

U.S. Tsubaki DISCO

Powerful, flexible and reliable speed variation backed by U.S. Tsubaki high technology.

DISCO

■ Low Maintenance

- Use of a synthetic oil means virtually no maintenance is necessary.
- DISCO is shipped fully lubricated, and can be put to use immediately.

■ Compact, lightweight design

- Compact design for use almost anywhere in your environment.
- Lightweight aluminum case allows for easier handling.

■ Flexible placement of speed control knob

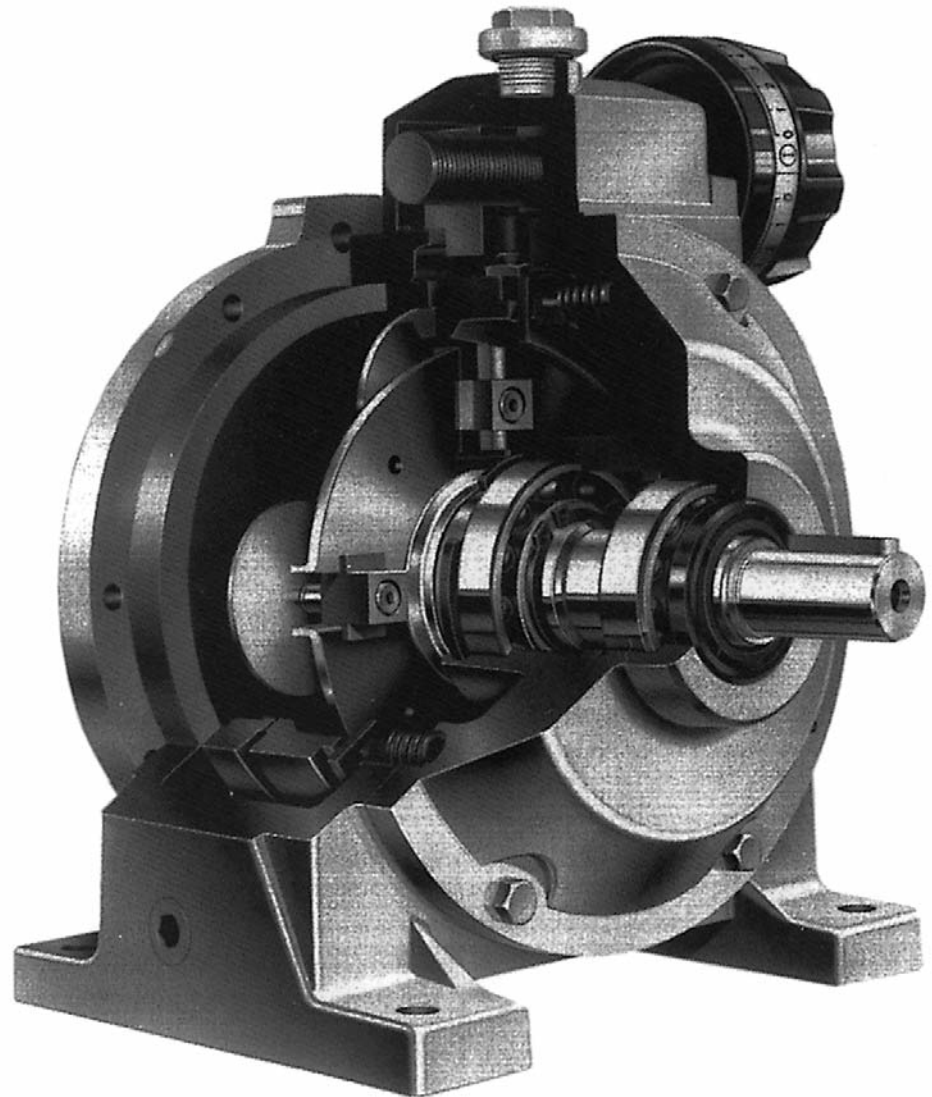
- Removing just one screw allows you to change the speed control knob position, and use it on the side appropriate for the installation position.
- Ergonomically designed, easy-to-grip knob.

■ Remote control related options available

- The electrical type speed variation range has been increased to a 6-to-1 speed range, the same as that for the speed control knob type.

■ Uses the ANSI key

- The input-output shaft keys meet ANSI standards.



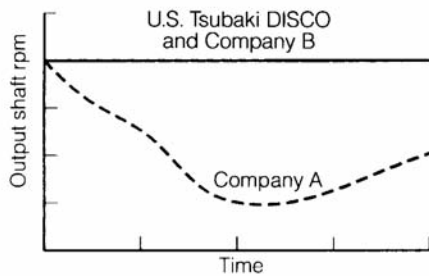
INFINITELY VARIABLE SPEED DRIVES

U.S. Tsubaki DISCO is one of the most competitive traction drive units on the market today.

DISCO combines compactness and simplicity with energy efficiency to ensure quiet operation and long, trouble-free performance.

Starting with materials of the highest quality, U.S. Tsubaki carefully manufactures and assembles DISCO according to strict quality control and efficient manufacturing processes.

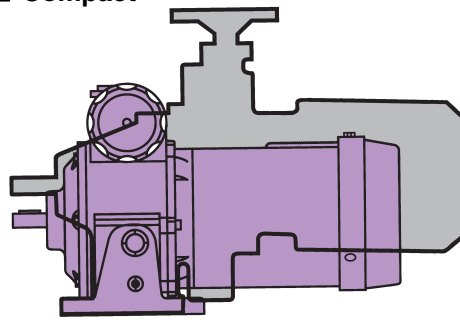
■ Speed stability



Comparison of speed stability

DISCO uses precisely machined parts. This provides very low speed drift under changing loads or over long periods of operation; speed is stable right throughout the range, with very little noise or vibration.

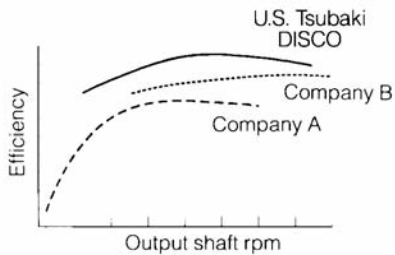
■ Compact



Size comparison

The unique construction of DISCO minimizes the number of parts required, yielding a lightweight, compact design—the smallest in its class.

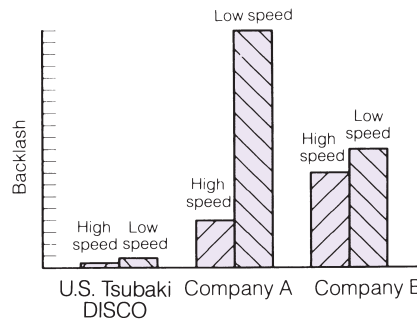
■ High efficiency & long life



Comparison of mechanical efficiency

To achieve long-term, high torque capacity and wide speed variation with low surface pressure, DISCO employs a planetary design utilizing specially formulated synthetic lubricants.

■ Low backlash and good shock resistance

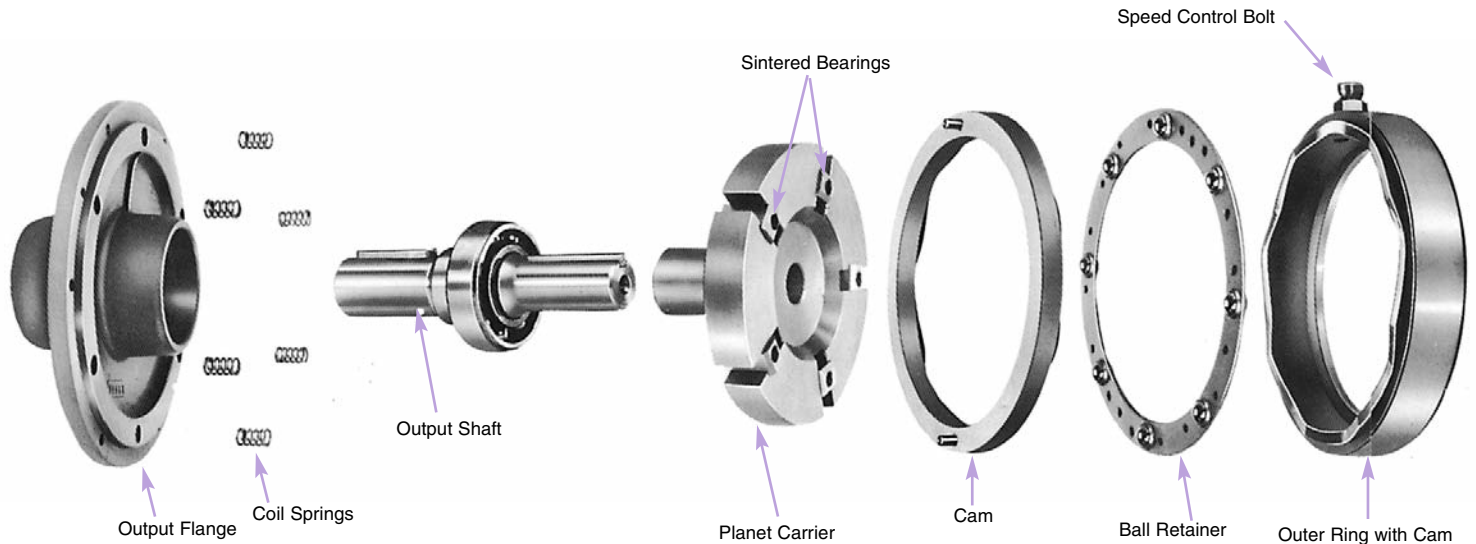


Comparison of amount of backlash

DISCO is constructed to allow for constant pressure, eliminating backlash and providing good shock resistance. This allows you to use DISCO with confidence in situations requiring frequent start/stop cycles or reversing.

Variable Speed Mechanism

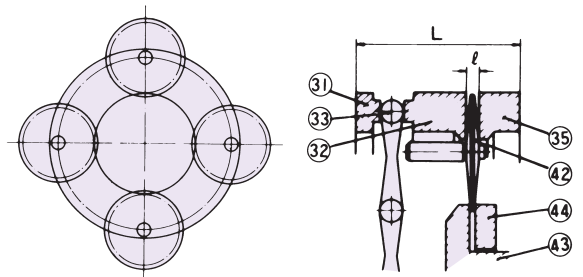
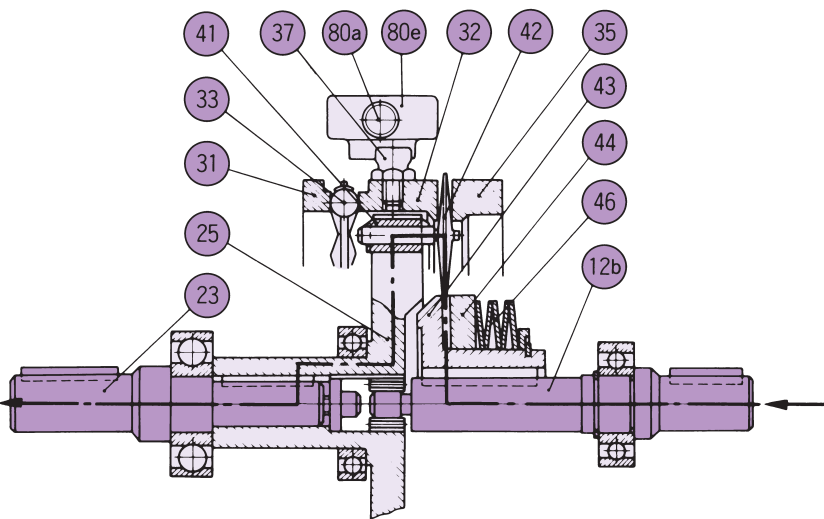
The secret to the dependability of DISCO lies in its simple construction.



DISCO basic construction

Speed variation arrangements

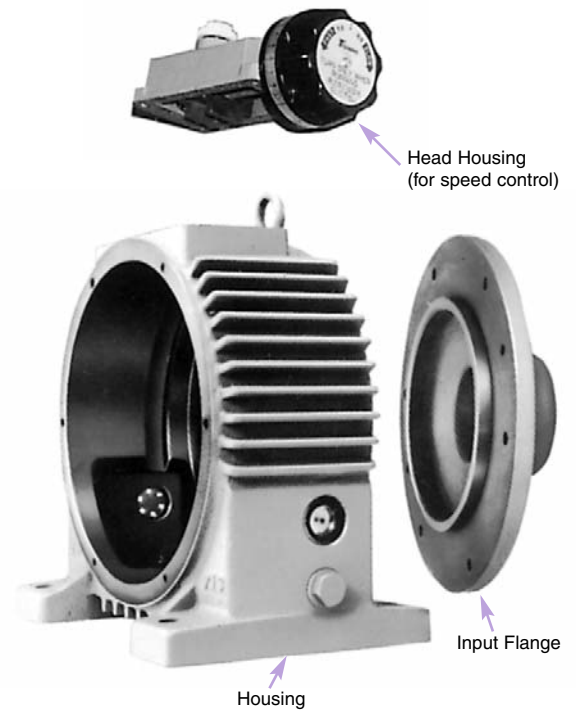
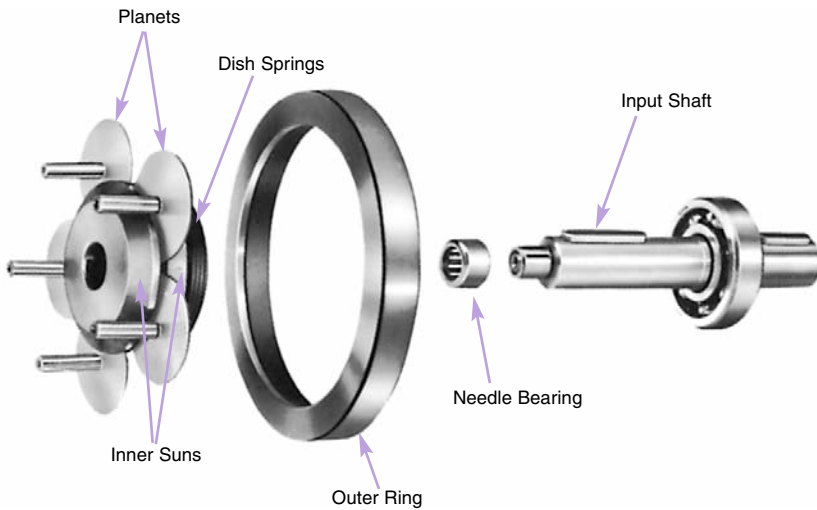
(a) Output shaft at minimum speed



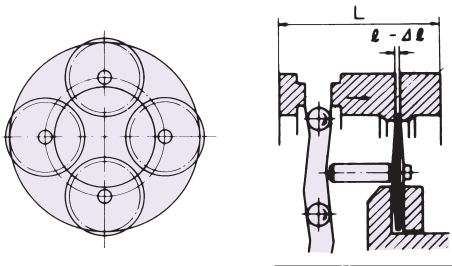
1. Power transfer

Power is transferred through the route shown by the thick dotted line in the diagram. First, the rotation of the input shaft (12b) is transferred to the inner sun with hub (43), and then the inner sun (44). The inner sides of the circular parts of the planets (42) are pushed by both suns by the force of the dish spring (46), and the outer sides are pressed against the outer ring and outer ring with cam.

When the suns rotate, the planets revolve in a fixed orbit as shown in the drawings (a) and (b). The sintered bearings (41), fitted into the grooves of the planet carrier (25), transmit the rotation to the output shaft (23).



(b) Output shaft at maximum speed

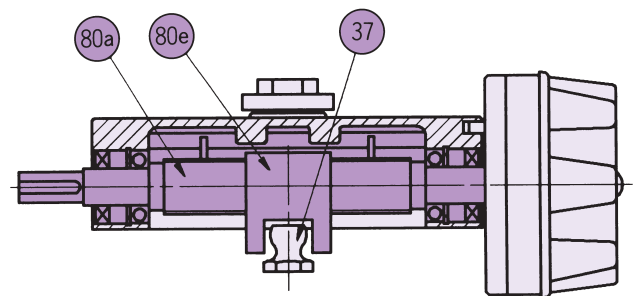


2. Speed variation

Speed adjustment is achieved by modifying the gap ℓ between the outer ring (35) and the outer ring with cam (32), and changing the radius of the planet's orbital revolution.

The outer ring with cam has a special shape (32), holding the ball retainer (33) in place. Turning the speed control shaft (80a) acts through the speed control nut (80e) and the speed control bolt (37) to move the outer ring with cam in the direction of rotation. The cam moves only $\Delta\ell$ in the direction of the shaft, and changes the gap ℓ .

Speed control head housing construction



3. Power transmission

Power is transmitted via a traction drive through an oil membrane that forms between the ground contact surfaces.

The low surface pressure on the contact surfaces assures long life. Planet positioning is the secret to achieving strength in this compact design.

Standard Types

■ K Series (constant torque)

● Stock product

○ Short lead time product

DISCO capacity H.P.			1/4 (0.2kW)	1/2 (0.4kW)	1 (0.75kW)	2 (1.5kW)	3 (2.2kW)	5 (3.7kW)	7.5 (5.5kW)	10 (7.5kW)	Speed range (rpm) with 60 Hz — 4P motor directly connected	
Model			DK002	DK004	DK007	DK015	DK022	DK037	DK055	DK075	2 4 6 8 10 20 40 60 80 100 200 400 600 1000 2000	
Basic type	NEMA C-flange input type	Free output type	●	●	●	●	●	●	●	●	1/4 H.P. to 5 H.P. 200 ██████████ 1200	
	Free input type		●	●	●	●	●	●	●	●		
	NEMA C-flange input type	NEMA-C flange output type	●	●	●	●	●	●	—	—	7.5 H.P. to 30 H.P. 240 ██████████ 1200	
with Helical Gear Speed Reducer R type	NEMA C-flange input type	Speed reduction ratio 2.5:1	●	●	●	●	●	●	●	●	1/4 H.P. to 5 H.P. 80 ██████████ 480	
	Free input type		●	●	●	●	●	●	●	●	7.5 H.P. to 30 H.P. 96 ██████████ 480	
	NEMA C-flange input type	Speed reduction ratio 5:1	●	●	●	●	●	●	●	●	1/4 H.P. to 5 H.P. 40 ██████████ 240	
	Free input type		●	●	●	●	●	●	●	●	7.5 H.P. to 30 H.P. 40 ██████████ 240	

*In stock unless temporarily sold out.

