

Applications

Service Factor

The AGMA Classification of service factor depends on the conditions under which the gear reducer operates. Motovario reducers can be rated for operation using the AGMA standards of service, based on AGMA Standard 6019-E89.

Class I

Reducer Service Factor ≥ 1.0

Steady loads not exceeding normal rating and 8-10 hours continuous running time per day.

Class II

Reducer Service Factor ≥ 1.4

Moderate shock loads not exceeding 1.25 x rated load torque and 8-10 hours continuous running time per day.

Class III

Reducer Service Factor ≥ 2.0

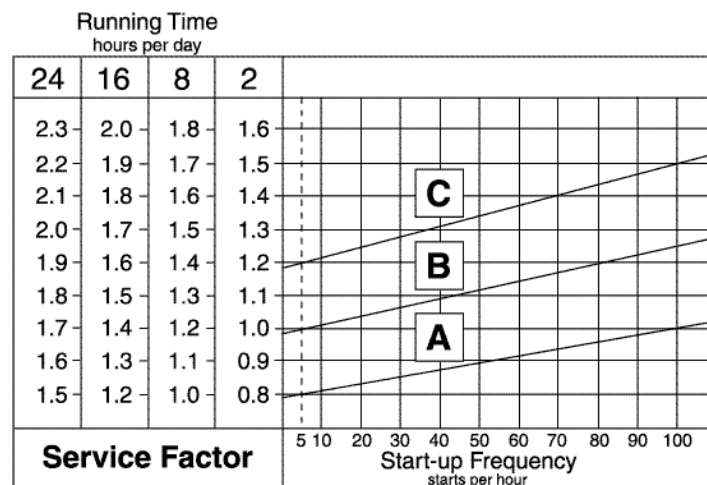
Heavy shock loads exceeding 1.25 x rated load torque and 8-10 hours running time per day.

Maximum duration of shock is 15 seconds. If shocks are likely to last longer than 15 seconds, please contact Motovario technical service representatives for additional support.

Consider ambient temperature when choosing a gear reducer. The service factor determined according to AGMA classification must be corrected for temperature:

Ambient Temperature	Multiply Service Factor by
86-104°F	1.1 - 1.2
104-122°F	1.3 - 1.4
122-140°F	1.5 - 1.6
above 140°F	contact Motovario for technical assistance

The load classification can also be determined by the following chart:



Type of load of the operated machine

A – Uniform Load – $fa \leq 0.3$

Screw feeders for light materials, fans, assembly lines, conveyor belts for light materials, small mixers, lifts, cleaning machines, fillers, control machines.

B – Moderate Shocks – $fa \leq 3$

Winding devices, woodworking machine feeders, goods lifts, balancers, threading machines, medium mixers, conveyor belts for heavy materials, winches, sliding doors, fertilizer scrapers, packing machines, concrete mixers, crane mechanisms, milling cutters, folding machines, gear pumps.

C – Heavy Shocks – $fa \leq 10$

Mixers for heavy materials, shears, presses, centrifuges, rotating supports, winches and lifts for heavy materials, grinding lathes, stone mills, bucket elevators, drilling machines, hammer mills, cam presses, folding machines, turntables, tumbling barrels, vibrators, shredders.

fa is defined as: $fa = Je/Jm$

where Je (lb-in²) is the moment of low-speed external inertia at the drive-shaft

and Jm (lb-in²) is the moment of inertia of the motor

If $fa > 10$, please contact Motovario for technical assistance.

Applications

Critical Applications

Performance ratings correspond to mounting position B3 or similar, i.e. when the first stage is not entirely immersed in oil. For other mounting positions and/or particular input speeds, refer to the tables that highlight different critical situations for each size reducer.

It is also necessary to consider the following applications by contacting Motovario Technical Service:

- Use as a speed increaser
- Use that could be hazardous for people if the reducer fails
- Applications with high inertia
- Use as a lifting winch
- Applications with high dynamic strain on the housing of the reducer
- In places with ambient temperatures below 23°F or over 104°F.
- Use in chemically aggressive or caustic environments
- Use in salty environments
- Use in radioactive environments
- Use in environments with pressures other than standard atmospheric pressure
- Mounting positions not described in this catalog

Avoid applications where even partial immersion of the reducer is required.

The maximum torque that the gear reducer can support must not exceed two times the nominal torque (when service factor = 1.0) stated in the performance tables. Maximum torque considers momentary overloads at full load start-up, braking, shocks or other causes, particularly dynamic shock.

