

SM-BEIER

Mechanical Adjustable Speed Drives

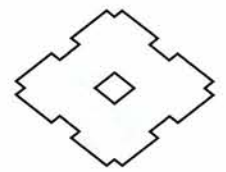


**THE AVAILABLE
SOLUTION,
WORLDWIDE.**

 **SUMITOMO**
MACHINERY CORPORATION OF AMERICA

SM-BEIER

Catalog
06.002.50.003



INTRODUCTION

SM-BEIER

Sumitomo Machinery Corporation of America, a world leader in power transmission, offers the flexibility of mechanical speed variation.



SM-BEIER VARIATOR

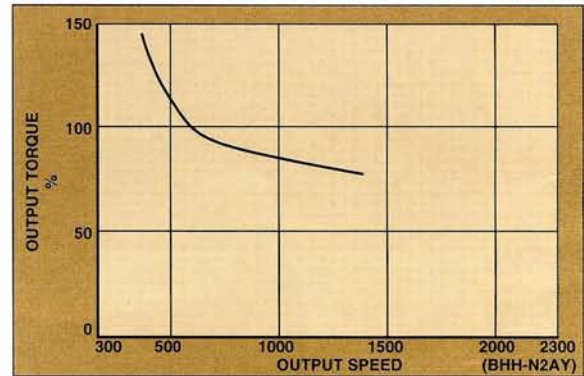
The SM-Beier is a premium-featured speed variator that is clearly superior to other mechanical adjustable speed drives. Because it maintains a constant oil film as a tractive force, the Beier Variator experiences no wear or grooving, which increases life with minimal maintenance.

The Beier Variator offers the highest HP capacity of any mechanical drive on the market today. Its unique viscous drag design provides high operating efficiency, heavy shock load capacity and stable rotational speed. It is also easily modifiable for explosion-proof, washdown and both open and closed loop signal following.

The Beier, when combined with the SM-Cyclo in-line, provides a broad speed variation over a low speed range.

Beier Speed Torque Characteristics

The Beier Variator increases torque as speed is reduced. This drive offers a torque compensating face cam design for efficient, trouble-free operation and it is also backed by Sumitomo's two year warranty.

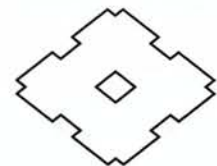


SM-BEIER VARIATOR

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SM-BEIER & BEIER CYCLO

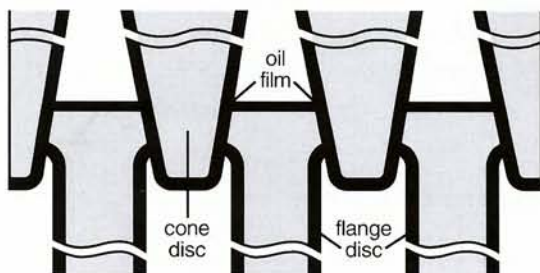


FEATURES

Power Transmission Through Viscous Drag

Power is transmitted through viscous drag or the tractive force of the oil film between the discs at the point of contact, not through friction between the cone and flange discs. The cone discs are relatively thin; thus the radius of curvature is great. This minimizes the contact pressure. Accordingly, at the points of contact, an ideal boundary lubrication nearing fluid film friction is obtained.

Transmission Through Oil Film



Overload Resistance

Excellent overload resistance due to the high multiplicity of contact points.

Durability

Metallic contact is avoided by maintaining a constant oil film between the discs, thus minimizing wear of the discs. This unique design results in long life and low maintenance costs. There is virtually no wear, and no grooving or fretting corrosion.

Ratings

The ratings are based on 24-hour daily service under uniform or low fluctuating load conditions. Service factors above 1.0 are required only for heavy load conditions.

Speed Adjustment

Speeds are infinitely adjustable within the 3.3:1, 4:1, or 10:1 speed ranges, depending on the model. Settings remain stable, even over long periods of time. There is no need to run the Beier through the entire speed range daily as with belt drives.

Minimum Vibration

The rotational parts, including the discs, are completely symmetrized, and the moment of inertia is low. This assures almost vibrationless operation.

Concentric Shafts Arrangement

The concentric shafts arrangement enables easy installation and handling.