Explanation of model number



DK 007 A FN

Input style (FN: NEMA-C flange input type, if not specified: free input type)

DISCO mounting system (A: foot mounted)

Capacity (DISCO capacity 007: 1 hp)

DISCO K Series



DK 004 A

DISCO mounting (A: foot mounted)

Capacity (DISCO capacity 004: 1/2 hp)

DISCO K Series



DK 015 FNFN - 1

NEMA-C flange output/input combination mark

DISCO mounting system (FNFN: NEMA-C flange output/input type)

Capacity (DISCO capacity 015: 2 hp)

DISCO K Series



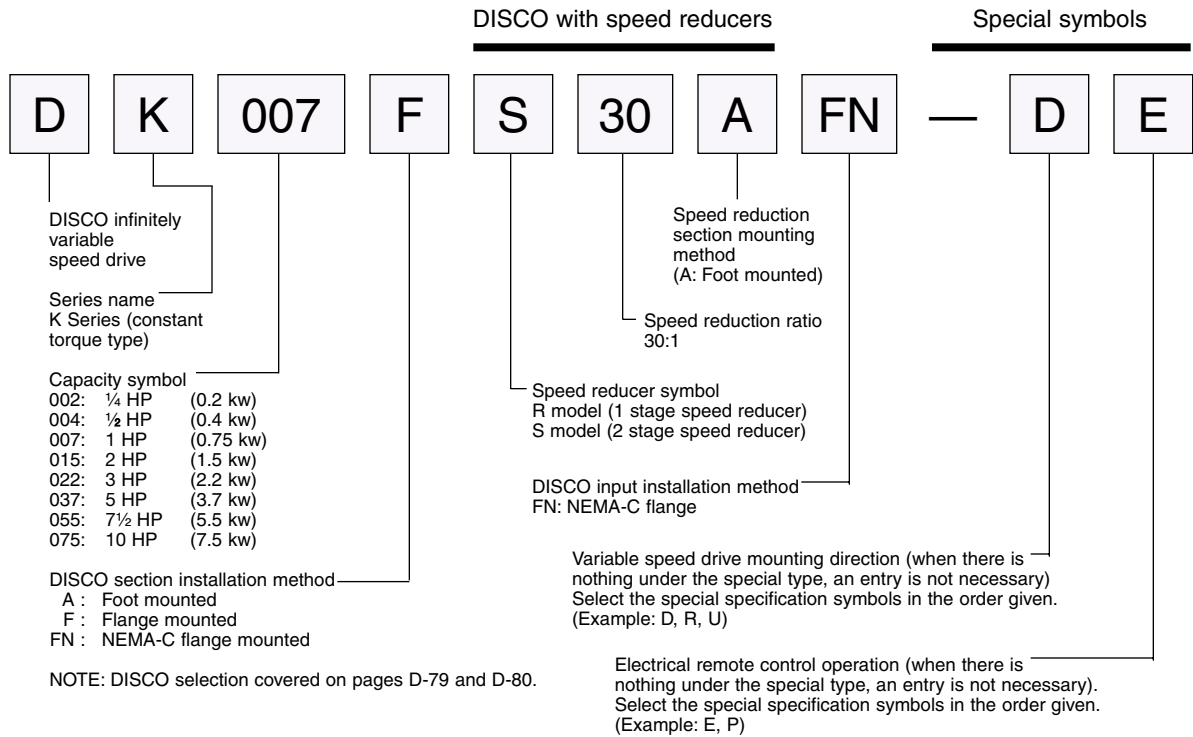
DK007A R 5 FN

Speed reduction ratio 5:1

R model — one-stage speed reducer

Models and Special Symbols

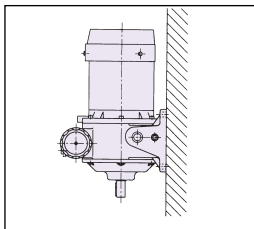
Example of Model Number



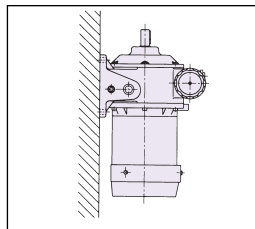
Special Specification Symbols

Variable speed drive mounting direction

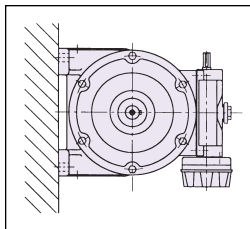
D Vertical mounted, output shaft down



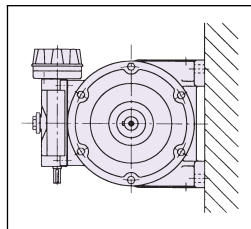
F Vertical mounted, output shaft up



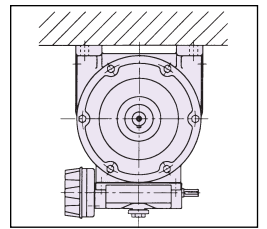
R Wall mounted, right operation



L Wall mounted, left operation

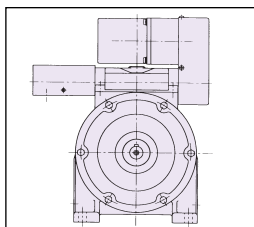


U Ceiling mounted



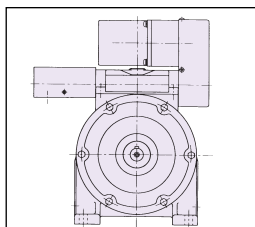
Electrical remote control operation

E Basic type



Pilot motor to vary speed

P Potentiometer system



Pilot motor and analog meter

K Series DISCO

Specifications

DISCO infinitely variable speed drive K series	
Characteristics	Constant torque and constant horsepower interim characteristics
Output shaft torque	At low speed, twice the high-speed torque
Variable speed ratio	6 to 1 (Note: for 15 h.p. and above — 5 to 1)
Output shaft speed	200 to 1,200 rpm with 60 Hz - 4P Motor directly connected (Note: 240 to 1200 rpm for 15 h.p. and above)
Use and selection points	Use for applications where load torque is constant regardless of speed, and select by calculating the load torque at maximum speed
Available Type	Basic (without speed reducer)
	With helical gear speed reducer (2.5:1 through 45:1)

NOTE: DISCO selection covered on pages D-79 and D-80.

Output Shaft Torque vs. Output Shaft Speed (Basic Type)

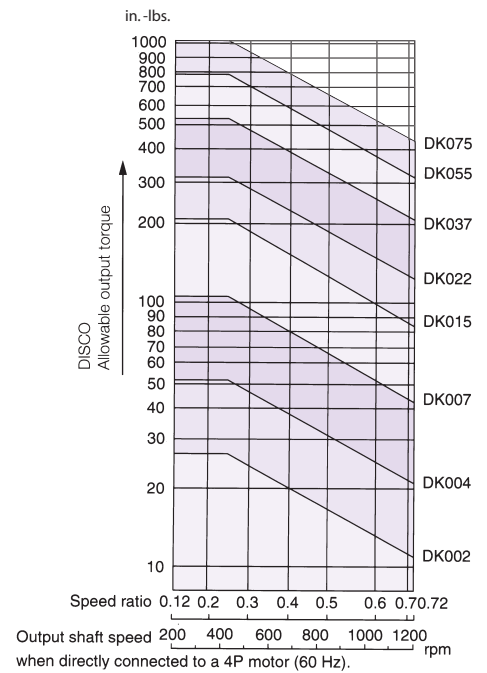


Table of Standard Characteristics

Please refer to the "Output Shaft Torque vs. Output Shaft Speed" graph for the relationship between speed and output shaft torque.

Basic type

Model number			Variable Speed Range	Ratio Range Output rpm / Input rpm	Output shaft speed when directly connected to a 4P-60HZ motor rpm	Output shaft torque in./lbs.	Allowable overhang load lbs.		Allowable thrust load lbs.				
NEMA C-flange input type		Free input type					Input shaft	Output shaft	Input shaft	Output shaft			
Foot mounted	NEMA C-flange mounted	Foot mounted											
DK002AFN	DK002FNFN	DK002A	6 to 1	1/8.4 ~ 1/1.4	200 ~ 1200	26.0 ~ 11.2 52.0 ~ 21.6 104 ~ 43	66 88 110	88 132 220	44 77 96	66 110 220			
DK015AFN	DK015FNFN	DK015A											
DK022AFN	DK022FNFN	DK022A											
DK037AFN	DK037FNFN	DK037A				330 330	286 418 418	136 308 308	374 374 374				
DK055AFN	—	DK055A											
DK075AFN	—	DK075A											
						780 ~ 329 1,040 ~ 433	385 385	484 484	330 330	440 440			

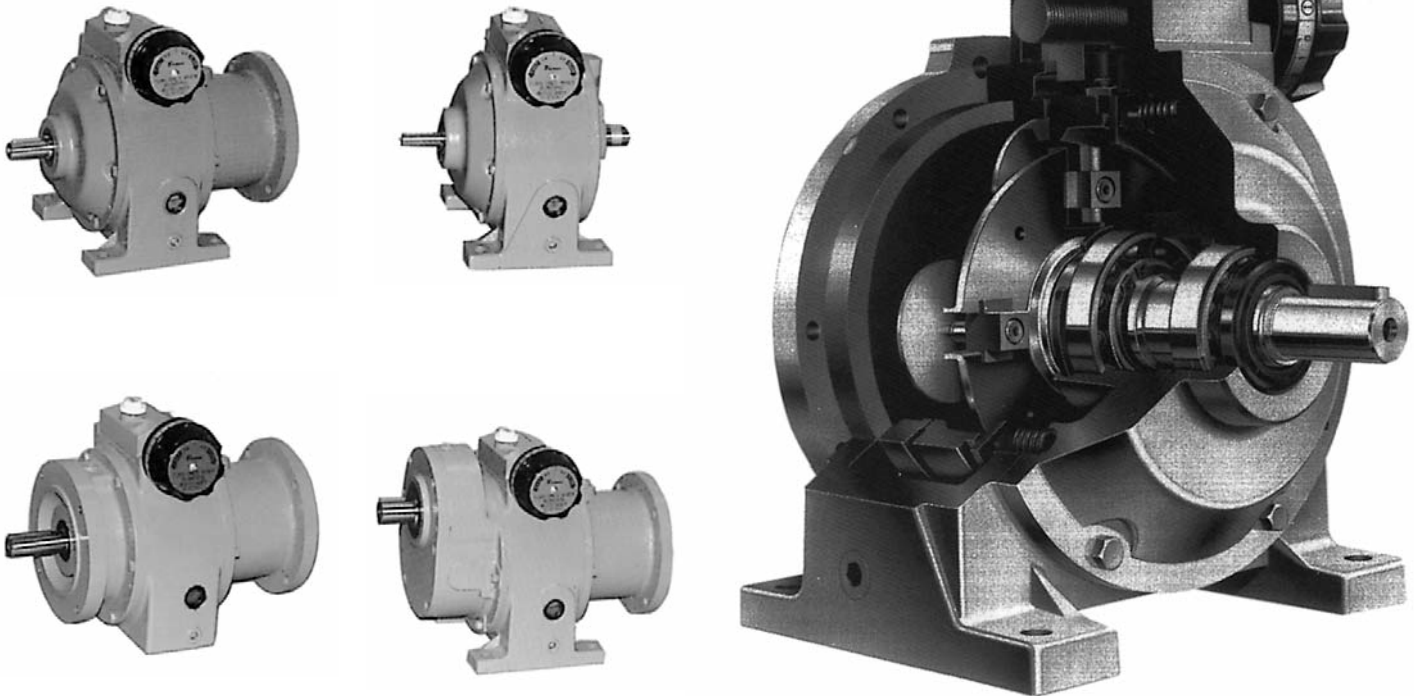
Note: Output shaft turns same direction as input.
Ratio range is ratio of output rpm to input rpm.

STANDARD MODEL CHARACTERISTICS AND SELECTION PROCEDURE

With R type speed reducer (reduction ratio 2.5:1 and 5:1)

Speed reducer reduction ratio	Model number		Variable Speed Range	Ratio Range (Output rpm / Input rpm)	Output shaft speed when directly connected to a 4P-60HZ motor rpm	Output shaft torque in./lbs.	Allowable overhang load lbs.		Allowable thrust load lbs.	
	NEMA C-flange input type	Free input type				Input shaft speed up to 1800 rpm	Input shaft	Output shaft	Input shaft	Output shaft
	Foot mounted	Foot mounted								
2.5:1	DK002A R2.5FN	DK002A R2.5	6 to 1	1/21 ~ 1/3.5	80 ~ 480	62 ~ 27	66	154	44	50
	DK004A R2.5FN	DK004A R2.5				124 ~ 51	88	242	77	81
	DK007A R2.5FN	DK007A R2.5				247 ~ 102	110	374	96	125
2.5:1	DK015A R2.5FN	DK015A R2.5	6 to 1	1/21 ~ 1/3.5	80 ~ 480	444 ~ 207	165	726	136	242
	DK022A R2.5FN	DK022A R2.5				741 ~ 309	330	1,057	308	352
	DK037A R2.5FN	DK037A R2.5				1,235 ~ 515	330	1,057	308	352
2.5:1	DK055A R2.5FN	DK055A R2.5	6 to 1	1/21 ~ 1/3.5	80 ~ 480	1,855 ~ 771	385	1,431	330	477
	DK075A R2.5FN	DK075A R2.5				2,470 ~ 1,031	385	1,431	330	477
5:1	DK002A R5FN	DK002A R5	6 to 1	1/42 ~ 1/7	40 ~ 240	124 ~ 54	66	154	44	50
	DK004A R5FN	DK004A R5				248 ~ 102	88	242	77	81
	DK007A R5FN	DK007A R5				494 ~ 204	110	374	96	125
5:1	DK015A R5FN	DK015A R5	6 to 1	1/42 ~ 1/7	40 ~ 240	988 ~ 414	165	726	136	242
	DK022A R5FN	DK022A R5				1,482 ~ 618	330	1,057	308	352
	DK037A R5FN	DK037A R5				2,470 ~ 1,030	330	1,057	308	352
5:1	DK055A R5FN	DK055A R5	6 to 1	1/42 ~ 1/7	40 ~ 240	3,710 ~ 1,543	385	1,431	330	477
	DK075A R5FN	DK075A R5				4,841 ~ 2,063	385	1,431	330	477

Output shaft turns opposite direction as input.



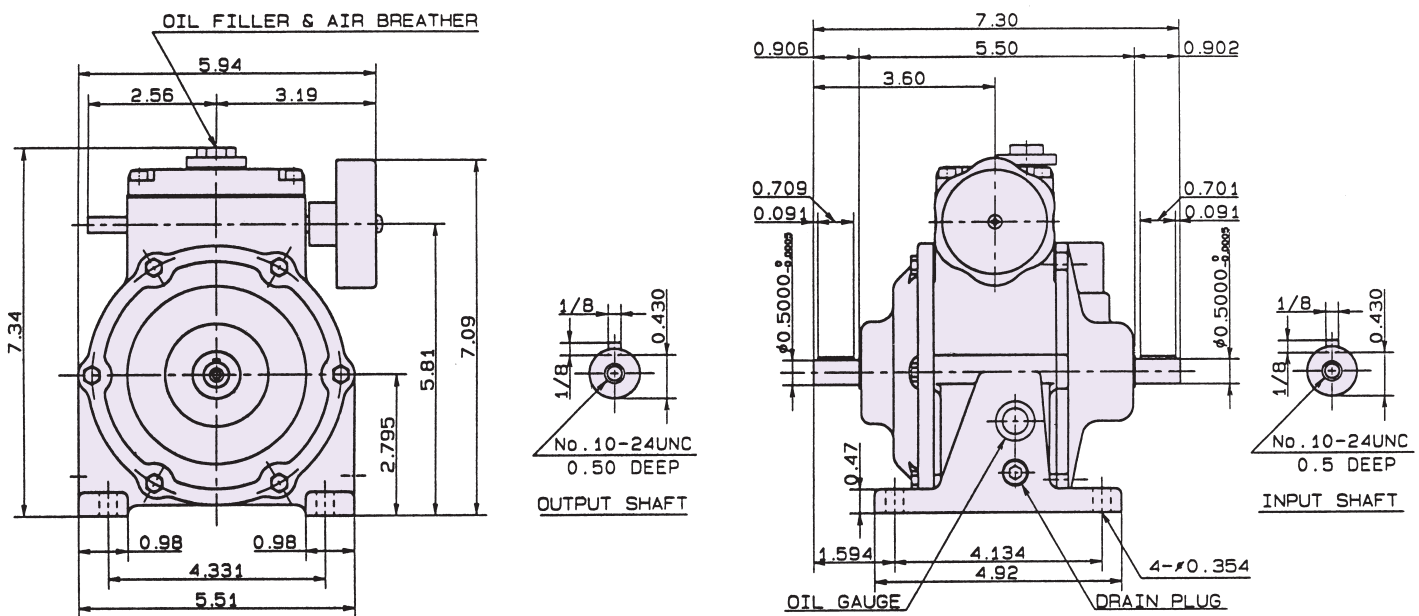
DIMENSION DIAGRAM (1)

Free Input/Free Output Type (1/4 H.P. to 30 H.P.)

All dimensions in inches, unless otherwise noted.
All weights are approximate and include lubrication.

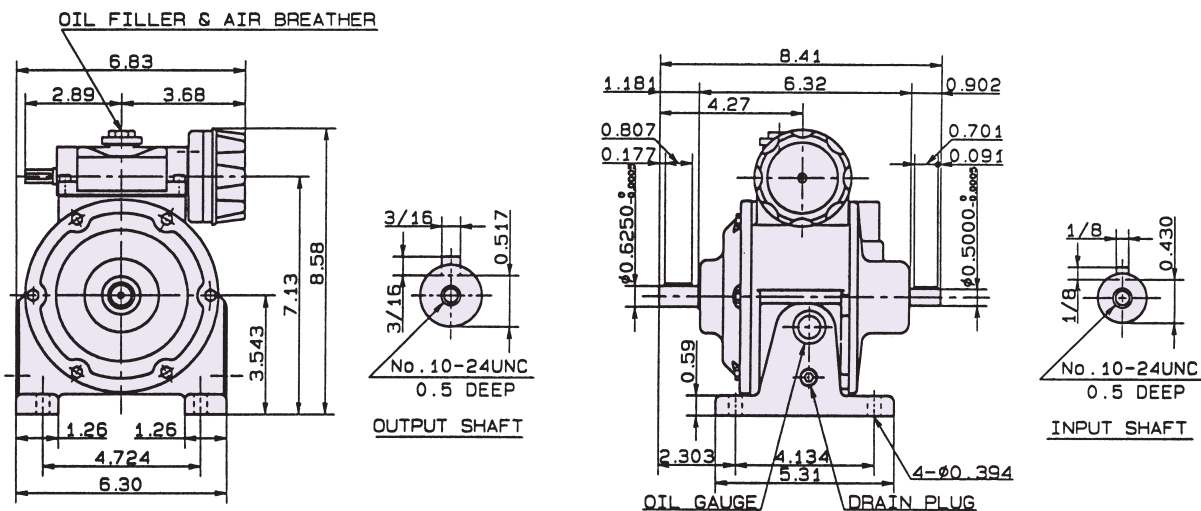
DK 002 A
DISCO mounting (A: foot mounted)
Capacity (DISCO capacity 002: 1/4 hp)
DISCO K Series

DK002A



Weight: 11 lbs.

