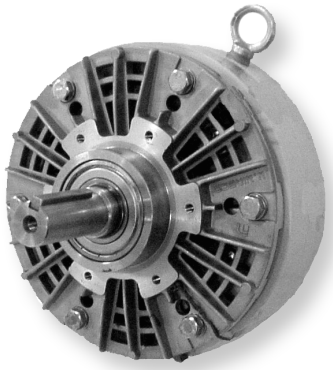
nexen®

WEB CONTROL PRODUCTS

User Manual



Magnetic Particle Brake

NBS-5, NBS-10

FORM NO. L-21079-A-0201

In accordance with Nexen's established policy of constant product improvement, the specifications contained in this manual are subject to change without notice. Technical data listed in this manual are based on the latest information available at the time of printing and are also subject to change without notice.

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ISO 9001 Certified

DANGER

Read this manual carefully before installation and operation.

Follow Nexen's instructions and integrate this unit into your system with care.

This unit should be installed, operated and maintained by qualified personnel ONLY.

Improper installation can damage your system or cause injury or death.

Comply with all applicable codes.

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INTRODUCTION

The NBS-5 and NBS-10 Magnetic Particle Brakes were developed for web tension control. These brakes use magnetic powder to transfer torque between the rotating shaft and the stationary housing. Thus, torque output is easily controlled by varying the amount of current applied to the brake.

Benefits Include:

- Linear torque control
- Long life
- Low excitation current produces wide range of torque control
- Dust free operation
- Quiet operation
- Output torque controlled independently of speed changes

INSTALLATION

Caution: Install NBS-5 and NBS-10 away from high sources of heat, corrosive gas and liquids, water spray, and oil spray. Failure to do so can result in electrical failure and/or deterioration of performance.

When shielding the NBS-5 or NBS-10 from liquids, the shielding must not restrict the surrounding air flow or the thermal dissipation rating will decrease.

Caution: Keep the NBS-5 and NBS-10 dry when unused for extended periods of time. Rust in the magnetic powder will degrade performance.

1. Connect the wiring and power cable using appropriate close-ended connectors. Ensure the wires and connectors are properly insulated. Use a power cable with a capacity sufficient for the maximum electric current. Also, make sure that the connected wire is secure and does not make contact with any rotating parts.

Caution: Poor electrical wiring connections may lead to an electrical short, open circuits, hazards, or fire.

2. Fasten the brake with the specified bolts and tighten securely within the torque range specified below.

NBS-5	Installation screw size M6 Torque 70-120 in-lb (8.0-13.5 Nm)
NBS-10	Installation screw size M10 Torque 345-575 in-lb (39-65 Nm)

WARNING

Do not use the NBS-5 or NBS-10 in environments that have explosive gas or dust present. The NBS brakes have electricity flowing through them that could cause sparks. Surface temperatures of 90℃ are normal, therefore, keep combustible materials from touching brake housing.

DANGER

Do not lift the NBS-5 or NBS-10 by the electrical wires. The wires can not support the weight of the brake.

DANGER

Before installation or maintenance, disconnect power and lockout/tagout the machine.

(continued...)

INSTALLATION (continued...)

3. Install a seal on the shaft if there is a chance of water or oil seeping in around the shaft. If oil or water is allowed to seep in, the magnetic powder will deteriorate at a faster rate. This requires particular attention when the shaft is connected through a gear box.

4. If shafts are connected directly, be sure to use a flexible coupling. If shafts are not properly aligned, the bearings will receive extra stress, which shortens their life.

NOTE: When using a flexible coupling, keep the alignment of the shafts within the allowable values for the coupling.

5. The following shaft-end load must be observed when the brake is being driven by a pulley system.

   The actual shaft-end load must satisfy the following equation:

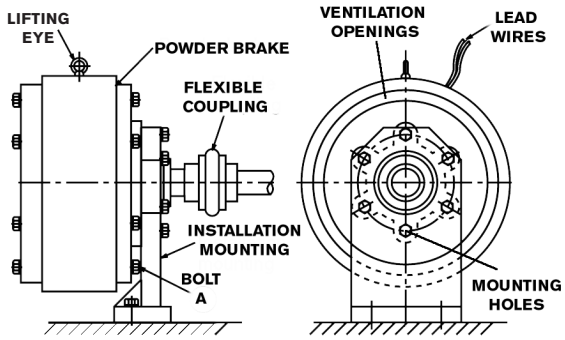
$$F = \frac{2\tau fb}{D_P}$$

F = Shaft-end load (lb)

τ = Transmission Torque (in-lb)

D_P = Pitch diameter of the pulley (in)

fb = Chain (1.2 to 1.5) or Belt (2.5 to 4.0) coefficient



Bolt A must remain clear of the Installation Mounting.