Capacity

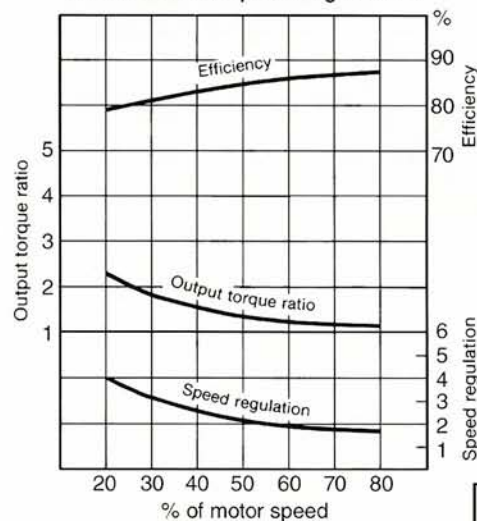
Highest load capacity of any mechanical drive—200 HP.

Space-Saving Compactness

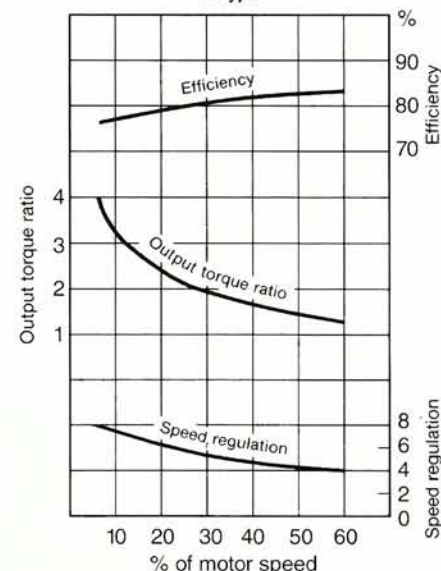
The power transmitting section is composed of thin metallic discs. This feature provides compactness, while transmitting high torque. The Beier takes no more space than an ordinary mechanical speed variator of similar rating.

PERFORMANCE CURVES

STD 4:1 and 3.3:1 Speed Range Variator



Wide Range 10:1 Speed Range Variator D Type

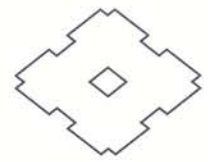


Full Load Motor Torque is 1

- Face Cam Design on All Models Decreases Wear and Increases Service Life
- Discs Hardened and Ground to 60 Rockwell C

OPTIONS:

- C Face Output to 7½ HP
- Accepts STD C Face Motor to 10 HP Input
- Remote control (electric, pneumatic, hydraulic)
- Explosion Proof Modifications
- Signal Following Remote Control (see Pg. 27)
- Top Mount Assembly (see Pg. 37)
- Washdown Modifications



BENEFITS

The Beier Variator is an adjustable speed traction drive whose design and method of speed variation is truly unique among mechanical drives available today. Power is transmitted through the viscous friction of an oil film that separates multiple thin metal discs. Variations in the depth of engagement between the driver and driven discs provide the means of adjusting speed.

Sumitomo has applied their extensive experience in the design and development of high-quality Cyclo speed reducers to the manufacture of the Beier Variator. The use of special bearing steels, through-hardened and machined to exacting dimensional tolerances, is common to both products. The ultra-compact combination of a Beier Variator and a Cyclo Reducer results in a Beier-Cyclo Variator that provides not only an adjustable speed range, but extremely low output speeds as well. Both units enjoy outstanding reputations where severe working conditions prevail, and in applications that cannot tolerate breakdowns.

High Efficiency

Efficiency of the Beier Variator approaches 90%. High efficiencies are maintained even when combined with Cyclo Speed Reducers, due to inherent efficiency advantages of Cyclo.

Heavy Load Capacity

The contact pressure is relatively low, since power transmission is evenly distributed over many contact points. This results in excellent shock load resistance. The Beier can withstand momentary shock or heavy overload and still not break the oil film that prevents metallic contact. It has the highest load capacity of any mechanical drive—200 HP.