H	030	040	050	060	080	100	125	140
Mounting Position: V5-V1 Input Speed: 1500-3000 RPM	-	-	-	-	-	-	B	B
Input Speed: >3000 RPM	B	B	B	B	B	B	A	A
Mounting Position: V3-V6	B	B	B	B	B	B	B	B

B	080	100	125	140	150
Input Speed: 2000-3000 RPM	-	-	B	B	B
Mounting Position: V6	B	B	B	B	B
Input Speed: >3000 RPM	B	B	B	A	A
Shrink Disk Mounting Position B6-B7	B	B	B	B	B

S	050	060	080	100	125
Input Speed: 2000-3000 RPM	-	-	-	-	-
Mounting Position: V6	B	B	B	B	B
Input Speed: >3000 RPM	B	B	B	B	B
Shrink Disk Mounting Position V5-V6	B	B	B	B	B

A = Application not recommended

B = Contact Motovario for Assistance

Overhung Load

Overhung Load (OHL)

The overhung load on the shaft is calculated as:

$$F_{re} = \frac{2 \cdot M \cdot f_z}{D} \leq Fr1 \text{ or } Fr2$$

Where:

F_{re} (lbs) is the resulting overhung load

M (in-lbs) is the torque on the shaft

D (in) is the pitch diameter of the transmission member mounted on the shaft

Fr (lbs) is the value of the maximum permissible overhung load (see relative tables)

f_z = 1.1 gear pinion

1.4 chain wheel

1.7 v-pulley

2.5 flat pulley

When the resulting overhung load is not applied on the center line of the shaft, the overhung load on the shaft is calculated as:

$$F_{re} \leq \frac{Fr \cdot a}{(b + x)} \leq Fr1_{max} \text{ or } Fr2_{max}$$

a, b, x = values given in the tables on pages 240 and 241.

The value of the permissible overhung load (lbs) is given in the tables relating to the performance of the reducer in use. It is related to the load applied on the center line of the shaft and in the most unfavorable conditions of angle of application and direction of rotation.

The maximum admissible thrust loads are 1/5 (20%) of the value of the given overhung load when they are applied in combination with the overhung load.

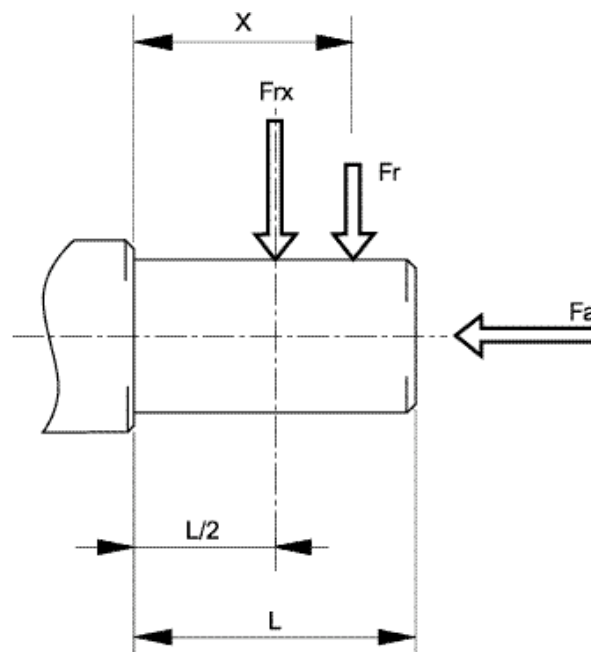
The tables relating to the output shafts give the maximum permissible value.

This value must never be exceeded since it relates to the strength of the reducer housing.

Particular conditions of overhung load higher than the limits listed in this catalog may occur. In this case, call Motovario

Technical Service and provide details on the application: (direction of the load, direction of output shaft rotation, type of service).

Overhung Load



Overhung Load, Output

Maximum Permissible Output OHL

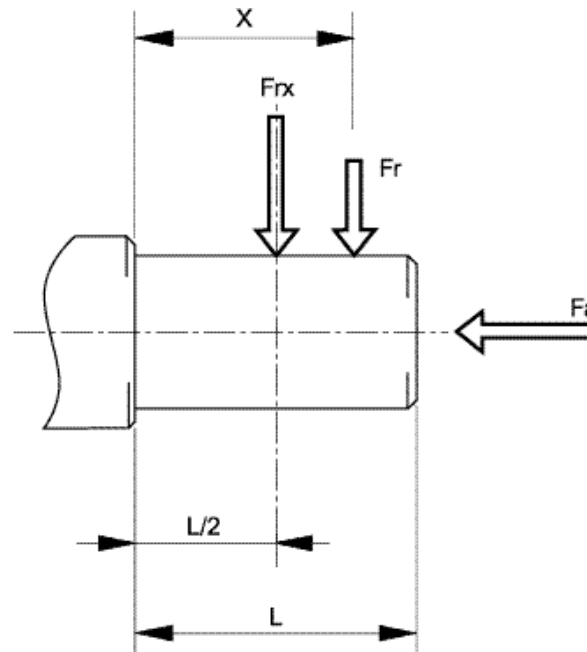
H	041	051	061	081	101	121
a (inch)	3.50	3.86	4.53	5.94	8.27	9.13
b (inch)	3.11	2.87	3.35	4.37	6.10	6.97
Fr2 max (lbs)	225	562	832	899	1124	1349