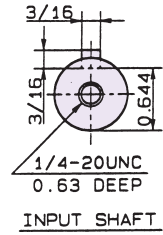
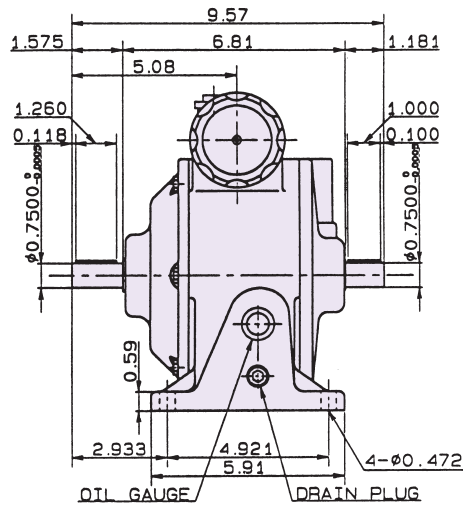
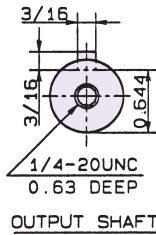
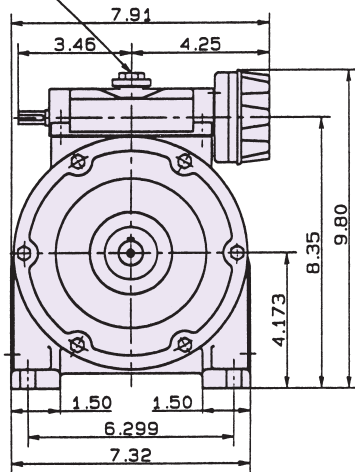
DK004A



Weight: 26 lbs.

DK007A

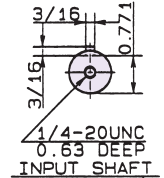
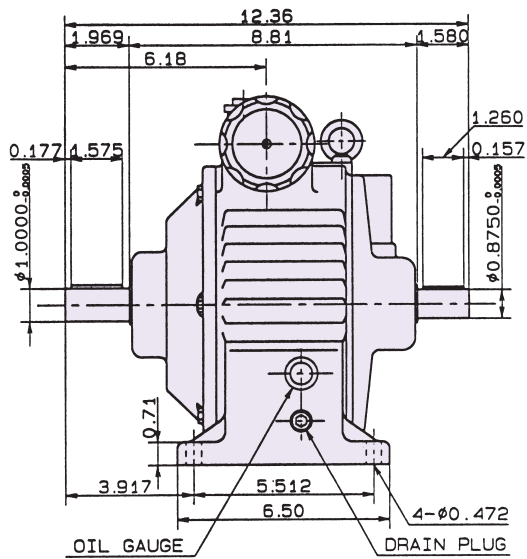
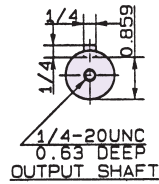
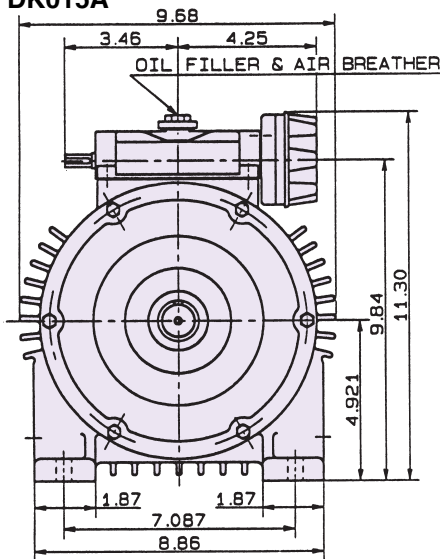
OIL FILLER & AIR BREATHER



Weight: 40 lbs.

DK015A

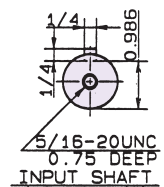
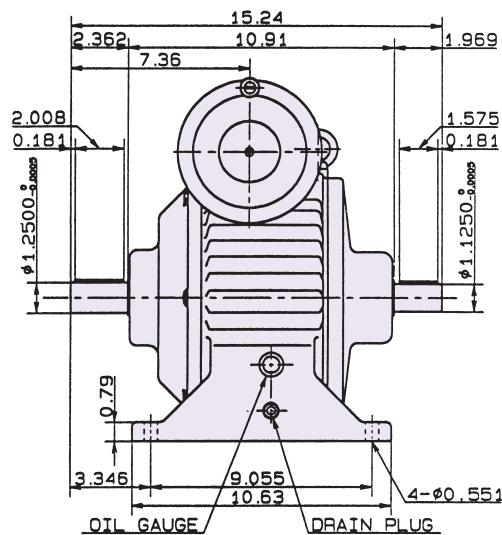
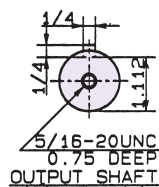
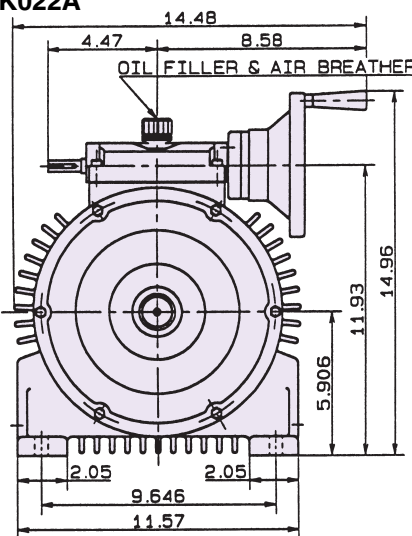
OIL FILLER & AIR BREATHER



Weight: 70 lbs.

DK022A

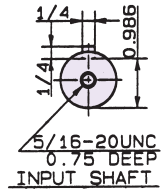
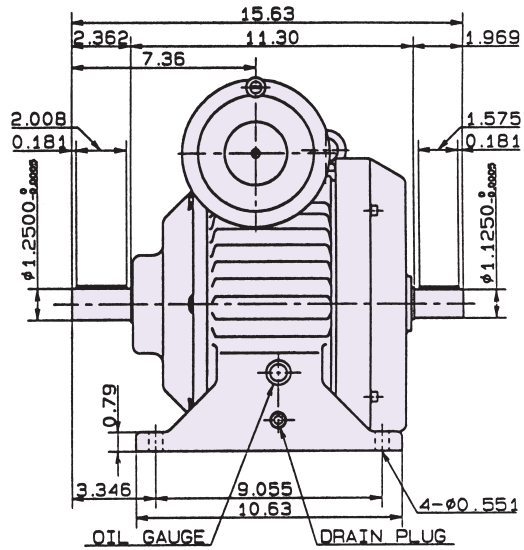
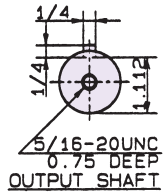
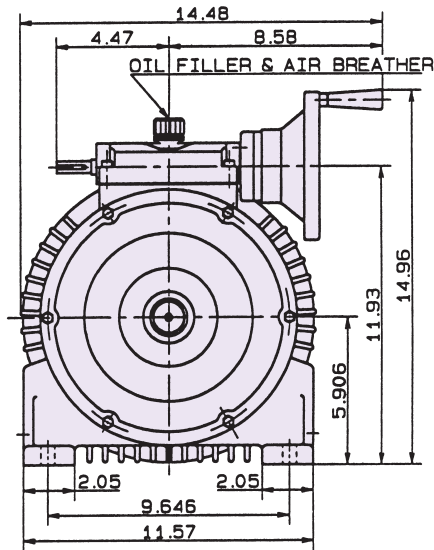
OIL FILLER & AIR BREATHER



Weight: 132 lbs.

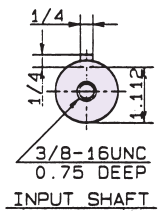
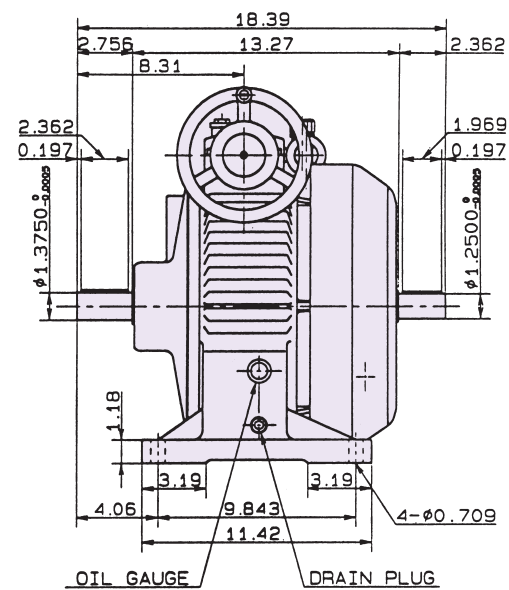
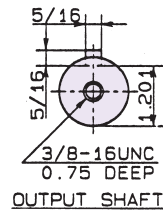
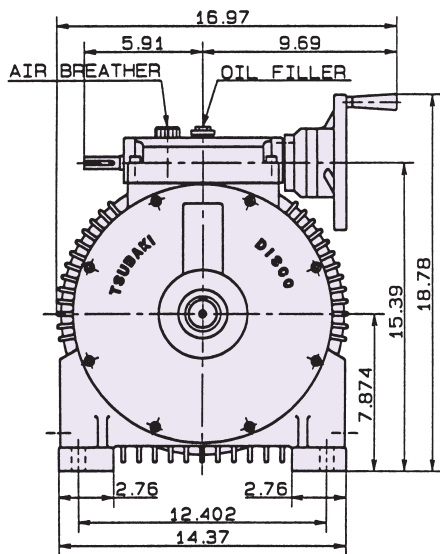
U.S. TSUBAKI DISCO

DK037A



Weight: 141 lbs.

DK055A DK075A



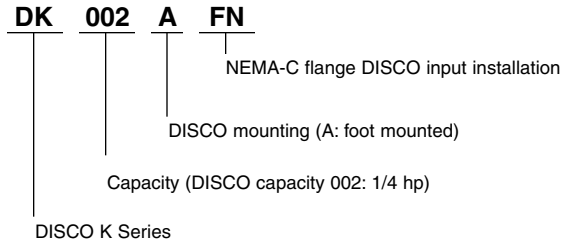
Weight: 249 lbs.

D - PT COMPONENTS

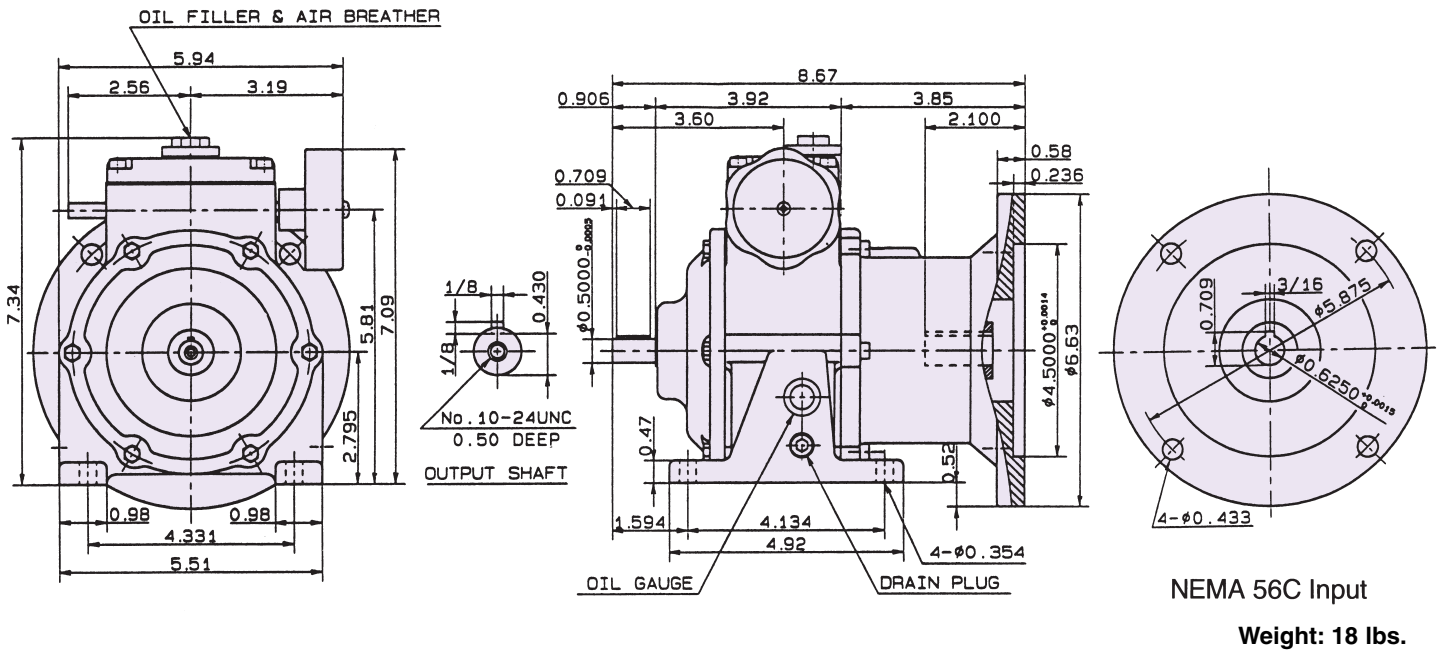
DIMENSION DIAGRAM (2)

NEMA-C Flange Input/Free Output Type (1/4 H.P. to 10 H.P.)

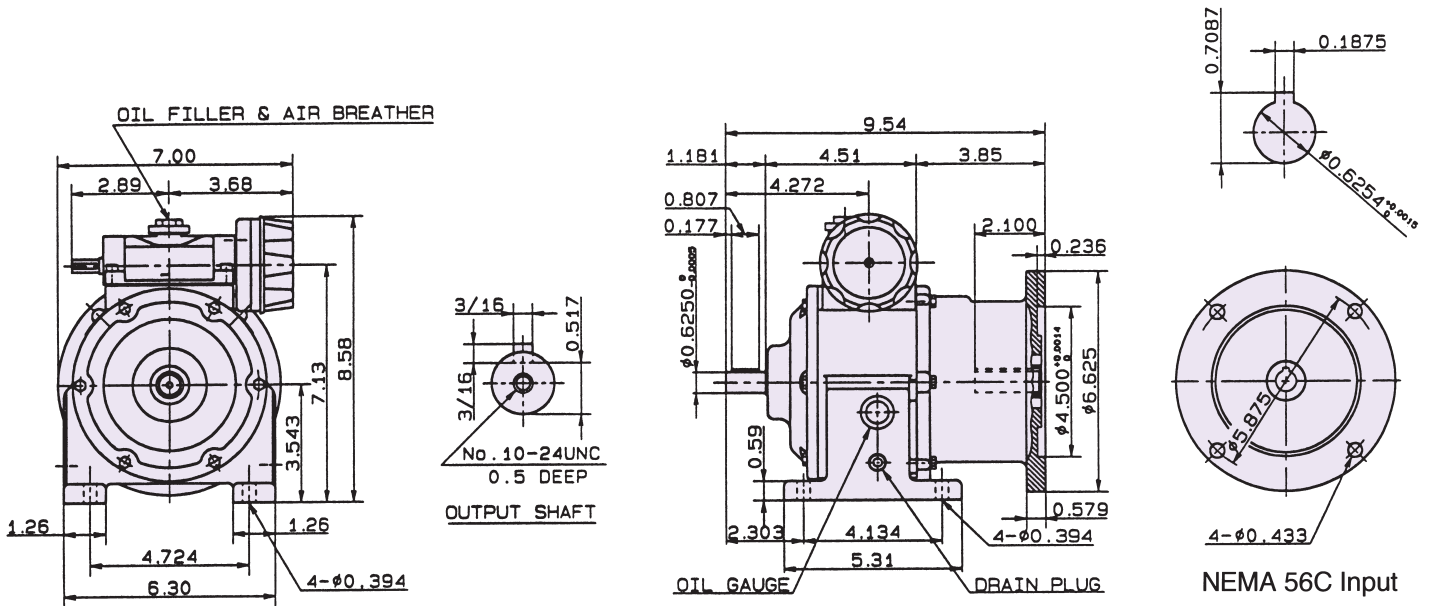
Example of model number



DK002AFN

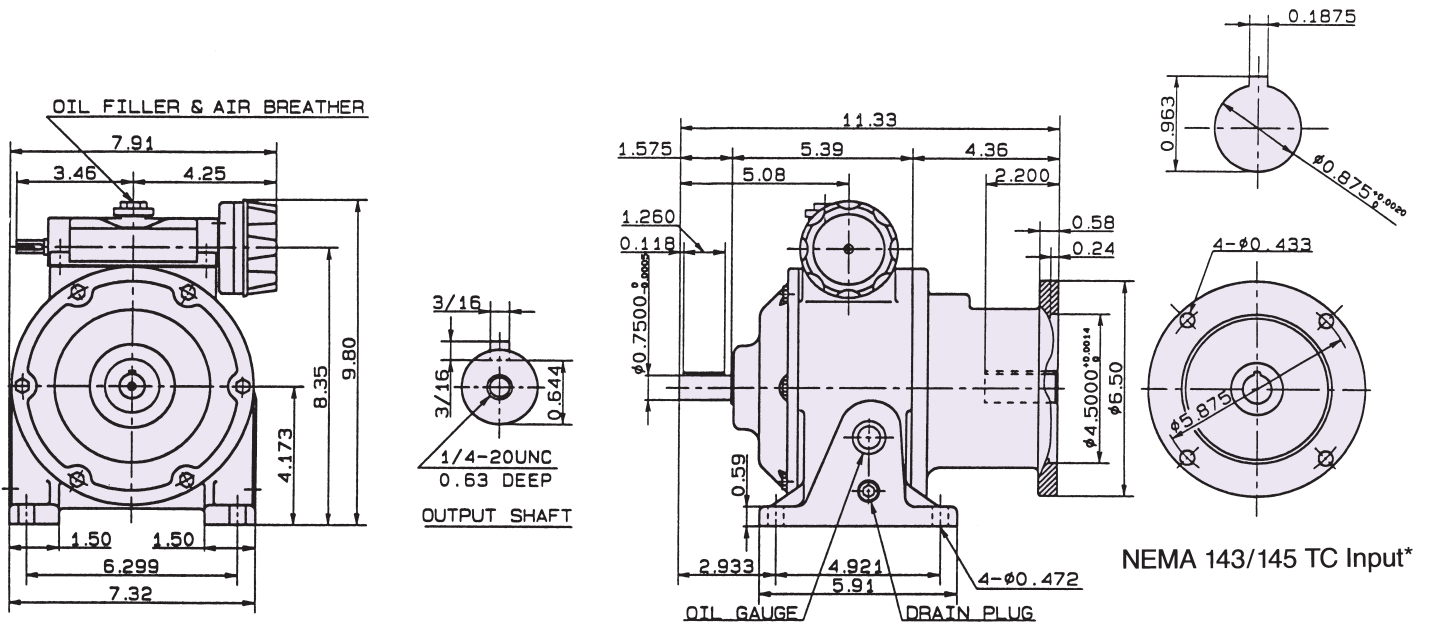


DK004AFN



Weight: 26 lbs.