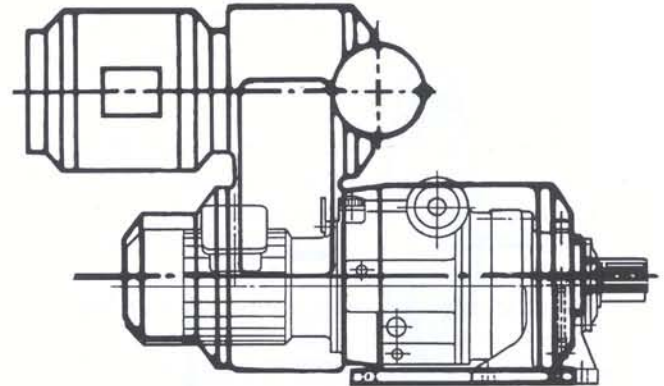
Durability

Virtually no wear and no grooving or fretting corrosion, as exhibited by belt drives.

Versatility

Wide product range covered by standard models and applied products that will meet diversified customer requirements.

Excellent Power Density



Typical motorized Beier Cyclo compared to belt drive. Both units are identical in HP capacity and final output speeds.

Speed Variation at Very Low Speed Area

Wide speed variation even at extremely low speed area is attainable in "BEIER-CYCLO VARIATOR."