FIGURE 1

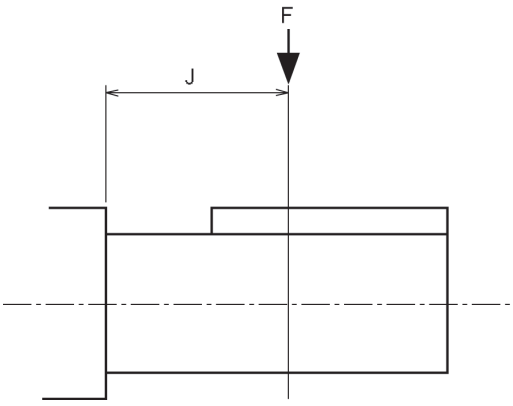


FIGURE 2

NOTE: See Table 2 for allowable shaft-end load at a speed of 1800 rpm and a shaft life of 6000 hours. The value of Fmax from Table 2 should be corrected based on the speed being applied. The modified Fmax can be calculated by multiplying the allowable load from Table 2 with the speed coefficient from Table 1.

TABLE 1

Speed (rpm)	Speed Coefficient
600	1.44
800	1.36
1000	1.21
1200	1.14
1400	1.09
1600	1.04
1800	1.00

TABLE 2 **Allowable shaft-end loads**

Model	J(in)[mm]	Fmax(lbs)[N]	J(in)[mm]	Fmax(lbs)[N]
NBS-5	(2.24)[57]	(97.8)[435]	(1.12)[78.5]	(137.6)[590]
NSB-10	(2.52)[64]	(193.3)[860]	(1.26)[32]	(251.8)[1120]

(continued...)

INSTALLATION (continued...)

6. When using the NBS brake, a diode should be installed to dissipate the inductive energy of the brake's coil. Use a diode with ratings exceeding 400V and 6A. When installing the diode, ensure that the polarity is in the right direction. (See Figure 4).