DK007AFN

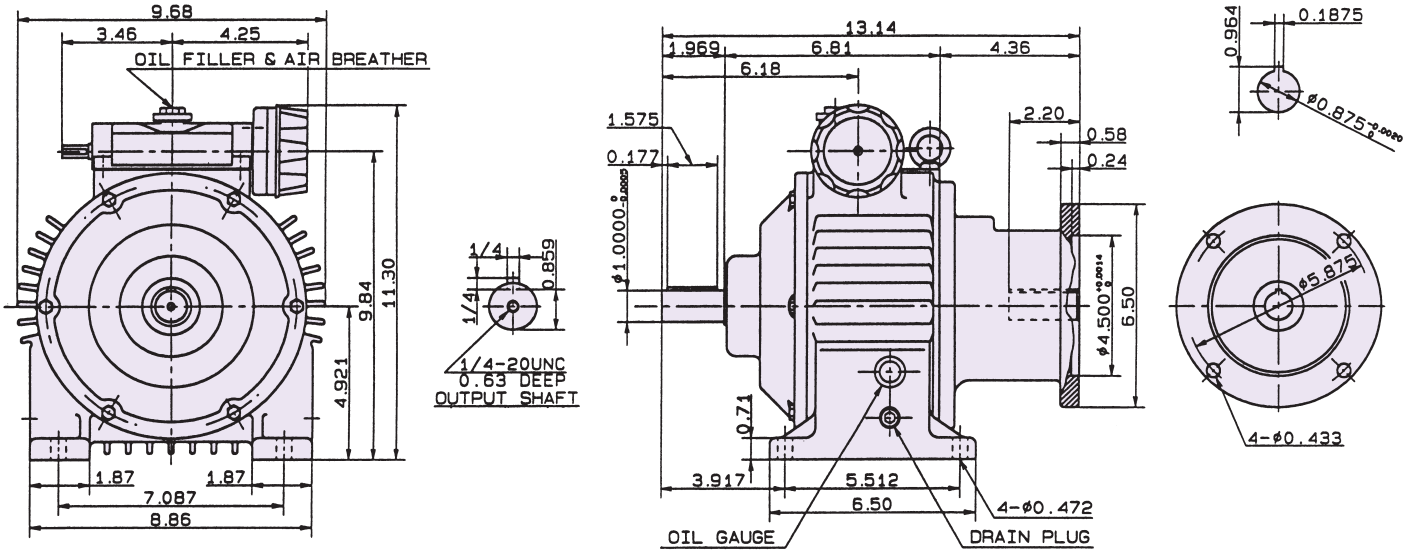


*56C adapter available

Weight: 37 lbs.

D - PT COMPONENTS

DK015AFN

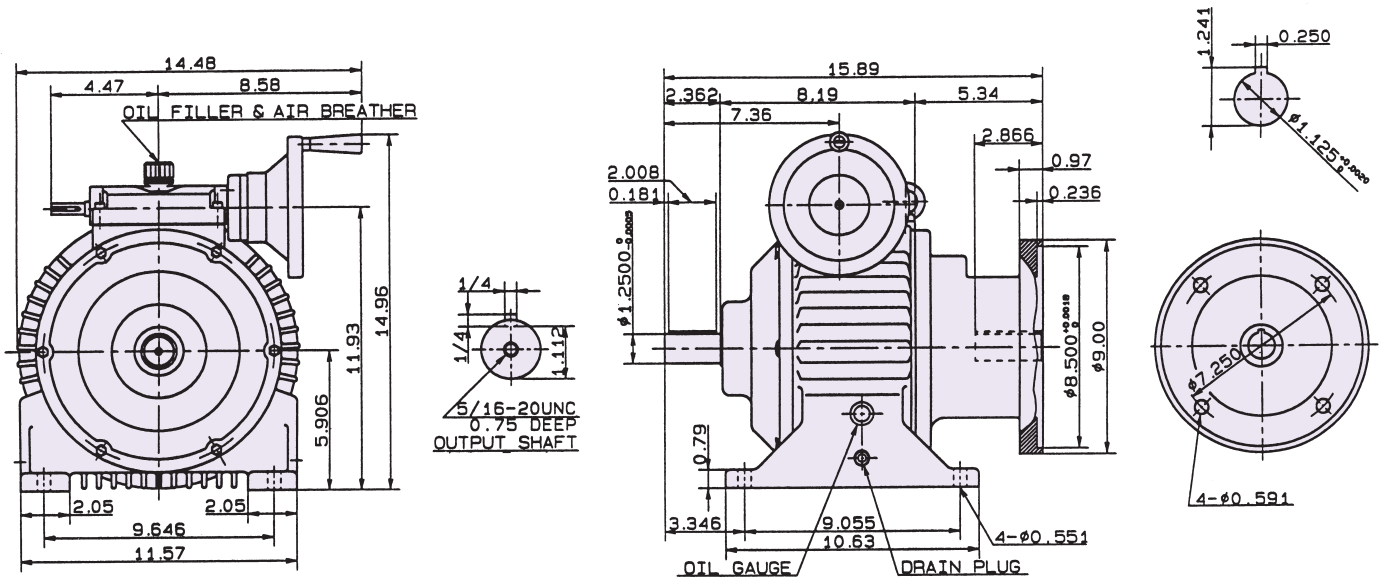


NEMA 143/145 TC Input*

*56C adapter available

Weight: 75 lbs.

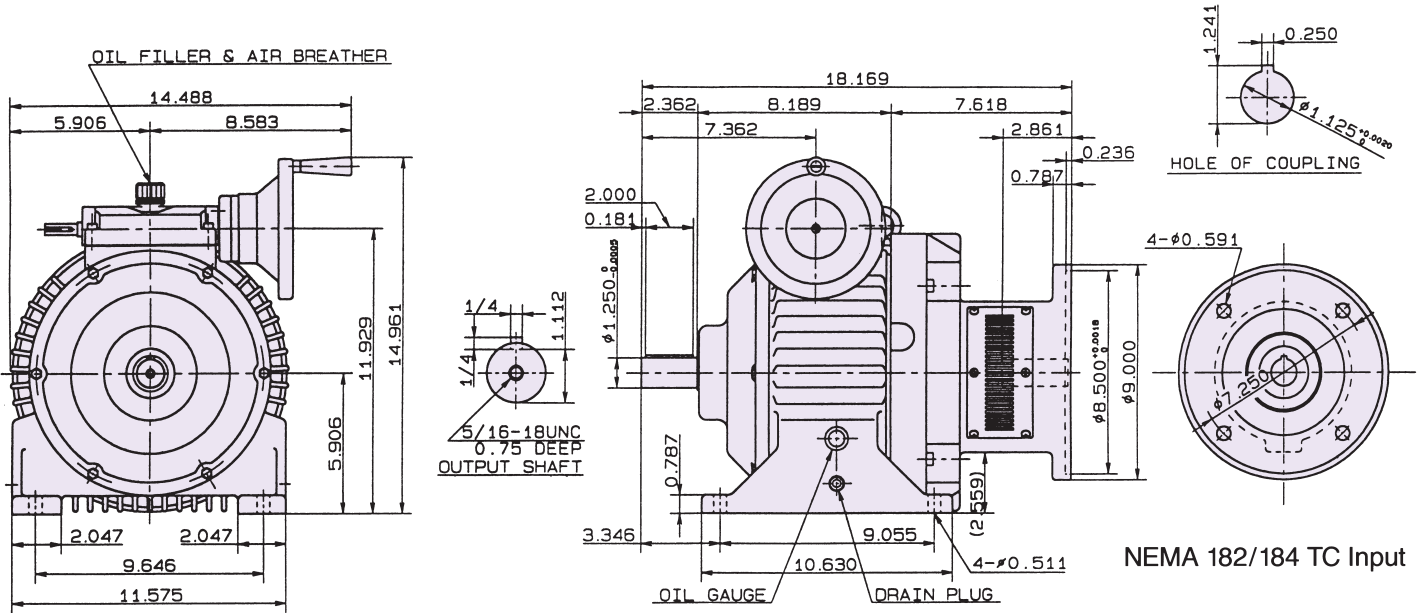
DK022AFN



NEMA 182/184 TC Input

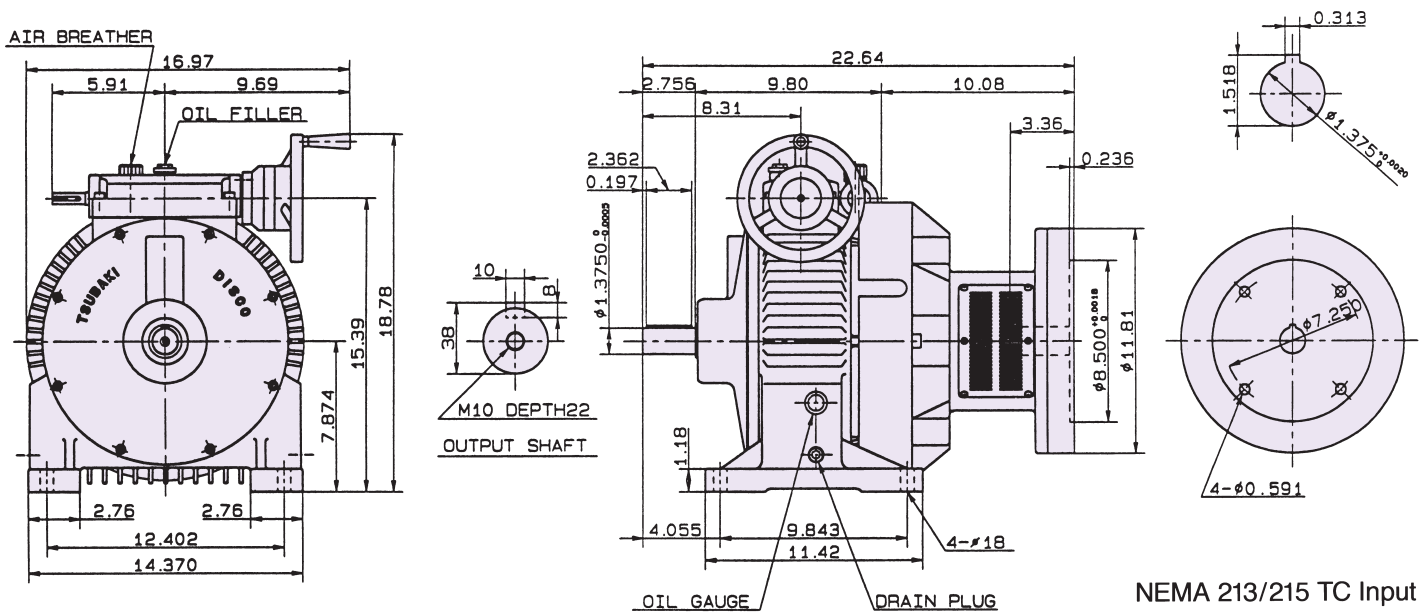
Weight: 146 lbs.

DK037AFN



Weight: 146 lbs.

**DK055AFN
DK075AFN**



Weight: 298 lbs.

D - PT COMPONENTS

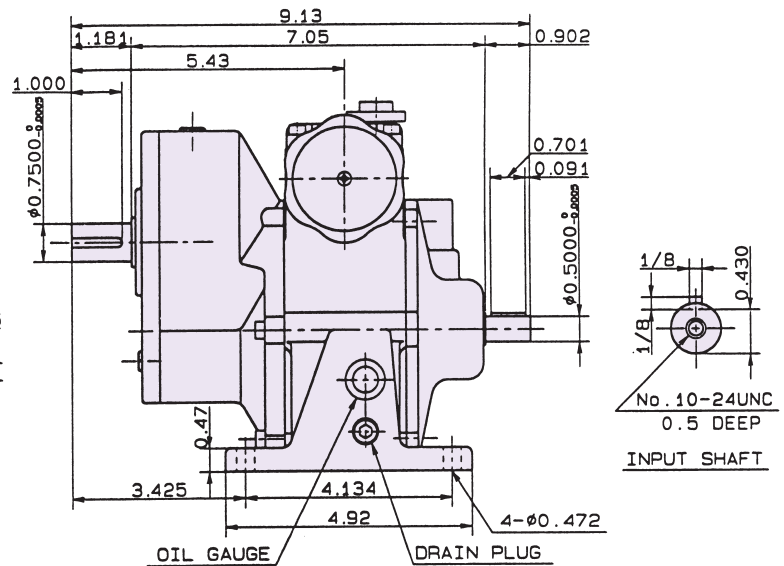
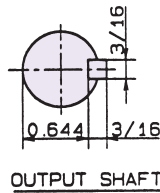
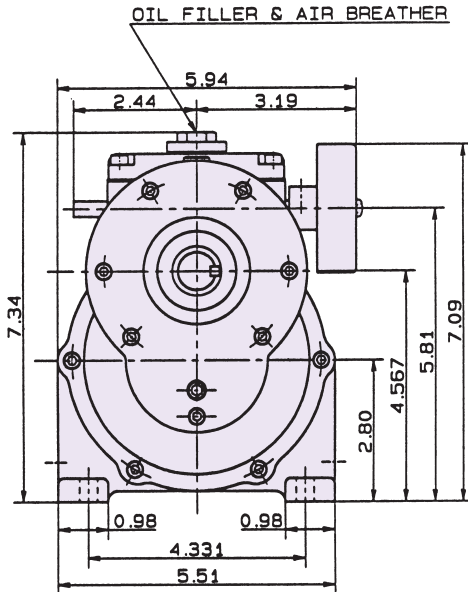
DIMENSION DIAGRAM (3)

Free Input R-type Reducer (1/4 H.P. to 30 H.P.) (Speed Reduction Ratio 2.5:1 and 5:1)

Example of model number

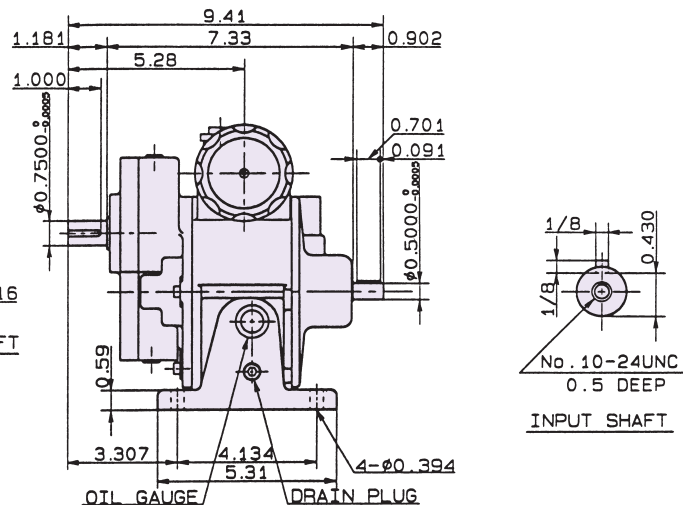
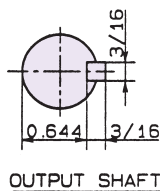
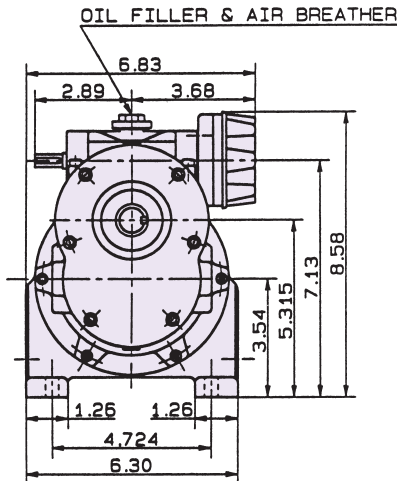
DK	002	A	R	2.5
				Speed reduction ratio (2.5:1)
				R model - one stage speed reducer
				Foot mounted DISCO installation
				Capacity (DISCO capacity 002: 1/4 hp)
DISCO K Series				

DK002AR2.5
DK002AR5



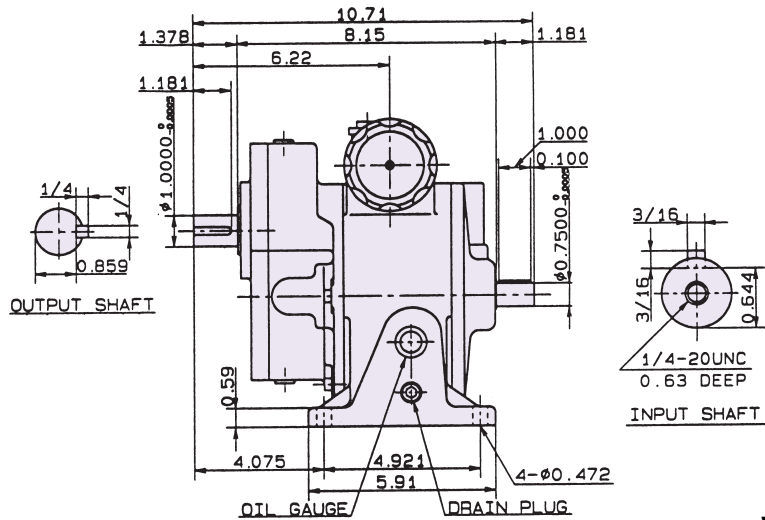
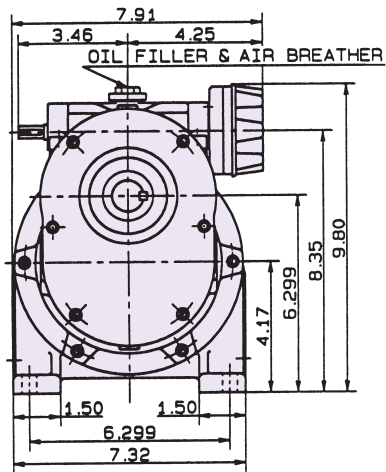
Weight: 30 lbs.

DK004AR2.5
DK004AR5



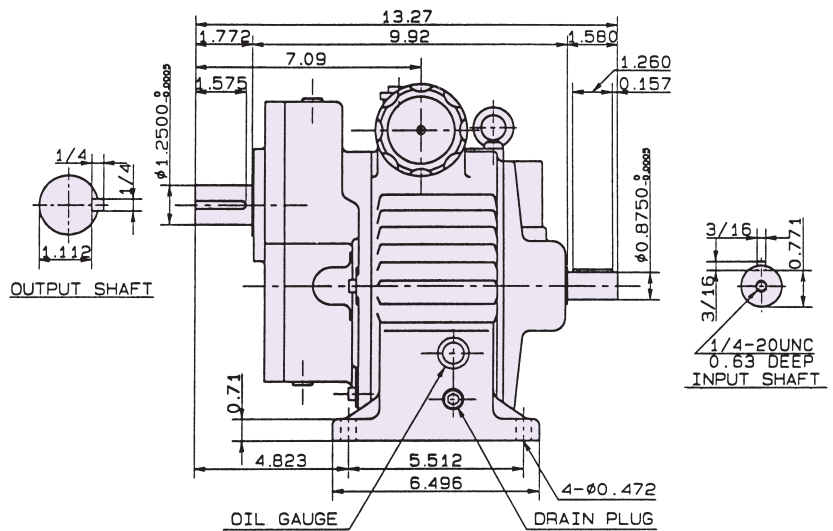
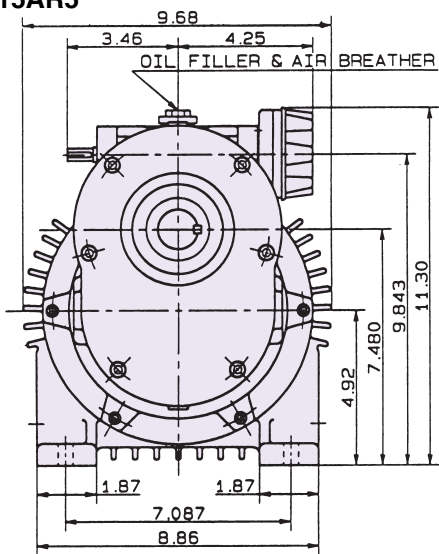
Weight: 37 lbs.