H	032 033	042 043	052 053	062 063	082 083	102 103	122 123	142 143
a (inch)	4.72	5.43	6.65	7.68	9.37	11.06	13.03	14.45
b (inch)	3.78	4.25	5.28	6.10	7.40	8.70	10.28	11.10
Fr2 max (lbs)	1236	1484	1798	2698	4047	4946	6744	12364

B	083	103	123	143	153
a (inch)	7.48	8.86	10.31	12.05	13.70
b (inch)	5.91	6.89	7.95	9.29	10.94
Fr2 max Output Shaft, lbs	4047	4946	6744	10116	14613
Fr2 max Hollow Bore, lbs	2248	2698	3372	10116	14613

S	052 053	062 063	082 083	102 103	122 123
a (inch)	4.92	5.71	7.48	8.86	10.43
b (inch)	3.74	4.33	5.91	6.89	7.95
Fr2 max Output Shaft, lbs	1561	2159	4047	4946	6744
Fr2 max Hollow Bore, lbs	674	899	1619	2023	2518

Overhung Load



Overhung Load, Input

Maximum Permissible Input OHL

SH	041	051	061	081	101	121
a (inch)	4.13	4.13	4.13	5.39	6.89	6.89
b (inch)	3.15	3.15	3.15	4.25	5.31	5.31
Fr1 max (lbf)	297	405	495	592	674	674

SH	032 033	042 043	052 053	062 063	082 083	102 103	122 123	142 143
a (inch)	4.13	4.13	4.13	5.39	5.39	6.89	6.89	8.86
b (inch)	3.15	3.15	3.15	4.25	4.25	5.31	5.31	6.69
Fr1 max (lbf)	495	495	592	809	809	1619	1619	3372

SH	083	103	123	143	163
a (inch)	5.39	6.39	6.89	6.89	8.86
b (inch)	4.25	4.25	5.31	5.31	6.69
Fr1 max (lbf)	809	809	1619	1619	3372

SH	062 063	082 083	062 083	102 103	122 123
a (inch)	4.13	4.13	5.39	5.39	6.89
b (inch)	3.15	3.15	4.25	4.25	5.31
Fr1 max (lbf)	592	592	809	809	1619

Physical Properties

Paint

Motovario SmartBox™ products are supplied with the following surface treatments:

- De-burring by mechanical shearing system
- Accurate shot-peening
- Painting
- Washing and passivation
- Die-cast materials are always painted.

Paint used on Motovario reducers meets the following specifications:

- Orange-peel blue-colored epoxy-polyester RAL 5010
- Polyester resin based heat-hardening powders, altered with epoxy resins, applied by electrostatic spray
- Heat resistance: 24 hours at 150°C (302°F)
- Corrosion strength: ASTM B 117/97 salt fog from 100 to 500 hours, depending on the surface's preliminary treatment
- Non-toxic and non-irritating according to EEC directives no. 67/548 regarding dangerous substances and no. 88/379 dangerous compounds
- Tests carried out on degreased Unichim white lattens (film thickness: 60 microns) comply with the following specifications:
 - o Adherence (ISO2409)
 - o Erichsen drawing (ISO152)
 - o Inverted shock (DIN53158)
 - o Cone-shaped mandrel (DIN53151)
 - o Hardness (ASTM D3363/74)

Lubrication

Lubrication

Reducer maintenance should be performed after approximately 10,000 hours of service, including changing the reducer's oil. The type of service and the environment of the application will determine the maintenance period. Units supplied without oil plugs are lubricated for life and need no servicing.

All Motovario SmartBox™ reducers are supplied with lubricant. The mounting position of the reducers must be specified when ordering.

Motovario SmartBox™ maintenance-free reducers:

o H032	o H043	o H053	o S052
o H033	o H051	o H061	o S053
o H041	o H052		o S062
o H042			o S063

Motovario SmartBox™ reducers, supplied with lubricant and oil plugs for maintenance:

o H062	o H102	o H123	o B083	o S082
o H063	o H103	o H142	o B103	o S083
o H081	o H121	o H143	o B123	o S102
o H082	o H122		o B143	o S103
o H083			o B153	o S122
o H101				o S123

Units equipped with oil plugs are shipped with closed plugs to prevent leaking in shipping. Replace the closed plug with the breather plug before use. When the reducer is supplied without lubricant, it is provided with a label of suggested oil types.

