

OVERVIEW

On occasion, linear valves such as wedge and knife gate valves are installed in areas where mechanical advantage is needed, or where the valve hand wheel needs to be moved from the horizontal plane to the vertical. The BGTM enclosed right-angle bevel gear operator provides thrust and torque advantage, making it easier to operate rising and non-rising multi-turn valves. The heavy design and hammer-blow feature makes the BGTM perfect for industrial application.



OPTIONS

Not every valve installation with gear operator places the handwheel in an ideal position for the user. Options and WIGVA's fabrication capabilities are available to provide this accessibility. Options include, but are not limit to:

- Square Drive Nuts - For valves installed below grade or otherwise inaccessible directly, or as a means to limit operation to only those with the proper tee-handle, the handwheel can be replaced with a square drive nut on the input shaft.
- Mitters - Used in conjunction with the BGTM, a 1:1 ratio miter can reorient the input shaft by 90° for accessibility or addition of further options.
- Stem Extensions - Since the BGTM reduces the input torque and provides the thrust needed to operate a linear valve, a lower torque non-rising stem extension can be applied to the input shaft. Stem extensions can be fabricated to meet many installation requirements.
- Chainwheel Operators - For remote overhead installations, a chainwheel operator can be applied to the handwheel. Galvanized chain can be supplied with the chainwheel provided the drop is known.

SIZING CALCULATIONS

In addition to picking a gear that can achieve the desired output torque and accept the valve stem characteristics, use the following formulas to determine the input torque and handwheel rim pull. Gear operators have a maximum input torque that should not be exceeded.

TQ_{IN} - Input Torque: The amount of torque required at the gear's input shaft to achieve a certain output torque, expressed as "Lbs-Ft" in these equations

TQ_{OUT} - Output Torque: The amount of torque produced at the gear's stem bushing based on a certain input torque, expressed as "Lbs-Ft" in these equations

HW - Handwheel Diameter: Diameter of the handwheel expressed in inches

MA - Mechanical Advantage: Based on the physical characteristics of the gear configuration, expressed as a multiplier

RP - Rim Pull: The amount of force, expressed in pounds (Lbs), required or desired on the handwheel

GR - Gear Ratio: Based on the physical characteristics of the gear configuration, expressed as a fraction (e.g. - A ratio of "3.5 : 1" is expressed as "3.5/1" or "3.5")

TR_{IN} - Input Turns: The number of turns required at the gear operator's handwheel to fully stroke a valve

TR_{OUT} - Output Turns: The number of turns required at the valve stem to fully stroke the valve

LFT - Lift: The overall linear distance the valve's stem moves to complete one stroke (close to open)

LD - Lead: A characteristic of the valve stem, it is the linear distance the stem moves with one turn of the valve's handwheel

