bolt/Screw Torque Specifications				
Bolt/Screw			**Torque***	
Size	**Pitch**	**Type**	**lb·in**	**lb·ft**
6	32	Low Carbon Steel	8.7	–
8	32		17.8	
10	24		20.8	
1/4	20	SAE Grade 5 Med. Carbon Steel	–	10
5/16	18			19
3/8	16			33
7/16	14			54
1/2	13			78

** It is recommended to use 50% of listed torque when using steel threads into aluminum material.*

Metric Steel Bolt/Screw Torque Specifications			
Bolt/Screw			**Torque***
Size	**Pitch**	**Type**	**N·m**
M3	0.5	Standard 5D Med. Carbon Steel	0.6
M4	0.7		1.5
M5	0.8		3.0
M6	1.0		5.2
M8	1.25		12.5
M10	1.50		24.0

** It is recommended to use 50% of listed torque when using steel threads into aluminum material.*

See our website www.AutomationDirect.com for complete Engineering drawings.

Sure motion Grooved Shafts

303 Stainless Steel

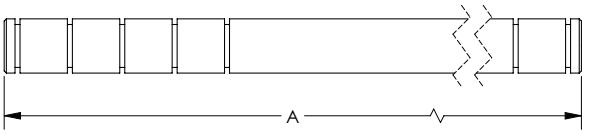
Features

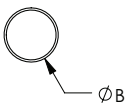
- Retaining ring grooved
- Groove spacing to fit typical bearings
- RB-83 Hardness
- 10RMS Surface Finish
- ± 0.010" length tolerance
  + 0.0000" / - 0.0002" diameter tolerance for 0.250 to 0.500
  + 0.0000" / - 0.0004" diameter tolerance for 0.625 to 1.000

MADE IN USA

Grooved Shafts - 303 Stainless Steel						
Part Number	***Groove Spacing***	***Number of Grooves***	***A***	***ØB***	***Price***	***Weight (lb)***
GSS04-3	0.250	7	3.0	0.250	$3.25	0.04
GSS04-6			6.0		$4.50	0.08
GSS04-10			10.0		$6.75	0.14
GSS04-12			12.0		$7.25	0.17
GSS06-3	0.375	7	3.0	0.375	$6.50	0.10
GSS06-6			6.0		$11.50	0.19
GSS06-10			10.0		$18.00	0.32
GSS06-12			12.0		$22.00	0.38
GSS08-3	0.437	7	3.0	0.500	$9.50	0.17
GSS08-6			6.0		$17.00	0.34
GSS08-10			10.0		$27.00	0.57
GSS08-12			12.0		$29.00	0.68
GSS10-3	0.500	6	3.0	0.625	$13.50	0.26
GSS10-6		7	6.0		$27.00	0.52
GSS10-10			10.0		$46.00	0.87
GSS10-12			12.0		$54.00	1.05
GSS12-3	0.562	6	3.0	0.750	$16.00	0.38
GSS12-6		7	6.0		$30.00	0.75
GSS12-10			10.0		$53.00	1.25
GSS12-12			12.0		$64.00	1.50
GSS16-3		6	3.0	1.000	$27.00	0.67
GSS16-6		7	6.0		$55.00	1.33
GSS16-10			10.0		$84.00	2.22
GSS16-12			12.0		$101.00	2.67
Note: All measurements in inches						

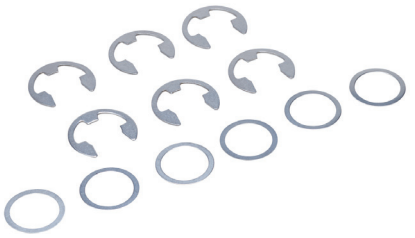
Dimensions





See our website www.AutomationDirect.com for complete Engineering drawings.

Grooved Shafts
Accessories



Features

- 15-7 PH Stainless Steel E-rings
- Stainless Steel shims

Grooved Shaft Accessories			
Part Number	***Description***	***Price***	***Weight (lb)***
GSS04-RPK	6 Retainer Rings and 6 Shims for GSS04-xx series Grooved Shafts	$2.25	0.02
GSS06-RPK	6 Retainer Rings and 6 Shims for GSS06-xx series Grooved Shafts	$2.50	0.03
GSS08-RPK	6 Retainer Rings and 6 Shims for GSS08-xx series Grooved Shafts	$3.00	0.04
GSS10-RPK	6 Retainer Rings and 6 Shims for GSS10-xx series Grooved Shafts	$9.25	0.04
GSS12-RPK	6 Retainer Rings and 6 Shims for GSS12-xx series Grooved Shafts	$9.50	0.05
GSS16-RPK	6 Retainer Rings and 6 Shims for GSS16-xx series Grooved Shafts	$13.00	0.05

Sure motion Precision Ground Rotary Shafts

303 Stainless Steel

Features

- RB75-90 Hardness
- 10RMS Surface Finish
- Straightness: up to 1/4" diameter: 0.0004 in/in
  over 1/4" diameter: 0.0006 in/in
- 45° chamfer on both ends on diameters 0.1875" and over; rough cut on 0.125" diameter
- ± 0.010" length tolerance
  + 0.0000" / - 0.0002" diameter tolerance on 1/2" and smaller diameters
  + 0.0000" / - 0.0004" diameter tolerance on 5/8" and larger diameters

Rotary Shafts - 303 Stainless Steel				
Part Number	***A***	***ØB***	***Price***	***Weight (lb)***
RPSS02-3	3.0	0.125	$2.50	0.02
RPSS02-6	6.0	0.125	$3.75	0.03
RPSS02-12	12.0	0.125	$5.50	0.08
RPSS02-24	24.0	0.125	$11.00	1.15
RPSS02-36	36.0	0.125	$15.00	1.41
RPSS03-3	3.0	0.1875	$2.75	0.03
RPSS03-6	6.0	0.1875	$4.50	0.06
RPSS03-12	12.0	0.1875	$6.75	0.12
RPSS03-24	24.0	0.1875	$12.00	1.23
RPSS03-36	36.0	0.1875	$16.00	1.64
RPSS04-3	3.0	0.25	$3.25	0.04
RPSS04-6	6.0	0.25	$4.75	0.08
RPSS04-12	12.0	0.25	$7.25	0.16
RPSS04-24	24.0	0.25	$14.50	1.31
RPSS04-36	36.0	0.25	$22.00	1.76
RPSS06-12	12.0	0.375	$20.00	0.38
RPSS06-24	24.0	0.375	$33.00	1.75
RPSS06-36	36.0	0.375	$46.00	2.42
RPSS08-12	12.0	0.50	$25.00	0.71
RPSS08-24	24.0	0.50	$43.00	2.41
RPSS08-36	36.0	0.50	$57.00	3.41
RPSS10-12	12.0	0.625	$41.00	1.04
RPSS10-24	24.0	0.625	$78.00	3.07
RPSS10-36	36.0	0.625	$113.00	4.40
RPSS12-12	12.0	0.75	$44.00	1.52
RPSS12-18	18.0	0.75	$68.00	3.13
RPSS12-24	24.0	0.75	$89.00	4.03
RPSS12-36	36.0	0.75	$134.00	5.84
RPSS16-12	12.0	1.00	$75.00	2.71
RPSS16-18	18.0	1.00	$112.00	4.92
RPSS16-24	24.0	1.00	$150.00	6.41
RPSS16-36	36.0	1.00	$225.00	9.41
RPSS20-12	12.0	1.25	$97.00	4.22
RPSS20-18	18.0	1.25	$138.00	7.18
RPSS20-24	24.0	1.25	$192.00	9.43
RPSS20-36	36.0	1.25	$265.00	13.94
Note: All measurements in inches				

Dimensions

See our website www.AutomationDirect.com for complete Engineering drawings.

Sure motion Precision Ground Linear Shafts

1060 Steel and 440C Stainless Steel

Features

- C1060 steel
- RC60-65 Hardness
- 10RMS Surface Finish
- Tolerance: Class L
  ± 1/32" length tolerance
  + 0.0000" / - 0.0005" diameter tolerance

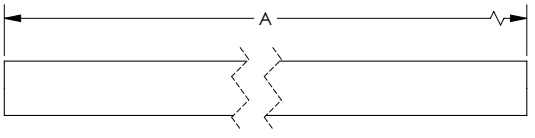
Linear Shafts - 1060 Steel				
Part Number	*A*	*ØB*	*Price*	*Weight (lb)*
LPCS08-12	12.0	0.50	$8.25	0.71
LPCS08-24	24.0	0.50	$18.00	2.41
LPCS08-36	36.0	0.50	$26.50	3.41
LPCS12-12	12.0	0.75	$12.00	1.52
LPCS12-24	24.0	0.75	$24.00	4.03
LPCS12-36	36.0	0.75	$35.00	5.84
LPCS16-12	12.0	1.0	$18.00	2.71
LPCS16-24	24.0	1.0	$35.00	6.41
LPCS16-36	36.0	1.0	$47.50	9.41
Note: All measurements in inches				

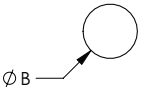
Features

- 440C Stainless steel
- RC50-55 Hardness
- 10RMS Surface Finish
- Tolerance: Class L
  ± 1/32" length tolerance
  + 0.0000" / - 0.0005" diameter tolerance

Linear Shafts - 440C Stainless Steel				
Part Number	*A*	*ØB*	*Price*	*Weight (lb)*
LPSS08-12	12.0	0.50	$21.50	0.71
LPSS08-24	24.0	0.50	$43.00	2.41
LPSS08-36	36.0	0.50	$65.00	3.41
LPSS12-12	12.0	0.75	$31.00	1.52
LPSS12-24	24.0	0.75	$62.00	4.03
LPSS12-36	36.0	0.75	$93.00	5.84
LPSS16-12	12.0	1.0	$44.00	2.71
LPSS16-24	24.0	1.0	$87.00	6.41
LPSS16-36	36.0	1.0	$131.00	9.41
Note: All measurements in inches				

Dimensions





See our website www.AutomationDirect.com for complete Engineering drawings.

igus® iglide® Plastic Plain Bearings

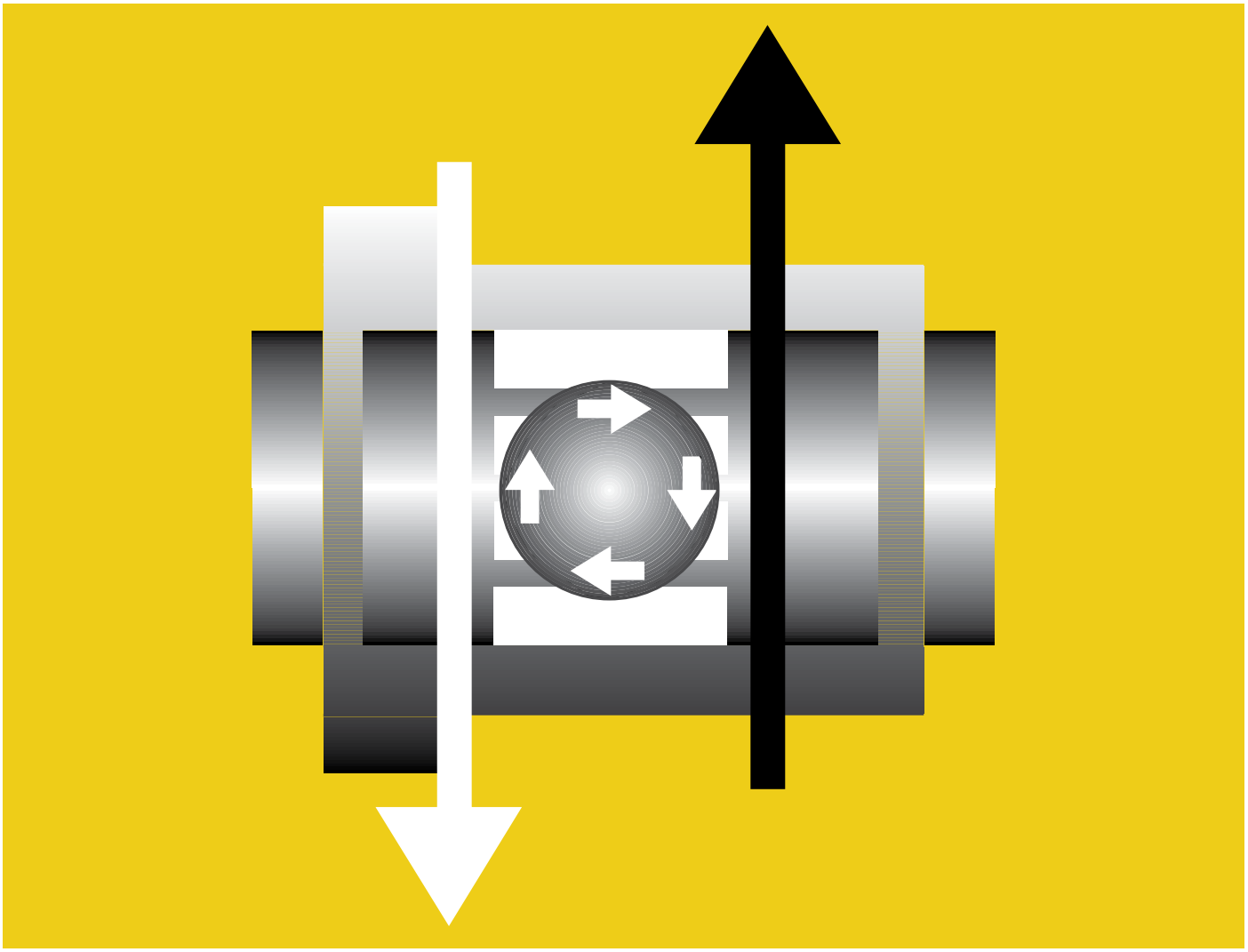
igus® iglide® plastic bearings are economical, dry-running and maintenance-free. Offered in three of the most popular materials with or without flanges, these plain bearings are an excellent choice for a wide range of motion applications.

Features

- 3 popular materials - J (low friction), G300 (general purpose), T500 (high temp)
- Sleeve and flange bearings
- Fits shafts from 1/4" to 1"
- Good chemical resistance
- Link to selection guide materials

CE

igus® iglide® Plain Bearings									
Item Photo	Part Number	Material	Size I.D. (inch)	Size O.D. (inch)	Flange	Qty. per Package	Weight (lb)	Price	Drawing Link
	A-JSI-0406-04	J	1/4	3/8	No	10	0.19	$7.75	PDF
	A-JSI-0810-08		1/2	5/8		10	0.04	$10.00	PDF
	A-JSI-1214-12		3/4	7/8		5	0.03	$9.00	PDF
	A-JSI-1618-16		1	1-1/8		2	0.44	$5.75	PDF
	A-JFI-0406-04		1/4	3/8	Yes	10	0.02	$8.00	PDF
	A-JFI-0810-08		1/2	5/8		10	0.49	$12.00	PDF
	A-JFI-1214-12		3/4	7/8		5	0.49	$9.25	PDF
	A-JFI-1618-16		1	1-1/8		2	0.04	$5.75	PDF
	A-GSI-0405-04	G300	1/4	5/16	No	10	0.02	$7.25	PDF
	A-GSI-0809-08		1/2	9/16		10	0.03	$8.00	PDF
	A-GSI-1214-12		3/4	7/8		5	0.04	$9.50	PDF
	A-GSI-1618-16		1	1-1/8		2	0.04	$6.50	PDF
	A-GFI-0405-04		1/4	5/16	Yes	10	0.02	$7.25	PDF
	A-GFI-0809-08		1/2	9/16		10	0.04	$8.75	PDF
	A-GFI-1214-12		3/4	7/8		5	0.05	$10.50	PDF
	A-GFI-1618-16		1	1-1/8		2	0.03	$6.50	PDF
	A-TSI-0405-04	T500	1/4	5/16	No	5	0.02	$13.50	PDF
	A-TSI-0809-08		1/2	9/16		5	0.02	$15.00	PDF
	A-TSI-1214-12		3/4	7/8		2	0.03	$17.50	PDF
	A-TSI-1618-16		1	1-1/8		2	0.03	$22.50	PDF
	A-TFI-0405-04		1/4	5/16	Yes	5	0.01	$14.50	PDF
	A-TFI-0809-08		1/2	9/16		5	0.02	$23.00	PDF
	A-TFI-1214-12		3/4	7/8		2	0.02	$18.50	PDF
	A-TFI-1618-16		1	1-1/8		2	0.04	$24.00	PDF

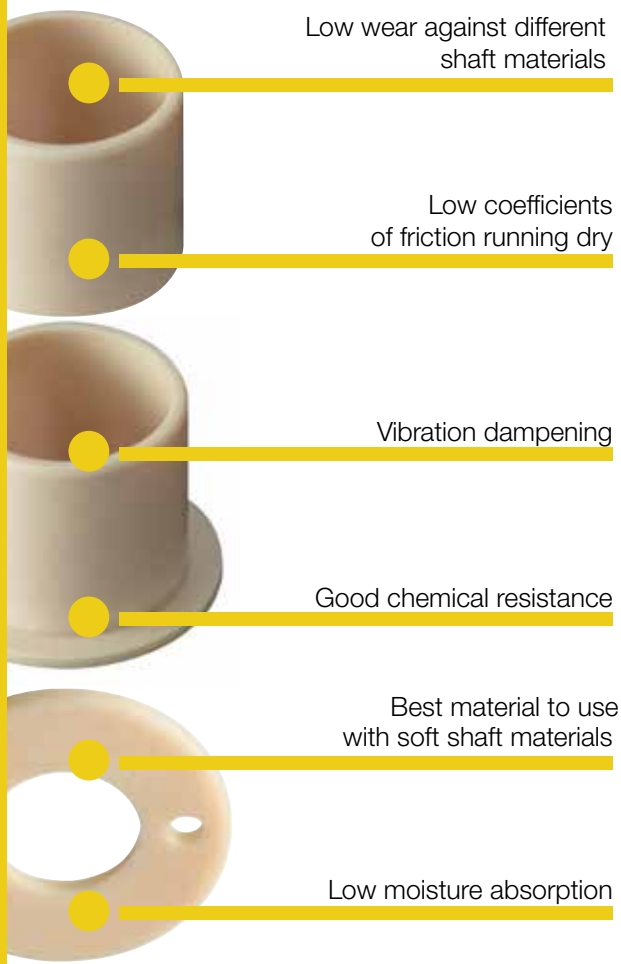


iglide® J

- Low wear against different shaft materials
- Low coefficients of friction running dry
- Vibration dampening
- Good chemical resistance
- Low moisture absorption

iglide® J - The fast and slow motion specialist

Low friction, low wear



The iglide® J plain bearings are designed for the lowest coefficients of friction while running dry and their low stick-slip tendency. With a maximum permissible surface pressure of 5,076 psi iglide® J bearings are not suitable for extreme loads.

Best Applications

- For high speeds
- For highest wear resistance at low to medium pressures
- When very low coefficients of friction are necessary
- When a cost effective bearing for low pressure loads is needed

Not For Use In Applications

When high pressure loads occur
➤ iglide® G300
When short-term temperatures occur that are greater than 248°F
➤ iglide® G300
When a low-cost bearing for occasional movements is necessary
➤ iglide® G300

Typical application areas

- Automation
- Printing industry
- Cleanroom
- Aerospace engineering
- Beverage technology
- Automation

max. +194°F
min. –58°F

Ø 1/4 to 1 inch
more sizes available from igus

Ø 1.5 to 110 mm
metric sizes available from igus

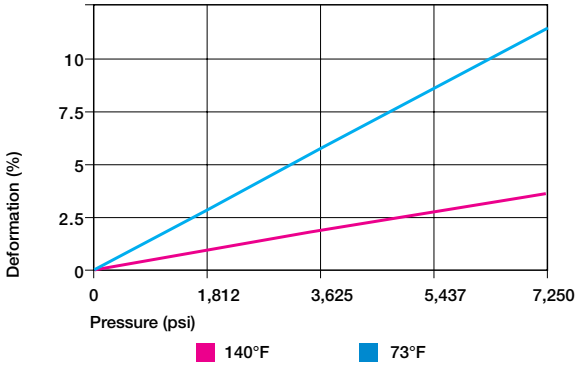
iglide® J - Technical data

Material Properties Table

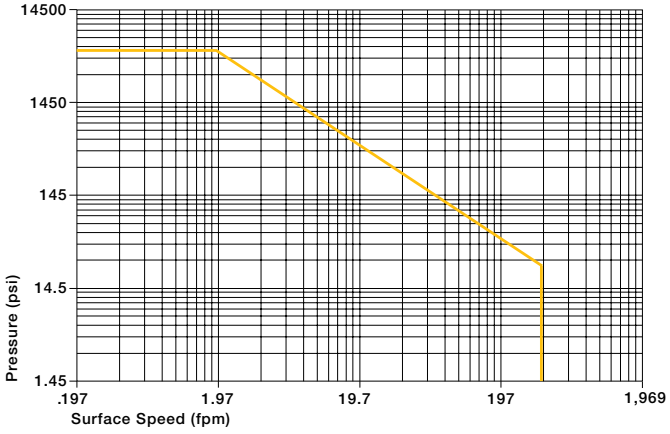
General Properties	Unit	iglide® J	Testing Method
Density	g/cm³	1.49	
Color		yellow	
Max. moisture absorption at 73°F / 50% r.h.	% weight	0.3	DIN 53495
Max. moisture absorption	% weight	1.3	
Coefficient of friction, dynamic against steel	µ	0.06 - 0.18	
pv value, max. (dry)	psi x fpm	9,700	
Mechanical Properties			
Modulus of elasticity	psi	348,100	DIN 53457
Tensile strength at 68°F	psi	10,590	DIN 53452
Compressive strength	psi	8,702	
Permissible static surface pressure (68°F)	psi	5,076	
Shore D-hardness		74	DIN 53505
Physical and Thermal Properties			
Max. long-term application temperature	°F	194	
Max. application temperature, short-term	°F	248	
Min. application temperature	°F	-58	
Thermal conductivity	W/m x K	0.25	ASTM C 177
Coefficient of thermal expansion	$K^{-1} \times 10^{-5}$	10	DIN 53752
Electrical Properties			
Specific volume resistance	Ωcm	$> 10^{13}$	DIN IEC 93
Surface resistance	Ω	$> 10^{12}$	DIN 53482

Compressive Strength

With a maximum permissible surface pressure of 5,075 psi, iglide® J plain bearings are not suited for extreme loads. The graph shows the elastic deformation of iglide® J for radial loads. At the maximum permissible load of 5,075 psi, the deformation is less than 2.5%.



Deformation under load and temperature



Permissible pv value for iglide® J running dry against steel shaft, at 68°F

Permissible Surface Speeds

The low coefficient of friction and the extremely low stick-slip tendency of iglide® J plain bearings are especially important at very low speeds. However, iglide® J material can also be used for high speeds of over 197 fpm. In both cases,the static friction is very low and stick-slip does not occur. The maximum values given in the table can only be achieved at the lowest pressure loads. At the given speeds, friction can cause a temperature increase to maximum permissible levels. In practice, though, this temperature level is rarely reached, due to varying application conditions.

	Continuous fpm	Short Term fpm
Rotating	295	590
Oscillating	216	413
Linear	1574	1968

Maximum surface speeds

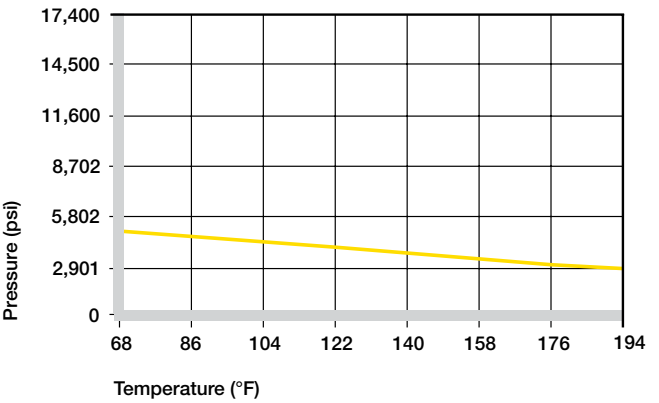
iglide® J - Technical data

Temperatures

iglide® J plain bearings can be used between -58°F and 194°F; the short-term maximum permissible temperature is 248°F. The graph shows that the compressive strength of iglide® J plain bearings decreases with increasing temperatures. Also, the wear increases significantly above 176°F

iglide® J	Application Temperature
Minimum	- 58°F
Max. long-term	+194°F
Max. short-term	+248°F
Additional axial securing	+140°F

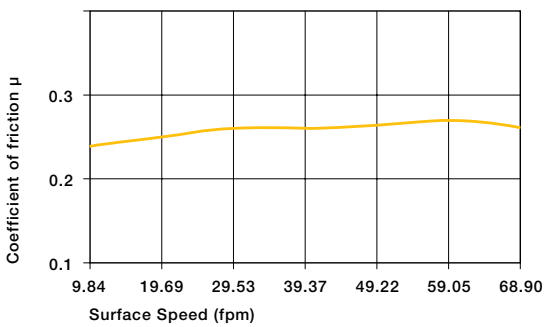
Temperature limits for iglide® J



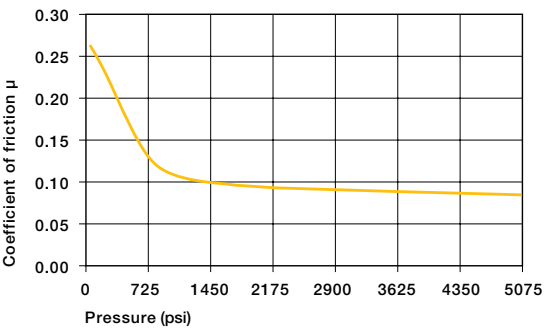
Recommended maximum permissible static surface pressure of iglide® J as a result of the temperature

Friction and Wear

The graph to the right shows the coefficients of friction for different loads. The coefficient of friction level is very good for all loads with iglide® J. Friction and wear are also dependent, to a large extent, on the shafting partner. With increasing shaft roughness, the coefficient of friction also increases. For iglide® J a ground surface with an average roughness range of 4 - 12 rms is recommended for the shaft.



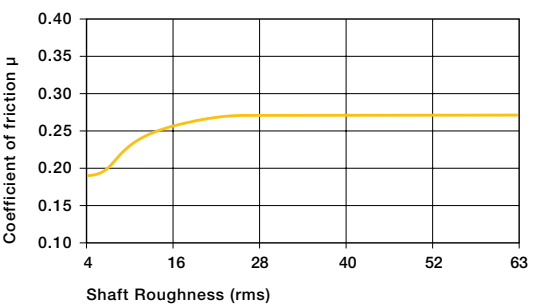
Coefficient of friction of iglide® J as a result of the surface speed; p = 108 psi



Coefficient of friction of iglide® J as a result of the load, v = 1.97 fpm

iglide® J	Coefficient of Friction
Dry	0.06 - 0.18
Grease	0.09
Oil	0.04
Water	0.04

Coefficients of friction for iglide® J against steel (Shaft finish = 40 rms, 50 HRC)

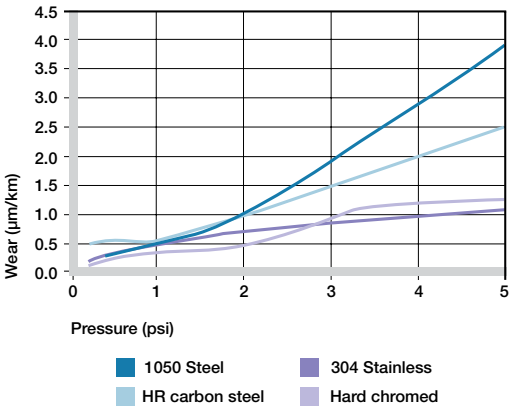


Coefficient of friction of iglide® J as a result of the shaft surface (1050 hard chromed)

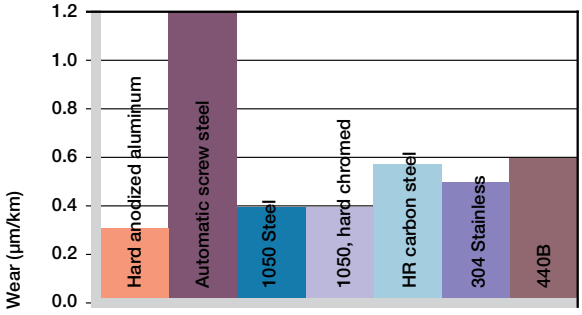
iglide® J - Technical data

Shaft Materials

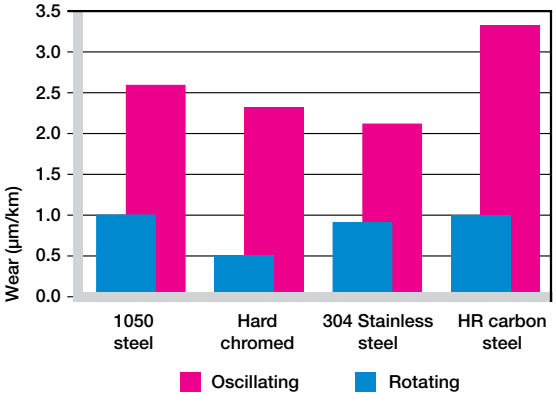
The graphs show results of testing different shaft materials with plain bearings made of iglide® J.
If iglide® J plain bearings are used in rotational applications with loads under 290 psi, several shaft materials are suitable. A Hard Chromed shaft provides the lowest wear in this range. When compared to most iglide® materials, iglide® J has very low wear results at low loads with all shaft materials tested.
Also, for increasing loads up to 725 psi, the wear resistance of iglide® J is excellent. Especially suitable is the combination of 303 stainless steel.
In oscillating operation with Cold Rolled Steel and HR Carbon Steel, the wear of iglide® J is slightly higher than for rotation. For oscillating movements with loads of 290 psi, iglide® J performs best with Cold Rolled Steel shaft.
As shown in the graph, the difference in wear between rotation and oscillating movements is most significant for 303 stainless steel shafts.
If the shaft material you plan to use is not contained in this list, please contact us.



Wear of iglide® J, rotating application with different shaft materials, depending on load



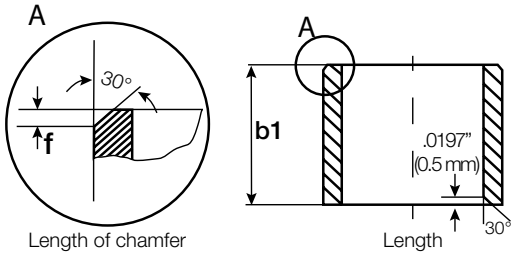
Wear of iglide® J, rotating application with different shaft materials, p = 108 psi, v = 98 fpm



Wear for oscillating and rotating applications with different shaft materials under constant load p = 290 psi

Installation Tolerances

iglide® J plain bearings are oversized before being pressfit. After proper installation into a recommended housing bore, the inner diameter adjusts to meet our specified tolerances. Please adhere to the catalog specifications for housing bore and recommended shaft sizes. This will help to ensure optimal performance of iglide® plain bearings.



For Inch Size Bearings		
Length Tolerance (b1)		
Length (inches)	Tolerance (h13) (inches)	Length of Chamfer (f) Based on d1
0.1181 to 0.2362	-0.0000 /-0.0071	f = .012 → d_1 .040" - .236"
0.2362 to 0.3937	-0.0000 /-0.0087	f = .019 → d_1 > .236" - .472"
0.3937 to 0.7086	-0.0000 /-0.0106	f = .031 → d_1 > .472" - 1.18"
0.7086 to 1.1811	-0.0000 /-0.0130	f = .047 → d_1 > 1.18"
1.1811 to 1.9685	-0.0000 /-0.0154	
1.9685 to 3.1496	-0.0000 /-0.0181	

For Metric Size Bearings		
Length Tolerance (b1)		
Length (mm)	Tolerance (h13) (mm)	Length of Chamfer (f) Based on d1
1 to 3	-0 /-140	f = 0.3 → d_1 1 - 6 mm
> 3 to 6	-0 /-180	f = 0.5 → d_1 > 6 - 12 mm
> 6 to 10	-0 /-220	f = 0.8 → d_1 > 12 - 30 mm
>10 to 18	-0 /-270	f = 1.2 → d_1 > 30 mm
>18 to 30	-0 /-330	
>30 to 50	-0 /-390	
>50 to 80	-0 /-460	

iglide® J - Technical data

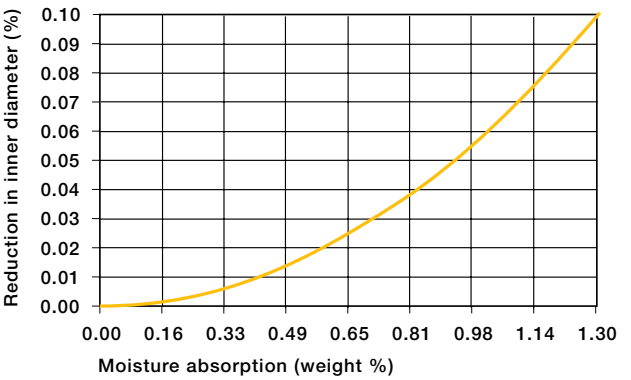
Chemical Resistance

iglide® J plain bearings are resistant to diluted lyes and very weak acids, as well as fuels and all types of lubricants. The low moisture absorption also permits use in wet or damp environments. Plain bearings made of iglide® J are resistant to common cleaning agents used in the food industry. The moisture absorption of iglide® J plain bearings is 0.3% in standard atmosphere. The saturation limit in water is 1.3%. These values are so low that possible design changes due to absorption are only necessary in extreme cases.

Medium	Resistance
Alcohol	+
Hydrocarbon	+
Greases, oils without additives	+
Fuels	+
Weak acids	0 to –
Strong acids	–
Weak alkaline	+
Strong alkaline	+ to 0

+ resistant, 0 conditionally resistant, – not resistant

Chemical resistance of iglide® J
All data given concerns the chemical resistance at room temperature (68°F).



Effect of moisture absorption on iglide® J plain bearings

Radiation Resistance

Plain bearings made from iglide® J are resistant to radiation up to an intensity of 3 x 10^2 Gy.

UV-Resistance

iglide® J plain bearings become discolored under UV radiation. However, hardness, compressive strength and the wear resistance of the material do not change.

Vacuum

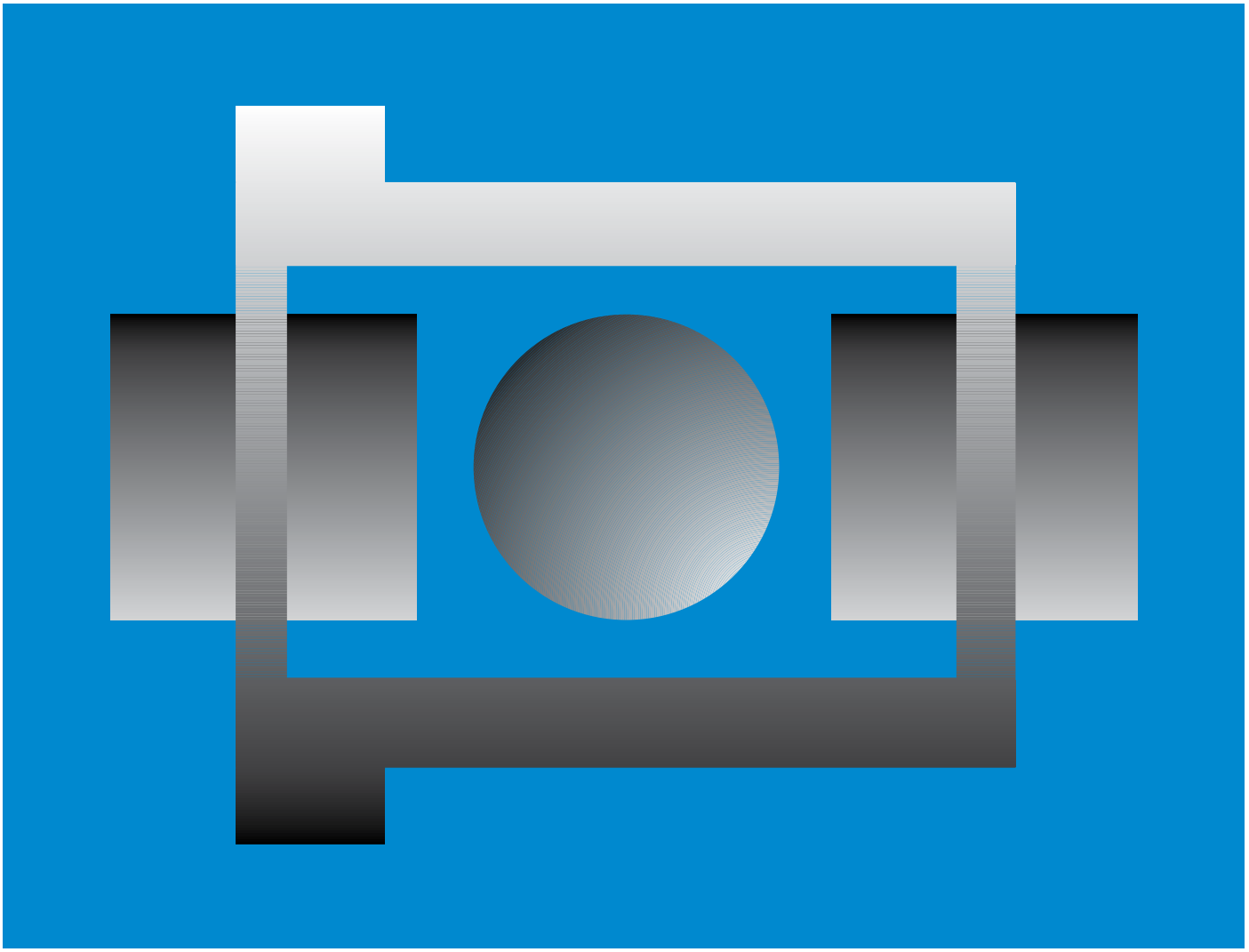
When used in a vacuum environment, the iglide® J plain bearings release moisture as a vapor. Therefore, only dehumidified bearings made of iglide® J are suitable for the vacuum environment.