Lubrication Quantities (Liters)

PH - CH	032 033	041	042 043	051	052 053	061	062 063	081	082 083	101	102 103	121	122 123	142 143
B3-B4	0.5	0.5	1.2	0.5	0.7	0.7	2.3	1.4	4.0	3.4	5.2	4.8	12.0	22.0
B5	0.5	0.5	1.2	0.4	0.5	0.5	2.1	1.4	4.7	3.4	5.5	3.8	12.0	22.0
B5-B7	1.2	0.5	1.2	0.5	0.7	0.7	2.7	1.4	4.8	3.4	5.8	3.8	12.0	22.0
V6-V1	1.3	0.5	1.7	0.5	0.9	0.8	3.7	1.4	7.0	3.4	12.8	4.8	20.5	30.5
V6-V3	1.2	0.5	1.7	0.5	0.7	0.7	5.5	1.4	7.8	3.4	14.5	3.8	20.0	39.0

PS - CS	042	102	122	142	162
B3	2.4	3.6	6.0	11.5	19.0
B5	3.0	4.3	8.2	16.5	17.5
B5-B7	2.8	4.0	7.8	12.0	19.0
V6	3.8	7.2	10.5	19.0	40.0
V8	2.8	4.3	7.0	11.5	16.5

PS - CS	082	092	082	083	082	083	102	103	122	123
B3	2.2	2.2	2.2	2.2	4.0	4.0	5.8	5.8	11.5	11.5
B5	2.2	2.2	2.2	2.2	3.8	3.8	5.4	5.4	11.5	11.5
B5-B7	2.2	2.2	2.2	2.2	3.7	3.7	5.6	5.6	11.5	11.5
V6	2.7	2.7	3.2	3.2	4.5	4.5	8.4	8.4	17.0	17.0
V8	2.7	2.7	2.8	2.8	5.2	5.2	8.0	8.0	17.0	17.0

Recommended Lubrication Types

	H 032 - 140 B 032 - 160 S 042 - 125	
	Mineral Oil	
Temp. (C°) Temp. (F°) ISO VG	-10 to +80 32 to 104 ISO VG220	-10 to +80 32 to 177 ISO VG150
AGIP	ELIAS 220	ELIAS 150
SHELL	OMALA OIL* 220	OMALA OIL 150
ELSO	SPARTAN EP220	SPARTAN EP150
MOBIL	MOBILGEAR 680	MOBILGEAR 680
CALTROL	ALPHA MAX 220	ALPHA MAX 150
BP	ENERGOL GR-XP220	ENERGOL GR-XP150

NOTE: Contact Motovario for suggested lubrication options for applications operating in ambient temperatures not listed.

*Supplied by Motovario in all SmartBox™ products.

Weights

H Series SmartBox™ Weights (lbs)

Shaft Input Gear Reducer

	030	041	040	051	050	061	060	081	080	101	100	121	125	140
IH	27	17	33	22	45	26	78	54	115	96	192	101	256	423

NEMA C-Face Input Gear Reducer

	030	041	040	051	050	061	060	081	080	101	100	121	125	140
56C	28	22	34	24	44	34	67	47	109					
140TC	28	22	34	24	44	34	67	47	109		180			
180TC	32	25	37	28	47	37	72	52	115	79	185		275	429
210TC								64	126	91	199	125	288	441
250TC										91	198	125	288	441
280TC												150	313	468
320TC													319	475
360TC														475

IEC PAM Input Gear Reducer

	030	041	040	051	050	061	060	081	080	101	100	121	125	140
63	20		26		39									
71	21	11	27	16	39		64							
80	22	13	29	17	40	22	69	45	106					
90	22	13	29	17	40	22	69	45	106		170			
100	32		38	27	50	31	73	50	111	79	175		240	
112	32		38	27	50	31	73	50	111	79	181	90	240	
132							79	56	117	85	181	90	255	389
160									131	98	194	104	259	407
180										98	194	137	259	407
200													292	438
225														442

Gearmotor

	030	041	040	051	050	061	060	081	080	101	100	121	125
63	28		34		46								
71	30	20	36	25	48		72						
80	40	31	47	35	58	40	83	60	121				
90S	49	39	55	44	67	48	89	65	126		190		
90L	53	44	60	48	71	53	92	68	129		192		
100	65		72	60	83	65	103	80	140	109	205		270
112	91		97	86	109	90	128	105	166	131	227		292
132S							159	136	196	164	260	170	325
132M							185	161	222	184	280	190	345

Gearmotor with Brake

	030	041	040	051	050	061	060	081	080	101	100	121	125
63	31		37		49								
71	35	25	41	30	53		77						
80	48	38	54	43	66	47	91	67	128				
90S	61	51	67	56	79	60	101	77	138		202		
90L	65	56	72	60	83	65	104	80	141		204		
100	77		84	73	95	77	115	92	153	121	217		282
112	112		118	107	130	112	150	126	187	153	249		314
132S							182	158	219	187	283	192	348
132M							217	194	254	217	313	222	377

Weights are close approximations, rounded to the nearest pound.

Weights do not include additional accessories.

Weights include lubrication.