DK007AR2.5
DK007AR5



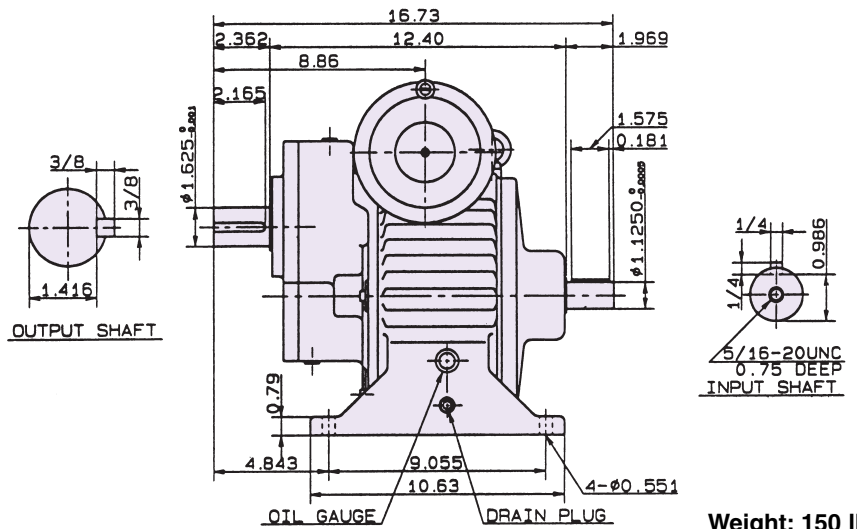
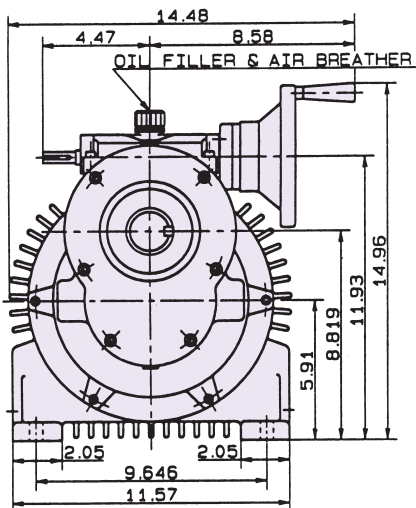
Weight: 53 lbs.

DK015AR2.5
DK015AR5



Weight: 89 lbs.

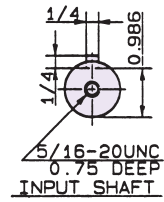
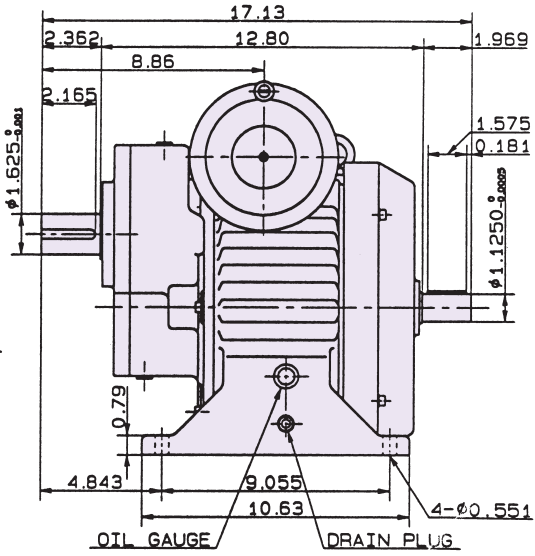
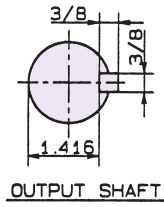
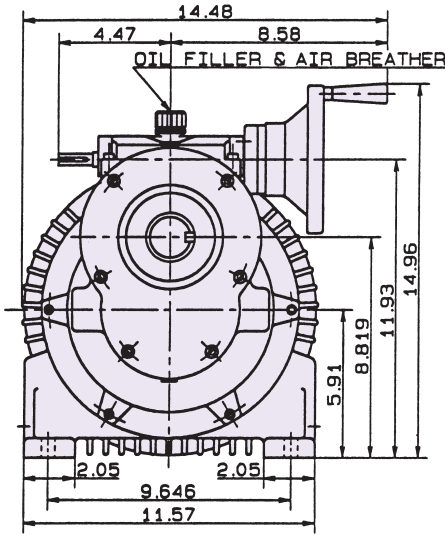
DK022AR2.5
DK022AR5



Weight: 150 lbs.

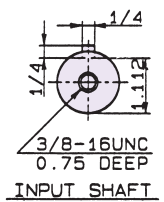
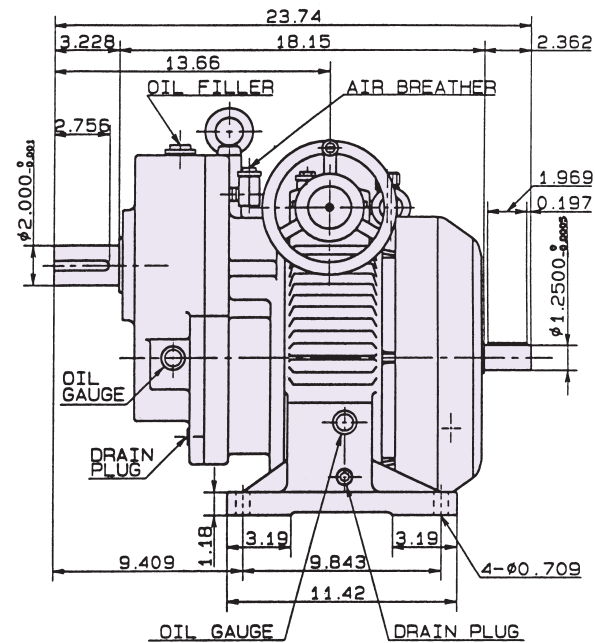
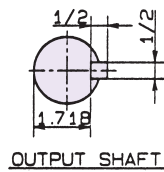
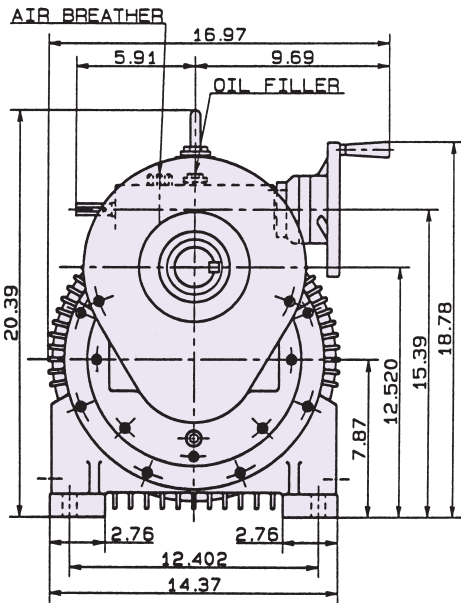
U.S. TSUBAKI DISCO

DK037AR2.5
DK037AR5



Weight: 160 lbs.

DK055AR2.5
DK055AR5
DK075AR2.5
DK075AR5

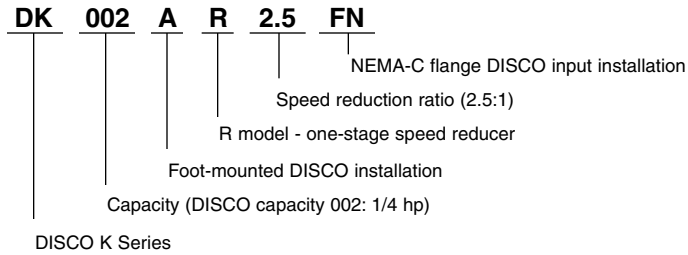


Weight: 418 lbs.

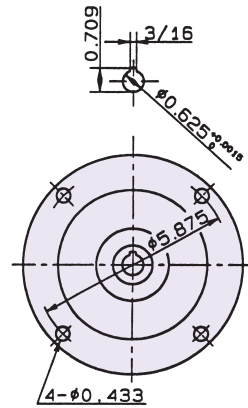
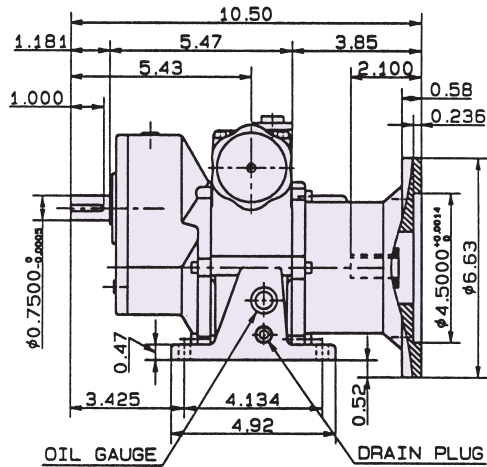
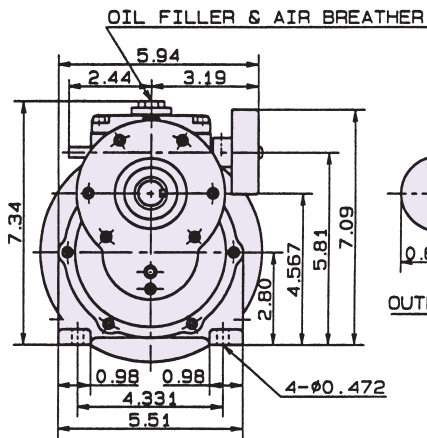
DIMENSION DIAGRAM (4)

NEMA-C Flange Input with R-type Reducer (1/4 H.P. to 10 H.P.) (Speed Reduction Ratio 2.5:1 and 5:1)

Example of model number



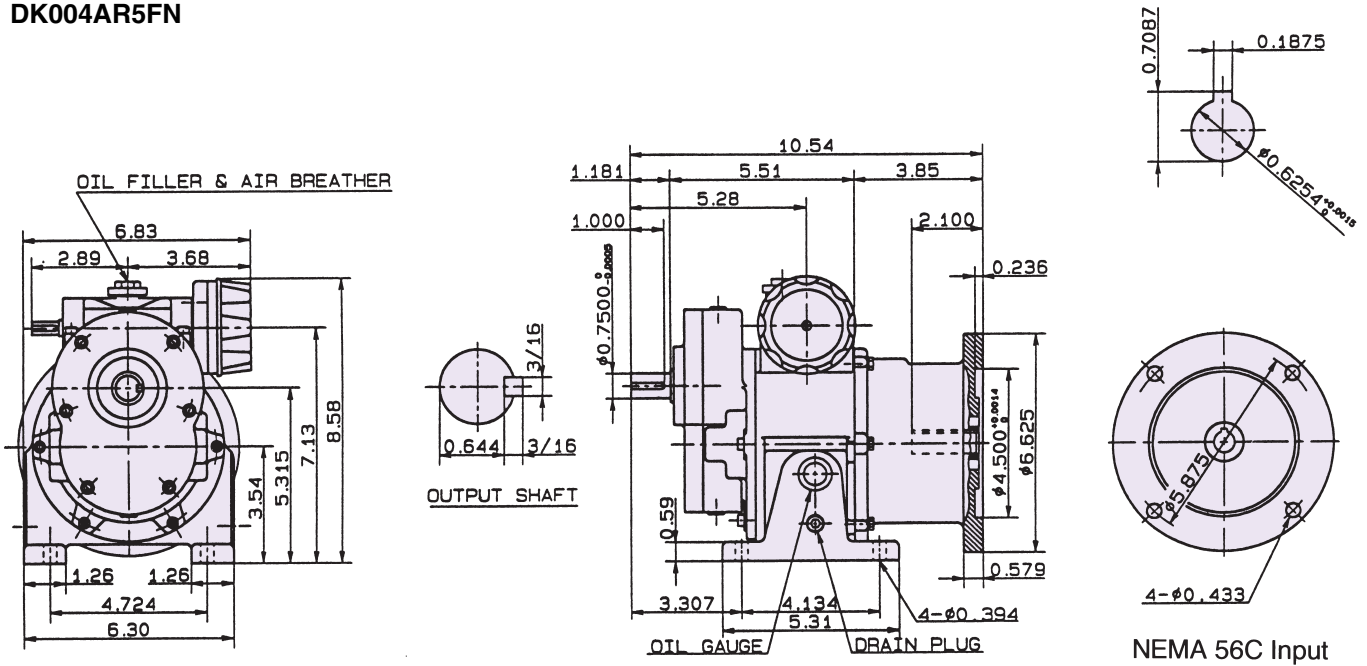
DK002AR2.5FN
DK002AR5FN



NEMA 56C Input

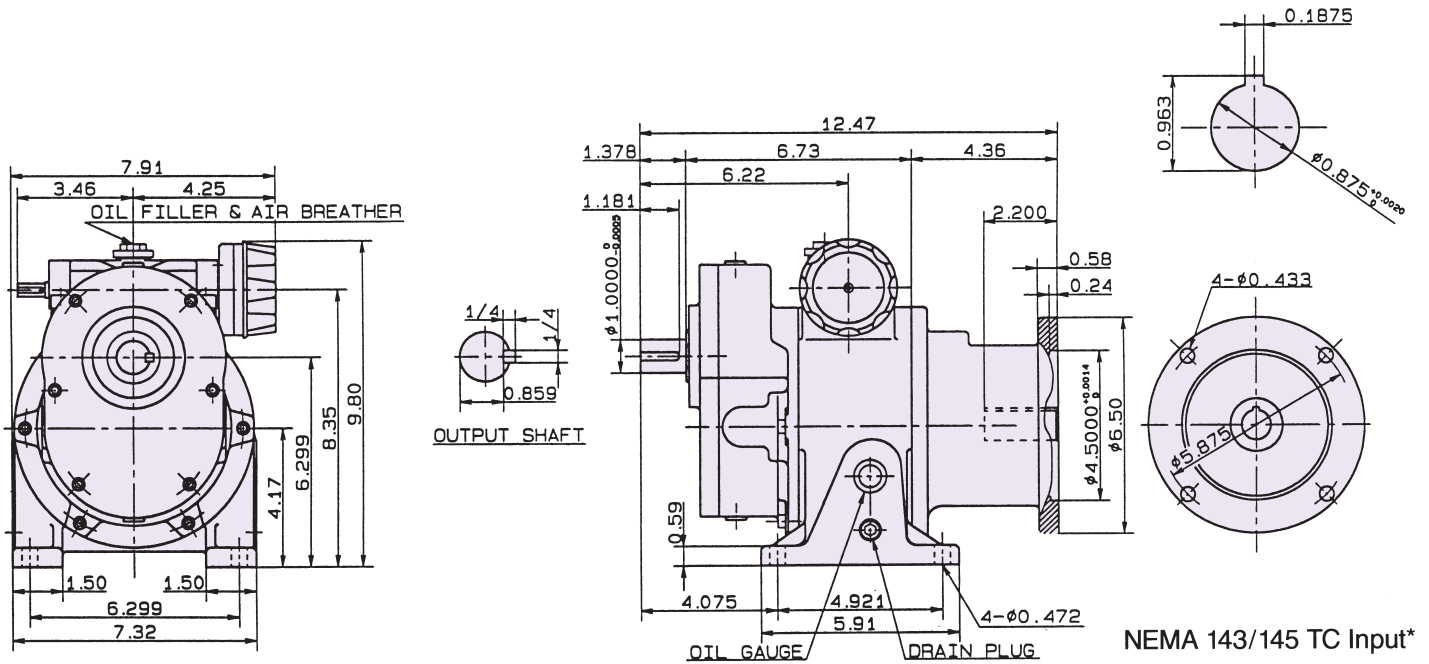
Weight: 31 lbs.

DK004AR2.5FN
DK004AR5FN



Weight: 46 lbs.

DK007AR2.5FN
DK007AR5FN

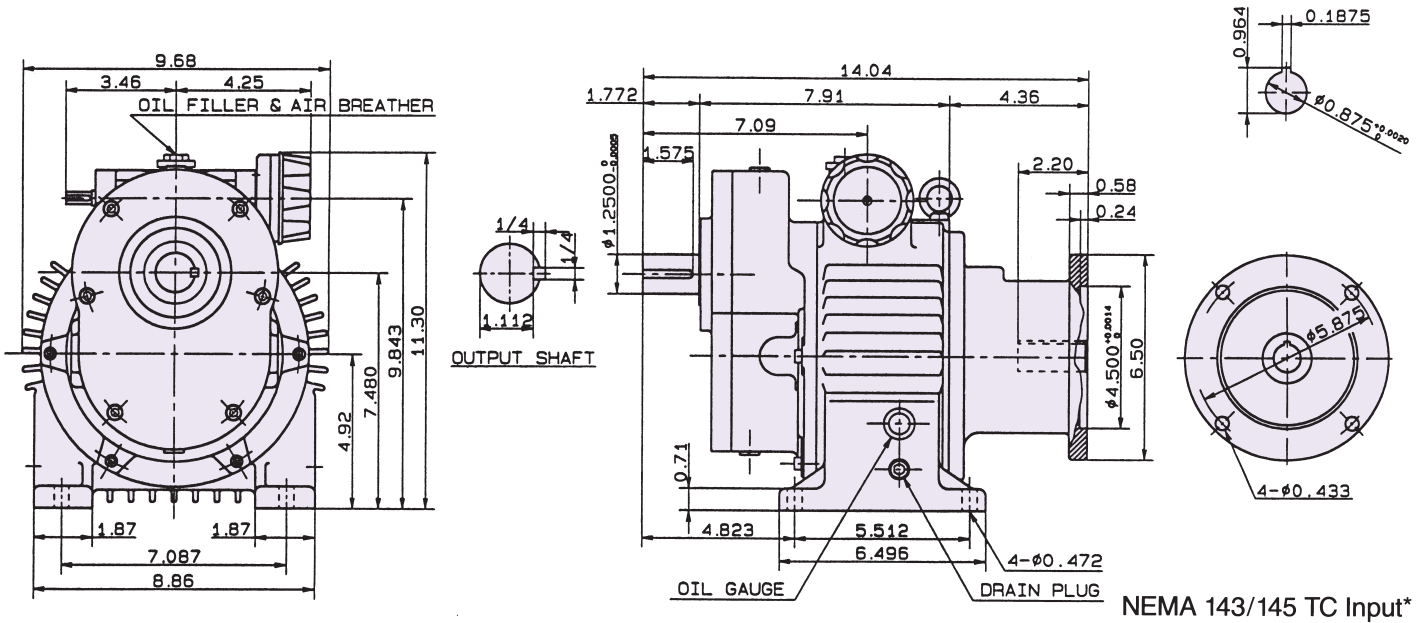


*56C adapter available

Weight: 68 lbs.

