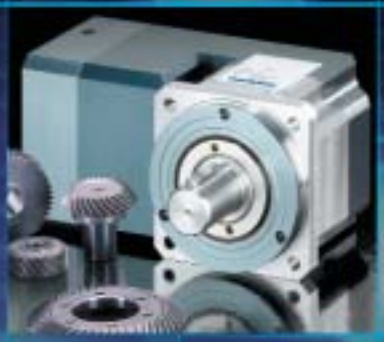
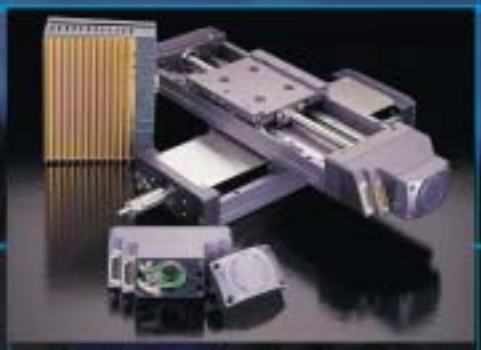


Servo Motors & Drives



Linear & Rotary
Positioning Stages

Gearmotors & Gearheads

Mini-Luge BPSK Product Manual

BAYSIDE Motion Group

PRECISION IN MOTION

Mini-Luge BPSK

Product Manual

Rev: 1.0 / 5/04
P/N: 12197028

Please check www.baysidemotion.com for latest revisions.

Product Manual

Mini-Luge BPSK 50 & 60
Precision Linear Stage

Table Of Contents

BAYSIDE® Motion Group

27 Seaview Boulevard * Port Washington, NY 11050 * ☎ 516-484-5353 * Fax: 516-484-5496
baysidemotion.com

1. Introduction

Thank you for your purchase of the BPSK Series of precision linear stages. The BPSK is a high speed stage designed to meet the most demanding of automation applications. This manual provides installation and maintenance information for the:

BPSK50 Series
BPSK60 Series

If there are any questions regarding the set up of your product, please feel free to contact Bayside Motion Group, Technical Services at (516) 484-5353 for additional support

2. Packaging

The stage is packaged in a wooden crate/carton with high density foam padding to avoid any damage during transportation. The assembly is wrapped in plastic to maintain cleanliness and should be handled with appropriate care.

2.1 Uncrating
All appropriate stage documentation (including this manual) will be found on top of the stage. The stage can be easily lifted out of the crate and placed on a secure surface.

2.2 Unlocking
Some models may arrive with a locking bracket that restrains the slide plate from moving during transportation. All locking brackets will be identified with an orange tag, and must be removed before operating the stage.

3. Specifications

3.1 General

All BPSK Stages feature a compact, low profile, totally enclosed aluminum alloy construction for high strength in a light weight package. The stages are rugged enough for the toughest requirements, yet accurate enough for precise applications. BPSK stages provide state-of-the-art performance and efficiency at an exceptional value.

BPSK Series

The BPSK series is unique because a brushless servomotor is built directly onto the ball screw. This decreases overall length, while providing superior dynamic performance over conventional mounting methods. Eliminating the motor mounting and flexible coupling increases positioning accuracy and repeatability, providing greater reliability. A rotary encoder is also directly mounted to the ball screw, eliminating any build up of errors.

Motors in the BPSK are available for either 160V or 300V operation (both with Hall effects). To identify the specific winding, please refer to the catalog configuration number. In addition the BPSK series can be supplied with limits, and a fail safe brake, both of which are integrated into the stage design. This series provides flying leads for motor power/rotary encoder/Hall/limit/brake (see Sect 4. Wiring).

3.2 Catalog Configuration Number

Model

BPSK	50	1465-200-00	150	MF01	01	01	31	02	01	02	0
	A		B	C	D	E	F	G	H	J	K

A MODEL

50	50 mm wide
60	60 mm wide

B LENGTH (mm)

Length (mm)	Travel	Model	Ball Screw Lead
150	70 mm with Cover Plate	BPSK50	2.5
200	120 mm with Cover Plate 63 mm with Sealing Strip	BPSK50	2.5
	110 mm with Cover Plate	BPSK60	5
	90 mm with Cover Plate	BPSK60	10
250	170 mm with Cover Plate 113 mm with Sealing Strip	BPSK50	2.5
300	220 mm with Cover Plate 163 mm with Sealing Strip	BPSK50	2.5
	210 mm with Cover Plate 120 mm with Sealing Strip	BPSK60	5
	190 mm with Cover Plate 100 mm with Sealing Strip	BPSK60	10
400	310 mm with Cover Plate 220 mm with Sealing Strip	BPSK60	5
	290 mm with Cover Plate 200 mm with Sealing Strip	BPSK60	10
500	410 mm with Cover Plate 320 mm with Sealing Strip	BPSK60	5
	390 mm with Cover Plate 300 mm with Sealing Strip	BPSK60	10
600	510 mm with Cover Plate 420 mm with Sealing Strip	BPSK60	5
	490 mm with Cover Plate 400 mm with Sealing Strip	BPSK60	10