Weights

B Series SmartBox™ Weights (lbs)

Shaft Input Gear Reducer

	083	103	123	143	163
B5	70	123	182	289	441

NEMA C-Face Input Gear Reducer

	083	103	123	143	163
88C	88	106			
140TC	88	106	168		
180TC	71	110	174	265	428
210TC	83	121	188	278	441
280TC		121	188	278	441
380TC			213	303	488
320TC				309	476
380TC					474

IEC PAM Input Gear Reducer

	083	103	123	143	163
80	82	115			
90	82	116	180		
100	86	119	185	251	
112	86	119	185	251	
132	72	125	171	258	410
160		140	185	271	427
180			185	271	427
200				304	458
225					463

Gearmotor

	083	103	123	143
80	78	129		
90S	81	136	180	
90L	84	138	182	
100	96	148	186	282
112	121	174	218	34
132S	152	206	251	337
132M	177	231	271	357

Gearmotor with Brakes

	083	103	123	143
80	84	137		
90S	89	147	192	
90L	97	150	194	
100	108	161	206	284
112	142	198	238	328
132S	174	228	273	368
132M	209	268	303	390

S Series SmartBox™ Weights (lbs)

Shaft Input Gear Reducer

	050	088	080	100	125
S9	46	56	88	110	202

NEMA C-Face Input Gear Reducer

	050	088	080	100	125
88C	40	137	76	104	
140TC	40	48	75	104	161
180TC	44	48	80	108	188
210TC		51	82	121	198
280TC				120	198
380TC					224
320TC					230

IEC PAM Input Gear Reducer

	050	088	080	100	125
63	38				
71	40	49	78	97	
80	41	50	77	101	181
90	41	50	77	101	181
100	51	80	82	108	186
112	51	80	82	108	186
132			88	112	192
160				127	205
180					208
200					236

Gearmotor

	050	088	080	100	125
63	47				
71	48	57	80	105	
80	58	68	82	118	
90S	68	77	97	121	201
90L	72	81	100	126	203
100	84	93	112	138	216
112	110	118	137	161	238
132S			168	192	271
132M			183	217	291

Gearmotor with Brakes

	050	088	080	100	125
63	50				
71	54	62	86	110	
80	67	76	99	123	
90S	80	89	109	133	218
90L	84	93	112	137	215
100	97	106	123	148	228
112	131	140	158	182	260
132S			190	216	294
132M			226	250	329

Weights are close approximations, rounded to the nearest pound.

Weights do not include additional accessories.

Weights include lubrication.

Installation and Use

Recommendations for SmartBox™ installation:

- Avoid vibration by mounting the reducer securely to the application.
- Check the direction of rotation of the reducer output shaft before fitting the unit to the application.
- If the reducer is stored for long periods (4-6 months or more), make sure the oil seals are in contact with the reducer's internal lubricant. If the oil seal cannot contact the reducer's lubricant, change the oil seal before use. The seal's rubber coating may stick to the shaft or may lose the elasticity necessary to function properly.
- Mount hollow output shaft reducers with Motovario torque arms or output flanges. If Motovario mounts are not available, make sure the application allows for movement of the reducer.
- Whenever possible, protect the reducer against solar radiation and bad weather.
- Ensure the motor cools correctly by allowing air to flow freely on the motor's fan side.
- When ambient temperatures are below -5°C (23°F) or above 40°C (104°F), contact Motovario for assistance.
- Pulleys, sprockets, couplings, shafts and other output devices must be securely mounted on the solid or hollow shafts. Use threaded holes or similar locking methods to ensure correct operation without risking damage to the bearings or external reducer parts. Lubricate all surfaces in contact to avoid seizure or oxidation.
- Rubber parts (seals and o-rings) and the holes on the breather plugs (if applicable) must not be painted.
- Units equipped with oil plugs are shipped with closed plugs to prevent leaks during shipping. Replace the closed plug with the breather plug before use.
- Check for the correct level of the lubricant through the sight glass (if applicable).
- Do not immediately apply the maximum application load. Start-up slowly whenever possible.
- Take extra precautions when there are parts, objects, materials or people under the reducer that can be damaged by any oil leak.
- Applications operating in ambient temperatures below -30°C (-22°F) or over 60°C (140°F) require special oil seals.
- Applications operating in ambient temperatures under 0°C (32°F) have special needs:
 - o Motors must be suitable for operation at the ambient temperature.
 - o Colder temperatures require more starting torque from the motor. The motor power must be adequate to exceed the required starting torque.
 - o Cast iron becomes fragile and brittle in temperatures under -15°C (5°F).
- The viscosity of the reducer lubrication is higher at start-up. Whenever possible, run the reducer under no load for a few minutes to decrease oil viscosity.
- Installations and maintenance guides are available from Motovario or at www.motovario.com.

Motor Coupling Installation

Motovario SmartBox™ reducers designed for c-face motors use a flexible motor coupling design to maximize start and stop shock load capacity. The Hytel component of the coupling absorbs the shocks associated with harsh starts and stops.