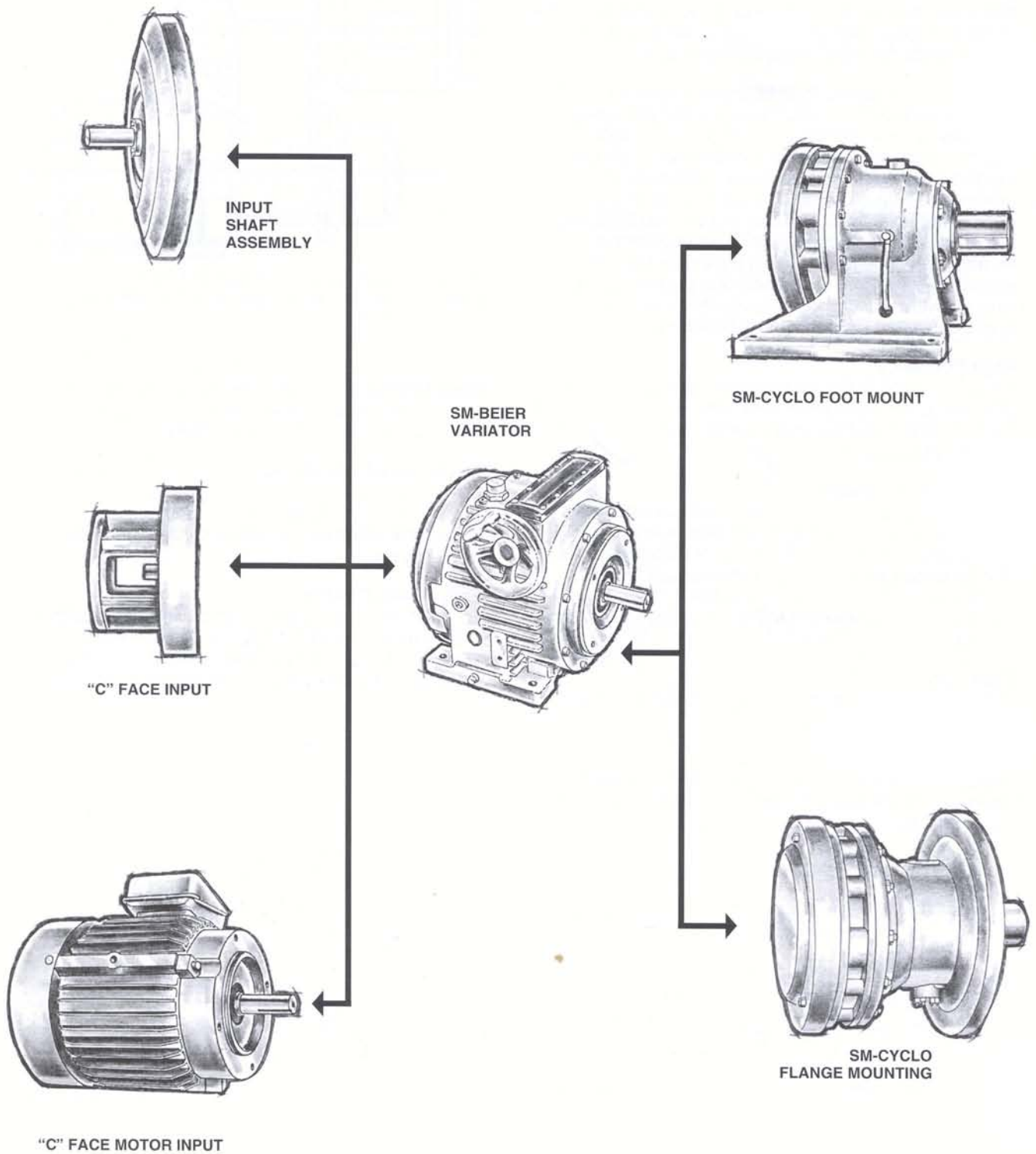
Stable Rotational Speed

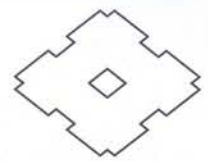
There is hardly any fluctuation in the rotational speed of the BEIER VARIATOR, even when shock load is imposed or when the variator is continuously operated for a long time.

Easy Speed Control

An infinitely variable speed can be obtained rapidly and exactly during operation by easy speed control operation. Various remote control equipment and automatic control systems are available as an option.

THE AVAILABLE MODULAR SOLUTION



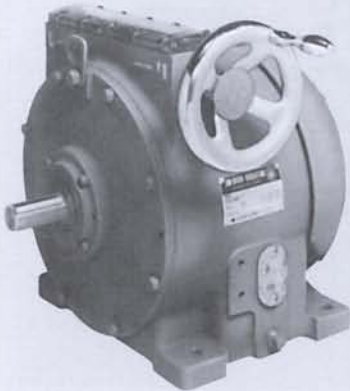


BASIC CONFIGURATIONS

Type A, AX

Input Power Available: $\frac{1}{2}$ ~200 HP
Speed Range Ratio: 4:1 or 3.3:1

Pgs. 10 thru 17 — Ratings
Pg. 30 — Dimensions



Type AJ, AXJ (C Face Input)

Input Power Available: $\frac{1}{2}$ ~10 HP

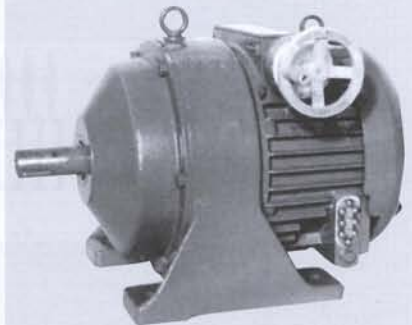
Pgs. 10 thru 17 — Ratings
Pgs. 30 and 42 — Dimensions



G-Type (Gear)

Input Power Available: $\frac{1}{2}$ ~100 HP
Speed Range Ratio: 4:1
Reduction Ratio: 2:1, 3:1, 4:1, 5:1

Pgs. 10 thru 17 — Ratings
Pg. 31 — Dimensions



Beier-Cyclo (Integral Design)

Input Power Available: $\frac{1}{2}$ ~20 HP
Speed Range Ratio: 4:1
Reduction Ratio: 6:1~infinite



Pgs. 10 thru 17 — Ratings
Pgs. 32 and 33 — Dimensions

Base Plate Model

Input Power Available: 15~200 HP

Pgs. 14 thru 17 — Ratings
For Dimensions please consult factory.

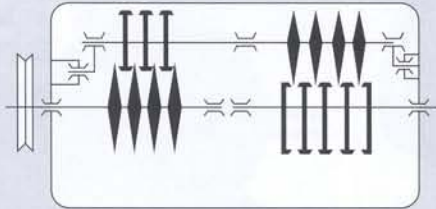


D-Type (Wide Range Type)