Electrical Properties

iglide® J plain bearings are electrically insulating.

iglide® J	
Specific volume resistance	> 10^{13} Ωcm
Surface resistance	> 10^{12} Ω

Electrical properties of iglide® G300

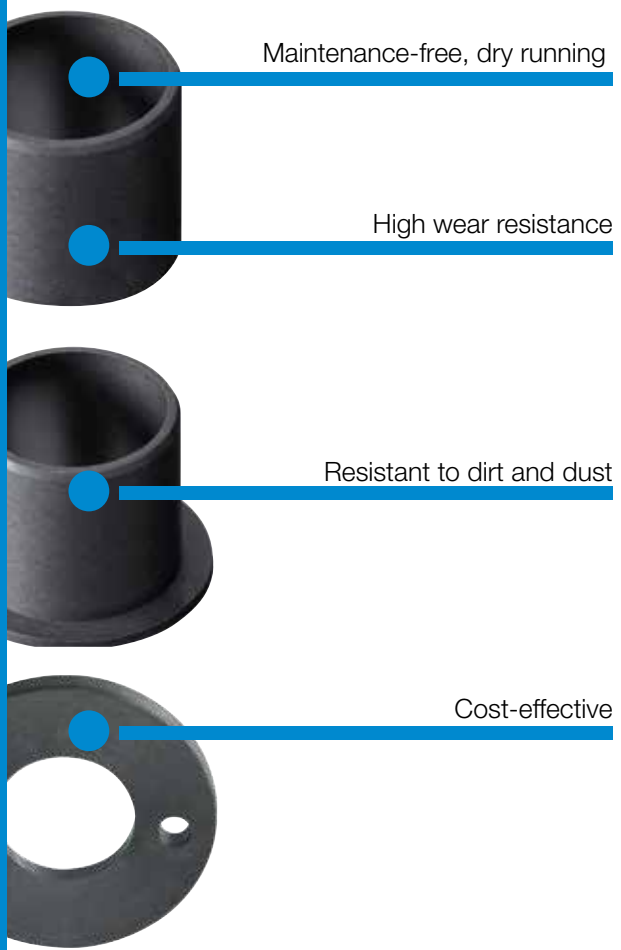


iglide® G300

- High wear resistance
- Resistance to dust and dirt
- Economic
- Self-lubricating and maintenance free

iglide® G300 - General Purpose

Most popular iglide® material worldwide



iglide® G300 bearings cover an extremely wide range of different requirements. Typical applications include medium to high loads, medium sliding speeds and medium temperatures. Typical applications include medium to high loads, medium sliding speeds and medium temperatures.

Best Applications

- When you need an economical all-around performance bearing
- For low to average surface speeds
- When the bearing needs to run on different shaft materials
- For oscillating and rotating movements

Not For Use In Applications

- When mechanical reaming of the wall surface is necessary
- When the highest wear resistance is necessary
- When universal chemical resistance is required
  ➤ iglide® T500
- If temperatures are constantly greater than +266°F
  ➤ iglide® T500
- For underwater use

Typical application areas

- Agricultural machines
- Machine building
- Sports and leisure
- Automotive
- Mechatronics
- Construction machinery

max. +266°F
min. –40°F

inch **Ø 1/4 to 1 inch**
more sizes available from igus

mm **Ø 1.5 to 150 mm**
metric sizes available from igus

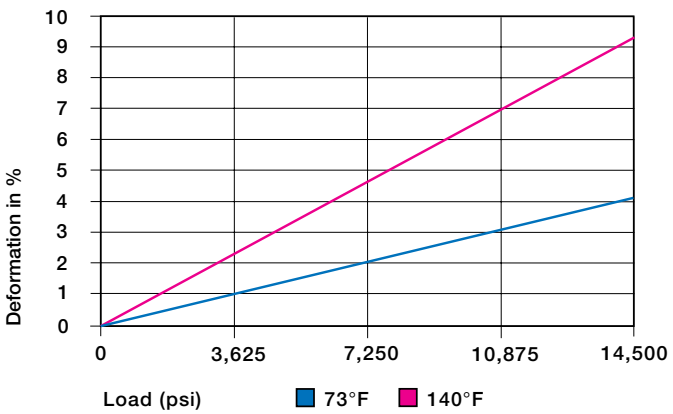
iglide® G300 - Technical Data

Material Properties Table

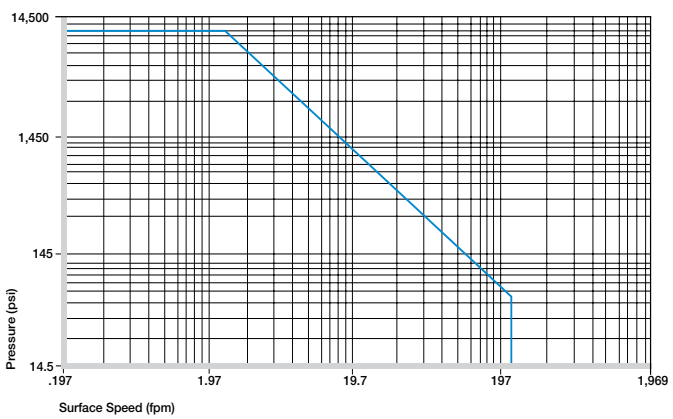
General Properties	Unit	iglide® G300	Testing Method
Density	g/cm³	1.46	
Color		dark gray	
Max. moisture absorption at 73°F / 50% r.h.	% weight	0.7	DIN 53495
Max. moisture absorption	% weight	4.0	
Coefficient of friction, dynamic against steel	µ	0.08 - 0.15	
pv value, max. (dry)	psi x fpm	12,000	
Mechanical Properties			
Modulus of elasticity	psi	1,131,000	DIN 53457
Tensile strength at 68°F	psi	30,460	DIN 53452
Compressive strength	psi	11,310	
Permissible static surface pressure (68°F)	psi	11,600	
Shore D-hardness		81	DIN 53505
Physical and Thermal Properties			
Max. long-term application temperature	°F	266	
Max. application temperature, short-term	°F	428	
Min. application temperature	°F	-40	
Thermal conductivity	W/m x K	0.24	ASTM C 177
Coefficient of thermal expansion	$K^{-1} \times 10^{-5}$	9	DIN 53752
Electrical Properties			
Specific volume resistance	Ωcm	$> 10^{13}$	DIN IEC 93
Surface resistance	Ω	$> 10^{11}$	DIN 53482

Compressive Strength

The graph shows the elastic deformation of iglide® G300 during radial loading. At the maximum permissible load of 11,600 psi, the deformation is less than 5%. The plastic deformation is minimal up to a pressure of approximately 14,500 psi. However, it is also a result of the cycle time.



Deformation under load and temperature



Permissible pv value for iglide® G300 running dry against a steel shaft, at 68°F

Permissible Surface Speeds

iglide® G300 has been developed for low to medium surface speeds. The maximum values shown in the table can only be achieved at low pressure loads. At the given speeds, friction can cause a temperature increase to maximum permissible levels. In practice, though, this temperature level is rarely reached, due to varying application conditions.

	Continuous fpm	Short Term fpm
Rotating	196	393
Oscillating	137	275
Linear	787	984

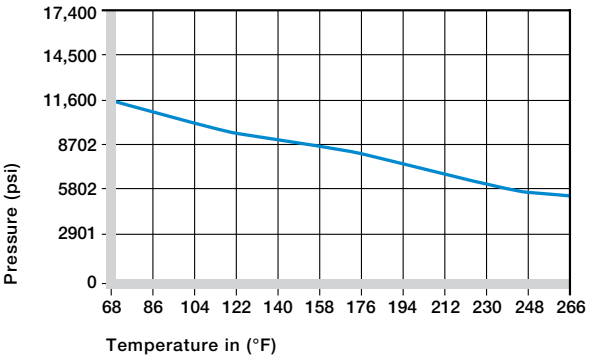
Maximum surface speeds

iglide® G300 - Technical Data

Temperatures

Application temperatures affect the properties of plain bearings greatly. The short-term maximum temperature is 428°F, this allows the use of iglide® G300 plain bearings in heat treating applications in which the bearings are not subjected to additional loading.

With increasing temperatures, the compressive strength of iglide® G300 plain bearings decreases. The graph shows this inverse relationship. However, at the long-term maximum temperature of 266°F, the permissible surface pressure is still above 5,800 psi.
The ambient temperatures that are prevalent in applications also has an effect on the bearing wear. With increasing temperatures, the wear increases and this effect is notable starting at the temperature of 248°F.



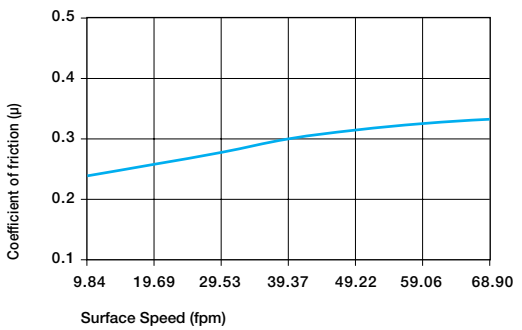
Recommended maximum permissible static surface pressure of iglide® G300 as a result of temperature

iglide® G300	Application Temperature
Minimum	- 40°F
Max. long-term	+266°F
Max. short-term	+428°F
Additional axial securing	+176°F

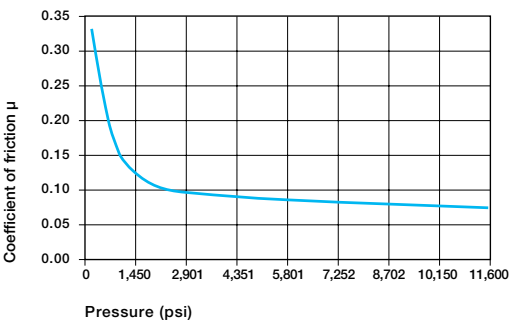
Temperature limits for iglide® G300

Friction and Wear

Similar to wear resistance, the coefficient of friction μ also changes with the load. The coefficient of friction decreases with increasing loads, whereas an increase in surface speed causes an increase of the coefficient of friction. This relationship explains the excellent results of iglide® G300 plain bearings for high loads and low speeds.
The friction and wear are also dependent, to a large degree, on the shaft partner. Shafts that are too smooth, increase both the coefficient of friction and the wear of the bearing. For iglide® G300, a ground surface with an average roughness Ra= 32 rms is recommended.



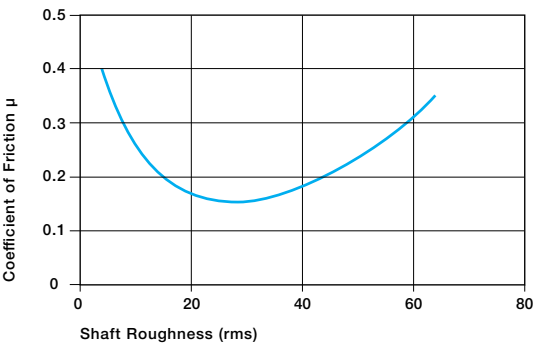
Coefficient of friction of iglide® G300 as a result of the running speed; p = 108 psi



Coefficient of friction of iglide® G300 as a result of the load, v = 1.96 fpm

iglide® G300	Coefficient of Friction
Dry	0.08 - 0.15
Grease	0.09
Oil	0.04
Water	0.04

Coefficient of friction for iglide® G300 against steel (Shaft finish = 40 rms, 50 HRC)



Coefficient of friction as result of the shaft surface (Shaft - 1050 hard chromed)

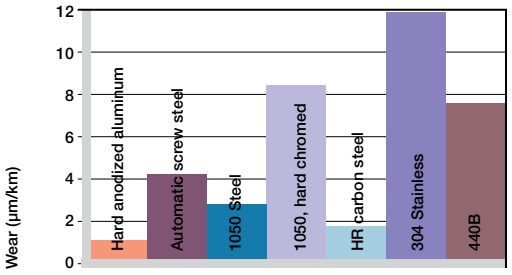
iglide® G300 - Technical Data

Shaft Materials

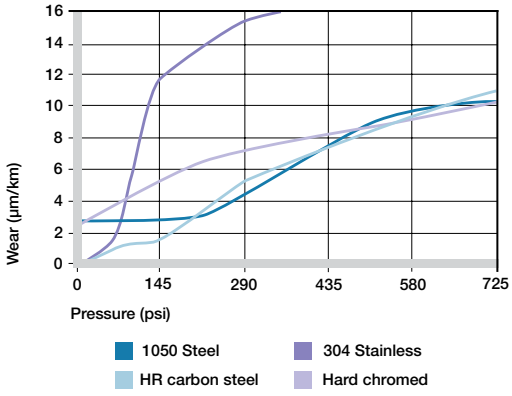
The graphs show results of testing different shaft materials with plain bearings made of iglide® G300. In the graph below it is observed that iglide® G300 can be combined with various shaft materials. The simple shaft materials of free-cutting steel and HR Carbon Steel have proven best at low loads. This helps to design cost-effective systems, since both iglide® G300 and the sliding partner are economically priced.

It is important to note that with increasing loads, the recommended hardness of the shaft increases. The “soft” shafts tend to wear more easily and thus increase the wear of the overall system. If the loads exceed 290 psi, it is important to recognize that the wear rate (the slope of the curves) clearly decreases with the hard shaft materials.

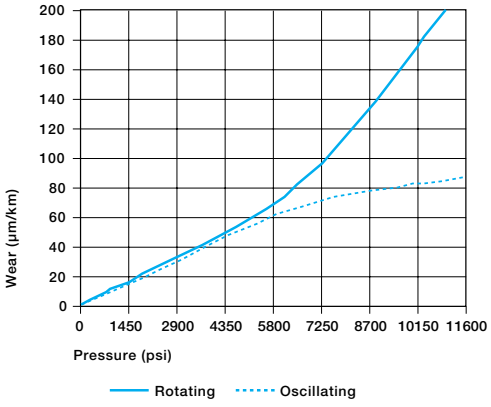
The comparison of rotational movements to oscillating movements shows that iglide® G300 can provide advantages in oscillating movements. The wear of the bearing is smaller for equivalent conditions. The higher the load, the larger the difference. This means that iglide® G300 can be used for oscillating movements that are well above the given maximum load of 11,600 psi. For these loads, the use of hardened shafts is recommended. In addition to the shaft materials presented here, many others have been tested. If the shaft material you plan on using is not contained in the test results presented here, please contact us.



Wear of iglide® G300, rotating with different shaft materials, load p = 145 psi, v = 59 fpm



Wear with different shaft materials in rotational operation, as a result of the load



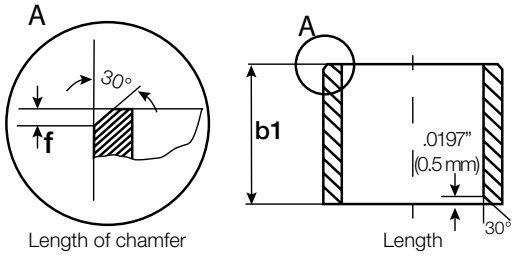
Wear for pivoting and rotating applications with shaft material 1050 hard chromed, as a result of the load

Installation Tolerances

iglide® G300 plain bearings are oversized before being pressfit. After proper installation into a recommended housing bore, the inner diameter adjusts to meet our specified tolerances. Please adhere to the catalog specifications for housing bore and recommended shaft sizes. This will help to ensure optimal performance of iglide® plain bearings.

For Inch Size Bearings		
Length Tolerance (b1)		
Length (inches)	Tolerance (h13) (inches)	Length of Chamfer (f) Based on d1
0.1181 to 0.2362	-0.0000 /-0.0071	f = .012 → d_1 .040” - .236”
0.2362 to 0.3937	-0.0000 /-0.0087	f = .019 → d_1 > .236” - .472”
0.3937 to 0.7086	-0.0000 /-0.0106	f = .031 → d_1 > .472” - 1.18”
0.7086 to 1.1811	-0.0000 /-0.0130	f = .047 → d_1 > 1.18”
1.1811 to 1.9685	-0.0000 /-0.0154	
1.9685 to 3.1496	-0.0000 /-0.0181	

For Metric Size Bearings		
Length Tolerance (b1)		
Length (mm)	Tolerance (h13) (mm)	Length of Chamfer (f) Based on d1
1 to 3	-0 /-140	f = 0.3 → d_1 1 - 6 mm
> 3 to 6	-0 /-180	f = 0.5 → d_1 > 6 - 12 mm
> 6 to 10	-0 /-220	f = 0.8 → d_1 > 12 - 30 mm
>10 to 18	-0 /-270	f = 1.2 → d_1 > 30 mm
>18 to 30	-0 /-330	
>30 to 50	-0 /-390	
>50 to 80	-0 /-460	



iglide® G300 - Technical Data

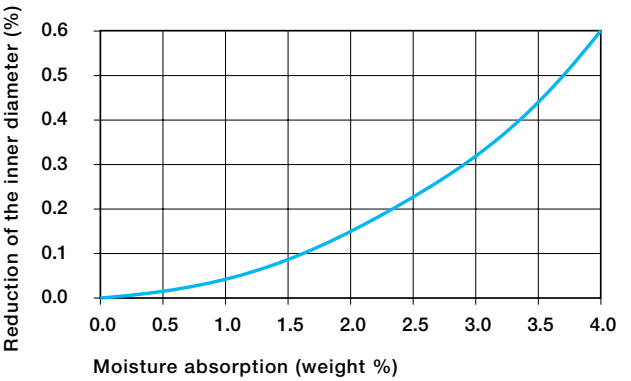
Chemical & Moisture Resistance

iglide® G300 plain bearings have strong resistance to chemicals. They are also resistant to most lubricants.
iglide® G300 plain bearings are not affected by most weak organic and inorganic acids.
The moisture absorption of iglide® G300 plain bearings is approximately 1% in the standard atmosphere. The saturation limit submerged in water is 4%. This must be taken into account for these types of applications.
➤ Chemical table, Page 1364

Medium	Resistance
Alcohol	+ to 0
Hydrocarbon	+
Greases, oils without additives	+
Fuels	+
Weak acids	0 to –
Strong acids	–
Weak alkaline	+
Strong alkaline	0

+ resistant, 0 conditionally resistant, – not resistant

Chemical resistance of iglide® G300
All data given concerns the chemical resistance at room temperature (68°F).



Effect of moisture absorption on iglide® G300 plain bearings

Radiation Resistance

Plain bearings made from iglide® G300 are resistant to radiation up to an intensity of 3 x 10^2 Gy.

UV-Resistance

iglide® G300 plain bearings are permanently resistant to UV-radiation.

Vacuum

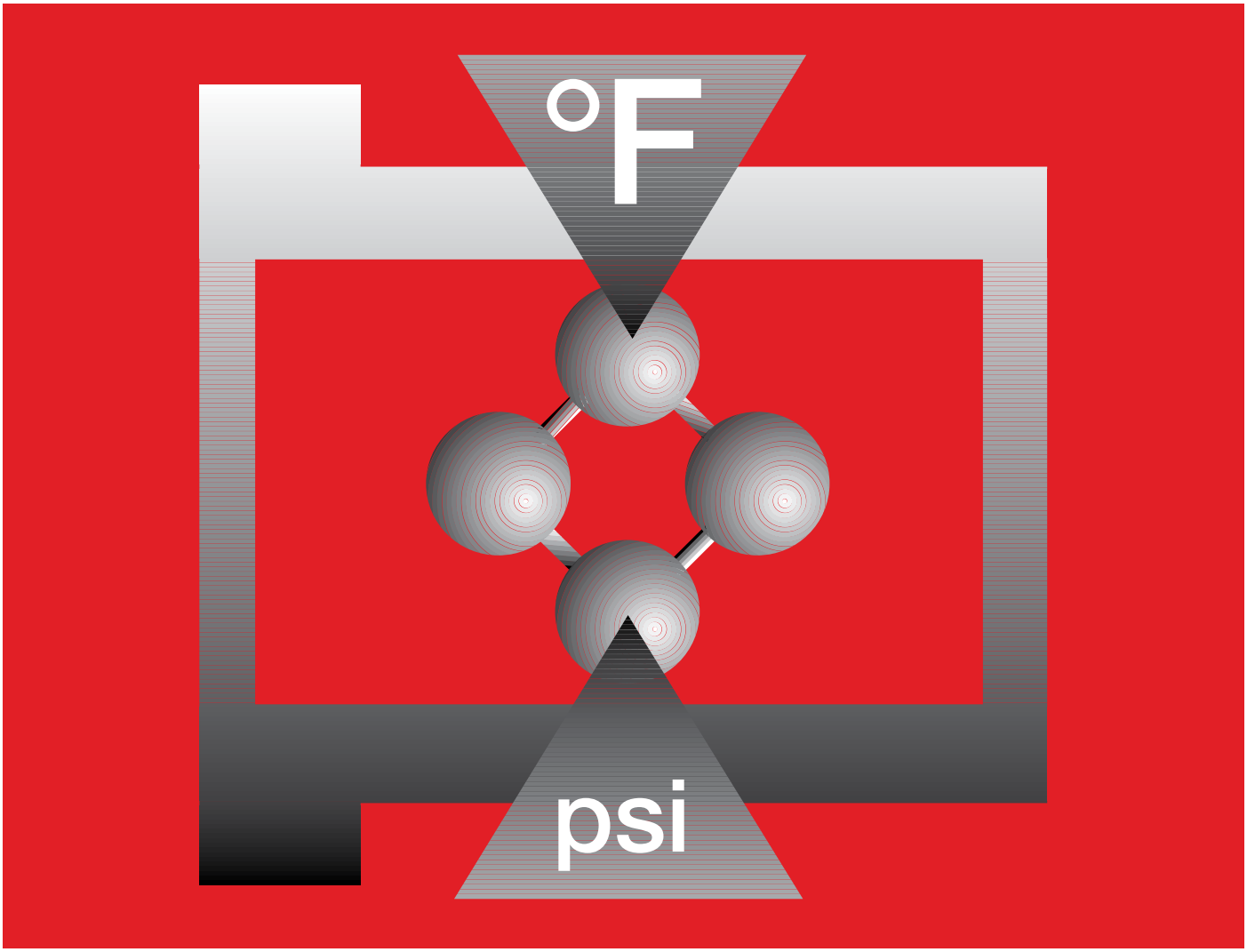
iglide® G300 plain bearings outgas in a vacuum. Use in a vacuum environment is only possible for dehumidified bearings.

Electrical Properties

iglide® G300 plain bearings are electrically insulating.

iglide® G300	
Specific volume resistance	> 10^{13} Ωcm
Surface resistance	> 10^{11} Ω

Electrical properties of iglide® G300

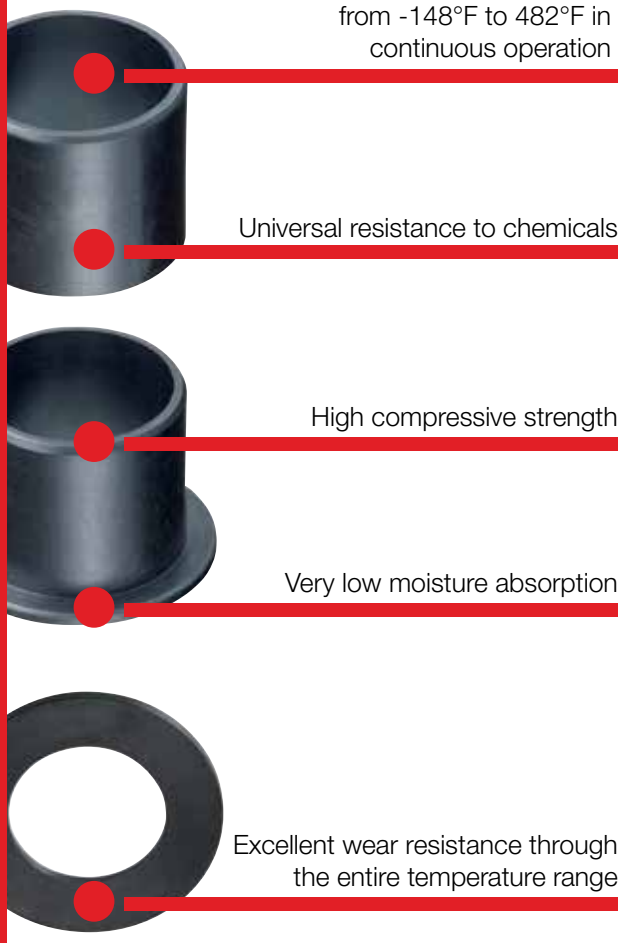


iglide® T500

- Temperature resistant from -148°F to 482°F in continuous operation
- Universal resistance to chemicals
- High compressive strength
- Very low moisture absorption
- Excellent wear resistance through the entire temperature range

iglide® T500 - High-Tech Problem Solver

High temperature and chemical resistance



iglide® T500 is defined by its combination of high temperature resistance with compressive strength, along with high resistance to chemicals. iglide® T500 is designed for higher speeds than other iglide® bearings.

Best Applications

- When especially high temperature resistance is necessary
- For pressure loads up to 21,760 psi
- For linear movements with a hard stainless steel
- For linear movements especially at high temperatures
- When universal resistance to chemicals is required
- Very low moisture absorption

Not For Use In Applications

- For very low wear at high loads
- For economical underwater applications
- For edge compression

Typical application areas

- Beverage technology
- Woodworking
- Aerospace engineering
- Cleanroom
- Plastic processing industry

max. +482°F
min. –148°F

Ø 1/4 to 1 inch
more **sizes available from igus**

Ø 2 to 75 mm
metric sizes available from igus

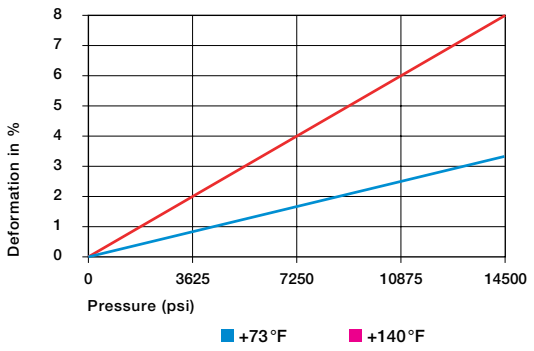
iglide® T500 - Technical Data

Material Properties Table

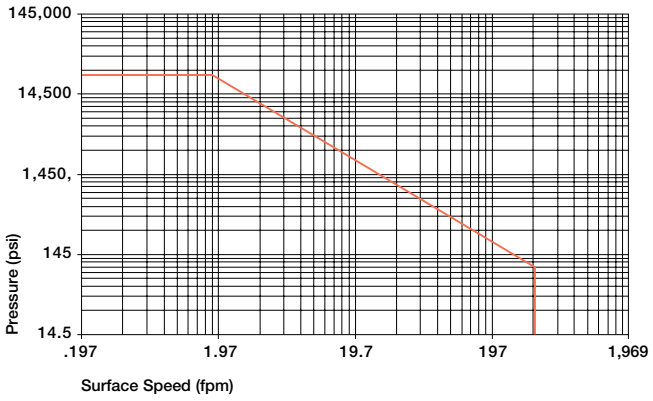
General Properties	Unit	iglide® T500	Testing Method
Density	g/cm³	1.44	
Color		black	
Max. moisture absorption at 73°F / 50% r.h.	% weight	0.1	DIN 53495
Max. moisture absorption	% weight	0.5	
Coefficient of friction, dynamic against steel	µ	0.09 - 0.27	
pv value, max. (dry)	psi x fpm	37,700	
Mechanical Properties			
Modulus of elasticity	psi	1,174,800	DIN 53457
Tensile strength at 68°F	psi	24,660	DIN 53452
Compressive strength	psi	14,500	
Permissible static surface pressure (68°F)	psi	21,760	
Shore D-hardness		85	DIN 53505
Physical and Thermal Properties			
Max. long-term application temperature	°F	482	
Max. application temperature, short-term	°F	599	
Min. application temperature	°F	-148	
Thermal conductivity	W/m x K	0.6	ASTM C 177
Coefficient of thermal expansion	$K^{-1} \times 10^{-5}$	5	DIN 53752
Electrical Properties			
Specific volume resistance	Ωcm	$< 10^5$	DIN IEC 93
Surface resistance	Ω	$< 10^3$	DIN 53482

Compressive Strength

The graph shows the special compression resistance of iglide® T500 also at very high temperatures. Even at the highest long-term application temperature of 482°F, iglide® T500 plain bearings still withstand a static surface pressure of approximately 4350 psi.



Deformation under load and temperature



Permissible pv values for iglide® T500 running dry against a steel shaft, at 68°F

Permissible Surface Speeds

iglide® T500 is designed for higher speeds than other iglide® bearings. This is due to its high temperature resistance and excellent heat conductivity. These benefits are readily apparent in the pv values of max. 37,700 psi x fpm. However, only the smallest radial loads may act on the bearings. At the given speeds, friction can cause a temperature increase to maximum permissible levels.

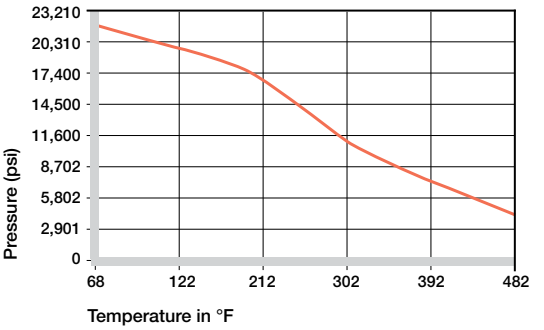
	Continuous fpm	Short Term fpm
Rotating	295	689
Oscillating	216	492
Linear	984	1968

Maximum surface speeds

iglide® T500 - Technical Data

Temperatures

In terms of temperature resistance, iglide® T500 has taken on a leading position. Having a permissible long-term application temperature of 482°F, iglide® T500 will even withstand 599°F for the short-term.
As in all thermoplastics, the compression resistance of T500 decreases with increasED temperature. However, the wear drops considerably when used within the observed temperature range of 73°F to 302°F. In certain cases, relaxation of the bearing can occur at temperatures greater than 275°F. This could lead to the bearing moving out of the housing after re-cooling. At temperatures over 275°F, the axial securing of the bearing in the housing needs to be tested. If necessary, secondary measures must be taken to mechanically secure the bearing. Please contact us if you have questions on bearing use.



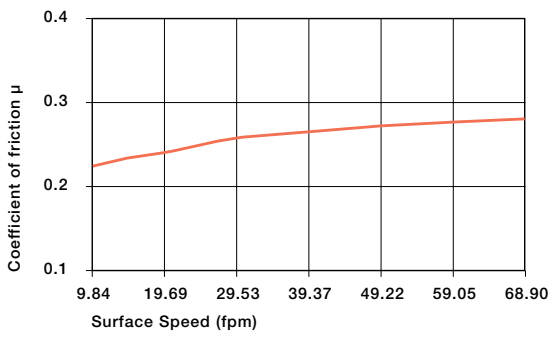
Recommended maximum permissible static surface pressure of iglide® T500 as a result of temperature

iglide® T500	Application Temperature
Minimum	- 148°F
Max. long-term	+482°F
Max. short-term	+599°F
Additional axial securing	+275°F

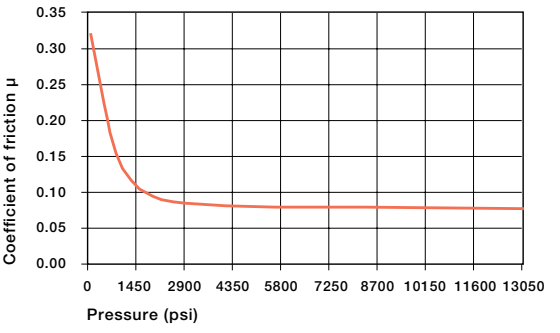
Temperature limits for iglide® T500

Friction and Wear

Similar to wear resistance, the coefficient of friction μ also changes with the load. The coefficient of friction increases with an increase in surface speed. On the other hand, an increased load has an inverse effect: the coefficient of friction decreases. This explains the excellent performance of iglide® T500 plain bearings for high loads.
Friction and wear are also dependent to a large degree on the shafting partner. Shafts that are too smooth increase the coefficient of friction of the bearing. For iglide® T500, a ground surface with an average roughness range of 24 - 32 rms is recommended for the shaft.



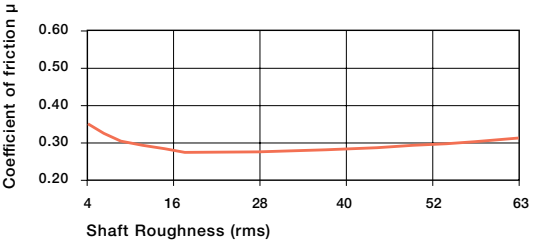
Coefficient of friction for iglide® T500 as a result of the surface speed; p = 108 psi, 1050 hard chromed



Coefficient of friction for iglide® T500 as a result of the load, v = 1.97 fpm

iglide® T500	Coefficient of Friction
Dry	0.09 - 0.27
Grease	0.09
Oil	0.04
Water	0.04

Coefficient of friction for iglide® T500 against steel (Shaft finish = 40 rms, 50 HRC)

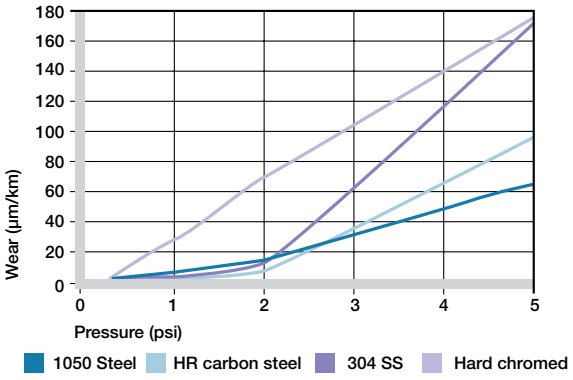


Coefficients of friction as a function of the shaft surface (1050 hard chromed)

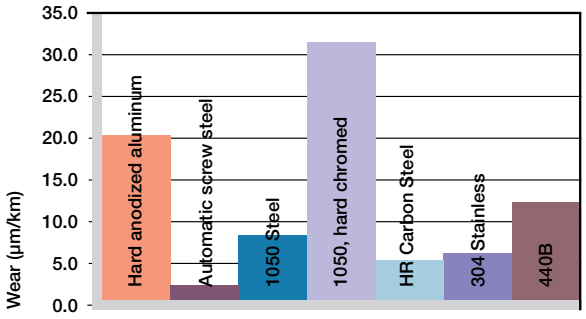
iglide® T500 - Technical Data

Shaft Materials

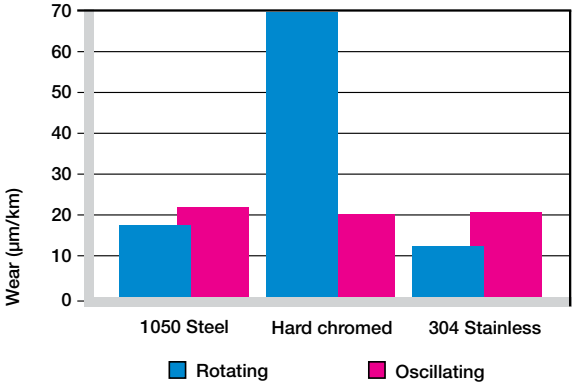
The graphs show results of testing different shaft materials with plain bearings made of iglide® T500. For low loads in rotating operation, the best wear values are found with 303 Stainless and HR Carbon Steel shafts. However, above a load of 290 psi, the bearing wear greatly increases with these two shaft materials. For the higher load range, hard-chromed shafts or Cold Rolled Steel shafts are advantageous. In oscillating operation at low loads, similar wear values for cold rolled steel and 303 stainless steel shafts occur. The wear is somewhat higher than during rotational movements.
If the shaft material you plan to use is not contained in this list, please contact us.



