

F Series: OFFSET – Solid Shaft/Hollow Output

Compact size and flexibility make these STOBER gear drives a popular choice for applications that require high performance, efficiency, and durability. Series F gear drives, like all SMS units, are available with a wide selection of configurations to match almost any mounting requirement.

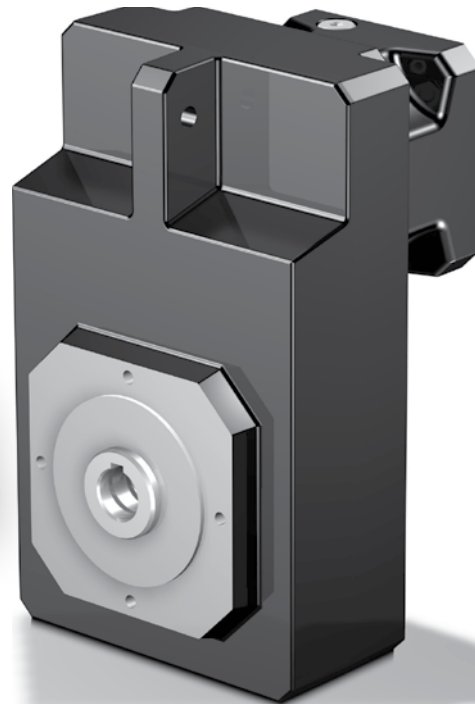
F Series Advantages

- ≥95.5% efficiency
- 5 year limited warranty (2 years on bearings, seals, etc.)
- Input RPM up to 6,000
- Assembled in the U.S.A.

**SHIPS in
1 DAY!**
NO EXPEDITE FEE FOR
24 HOUR SERVICE

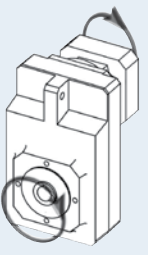
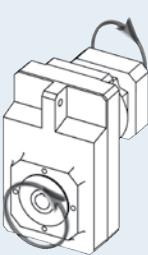
F Series Features

- 4:1 to 540:1
- Standard backlash is ≤11 arc minutes; reduced backlash is ≤6 arc minutes
- Double lip seals keep oil in and contaminants out. Double seals available for severe duty applications
- High quality helical gearing is case hardened to 58-62 Rockwell C. Precision finished for low noise and long service life
- Magnetic oil filtration
- Most hollow and solid shaft outputs are also available in metric, and in stainless steel for washdown, food, and beverage duty
- Shipped with the proper amount of oil to prevent gear damaging dry start-ups
- One-piece cast iron housing with precision machined bearing supports assure gearset alignment, prolongs bearing life, provides exceptional overhung load capacities, and eliminates leakage problems common to two-piece housings
- Motor plate can easily be changed to fit your choice of motors



F Direction of Rotation

(Viewed looking into output shaft)

CW	CCW
	
2 Stage F102 F202 F302 F402 F602	3 Stage F203 F303 F403 F603

Optional Features

Diverse Output Styles

- V** Shaft Output
- A** Hollow Output
- S** Shrink Ring
- W** Wobble-Free Bushing

Three Housing Styles

- F** Output flange
- G** Tapped holes
- NG** Foot mounting

Lubrication Options

- Standard or food grade optional

Coating Options

- Beverage Duty (**B** special option)
- Food Duty (**F** special option)

ATEX

- ATmosphere EXplosible — Please allow up to 8 weeks for delivery



Overview

Selection Options *At-a-Glance*

F Series Gearheads are available in a wide range of user-selected design options that tailor the gearhead to your motor choice and exact application requirements. Use the appropriate order codes on the following pages to build a part number for the complete gearhead assembly.

Part Number Example:

F 1 0 2 V F 0043 MT10 B

Design Option	Part Number Code	Description
Series	F	Offset helical
Gearhead Size	1 2 3 4 6	5 sizes of gearhead
Generation	0	Version of gearhead
# of Stages	2 3	Two stage (determined by ratio) Three stage (determined by ratio)
Output	V	Shaft output (only available with housing option "F"; not available with food or beverage duty)
	A	Hollow output (available imperial or metric, stainless steel)
	W	Single or double wobble-free bushing (If single, specify side 5 or 6 only)
	S	Shrink ring
Housing	F	Round output flange
	G	Tapped holes around output
	NG	Foot mounting (with tapped holes for side mounting)
Ratio	0043	Ratios range from 4.3:1 to 552:1 (0043=4.3:1; 0063=6.3:1; 5520=520:1)
Motor Adapter	MT10	4 input sizes (see also motor mounting plate option)
Special Options	B	Add when ordering Beverage Duty
	F	Add when ordering Food Duty

General Specifications

Lubrication	Lubricated for life — Standard: Mobilgear 600XP220 Optional: Food grade (Mobil SHC CIBUS 220) or Synthetic (Mobil SHC630)
Degree of Protection	IP65 standard; IP69K optional
Mounting Position	Must be specified, see page 170
Direction of Rotation	See page 168
Ambient Temperature	0° C to +40°C (104° F) [Unit temperature ≤ 80° C Max.]
Coating	Standard Black (RAL 9005); food option available
Warranty	5 Year Limited (2 years on normal wear items: bearings, seals, etc.)