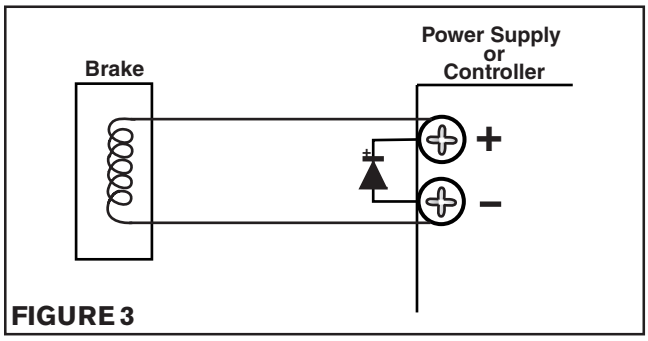
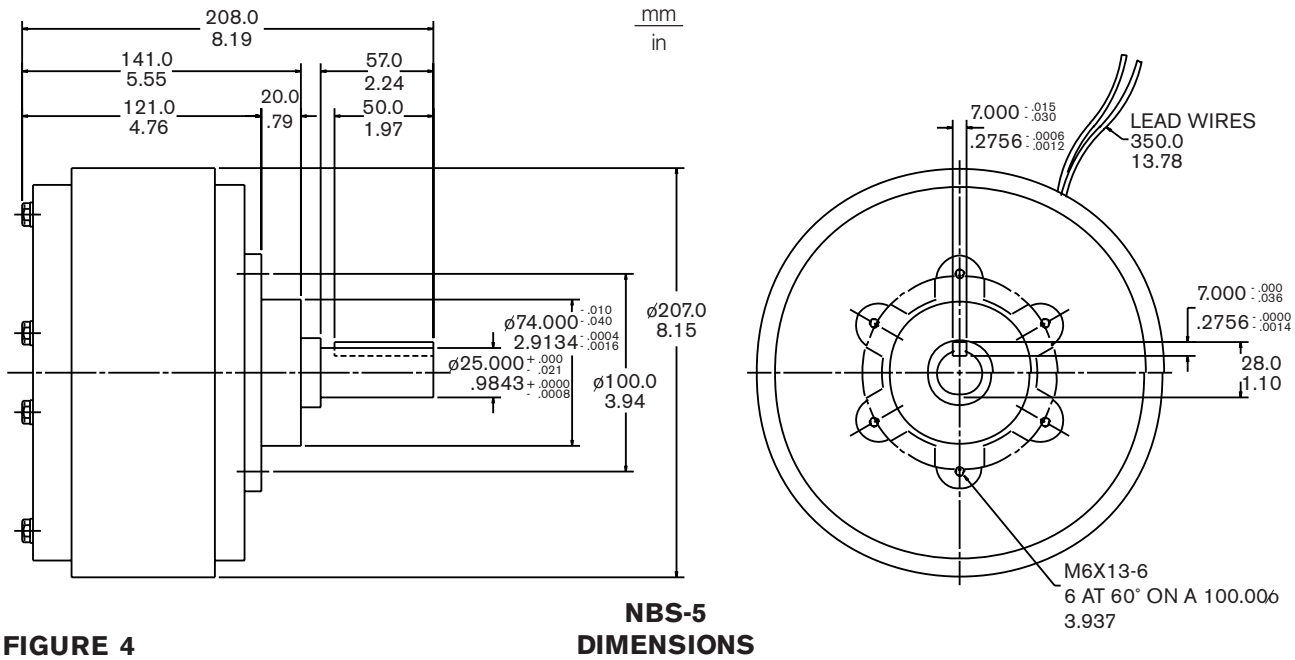
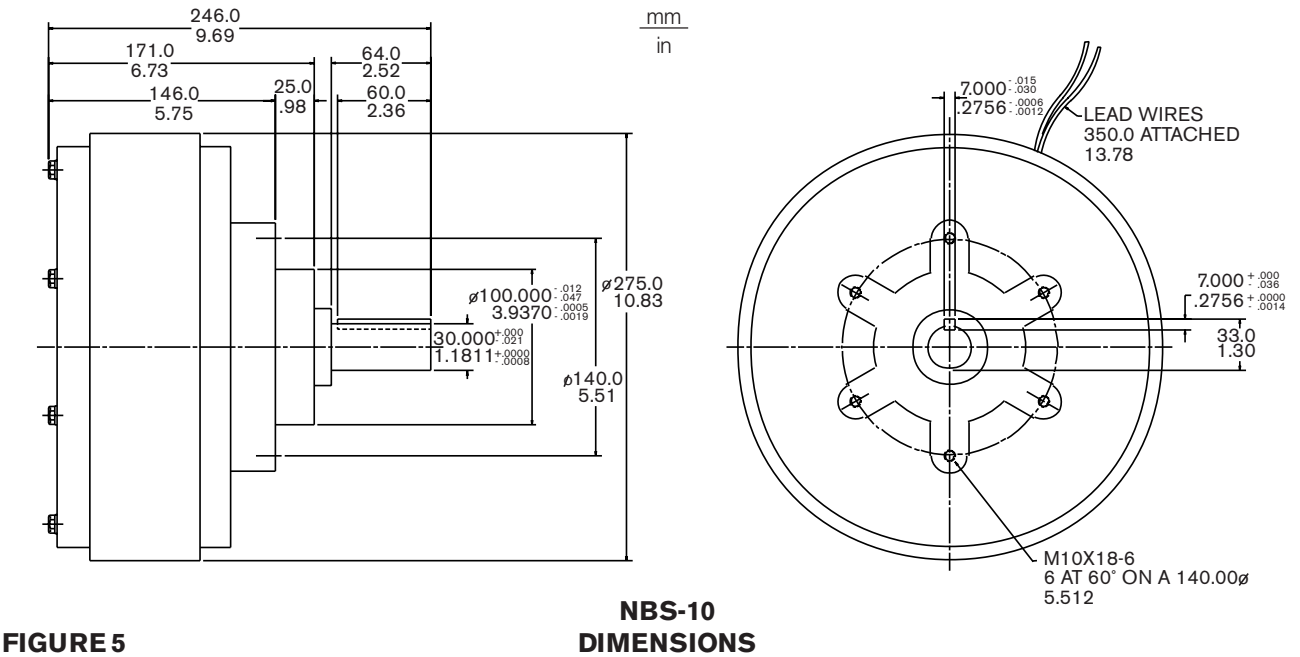


FIGURE 3



NBS-5 DIMENSIONS

FIGURE 4



NBS-10 DIMENSIONS

FIGURE 5

OPERATION

Caution: Operation of the brake must be done within the allowable speed. If the speed exceeds 1800 rpm, internal friction and vibration could become large enough to cause failure.