Wear of iglide® T500 with different shaft materials in rotational operation



Wear of iglide® T500 with different shaft materials, p = 108 psi, v = 98 fpm



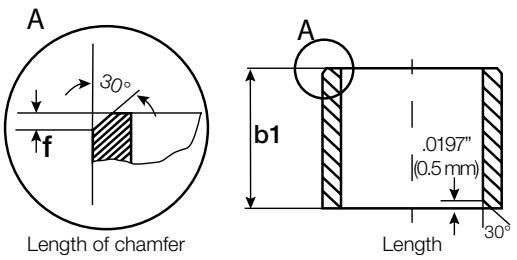
Wear for oscillating and rotating applications with different shaft materials p = 290 psi

Installation Tolerances

iglide® T500 plain bearings are oversized before being pressfit. After proper installation into a recommended housing bore, the inner diameter adjusts to meet our specified tolerances. Please adhere to the catalog specifications for housing bore and recommended shaft sizes. This will help to ensure optimal performance of iglide® plain bearings.

For Inch Size Bearings		
Length Tolerance (b1)		
Length (inches)	Tolerance (h13) (inches)	Length of Chamfer (f) Based on d1
0.1181 to 0.2362	-0.0000 /-0.0071	f = .012 → d_1 .040" - .236"
0.2362 to 0.3937	-0.0000 /-0.0087	f = .019 → d_1 > .236" - .472"
0.3937 to 0.7086	-0.0000 /-0.0106	f = .031 → d_1 > .472" - 1.18"
0.7086 to 1.1811	-0.0000 /-0.0130	f = .047 → d_1 > 1.18"
1.1811 to 1.9685	-0.0000 /-0.0154	
1.9685 to 3.1496	-0.0000 /-0.0181	

For Metric Size Bearings		
Length Tolerance (b1)		
Length (mm)	Tolerance (h13) (mm)	Length of Chamfer (f) Based on d1
1 to 3	-0 /-140	f = 0.3 → d_1 1 - 6 mm
> 3 to 6	-0 /-180	f = 0.5 → d_1 > 6 - 12 mm
> 6 to 10	-0 /-220	f = 0.8 → d_1 > 12 - 30 mm
>10 to 18	-0 /-270	f = 1.2 → d_1 > 30 mm
>18 to 30	-0 /-330	
>30 to 50	-0 /-390	
>50 to 80	-0 /-460	



iglide® T500 - Technical Data

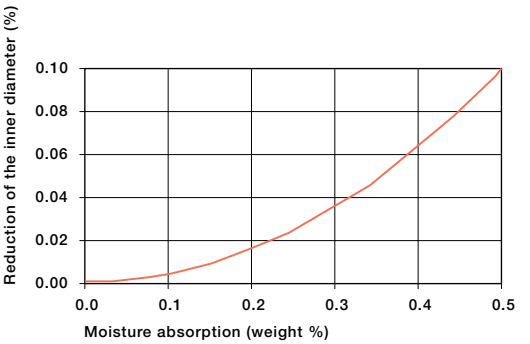
Chemical Resistance

iglide® T500 plain bearings are close to universally resistant to chemicals. They are only attacked by concentrated nitric acid and by sulfuric acid with acidity levels over 65%. The list at the end of this catalog provides more comprehensive detailed information.

Medium	Resistance
Alcohol	+
Hydrocarbon	+
Greases, oils without additives	+
Fuels	+
Weak acids	+
Strong acids	–
Weak alkaline	+
Strong alkaline	+

+ resistant, 0 conditionally resistant, – not resistant

Chemical resistance of iglide® T500
All data given concerns the chemical resistance at room temperature (68°F).



Effect of moisture absorption on iglide® T500 plain bearings

Radiation Resistance

Plain bearings made from iglide® T500 are resistant to radiation up to an intensity of $1x10^5$ Gy. iglide® T500 is the most radioactive-resistant material of the iglide® product line. iglide® T500 is extremely resistant to hard gamma radiation and withstands a radiation dose of 1000 Mrad without detectable change in its properties. The material also withstands an alpha or beta radiation of 10,000 Mrad with practically no damage.

UV Resistance

The excellent material properties of iglide® T500 do not change under UV radiation and other weathering effects.

Vacuum

In a vacuum environment, iglide® T500 plain bearings can be used virtually without restrictions. Outgassing takes place to a very limited extent.

Electrical Properties

iglide® T500 plain bearings are electrically conductive.

iglide® T500	
Specific volume resistance	< 10^5 Ωcm
Surface resistance	< 10^3 Ω

Electrical properties of iglide® T500

igus® igubal® Mounted Spherical Bearings

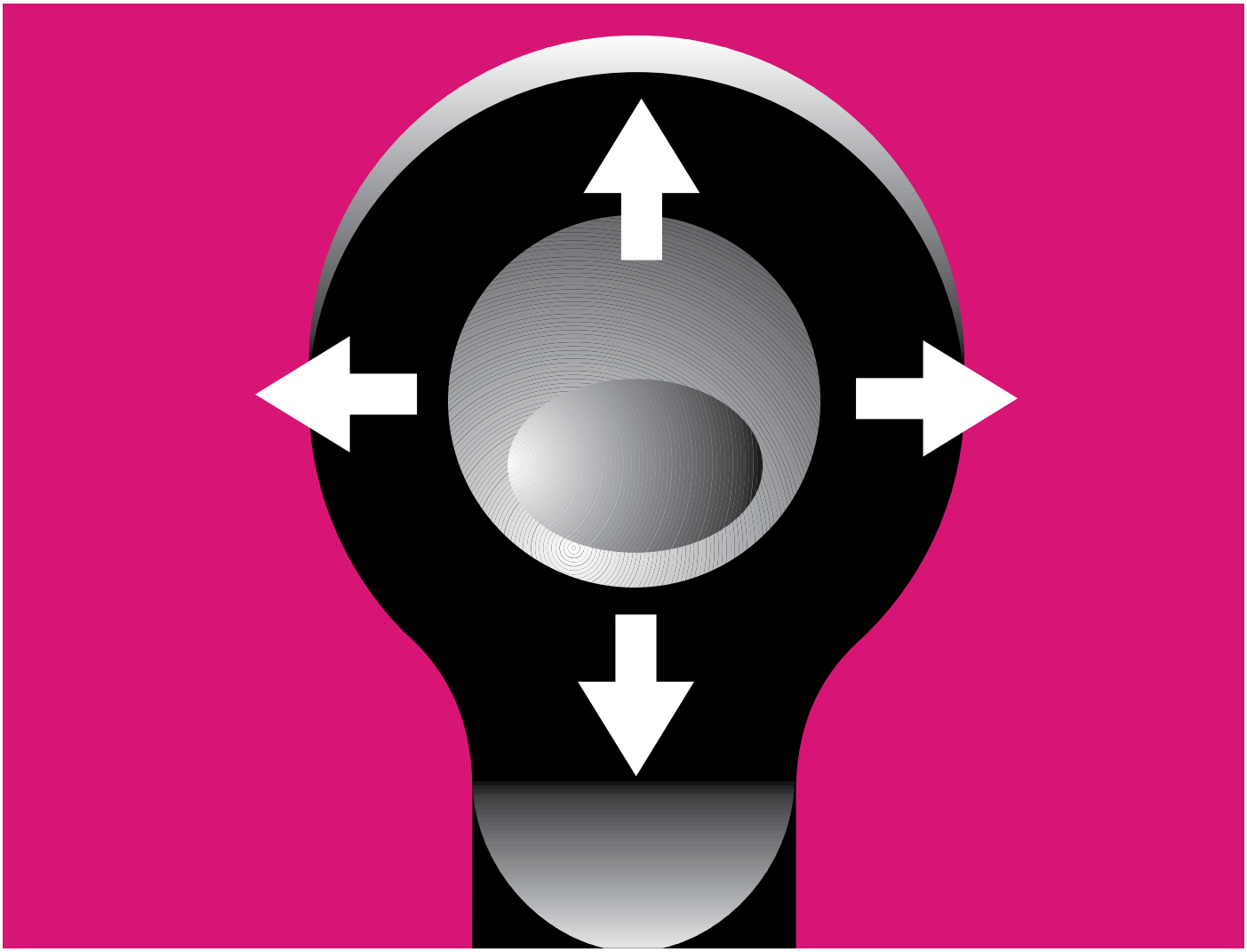
igus® igubal® mounted spherical bearings are made with high quality engineered polymers. They are lubrication-free and maintenance-free. These bearings are lighter and more economical than traditional mounted spherical bearings.

Features

- Five popular mounting configurations
- Four popular shaft sizes
- Maintenance-free
- Excellent wear resistance
- L280 polymer type bearing material

CE

igus® igubal® Mounted Spherical Bearings								
Item Photo	*Part Number*	*Style*	*Size I.D. (inch)*	*Thread/ Housing Type*	*Qty. per Package*	*Weight (lb)*	*Price*	*Drawing Link*
	*A-KBRI-04*	K Series, Female Thread, Rod End	1/4	1/4-28 UNF female	4	0.06	$14.50	PDF
	A-KBRI-08		1/2	1/2-20 UNF female	2	0.12	$21.50	PDF
	A-KBRI-12		3/4	3/4-16 UNF female	1	0.14	$17.00	PDF
	A-KBRI-16		1	1-12 UNF female	1	0.46	$20.00	PDF
	*A-KARI-04*	K Series, Male Thread, Rod End	1/4	1/4-28 UNF male	4	0.04	$14.00	PDF
	A-KARI-08		1/2	1/2-20 UNF male	2	0.10	$14.00	PDF
	A-KARI-12		3/4	3/4-16 UNF male	1	0.10	$11.00	PDF
	A-KARI-16		1	1-12 UNF male	1	0.34	$18.00	PDF
	*A-KSTI-04*	K Series, Pillow Block	1/4	Pillow block	4	0.02	$10.50	PDF
	A-KSTI-08		1/2		2	0.07	$14.50	PDF
	A-KSTI-12		3/4		1	0.09	$9.00	PDF
	A-KSTI-16		1		1	0.20	$15.00	PDF
	*A-EFOI-04*	E Series, 2-Bolt Flange	1/4	2-bolt flange	4	0.03	$14.00	PDF
	A-EFOI-08		1/2		2	0.05	$14.50	PDF
	A-EFOI-12		3/4		1	0.09	$13.00	PDF
	A-EFOI-16		1		1	0.14	$16.50	PDF
	*A-EFSI-04*	E Series, 4-Bolt Flange	1/4	4-bolt flange	4	0.04	$20.00	PDF
	A-EFSI-08		1/2		2	0.04	$15.50	PDF
	A-EFSI-12		3/4		1	0.12	$12.00	PDF
	A-EFSI-16		1		1	0.17	$14.50	PDF



igubal® Rod Ends

- Self-lubricating, maintenance-free
- High strength under impact loads
- High tensile strength
- Compensation of misalignment
- Compensation of edge loads
- Very low weight

igubal® Rod Ends

igubal® rod ends can also be used in rough environments. They are corrosion-resistant in humid environments and resistant to weak acids and bases. The operation temperature is from –40°F up to +176°C. Rod ends are also resistant to dirt and dust.

Maintenance free, dry-running

High strength under impact loads

High tensile strength

Best Applications

- If you want to save weight
- For rotating, oscillating and linear movements
- If high-frequency oscillations/vibrations occur
- If silent operation is required
- If you need an electrically insulating part
- If corrosion resistance is required
- In combination with pneumatic cylinders and gas struts
- If chemical resistance is required
- If high rigidity is required

Not For Use In Applications

- If temperatures are higher than +176 °F
- If rotation speeds higher than 98.4 fpm (0.5 m/s) are required
- If really high tensile and shear loads occur
- With a hydraulic cylinder
- If dimensions above 1 inch or 30 mm are required

Compensation of misalignment

Compensation of edge loads

Lightweight

max. +392°F
min. –40°F

Ø 1/4 to 1 inch
more sizes available from igus

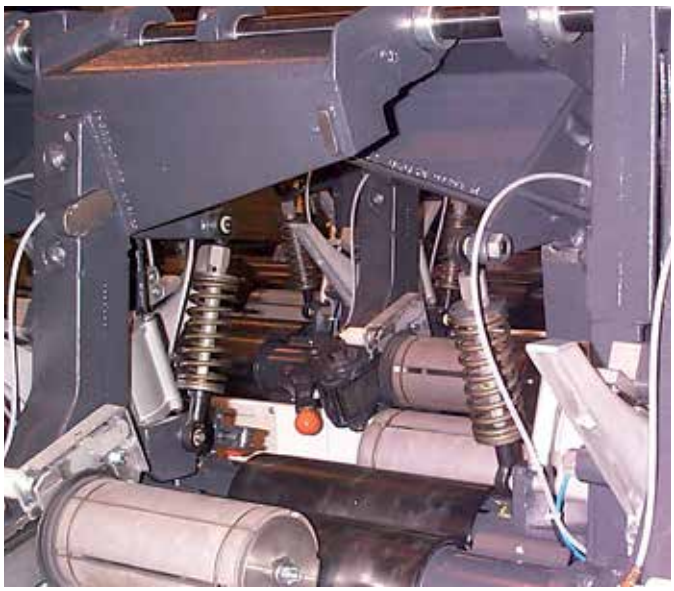
Ø 2 to 30 mm
metric sizes available from igus

igubal® Rod Ends - Application examples

Typical application areas

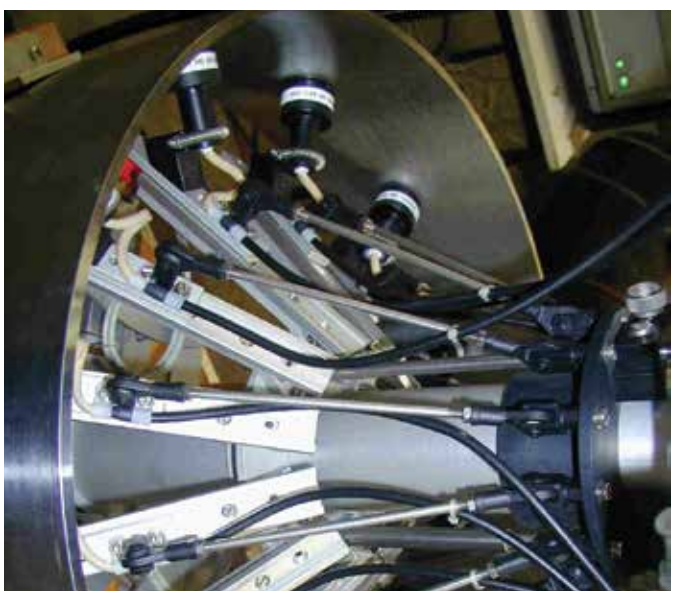
- Agricultural machines
- Machine building
- Sports and leisure
- Automotive
- Mechatronics
- Construction machinery

Specialty bikes



Textile industry

Packaging industry



Offshore industry

igubal® Rod Ends - Technical data

Advantages

- Maintenance-free
- High strength under impact loads
- Very high tensile strength for varying loads
- Compensation for misalignment
- Compensation for edge loads
- Resistant to dirt, dust and lint
- Resistant to corrosion and chemicals
- High vibration dampening capacity
- Suitable for rotating, oscillating and linear movements
- Lightweight
- Dimensional K series and E series, dimensions according to standard DIN ISO 12240

Product range

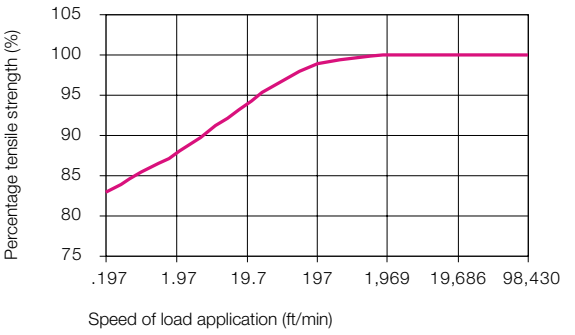
igubal® rod ends are available in the dimensional K series and E series for shaft diameters of 3/16 to 1 inch and 2 to 30 mm.

- Form A – with male thread and
- Form B – with female thread

The dimensional K series and, to a limited extent, E are available in inch dimensions, as well as a special version containing a stainless steel sleeve in the inner race. This allows a significantly higher torque than for the standard plastic race.

Loads

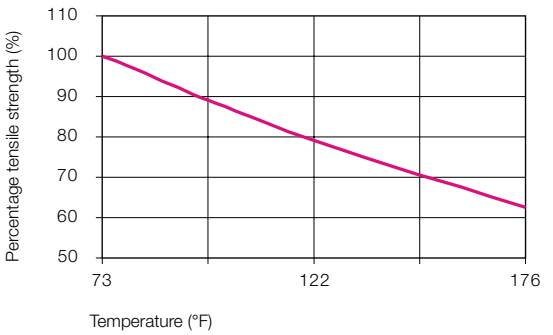
igubal® rod end bearings handle high loads at normal room temperatures, have excellent dampening properties and weigh only a fifth of traditional metallic rod end bearings. In applications with high continuous loads and high temperatures, the loading capacity of igubal® rod end bearings should be tested in an experiment that duplicates the application.



Effect of the speed of load application on the maximum tensile strength of igubal® rod end bearings

Coefficients of Friction and Speed

One important advantage of igubal® spherical bearings is that rapid, rotary movements of a mounted shaft take place directly in the spherical portion. In metallic rod ends, rotary motion takes place between the race and the spherical bearing. High speeds can be achieved with igubal® bearings.
igubal® bearings ares used in such a way that the angular movements of the spherical bearings take place at the spherical outer diameter. In contrast, rotations of the shaft are supported directly in the inner diameter of the spherical portion. The advantage, therefore, lies in the plastic vs. steel relationship. Plastic produces lower friction and permits high speeds, even when running dry.
The maintenance-free igubal® bearing system is also suited for linear and oscillating shaft movements.



Effect of the temperature on the maximum tensile strength of igubal® rod end bearings

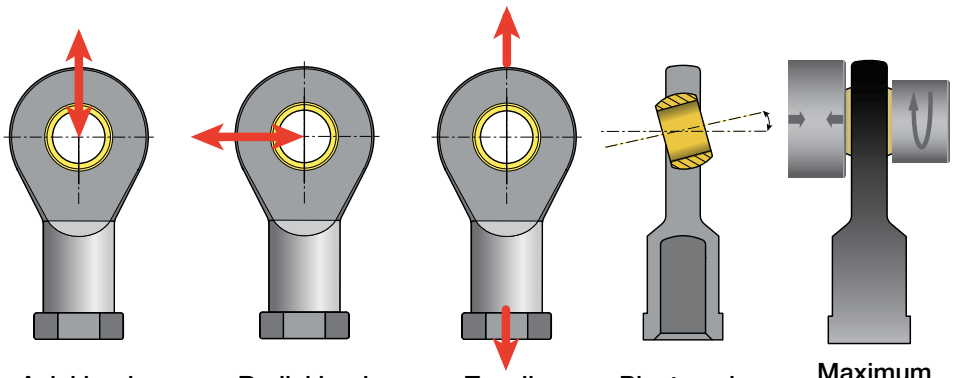
Temperatures

The igubal® rod ends can be used in temperatures from –22 °F up to +176 °F. igubal® rod ends made of HT-Material are suitable for temperatures from -40°F up to +392°F (E series, types A and B).

igubal® Rod Ends - Technical data

Tolerances

igubal® rod end bearings can be used at different tolerances depending on the individual application. As a standard program, they are designed with a large amount of bearing clearance, which permits secure operation even at high rotational speeds. The bore of the inner race is produced within a standard tolerance range. Shafts should also meet recommended tolerances.



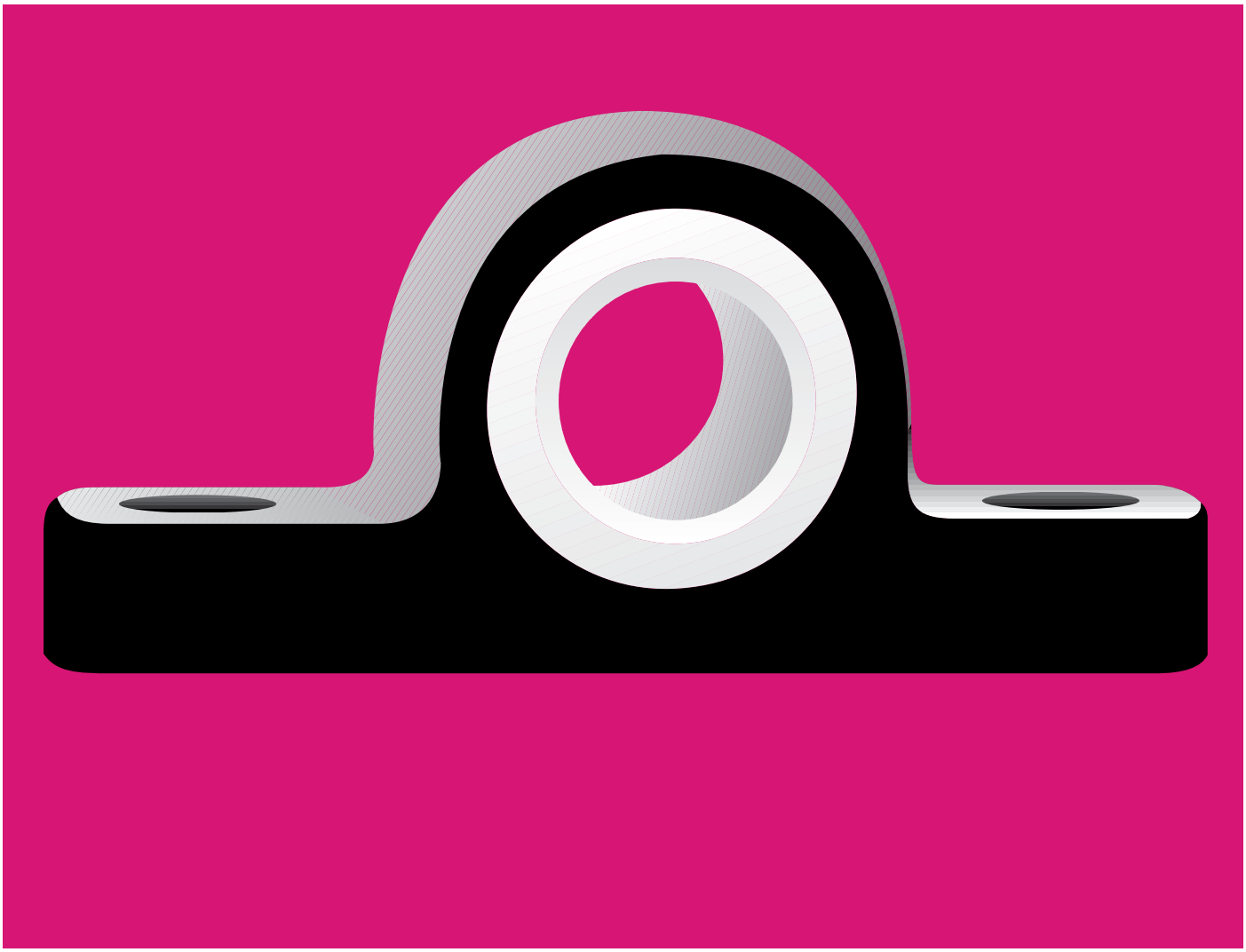
Axial load | Radial load | Tensile | Pivot angle | Maximum torque through ball

Recommended Shaft Tolerances

Inch	Shaft		Metric	Shaft	
	Min.	Max.		Min.	Max.
3/16	0.1888	0.1900	2mm	1.975	2.000
1/4	0.2485	0.2500	3mm	2.975	3.000
5/16	0.3110	0.3125	5mm	4.970	5.000
3/8	0.3735	0.3750	6mm	5.970	6.000
7/16	0.4358	0.4375	8mm	7.964	8.000
1/2	0.4983	0.5000	10mm	9.964	10.000
5/8	0.6235	0.6250	12mm	11.957	12.000
3/4	0.7479	0.7500	16mm	15.957	16.000
1	0.9980	1.0000	20mm	19.948	20.000

Thread pitches of the igubal® rod end bearings

Thread Name	Pitch (mm)
M 2	0.40
M 3	0.50
M 4	0.70
M 5	0.80
M 6	1.00
M 8	1.25
M 10	1.50
M 10 F	1.25
M 12	1.75
M 12 F	1.25
M 14	2.00
M 16	2.00
M 16 F	1.50
M 18	1.50
M 20	2.50
M 20 M 20	1.50
M 22	1.50
M 24	2.00
M 27	2.00
M 30	2.00

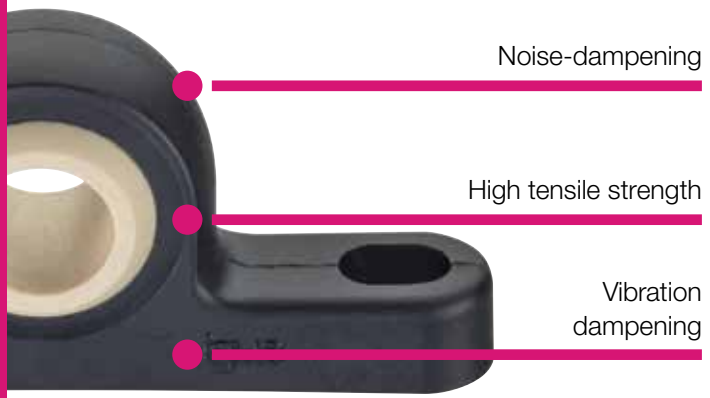


igubal® Pillow Block

- Maintenance-free, dry running
- High tensile strength
- High endurance strength
- Can be used in combination with E series rod ends
- Lightweight

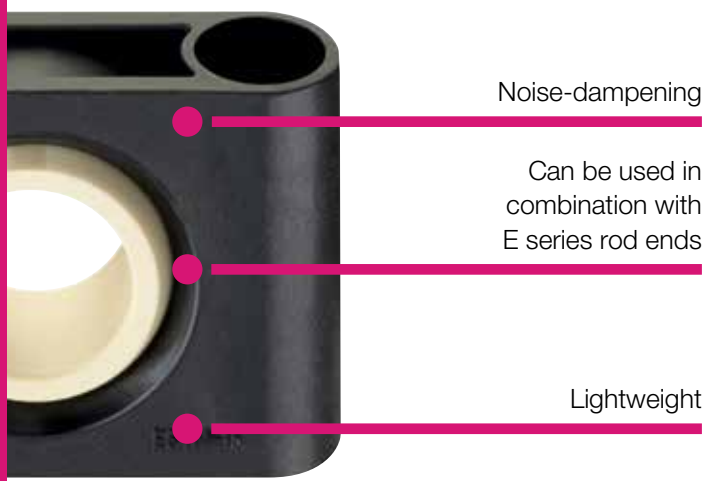
igubal® Pillow Block

The igubal® pillow block bearings consist of a housing with a bearing insert. igubal® pillow block bearings are especially easy to install, able to compensate for misalignment and prevent edge loads.



Best Applications

- If chemical resistance is required
- If a cost-effective option is requested
- If you need dirt-resistant bearings
- To account for misalignment
- If you need split components



Not For Use In Applications

- If temperatures are higher than +176 °F
- If an integrated fixing collar is required
- If diameters above 1 inch or 50 mm are required
- If rotation speeds higher than 98.4 fpm (0.5 m/s) are required

max. +176°F
min. –22°F

Ø 1/4 to 1 inch
more sizes available from igus

Ø 5 to 50 mm
metric sizes available from igus

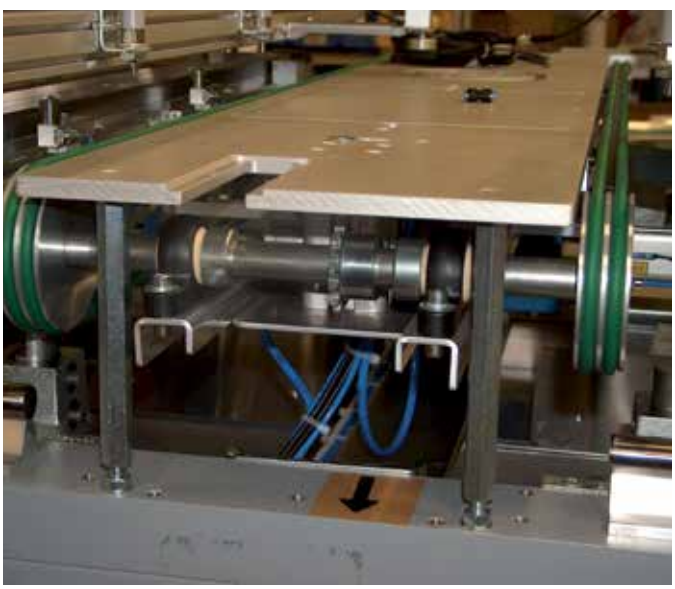
igubal® Pillow Block - Application examples

Typical application areas

- Plant design
- Machine building
- Packaging etc.

Stone processing

Solar technology



Paper industry

Packaging industry

igubal® Pillow Block - Technical data

General information

igubal® pillow blocks are made of igumid G according to DIN 71752. The pillow blocks are available in a variety of configurations. igubal® pillow blocks can be used in difficult circumstances without any problems. The pillow blocks are corrosion resistant in moist or wet environments and the sliding bearings are resistant to weak acids and alkalis. The operating temperatures range from -22°F to +176°F. igubal® pillow blocks are made out of a high-wear resistant material which requires no external lubrication.

Advantages

- Maintenance-free, self-lubricating
- High rigidity
- High strength under impact loads
- Compensation for misalignment
- Compensation for edge loads
- Corrosion-free
- Chemically resistant
- Vibration damping
- Suitable for rotating, oscillating and linear movements
- Lightweight
- High radial loads
- Can be used in liquid media
- Space-saving design
- Easy to install
- Predictable lifetime

Chemical resistance

The ability to pivot allows igubal® pillow block bearings to compensate for misalignment and possible shaft deflection. Applications where these effects cannot be prevented are suited for igubal pillow block bearings.

Tolerances

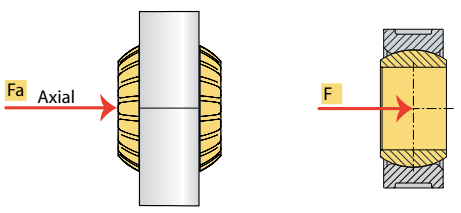
Maintenance-free igubal® pillow block bearings are designed with inside diameter tolerance of E10. The shaft should be made to tolerance class h6 to h9. These recommended tolerances allow for changes in the bearing due to temperature and moisture absorption.

Mounting

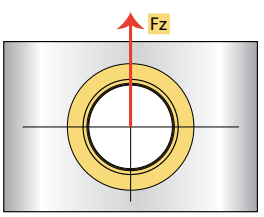
igubal® pillow block bearings are designed for mounting with 2 bolts. Precision mounting of the bearing is not necessary, since the spherical ball compensates for misalignment.

Loads

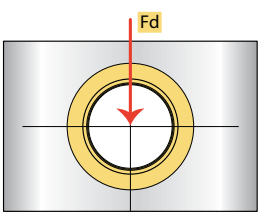
The load capacity of the maintenance-free igubal® bearing elements is very high at normal ambient temperatures. igubal® bearings absorb high forces and weigh only one fifth of traditional, metal bearing housings. The excellent dampening properties are based on the fact that the polymer material of the two part bearing can absorb vibrations differently than steel.
However, plastic specific properties, such as dependence on temperature and behavior under long-term stress, must be taken into consideration when using igubal® bearings. The load capacity of the pillow block should therefore be checked in a practical test, particularly if it will be used under continuous high loads and at elevated temperatures.



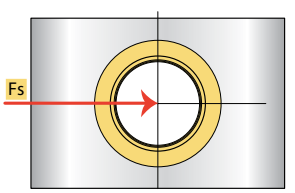
Axial Strength



Radial tensile strength (upward)

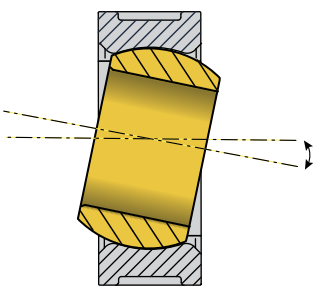


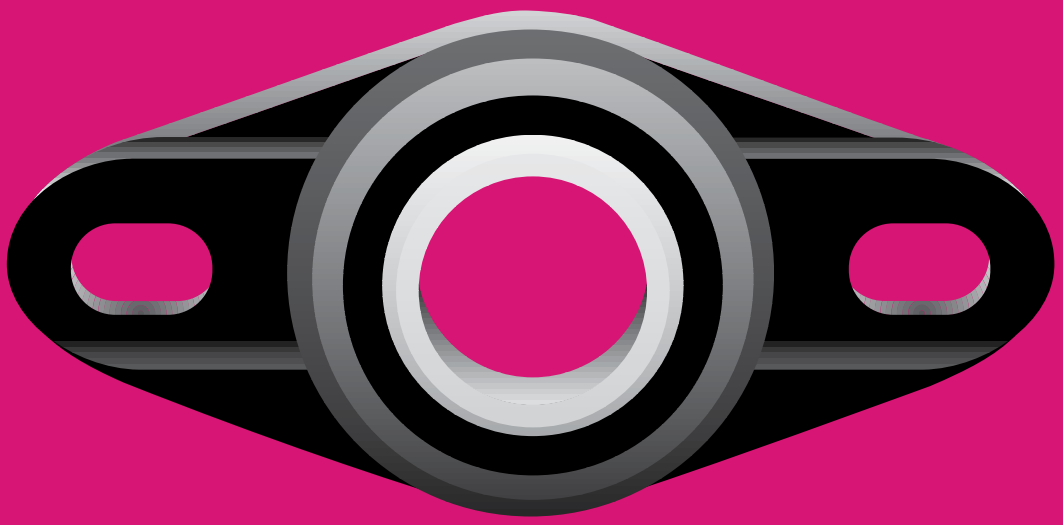
Radial compressive strength (downward)



Lateral strength (radial)

Pivot angle



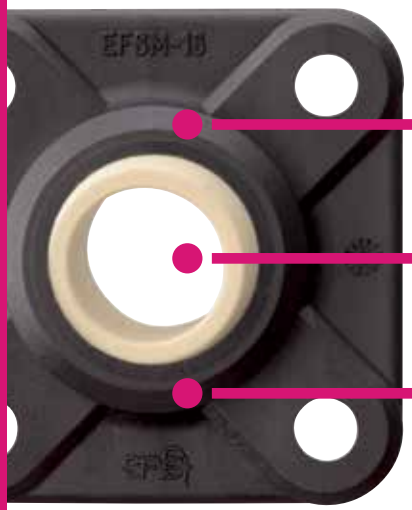


igubal® Flange Bearing

- Maintenance-free, dry running
- High tensile strength
- High endurance strength
- Compensation for alignment errors
- Compensation for edge loads
- Lightweight

igubal® Flange Bearing

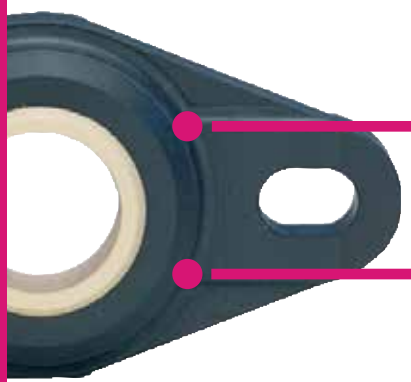
igubal® Flange bearings have been developed for the support of shaft ends or for shafts lead-through. Like all igubal® products, these bearings consist of an igumid G housing and an iglide® L280 spherical ball (with other options available). igubal® Flange bearings are made to the dimensional E series and are offered with two or four mounting holes.