Motovario's motor coupling is designed to fit simply over the motor shaft for easy installation. When installing, make sure the motor shaft, pilot and flange are free of oil, dirt, paint or other contaminants. The motor key must fit securely to the motor shaft before installing the coupling. The coupling will fit against the motor shaft's shoulder, keeping the coupling securely in place.

Fit the flexible coupling element to the motor coupling and position the motor and reducer together. Align the flexible component with the reducer component. Secure the motor to the reducer by bolting it to the input flange.

Instruction sheets for IEC and NEMA motors are available from Motovario or at www.motovario.com.

Installation and Use

Shaft Construction

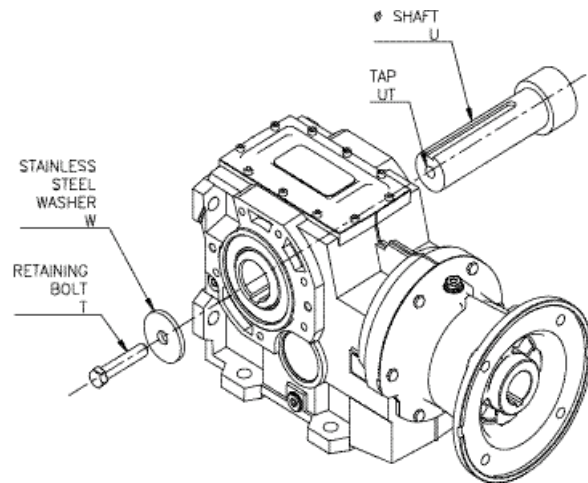
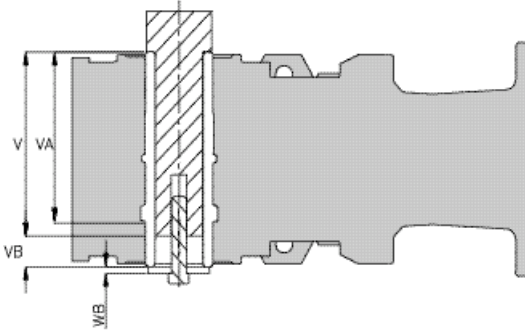
Motovario customers can mount the SmartBox™ B and S series directly on to the drive shaft of their application.

- The drive shaft must be manufactured according to the dimensions shown in the following diagrams. Not following these dimensions can lead to shaft deformation, inability to service or remove the reducer from the application or cancellation of the factory warranty.
- The suggested length of the drive shaft from the shoulder to shaft-end is dimension V. The shaft length must be greater than dimension VA on standard shaft units; greater than or equal to dimension V on shrink disk units. The drive shaft must be manufactured with a shoulder in order to mount the reducer securely.
- The reducer must be fixed to the application using a torque arm, output flange, mounting feet or by other means of stabilizing the reducer. If the reducer cannot be fixed, make sure the application allows for movement of the reducer assembly.
- Check the output rotation of the reducer before mounting to the application.
- Lubricate all metal surfaces that come in contact to avoid seizure and oxidation.
- Install the locking kit (retaining bolt, stainless steel washer and optional rubberized washer) to secure the drive shaft and reducer together. Use a rubberized or plastic washer inside the stainless steel washer to seal the hollow output bore from intrusion by water, dust or other contaminants.
- Do not over-tighten the retaining bolt so as to deform the washer.
- The locking kit will rotate with the drive shaft. Keep away loose items that may become tangled in the locking kit.

Do not immediately apply the maximum load of an application. Start slowly whenever possible.