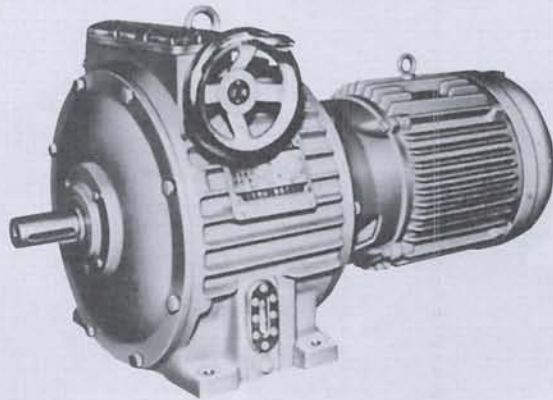
Pgs. 18 thru 20 — Ratings Pgs. 35 and 36 — Dimensions

This type consists of a double speed changing mechanism, giving infinitely stepless variable output speed in the speed range ratio of 10:1.

"D" Type available for horizontal operation only.



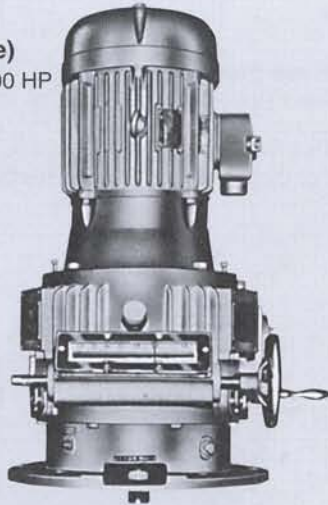
Input Power Available $\frac{1}{2}$ ~10 HP
Speed Range Ratio: 10:1



SPECIAL CONFIGURATIONS

AV Type (Vertical Motorized Type)

Input Power Available: $\frac{1}{2}$ ~200 HP
Speed Range Ratio: 4:1
Consult Factory
For Ratings & Dimensions

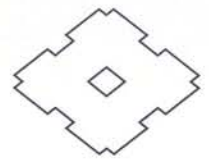


Vertical Beier-Cyclo

Input Power Available: $\frac{1}{2}$ ~100 HP
Note: 7.5~100 HP units
feature motor driven
lubrication system.
Consult Factory
For Ratings & Dimensions