Maintenance-free, dry running

High rigidity

High strength under impact loads



Lightweight

Low installation space

Best Applications

- If chemical resistance is required
- If a cost-effective option is requested
- If you need dirt-resistant bearings
- To adjust misalignment
- If you need split components

Not For Use In Applications

- If temperatures are higher than +176 °F
- If an integrated fixing collar is required
- If diameters above 1 inch or 50 mm are required
- If rotation speeds higher than 98.4 fpm (0.5 m/s) are required

max. +176°F
min. –40°F

Ø 3/8 to 1 inch
more sizes available from igus

Ø 4 to 50 mm
metric sizes available from igus

igubal® Flange Bearing - Application examples

Typical application areas

- Plant design
- Automation
- Agricultural machines
- Machine building
- Food industry etc.

Conveyor technique

Solar industry

Rotary sorter

Food industry

igubal® Flange Bearing - Technical data

General Properties

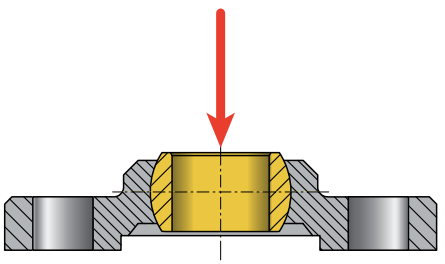
igubal® Flange bearings have been developed for the support of shaft ends or for shafts lead-through. Like all igubal® products, these bearings consist of an igumid G housing and an iglide® L280 spherical ball (with other options available). igubal® Flange bearings are made to the dimensional E series and are offered with two or four mounting holes.

Areas of Application

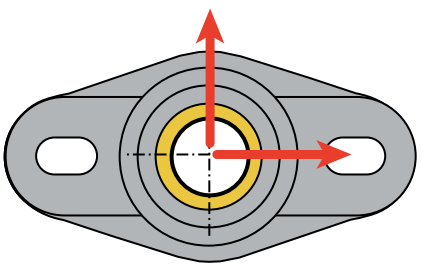
Since igubal® flange bearings are made for maintenance-free use, they are especially suited for applications in which access to the bearing is limited, in moist or wet environments or clean-room environments. Thus, igubal® flange bearings are also found in electric toothbrushes, awnings, conveyor technology, bakery machines and agriculture to name a few.

Installation

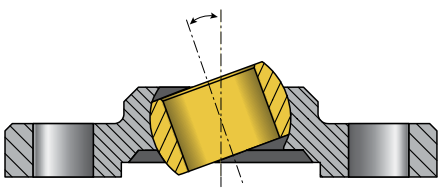
igubal® flange bearings are designed for mounting with 2 or 4 bolts, depending on the design. The 2-hole types are provided with elongated holes, which allow a problem-free adjustment. An exact positioning of the bearing housing is not necessary, since the spherical ball compensates for misalignment.



Static axial load



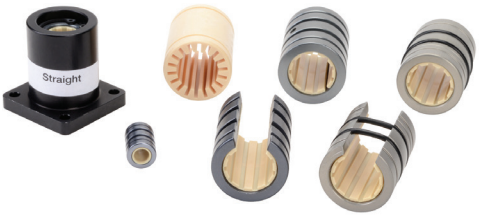
Static radial load



Pivot Angle

igus® DryLin® R Linear Plain Bearings

igus® DryLin® R linear plain bearings are dimensionally interchangeable with other popular brands, but offer a low cost alternative to recirculating ball bearings. The low friction liner makes DryLin R suitable for wet or dirty enviornments.



Features

- Dimensionally interchangeable with ball bearings
- Available in four shaft diameters in both fixed and self-aligning housings
- Type J polymer is an excellent all-purpose sliding material
- Ideally suited to work with Drylin R hard-anodized aluminum shafting

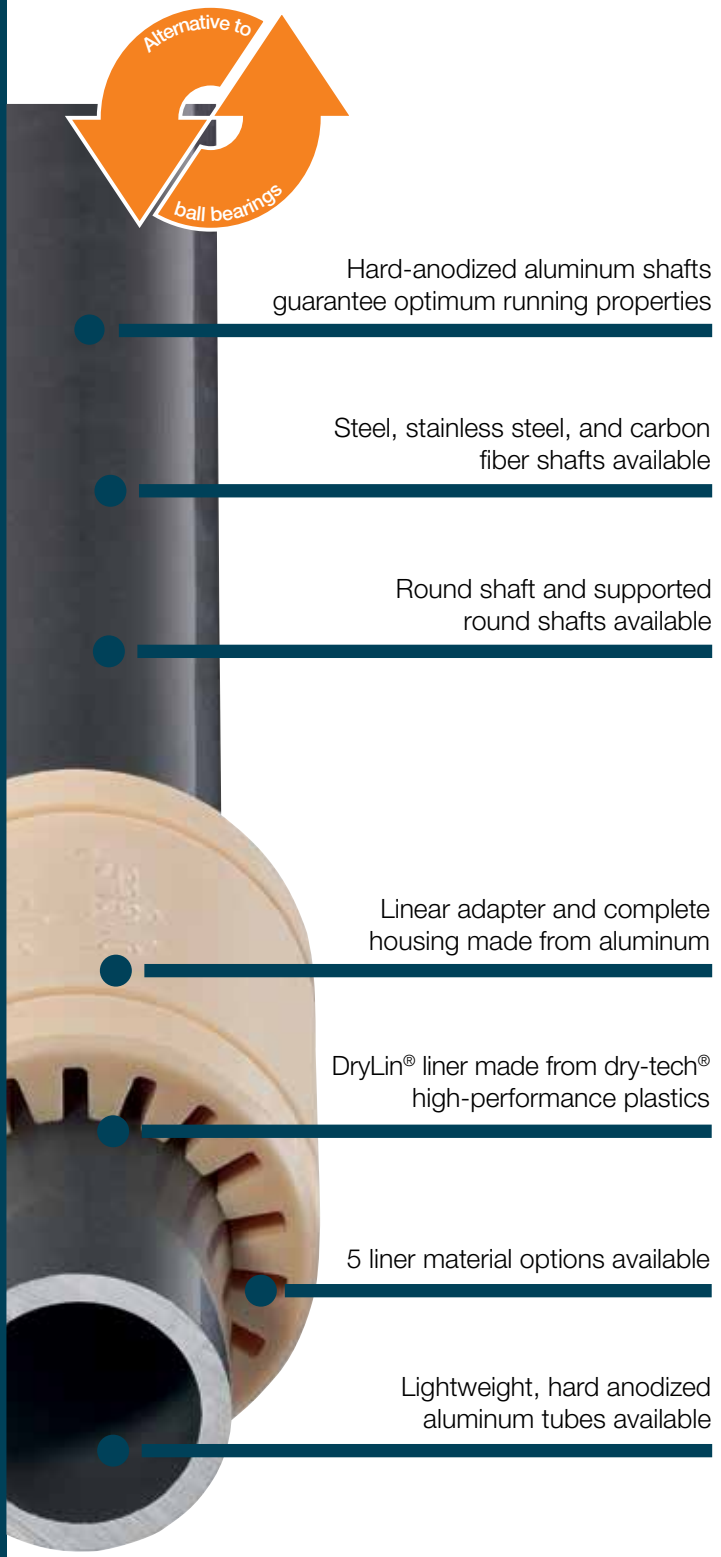
CE

igus® DryLin® R Linear Plain Bearings											
Item Photo	Part Number	Housing Fit	Size I.D. (inch)	Length (inch)	Housing Type	Bearing Material	Housing Material	Qty. per Package	Weight (lb)	Price	Drawing Link
	A-RJZI-01-04	Fixed housing	1/4	3/4	Closed	Type J polymer	Anodized aluminum	1	0.00	$9.25	PDF
	A-RJUI-01-08		1/2	1-1/4				1	0.04	$10.50	PDF
	A-RJUI-01-12		3/4	1-5/8				1	0.06	$13.00	PDF
	A-RJUI-01-16		1	2-1/4				1	0.23	$20.00	PDF
	A-RJI-01-08		1/2	1-1/4			Type J polymer	1	0.03	$6.50	PDF
	A-RJI-01-12		3/4	1-5/8				1	0.05	$7.00	PDF
	A-RJI-01-16		1	2-1/4				1	0.11	$9.75	PDF
	A-OJUI-01-08		1/2	1-1/4	Open		Anodized aluminum	1	0.11	$14.50	PDF
	A-OJUI-01-12		3/4	1-5/8				1	0.06	$16.50	PDF
	A-OJUI-01-16		1	2-1/4				1	0.23	$22.50	PDF
	A-RJUI-03-08	Self-aligning housing	1/2	1-1/4	Closed			1	0.03	$11.00	PDF
	A-RJUI-03-12		3/4	1-5/8				1	0.06	$13.00	PDF
	A-RJUI-03-16		1	2-1/4				1	0.11	$21.00	PDF
	A-OJUI-03-08		1/2	1-1/4	Open			1	0.11	$11.00	PDF
	A-OJUI-03-12		3/4	1-5/8				1	0.06	$14.00	PDF
	A-OJUI-03-16		1	2-1/4				1	0.23	$21.00	PDF
	A-FJUI-11-08	Fixed housing	1/2	1-11/16	4-bolt flange pillow block			1	0.18	$41.50	PDF
	A-FJUI-11-12		3/4	2-1/16				1	0.46	$50.00	PDF
	A-FJUI-11-16		1	2-13/16				1	1.21	$83.00	PDF
	A-FJUI-13-08	Self-aligning housing	1/2	1-11/16				1	0.18	$41.50	PDF
	A-FJUI-13-12		3/4	2-1/16				1	0.46	$50.00	PDF
	A-FJUI-13-16		1	2-13/16				1	1.21	$83.00	PDF

DryLin® R Round Shaft Guide Systems

- Self-lubricating
- Maintenance-free
- Corrosion-free
- Resistant to dirt
- Low weight
- Dimensionally interchangeable with recirculating ball bearings

DryLin® R Round Shaft Guide Systems - Advantages



Self-lubricating round shaft guide systems – DryLin® R

DryLin® R is dimensionally interchangeable with linear ball bearings, but offers cleaner, more cost-effective results even in harsh environments. The standard RJUI/RJUM bearing consists of an iglide® J liner slip-fit into an aluminum housing. The unique grooved design of the J liner minimizes clearance, is suitable for use in extremely wet and dirty environments, and is easily replaceable. Dimensionally interchangeable 100% plastic parts RJI/RJM/RJIP/RJMP are also available for cost-savings, weight reduction, and other technical advantages. DryLin® R bearings may also be used with high temperature and chemically resistant iglide® T500 (X)* (TUI/TUM) liners for more demanding applications, and E7 material liners for steel and stainless shafting.

- 100% self-lubricating
- Dimensionally interchangeable with standard recirculating ball bearings
- Large variety of housing options
- Shafts, shaft-end supports and accessories available
- Replaceable bearing liner
- 300 series stainless steel housing available

Typical application areas:
- Packaging
- Lab
- Kiosk
- 3D Printing

max. +482°F (+250°C)
min. -130°F (-90°C)
(depending on material)

8 shaft materials
8 versions
Inner-Ø up to 60 mm

Inch dimensions available

Clean-Room
Cleanroom certified
IPA Fraunhofer

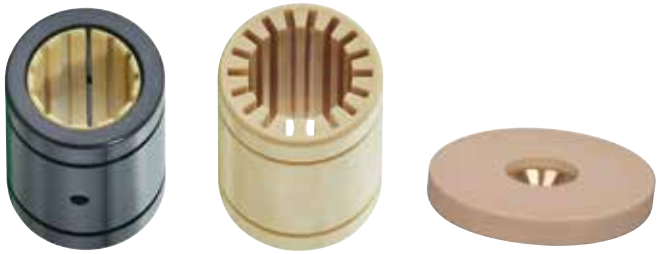
CE
Free of toxins
ROHS 2011/65/EU

ESD-compatible
(electrostatic discharge)

DryLin® R Round Shaft Guide Systems - Product overview

Liners and pressfit bearings

- Low friction, optimized wear quality
- Space saving, lightweight
- High chemical resistance



Linear plain bearing

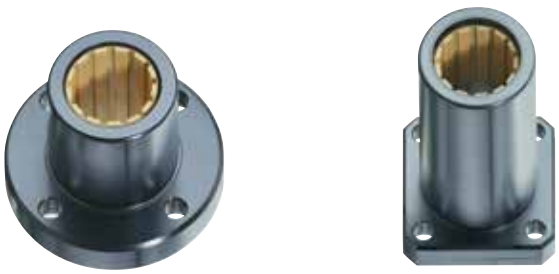
- Aluminum or stainless steel adapter with iglide® material liner
- Solid iglide® plastic bearings available, dimensionally interchangeable with recirculating ball bearings
- Closed or open versions available
- Self-aligning
- Sliding discs available

Pillow blocks and floating pillow blocks

- Easy to assemble
- Stands up to high static load
- Replaceable bearing liners
- Split housing for quick liner replacement available

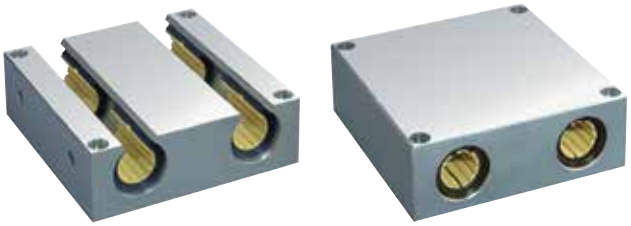
Open linear plain bearings

- For supported loads using supported shafting
- Round or mounted design
- Adjustable options
- Optional floating bearing for quick assembly and design optimization



Flange bearing

- Easy to fit
- Round or square options available
- Standard or twin flange designs



Quad block

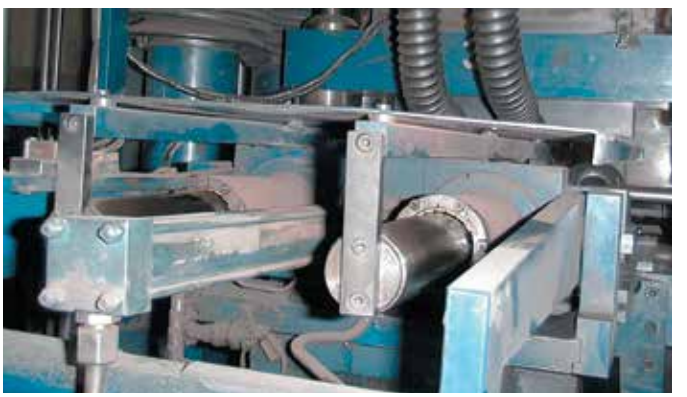
- Closed or open design options
- Quad block housing with 4 bearing liners
- Floating bearing available

DryLin® R - Application Examples

DryLin® R linear plain bearings on supported aluminum shafts are used in the guide for this cutting table. The DryLin® components stand up to the high levels of dust and dirt, and offer accurate, smooth operation.

This saw mill uses a DryLin® linear bearing with iglide® J plastic liner for the angle stops.

This heavy duty application has run reliably for more than three years thanks to DryLin® RJUM-01 linear bearings



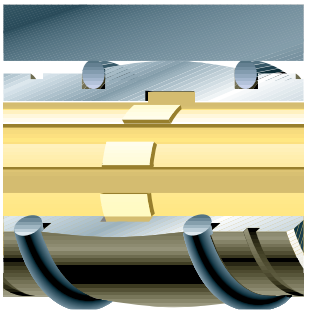
Despite the high stresses from abrasive particles and powder particles, this compactor unit can extend maintenance-free uptime by up to two years after switching to DryLin® R linear bearings.

Maintenance-free, precise, compact, and wear resistant bearing liners were mounted directly in the passages of this machine's frame.

To enable fast, and precise adjustment of a production line without the need for downtime, DryLin® precision linear guides were utilized.

DryLin® R - Technical data

DryLin® R linear plain bearings



The DryLin® standard round bearings consist of a replaceable iglide® J, J200, A180 or T500 (X)* bearing liner, manufactured to fit securely into an anodized aluminum bearing housing, axially secured via a snap ring groove. DryLin® linear bearings are designed as dimensionally interchangeable with standard ball bearings. Made of highly wear resistant iglide® J, J200, A180 or T500 (X)* materials, which offer technical advantages as well as cost savings. Plastic bearings are well suited for applications where machine components are primarily stainless steel, such as in food production and packaging equipment, as well as applications where weight savings are critical. DryLin® R linear plain bearings are designed to fit housings with our recommended tolerances, secured via circlips in the same way as ball bearings.

Dirt, dust, fibers

An important feature of all the linear plain bearings is their tolerance of dirt and other abrasive particles. For most conventional bearing systems, the use of wiper or seals is recommended to prevent the accumulation of dirt. With DryLin®, the patented design of the bearing surface, which uses connected slide pads, provides performance benefits for dirty environments. Dirt, even if it becomes wet on the shaft, is wiped away by the individual slide pads and is wiped to an open area. The running sections of the DryLin® bearings then slide on the shaft that has been cleared of all contaminants.

Split linear bearings

Applications on the edge of technical feasibility or in extreme environments often require frequent replacement of linear bearings. DryLin® linear bearings can provide significant increases in service life, and even when replacement is necessary, the replaceable bearing liners can offer substantial cost savings. Replacing only the bearing's liner can reduce maintenance time by 90%. The range of split bearing housings are easily opened, and the split shell means that the shafts are able to stay in place while a new bearing and liner can be installed around the shaft, keeping installation time to a minimum.

	 The "all-rounder" – iglide® J	 The specialist – iglide® J200	 The extreme – iglide® T500 (X)	 The marathon runner – iglide® E7	 FDA compliant – iglide® A180
Optimal shaft material(s)	all shaft materials	Aluminum, hard anodized	Hardened stainless steel Hard chromed plated steel	Steel stainless steel shaft	all shaft materials
Application temperature	-40°F to +194°F (-40°C to +90°C)	-40°F to +194°F (-40°C to +90°C)	-148°F to +482°F (-100°C to +250°C)	-40°F to +194°F (-40°C to +90°C)	-40°F to +194°F (-40°C to +90°C)
Best coefficient of friction with	Steel shaft	Aluminum, hard anodized	Steel hard chrome-plated	Steel stainless steel shaft	Stainless steel shaft
Maximum life time	Aluminum, hard anodized	Aluminum, hard anodized	Hardened stainless steel	Steel stainless steel shaft	Stainless steel shaft
Permissible stat. surface pressure	35 MPa	23 MPa	150 MPa	18 MPa	28 MPa
Moisture absorption	1.3% weight	0.7% weight	0.5% weight	< 0.1% weight	0.2% weight
Volume resistance	> 10^{13} Ωcm	> 10^{8} Ωcm	< 10^{5} Ωcm	> 10^{9} Ωcm	> 10^{12} Ωcm
Part No.	JUM-...	J200UM-...	TUM-.../XUM-...	E7UM-...	A180UM-...

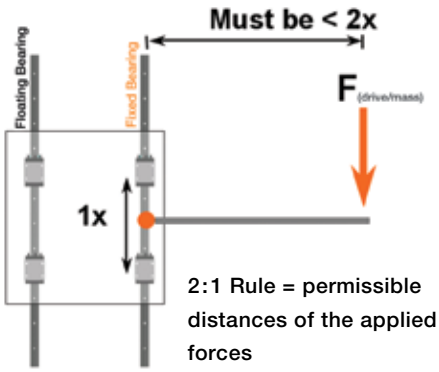
These pages contain igus® factory information and was current as of 1/15/18. Information subject to change without notice.

DryLin® R - Design standards

Eccentric Forces

The 2:1 Rule

When using linear plain bearings it is important to ensure that the acting forces follow the 2:1 Rule (see drawing). If either the load or the drive force (F) is greater than twice the bearing length (1X), then a binding or interrupted motion may occur. If the location of the drive force or load cannot be changed, simply increase the distance between the bearings, or create a counterbalance to move the center-of-gravity back within the 2 to 1 ratio.



2:1 Rule = permissible distances of the applied forces

Fixed and Floating Bearing Mounting Instructions

When using systems with 2 parallel rails, one side must be designated as the “fixed” rail, and the opposite side as the “floating” rail.

Why use floating bearings?

- Promotes smooth gliding performance and maximizes bearing life
- Prevents binding caused by parallelism and angle errors
- Decreases necessary drive force and wear by minimizing friction-forces
- Enhances the precision of the system over the bearings’ lifetime.
- Reduce assembly time and co

Fixed Bearings

The “fixed” bearing rail should be positioned closest to the drive force. This rail will determine the precision of the system; no system should contain more than two “fixed” bearings.

Floating/Self-Aligning Bearings

The “floating” rail should be the rail located furthest from the drive force. It is to act only as a guide, and will compensate for any misalignments or angle errors in the system ensuring proper functionality.

Mounting Surfaces

The mounting surfaces for rails and bearings should have a very flat surface (e.g milled surface) in order to enhance performance. Variations in these surfaces may be compensated for by using floating bearings.

DryLin® R - Mounting Instructions

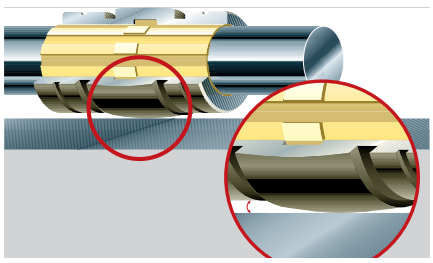
DryLin® R linear plain bearings in the 03 Design Series are self-aligning and offer great advantages in applications with parallel shafts. They are able to compensate for alignment and parallelism errors and should be used on the shaft located furthest from the drive mechanism.
The design provides a raised spherical area on the outer diameter of the aluminum adapter for self-alignment. Load capacity is the same as the fixed version.
Even in unfavorable edge-load conditions, the load is supported by the entire projected surface
In order to compensate for parallelism errors between two shafts, the outer diameter is designed to be smaller than the housing bore diameter by 0.2 - 0.3 mm (depending on the size). With the use of mounted O-rings, these bearings have an elastic bearing seat.

Compensation for angle errors

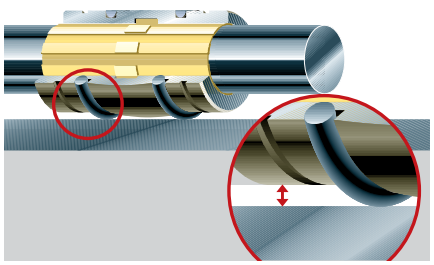
Series RJUI/RJUM/OJUI/OJUM-03 ±0.5°
Series RJUM-06-LL/OJUM-06-LL ±3.5°

Compensation of parallelism errors

Series RJUI/RJUM/OJUI/OJUM-03 ±0.1 mm (.004”)
Series RJUM-06-LL/OJUM-06-LL ±3 mm (.12”)



The spherical DryLin® adapters can compensate for alignment errors. A hard-anodization protects the aluminum adapter from wear.



With built in clearances and the use of O-rings, the self-aligning DryLin® R bearings of the 03 Design Series can compensate for parallelism errors.

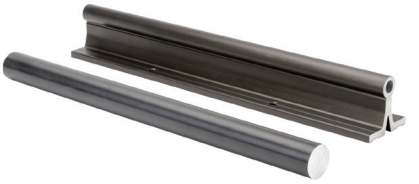
The self-aligning DryLin® R bearings of the 06 LL design series can compensate parallelism errors up to ± .12” (3mm).

igus® DryLin® R Hard-Anodized Shafts

igus® DryLin® R hard-anodized shafts were specifically developed as the optimal sliding surface for DryLin R linear bearings. Available in four diameters and three lengths of both round shafting and fully supported shafting.

Features

- 6061-T6 aluminum hard-anodized to 450-550 HV surface hardness
- Round and fully supported styles
- Four diameters and three lengths up to 1000mm
- Best choice of shafting to use with DryLin R bearings



CE

igus® DryLin® R Hard-Anodized Shafts										
Item Photo	Part Number	Shaft Type	Diameter (inch)	Length (mm)	Material	Surface Hardness	Qty. per Package	Weight (lb)	Price	Drawing Link
	A-AWUI-08-250	Supported	1/2	250	Hard-anodized aluminum	450-550 HV	1	0.54	$18.00	PDF
	A-AWUI-08-500			500			1	1.07	$33.00	PDF
	A-AWUI-08-1000			1000			1	2.13	$65.00	PDF
	A-AWUI-12-250		3/4	250			1	0.92	$24.00	PDF
	A-AWUI-12-500			500			1	1.85	$46.50	PDF
	A-AWUI-12-1000			1000			1	3.67	$94.00	PDF
	A-AWUI-16-250		1	250			1	1.23	$28.50	PDF
	A-AWUI-16-500			500			1	2.46	$56.00	PDF
	A-AWUI-16-1000			1000			1	4.92	$111.00	PDF
	A-AWI-04-250	Round	1/4	250			1	0.05	$9.75	PDF
	A-AWI-04-500			500			1	0.10	$17.50	PDF
	A-AWI-04-1000			1000			1	0.20	$35.00	PDF
	A-AWI-08-250		1/2	250			1	0.19	$11.00	PDF
	A-AWI-08-500			500			1	0.39	$20.50	PDF
	A-AWI-08-1000			1000			1	0.77	$41.50	PDF
	A-AWI-12-250		3/4	250			1	0.43	$16.50	PDF
	A-AWI-12-500			500			1	0.87	$30.50	PDF
	A-AWI-12-1000			1000			1	1.73	$60.00	PDF
	A-AWI-16-250		1	250			1	0.77	$22.00	PDF
	A-AWI-16-500			500			1	1.53	$41.50	PDF
	A-AWI-16-1000			1000			1	3.05	$84.00	PDF

DryLin® Shafting

- Available in supported versions
- Aluminum for low weight
- Diameters 1/2 - 1 inch

DryLin® Shafts

	 The "all-rounder" – iglide® J	 The specialist – iglide® J200	 The extreme – iglide® T500 (X)*	 The marathon runner – iglide® E7	 FDA compliant – iglide® A180
Optimal shaft material(s)	all shaft materials	Aluminum, hard anodized	Hardened stainless steel Hard chromed plated steel	Steel stainless steel shaft	all shaft materials
Application temperature	-40°F to +194°F (-40°C to +90°C)	-40°F to +194°F (-40°C to +90°C)	-148°F to +482°F (-100°C to +250°C)	-40°F to +194°F (-40°C to +90°C)	-40°F to +194°F (-40°C to +90°C)
Best coefficient of friction with	Steel shaft	Aluminum, hard anodized	Steel, hard chrome-plated, SS	Steel stainless steel shaft	Stainless steel shaft
Maximum life time	Aluminum, hard anodized	Aluminum, hard anodized	Hardened stainless steel	Steel stainless steel shaft	Stainless steel shaft
Permissible stat. surface pressure	35 MPa	23 MPa	150 MPa	18 MPa	28 MPa
Moisture absorption	1.3% weight	0.7% weight	0.5% weight	< 0.1% weight	0.2% weight
Volume resistance	> 10^{13} Ωcm	> 10^{8} Ωcm	< 10^{5} Ωcm	> 10^{9} Ωcm	> 10^{12} Ωcm
Part No.	JUM-...	J200UM-...	TUM-.../XUM-...	E7UM-...	A180UM-...

Available shaft materials:

Aluminum

- Ideal in combination with liners made from iglide® J/J200
- Lightweight
- Lower wear
- Corrosion resistant
- Available from stock

Steel

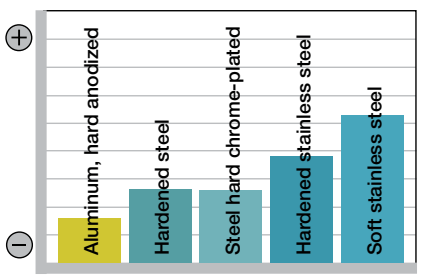
- Ideal with E7 liner
- Low-priced standard
- High load capacity
- Dry area applications
- Hard chrome-plated also available
- Lower coefficient of friction against plastic bearings

Stainless steel

- Ideal with E7 liner
- High corrosion resistance
- High chemical resistance
- Ideal solution for wet applications
- 300 series for extremely chemical intensive applications

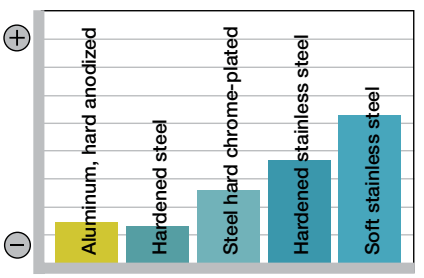
Please remember that this is a technical surface.
Small color variations are possible due to variable coating depths.

Wear



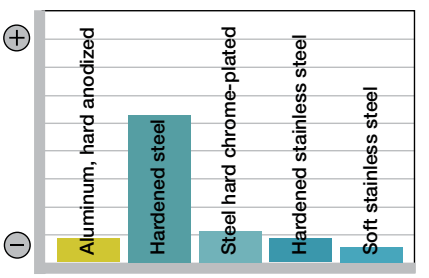
iglide ®J against particular shaft materials

Coefficient of friction



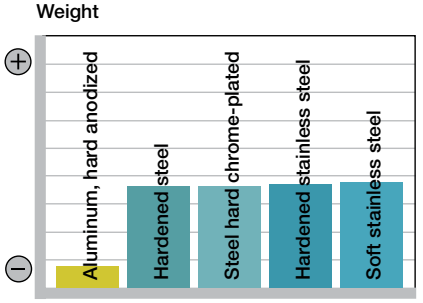
iglide ®J against particular shaft materials

Corrosion

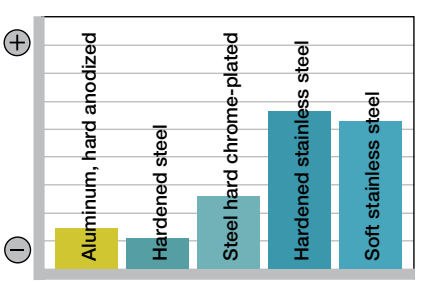


iglide ®J against particular shaft materials

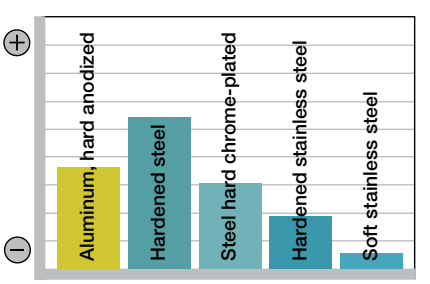
Weight



Costs



Chemical contamination



*X is the European equivalent material for iglide® T500

NEMA Planetary Gearboxes

The SureGear PGCN series easily mates to SureStep motors, and other NEMA frame motors. Everything you need to mount your SureStep motor is included!

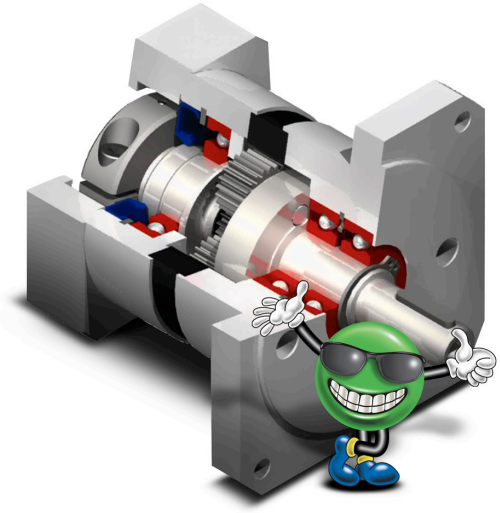
It is the perfect solution for applications such as material handling, pick and place, automation, packaging, and other motion control applications requiring a NEMA input/output interface.

Precision Gearboxes for Stepper Motors

15 models, five gear ratios available in NEMA 17, 23 and 34 frame sizes

Sure gear®

Tough on the outside, precision quality on the inside



Sure gear Planetary Gearboxes for NEMA Motors

SureGear® Planetary Gear Reducers for NEMA Motors – Overview

The SureGear PGCN series is a great gearbox (gear reducer) value for servo, stepper, and other motion control applications requiring a NEMA size input/output interface. It offers the best quality available for the price point.