U.S. TSUBAKI DISCO

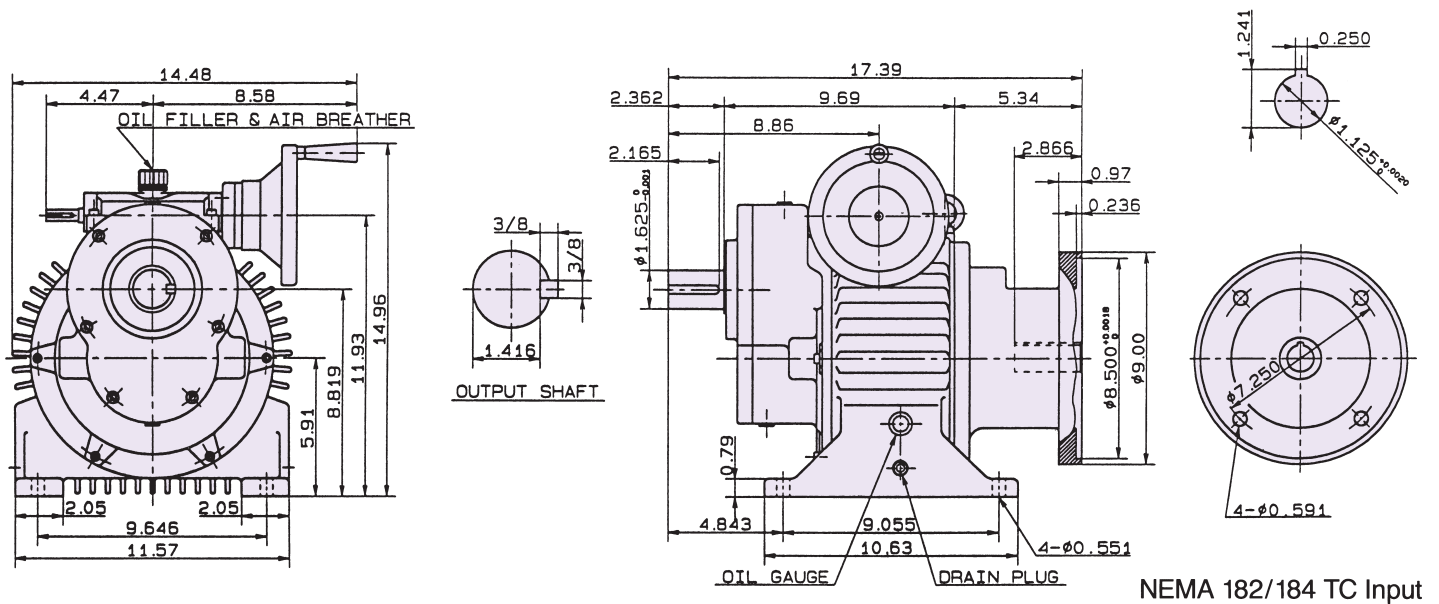
DK015AR2.5FN
DK015AR5FN



*56C adapter available

Weight: 104 lbs.

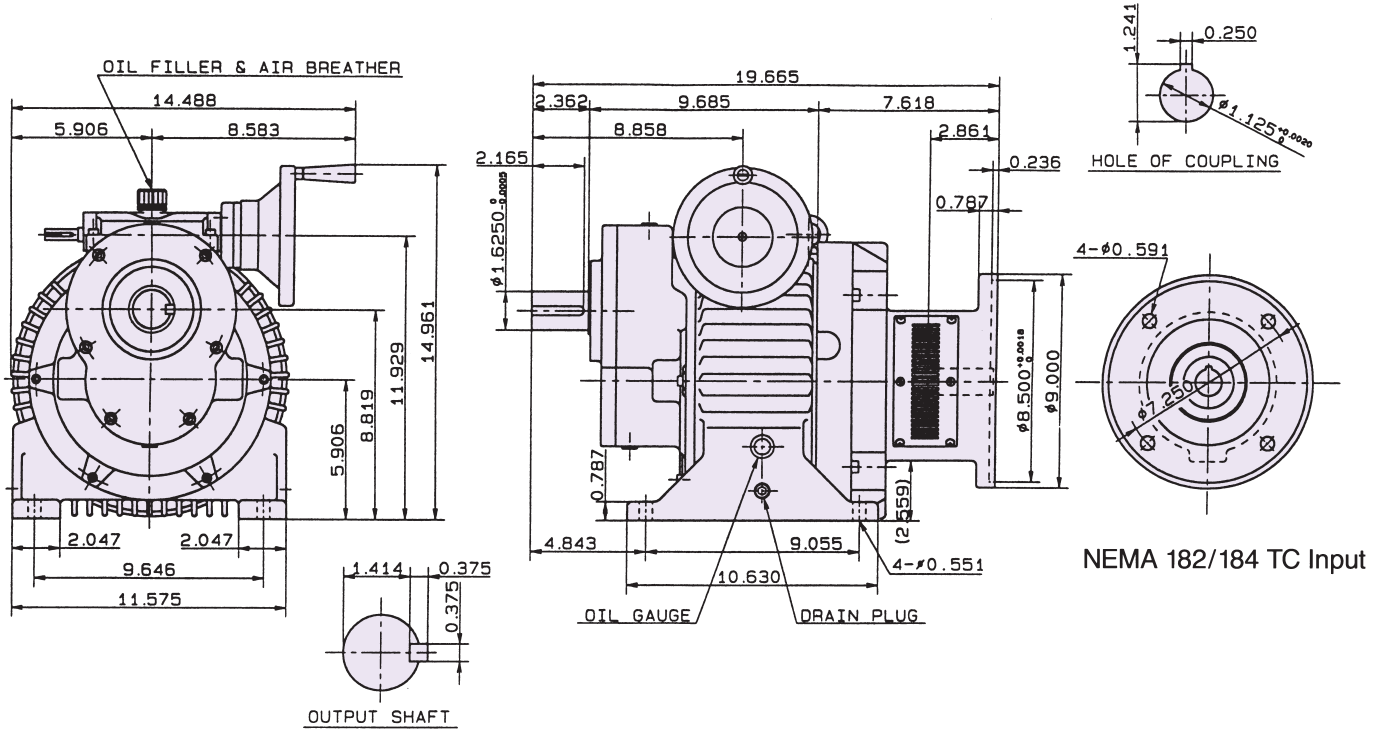
DK022AR2.5FN
DK022AR5FN



Weight: 168 lbs.

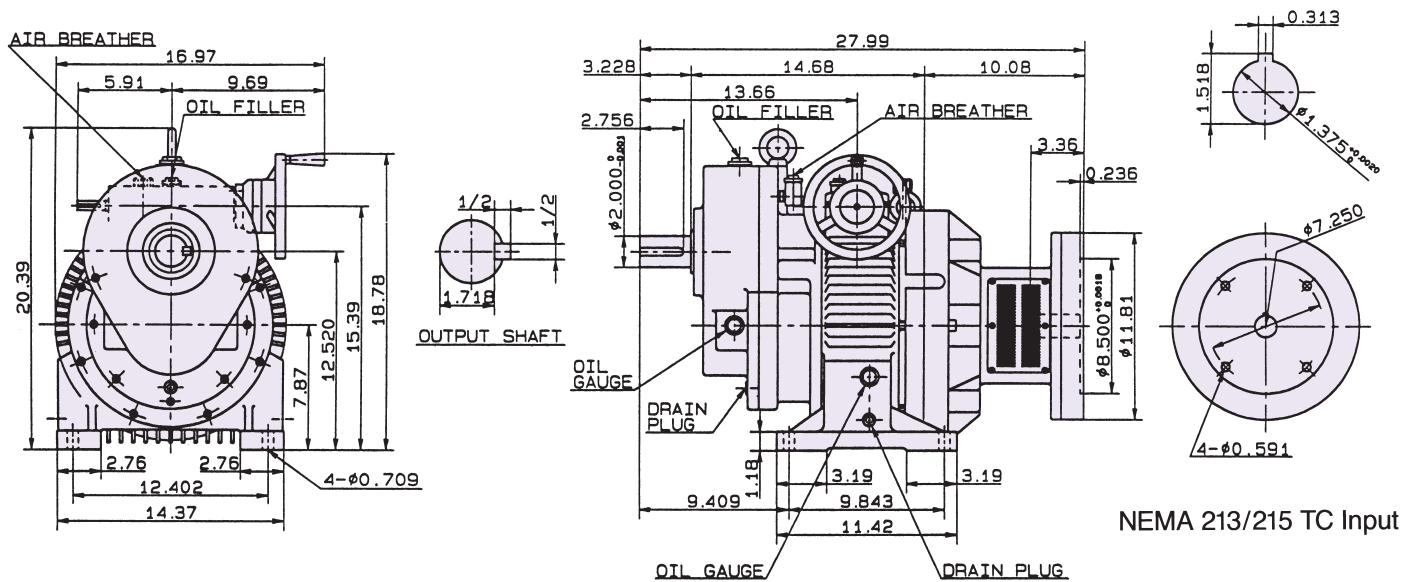
D - PT COMPONENTS

DK037AR2.5FN
DK037AR5FN



Weight: 183 lbs.

DK055AR2.5FN
DK055AR5FN
DK075AR2.5FN
DK075AR5FN



Weight: 468 lbs.

DIMENSION DIAGRAM (7)

NEMA-C Flange Input/Output Type (1/4 H.P. to 5 H.P.)

Example of model number

DK 002 FN FN - 1

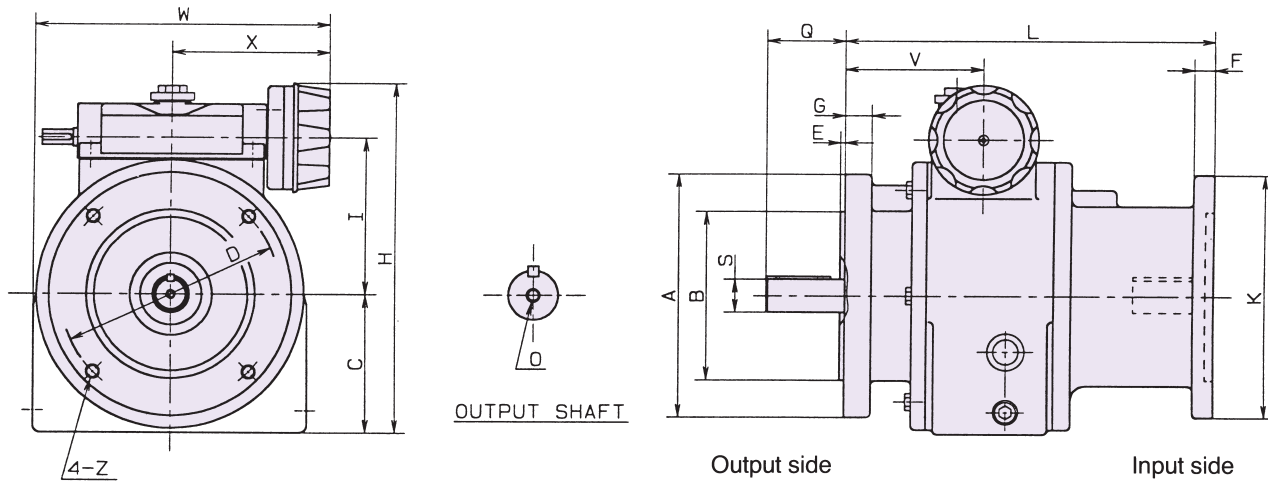
56C output and 56C input
 -1, -2, -3 or -4 added to the end of the model number denotes various combinations of output to input flange sizes
 (-1 is a stock item, other numbers require a short lead time). See chart below for these combinations.

NEMA-C flange DISCO output installation

NEMA-C flange DISCO input installation

Capacity (DISCO capacity 002: 1/4 hp)

DISCO K Series



Model Number	Output Side NEMA Frame No.	Input Side NEMA Frame No.	Length			Height		Width		Knob		Flange			Weight lbs.
			L	H	C	W	X	I	V	G	F	K			
DK002FNFN-1	56C	56C	7.98	6.89	2.60	5.94	3.15	3.01	2.91	0.59	0.58	6.63	30		
DK004FNFN-1	56C	56C	8.49	7.99	2.95	6.83	3.68	3.59	3.27	0.59	0.58	6.63	38		
DK007FNFN-1	143/145TC	143/145TC	9.91	9.33	3.70	7.91	4.25	4.18	3.66	0.71	0.58	6.50	61		
DK007FNFN-2	143/145TC	56C													
DK007FNFN-3	56C	143/145TC													
DK007FNFN-4	56C	56C													
DK015FNFN-1	182/184TC	143/145TC	11.71	10.71	4.33	9.09	4.25	4.92	4.21	0.63	0.58	6.50	93		
DK015FNFN-2	182/184TC	56C													
DK022FNFN-1	213/215TC	182/184TC	13.53	14.53	5.80	14.48	8.58	6.02	5.00	0.63	0.97	9.00	178		
DK037FNFN-1	213/215TC	182/184TC	16.00	14.86	5.80	14.48	8.58	6.02	5.00	0.63	0.79	9.00	187		

Output Side NEMA-C Flange and Shaft Dimensions

NEMA Frame No.	Flange					Shaft				
	A	B	D	E	Z	O	Q	S	Key	
56C	6.50	4.500	5.875	0.125	3/8-16	10-24UNC 0.50DP	2.063	5/8	3/16	
143/145TC	6.50	4.500	5.875	0.125	3/8-16	1/4-20UNC 0.63DP	2.125	7/8	3/16	
182/184TC	9.00	8.500	7.250	0.250	1/2-13	1/4-20UNC 0.63DP	2.875	1%	1/4	
213/215TC	9.00	8.500	7.250	0.250	1/2-13	5/16-18UNC 0.75DP	3.375	1%	5/16	

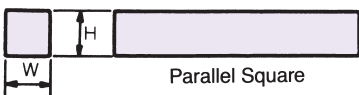
Shaft, Key and Flange Dimensions (in.)

Shaft Tolerance

Nominal Shaft Dia.	Tolerance
1/4 ~ 1 1/2	+0 ~ -.0005"
+1 1/2 ~ 6 1/2	+0 ~ -.001"

Parallel Key and Keyseats (ANSI B 17.1-1967, R1973)

Shaft diameter and accompanying key size



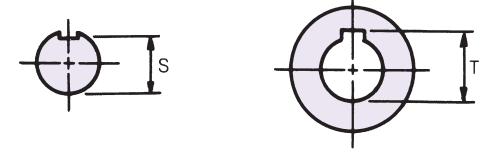
Nominal Shaft Diameter		Nominal Key Size		Nominal Keyseat Depth
Over	To (incl.)	Width W	Height H	H/2
5/16	7/16	3/32	3/32	3/64
7/16	9/16	1/8	1/8	1/16
9/16	7/8	3/16	3/16	3/32
7/8	1 1/4	1/4	1/4	1/8
1 1/4	1 3/8	5/16	5/16	5/32
1 3/8	1 3/4	3/8	3/8	3/16
1 3/4	2 1/4	1/2	1/2	1/4
2 1/4	2 3/4	5/8	5/8	5/16
2 3/4	3	3/4	3/4	3/8

ANSI Standard Fits for Parallel Keys

Type of Key	Key Width		Side Fit		
	Over	To (incl.)	Width Tolerance		Fit Range
			Key	Keyseat	
Parallel Square	—	3/4	+0.001 -0.000	+0.002 -0.000	0.002 CL 0.001 INT

CL = Clearance INT = Interference

Depth Control Values S and T for Shaft and Hub

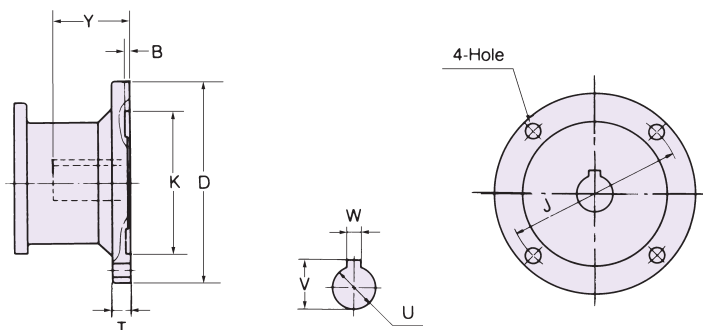


Nominal Shaft Diameter	Parallel Square		Nominal Shaft Diameter	Parallel Square	
	S	T		S	T
1/2	.430	.560	1 13/16	1.527	2.032
9/16	.493	.623	1 7/8	1.591	2.096
5/8	.517	.709	1 15/16	1.655	2.160
11/16	.581	.773	2	1.718	2.223
3/4	.644	.837	2 1/16	1.782	2.287
13/16	.708	.900	2 1/8	1.845	2.350
7/8	.771	.964	2 3/16	1.909	2.414
15/16	.796	1.051	2 1/4	1.972	2.477
1	.859	1.114	2 5/16	1.957	2.587
1 1/16	.923	1.178	2 3/8	2.021	2.651
1 1/8	.986	1.241	2 7/16	2.084	2.714
1 3/16	1.049	1.304	2 1/2	2.148	2.778
1 1/4	1.112	1.367	2 9/16	2.211	2.841
1 5/16	1.137	1.455	2 5/8	2.275	2.905
1 3/8	1.201	1.518	2 11/16	2.338	2.968
1 7/16	1.255	1.605	2 3/4	2.402	3.032
1 1/2	1.289	1.669	2 13/16	2.387	3.142
1 9/16	1.352	1.732	2 7/8	2.450	3.205
1 5/8	1.416	1.796	2 15/16	2.514	3.269
1 11/16	1.479	1.859	3	2.577	3.332
1 3/4	1.542	1.922			

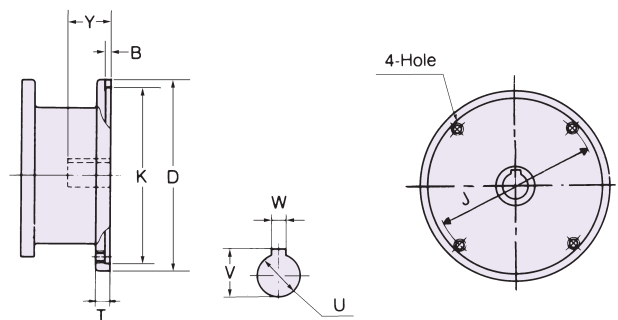
Details of NEMA-C Flange Input Type

NEMA Frame No.	B	D	J	K	T	U	V	W	Y	Hole dia.		
56C	.236	6.63	5.875	4.500	+0.0014 -.0	.55	5/8	+0.0015 -.0	.709	.1875	2.100	.433
143/145 TC	.236	6.50	5.875	4.500	+0.0014 -.0	.55	7/8	+0.0020 -.0	.964	.1875	2.200	.433
182/184 TC	.236	9.00	7.250	8.500	+0.0018 -.0	.944	1 1/8	+0.0020 -.0	1.241	.25	2.866	1.591
213/215 TC	.236	9.00	7.250	8.500	+0.0018 -.0	.78	1 3/8	+0.0020 -.0	1.518	.3125	3.361	1.591

Dimension Y is for quill shaft depth of DISCO.