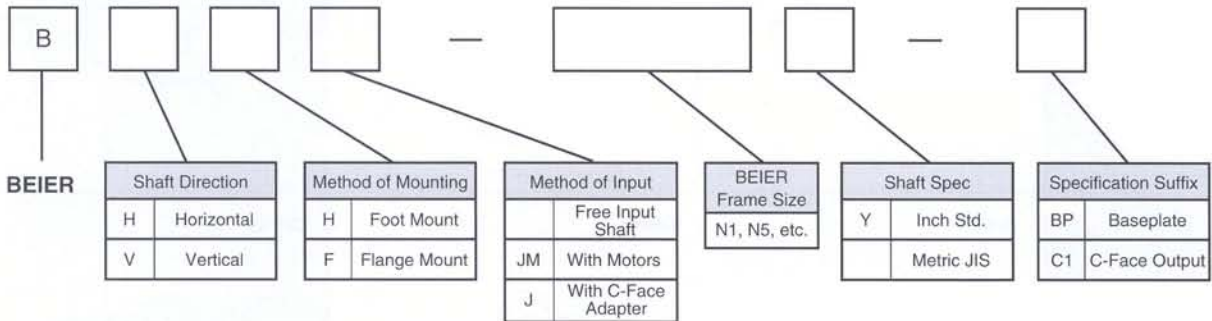
NOMENCLATURE



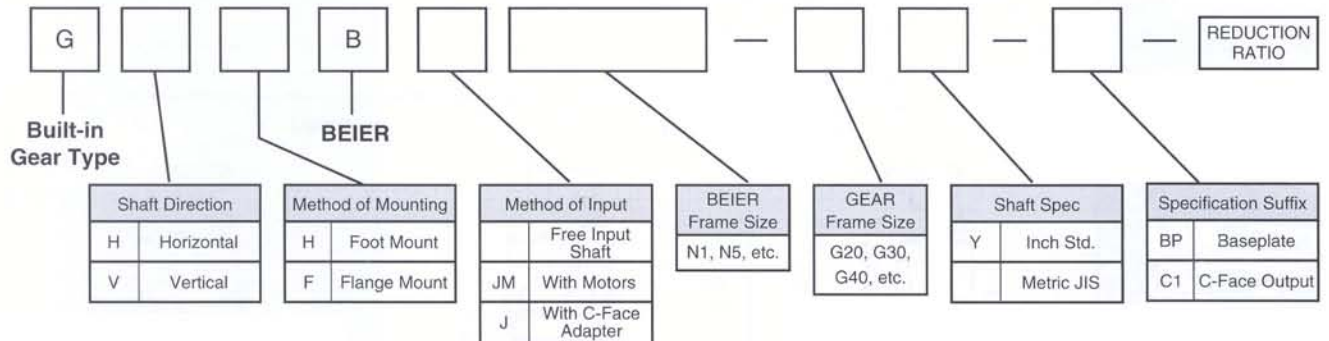
Basic



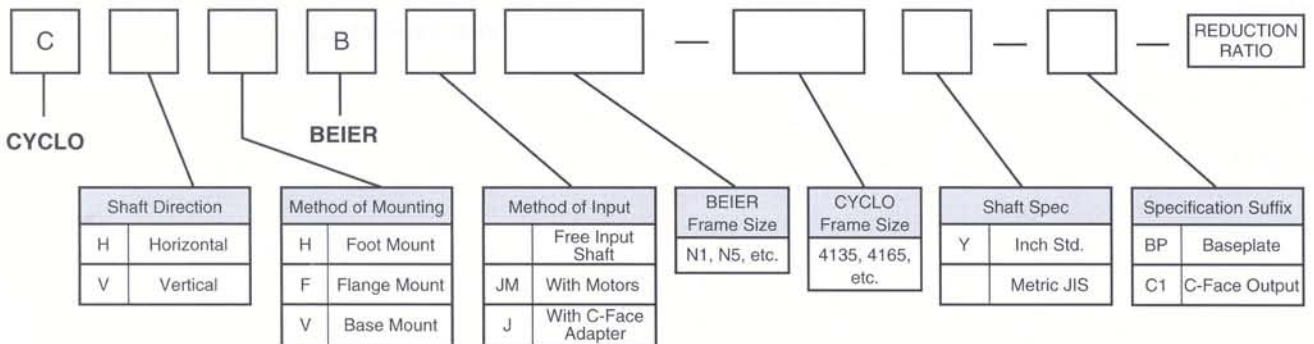
1. Beier Variator – Ex: “BHH-1AXY, BHHJ-5AXY”



2. Beier Variator (Built-in Gear Type) – Ex: “GHHBN5A-G30Y-5, GHHBJN2A-G20Y-3”

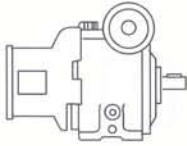
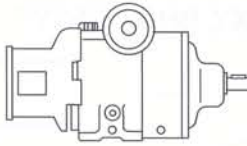
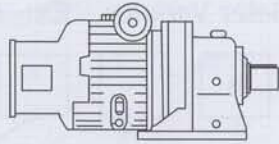
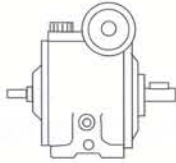
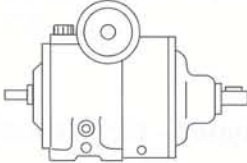
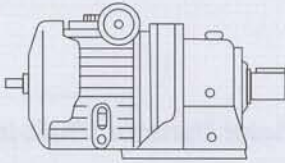
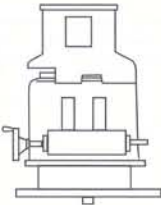
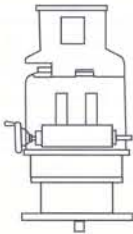
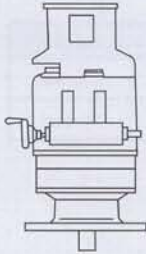


3. Beier-Cyclo Variator – Ex: “CHHBN8A-4165Y-17, CHHBJN8A-4175Y-87”

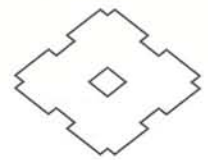


Note: AX = 1750 RPM rated output.