Features

- Wide range of ratios (5, 10, 25, 50, and 100:1)
- Low backlash of 30 arc-min or less
- 20,000 hour service life
- Maintenance free; requires no additional lubrication
- NEMA sizes 17, 23, and 34
- Includes hardware for mounting to SureStep stepper motors
- Optional shaft bushings available for mounting to other motors

Applications

- Material handling
- Pick and place
- Automation
- Packaging
- Other motion control applications requiring a NEMA input/output

SureGear® NEMA Planetary Gearboxes

Model-Specific Specifications

Part Number	Price	Ratio	NEMA Frame Size	Nominal Output Torque (N·m [lb·in])	Maximum Acceleration Torque (N·m [lb·in])	Emergency Stop Torque (N·m [lb·in])	Standard Output Backlash (arc-min)	Allowable Radial Load (N [lb])	Allowable Axial Load (N [lb])	Torsional Stiffness (N·m/arc-min [lb·in/arc-min])	Mass Moment of Inertia (kg·cm² [lb·in²])	Efficiency (%)	Approx Weight (kg [lb])	Fits SureStep Stepper Motor
PGCN17-055M	$295.00	5:1	17	6.5 [58]	13 [115]	26 [230]	<25	361 [81]	298 [67]	0.8 [7.5]	0.0096 [0.003]	94	0.45 [1.0]	STP-MTR-170xx(D)
PGCN17-105M	$295.00	10:1		5.0 [44]	10 [89]	20 [177]	<25			0.5 [4.4]	0.0078 [0.003]	94	0.45 [1.0]	
PGCN17-255M	$371.00	25:1		16 [142]	20 [177]	32 [283]	<30			0.8 [7.5]	0.0096 [0.003]	92	0.55 [1.2]	
PGCN17-505M	$371.00	50:1		16 [142]	20 [177]	32 [283]	<30			0.8 [7.5]	0.0078 [0.003]	92	0.55 [1.2]	
PGCN17-1005M	$371.00	100:1		5.0 [44]	10 [89]	20 [177]	<30			0.5 [4.4]	0.0078 [0.003]	92	0.55 [1.2]	
PGCN23-0525	$325.00	5:1	23	6.5 [58]	13 [115]	26 [230]	<20			0.9 [8.0]	0.04 [0.014]	94	0.45 [1.0]	STP-MTR(H)-230xx(D)
PGCN23-1025	$325.00	10:1		5.0 [44]	10 [89]	20 [177]	<20			0.6 [5.3]		94	0.45 [1.0]	
PGCN23-2525	$381.00	25:1		16 [142]	20 [177]	32 [283]	<25			0.9 [8.0]		92	0.55 [1.2]	
PGCN23-5025	$381.00	50:1		16 [142]	20 [177]	32 [283]	<25			0.9 [8.0]		92	0.55 [1.2]	
PGCN23-10025	$381.00	100:1		5.0 [44]	10 [89]	20 [177]	<25			0.6 [5.3]		92	0.55 [1.2]	
PGCN34-0550	$387.00	5:1	34	26 [230]	44 [389]	84 [743]	<15	476 [107]	425 [96]	2.4 [21.2]	0.36 [0.123]	94	1.1 [2.4]	STP-MTR(H)-34xxx(D)
PGCN34-1050	$387.00	10:1		16 [142]	24 [212]	62 [549]	<15			1.3 [11.5]	0.34 [0.116]	94	1.1 [2.4]	
PGCN34-2550	$524.00	25:1		42 [372]	52 [460]	84 [743]	<20			2.4 [21.2]	0.36 [0.123]	92	1.4 [3.1]	
PGCN34-5050	$524.00	50:1		42 [372]	52 [460]	84 [743]	<20			2.4 [21.2]	0.34 [0.116]	92	1.4 [3.1]	
PGCN34-10050	$524.00	100:1		16 [142]	24 [212]	62 [549]	<20			1.3 [11.5]	0.34 [0.116]	92	1.4 [3.1]	

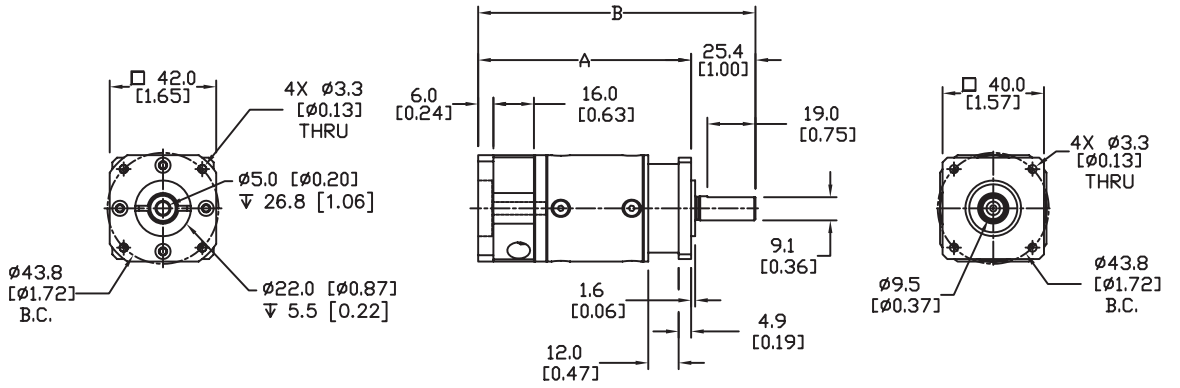
Specifications Applicable to All PGCN Gearboxes

Nominal Speed (rpm)	3500
Maximum Input Speed (rpm)	6000
Mounting Orientation	can be mounted in any orientation
Environmental Rating	IP64
Operating Temperature	-20 to 90 °C [-4 to 194 °F]
Lubrication	Mineral Grease EPO
Service Life (hrs)	>20,000

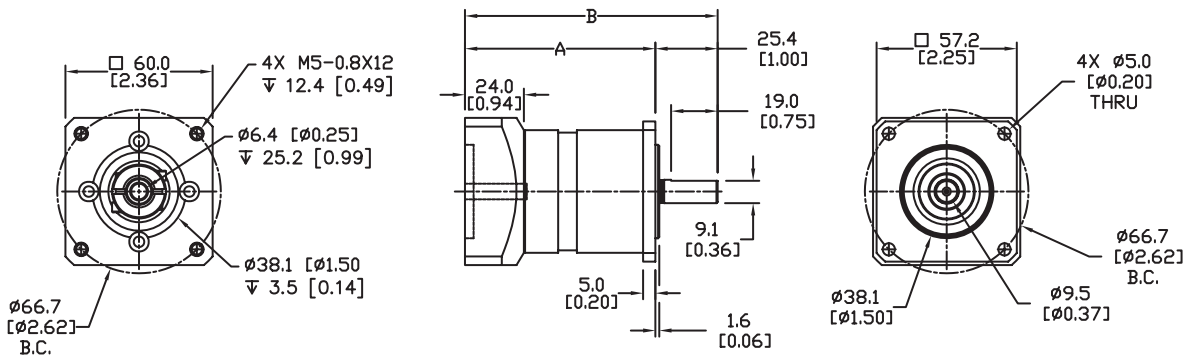
NOTE: SureGear PGCN gearboxes (gear reducers) are <u>not</u> designed for back driving.

SureGear Planetary Gearboxes for NEMA Motors

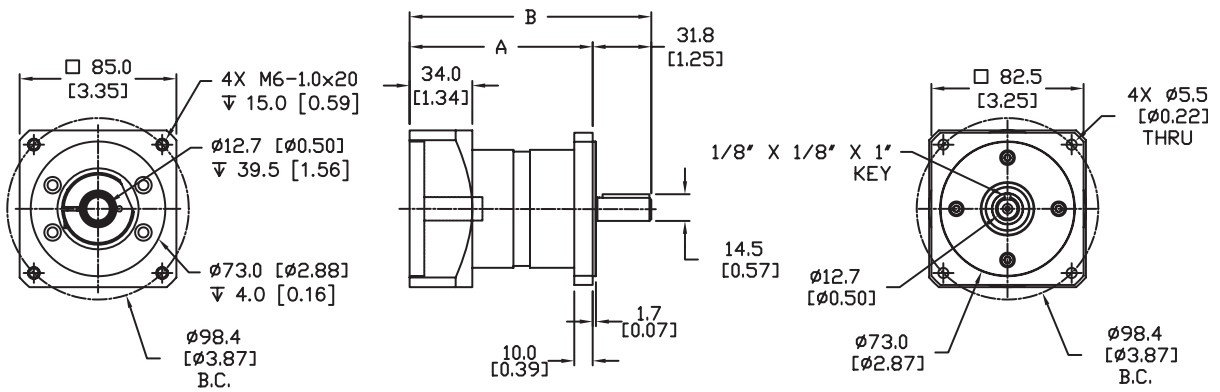
Dimensions (dimensions = mm [in])



PGCN17-xxxx SureGear Dimension Drawing



PGCN23-xxxx SureGear Dimension Drawing



PGCN34-xxxx SureGear Dimension Drawing

SureGear® NEMA Planetary Gearbox Dimensions (dimensions = mm [in])					
NEMA-17 Part Number	***PGCN17-055M***	***PGCN17-105M***	***PGCN17-255M***	***PGCN17-505M***	***PGCN17-1005M***
Dimension A	84.0 [3.31]		99.8 [3.93]		
Dimension B	109.4 [4.31]		125.2 [4.93]		
NEMA-23 Part Number	***PGCN23-0525***	***PGCN23-1025***	***PGCN23-2525***	***PGCN23-5025***	***PGCN23-10025***
Dimension A	77.6 [3.06]		95.2 [3.75]		
Dimension B	103.0 [4.06]		120.6 [4.75]		
NEMA-34 Part Number	***PGCN34-0550***	***PGCN34-1050***	***PGCN34-2550***	***PGCN34-5050***	***PGCN34-10050***
Dimension A	99.3 [3.91]		121.3 [4.78]		
Dimension B	131.1 [5.16]		153.0 [6.02]		

Sure gear Planetary Gearboxes for NEMA Motors

Accessories

Typical PGCN Accessory Bushings

Typical PGCN Accessory Screws

SureGear® NEMA Planetary Gearbox Accessories			
Part Number	***Price***	***Description***	***Fits SureGear NEMA Planetary Gearbox***
PGCN17-SK	$3.00	Mounting screws, replacement, for SureGear NEMA size 17 gearboxes (Package of 4)	PGCN17-xxxx
PGCN17-BSH5M	$6.50	Motor shaft bushing for SureGear NEMA size 17 gearboxes, fits 5mm diameter motor shaft	
PGCN17-BSH8M	$6.50	Motor shaft bushing for SureGear NEMA size 17 gearboxes, fits 8mm diameter motor shaft	
PGCN17-BSH9M	$6.50	Motor shaft bushing for SureGear NEMA size 17 gearboxes, fits 9mm diameter motor shaft	
PGCN17-BSH25	$6.50	Motor shaft bushing for SureGear NEMA size 17 gearboxes, fits 1/4 inch diameter motor shaft	
PGCN23-SK	$3.00	Mounting screws, replacement, for SureGear NEMA size 23 gearboxes (Package of 4)	PGCN23-xxxx
PGCN23-BSH8M	$6.50	Motor shaft bushing for SureGear NEMA size 23 gearboxes, fits 8mm diameter motor shaft	
PGCN23-BSH9M	$6.50	Motor shaft bushing for SureGear NEMA size 23 gearboxes, fits 9mm diameter motor shaft	
PGCN23-BSH25	$6.50	Motor shaft bushing for SureGear NEMA size 23 gearboxes, fits 1/4 inch diameter motor shaft	
PGCN23-BSH37	$6.50	Motor shaft bushing for SureGear NEMA size 23 gearboxes, fits 3/8 inch diameter motor shaft	
PGCN34-SK	$3.00	Mounting screws, replacement, for SureGear NEMA size 34 gearboxes (Package of 4)	PGCN34-xxxx
PGCN34-BSH9M	$6.50	Motor shaft bushing for SureGear NEMA size 34 gearboxes, fits 9mm diameter motor shaft	
PGCN34-BSH11M	$6.50	Motor shaft bushing for SureGear NEMA size 34 gearboxes, fits 11mm diameter motor shaft	
PGCN34-BSH37	$6.50	Motor shaft bushing for SureGear NEMA size 34 gearboxes, fits 3/8 inch diameter motor shaft	
PGCN34-BSH50	$6.50	Motor shaft bushing for SureGear NEMA size 34 gearboxes, fits 1/2 inch diameter motor shaft	

SureServo® AC Servo Systems

*Sure*Servo® AC servo systems

The SureServo family of brushless servo systems from AutomationDirect is fully digital and offers a rich set of features at dynamite prices. Choose from eight standard servo motors that are used in combination with one of three standard servo drives.

- Eight standard systems from 100W to 3kW
- Use with any AutomationDirect PLC; or any other host controller
- Drives feature on-board indexer and adaptive tuning modes
- Free setup software
- 30-day money-back guarantee
- Two year warranty

*Sure*Servo family

The SureServo family is designed for flexibility and quick implementation. SureServo drives accept a wide range of command sources:

- Built-in motion controller w/preset position, velocity or torque
- Select presets with switch inputs and/or the multi-drop Modbus serial interface
- Position commands with "pulse and direction" or "count up and down" format
- Analog voltage Velocity or Torque command
- Encoder follower

For configuration, tuning and diagnostics, use the drive's integrated keypad / display or take advantage of the free SureServo Pro® PC-based software. Tune the system easily with adaptive auto-tuning selections or a manual mode.

Adapt to diverse applications with configurable I/O, including eight digital inputs, five digital outputs, two analog monitors and a scalable encoder output.

Why use a servo?

The SureServo servo systems provide the highest possible level of performance for precise control of position, velocity, and torque. Compared to lower cost stepping systems, the SureServo products provide:

- More torque at higher speeds (up to 5,000 rpm)
- Broader range of power (up to 3kW)
- Higher response with closed-loop control (high hit rate without stalling or lost position)

Servo Systems	AutomationDirect Price/Part Number	VS.	Allen-Bradley Price/Part Number
Digital Servo Drive	$483.00 SVA-2040		$1,410.00 2098-DSD-005
100W Servo Motor with connectorized Leads	$322.00 SVL-201		$660.00 TLY-A130T-HK62AA
Breakout Board Kit for CN1 Control Interface	$84.00 ZL-SVC-CBL50 + ZL-RTB50		$316.05 2090-U3BK-D4401
10' Motor Feedback Cable	$56.00 SVC-EFL-010		$99.10 2090-CFBM6DF-CBAA03
10' Motor Power Cable	$33.50 SVC-PFL-010		$112.00 2090-CPBM6DF-16AA03
Configuration Software	FREE SV-PRO*		$85.02 2098-UWCPRG

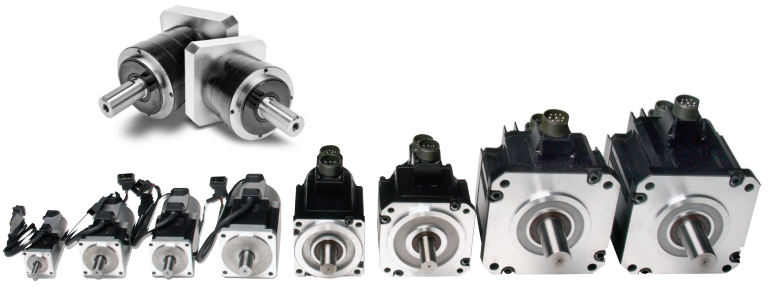
*SureServo Pro software is FREE when downloaded and is also available for $9.00 on a CD

Complete 1-axis 100W System $978.50 $2,682.17

All prices are U.S. list prices, AutomationDirect prices as of 4/17/2020.
The Allen-Bradley 100W system consists of part numbers shown in table above with prices from www.wernerelectric.com, www.todaycomponents.com 4/17/2020.

SureServo® AC Servo Systems

3 Standard Drives … 8 Standard Motors … 100W to 3kW … over 50 gearboxes (both inline and right angle) with four ratios



Drive features

- **Main Power and Control Power Inputs**
  - Main Power: 230 VAC 1-phase/3-phase (2kW and 3kW systems are 3-phase only)
  - Control Power: 230 VAC Single Phase; 50/60 Hz
- **Fully digital with up to 450 Hz velocity loop response**
- **Easy setup and diagnostics with built-in keypad/display or the *Sure*Servo Pro PC-based software**
- **Five-in-one command options include:**
  - ± 10V torque or velocity command
  - Pulse train or master encoder position command (accepts line driver or open collector) with electronic gearing
  - Built-in indexer for position control using 8 preset positions and/or position setpoint with serial Modbus
- **Tuning aids include inertia estimation and easy tuning for up to 10 levels of response**
- **Optically isolated digital inputs (8) and outputs (5), analog outputs for monitor signals (2), and line driver output for encoder (with scalable resolution)**

Motor features

- **Low inertia models:**
  - 100W, 200W, 400W, 750W and 1kW
  - Speeds up to 5,000 rpm.
- **Medium inertia models:**
  - 1kW, 2kW and 3kW
  - Speeds up to 3,000 rpm.
- **Square flange mounting with metric dimensions:**
  - 40, 60, 80, 100, 130 and 180 mm flanges
- **Permanent magnet 3-phase synchronous motor**
- **Keyless drive shafts support clamp-on style coupling**
- **Integrated encoder with 2,500 (x4) pulses/revolution plus marker pulse (once per revolution)**
- **Optional 24 VDC spring-set holding brakes**
- **Standard hook-up cables for motor power/brake and encoder**
- **Standard DIN-rail mounted ZIPLink break-out kit for the drive's CN1 connector (with screw terminal connections)**

*Sure*Servo tuning technology

The SureServo drive closes the loop on current, velocity, and position (depending on control mode selection). Proportional gain, integral gain, feed forward compensation, command low pass filter, and a notch filter for resonance suppression are available. There are three tuning modes:

1. "Manual Mode" for user-defined adjustments
2. "Easy Mode" for default settings over a wide range of programmed inertia with 10 response levels
3. "Auto Mode" for automatic adjustment using an estimated (or measured) value of inertia

*Sure*Servo built-in motion controller

While the SureServo drives can accept traditional commands from host controls, they can also provide their own internal motion control. For example, up to eight index moves can be pre-defined and stored in the drive and then selected and executed using up to three discrete inputs. The predefined index profiles can also be changed via serial communications. The motion can be incremental or absolute (homing routines are available in the drive) and acceleration can be linear or S-curve.

Multiple drives can be daisy-chained and addressed separately using the drive's serial port. This allows very simple yet powerful control of multi-axis processes that do not need precise path control but only precise starting and stopping points. Applications include press feeds, auger fillers, rotary tables, robots for pick and place, test or assembly operations, drilling, cutting, tapping, and similar applications using simple index moves for single or multi-axis motion.

*Sure*Servo Optional Holding Brake

Each SureServo motor can be ordered with an optional 24VDC spring-set holding brake that holds the motor in place when power is removed.

*Sure*Gear® Precision Gearboxes for Servo motors

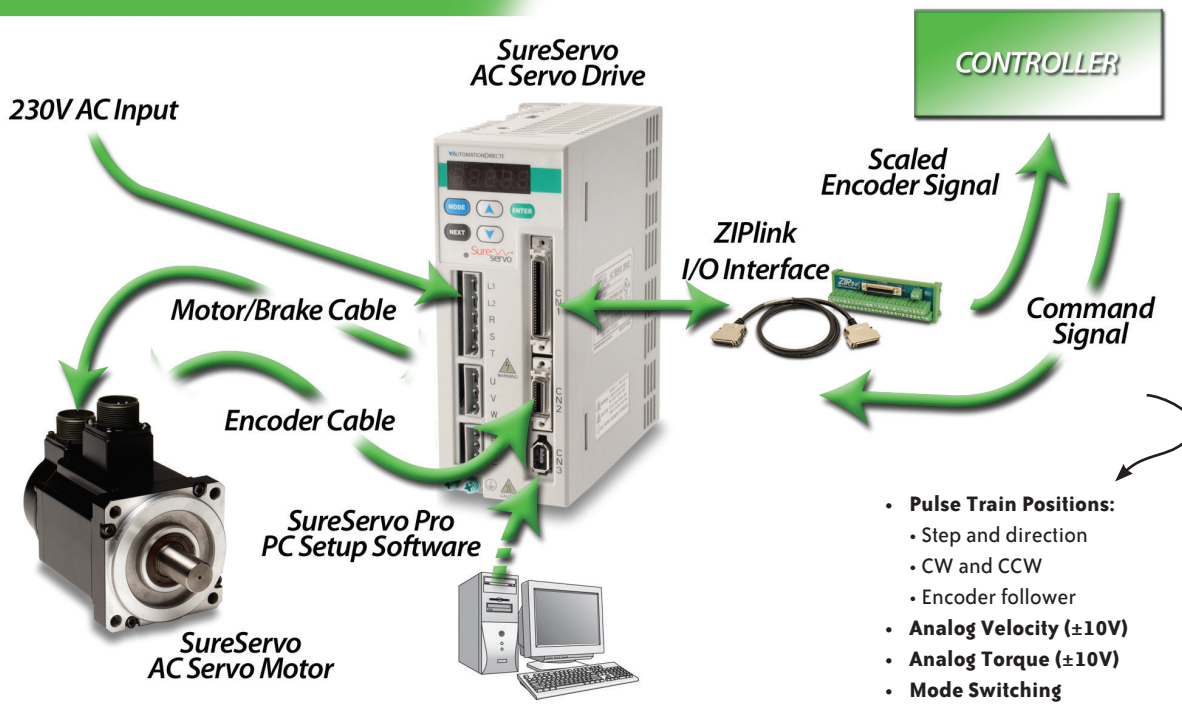
Inertia balancing issue in your design?

The SureGear PGA series easily mates to SureServo motors. Everything you need to mount your SureServo motor is included!

- Four gear ratios available (5, 10, 15, 25:1)
- Mounting hardware included for attaching to SureServo motors
- Industry-standard mounting dimensions
- Thread-in mounting style
- Best-in-class backlash (5 arc-min)
- 5-year warranty

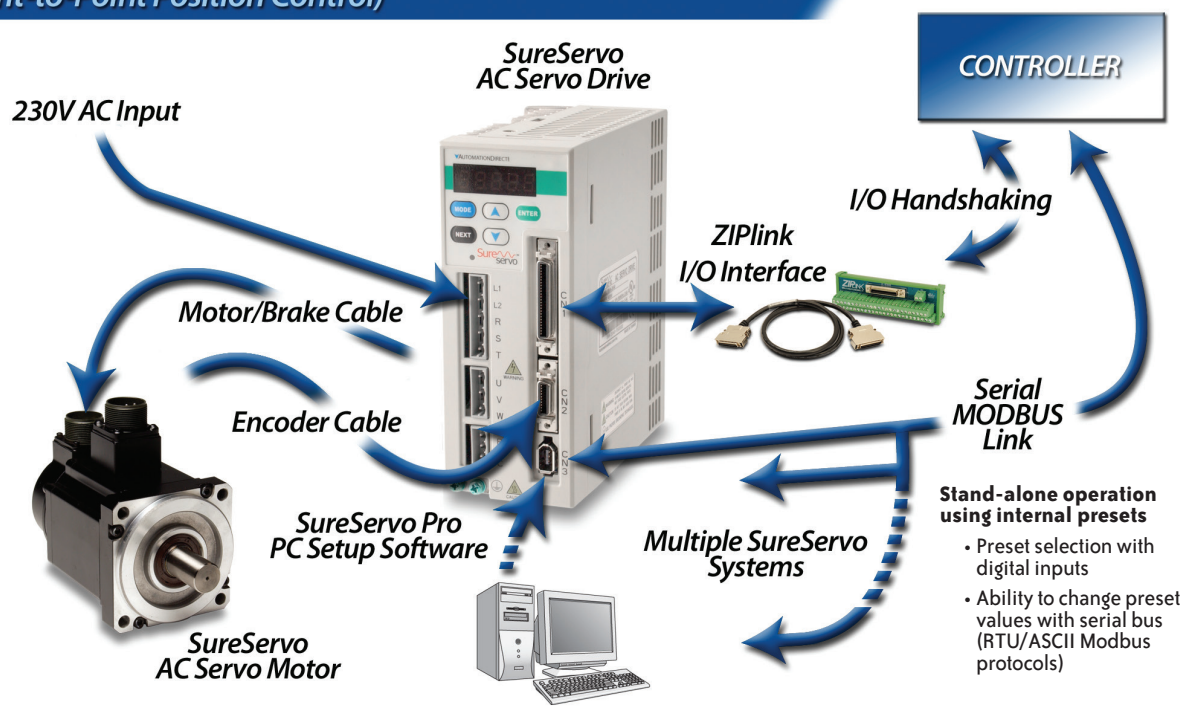
AC Servo Systems

Traditional Command Sources



- **Pulse Train Positions:**
  - Step and direction
  - CW and CCW
  - Encoder follower
- **Analog Velocity (±10V)**
- **Analog Torque (±10V)**
- **Mode Switching**
- **"On-the-Fly" Control Mode Switching**

Built-in Indexer
(Point-to-Point Position Control)



Stand-alone operation using internal presets

- Preset selection with digital inputs
- Ability to change preset values with serial bus (RTU/ASCII Modbus protocols)

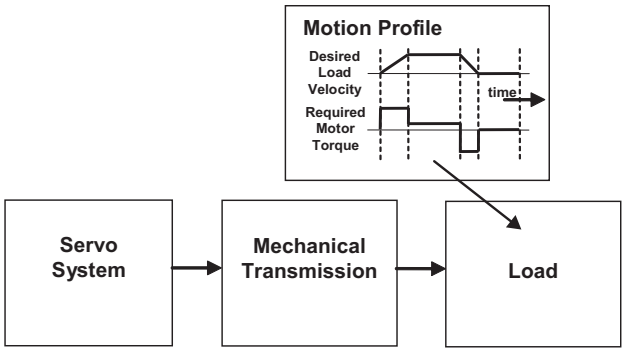
AC Servo Systems

How to select and apply *Sure*Servo systems

The primary purpose of the AC servo system is to precisely control the motion of the load. The most fundamental considerations in selecting the servo system are "reflected" load inertia, servo system maximum speed requirement, servo system continuous torque requirement, and servo system peak torque requirement. In a retrofit application, select the largest torque SureServo system that most closely matches these parameters for the system being replaced. In a new application, these parameters should be determined through calculation and/or measurement.

AutomationDirect has teamed with Copperhill Technologies to provide free servo-sizing software. "VisualSizer-SureServo" software will assist in determining the correct motor and drive for your application by calculating the reflected load inertia and required speed and torque based on the load configuration. "VisualSizer-SureServo" software can be downloaded from www.sureservo.com/downloads.htm.

Information for selecting SureServo systems is also included in Appendix B of the SureServo User Manual, which can be downloaded from the AutomationDirect.com website.



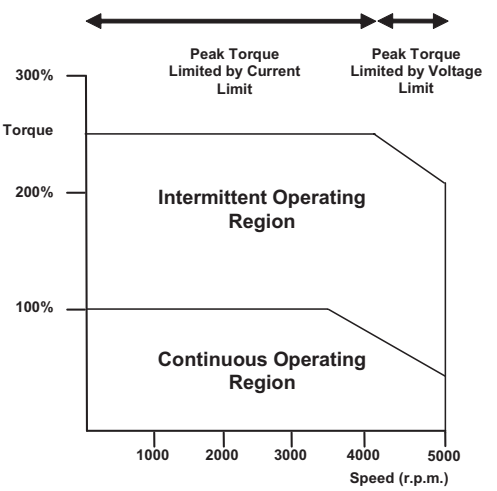
1. "Reflected" load inertia

The inertia of everything attached to the servo motor driveshaft needs to be considered and the total "reflected" inertia needs to be determined. This means that all elements of any mechanical transmission and load inertia need to be translated into an equivalent inertia as if attached directly to the motor driveshaft. The ratio of "reflected" load inertia to motor inertia needs to be carefully considered when selecting the servo system.

In general, applications that need high response or bandwidth will benefit from keeping the ratio of load inertia to motor inertia as low as possible and ideally under 10:1. Systems with ratios as high as 200:1 can be implemented, but corresponding lower bandwidth or responsiveness must be accepted. The servo response including the attached load inertia is determined by the servo tuning. SureServo systems may be tuned manually, adaptively with measurement of the load inertia, or set with default tuning based on a programmed value of load inertia.

2. Torque and speed

With knowledge of the motion profile and any mechanical transmission between the motor and load, calculations can be made to determine the required servo motor continuous torque, peak torque, and maximum motor speed. The required amount of continuous torque must fall inside the continuous operating region of the system torque-speed curve (you can check the continuous torque at the average speed of the motion profile). The required amount of peak torque must also fall within the servo system's intermittent operating region of the system torque-speed curve (you need to check this value at the required maximum speed).



SureServo AC Servo Systems

Application tip - coupling considerations

The SureServo motors have keyless shafts that are designed for use with clamp-on or compression style couplings. Couplings using keys and/or set screws should NOT be used with SureServo motors as they are likely to come loose or damage the motor shaft. "Servo-grade" clamp-on or compression style couplings are usually the best choice when you consider the stiffness, torque rating, and inertia. Higher stiffness (lb-in/radian) is needed for better response but there is a trade-off between the stiffness and the added inertia of the coupling. Concerning the torque rating of the coupling, use a safety factor of 1.25 over the SureServo peak torque requirement of your application.

Coupling Suppliers: www.sureservo.com/couplingconsiderations.htm

Mechanical transmissions

Common mechanical transmissions include leadscrews, rack & pinion mechanisms, conveyors, gears, and timing belts. The use of leadscrew, rack & pinion, or conveyor are common ways to translate the rotary motion of the servo motor into linear motion of the load. The use of a speed reducer such as a gearbox or timing belt can be very beneficial as follows:

1. Reduction of reflected load inertia

As a general rule, it is beneficial to keep the reflected load inertia as low as possible while using the full range of servo speed. SureServo systems can go up to 5,000 rpm for the low inertia motors and up to 3,000 rpm for the medium inertia motors.

Example: A gearbox reduces the required torque by a factor of the gear ratio, and reduces the reflected load inertia by a factor of the gear ratio squared. A 10:1 gearbox reduces output speed to 1/10, increases output torque 10 times, and decreases reflected inertia to 1/100.

However, when investigating the effect of different speed reduction ratios DO NOT forget to include the added inertia of couplings, gearbox, or timing belt pulleys. These added inertias can be significant, and can negate any inertia reduction due to the speed reduction.

2. Low speed and high torque applications

If the application requires low speed and high torque then it is common to introduce a speed reducer so that the servo system can operate over more of the available speed range. This could also have the added benefit of reducing the servo motor torque requirement which could allow you to use a smaller and lower cost servo system. Additional benefits are also possible with reduction in reflected inertia, increased number of motor encoder counts at the load, and increased ability to reject load disturbances due to mechanical advantage of the speed reducer.

3. Space limitations and motor orientation

SureServo motors can be mounted in any orientation, but the shaft seal should not be immersed in oil (open-frame gearbox, etc.). Reducers can possibly allow the use of a smaller motor or allow the motor to be repositioned. For example, some reducers would allow for in-line, right angle, or parallel mounting of the motor.

For more information, refer to the website listed below.

www.sureservo.com/mechanical_trans.htm

Ordering guide instructions

The following four pages are your ordering guide for the eight standard SureServo systems. Each of the eight standard systems has a torque-speed curve including the motor inertia for reference. This is the fundamental information that you need to select the servo drive and matching motor for your application.

Don't forget the cables and *ZIP*Link break-out board kit!

Included in the ordering guide are the available connection cables from the drive to motor in standard lengths from 10 to 60 feet. The break-out board kit includes a 0.5m (19 inch) cable for the CN1 I/O interface, and is listed for your convenience. We highly recommend all five items per system as a minimum. All cables are 100% factory tested to make your system installation as easy and quick as possible. See the Accessories section for regeneration resistors, AC line filters, fuses, contactors, and RF noise filters.

Sure servo AC Servo System Configuration

*Sure*Servo series drives and motors part numbering system

SV A - 2 04 0

Series
SV: *Sure*Servo AC servo

Component Type
A: Drive
L: Low inertia motor
M: Medium inertia motor

Component Option
0: Drive
Blank: Motor without brake
B: Motor with brake

Rated Output Power
01: 100W
02: 200W
04: 400W
07: 750W
10: 1000W
20: 2000W
30: 3000W

Nominal Input Voltage
2: 230VAC; 50/60 Hz

Here is what you will need to order a complete servo system:

NOTE: UNIT CAN BE PROGRAMMED VIA KEYPAD.
OPTIONAL PROGRAMMING SOFTWARE (FREE DOWNLOAD) AND OPTIONAL PROGRAMMING CABLE AVAILABLE.

NOTE: IF YOU NEED A GEAR BOX FOR YOUR CONFIGURATION, YOU CAN DO IT EASILY ONLINE:
HTTP://WWW.SURESERVO.COM/GEARBOX/SELECTOR

*Sure*Servo AC servo drive, motor, and cable combinations

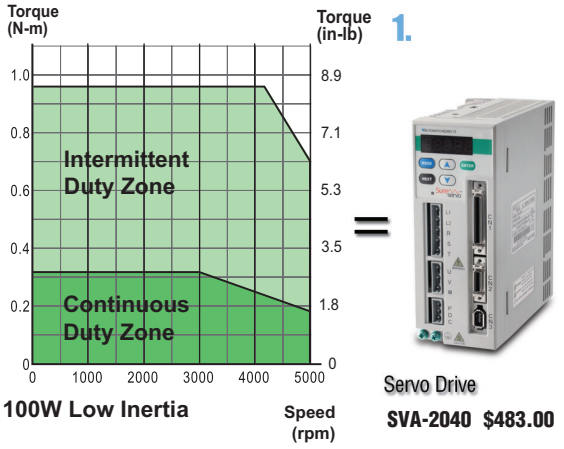
Inertia & Power		Drive and Motor			Power Cables (from Drive to Motor)				Encoder Feedback Cables				Miscellaneous	
Inertia	*Power*	*Servo Drive*	*Servo Motor without brake (note)*	*Servo Motor with brake (note)*	*10 ft*	*20 ft*	*30 ft*	*60 ft*	*10 ft*	*20 ft*	*30 ft*	*60 ft*	*ZIPLink I/O Interface*	*RS-422/485 Serial Communication Cable*
Low inertia	100W	SVA-2040	SVL-201	SVL-201B	SVC-PFL-010	SVC-PFL-020	SVC-PFL-030	SVC-PFL-060	SVC-EFL-010	SVC-EFL-020	SVC-EFL-030	SVC-EFL-060	ZL-RTB50 *and* ZL-SVC-CBL50 or ZL-SVC-CBL50-1 or ZL-SVC-CBL50-2	SVC-MDCOM-CBL
	200W		SVL-202	SVL-202B										
	400W		SVL-204	SVL-204B										
	750W	SVA-2100	SVL-207	SVL-207B										
	1000W		SVL-210	SVL-210B	SVC-PHM-010	SVC-PHM-020	SVC-PHM-030	SVC-PHM-060	SVC-EHH-010	SVC-EHH-020	SVC-EHH-030	SVC-EHH-060		
Medium inertia	1000W		SVM-210	SVM-210B										
	2000W	SVA-2300	SVM-220	SVM-220B	SVC-PHH-010	SVC-PHH-020	SVC-PHH-030	SVC-PHH-060						
	3000W		SVM-230	SVM-230B										

NOTE: EACH SERVO MOTOR REQUIRES AN ENCODER FEEDBACK CABLE AND A POWER CABLE.
THE MOTOR POWER CABLE INCLUDES BRAKE POWER WIRES FOR THE OPTIONAL MOTOR BRAKE.

SureServo® AC Servo System Configuration

For all systems:
Order programming software & programming cable if needed.
See pgs. tMNC-144 & 45.

100W Low Inertia System



1. Servo Drive
SVA-2040 $483.00

*Sure*Servo Motor

2.
SVL-201 $322.00
SVL-201B (w/brake) $554.00

Motor Power Cable (1)

3.
SVC-PFL-010 (10') $33.50
SVC-PFL-020 (20') $62.00
SVC-PFL-030 (30') $77.00
SVC-PFL-060 (60') $140.00

Motor Encoder Cable (1)

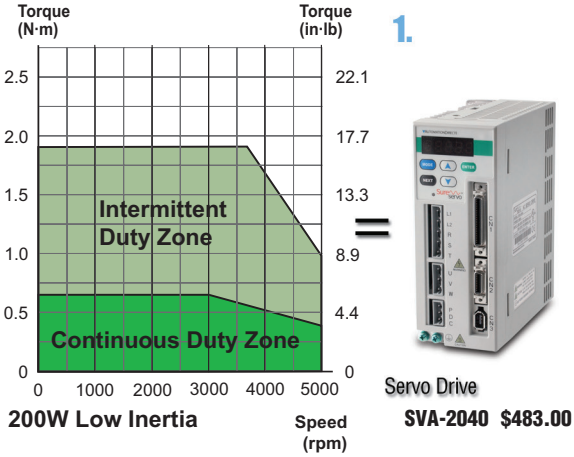
4.
SVC-EFL-010 (10') $56.00
SVC-EFL-020 (20') $90.00
SVC-EFL-030 (30') $105.00
SVC-EFL-060 (60') $134.00

*ZIP*Link I/O Interface

5.
ZL-RTB50 $51.00
and one cable below:
ZL-SVC-CBL50 (0.5m) $33.00
ZL-SVC-CBL50-1 (1m) $34.00
ZL-SVC-CBL50-2 (2m) $39.50

J_m= Motor Inertia = 0.000027 lb-in-s² (0.000003 kg - m²)

200W Low Inertia System



1. Servo Drive
SVA-2040 $483.00

*Sure*Servo Motor

2.
SVL-202 $415.00
SVL-202B (w/brake) $614.00

Motor Power Cable (1)

3.
SVC-PFL-010 (10') $33.50
SVC-PFL-020 (20') $62.00
SVC-PFL-030 (30') $77.00
SVC-PFL-060 (60') $140.00

Motor Encoder Cable (1)

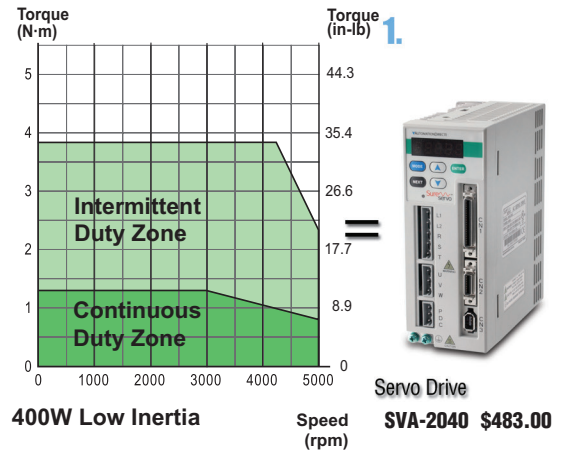
4.
SVC-EFL-010 (10') $56.00
SVC-EFL-020 (20') $90.00
SVC-EFL-030 (30') $105.00
SVC-EFL-060 (60') $134.00

*ZIP*Link I/O Interface

5.
ZL-RTB50 $51.00
and one cable below:
ZL-SVC-CBL50 (0.5m) $33.00
ZL-SVC-CBL50-1 (1m) $34.00
ZL-SVC-CBL50-2 (2m) $39.50

J_m= Motor Inertia = 0.00016 lb-in-s² (0.000018 kg - m²)

400W Low Inertia System



1. Servo Drive
SVA-2040 $483.00

*Sure*Servo Motor

2.
SVL-204 $508.00
SVL-204B (w/brake) $716.00

Motor Power Cable (1)

3.
SVC-PFL-010 (10') $33.50
SVC-PFL-020 (20') $62.00
SVC-PFL-030 (30') $77.00
SVC-PFL-060 (60') $140.00

Motor Encoder Cable (1)

4.
SVC-EFL-010 (10') $56.00
SVC-EFL-020 (20') $90.00
SVC-EFL-030 (30') $105.00
SVC-EFL-060 (60') $134.00

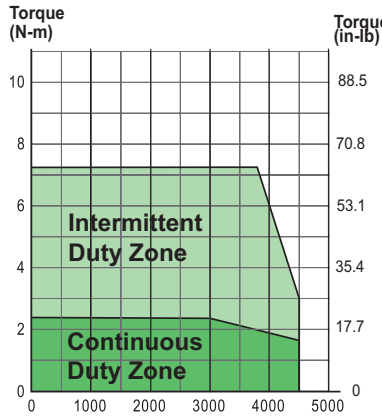
*ZIP*Link I/O Interface

5.
ZL-RTB50 $51.00
and one cable below:
ZL-SVC-CBL50 (0.5m) $33.00
ZL-SVC-CBL50-1 (1m) $34.00
ZL-SVC-CBL50-2 (2m) $39.50

J_m= Motor Inertia =0.0003 lb-in-s² (0 .000034 kg - m²)

SureServo® AC Servo System Configuration

750W Low Inertia System



For all systems:
Order programming software & programming cable if needed. See pgs. tMNC-145 & 45.