Installation and Use

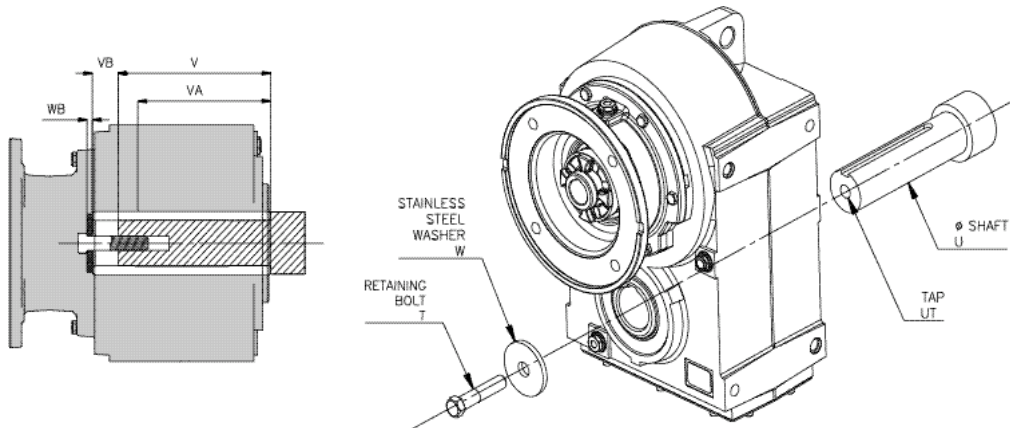
Shaft Construction



B Shaft Dimensions

	T	U	UT	V	VA*	VB	W		WB
							Ø OD	Ø ID	
B083	5/8-11 x 1"	1.500 +0.0000 -0.0008	5/8-11	8.38	5.44	0.2	2.0	0.888	0.160
B103	5/8-11 x 1"	2.000 +0.0000 -0.0010	5/8-11	8.07	6.30	0.2	2.6	0.888	0.160
B123	3/4-10 x 1"	2.375 +0.0000 -0.0010	3/4-10	8.25	6.68	0.2	3.2	0.812	0.177
B143	3/4-10 x 1"	2.750 +0.0000 -0.0010	3/4-10	11.81	8.88	0.2	3.8	0.812	0.177
B163	3/4-10 x 1"	3.250 +0.0000 -0.0010	3/4-10	16.58	10.24	0.2	4.6	0.812	0.177

*Minimum shaft length



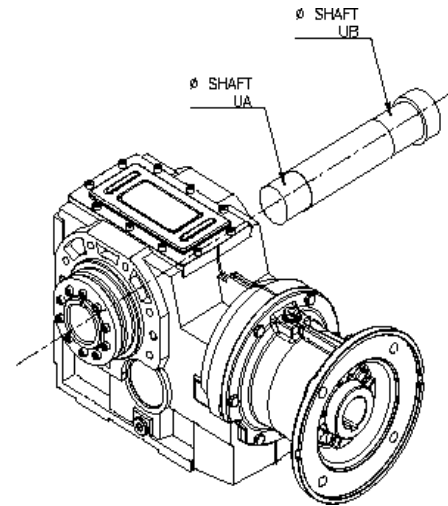
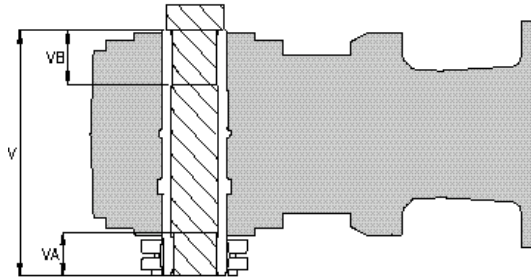
S Shaft Dimensions

	T	U	UT	V	VA*	VB	W		WB
							Ø OD	Ø ID	
S060	1/2-13 x 3/4"	1.250 +0.0000 -0.0008	1/2-13	4.52	3.54	0.2	1.7	0.500	0.104
S080	1/2-13 x 3/4"	1.375 +0.0000 -0.0008	1/2-13	5.31	4.17	0.2	1.8	0.582	0.132
S080	5/8-11 x 1"	1.500 +0.0000 -0.0008	5/8-11	6.89	5.44	0.2	2.0	0.688	0.160
S100	5/8-11 x 1"	2.000 +0.0000 -0.0010	5/8-11	8.07	6.30	0.2	2.6	0.688	0.160
S125	3/4-10 x 1"	2.375 +0.0000 -0.0010	3/4-10	9.25	6.68	0.2	3.2	0.812	0.177

*Minimum shaft length

Installation and Use

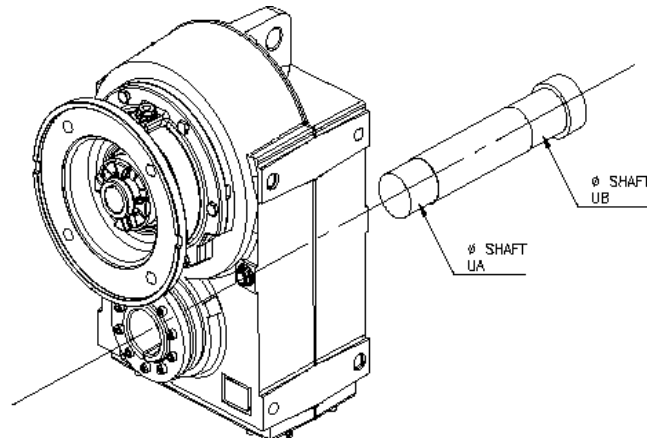
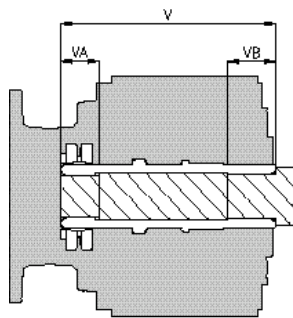
Shrink Disk Shaft Construction



B Shrink Disk Shaft Dimensions

	UA	UB	V*	VA	VB
B083	40 ⁺⁰ _{-0.0250}	41 ⁺⁰ _{-0.0250}	217	42	50
B103	50 ⁺⁰ _{-0.0250}	51 ⁺⁰ _{-0.0300}	248	42	55
B123	60 ⁺⁰ _{-0.0300}	61 ⁺⁰ _{-0.0300}	282	52	60
B143	70 ⁺⁰ _{-0.0300}	72 ⁺⁰ _{-0.0300}	355	67	70
B163	90 ⁺⁰ _{-0.0300}	82 ⁺⁰ _{-0.0300}	415	77	80