STANDARD MODEL AND TYPE

Shaft	Variety of output section	Input Mode		
		Basic Type	Built-in Gear Type	BEIER-CYCLO VARIATOR
Horizontal	Motorized	BHHJ 	GHHBJ 	CHHBJ 
	Free Input Shaft	BHH 	GHHB 	CHHB 
Vertical	Motorized	BVFJ 	GVFBJ 	CVVBJ 

- Other applied products:
- Remote control equipped
 - Inverted vertical type (A TYPE: 7.5 HP or less, B TYPE: 5 HP or less)
 - Special vertical type for mixers



SELECTION

Ratings

The ratings (input horsepower) of Beier/Beier-Cyclo Variators are based on 24 hours daily service under uniform or low fluctuating load conditions. The input horsepower ratings of each frame size are shown on Pgs. 10 through 20.

When the application involves frequent start-stop, large shock loads, large load fluctuation or overload, consult the factory for unit selection.

Selection Procedure

All data prepared in this catalog is for proper selection of standard Beier/Beier-Cyclo Variators under uniform load conditions.

The following information is required for proper selection:

- 1) Input RPM
- 2) Output RPM (Max. – Min.)
- 3) Motor Rating
- 4) H.P. (@ Max. RPM – @ Min. RPM)
- 5) Method of connecting input and output shafts
- 6) Operating conditions
- 7) Environmental conditions

Selection Example I

Conditions:

- 1) Driven machine: Conveyor
- 2) Operating time: 16 hours per day continuous
- 3) Motor specifications: 3 HP, 1800 RPM, 182TC
- 4) Output shaft speed: 32 RPM Max., 9 RPM Min.
- 5) Running load: 4600"#
- 6) Input shaft connection: coupling
Output shaft connection: coupling

Selection:

Refer to rating tables Pg. 12. Select Model CHHBJN3A-4135Y (43:1 ratio). Output speed range 32.6 RPM — 8.1 RPM. Rated input power 3.0 HP @ Max. Output RPM. 1.76 HP @ Min. Output RPM.

Selection Example II

Conditions:

- 1) Driven machine: Plunger Pump
- 2) Operating time: 8 hours per day
- 3) Motor Specifications: 10 HP, 1200 RPM
- 4) Output speed: 875 RPM Max., 250 RPM Min.
- 5) Input shaft connection: coupling
Output shaft connection: coupling

Selection:

Determine rated input power requirement

$$\text{Allowable input HP} = \text{Rated input HP} \times$$

$$\frac{\text{Operating input speed}}{\text{Standard input speed}}$$

Therefore, the

$$\text{Rated input HP} = \text{Allowable input HP} \times$$

$$\frac{\text{Standard input speed}}{\text{Operating input speed}}$$

$$\begin{aligned} \text{Allowable input power} &= 10 \text{ HP} \\ \text{Operating input speed} &= 1200 \text{ RPM} \\ \text{Standard input speed} &= 1800 \text{ RPM} \\ \text{Rated input power} &= 10 \times \frac{1800}{1200} \end{aligned}$$

Rated input power = 15 HP
 Refer to rating tables Pg. 14
 Select Model BHH-15AY
 Output speed range 932 RPM — 233 RPM (based on 1165 RPM input).
 Rated input power:
 10.0 HP @ Max. output RPM
 7.5 HP @ Min. output RPM

Selection Example III

Conditions:

- 1) Driven machine: Mixer
- 2) Operating time: 16 hours per day
- 3) Output speed: 300 RPM Max., 100 RPM Min.
- 4) Running load: 1250"# @ 300 RPM
1900"# @ 100 RPM
- 5) Input and output shaft connections: coupling

Selection:

Determine HP equivalents @ 300 RPM HP =

$$\frac{(1250\text{"}) (300 \text{ RPM})}{63025} = 6.0 \text{ HP}$$

@ 100 RPM HP =

$$\frac{(1900\text{"}) (100 \text{ RPM})}{63025} = 3.0 \text{ HP}$$

Refer to rating tables Pg. 13. Select Model GHHBN8A-G30Y with 4:1 reducer ratio. Output speed range 350 RPM — 87.5 RPM (based on 1750 RPM input speed).
 Rated input power:
 7.5 HP @ Max. output RPM
 3.4 HP @ Min. output RPM