1.

Servo Drive
SVA-2100 $654.00

*Sure*Servo Motor

2.

SVL-207	$543.00
SVL-207B (w/brake)	$775.00

Motor Power Cable (1)

3.

SVC-PFL-010 (10')	$33.50
SVC-PFL-020 (20')	$62.00
SVC-PFL-030 (30')	$77.00
SVC-PFL-060 (60')	$140.00

Motor Encoder Cable (1)

4.

SVC-EFL-010 (10')	$56.00
SVC-EFL-020 (20')	$90.00
SVC-EFL-030 (30')	$105.00
SVC-EFL-060 (60')	$134.00

*ZIP*Link I/O Interface

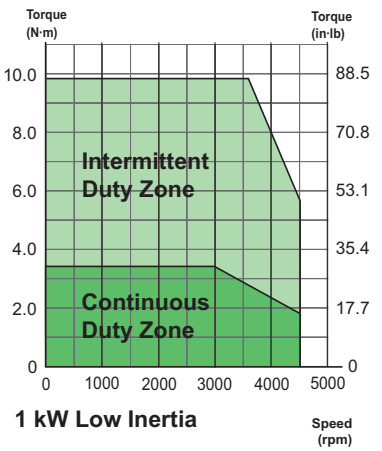
5.

ZL-RTB50 $51.00
and one cable below:

ZL-SVC-CBL50 (0.5m)	$33.00
ZL-SVC-CBL50-1 (1m)	$34.00
ZL-SVC-CBL50-2 (2m)	$39.50

J_m= Motor Inertia = .00096 lb-in-s² (0.000108 kg - m²)

1 kW Low Inertia System



1.

Servo Drive
SVA-2100 $654.00

*Sure*Servo Motor

2.

SVL-210	$647.00
SVL-210B (w/brake)	$970.00

Motor Power Cable (1)

3.

SVC-PHM-010 (10')	$103.00
SVC-PHM-020 (20')	$111.00
SVC-PHM-030 (30')	$186.00
SVC-PHM-060 (60')	$219.00

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10')	$97.00
SVC-EHH-020 (20')	$109.00
SVC-EHH-030 (30')	$122.00
SVC-EHH-060 (60')	$159.00

*ZIP*Link I/O Interface

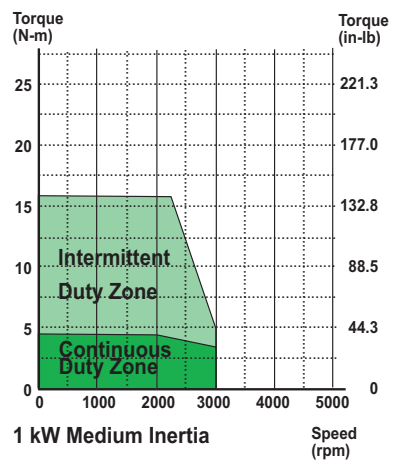
5.

ZL-RTB50 $51.00
and one cable below:

ZL-SVC-CBL50 (0.5m)	$33.00
ZL-SVC-CBL50-1 (1m)	$34.00
ZL-SVC-CBL50-2 (2m)	$39.50

J_m= Motor Inertia = .0023 lb-in-s² (0.00026 kg - m²)

1 kW Medium Inertia System



1.

Servo Drive
SVA-2100 $654.00

*Sure*Servo Motor

2.

SVM-210	$832.00
SVM-210B (w/brake)	$1,156.00

Motor Power Cable (1)

3.

SVC-PHM-010 (10')	$103.00
SVC-PHM-020 (20')	$111.00
SVC-PHM-030 (30')	$186.00
SVC-PHM-060 (60')	$219.00

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10')	$97.00
SVC-EHH-020 (20')	$109.00
SVC-EHH-030 (30')	$122.00
SVC-EHH-060 (60')	$159.00

*ZIP*Link I/O Interface

5.

ZL-RTB50 $51.00
and one cable below:

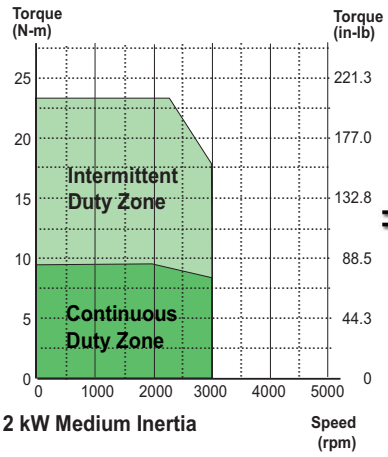
ZL-SVC-CBL50 (0.5m)	$33.00
ZL-SVC-CBL50-1 (1m)	$34.00
ZL-SVC-CBL50-2 (2m)	$39.50

J_m= Motor Inertia = .0053 lb-in-s² (0.000598 kg - m²)

AC Servo System Configuration

For all systems:
Order programming software & programming cable if needed.
See pgs. 44 & 45.

2 kW Medium Inertia System



2 kW Medium Inertia

1.

Servo Drive
SVA-2300 $1,091.00

*Sure*Servo Motor

2.

SVM-220	**$879.00**
SVM-220B (w/brake)	**$1,202.00**

Motor Power Cable (1)

3.

SVC-PHH-010 (10')	**$123.00**
SVC-PHH-020 (20')	**$161.00**
SVC-PHH-030 (30')	**$199.00**
SVC-PHH-060 (60')	**$324.00**

Motor Encoder Cable (1)

4.

SVC-EHH-010 (10')	**$97.00**
SVC-EHH-020 (20')	**$109.00**
SVC-EHH-030 (30')	**$122.00**
SVC-EHH-060 (60')	**$159.00**

*ZIP*Link I/O Interface

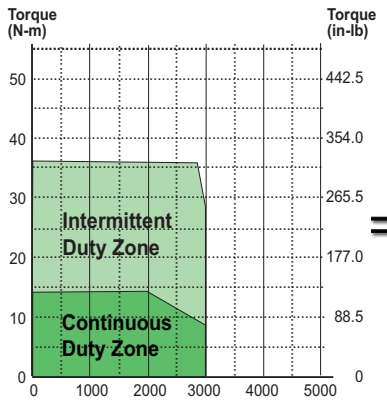
5.

ZL-RTB50 $51.00
and one cable below:

ZL-SVC-CBL50 (0.5m)	**$33.00**
ZL-SVC-CBL50-1 (1m)	**$34.00**
ZL-SVC-CBL50-2 (2m)	**$39.50**

J_m= Motor Inertia = .014 lb-in-s² = (0.00158 kg - m²)

3 kW Medium Inertia System



3 kW Medium Inertia

1.

Servo Drive
SVA-2300 $1,091.00

*Sure*Servo Motor

2.

SVM-230	**$1,341.00**
SVM-230B (w/brake)	**$1,530.00**

Motor Power Cable (1)

3.

SVC-PHH-010 (10')	**$123.00**
SVC-PHH-020 (20')	**$161.00**
SVC-PHH-030 (30')	**$199.00**
SVC-PHH-060 (60')	**$324.00**

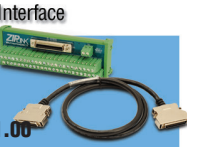
Motor Encoder Cable (1)

4.

SVC-EHH-010 (10')	**$97.00**
SVC-EHH-020 (20')	**$109.00**
SVC-EHH-030 (30')	**$122.00**
SVC-EHH-060 (60')	**$159.00**

*ZIP*Link I/O Interface

5.



ZL-RTB50 $51.00
and one cable below:

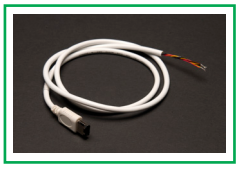
ZL-SVC-CBL50 (0.5m)	**$33.00**
ZL-SVC-CBL50-1 (1m)	**$34.00**
ZL-SVC-CBL50-2 (2m)	**$39.50**

J_m= Motor Inertia = 0.038 lb-in-s² = (0.00433 kg - m²)

NOTE: ALL MOTOR POWER CABLES INCLUDE BRAKE POWER WIRES FOR THE OPTIONAL MOTOR BRAKE.

*Sure*Servo Communications Cables for Muti-drop Networks

Product	Price	Description
SVC-MDCOM-CBL	$27.50	RS-422/485 serial communication cable for use with multidrop networks; 3ft length; IEEE 1394 plug to unterminated wires; compatible with all *Sure*Servo systems. Facilitates connection between the *Sure*Servo drive serial port and host controllers.
SVC-232RJ12-CBL-2 *	$8.25	*ZIP*Link SureServo Drives cable with 6-pin RJ12 connector to a 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. For RS-232 connection to all *Sure*Servo amplifiers.
SVC-485RJ12-CBL-2 *	$10.00	*ZIP*Link SureServo amplifier communication cable, RJ12 male to 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. Cable used in conjunction with *ZL-CDM-RJ12xxx* distribution module can access a compatible RS-485 device network.
SVC-485HD15-CBL-2 *	$8.75	*ZIP*Link SureServo Drives cable with a HD 15-pin male to a 6-pin IEEE 1394 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. For RS-485 connection to all *Sure*Servo amplifiers.
**** Refer to the ZIPLinks Wiring Solutions section for complete information regarding the ZIPLink cables.***		



AC Servo System Software

*Sure*Servo Pro configuration software

SureServo Pro is an optional free downloadable configuration software package for the SureServo drives. With SureServo Pro installed, the personal computer may be directly connected to the servo drive's serial port via the PC's RS-232 serial port*. A six-foot configuration cable (SVC-PCCFG-CBL, $19.50) is available to make the connection between the drive serial port and PC DB-9 serial port simple.

***Note: Use our USB-RS232 converter cable in conjunction with the SVC-PCCFG-CBL cable on PCs having only USB ports.**

Features

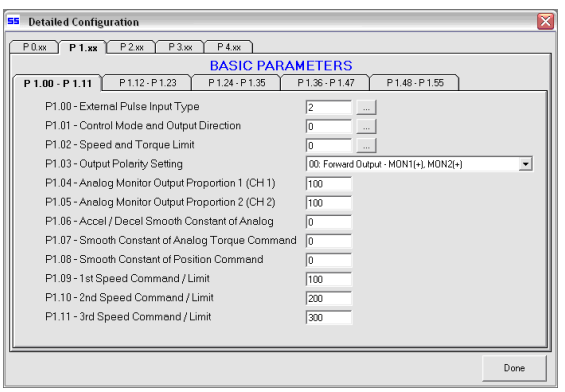
- Quick Start - The basic setup when you have limited time and just want to get up and running ASAP.
- Maintenance keypad allows the user to operate the servo system from the PC. This is a great aid during start-up to allow the servo to perform some basic motion and to check the I/O.
- Detailed - The complete setup for all the drive parameters
- Tune and check the servo response live using the scope feature.
- Upload and download the drive setup. Save the drive setup as a file for future use.
- Edit the drive setup
- View all drive faults
- Trend drive variables in real time

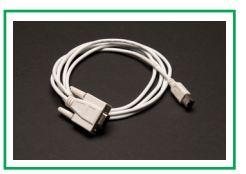
Parameter views

The SureServo Pro configuration tool logically organizes over 165 servo drive parameters into five tabbed groups. Each parameter has a factory default that usually allows the servo to run "out-of-the-box".

The parameters can be easily changed with available options or setting ranges displayed. Tuning modes and parameters can also be changed using SureServo Pro. After the parameters have been defined, the complete setup can be stored and archived. Drive configurations can be uploaded, edited, saved, and downloaded as often as necessary.

Parameter View Example Screen - Basic Parameters





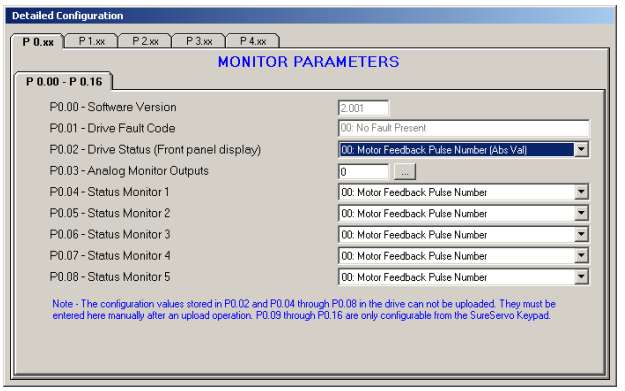
*Sure*Servo Software and Configuration Cables

Product	Price	Description
SV-PRO	Free	*Sure*Servo Pro configuration software for use with all *Sure*Servo servo systems. FREE download from www.sureservo.com or www.automationdirect.com websites.
SV-PRO	$9.25	CD with *Sure*Servo Pro configuration software
SVC-PCCFG-CBL	$24.00	Six-foot RS-232 communications cable; connects servo drive serial port to PC DB-9 serial port. *For PCs having only USB ports, use our USB-RS232 converter cable in conjunction with the SVC-PCCFG-CBL cable.*
SVC-485CFG-CBL-2	$11.50	*ZIP*Link *Sure*Servo amplifier configuration cable, 6-pin IEEE 1394 connector to RJ45 connector, shielded, twisted pair, 2.0 meter (6.6 ft.) length. *Use this cable in conjunction with our USB-485M serial adapter to connect any SureServo amplifier to a PC. Eliminates the need to reprogram networked servo drives from RS485 to RS232 when connecting to a PC.*
**** Refer to the ZIPLinks Wiring Solutions section for complete information regarding ZIPLink cable SVC-485CFG-CBL-2.***		

SureServo® AC Servo System Software

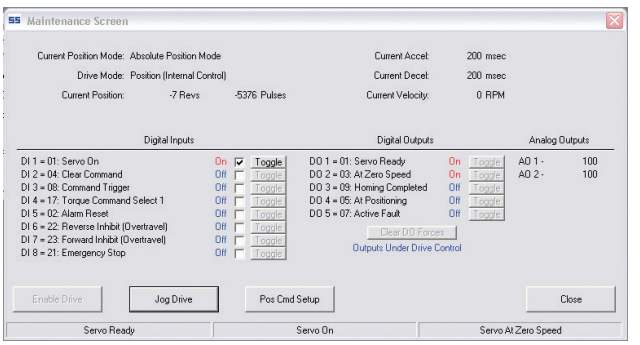
*Sure*Servo Pro configuration software - Parameter views (continued)

Parameter View Example Screen - Monitor Parameters

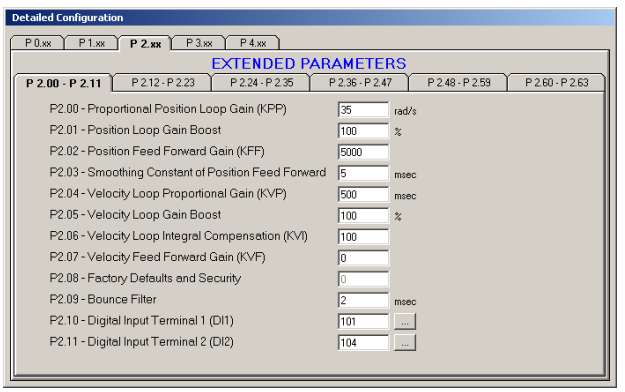


Maintenance screen

A maintenance keypad allows the user to operate the servo system from the PC. This is a great aid during start-up to allow the servo to perform some basic motion and to check the I/O.

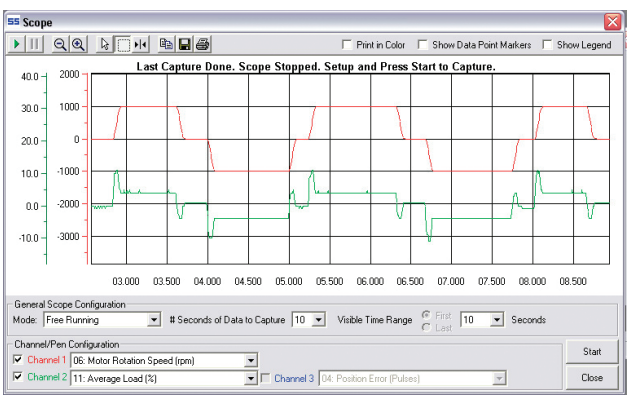


Parameter View Example Screen - Extended Parameters

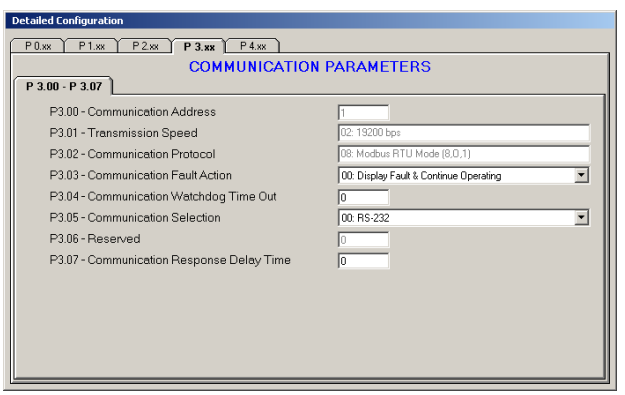


Scope

SureServo Pro includes a powerful scope function that allows the user to have as many as three channels of data displayed simultaneously. Each channel has a drop-down table to select the data to be displayed. The scope also has a trigger mode and timebase selection. This function is a valuable tool for tuning SureServo drives.



Parameter View Example Screen - Communication Parameters



SureServo® AC Servo Drive Specifications

Servo drive overview

Keypad
Five Function keys:

MODE:	Press to select or change mode
NEXT:	Press to shift left
UP:	Press to increase values
DOWN:	Press to decrease values
ENTER:	Press to enter value

LED Display
The LED display has 5 full digits and is used to indicate servo status and alarms

Power On LED
Main power is ON

Control Power Terminal
Single-phase power 230 VAC, 50/60 Hz is connected to L1 and L2

Main Power Terminal
Three-phase power 230 VAC, 50/60 Hz is connected to R, S and T
(Single-phase power 230 VAC 50/60 Hz may be connected to R and S for the low inertia systems)

Motor Output Terminal
The servo motor power cable is connected to U, V and W. Use our factory made and tested cables available in 10, 20, 30 or 60 foot lengths for easy connection.

Regenerative Resistor Terminal
1. When the internal regenerative resistor is used, the P and D terminal are connected together while the P and C connection is left open.
2. When an external regenerative resistor is used, it is connected across the P and C terminals while the P and D connection is left open. Use our factory approved resistors for "sure" results.

Ground Terminals

I/O Interface
50-pin connector for interfacing the host controller (such as *Direct*LOGIC PLC) and other types of I/O signals.

Use our *ZIP*Link kit which provides DIN-rail mounted screw terminals for easy connection.
- Command inputs:
  - Pulse and Direction
  - Encoder Follower
  - Analog Velocity/Torque
- (8) Digital Inputs
- (5) Digital Outputs
- (2) Analog Monitors
- Encoder Output (scalable)
  A+, A-, B+, B-, Z+, Z-

Encoder Interface
20-pin connector for interfacing the servo motor encoder.
Use our factory-made and tested cable available in 10, 20, 30 or 60 foot lengths for easy connection.

Serial Communication Interface
6-pin RS-485/422/232 interface to personal computer with *Sure*Servo Pro set-up software or host controller with Modbus RTU/ASCII protocol. Use our factory-made cables for easy connection to the PC or the host controller.

UL CERTIFIED SAFETY US-CA E12345

*Sure*Servo systems run "out-of-the-box"… but may be reconfigured for many applications!

The SureServo drives are fully digital and include over 165 programmable parameters. For convenience, the parameters are grouped into five categories:

1) Monitor parameters
2) Basic parameters
3) Extended parameters
4) Communication parameters
5) Diagnostic parameters.

All parameters have commonly used default values which allow you to operate the SureServo system "out-of-the-box". However, the programmability and large variety of parameters make the SureServo systems suitable for a very broad range of applications, including almost all types of general purpose industrial machinery such as assembly, test, packaging, machine tool, and robotics.

SureServo® AC Servo Drive Specifications

Servo drive specifications

General Drive Specifications	
Permissible Frequency	50/60 Hz ±5%
Encoder Resolution / Feedback Resolution	2500 lines / 10000 ppr
Control of Main Circuit	SVPWM (Space Vector Pulse Width Modulation) Control
Tuning Modes	Easy / Auto / Manual
Dynamic Brake	Built-in control
Analog Monitor Outputs (2)	Monitor signal can be set by parameters (Output voltage range: ±8V; Resolution: 12.8 mV/count)
8 Programmable Digital Inputs (45 selectable functions)	Servo enable, Alarm reset, Gain switching, Pulse counter clear, Fault stop, CW/CCW over-travel
	Internal parameter selection, Torque limit activation, Velocity limit activation, Control mode selection
Scalable Encoder Output	Encoder signal output A, /A, B, /B, Z /Z, Line Driver
5 Programmable Outputs (9 selectable indicators)	Servo ready, Servo On, Low velocity, Velocity reached, In Position, Torque limiting, Servo fault, Electromagnetic brake control, Home search completed
Communication Interface	RS-232 / RS-485 / RS-422 / Modbus ASCII & RTU up to 115k Baud
Protective Functions	Overcurrent, Overvoltage, Undervoltage, Overload, Excessive velocity/position error, Encoder error, Regeneration error, Communication error
Installation Site	Indoor location (free from direct sunlight), no corrosive liquid and gas (far away from oil mist, flammable gas, dust)
Altitude	1000m [3281 ft] above sea level – maximum
Operating Temperature	0 to 55 °C [32 to 131 °F] (If operating temperature is above 55°C, forced cooling is required). For long-term reliability, the ambient temperature of *Sure*Servo systems should be under 45°C (113°F).
Storage Temperature	-20° to 65°C (-4° to 149°F)
Humidity	0 to 90% (non-condensing)
Vibration	9.81 m/s^2 (1G) less than 20Hz, 5.88 m/s^2 (0.6G) 20 to 50 Hz
Protection	IP 20
Agency Approvals	CE; UL Certified (U.S. and Canada)

Sure servo® AC Servo Drive Specifications

Servo drive specifications (continued)

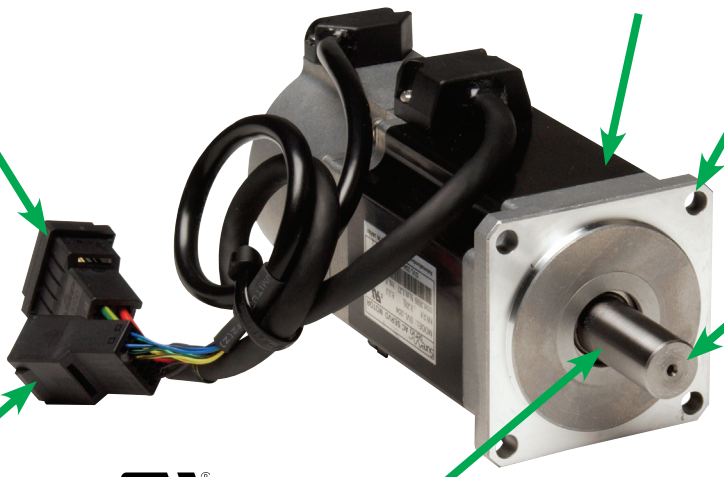
Model and Mode Specific Drive Specifications										
	AC Servo Model		**SVA-2040**			**SVA-2100**			**SVA-2300**	
	Price		$483.00			$667.00			$1,113.00	
	Voltage Phase		Single-phase or Three-phase						Three-phase	
	Voltage and Frequency Range		3-phase: 170~255 VAC @ 50/60 Hz ±5%; 1-phase: 200~255 VAC @ 50/60 Hz ±5%						170~255 VAC @ 50/60 Hz ±5%	
	Main Circuit Input Current	**Single Phase**	3.4A @ 400W			8.0A @ 1kW			–	
		Three Phase	2.6A @ 400W			6.2A @ 1kW			13.6A @ 3kW	
	Main Circuit Inrush Current		44A			77A			87A	
	Main Circuit Power Cycling		Maximum 1 power cycle per minute							
	Control Circuit Current and Voltage		43 mA @ 200~255 VAC, 1 phase							
	Control Circuit Inrush Current		32A maximum							
	Cooling System		Natural Air Circulation			Internal Cooling Fan				
	Drive Heat Loss *	**Motor driven ***	SVL-201(B)	SVL-202(B)	SVL-204(B)	SVL-207(B)	SVL-210(B)	SVM-210(B)	SVM-220(B)	SVM-230(B)
		Heat Loss	12W	15W	20W	35W	45W	50W	75W	80W
	Weight		1.5 kg [3.3 lb]			2kg [4lb]			3kg [7lb]	
Position Control Mode	**Max. Input Pulse Frequency**		Max. 500 kpps (Line driver); Max. 200 kpps (Open collector)							
	Pulse Type		Pulse + Direction, A phase + B phase Quadrature, CCW pulse + CW pulse							
	Command Source		External pulse train / Onboard indexer							
	Smoothing Strategy		Low-pass and P-curve filter							
	Electronic Gear		Electronic gear N/M multiple; N: 1~32767, M: 1~32767(1/50<N/M<200)							
	Torque Limit Operation		Set by parameters or by analog input							
	Feed Forward Compensation		Set by parameters							
Velocity Control Mode	**Analog Input Command**	**Voltage Range**	Bipolar ±10 VDC							
		Input Resistance	10 k							
		Time Constant	2.2 µs							
		Resolution	(Varies with input voltage) 13 bits @ 0V~1V; 13~10 bits @ 1V~2V; 10 bits @ 2V~10V							
	Speed Control Range		1:5000							
	Command Source		External analog signal / Onboard indexer							
	Smoothing Strategy		Low-pass and S-curve filter							
	Torque Limit Operation		Set by parameters or via analog input							
	Frequency Response Characteristic		Maximum 450 Hz							
	Speed Accuracy (at rated rotation speed)		0.01% or less at 0 to 100% load fluctuation							
			0.01% or less at ±10% power fluctuation							
			0.01% or less at 0 to 50°C ambient temperature fluctuation							
Torque Control Mode	**Analog Input Command**	**Voltage Range**	Bipolar ±10 VDC							
		Input Resistance	10 kΩ							
		Time Constant	2.2 µs							
		Resolution	10 bits							
	Permissible Time for Overload		8 sec. under 200% rated output							
	Command Source		External analog signal / Onboard indexer							
	Smoothing Strategy		Low-pass filter							
	Speed Limit Operation		Set by parameters or via analog input							

** Drive heat loss varies depending upon which motor is connected to the drive.*

Sure servo® AC Servo Motor Specifications

Servo motor overview

750W and below



Motor Power and Brake Connector
1-foot cable with
6-position connector
(Not liquid tight)

Encoder Connector
1-foot cable with
9-position connector
(Not liquid tight)

IP65 Housing

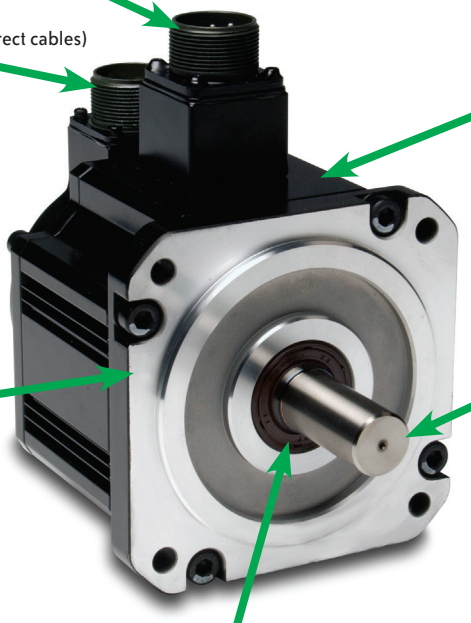
Low Inertia Motors
- 100W 40 mm flange
- 200W 60 mm flange
- 400W 60 mm flange
- 750W 80 mm flange

Keyless Shafts
- 100W 8 mm diameter
- 200W 14 mm diameter
- 400W 14 mm diameter
- 750W 19 mm diameter

***Without* Shaft Seal**
(not liquid tight)

All SureServo motors have keyless shafts for use with servo-grade clamp or compression couplings.

1 kW and above



Motor Power and Brake Connector
(Liquid tight when using AutomationDirect cables)

Encoder Connector
(Liquid tight when using AutomationDirect cables)

IP65 Housing

Low and Medium Inertia Motors
Low Inertia Model
- 1 kW 100 mm flange

Medium Inertia Models
- 1 kW 130 mm flange
- 2 kW 180 mm flange
- 3 kW 180 mm flange

Keyless Shafts
Low Inertia Model
- 1 kW 22 mm diameter

Medium Inertia Models
- 1 kW 22 mm diameter
- 2 kW 35 mm diameter
- 3 kW 35 mm diameter

***With* Shaft Seal**
(liquid tight)

SureServo® AC Servo Motor Specifications

Motor Specifications									
Inertia Range			Low					Medium		
Model Name: Sxx-xxx			SVL-201	SVL-202	SVL-204	SVL-207	SVL-210	SVM-210	SVM-220	SVM-230
Price			$322.00	$415.00	$508.00	$543.00	$647.00	$832.00	$879.00	$1,341.00
Model with brake: Sxx-xxxB			SVL-201B	SVL-202B	SVL-204B	SVL-207B	SVL-210B	SVM-210B	SVM-220B	SVM-230B
Price			$554.00	$614.00	$716.00	$775.00	$970.00	$1,156.00	$1,202.00	$1,530.00
Rated output power		W	100	200	400	750	1000	1000	2000	3000
Rated torque		N·m	0.32	0.64	1.27	2.39	3.3	4.8	9.4	14.3
		lb·in	2.8	5.7	11.2	21.2	29.2	42.5	83.2	126.6
Maximum torque		N·m	0.95	1.91	3.82	7.16	9.9	15.7	23.5	35.8
		lb·in	8.4	16.9	33.8	63.4	87.6	138.9	208.0	316.8
Rated speed		rpm	3000					2000		
Max. speed		rpm	5000			4500		3000		
Rated current		A	1.1	1.7	3.3	5.0	6.8	5.6	13.1	17.4
Max. current		A	3.0	4.9	9.3	14.1	18.7	17.6	31.4	42.3
Drive input current		1 phase A	1.0	1.7	3.4	5.9	8.0	8.0	-	-
		3 phase A	0.8	1.3	2.6	4.7	6.2	6.2	9.1	13.6
Max. radial shaft load		N	78.4	196		343	490		784	
		lb	18	44		77	110		176	
Max. thrust shaft load		N	39.2	68.6		98			392	
		lb	9	15		22			88	
Brake	Voltage	VDC	24							
	Current	ADC	0.21	0.38		0.4	0.75	0.83	1.45	1.67
	Holding Torque	N·m	0.32	1.27		2.55	9.3	7.5	32.0	50.0
		lb·in	2.83	11.24		22.57	82.3	66.38	283.2	442.5
Rotor inertia w/o brake		$kg·m^2$	0.03E-4	0.18E-4	0.34E-4	1.08E-4	2.6E-4	5.98E-4	15.8E-4	43.3E-4
		$lb·in·s^2$	0.27E-4	1.59E-4	3.0E-4	9.56E-4	23.0E-4	52.9E-4	139.8E-4	383.2E-4
Rotor inertia with brake		$kg·m^2$	0.06E-4	0.28E-4	0.44E-4	1.32E-4	3.1E-4	8.8E-4	27.8E-4	56.3E-4
		$lb·in·s^2$	0.53E-4	2.48E-4	3.9E-4	11.7E-4	27.4E-4	77.9E-4	246.0E-4	498.3E-4
Mechanical time constant		ms	0.6	0.9	0.7	0.6	1.7	1.4	1.6	0.9
Static friction torque		N·m	0.02	0.04		0.08	0.49	0.29	0.98	
Torque constant-KT		N·m/A	0.32	0.39	0.4	0.5	0.56	0.91	0.77	0.86
Voltage constant-KE		V/rpm	33.7E-3	41.0E-3	41.6E-3	52.2E-3	58.4E-3	95.71E-3	81.1E-3	90.5E-3
Armature resistance		Ω	20.3	7.5	3.1	1.3	2.052	1.98	0.6	0.162
Armature inductance		mH	32	24	11	6.3	8.4	13.2	6.1	2.3
Electrical time constant		ms	1.6	3.2	3.2	4.8	4.1	6.7	10.1	14.2
Motor Type			Brushless, AC, permanent magnet [Neodymium (Nd), Iron (Fe), Boron (B)]							
Insulation class			Class F							
Insulation resistance			>100 MΩ , 500 VDC							
Insulation strength			1500 VAC, 50 Hz, 60 seconds							
Ambient temperature range			0 to 40°C (32°F to 104°F)							
Operating temperature *(measured case temperature)*			70°C (158°F)							
Maximum operating temperature *(measured case temperature)*			70°C + 40°C = 110°C (230°F)							
Storage temperature			-20 to 65°C (-4 to 149°F)							
Operating humidity			20 to 90% RH (non-condensing)							
Storage humidity			20 to 90% RH (non-condensing)							
Vibration / Shock			2.5G / 5.0G							
Environmental rating			IP65 motor body; IP40 shaft; IP20 connector				IP65 (requires *Sure*Servo cables)			
Weight without brake		kg	0.5	0.9	1.3	2.5	4.7	4.8	12.0	17.0
		lb	1.1	1.98	2.87	5.5	10.36	10.58	26.46	37.48
Weight with brake		kg	0.7	1.4	1.8	3.4	6.3	7.5	19.0	24.0
		lb	1.54	3.09	3.97	7.5	13.89	16.53	41.89	52.9
Agency Approvals			CE; UL recognized (U.S. and Canada)							

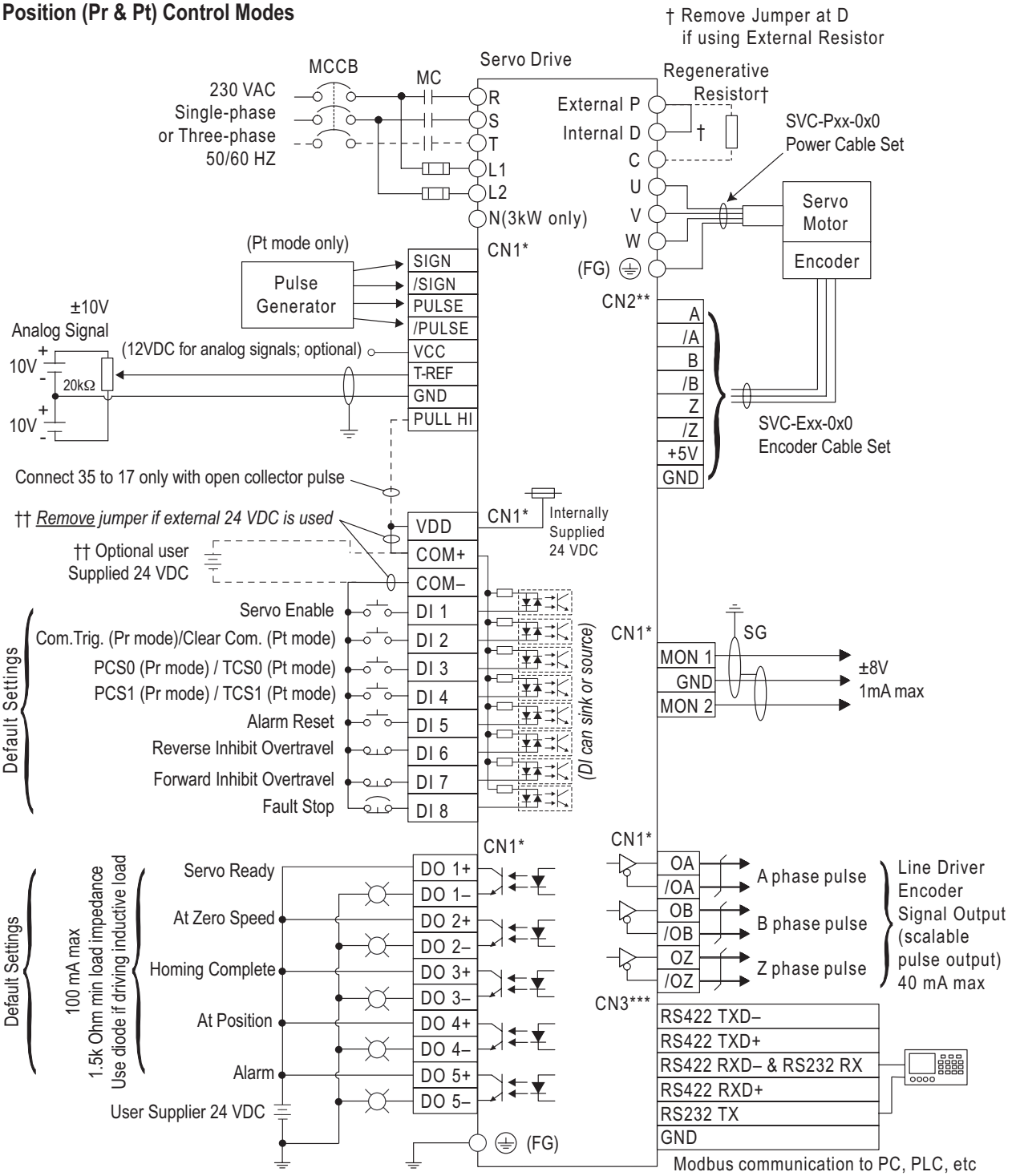
NOTE: U.S. customary units are for reference only.