*Minimum shaft length



S Shrink Disk Shaft Dimensions

	UA	UB	V*	VA	VB
S080	30 ⁺⁰ _{-0.0210}	31 ⁺⁰ _{-0.0250}	152	37	35
S090	35 ⁺⁰ _{-0.0250}	36 ⁺⁰ _{-0.0250}	173	37	40
S090	40 ⁺⁰ _{-0.0250}	41 ⁺⁰ _{-0.0250}	217	42	50
S100	50 ⁺⁰ _{-0.0250}	51 ⁺⁰ _{-0.0300}	248	42	55
S125	60 ⁺⁰ _{-0.0300}	61 ⁺⁰ _{-0.0300}	282	52	60

*Minimum shaft length

[illegible]

Terms and Conditions of Sale

The following will be the standard terms and conditions of sale between Motovario™ Corporation (noted herein as “Motovario”) and its customers.

Solely Motovario™ terms and conditions of sale will determine Motovario's™ liabilities. It is understood that upon acceptance by Motovario™ of a customer's purchase order, the terms and conditions noted herein shall govern. No modification of, or addition to, the terms and conditions of sale outlined herein will be recognized by Motovario™ unless specifically agreed to in writing and signed by an officer of Motovario™ Corporation.

All prices are F.O.B. Alpharetta, GA. Method of pre-paid shipment is at the sole discretion of Motovario™. Weights are carefully estimated, but not guaranteed.

Payment Terms

Unless otherwise provided, terms of payment are 30 days net from the date of invoice for customers with approved credit. Motovario™ reserves the right to charge interest up to the maximum rate allowed by law on any balance outstanding after the date payment is due. For those customers without approved credit, Motovario™ may require full or partial payment in advance to continue with the production or shipment of any open and/or pending orders.

Motovario™ will not accept changes in the specification of an order unless such changes are requested in writing and agreed to in writing by an authorized officer of Motovario™.

Delivery

Great care is taken in packaging Motovario's™ products, and Motovario™ cannot be held liable for breakage after having provided material in good working order to the transportation company. Motovario's™ responsibility ceases with the delivery to the carrier, at which time title passes to the consignee. At that time, all claims for loss, damage, and delay must be made to the carrier. Purchaser must make claims for shortages or incorrect material in writing within thirty (30) days after receipt of shipment; a failure to give Motovario™ such written notice within said thirty (30) day period shall serve as an unqualified acceptance of the products provided, and a waiver by the purchaser of all such claims. When goods are received in a damaged condition with the container intact, the consignee should obtain a concealed damage report from the carrier on the day of delivery.

Cancellation or Suspension

Orders placed with Motovario™ are not subject to cancellation or suspension except with Motovario's™ consent and upon payment to Motovario™ of cancellation charges.

Limited Warranty

Motovario warrants all of its products against defects in material and workmanship for a period of one (1) year in service to a maximum of 18 months from the date of shipment. Motovario's™ obligation under this warranty is to service, repair, or replace any unit returned to Motovario™ for that specific purpose with transportation charges prepaid. Any attempt to repair Motovario™ products by

anyone other than Motovario™ voids this warranty. Use of products above rated capacity, misuse, field alterations of products, damage due to lack of maintenance or improper storage, neglect or accident are also excluded from this Limited Warranty.

Any equipment or components of the products supplied that are not of Motovario's™ own manufacture are sold under such warranty as the maker thereof provides. Motovario™ and Motovario™ is able to enforce: Such items are not warranted by Motovario™ in any way.

Returned Goods Policy

Authorization and shipping instructions must be obtained by the purchaser from Motovario™ prior to returning any product. The product must be returned with complete identification in accordance with instructions provided by Motovario™ for the return to be accepted. In no event will Motovario™ be responsible for products returned without prior authorization or identification.

Where the purchaser requests authorization to return to Motovario™ products for reasons other than an incorrect shipment by Motovario™ or damaged goods, a restocking charge of a minimum of 25% of the net invoiced amount for each item will be assessed for placing the returned goods in a salable condition and for outgoing freight paid by Motovario™.

Any product returned for repair that is outside the warranty coverage period noted above will be subject to labor and material costs. All labor and materials costs provided by Motovario™ and its employees are understood to be estimates only.

Liability for Damage

The liability of Motovario™ is strictly limited to the above-stated obligations. Motovario™ takes no responsibility deriving from accidents of any nature that may occur during use of the products sold, whether they be considered defective or otherwise; also in cases of the choice of application being recommended by personnel in the Motovario™ sales organization. The user is obligated, under his own exclusive responsibility, to proceed with the utmost caution and make provisions for safety devices that conform with applicable directives, standards and technical regulations, and to limit adequately damage to personnel and/or property that may result from failure.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.