$$TQ_{IN} = \left(\frac{HW \times RP}{2} \right) \div 12$$

$$TQ_{IN} = \frac{TQ_{OUT}}{MA}$$

$$TQ_{OUT} = TQ_{IN} \times MA$$

$$RP = \left(\frac{2 \times TQ_{IN}}{HW} \right) \times 12$$

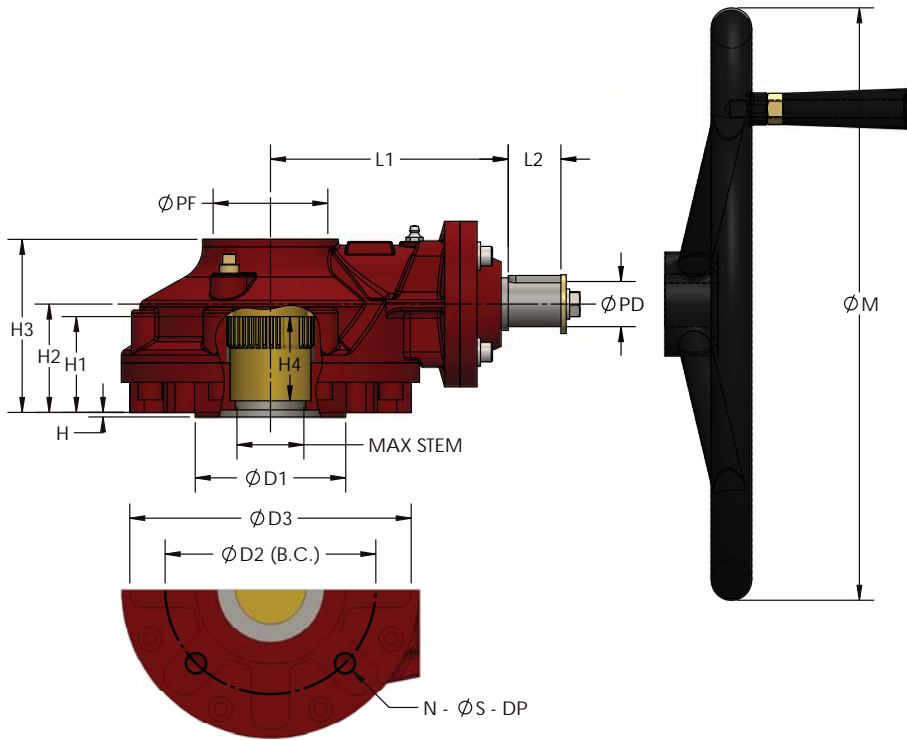
$$TR_{IN} = GR \times TR_{OUT}$$

$$TR_{OUT} = LFT \div LD$$

$$TR_{OUT} = TR_{IN} \div GR$$

$$\text{Lbs-In} = \text{Lbs-Ft} \times 12$$

$$\text{Lbs-Ft} = \text{Lbs-In} \div 12$$



Materials

Description	Material
Housing	Ductile Iron A536-65-45-12
Base	Ductile Iron A536-65-45-12
Bevel Gear	Carbon Steel A576-1045
Bevel Pinion	Alloy Steel A332-4140
Drive Sleeve	Ductile Iron A536-65-45-12
Lock Nuts	Carbon Steel A576-1045
Stem Bushing	Aluminum Bronze B584-C86200
Input Cap	Ductile Iron A536-65-45-12
Base/Cap Bolts	Alloy Steel A332-4140
Input Shaft Bearings	Bearing Steel A295-52100
Thrust Bearings	Bearing Steel A295-52100
Housing Plug	Carbon Steel A307 Gr B
Housing/Cap O-rings	Buna N (NBR)
Collar	Steel Pipe A53
Bearing Washer	Carbon Steel A576-1045
Bearing Nut	Carbon Steel A576-1045
Grease Fitting	Zinc Plated Carbon Steel A307 Gr B
Set Screw	Stainless Steel A276-304
Base/Cap Gaskets	Nonasbestos
Key	Carbon Steel A576-1045

Dimensions (inches)

Part Number	Flange	ϕ D1	ϕ D2	N	ϕ S	DP	ϕ D3	H	H1	H2	H3	H4	L1	L2	ϕ PD	KEY	ϕ M	PF (Straight)
WVABGTMB1	F10	2.756	4.016	4	3/8-16	0.59	4.92	0.08	2.20	2.62	4.06	1.97	4.96	1.38	0.98	0.315X0.276	11.81	2" - 11
WVABGTMB3	F14	3.937	5.512	4	5/8-11	0.79	6.89	0.12	2.52	2.83	4.53	2.28	6.26	1.38	1.18	0.394X0.315	15.75	2-1/2" - 11
WVABGTMB5	F20	5.512	8.071	8	5/8-11	1.18	9.65	0.12	3.58	4.09	6.02	3.15	7.80	1.38	1.18	0.394X0.315	24.80	3" - 11

Mechanical Specifications

Part Number	Gear Ratio	Maximum Thrust (lbs)	Maximum Torque (lbs-ft)		Mechanical Advantage	Max Stem		Wt. (lbs)
			Input	Output		Keyed	Threaded	
WVABGTMB1	2.5 : 1	16,964	80	183	2.3	0.87	1.10	20
WVABGTMB3	3.5 : 1	28,419	159	507	3.2	1.50	1.81	38
WVABGTMB5	4.0 : 1	42,739	320	1151	3.6	2.17	2.44	75

© 2015 - WIGVA. All rights reserved.

Wolseley Industrial Group, Valve & Automation (WIGVA) is a member of Wolseley Industrial Group

The contents of this publication are presented for information purposes only, and while effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.