Sure servo AC Servo System Wiring

Standard wiring examples

This wiring diagram shows basic wiring only, and additional wiring configurations are possible for some I/O. Refer to the "Installation and Wiring" chapter of the User Manual for more detailed wiring information.

Position (Pr & Pt) Control Modes



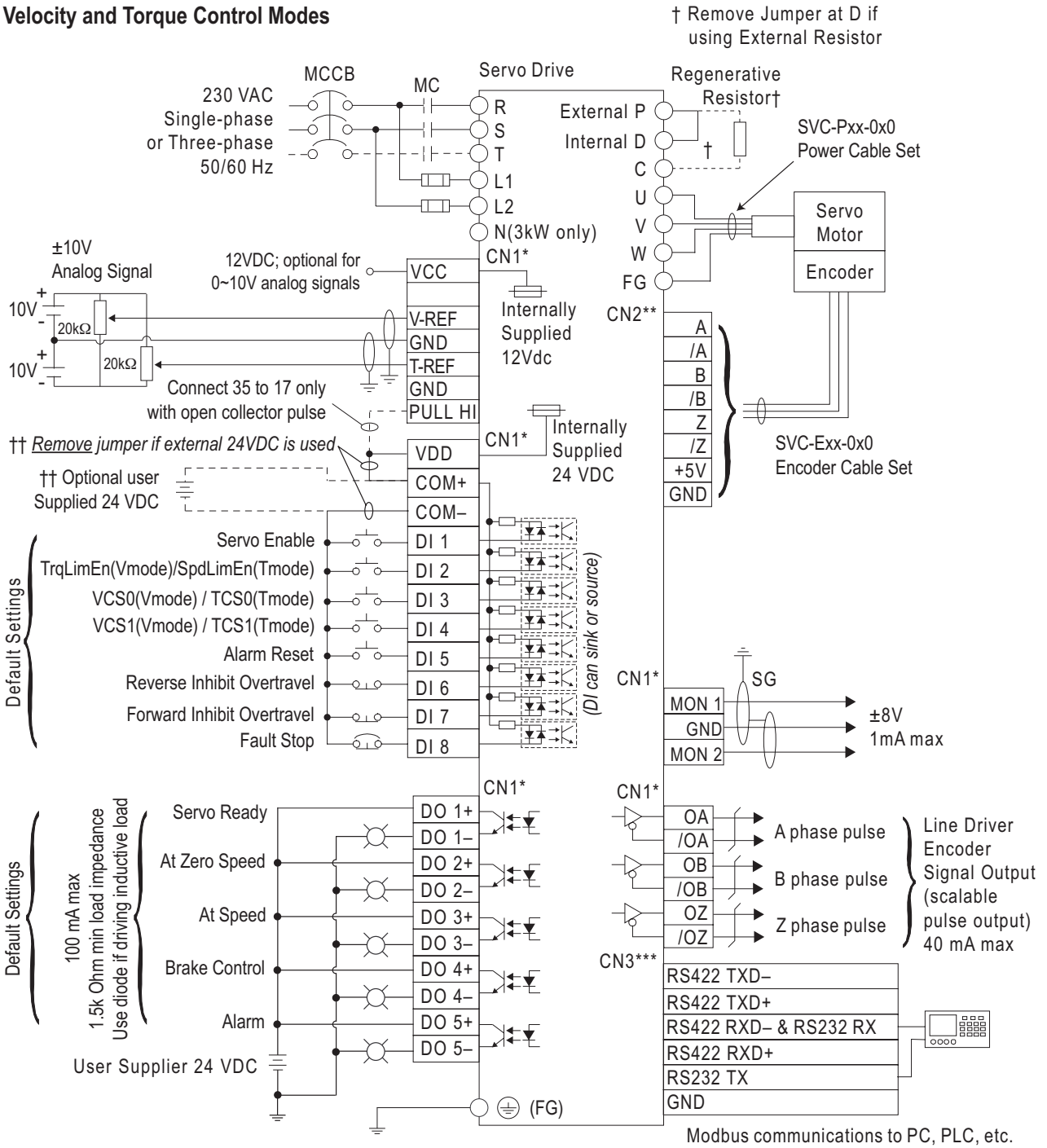
* Use connection kit part #s ZL-RTB50 & ZL-SVC-CBL-50(-x) for CN1 terminal connections.
** Use cable part # SVC-Exx-0x0 for CN2 terminal connections.
*** Use cable part # SVC-MDCOM-CBL for CN3 terminal Modbus network connections.

AC Servo System Wiring

Standard wiring examples (continued)

This wiring diagram shows basic wiring only, and additional wiring configurations are possible for some I/O. Refer to the "Installation and Wiring" chapter of the User Manual for more detailed wiring information.

Velocity and Torque Control Modes



* Use connection kit part #s ZL-RTB50 & ZL-SVC-CBL-50(-x) for CN1 terminal connections.
** Use cable part # SVC-Exx-0x0 for CN2 terminal connections.
*** Use cable part # SVC-MDCOM-CBL for CN3 terminal Modbus network connections.

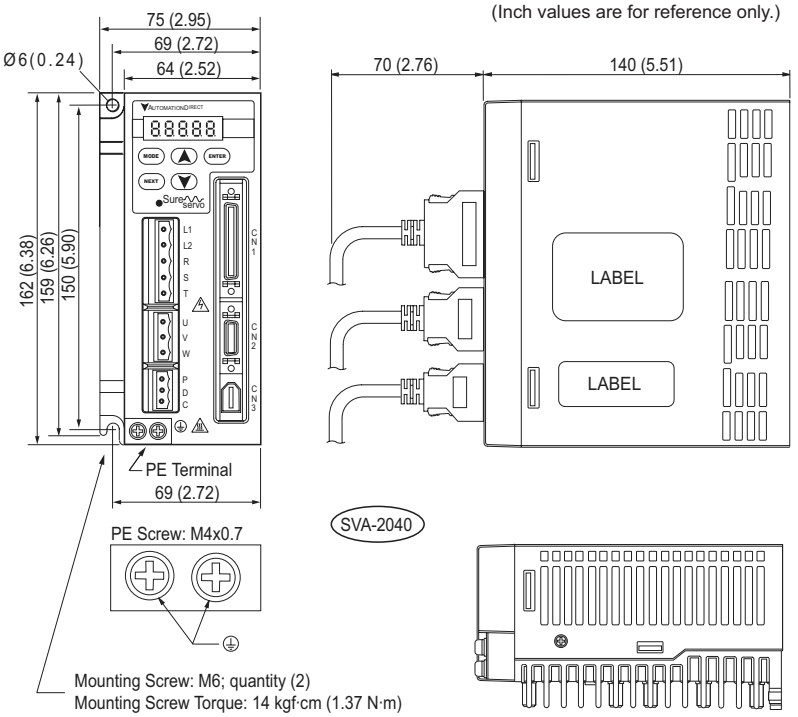
AC Servo System Dimensions

Servo drive dimensions

SVA-2040

RECOMMENDED USER SUPPLIED MOUNTING SCREW IS M6. TIGHTEN TO 14 KGF·CM (1.37 N·M).

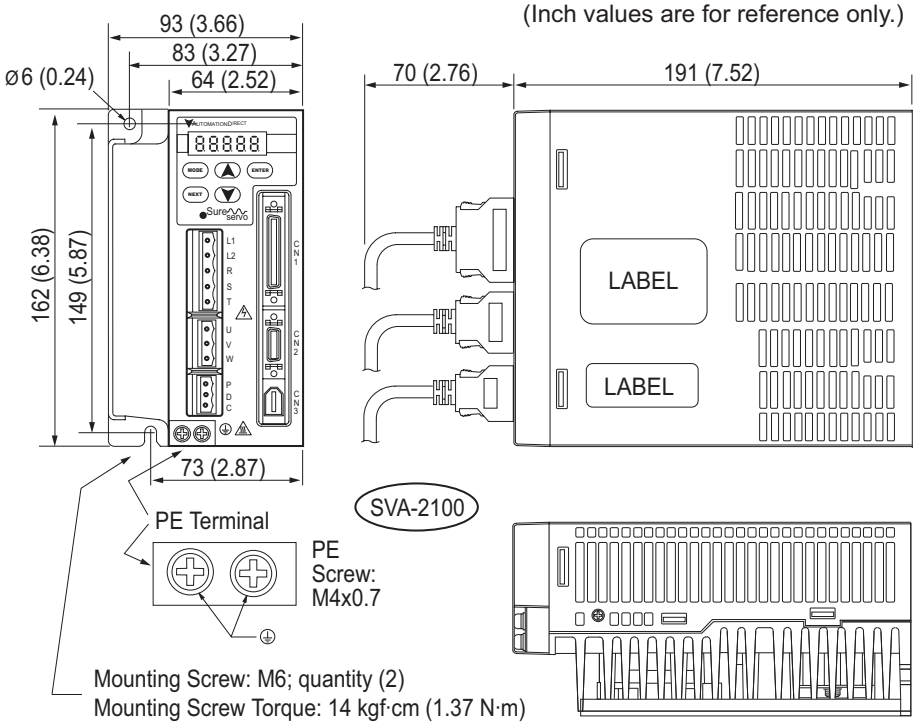
UNITS: mm (in)
(Inch values are for reference only.)



SVA-2100

RECOMMENDED USER SUPPLIED MOUNTING SCREW IS M6. TIGHTEN TO 14 KGF·CM (1.37 N·M).

UNITS: mm (in)
(Inch values are for reference only.)



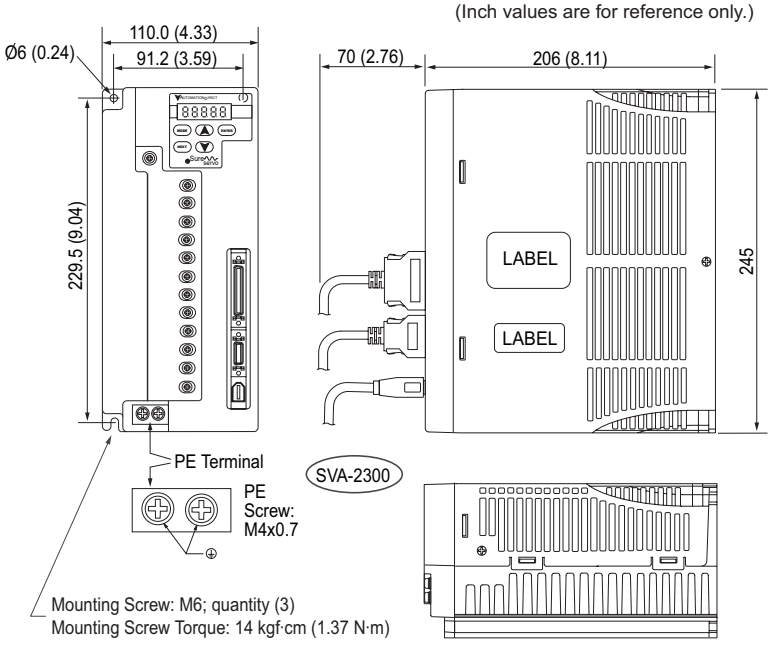
AC Servo System Dimensions

Servo drive dimensions (continued)

SVA-2300

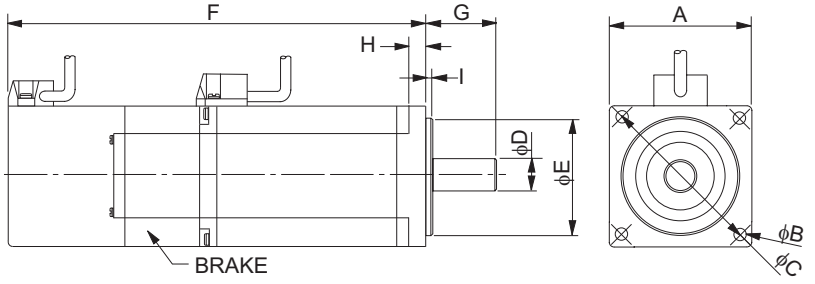
NOTE: RECOMMENDED USER SUPPLIED MOUNTING SCREW IS M6. TIGHTEN TO 14 KGF·CM (1.37 N·M).

UNITS: mm (in)
(Inch values are for reference only.)



Servo motor dimensions

Low inertia models SVL-201(B), SVL-202(B), SVL-SVL-204(B), SVL-207(B)

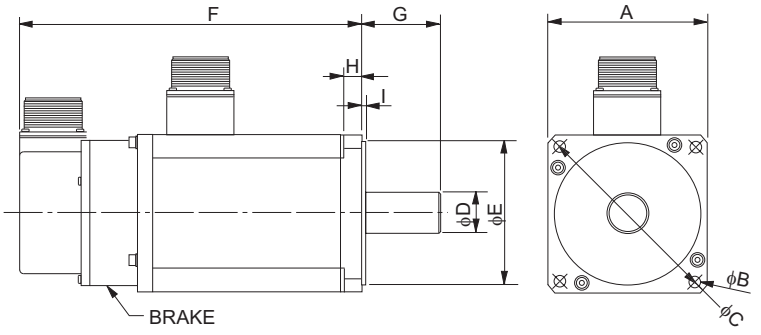


*Sure*Servo® Motor Dimensions – 100W-750W Low Inertia				
Dimension	SVL-201(B)	SVL-202(B)	SVL-204(B)	SVL-207(B)
A	40 [1.575]	60 [2.362]		80 [3.15]
B	4.5 [0.1772]	5.5 [0.2165]		6.6 [0.2598]
C	46 [1.811]	70 [2.756]		90 [3.543]
D	8 +0.0/-0.009 (8h6)	14 +0.0/-0.011 (14h6)		19 +0.0 -0.013 (19h6)
E	30 +0.0/-0.021 (30h7)	50 +0.0/-0.025 (50h7)		70 +0.0/-0.030 (70h7)
F (w/o brake)	100.1 [3.941]	102.4 [4.032]	124.4 [4.898]	135 [5.315]
F (with brake)	135.7 [5.343]	137 [5.394]	159 [6.26]	171.6 [6.756]
G	25 [0.98]	30 [1.18]		35 [1.38]
H	5 [0.197]	6 [0.236]		8 [0.315]
I	2.5 [0.098]	3 [0.118]		
Cable length	300mm (12 inches)			
UNITS: mm [in]. (Inches are for reference only; not included on diameter dimensions for accuracy.)				

AC Servo System Dimensions

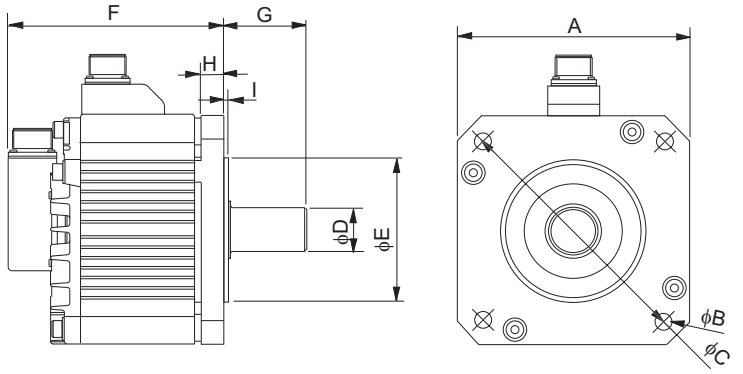
Servo motor dimensions (continued)

Low inertia models SVL-210(B)



*Sure*Servo® Motor Dimensions -1000W Low Inertia	
Dimension	**SVL-210(B)**
A	100 [3.937]
B	9 [0.3543]
C	115 +0.2/-0.2 [4.528]
D	22 +0.0/-0.013 (22h6)
E	95 +0.0/-0.035 (95h7)
F (w/o brake)	158 [6.22]
F (with brake)	190 [7.48]
G	45 [1.77]
H	17 [0.669]
I	7 [0.28]
UNITS: mm [in] (Inches are for reference only; not included on diameter dimensions for accuracy.)	

Medium inertia models SVM-210(B), SVM-220(B), SVM-230(B)



*Sure*Servo® Motor Dimensions -1000W-3000W Medium Inertia			
Dimension	**SVM-210(B)**	**SVM-220(B)**	**SVM-230(B)**
A	130 [5.118]	180 [7.087]	
B	9 [0.3543]	13.5 [0.5315]	
C	145 +0.2/-0.2 [5.709]	200 +0.2/-0.2 [7.874]	
D	22 +0.0/-0.013 (22h6)	35 +0.0/-0.016 (35h6)	
E	110 +0.0/-0.035 (110h7)	114.3 +0/-0.035 (114.3h7)	
F (w/o brake)	143 [5.63]	164 [6.457]	212 [8.35]
F (with brake)	181 [7.126]	213 [8.386]	258 [10.16]
G	55 [2.17]	75 [2.95]	
H	15 [0.591]	20 [0.787]	
I	4 [0.157]		
UNITS: mm [in] (Inches are for reference only; not included on diameter dimensions for accuracy.)			

SureServo® AC Servo System Accessories

Accessories

External Regeneration Resistors

Use external resistors to provide additional regenerative capacity and to dissipate heat away from the servo drive.

Part Number	Resistance	SureServo Drives	Price
GS-25P0-BR	40Ω	SVA-2040	$80.00
GS-2010-BR-ENC	20Ω	SVA-2100, SVA-2300	$242.00

Resistor GS-25P0-BR

AC Line Filters

Input EMI filters reduce electromagnetic interference or noise on the input side of the servo drive. They are required for CE compliance and recommended for installations prone to or sensitive to electromagnetic interference.

SureServo® Drives	AC Input Power	EMI Filter Rating	EMI Filter Part Number	Price
SVA-2040	Single-Phase	250V, 1-phase, 20A	20DRT1W3S	$81.00
	Three-Phase	250V, 3-phase, 10A	10TDT1W4C	$86.00
SVA-2100	Single-Phase	250V, 1-phase, 20A	20DRT1W3S	$81.00
	Three-Phase	250V, 3-phase, 10A	10TDT1W4C	$86.00
SVA-2300	Three-Phase	250V, 3-phase, 26A	26TDT1W4C	$119.00

NOTE: THESE EMI FILTERS ARE ELECTRICALLY COMPATIBLE WITH THE SURESERVO DRIVES. HOWEVER, THEY ARE INTENDED TO BE MOUNTED NEXT TO THE SERVO DRIVE. DO NOT MOUNT THE FILTER UNDER THE DRIVE. THE DRIVE MOUNTING HOLES ON THESE UNITS ARE INTENDED TO BE USED ONLY WITH AUTOMATIONDIRECT'S LINE OF VFDS.

AC Line Filter 10TD1W4C

Edison Fuses & Fuji Contactors

SureServo® Drives	Input Type	Input Voltage	Edison Fuse - Class CC	Price*	Contactor**	Price
SVA-2040	Main Input Power	230V 3-Phase	HCTR4	$103.00	SC-E02-xxx	varies
SVA-2100			HCTR7-5	$114.00	SC-E03-xxx	varies
SVA-2300			HCTR15	$97.00	SC-E04-xxx	varies
SVA-2040		230V 1-phase	HCTR4	$103.00	SC-E02-xxx	varies
SVA-2100			HCTR10	$103.00	SC-E03-xxx	varies
SVA-2040 SVA-2100 SVA-2300	Control Input Power	230V 1-phase	HCTR2-5	$106.00		

* *Fuses are sold in packages of 10.*

** *Note: For contactors, xxx = coil voltage (for example, SC-E02-220VAC).*

Fuji Contactor SC-E02-xxx

Edison Fuse HCTRx

The SureGear PGA, PGB and PGD series easily mates to SureServo motors. Everything you need to mount your SureServo motor is included!
It is the perfect solution for applications such as gantries, injection-molding machines, pick-and-place automation, and linear slides.

Quickly and easily configure a system online:
http://www.sureservo.com/gearbox/selector

SureGear® Precision Gearboxes for Servo motors

Sure gear®

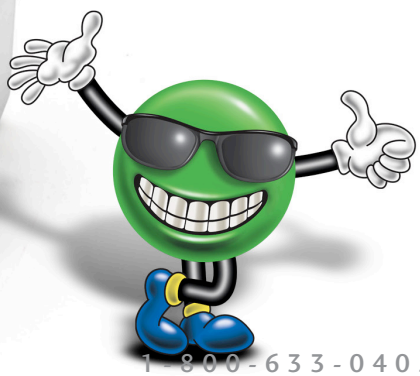
HUB-STYLE

IN-LINE

RIGHT ANGLE

Tough on the outside, precision quality on the inside

81 models, four gear ratios available



Precision Servo Gearboxes

SureGear® Servo Gearbox Overview

PGA In-line Series

The SureGear PGA series of high-precision servo gear reducers is an excellent choice for applications that require good accuracy and reliability at an exceptional value. This in-line planetary gear reducer has a thread-in mounting style, along with a level of precision and torque capacity that is best in its class. Offered in a concentric shaft design with a maximum seven arc-min backlash rating, the SureGear PGA series is an accurate, high-performance, and cost effective solution for any OEM.

The machining quality of the SureGear PGA helical planetary gears provides a very quiet and more efficient reducer than other competitive products that are similarly priced. The SureGear PGA series easily mates to SureServo motors, and is the perfect solution for applications such as gantries, injection-molding machines, pick-and-place automation, and linear slides.

SureGear PGA Gearbox

PGB Right-angle Series

The SureGear PGB series of high-precision right-angle servo gear reducers is an excellent choice for applications that require a more compact footprint.

The PGB right-angle planetary gear reducers offer similar technical specifications to the PGA series in-line gear reducers, and provides the customer with an excellent solution when space and clearance requirements are limited.

Offered with a six arc-min backlash rating for 2-stage and nine arc-min backlash for 3-stage, the SureGear PGB series performs to OEMs' demanding expectations.

SureGear PGB Gearbox

PGD Hub Style In-line Series

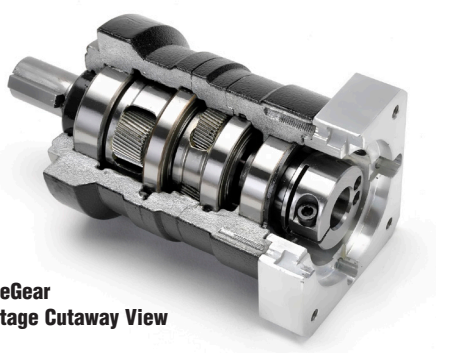
The SureGear PGD series sets a new standard in applications requiring extremely high-torque ratings and rigidity. The compact design and hub-style output is ideal for equipment that requires high-speed, high-precision indexing movement. The remarkable torsion stiffness and the low backlash of the planetary gearing combine to provide outstanding positioning accuracy.

With a backlash rating less than 3 arc-minutes and exceptional torque handling capabilities, the PGD series offers a high performance robust planetary solution for OEM customers. The PGD reducer is often used for larger indexing applications and dial tables commonly found in packaging and filling equipment and assembly automation systems.

SureGear Hub Style PGD Gearbox

Features

- Thread-in mounting style
- Best-in-class backlash
- Four gear ratios available (5:1, 10:1, 15:1, 25:1), Two additional for PGD models (35:1 and 50:1)
- Mounting hardware included for attaching to SureServo motors
- Helical-cut planetary gears for quiet operation and reduced vibration
- Right-angle reducer utilizes a spiral bevel gear; motor can be located at a 90° position from the reducer, providing a more compact footprint
- Uncaged needle roller bearings for high rigidity and torque
- Adapter bushing connection for simple and effective attachment to most servo motors
- High-viscosity, anti-separation grease does not migrate away from the gears; no leakage through the seal
- Maintenance free: No need to replace the grease for the life of the unit
- At nominal speed, service life is 20,000 hours
- Can be positioned in any orientation
- IP55 environmental rating
- 5-year warranty



SureGear 2-Stage Cutaway View

Applications

- Gantries
- Injection-molding machines
- Pick-and-place automation
- Linear slides
- Packaging machines
- Conveyors

Sure gear Precision Servo Gearboxes

SureGear® Servo Gearbox Selection

SureGear® Servo Gearbox Selection											
Sure Servo Motor	Gear Ratio	*Sure*Gear Gearbox	Frame Size (mm)	Motor Nominal Output Torque		Combo Nominal Output Torque		Nominal Output Speed (rpm)	Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch *	
				N·m	lb·in	N·m	lb·in			kg·cm²	lb·in·s²
SVL-201(B)	5:1	PGD047-05A1	47	0.32	2.83	1.52	13.44	600	1,000	2.68	0.002
		PGA050-05A1	50							2.85	0.003
		PGA070-05A1	70							1.83	0.002
		PGB070-05A1	70			1.49	13.16			-2.50**	-0.002**
	10:1	PGD047-10A1	47			3.04	26.89	300	500	11.80	0.010
		PGA050-10A1	50							12.00	0.011
		PGA070-10A1	70							9.40	0.008
		PGB070-10A1	70			2.98	26.32			-8.00**	-0.007**
	15:1	PGA050-15A1	50			4.32	38.21	200	333	25.88	0.023
		PGA070-15A1	70							21.38	0.019
		PGB070-15A1	70			4.22	37.36			17.33	0.015
	25:1	PGD047-25A1	47			7.20	63.68	120	200	72.50	0.064
		PGA050-25A1	50							72.50	0.064
		PGA070-25A1	70							60.63	0.054
		PGB070-25A1	70			7.04	62.26			49.38	0.044
	50:1	PGD064-50A1	64			14.40	127.35	60	100	252.50	0.223
SVL-202(B)	5:1	PGD064-05A2	64	0.64	5.7	3.04	27.08	600	1,000	20.00	0.018
		PGA070-05A2	70							20.58	0.018
		PGB070-05A2	70			2.98	26.51			16.25	0.014
	10:1	PGD064-10A2	64			6.08	54.15	300	500	83.80	0.074
		PGA070-10A2	70							84.40	0.075
		PGB070-10A2	70			5.95	53.01			67.00	0.059
	15:1	PGA070-15A2	70			8.64	76.95	200	333	190.13	0.168
		PGB070-15A2	70			8.45	75.24			186.08	0.165
		PGB090-15A2	90							126.00	0.112
	25:1	PGD064-25A2	64			14.40	128.25	120	200	528.75	0.468
		PGA070-25A2	70							529.38	0.468
		PGB070-25A2	70			14.08	125.40			518.13	0.459
		PGB090-25A2	90							362.50	0.321
		PGD090-25A2	90			14.40	128.25			481.25	0.426
	50:1	PGD090-50A2	90			28.80	256.50	60	100	2000.00	1.770
		PGD110-50A2	110							1250.00	1.106
SVL-204(B)	5:1	PGD064-05A2	64	1.27	11.2	6.03	53.20	600	1,000	40.00	0.035
		PGA070-05A2	70							40.58	0.036
		PGB070-05A2	70			5.91	52.08			36.25	0.032
	10:1	PGD064-10A2	64			12.07	106.40	300	500	163.80	0.145
		PGA070-10A2	70							164.40	0.145
		PGB070-10A2	70			11.81	104.16			147.00	0.130
	15:1	PGA070-15A2	70			17.15	151.20	200	333	370.13	0.328
		PGB070-15A2	70			16.76	147.84			366.08	0.324
		PGB090-15A2	90							306.00	0.271
	25:1	PGD064-25A2	64			28.58	252.00	120	200	1028.75	0.910
		PGA070-25A2	70							1029.38	0.911
		PGB070-25A2	70			27.94	246.40			1018.13	0.901
		PGB090-25A2	90							862.50	0.763
		PGD090-25A2	90			28.58	252.00			981.25	0.868
	50:1	PGD090-50A2	90			57.15	504.00	60	100	4000.00	3.540
		PGD110-50A2	110							3250.00	2.876
SVL-207(B)	5:1	PGA070-05A3	70	2.39	21.2	11.35	100.70	600	1000	133.08	0.118
		PGB090-05A3	90			11.11	98.58			90.00	0.080
		PGD090-05A3	90			11.35	100.70			120.50	0.107
	10:1	PGA090-10A3	90			22.71	201.40	300	500	511.00	0.452
		PGB090-10A3	90			22.23	197.16			371.00	0.328
		PGD090-10A3	90			22.71	201.40			507.00	0.449
	15:1	PGA090-15A3	90			32.27	286.20	200	333	1185.75	1.049
		PGB090-15A3	90			31.55	279.84			1138.50	1.008
	25:1	PGA090-25A3	90			53.78	477.00	120	200	3300.00	2.921
		PGB090-25A3	90			52.58	466.40			3175.00	2.810
		PGD110-25A3	110			53.78	477.00			2937.50	2.600
	50:1	PGD110-50A3	110			107.55	954.00	60	100	12500.00	11.063

** Available load inertia is calculated based on servo motor inertia using the formula: Available Inertia = (5 x Motor Inertia – Gearbox Inertia) x (Gear Ratio)² A 5:1 inertia mismatch is a good target for design purposes. Systems with lower or higher mismatch may be possible, depending on operating conditions.*

*** This gearbox is NOT a suitable choice at a 5:1 mismatch. If inertia balancing is a selection criteria for your end use, please use a mismatch of 8:1 to 10:1.*

SureGear® Precision Servo Gearboxes

SureGear® Servo Gearbox Selection (continued)

SureGear® Servo Gearbox Selection											
Sure Servo Motor	Gear Ratio	*Sure*Gear Gearbox	Frame Size (mm)	Motor Nominal Output Torque		Combo Nominal Output Torque		Nominal Output Speed (rpm)	Max Output Speed (rpm)	Available Load Inertia @ 5:1 Mismatch *	
				N·m	lb·in	N·m	lb·in			kg·cm²	lb·in·s²
SVL-210(B)	5:1	PGA090-05A4	90	3.3	29.2	15.68	138.70	600	1000	315.00	0.279
		PGB090-05A4	90			15.35	135.78			280.00	0.248
		PGD090-05A4	90			15.68	138.70			313.00	0.277
	10:1	PGA090-10A4	90			31.45	277.40	300	500	1271.00	1.125
		PGB090-10A4	90			30.69	271.56			1131.00	1.001
		PGD090-10A4	90			31.35	277.40			1267.00	1.121
	15:1	PGA120-15A4	120			44.55	394.20	200	333	2828.25	2.503
		PGB120-15A4	120			43.56	385.44			2418.75	2.141
	25:1	PGD110-25A4	110			74.25	657.00	120	200	7687.50	6.803
		PGA120-25A4	120							7887.50	6.980
		PGB120-25A4	120			72.60	642.40			6762.50	5.985
	50:1	PGD110-50A4	110			148.50	1314.00	60	100	31500.00	27.878
SVM-210(B)	5:1	PGA090-05A5	90	4.8	42.5	22.80	201.88	600	1000	737.50	0.653
		PGD090-05A5	90							735.50	0.651
		PGB120-05A5	120			22.32	197.63			622.00	0.550
	10:1	PGA090-10A5	90			45.60	403.75	300	500	2961.00	2.620
		PGD110-10A5	110							2957.00	2.617
		PGB120-10A5	120			44.64	395.25			2544.00	2.251
	15:1	PGA120-15A5	120			64.80	573.75	200	333	6630.75	58.68
		PGB120-15A5	120			63.36	561.00			6221.25	5.506
	25:1	PGD110-25A5	110			108.00	956.25	120	200	18250.00	16.151
		PGA120-25A5	120							18450.00	16.328
		PGB120-25A5	120			105.60	935.00			17325.00	15.333
	35:1	PGD110-35A5	110			151.20	1338.75	86	143	35770.00	31.656
SVM-220(B)	5:1	PGD110-05A6	110	9.4	83.2	44.65	395.20	600	1000	5355.00	4.739
		PGA120-05A6	120							5372.50	4.755
		PGB120-05A6	120			43.71	386.88			5287.00	4.679
		PGB155-05A6	155							4989.75	4.416
	10:1	PGD110-10A6	110			89.30	790.40	300	500	21540.00	19.063
		PGA120-10A6	120							21555.00	19.076
		PGB120-10A6	120			87.42	773.76			21204.00	18.766
		PGB155-10A6	155							20184.00	17.863
	15:1	PGA155-15A6	155			126.90	1123.20	200	333	48420.00	42.852
		PGB155-15A6	155			124.08	1098.24			47272.50	41.836
	25:1	PGA155-25A6	155			211.50	1872.00	120	200	134625.00	119.143
		PGB155-25A6	155			206.80	1830.40			131468.75	116.350
SVM-230(B)	5:1	PGD110-05A6	110	14.3	12.6	67.93	601.35	600	1000	5355.00	4.739
		PGA120-05A6	120							5372.50	4.755
		PGB120-05A6	120			66.50	588.69			5287.00	4.679
	10:1	PGD110-10A6	110			135.85	1202.70	300	500	21540.00	19.063
		PGA120-10A6	120							21555.00	19.076
		PGB120-10A6	120			132.99	1177.38			21204.00	18.766
		PGB155-10A6	155							20184.00	17.863
	15:1	PGA155-15A6	155			193.05	1709.10	200	333	48420.00	42.852
		PGB155-15A6	155			188.76	1671.12			47272.50	41.836
	25:1	PGA155-25A6	155			321.75	2848.50	120	200	134625.00	119.143
		PGB155-25A6	155			314.60	2785.20			131468.75	116.350

** Available load inertia is calculated based on servo motor inertia using the formula: Available Inertia = (5 x Motor Inertia – Gearbox Inertia) x (Gear Ratio)² A 5:1 inertia mismatch is a good target for design purposes. Systems with lower or higher mismatch may be possible, depending on operating conditions.*