For DK002 up to DK015



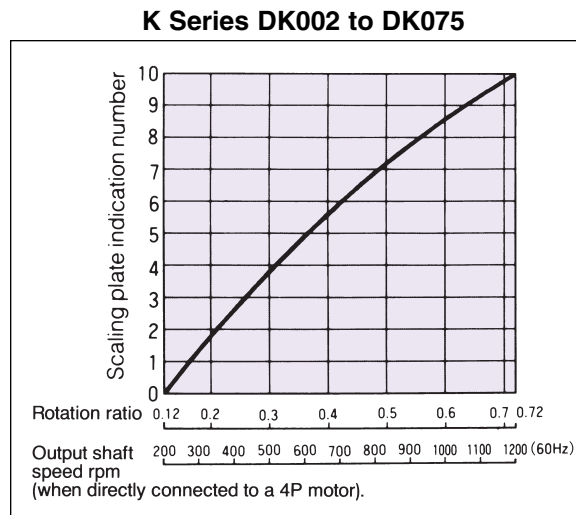
For DK022 up to DK075

Variable Speed Operation

DISCO comes standard with knob speed control. It is also possible to control the speed via remote speed control systems. These systems include both mechanical and electrical options.

Standard Knob Control Operation

Relationship between the knob scale position and rotation ratio



Knob torque and knob rotation

The torque necessary for rotating the speed adjustment knob and the number of rotations necessary to cover the entire range are given below.

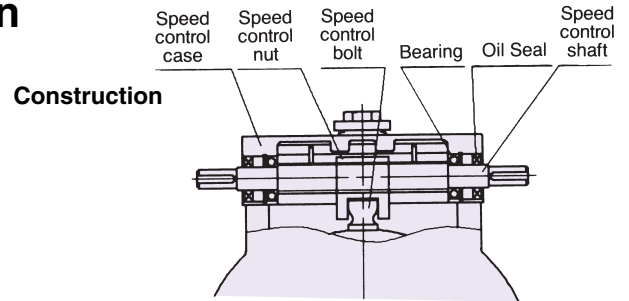
Series number	Knob torque in./lbs.	No. of knob rotations
DK002	1.7 ~ 3.5	18.5
DK004	6.9 ~ 10.4	16.5
DK007	8.7 ~ 13.0	20
DK015	15.6 ~ 20.8	23
DK022	26.0 ~ 36.5	20.5
DK037	34.7 ~ 52.0	20.5
DK055	43.4 ~ 60.8	25
DK075	56.4 ~ 78.1	25

Mechanical Remote Control Operation

Mechanical remote control operation

Speed change operation can be performed by connecting a flexible shaft or chain between the DISCO infinitely variable speed-drive speed control shaft and the knob.

Mechanical remote control with miter gear box is available.

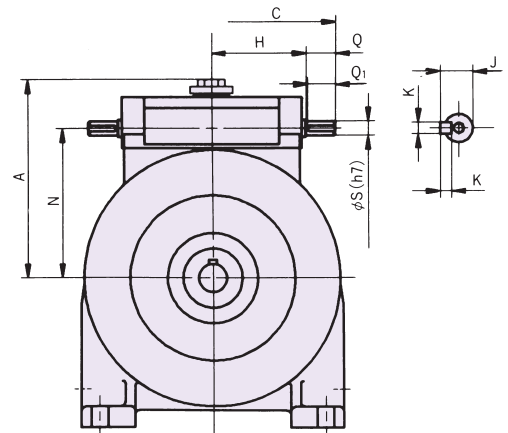


Construction

Dimensions

(in.)

K Series	With straight shaft									
	A	C	H	N	Q	Q ₁	S	J	K	Key dimensions
DK002	4.6	2.56	1.77	3.03	0.79	—	8mm	—	—	Set Bolt
DK004	5.0	2.91	2.09	3.58	0.83	0.79	10mm	0.453	4mm	4 • 4 • 20mm
DK007	5.6	3.46	2.64	4.17	0.83	0.79	10mm	0.453	4mm	
DK015	6.3	3.46	2.64	4.92	0.83	0.79	10mm	0.453	4mm	
DK022	8.0	4.49	3.11	6.02	1.38	1.18	12mm	0.532	4mm	4 • 4 • 30mm
DK037							12mm		4mm	
DK055	9.8	5.91	4.13	7.52	1.77	1.50	15mm	0.670	5mm	5 • 5 • 38mm
DK075									5mm	

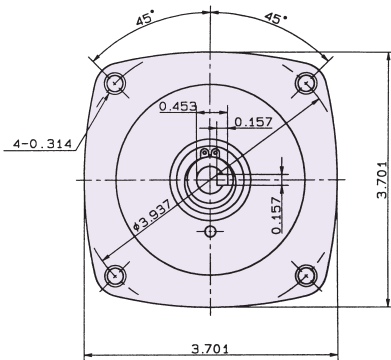


Remote speed control knob

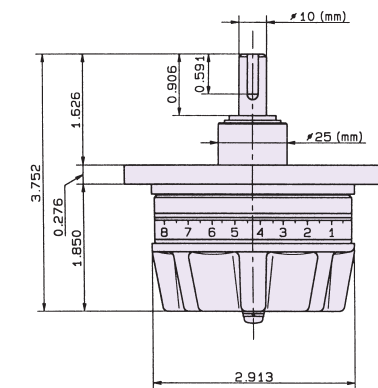
There are 3 types of speed control knobs that meet the capacity of each DISCO. Choose the speed control knob appropriate for the DISCO.

H75

(For DK002 to DK015)



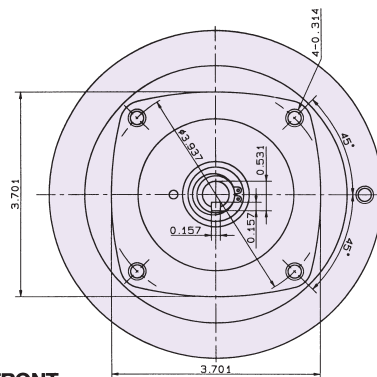
FRONT



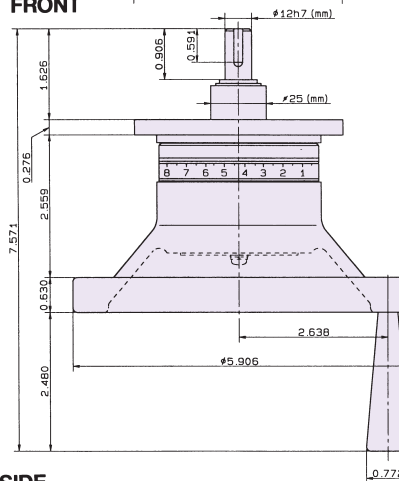
SIDE

H150

(For DK022 and DK037)



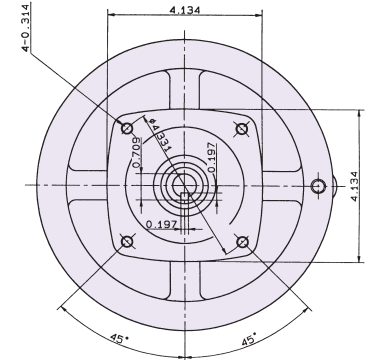
FRONT



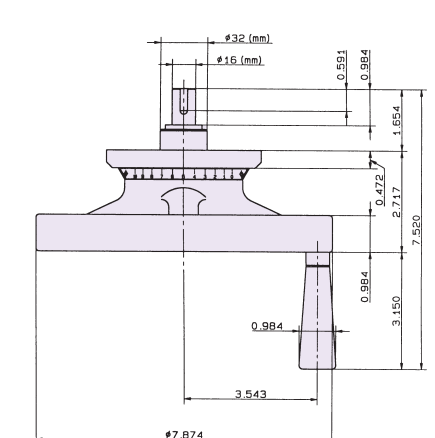
SIDE

H200

(For DK055 and DK075)



FRONT



SIDE

Electrical Remote Control Operation (Basic Type)

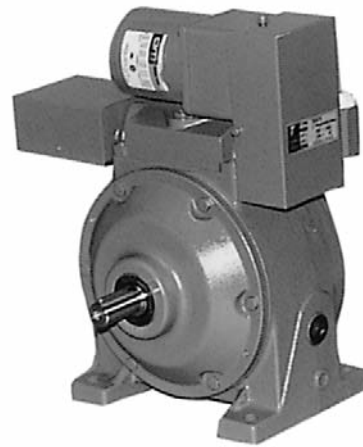
Speed change in the DISCO infinitely variable speed drive can be performed by electrical remote control through use of a pilot motor.

Basic type

This specification is for electrical remote control operation only in which detection of speed or the variable speed position of the DISCO is not required.

Characteristics

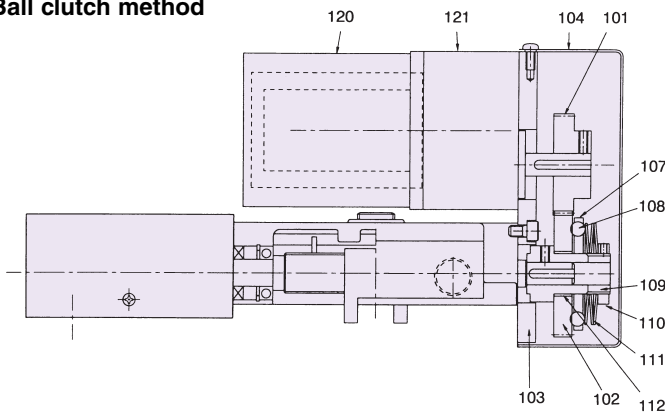
Model (K-Series)	Variable speed ratio	Variable speed parameter	Direct motor output shaft speed (rpm) 60Hz	Full range variation time sec.
DK002	6 to 1	1/8.4 ~ 1/1.4	200 ~ 1200	20
DK004				21
DK007				25
DK015				30
DK022				27
DK037				36
DK055 DK075	5 to 1	1/8 ~ 1/1.16	210 ~ 1050	70



Drive method and safety equipment

Speed is changed by turning the DISCO speed control shaft with the pilot motor. A ball clutch is used on DK037 or smaller units. Limit switches are used on D055 and larger capacity units. A ball clutch or limit switch is installed in the speed control shaft for safety.

Ball clutch method



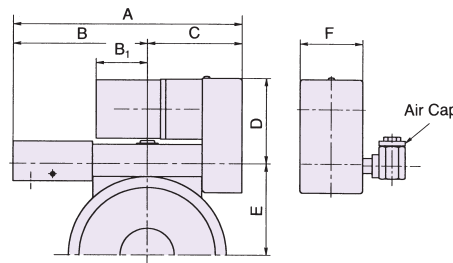
101	Pinion
102	Remote control gear
103	PM mounting plate
104	Gear cover
107	Ball retainer
108	Steel ball bearing
109	Clutch bushing
110	Spring retainer nut
111	Dish spring
112	Gear bushing
120	Pilot motor
121	Gear head

Dimensions

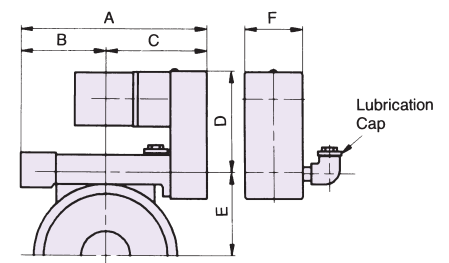
Model (K-Series)	A	B	B ₁	C	D	E	F
DK002	6.50	5.43	3.19	3.31	3.90	3.03	2.68
DK004	6.70	5.59	—	3.78	3.94	3.58	2.87
DK007	7.76	6.14	—	4.29	3.94	4.17	2.87
DK015	7.83	6.14	—	4.37	4.17	4.92	3.27
DK022 DK037	9.17	6.46	—	4.69	4.33	6.02	3.27
DK055 DK075	14.53	7.20	—	7.32	6.38	7.44	3.66

(in.)

DK002 ~ DK037



DK055 ~ DK075



Specifications

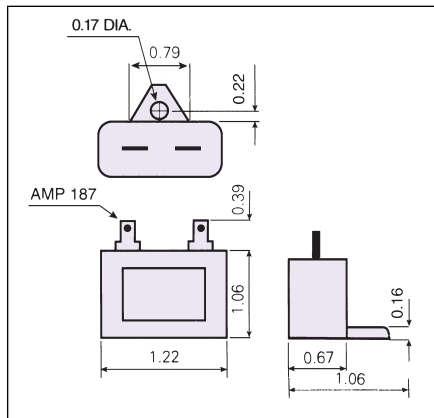
Model (K Series)	Pilot Motor			Auxiliary condenser capacity	Pilot motor protective equipment	Gear or chain sprocket
	Voltage — frequency	Output	Rated current			
DK002	Single phase 115 V 60 Hz	6W	0.22A	2.5 μ F	Ball clutch	57T • 58T
DK004 DK007		15W	0.36A	4.5 μ F		43T • 54T
DK015		30W	0.7A	8.0 μ F		46T • 54T
DK022 DK037		40W	0.85A	10 μ F		54T • 54T 46T • 62T
DK055 DK075		40W	0.87A	12 μ F	Limit switch S-5GL13	RS-35-40 link 16T • 24T

The pilot motors for DK002-DK075 are recognized by UL.

Pilot motor capacitor

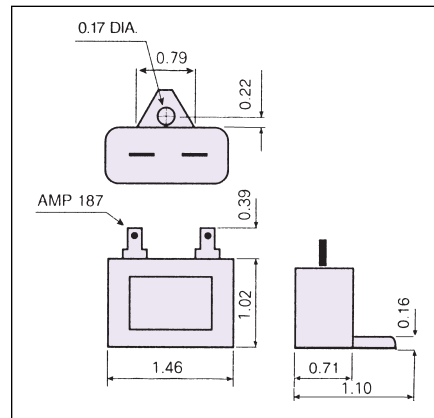
for DK002 (2.5 μ F)

(in.)



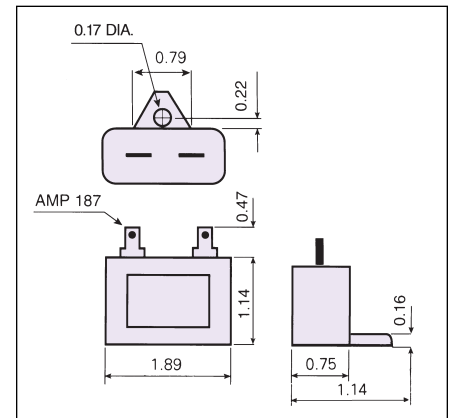
for DK004 and DK007 (4.5 μ F)

(in.)



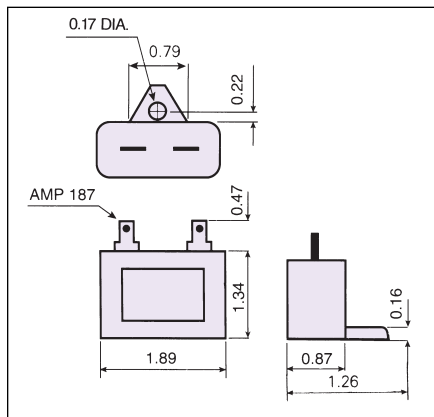
for DK015 (8.0 μ F)

(in.)



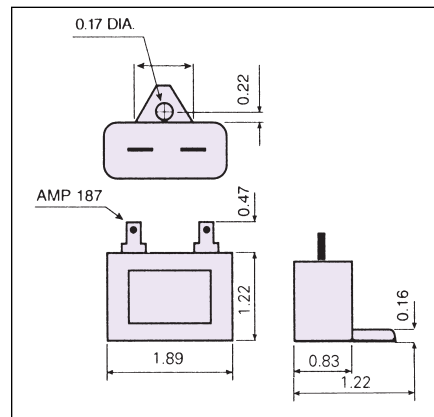
for DK022 and DK037 (10 μ F)

(in.)



for DK055 and DK075 (12 μ F)

(in.)

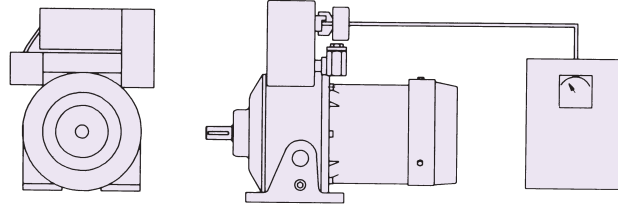


Electrical Remote Control Operation (Potentiometer System)

■ Potentiometer system

The potentiometer senses the approximate output rpm and sends a signal to the analog meter.

Note: Outer dimensions of potentiometer style ERC are same as shown on page D-75.

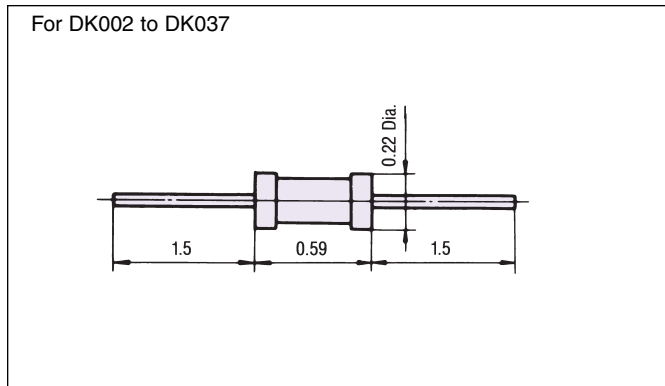


Standard Attachments (included)

In addition to the basic system, the potentiometer system includes the following items, which should be mounted in the control panel.

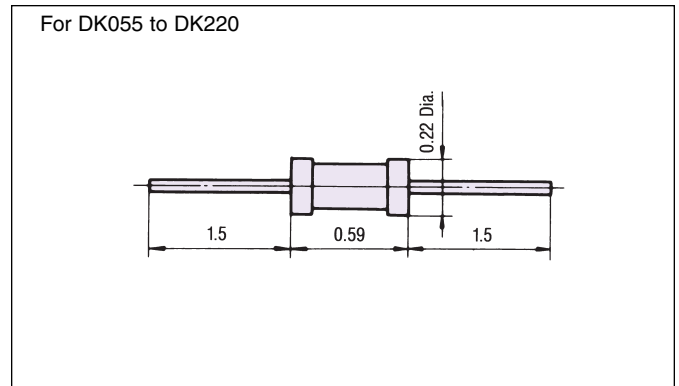
Fixed resistance ERG-3ANJ682

(in.)