C TYPE

MF01	Factory number

D GUIDEWAY

01	Standard

E DRIVE UNIT

		Model
01	Ball screw 8 d x 2.5 lead	BPSK50
02	Ball screw 12 d x 5 lead	BPSK60
03	Ball screw 12 d x 10 lead	BPSK60

F MOVING SLIDE

31	With cover plate
40	With sealing strip

G MOTOR & ENCODER

02	Direct Drive Motor 160V, 1,000 LPR
03	Direct Drive Motor 300V, 1,000 LPR

H COVER TYPE

01	With Cover Plate
02	With Sealing Strip

J LIMIT SWITCHES & MOUNTING

01	Without Limit Switches
02	NPN NC (5 ~ 24 VDC, sinking 20mA Max) on Ref Edge
03	NPN NC (5 ~ 24 VDC, sinking 20mA Max) non Ref Edge

K BRAKE

0	No Brake
1	With Brake

NOTE:

Part Number follows the Rexroth Bosch part number code.

Specifications are subject to change without notice.

How to Order

Mini Luge BPSK stages are supported by a worldwide network of offices and local distributors.
Call 1-800-305-4555 for application engineering assistance or for the name of your local distributor.
Information can also be obtained at **www.baysidemotion.com**.

3.3 Electrical Specifications

3.3.1 Limits

Two end of travel limits can be ordered with all BPSK stages. These are Hall effect type switches and have the following characteristics:

Supply Power	5-24VDC at 20mA max
Transistor Type	NPN (Current Sinking)
Operation Mode	Normally Closed
Length of Engagement	approx. 7mm
Repeatability	± 0.3mm (bidirectional)

3.3.2 Brake

A fail safe brake can ordered with the BPSK stage. The brake is a fail safe type, i.e. braking action occurs when power is removed. Therefore, for slide operation, the brake must be electrically energized. The brake is mounted to the far end of the stage away from the motor. The brake has the following characteristics:

Supply Power	24VDC at 200mA max
Static Torque	0.34Nm (3 in lb) ???
Rotating Inertia	5.07e-3 gm cm sec^2 (7.05e-5 in oz sec^2)???

3.3.3 Direct Drive

3.3.3.1 Rotary Servo Motor

The direct drive servo motor in both BPSK series has the following specifications:

Motor Specifications
(sinusoidal comm)

KO32 Frameless Motor with: Voltage		160V	300V
K_{EL-L}	(Vpk/kRPM)	11.5	23.2
K_{TL-L}	**(Nm/amp RMS)** (oz in/amp RMS)	**0.134** 18.91	**0.26** 38.7
Continuous Current	Arms	1.0	0.5
Peak Current	Arms	3.0	1.5
R_{L-L}	(ohms)	16.5	6.6
L_{L-L}	(mH)	8.1	33
Pole	#	4	4
Rotor Inertia	**(gm cm sec^2)** (oz in sec^2)	**0.0064** 0.000089	**0.0064** 0.000089

Temperature Note:

All motor speed/torque curves are based on 25 °C ambient with a max winding temperature of 155 °C, at stall. Ambient temperatures above 25 °C will require derating. Consult Bayside Motion Group, Technical Services at (516) 484-5353 for application assistance.

3.3.3.2 Rotary Encoder

A rotary encoder is supplied with the BPSK series stages. It is mounted just behind the motor and supplies hall effect commutation for the motor. Commutation is factory aligned to the motor phases and therefore in case of failure this encoder (and motor stator) is not field replaceable. The encoder is a 1000 line rotary encoder, providing 4000 pulses per revolution, post quadrature. The encoder has the following specifications:

Supply Power	5VDC +/- 5% at 260mA max
Output Format	Square wave differential line driver. Dual channel quadrature plus index
Frequency response	300kHz
Operating Temperature	-20 to 100 deg C
Storage Temperature	-40 to 125 deg C