Sure gear Precision Servo Gearboxes

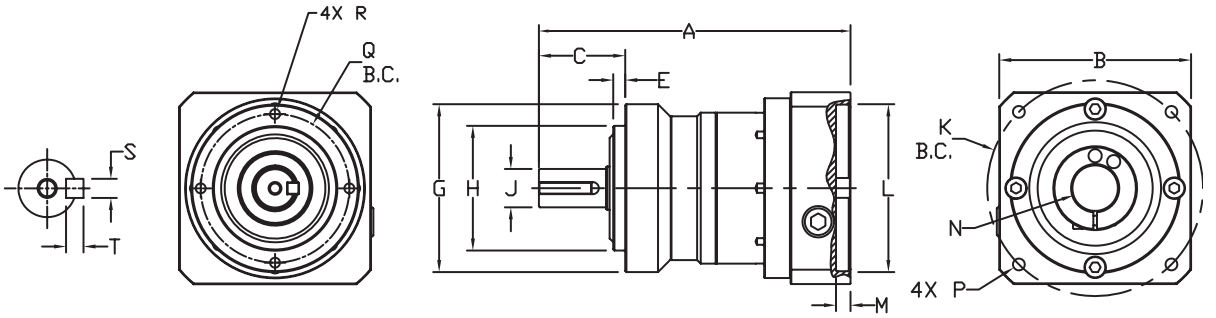
Pricing & Specifications – In-Line Shaft PGA Series

SureGear® Precision Servo Gearboxes – In-Line Shaft PGA Series

Part Number	Price	Frame Size (mm)	Ratio	Reduction	Nominal Output Torque (N·m [lb·in])	Max. Acceleration Torque (N·m [lb·in])	Emergency Stop Torque (N·m [lb·in])	Backlash (arc-min)	Nominal Input Speed (rpm)	Max. Input Speed (rpm)	Allowable Radial Load (N [lb])	Allowable Thrust Load (N [lb])	Moment of Inertia (kg·cm²)	Efficiency (%)	Max. Housing Temperature	Approx Weight (kg [lb])	Environmental Rating	Fits SureServo Servo Motor
PGA050-05A1	$420.00	50	5:1	single	9 [80]	18 [159]	35 [310]	5	4000	8000	290 [65]	330 [74]	0.036	95	90 °C [194 °F]	0.7 [1.5]	IP55	SVL-201(B)
PGA050-10A1	$442.00		10:1	single	6 [53]	12 [106]	30 [266]				360 [81]	450 [101]	0.030					
PGA050-15A1	$606.00		15:1	double	6 [53]	12 [106]	30 [266]	7			410 [92]	540 [121]	0.035	90		0.8 [1.8]		
PGA050-25A1	$606.00		25:1	double	9 [80]	18 [159]	35 [310]				490 [110]	640 [144]	0.034					
PGA070-05A1	$420.00	70	5:1	single	27 [239]	50 [443]	100 [885]	5	3000	6000	510 [115]	390 [88]	0.077	95		1.5 [3.3]		
PGA070-10A1	$442.00		10:1	single	18 [159]	35 [310]	80 [708]				640 [144]	530 [119]	0.056					
PGA070-15A1	$606.00		15:1	double	18 [159]	35 [310]	80 [708]				740 [166]	630 [142]	0.055	90		1.7 [3.7]		
PGA070-25A1	$606.00		25:1	double	27 [239]	50 [443]	100 [885]				870 [196]	790 [178]	0.053					
PGA070-05A2	$458.00		5:1	single	27 [239]	50 [443]	100 [885]				510 [115]	390 [88]	0.160	95		1.5 [3.3]		SVL-202(B) SVL-204(B)
PGA070-10A2	$458.00		10:1	single	18 [159]	35 [310]	80 [708]				640 [144]	530 [119]	0.140					
PGA070-15A2	$628.00		15:1	double	18 [159]	35 [310]	80 [708]				740 [166]	630 [142]	0.140	90		1.7 [3.7]		
PGA070-25A2	$628.00		25:1	double	27 [239]	50 [443]	100 [885]				870 [196]	790 [178]	0.130					
PGA070-05A3	$458.00		5:1	single	27 [239]	50 [443]	100 [885]				510 [115]	390 [88]	0.360	95		1.5 [3.3]		SVL-207(B)
PGA090-10A3	$543.00	90	10:1	single	50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	0.750			3.5 [7.7]		
PGA090-15A3	$717.00		15:1	double	50 [443]	80 [708]	200 [1770]				1400 [315]	1900 [427]	0.720	90		4.0 [8.8]		
PGA090-25A3	$717.00		25:1	double	75 [664]	125 [1106]	250 [2213]				1600 [360]	2200 [495]	0.710					
PGA090-05A4	$542.00		5:1	single	75 [664]	125 [1106]	250 [2213]				960 [216]	1200 [270]	2.900	95		3.5 [7.7]		SVL-210(B)
PGA090-10A4	$542.00		10:1	single	50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	2.800					
PGA090-05A5	$542.00		5:1	single	75 [664]	125 [1106]	250 [2213]				960 [216]	1200 [270]	2.900			3.5 [7.7]		SVM-210(B)
PGA090-10A5	$542.00		10:1	single	50 [443]	80 [708]	200 [1770]				1200 [270]	1600 [360]	2.800					
PGA120-15A4	$900.00	120	15:1	double	120 [1062]	225 [1991]	500 [4425]				2300 [517]	3000 [674]	2.800	90		8.7 [19.2]		SVL-210(B)
PGA120-25A4	$900.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				2700 [607]	3700 [832]	2.800					
PGA120-15A5	$900.00		15:1	double	120 [1062]	225 [1991]	500 [4425]				2300 [517]	3000 [674]	2.800			8.7 [19.2]		SVM-210(B)
PGA120-25A5	$900.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				2700 [607]	3700 [832]	2.800					
PGA120-05A6	$718.00		5:1	single	180 [1593]	330 [2921]	625 [5532]				1600 [360]	1900 [427]	11.000	95		7.8 [17.2]		SVM-220(B) SVM-230(B)
PGA120-10A6	$718.00		10:1	single	120 [1062]	225 [1991]	500 [4425]				2000 [450]	2500 [562]	11.000					
PGA155-10A6	$887.00	155	10:1	single	240 [2124]	470 [4160]	1000 [8851]		2000	4000	4700 [1057]	4100 [922]	11.000	95		16 [35.3]		
PGA155-15A6	$1,207.00		15:1	double	240 [2124]	470 [4160]	1000 [8851]				5400 [1214]	4900 [1102]	11.000	90		18 [40.0]		
PGA155-25A6	$1,207.00		25:1	double	360 [3186]	700 [6196]	1250 [11063]				6400 [1439]	6100 [1371]	11.000					

Sure gear Precision Servo Gearboxes

Dimensions – In-Line Shaft PGA Series



SureGear PGA Series In-Line Shaft Gearboxes Dimension Drawing

SureGear® Precision Servo Gearbox Dimensions – In-Line Shaft PGA Series (dimensions = mm [in])

Part Number	A	B	C	E	G	H	J	K	L	M	N	P	Q	R	S	T
PGA050-05A1 PGA050-10A1	88.5 [3.48]	42.0 [1.65]	24.5 [0.96]	4.0 [0.16]	Ø50.0 [Ø1.97]	Ø35.0 [Ø1.38]	Ø12.0 [Ø0.47]	Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]	5.0 [0.20]	Ø8.0 [Ø0.31]	M4- 0.7x9	Ø44.0 [Ø1.73]	M4- 0.7x8	4.0 [0.16]	4.0 [0.16]
PGA050-15A1 PGA050-25A1	105.0 [4.13]	42.0 [1.65]	24.5 [0.96]	4.0 [0.16]	Ø50.0 [Ø1.97]	Ø35.0 [Ø1.38]	Ø12.0 [Ø0.47]	Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]	5.0 [0.20]	Ø8.0 [Ø0.31]	M4- 0.7x9	Ø44.0 [Ø1.73]	M4- 0.7x8	4.0 [0.16]	4.0 [0.16]
PGA070-05A1 PGA070-10A1	112.0 [4.41]	52.0 [2.05]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]	5.0 [0.20]	Ø8.0 [Ø0.31]	M4- 0.7x9	Ø62.0 [Ø2.44]	M5- 0.8x10	5.0 [0.20]	5.0 [0.20]
PGA070-05A2 PGA070-10A2	115.0 [4.53]	65.0 [2.56]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø70.0 [Ø2.76]	Ø50.0 [Ø1.97]	5.0 [0.20]	Ø14.0 [Ø0.55]	M5- 0.8x11	Ø62.0 [Ø2.44]	M5- 0.8x10	5.0 [0.20]	5.0 [0.20]
PGA070-05A3	130.0 [5.12]	80.0 [3.15]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø90.0 [Ø3.54]	Ø70.0 [Ø2.76]	6.0 [0.24]	Ø19.0 [Ø0.75]	M6- 1.0x13	Ø62.0 [Ø2.44]	M5- 0.8x10	5.0 [0.20]	5.0 [0.20]
PGA070-15A1 PGA070-25A1	131.0 [5.16]	52.0 [2.05]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]	5.0 [0.20]	Ø8.0 [Ø0.31]	M4- 0.7x9	Ø62.0 [Ø2.44]	M5- 0.8x10	5.0 [0.20]	5.0 [0.20]
PGA070-15A2 PGA070-25A2	136.0 [5.35]	65.0 [2.56]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø70.0 [Ø2.76]	Ø50.0 [Ø1.97]	5.0 [0.20]	Ø14.0 [Ø0.55]	M5- 0.8x11	Ø62.0 [Ø2.44]	M5- 0.8x10	5.0 [0.20]	5.0 [0.20]
PGA090-10A3	153.0 [6.02]	80.0 [3.15]	46.0 [1.81]	7.0 [0.28]	Ø90.0 [Ø3.54]	Ø68.0 [Ø2.68]	Ø22.0 [Ø0.87]	Ø90.0 [Ø3.54]	Ø70.0 [Ø2.76]	6.0 [0.24]	Ø19.0 [Ø0.75]	M6- 1.0x13	Ø80.0 [Ø3.15]	M6- 1.0x12	6.0 [0.24]	6.0 [0.24]
PGA090-05A4 PGA090-10A4	170.0 [6.69]	100.0 [3.94]	46.0 [1.81]	7.0 [0.28]	Ø90.0 [Ø3.54]	Ø68.0 [Ø2.68]	Ø22.0 [Ø0.87]	Ø115.0 [Ø4.53]	Ø95.0 [Ø3.74]	8.0 [0.31]	Ø22.0 * [Ø0.87]	M8- 1.25x17	Ø80.0 [Ø3.15]	M6- 1.0x12	6.0 [0.24]	6.0 [0.24]
PGA090-05A5 PGA090-10A5	165.0 [6.50]	130.0 [5.12]	46.0 [1.81]	7.0 [0.28]	Ø90.0 [Ø3.54]	Ø68.0 [Ø2.68]	Ø22.0 [Ø0.87]	Ø145.0 [Ø5.71]	Ø110.0 [Ø4.33]	8.0 [0.31]	Ø22.0 * [Ø0.87]	M8- 1.25x17	Ø80.0 [Ø3.15]	M6- 1.0x12	6.0 [0.24]	6.0 [0.24]
PGA090-15A3 PGA090-25A3	175.0 [6.89]	80.0 [3.15]	46.0 [1.81]	7.0 [0.28]	Ø90.0 [Ø3.54]	Ø68.0 [Ø2.68]	Ø22.0 [Ø0.87]	Ø90.0 [Ø3.54]	Ø70.0 [Ø2.76]	6.0 [0.24]	Ø19.0 [Ø0.75]	M6- 1.0x13	Ø80.0 [Ø3.15]	M6- 1.0x12	6.0 [0.24]	6.0 [0.24]
PGA120-05A6 PGA120-10A6	225.0 [8.86]	180.0 [7.09]	70.0 [2.76]	9.0 [0.35]	Ø120.0 [Ø4.72]	Ø90.0 [Ø3.54]	Ø32.0 [Ø1.26]	Ø200.0 [Ø7.87]	Ø114.0 [Ø4.49]	8.0 [0.31]	Ø35.0 * [Ø1.38]	M12- 1.75x25	Ø108.0 [Ø4.25]	M8- 1.25x16	10.0 [0.39]	8.0 [0.31]
PGA120-15A4 PGA120-25A4	231.5 [9.11]	100.0 [3.94]	70.0 [2.76]	9.0 [0.35]	Ø120.0 [Ø4.72]	Ø90.0 [Ø3.54]	Ø32.0 [Ø1.26]	Ø115.0 [Ø4.53]	Ø95.0 [Ø3.74]	8.0 [0.31]	Ø22.0 * [Ø0.87]	M8- 1.25x17	Ø108.0 [Ø4.25]	M8- 1.25x16	10.0 [0.39]	8.0 [0.31]
PGA120-15A5 PGA120-25A5	231.5 [9.11]	130.0 [5.12]	70.0 [2.76]	9.0 [0.35]	Ø120.0 [Ø4.72]	Ø90.0 [Ø3.54]	Ø32.0 [Ø1.26]	Ø145.0 [Ø5.71]	Ø110.0 [Ø4.33]	8.0 [0.31]	Ø22.0 * [Ø0.87]	M8- 1.25x17	Ø108.0 [Ø4.25]	M8- 1.25x16	10.0 [0.39]	8.0 [0.31]
PGA155-10A6	264.0 [10.39]	180.0 [7.09]	97.0 [3.82]	12.0 [0.47]	Ø155.0 [Ø6.10]	Ø120.0 [Ø4.72]	Ø40.0 [Ø1.57]	Ø200.0 [Ø7.87]	Ø114.0 [Ø4.49]	8.0 [0.31]	Ø35.0 * [Ø1.38]	M12- 1.75x25	Ø140.0 [Ø5.51]	M10- 1.50x28	12.0 [0.47]	8.0 [0.31]
PGA155-15A6 PGA155-25A6	298.5 [11.75]	180.0 [7.09]	97.0 [3.82]	12.0 [0.47]	Ø155.0 [Ø6.10]	Ø120.0 [Ø4.72]	Ø40.0 [Ø1.57]	Ø200.0 [Ø7.87]	Ø114.0 [Ø4.49]	8.0 [0.31]	Ø35.0 * [Ø1.38]	M12- 1.75x25	Ø140.0 [Ø5.51]	M10- 1.50x28	12.0 [0.47]	8.0 [0.31]

** Dimension with supplied bushing*

NOTE: See our website: www.AutomationDirect.com for complete engineering drawings.

Sure gear Precision Servo Gearboxes

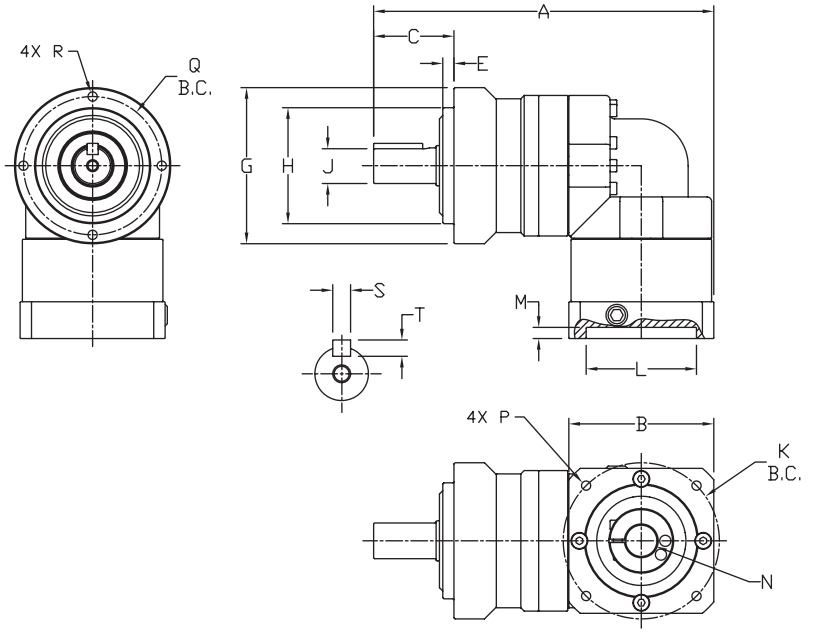
Pricing & Specifications – Right-Angle Shaft PGB Series

SureGear® Precision Servo Gearboxes – Right-Angle Shaft PGB Series

Part Number	Price	Frame Size (mm)	Ratio	Reduction	Nominal Output Torque (N·m [lb-in])	Max. Acceleration Torque (N·m [lb-in])	Emergency Stop Torque (N·m [lb-in])	Backlash (arc-min)	Nominal Input Speed (rpm)	Max. Input Speed (rpm)	Allowable Radial Load (N [lb])	Allowable Thrust Load (N [lb])	Moment of Inertia (kg·cm²)	Efficiency (%)	Max. Housing Temperature	Approx Weight (kg [lb])	Environmental Rating	Fits SureServo Servo Motor
PGB070-05A1	$712.00	70	5:1	double	22 [195]	40 [354]	80 [708]	6	3000	6000	510 [115]	390 [88]	0.250	93	90 °C [194 °F]	1.9 [4.2]	IP55	SVL-201(B)
PGB070-10A1	$712.00		10:1	double	16 [142]	32 [283]	65 [575]				640 [144]	530 [119]	0.230					
PGB070-15A1	$900.00		15:1	triple	16 [142]	32 [283]	65 [575]	9			740 [166]	630 [142]	0.073	88		1.7 [3.7]		
PGB070-25A1	$900.00		25:1	triple	24 [212]	45 [398]	90 [797]				870 [196]	790 [178]	0.071					
PGB070-05A2	$712.00		5:1	double	22 [195]	40 [354]	80 [708]	6			510 [115]	390 [88]	0.320	93		1.9 [4.2]		SVL-202(B) SVL-204(B)
PGB070-10A2	$712.00		10:1	double	16 [142]	32 [283]	65 [575]				640 [144]	530 [119]	0.300					
PGB070-15A2	$900.00		15:1	triple	16 [142]	32 [283]	65 [575]	9			740 [166]	630 [142]	0.118	88		1.7 [3.7]		SVL-202(B)
PGB070-25A2	$900.00		25:1	triple	24 [212]	45 [398]	90 [797]				870 [196]	790 [178]	0.115					
PGB090-15A2	$1,099.00	90	15:1	triple	45 [398]	65 [575]	170 [1505]	9			1400 [314]	1900 [427]	0.410	88		4.3 [9.5]		SVL-202(B) SVL-204(B)
PGB090-25A2	$1,099.00		25:1	triple	65 [575]	110 [974]	220 [1947]				1600 [360]	2200 [495]	0.400					
PGB090-05A3	$842.00		5:1	double	65 [575]	90 [797]	220 [1947]	6			960 [216]	1200 [270]	2.130	93		4.9 [10.8]		SVL-207(B)
PGB090-10A3	$842.00		10:1	double	45 [398]	65 [575]	170 [1505]				1200 [270]	1600 [360]	2.020					
PGB090-15A3	$1,099.00		15:1	triple	45 [398]	65 [575]	170 [1505]	9			1400 [314]	1900 [427]	0.600	88		4.3 [9.5]		
PGB090-25A3	$1,099.00		25:1	triple	65 [575]	110 [974]	220 [1947]				1600 [360]	2200 [495]	0.590					
PGB090-05A4	$842.00		5:1	double	65 [575]	90 [797]	220 [1947]	6			960 [216]	1200 [270]	4.260	93		4.9 [10.8]		SVL-210(B)
PGB090-10A4	$842.00		10:1	double	45 [398]	65 [575]	170 [1505]				1200 [270]	1600 [360]	4.150					
PGB120-15A4	$1,365.00	120	15:1	triple	110 [974]	200 [1770]	450 [3983]	9			2300 [517]	3000 [674]	4.700	88		10 [22]		
PGB120-25A4	$1,365.00		25:1	triple	150 [1328]	300 [2655]	550 [4868]				2700 [607]	3700 [832]	4.640					
PGB120-05A5	$1,099.00		5:1	double	120 [1062]	240 [2124]	500 [4425]	6			1600 [360]	1900 [427]	6.610	93		10.2 [22.5]		SVM-210(B)
PGB120-10A5	$1,099.00		10:1	double	110 [974]	200 [1770]	450 [3983]				2000 [450]	2500 [562]	6.050					
PGB120-15A5	$1,365.00		15:1	triple	110 [974]	200 [1770]	450 [3983]	9			2300 [517]	3000 [674]	4.700	88		10 [22]		
PGB120-25A5	$1,365.00		25:1	triple	150 [1328]	300 [2655]	550 [4868]				2700 [607]	3700 [832]	4.640					
PGB120-05A6	$1,099.00		5:1	double	120 [1062]	240 [2124]	500 [4425]	6			1600 [360]	1900 [427]	13.690	93		10.2 [22.5]		SVM-220(B) SVM-230(B)
PGB120-10A6	$1,099.00		10:1	double	110 [974]	200 [1770]	450 [3983]				2000 [450]	2500 [562]	13.120					
PGB155-15A6	$1,599.00	155	15:1	triple	200 [1770]	400 [3540]	750 [6638]	9	2000	4000	5400 [1214]	4900 [1102]	15.070	88		20.4 [45.0]		SVM-220(B)
PGB155-25A6	$1,599.00		25:1	triple	300 [2655]	600 [5310]	1100 [9736]				6400 [1439]	6100 [1371]	14.820					
PGB155-05A6	$1,265.00		5:1	double	200 [1770]	400 [3540]	1100 [9736]	6			3800 [854]	3000 [674]	21.280	93		19.8 [43.7]		SVM-220(B) SVM-230(B)
PGB155-10A6	$1,265.00		10:1	double	200 [1770]	400 [3540]	750 [6638]				4700 [1057]	4100 [922]	19.030					

Sure gear Precision Servo Gearboxes

Dimensions – Right-Angle Shaft PGB Series



SureGear PGB Series Right-Angle Shaft Gearboxes Dimension Drawing

SureGear® Precision Servo Gearbox Dimensions – Right-Angle Shaft PGA Series (dimensions = mm [in])

Part Number	A	B	C	E	G	H	J	K	L	M	N	P	Q	R	S	T
PGB070-05A1 PGB070-10A1	151.5 [5.96]	52.0 [2.05]	36.0 [1.42]	5.0 [0.20]	Ø70.0 [Ø2.76]	Ø52.0 [Ø2.05]	Ø16.0 [Ø0.63]	Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]	5.0 [0.20]	Ø8.0 [Ø0.31]	M4-0.7x9	Ø62.0 [Ø2.44]	M5-0.8x10	5.0 [0.20]	5.0 [0.20]
PGB070-05A2 PGB070-10A2		65.0 [2.56]						Ø70.0 [Ø2.76]	Ø50.0 [Ø1.97]		Ø14.0 [Ø0.55]	M5-0.8x11				
PGB070-15A1 PGB070-25A1	158.0 [6.22]	52.0 [2.05]						Ø46.0 [Ø1.81]	Ø30.0 [Ø1.18]		Ø8.0 [Ø0.31]	M4-0.7x9				
PGB070-15A2 PGB070-25A2	163.5 [6.44]	65.0 [2.56]						Ø70.0 [Ø2.76]	Ø50.0 [Ø1.97]		Ø14.0 [Ø0.55]	M5-0.8x11				
PGB090-15A2 PGB090-25A2	204.5 [8.05]		46.0 [1.81]	7.0 [0.28]	Ø90.0 [Ø3.54]	Ø68.0 [Ø2.68]	Ø22.0 [Ø0.87]						Ø80.0 [Ø3.15]	M6-1.0x12	6.0 [0.24]	6.0 [0.24]
PGB090-05A3 PGB090-10A3	205.5 [8.09]	80.0 [3.15]						Ø90.0 [Ø3.54]	Ø70.0 [Ø2.76]	6.0 [0.24]	Ø19.0 [Ø0.75]	M6-1.0x13				
PGB090-15A3 PGB090-25A3	210.5 [8.29]															
PGB090-05A4 PGB090-10A4	205.5 [8.09]	100.0 [3.94]						Ø115.0 [Ø4.53]	Ø95.0 [Ø3.74]							
PGB120-15A4 PGB120-25A4	272.0 [10.71]		70.0 [2.76]	9.0 [0.35]	Ø120.0 [Ø4.72]	Ø90.0 [Ø3.54]	Ø32.0 [Ø1.26]				Ø22.0 * [Ø0.87]	M8-1.25x17	Ø108.0 [Ø4.25]	M8-1.25x16	10.0 [0.39]	8.0 [0.31]
PGB120-05A5 PGB120-10A5	266.0 [10.47]	130.0 [5.12]						Ø145.0 [Ø5.71]	Ø110.0 [Ø4.33]	8.0 [0.31]						
PGB120-15A5 PGB120-25A5	272.0 [10.71]															
PGB120-05A6 PGB120-10A6	268.5 [10.57]	180.0 [7.09]						Ø200.0 [Ø7.87]	Ø114.0 [Ø4.50]		Ø35.0 * [Ø1.38]	M12-1.75x25				
PGB155-05A6 PGB155-10A6	341.0 [13.43]		97.0 [3.82]	12.0 [0.47]	Ø155.0 [Ø6.10]	Ø120.0 [Ø4.72]	Ø40.0 [Ø1.57]						Ø140.0 [Ø5.51]	M10-1.5x20	12.0 [0.47]	
PGB155-15A6 PGB155-25A6	364.0 [14.33]															

** Dimension with supplied bushing*

NOTE: See our website: www.AutomationDirect.com for complete engineering drawings.

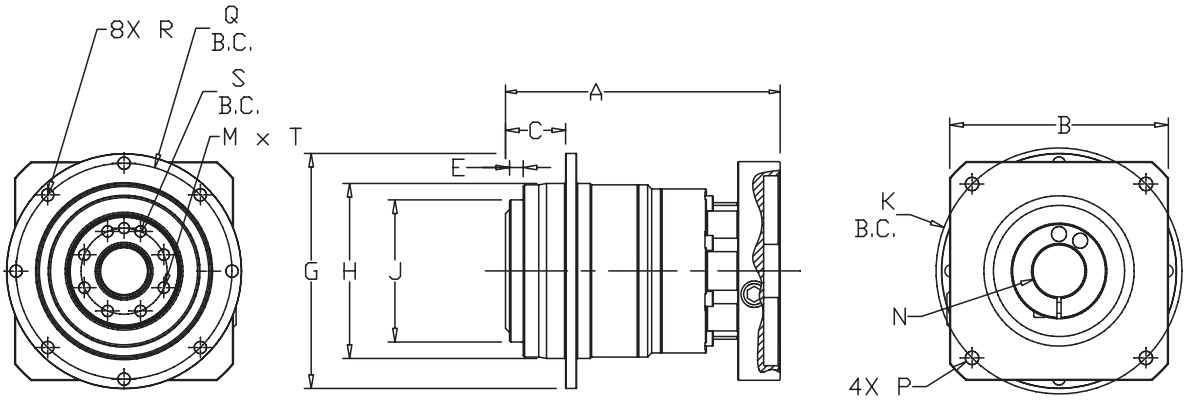
SureGear® Precision Servo Gearboxes

Pricing & Specifications – Hub Style In-Line PGD Series

SureGear® Precision Servo Gearboxes – Hub Style In-Line PGD Series																	
Part Number	Price	Frame Size (mm)	Ratio	Reduction	Nominal Output Torque (N·m [lb·in])	Max. Acceleration Torque (N·m [lb·in])	Emergency Stop Torque (N·m [lb·in])	Backlash (arc-min)	Nominal Input Speed (rpm)	Max. Input Speed (rpm)	Allowable Radial Load (N [lb])	Allowable Thrust Load (N [lb])	Moment of Inertia (kg·cm²)	Efficiency (%)	Max. Housing Temperature	Approx Weight (kg [lb])	Environmental Rating	Fits SureServo Servo Motor
PGD047-05A1	$762.00	47	5:1	single	9 [80]	18 [159]	35 [310]	≤ 3	4000	8000	300 [67]	330 [74]	0.043	95	90 °C [194 °F]	0.7 [1.5]	IP54 (IP65)	SVL-201(B)
PGD047-10A1	$762.00		10:1	single	6 [53]	12 [106]	30 [266]				370 [83]	450 [101]	0.032					
PGD047-25A1	$953.00		25:1	double	9 [80]	18 [159]	35 [310]	≤ 5			510 [115]	550 [124]	0.034	90		0.8 [1.8]		
PGD064-50A1	$1,153.00	64	50:1	double	27 [239]	50 [443]	100 [885]	≤ 3	3000	6000	850 [191]	750 [169]	0.049	90		1.6 [3.5]		
PGD064-05A2	$984.00		5:1	single	27 [239]	50 [443]	100 [885]				400 [90]	390 [88]	0.1	95		1.4 [3.1]		SVL-202(B) SVL-204(B)
PGD064-10A2	$984.00		10:1	single	18 [159]	35 [310]	80 [708]				500 [112]	530 [119]	0.062	95		1.4 [3.1]		
PGD064-25A2	$1,153.00		25:1	double	27 [239]	50 [443]	100 [885]				680 [153]	750 [169]	0.054	90		1.6 [3.5]		
PGD090-25A2	$1,322.00	90	25:1	double	75 [664]	125 [1106]	250 [2213]				1300 [292]	1400 [315]	0.130	90		4 [8.8]		
PGD090-50A2	$1,322.00		50:1	double	75 [664]	125 [1106]	250 [2213]				1700 [382]	1700 [382]	0.099	90		4 [8.8]		
PGD090-05A3	$1,153.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SVL-207(B)
PGD090-10A3	$1,153.00		10:1	single	50 [443]	80 [708]	200 [1770]				980 [220]	920 [207]	0.330	95		3.6 [7.9]		
PGD090-05A4	$1,153.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SVL-210(B)
PGD090-10A4	$1,153.00		10:1	single	50 [443]	80 [708]	200 [1770]				980 [220]	920 [207]	0.330	95		3.6 [7.9]		
PGD090-05A5	$1,153.00		5:1	single	75 [664]	125 [1106]	250 [2213]				780 [175]	680 [153]	0.580	95		3.6 [7.9]		SVM-210(B)
PGD110-50A2	$1,687.00	110	50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		SVL-202(B) SVL-204(B)
PGD110-25A3	$1,687.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		SVL-207(B)
PGD110-50A3	$1,687.00		50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		
PGD110-25A4	$1,687.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		SVL-210(B)
PGD110-50A4	$1,687.00		50:1	double	180 [1593]	330 [2921]	625 [5532]				10000 [2248]	6800 [1529]	0.400	90		8.6 [19]		
PGD110-10A5	$1,434.00		10:1	single	120 [1062]	225 [1991]	500 [4425]				6200 [1394]	4200 [944]	1.100	95		7.8 [17.2]		SVM-210(B)
PGD110-25A5	$1,687.00		25:1	double	180 [1593]	330 [2921]	625 [5532]				8200 [1843]	5500 [1236]	0.700	90		8.6 [19]		
PGD110-35A5	$1,687.00		35:1	double	180 [1593]	330 [2921]	625 [5532]				9000 [2023]	6100 [1371]	0.700	90		8.6 [19]		
PGD110-05A6	$1,434.00		5:1	single	180 [1593]	330 [2921]	625 [5532]				5000 [1124]	3400 [427]	2.300	95		7.8 [17.2]		SVM-220(B) SVM-230(B)
PGD110-10A6	$1,434.00		10:1	single	120 [1062]	225 [1991]	500 [4425]				6200 [1394]	4200 [944]	1.100	95		7.8 [17.2]		

SureGear Precision Servo Gearboxes

Dimensions – Hub Style In-Line PGD Series



SureGear PGD Series Hub Style In-Line Gearboxes Dimension Drawing

	SureGear® Precision Servo Gearbox Dimensions – Hub Style In-Line PGD Series (dimensions = mm [in])															
	Part Number	A*	B*	C	E	G	H	J	K	M	N**	P	Q	R	S	T
1	PGD047-05A1 PGD047-10A1	66.5 [2.62]	42.0 [1.65]	19.5 [0.7677]	3.0 [0.1181]	Ø72.0 [Ø2.83]	Ø47.0 [Ø1.85]	Ø28.0 [Ø1.102]	Ø46.0 [Ø1.811]	4	Ø8.0 [Ø0.31]	M4-0.7x9	Ø67.0 [Ø2.6378]	3.4 [0.13]	Ø20.0 [Ø0.7874]	M3-0.5x6.5
2	PGD047-25A1															
2	PGD064-50A1	98.0 [3.86]	52.0 [2.05]			Ø86.0 [Ø3.385]	Ø64.0 [Ø2.52]	Ø40.0 [Ø1.575]		8	Ø8.0 [Ø0.31]		Ø79.0 [Ø3.11]	4.5 [0.18]	Ø31.5 [Ø1.24]	M5-0.8x10
1	PGD064-05A2 PGD064-10A2	82.0 [3.228]	65.0 [2.56]						Ø70.0 [Ø2.756]		Ø14.0 [Ø0.55]	M5-0.8x11				M5-0.8x4
2	PGD064-25A2	103.0 [4.055]									Ø14.0 [Ø0.55]					M5-0.8x10
2	PGD090-25A2 PGD090-50A2	122.0 [4.803]		30.0 [1.1811]	6.0 [0.236]	Ø118.0 [Ø4.65]	Ø90.0 [Ø3.54]	Ø63.0 [Ø2.48]		8	Ø14.0 [Ø0.55]		Ø109.0 [Ø4.30]	5.5 [0.22]	Ø50.0 [Ø1.9685]	M6-1.0x12
1	PGD090-05A3 PGD090-10A3	110.0 [4.33]	80.0 [3.15]						Ø90.0 [Ø3.543]		Ø19.0 [Ø0.75]	M6-1.0x13				
1	PGD090-05A4 PGD090-10A4	127.0 [5.0]	100.0 [3.94]						Ø115.0 ±0.2 [Ø4.528]		Ø28.0 [Ø1.102]	M8-1.25x17				
1	PGD090-05A5		130.0 [5.12]						Ø145.0 ±0.2 [Ø5.709]							
2	PGD110-50A2	159.5 [6.28]	65.0 [2.56]	29.0 [1.142]		Ø145.0 [Ø5.70]	Ø110.0 [Ø4.33]	Ø80.0 [Ø3.15]	Ø70.0 [Ø2.756]	15	Ø14.0 [Ø0.55]	M5-0.8x11	Ø135.0 [Ø5.315]		Ø63.0 [Ø2.48]	
2	PGD110-25A3 PGD110-50A3	169.5 [6.673]	80.0 [3.15]						Ø90.0 [Ø3.543]		Ø19.0 [Ø0.75]	M6-1.0x13				
2	PGD110-25A4 PGD110-50A4	186.5 [7.3425]	100.0 [3.94]						Ø115.0 ±0.2 [Ø4.528]		Ø28.0 [Ø1.102]	M8-1.25x17				
1	PGD110-10A5	159.0 [6.26]	130.0 [5.12]						Ø145.0 ±0.2 [Ø5.709]							
2	PGD110-25A5 PGD110-35A5	186.5 [7.3425]														
1	PGD110-05A6 PGD110-10A6	180.0 [7.087]	180.0 [7.087]						Ø200.0 ±0.2 [Ø7.874]		Ø38.0 [Ø1.45]	M12-1.75x25				

** Length will vary depending on motor*

*** Bushing will be inserted to adapt to motor shaft*

NOTE: See our website: www.AutomationDirect.com for complete engineering drawings.

Sure gear Precision Servo Gearboxes

SureGear® Servo Gearbox Replacement Parts

SureGear® Precision Servo Gearboxes – Replacement Parts		
Part Number	***Price***	***Description***
PG050-KEY	$4.00	Output Shaft Key, replacement, 4 x 4 x 14 mm, for SureGear PGA050 series gearboxes.
PG070-KEY	$4.00	Output Shaft Key, replacement, 5 x 5 x 22 mm, for SureGear PGA070 and PGB070 series gearboxes.
PG090-KEY	$4.00	Output Shaft Key, replacement, 6 x 6 x 28 mm, for SureGear PGA090 and PGB090 series gearboxes.
PG120-KEY	$4.00	Output Shaft Key, replacement, 10 x 8 x 45 mm, for SureGear PGA120 and PGB120 series gearboxes.
PG155-KEY	$4.00	Output Shaft Key, replacement, 12 x 8 x 65 mm, for SureGear PGA155 and PGB155 series gearboxes.
PGA4-A5-BUSH	$20.00	Input Shaft Bushing, replacement, 28 x 22 x 30.5 mm, for all SureGear gearboxes using SVL-210(B) and SVM-210(B) SureServo motors.
PGA6-BUSH	$20.00	Input Shaft Bushing, replacement, 38 x 35 x 36 mm, for all SureGear gearboxes using SVM-220(B) and SVM-230(B) SureServo motors.