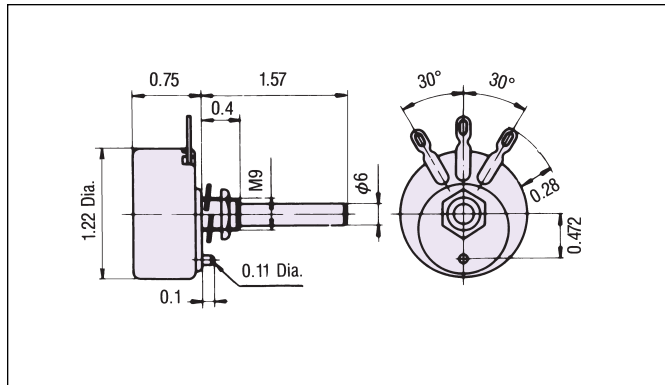
Fixed resistance ERG-2ANJ273

(in.)



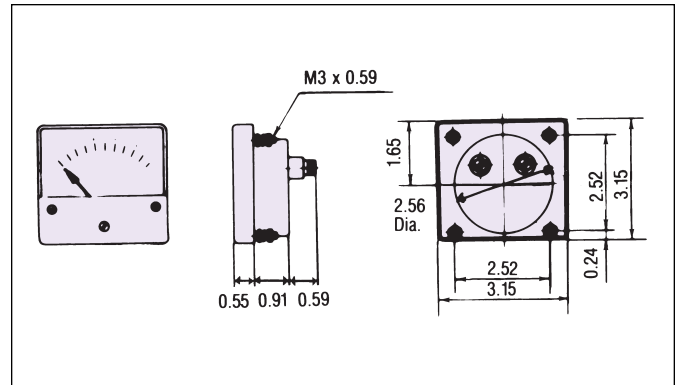
Variable resistance RV 30YN 40R

(in.)

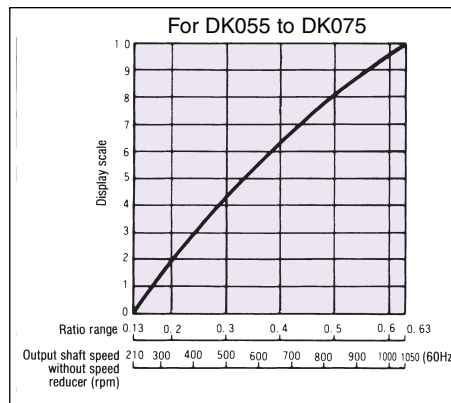
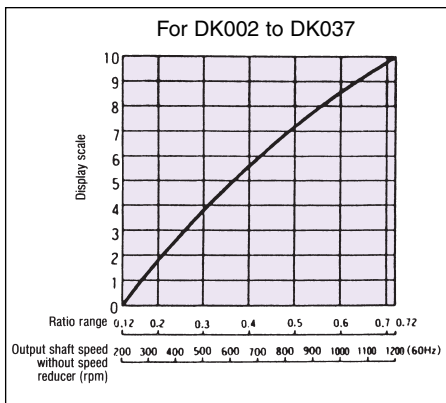


Analog display gauge SC-80

(in.)

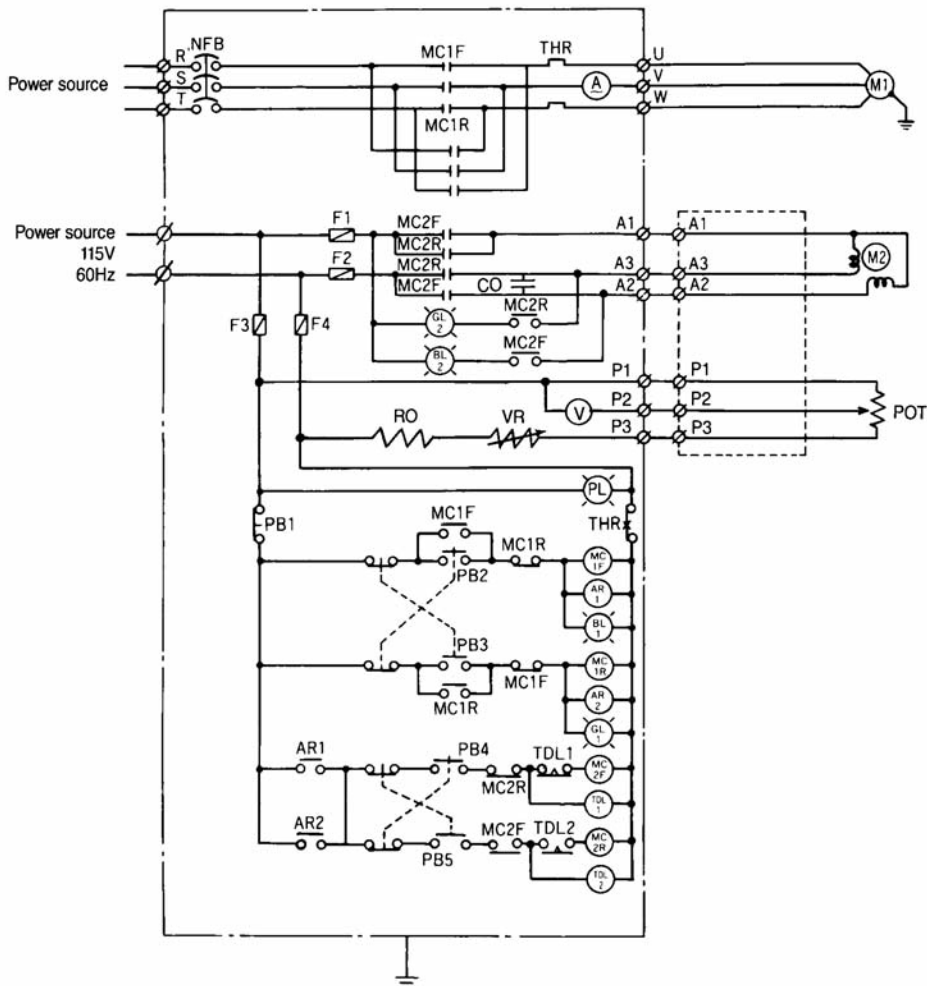


Display gauge scale — rotation ratio graph (with potentiometer)



Electrical remote control operation reference circuit drawing

DK002 to DK037



NFB	Wiring isolator
MC1F	Main motor normal operation electromagnetic contactor
MC1R	Main motor reverse operation electromagnetic contactor
THR	Thermal relay
A	Main motor ammeter
M1	Main motor
F1 ~ F4	Fuse
MC2F	PM(M2) electromagnetic accelerator contactor
MC2R	PM(M2) electromagnetic decelerator contactor
TDL1	PM(M2) accelerator timer ¹
TDL2	PM(M2) decelerator timer ¹
M2	Pilot motor (PM) ²
GL2	Decelerator indicator light
BL2	Accelerator indicator light
CO	PM(M2) operation capacitor
V	Analog display gauge
PL	Power source indicator light
PB1	All stop push button
PB2	Main motor normal operation push button
PB3	Main motor reverse operation push button
AR1 ~ 2	Support relay
BL1	Main motor normal operation indicator light
GL1	Main motor reverse operation indicator light
PB4	PM(M2) Accelerator push button
PB5	PM(M2) Decelerator push button
POT	Potentiometer
RO	Fixed resistance
VR	Variable resistance

¹ TDL1 - 2 settings differ according to the type of DISCO.

² PM(M2) power voltage and frequency is 115V 60 Hz.

Selecting a Drive

For long, trouble free DISCO operation, make sure to check every item carefully.

■ Calculation of required torque (T)

Determine the application torque requirement at the output shaft of the DISCO. If the horsepower requirement at the output shaft is known, the torque can be calculated using the following formula. Check the torque requirement at both the highest and lowest rpm of your application.

$$T = \frac{63,025 \cdot P}{N}$$

Where: T = Transmission Torque (in./lbs.)
 P = Transmission Power (hp)
 N = Maximum use speed for constant torque transmission (rpm)

■ Determine the service factor (Sf) of the application

The type and frequency of load applied to the output shaft of DISCO combine to provide a required service factor (Sf). Determine the service factor (Sf) from the following table.

Service Factor (Sf) Selection

Load Properties	Daily Operating Time		
	Up to 8 hours	8 to 16 hours	16 to 24 hours
Uniform load Continuous operation No reversals Low inertia	1.0	1.1	1.2
Light impact Intermittent operation Reversals ¹ Medium inertia	1.3	1.4	1.5
Heavy impact ² Frequent starts Reversals ¹ High inertia	1.7	1.8	2.0

¹ If application requires instant reversals, contact U.S. Tsubaki, PTUC Division.

² A mechanical protection device that slips at rated torque may be required.

■ Calculate Design Torque (T_d)

Multiply the required torque (T) by the required service factor (Sf) to obtain the design torque (T_d).

$$T_d = T \cdot Sf$$

■ Preliminary Selection of DISCO

Refer to the "Table of Standard Characteristics," pages D-55~D-56. The selected DISCO should:

1. Be appropriate for the required speed range
2. Have a torque capacity equal to or greater than the design torque (T_d).
 DISCO Shaft Torque ≥ T_d

■ Calculation of inertia ratio (I_R)

Calculate the inertia ratio (I_R)

$$I_R = I_L/I_M$$

I_L = Inertia of the load at the DISCO output shaft

I_M = Inertia of the motor rotor or input inertia (see chart)

Refer to the "DISCO Input Inertia" chart for inertia guidelines for all DISCO units, including free input types.

DISCO Input Inertia (I_M)

DISCO	HP	I_M (in ² ./lbs.)
DK002	1/4	2.68
DK004	1/2	4.05
DK007	1	9.24
DK015	2	15.62
DK022	3	23.18
DK037	5	51.15
DK055	7½	102.30
DK075	10	131.20

DISCO Inertia Guidelines

Classification	Inertia Ratio (I_R)	Caution for Selection
Low Inertia	Less than 1	None
Medium Inertia	1 - 4	Start a maximum of one time per hour, or select one size larger DISCO.*
High Inertia	4 - 15	Select one size larger DISCO, and choose a reducer combination that allows the DISCO to run in the higher rpm range.*
Very High Inertia	Above 15	Contact U.S. Tsubaki, PTUC Division

***Slow Starting:** Precautions may be necessary to avoid overloading the DISCO. One effective measure is to insert a powder coupling or fluid coupling between the variable speed drive and the load. In addition, start the DISCO at the lowest output rpm.

■ Input shaft speed check

Faster input shaft speed yields more efficient operation. The maximum input is 1800 rpm. If the input rpm is low, it may be difficult to change the speed of the DISCO. Please contact U.S. Tsubaki when the input is below 100 rpm.

■ Allowable overhung load/allowable thrust load

1. Overhung Load

When a sprocket, gear, or pulley is mounted on the high speed or low speed shaft of the DISCO, an overhung load is applied. Refer to the "Table of Standard Characteristics" (pages D55~D56) for the allowable overhung load. The value is given for mounting in the center of the shaft length.

$$\text{Allowable Overhung Load (lbs.)} \geq \frac{T \cdot C_f \cdot L_f}{R}$$

T = Required torque (in./lbs.)

C_f = Load connection factor

L_f = Load location factor

R = Pitch radius of the sprocket, gear, etc. (in.)

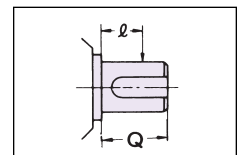
Confirm the overhung load.

Load Connection Factor (C_f)

Type of Connection	Factor
Sprocket/Chain	1.00
Gear/Pinion	1.25
Toothed Belt/Pulley	1.50
V-Belt/Pulley	2.00
Flat Belt/Pulley	2.50

Load Connection Factor (L_f)

l/Q	0.25	0.38	0.50	0.75	1.00
L_f	0.8	0.9	1.0	1.5	2.0



2. Thrust Load

Refer to the "Table of Standard Characteristics" (pages D-55~D56) of the selected DISCO to confirm that the thrust load is within the design limits. Thrust load is a force acting axially along the shaft.

Lubrication

Long-life synthetic oil is used in the DISCO variable speed drive, virtually eliminating the need for oil changing. The drive is oiled sufficiently before being shipped, thereby allowing it to be used as it is on delivery. As mixing oils and use of incorrect oil can have a considerable effect on the characteristics and life of the DISCO, great care should be taken with regard to lubrication.

■ Infinitely variable speed drive

Make sure to use the long-life oil specified by U.S. Tsubaki in the DISCO variable speed drive.

Specified synthetic lubrication oil: Dubney Alpha Drive P32 (Manufactured by Idemitsu Kosan)¹

This oil can be purchased from U.S. Tsubaki.

1. Oil change

Model	Oil change cycle
DK002 ~ DK037	20,000 hours or every 4 years ²
DK055 ~ DK075	5,000 hours or every year

¹ If you choose to use an oil different from the specified standard, use one with a viscosity which meets ISO VG32 and change the oil after the first 500 hours and every 2,000 hours thereafter (includes: MOBIL: DTE OIL 32, SHELL: TELLUS OIL 32, ESSO: TERESSO 32).

² The oil change cycle is based on less than 12 hours of operation per day. Change oil every 10,000 hours for operation conditions longer than this.

■ Speed reducer component

1. Oil and grease change

Oil and grease should be changed according to the table below.

Helical gear speed reducer	Oil	1st change: After 500 hours 2nd change onwards: every 2,000 hours
	Grease	Change every 20,000 hours

2. Suggested oil and grease

Part to lubricate	Ambient temperature	Viscosity	Oil Type	
			Mfg.	Brand
Helical Gear Speed Reducer	14°F ~ 104°F	Lithium type high grade grease No. 000	Nippon Grease	Nikdyte LYS No. 000
		Nippon Oil Mobil Oil		

2. Amount of lubrication

Amount of oil (ℓ) in the K Series infinitely variable speed drive

Model	Amount of oil horizontally mounted	
DK002	0.15	(5.1 oz.)
DK004	0.30	(10.1 oz.)
DK007	0.40	(13.5 oz.)
DK015	0.50	(16.9 oz.)
DK022	1.0	(33.8 oz.)
DK037	1.0	(33.8 oz.)
DK055	2.2	(74.3 oz.)
DK075	2.2	(74.3 oz.)

3. Amount of oil and grease

Speed Reduction Ratio

Model	Type of lube	1/2.5 • 1/5
DK002	Grease	0.25 lbs.
DK004	Grease	0.29 lbs.
DK007	Grease	0.71 lbs.
DK015	Grease	1.10 lbs.
DK022	Grease	1.40 lbs.
DK037	Grease	1.40 lbs.
DK055	Oil	* 1.6 ℓ
DK075	Oil	* 1.6 ℓ

* denotes the amount of oil (ℓ) for oil lubrication.

1ℓ = 1.057 quarts

Standard Model Specifications and Handling

Standard type DISCO specifications

Location of use	Indoors away from rain, water and direct sunlight*
Atmosphere	Dust at general factory levels is acceptable. No corrosive or explosive gas.*
Ambient temperature	14°F - 104°F
Relative humidity	Below 95%
Variable speed operation	Knob on the right-hand side (seen from the output shaft side).

* If standard DISCO will be used in washdown and corrosive environments, please contact U.S. Tsubaki, PTUC Division.

Key

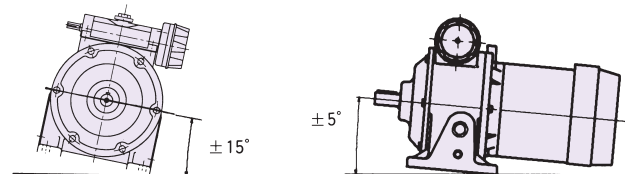
ANSI B17.1 - 1967.R1973	ISO R773
Output shaft of basic type and NEMA-C flange output Input shaft of free-input type Output shaft with R-type speed reducer and S-type speed reducer Input shaft hole with NEMA-C flange	The shaft keys of the speed control shaft and speed control knob meet ISO Key R773 (metric)

Installation and handling precautions

- Do not hang or carry the variable speed drive by its knob or speed control shaft.

Direction of installation

- Install as horizontally as possible (vertically for vertically mounted types). The allowable ranges are illustrated at right.
- If greater angles of installation are required, call U.S. Tsubaki.



Location of installation

- Install in a place with good ventilation and where maintenance and inspection can be carried out easily.

Coupling

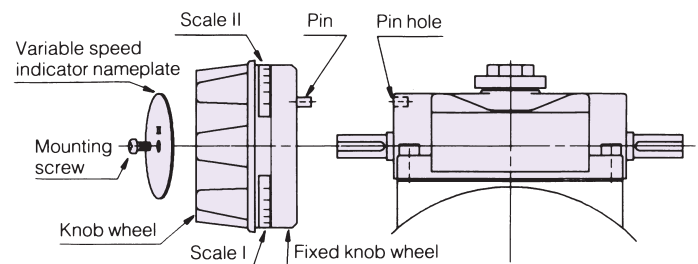
- When connecting to other machinery using a coupling, make sure to center correctly. Incorrect centering shortens the life of the couplings and can cause damage to the variable speed drive. (We suggest U.S. Tsubaki's flexible coupling for this purpose.)
- Try to minimize impact, vibration and thrust from connected equipment.
- When mounting couplings, sprockets and pulleys, etc., on the input and output shafts of the DISCO, insert a bolt into the tapped hole on the shaft and use a jack screw. Excessive hammering will damage the bearings or the inside of the variable speed drive.

Operation

- Do not turn the knob when the drive is stopped.
- When starting the drive with a full load or with large load inertia, start at as low a speed as possible.
- Make sure not to overload the drive.

Changing the right knob to left

- It is possible to change just the speed control knob without removing the speed control head housing.
- Remove the center screw with a Phillips screwdriver and remove the knob.
- Put the knob in the left-hand side of the speed control shaft and the pin into the pin hole. (See the drawing on the right.) Make sure not to hit the pin too hard.
- Turn the Scale II side on the variable speed indicator nameplate to the front and screw down the mounting screws to complete reassembly.



With DK002, it is possible to change the position of the knob wheel by removing the mounting screw only. Having removed the screw, turn the Scale II side on the variable speed indicator nameplate to the front and screw down.

WARNING

USE CARE TO PREVENT INJURY COMPLY WITH THE FOLLOWING TO AVOID SERIOUS PERSONAL INJURY

1. Guards must be provided on all chain and sprocket installations in accordance with provisions of ANSI/ASME B15.1 - 2000 "Safety Standards for Mechanical Power Transmission Apparatus," and ANSI/ASME B20.1 - 2006 "Safety Standards for Conveyors and Related Equipment," or other applicable safety standards. When revisions of these standards are published, the updated edition shall apply.
2. Always lock out power switch before installing, removing, lubricating or servicing a system which uses PTUC products.
3. When connecting or disconnecting PTUC products, eye protection is required. Wear safety glasses, protective clothing, gloves and safety shoes.

*PTUC is used by U.S. Tsubaki to designate "Power Transmission Unit Components." PTUC products include DISCO, POWER-LOCK®, Shock Relay, Gearmotor, HF Driver, Shock Damper, Power Cylinder™, Couplings, SCR variable speed motor and other like products manufactured by/for U.S. Tsubaki.

Rev. 11-06