NOTE: The following break-in procedure must be performed before using the NBS-5 or NBS-10 the first time. Failure to perform this procedure can cause poor brake performance.

Break-in

1. Let the brake rotate at 200-500 rpm for one-two minutes without supplying current to the coil.

2. At 30-40% of the brake's maximum amperage, turn on the current for five seconds, then off for ten seconds. Repeat this 20 times.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	SOLUTION
Fluctuating torque	Deterioration of powder	Replace powder
No change in torque	Deterioration of powder	Replace powder
Excessive drag torque	Failure of bearing	Replace bearings

MAINTENANCE

After extensive use, torque decreases due to deterioration of the powder. Nexen recommends replacing the magnetic powder when the torque output drops to about 70% of its original value or the tension stability begins to suffer.

Consult Nexen for replacement of powder or repair. We cannot be held responsible for any failures caused by the repair of a third party.

DANGER

Before maintenance, disconnect power and lockout/tagout the machine.

SPECIFICATIONS

MODEL	NBS-5	NBS-10
Rated Torque	442 in-lb (50 Nm)	884 in-lb (100 Nm)
Rated Voltage	24 VDC	24 VDC
Current	1.8 A	2.6 A
Coil Resistance	13.3 Ω	9.4 Ω
Power Consumption (at 75°C)	45.2 W	61.3 W
Weight	28.7 lbs (13 kg)	68.3 lbs (31 kg)
Coil Insulation Resistance	5 MΩ minimum	5 MΩ minimum
Allowable Rotation	1800 rpm maximum	1800 rpm maximum
Maximum Temperature*	194°F (90°C)	194°F (90°C)
Inertial Moment	0.4 lb-ft^2 [1.5x10^{-2}kg-m^2]	1.1 lb-ft^2 [4.5x10^{-2}kg-m^2]

*Surface Temperature of cover

(continued...)

SPECIFICATIONS (continued...)