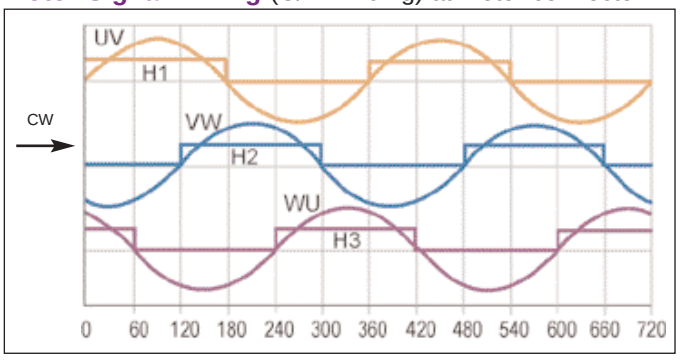
3.3.3.3 Motor Commutation

The commutation signals, developed by hall sensors, are avialable for proper control of the motor by an amplifier. The hall effects are located inside the encoder. The hall effect are pre-aligned at the factory and are not adjustable.

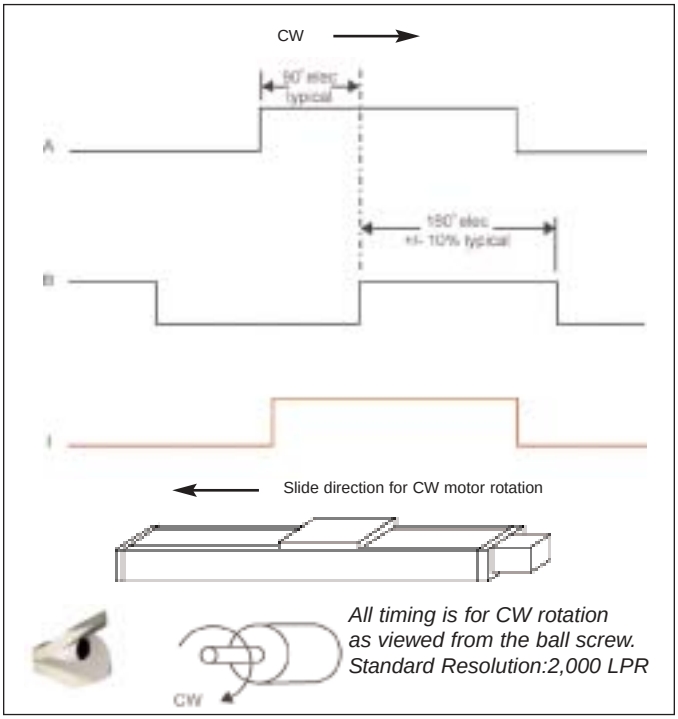
3.3.4.4 Signal Timing

The following chart shows the timing of the commutation and encoder signals in relation to the motor back EMF. Section Section 4. Cabling & Wiring, for signal pin designations. Note timing is for Counter Clockwise rotation as viewed from the ball screw.

Motor Signal Timing (C/D winding) at motor connector



Encoder Timing



3.4 Mechanical Specifications

4.0 Cabling & Wiring

4.1 Motor Power Connection

BPSK series stages are provided with flying leads for suppling power to the motor. The leads are labeled the following; U,V,W, and G for ground.

4.2 Sensor Connection

All models of BPSK stage come with flying leads for suppling power and receiving signals from various parts of the stage such as encoder, hall effect commutation, thermistor, limits, and brake.

5.0 Installation

5.1 Limit Adjustment

In order to adjust the home and limit switches follow these steps:
1. Remove the strip from the extrusion on the side of the stage
2. Inside the extrusion are two limits with set screws. These screws control the location of the end of travel limits. Loosen the appropriate screw and slide the screw forward or backward to adjust the limit location.
3. Replace the strip into the extrusion to prevent the limit wires from damage during shuttle movement.

6.0 Maintaince & Lubrication

The only periodic maintenance required is lubrication of the bearings and the ball screws. As the frequency of lubrication varies based on the specific application, parameters, and environmental conditions, it is recommended that each axis be analyzed and lubricated after the first 10,000 meters of travel. Based on this evaluation, future lubrication frequency should be developed. It is expected, that a three to six month lubrication frequency will be adequate to assure reliable service life of the bearing and ball screw structure.

6.1Lubrication Type

For both recirculating guides and ball screws
Lithium soap based grease #2 or equivalent
Acceptable products:
Nye Lubricants: Rheolube 716B
Kluber Lubrication: Isoflex NBU 15

6.2 Re-Lubricantion Procedure

1. Remove top cover of the stage
2. Wipe down the ball screw and rails with a clean lint free cloth.
3. Liberally apply grease to ballscrew and rails.
4. Operate the stage at low speeds to allow the grease to work into the reciculating pucks and ball screw nut.
5. Repeat steps 2 & 3 several times to make sure grease is worked into the components
6. Clean excess grease from rails and ball screw using a clean lint free cloth.
7. Install top cover.