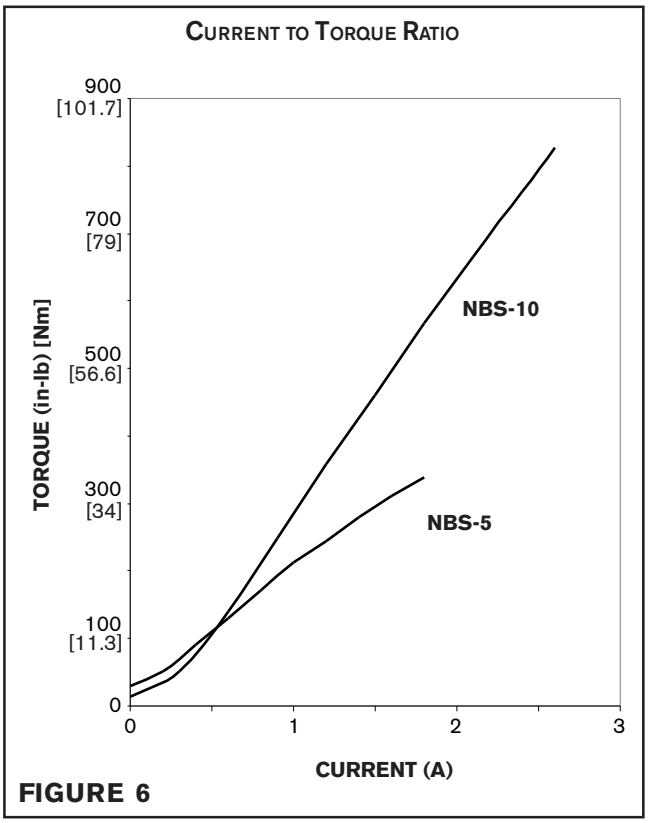


FIGURE 6

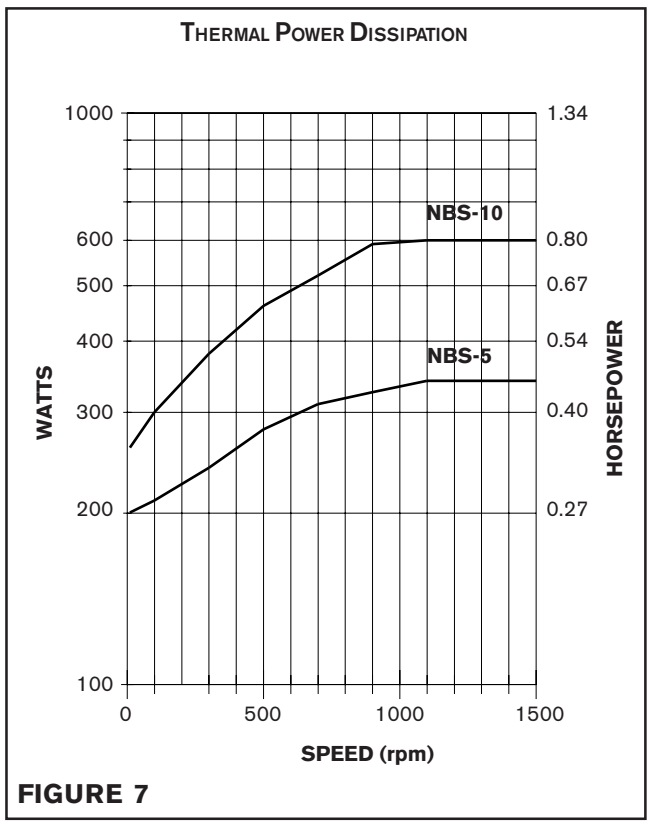


FIGURE 7

WARRANTY

Warranties

Nexen warrants that the Products will be free from any defects in material or workmanship for a period of 12 months from the date of shipment. NEXEN MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. This warranty applies only if (a) the Product has been installed, used and maintained in accordance with any applicable Nexen installation or maintenance manual for the Product; (b) the alleged defect is not attributable to normal wear and tear; (c) the Product has not been altered, misused or used for purposes other than those for which it was intended; and (d) Buyer has given written notice of the alleged defect to Nexen, and delivered the allegedly defective Product to Nexen, within one year of the date of shipment.

Exclusive Remedy

The exclusive remedy of the Buyer for any breach of the warranties set out above will be, at the sole discretion of Nexen, a repair or replacement with new, serviceably used or reconditioned Product, or issuance of credit in the amount of the purchase price paid to Nexen by the Buyer for the Products.

Limitation of Nexen's Liability

TO THE EXTENT PERMITTED BY LAW NEXEN SHALL HAVE NO LIABILITY TO BUYER OR ANY OTHER PERSON FOR INCIDENTAL DAMAGES, SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES OR OTHER DAMAGES OF ANY KIND OR NATURE WHATSOEVER, WHETHER ARISING OUT OF BREACH OF WARRANTY OR OTHER BREACH OF CONTRACT, NEGLIGENCE OR OTHER TORT, OR OTHERWISE, EVEN IF NEXEN SHALL HAVE BEEN ADVISED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH POTENTIAL LOSS OR DAMAGE. For all of the purposes hereof, the term "consequential damages" shall include lost profits, penalties, delay images, liquidated damages or other damages and liabilities which Buyer shall be obligated to pay or which Buyer may incur based upon, related to or arising out of its contracts with its customers or other third parties. In no event shall Nexen be liable for any amount of damages in excess of amounts paid by Buyer for Products or services as to which a breach of contract has been determined to exist. The parties expressly agree that the price for the Products and the services was determined in consideration of the limitation on damages set forth herein and such limitation has been specifically bargained for and constitutes an agreed allocation of risk which shall survive the determination of any court of competent jurisdiction that any remedy herein fails of its essential purpose.

Limitation of Damages

In no event shall Nexen be liable for any consequential, indirect, incidental, or special damages of any nature whatsoever, including without limitation, lost profits arising from the sale or use of the Products.

Warranty Claim Procedures

To make a claim under this warranty, the claimant must give written notice of the alleged defect to whom the Product was purchased from and deliver the Product to same within one year of the date on which the alleged defect first became apparent.

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