F Series: OFFSET – Solid Shaft/Hollow Output

F Performance Overview

F Series performance is dependent on several factors including duty cycle, bearing design, gearhead size and stage configuration, among others. Use the chart below for preliminary evaluation, then use the following performance chart and selection information on the following pages for specific performance sizing and selection.

Size/Generation		F10	F20		F30		F40		F60	
# of Stages		2	2	3	2	3	2	3	2	3
Acceleration Torque M_{2BMAX}	Nm	120	270		450		700		1100	
	in.lbs	1063	2392		3986		6201		9744	
Output Torque Nom. M_{2N}	Nm	120	240		400		700		1100	
	in.lbs	1063	2126		3543		6201		9744	
Torsional Stiffness C_2	Nm/arcmin	<7.7	<17.9	<17.9	<21.8	<21.8	<38.6	<38.7	<77.1	<77.3
	in.lbs/arcmin	<69	<158	<159	<193	<193	<342	<343	<683	<685
Torsional Backlash ¹⁾ $\Delta\phi$	arcmin									
	Standard Reduced	≤11 ≤8	≤11 ≤8	≤11 ≤7	≤11 ≤8	≤11 ≤7	≤10 ≤7	≤10 ≤6	≤10 ≤7	≤10 ≤6
Input Speed Max. n_{1MAX}	Continuous	EL1,2,3,4	4000	3800	4000	4000	3500	3800	3500	3500
		EL5,6	4000	3500	3900	3900	3500	3500	3200	3200
	Cyclic		6000	6000	6000	6000	5000	5500	5000	5000
Efficiency (@nom torque)		%	97	97	96	97	96	97	96	97
Weight	kg	17.2	23.1	29.0	30.4	33.1	38.1	41.2	74.7	80.2
	lbs	38	51	64	67	73	84	91	165	177
Noise ²⁾		dB(A)	≤55	≤53	≤53	≤53	≤53	≤53	≤61	≤61
Size/Generation/# of Stage		F102	F202/F203		F302/F303		F402/F403		F602/F603	
Axial Load Max. ³⁾ F_{2AMAX}	Solid Shaft	N	1100	1400	1900	2350	3100			
		lbs	247	351	427	528	697			
	Hollow Bore	N	900	1200	1350	1900	2200			
		lbs	203	270	304	428	495			
Tilting Moment Max. ³⁾ M_{2KMAX}	Solid Shaft	Nm	260	400	600	800	1200			
		in.lbs	2301	3540	5310	7080	10,620			
	Hollow Bore	Nm	175	250	375	550	800			
		in.lbs	1549	2213	3319	4858	7080			

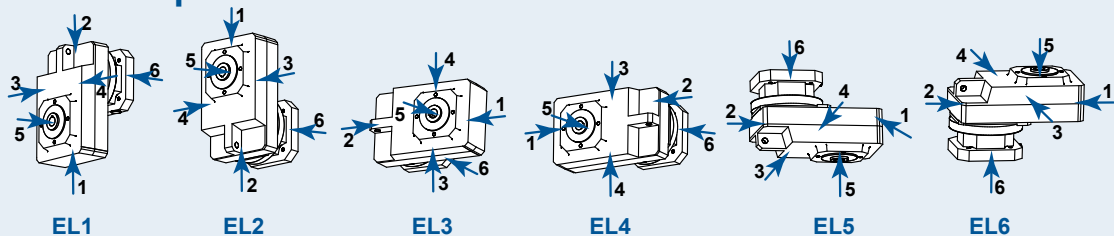
¹⁾ Tested at 1.5% of nominal torque and recorded on the output side of the gearhead. For lower backlash, contact STOBER technical support.

²⁾ Measurement at one (1) meter distance with input speed (n_1) of 2000 RPM.

³⁾ Rating based on output speed (n_2) of 20 RPM. For values at other speeds see page 172

F Mounting Position Options

When ordering, mounting in **Any Position** (EL1, EL2, EL3, EL4, EL5, EL6) **MUST BE SPECIFIED**





Overview

F Series Motor Mounting Plate Option (Motor information required with Motor Adapter option)

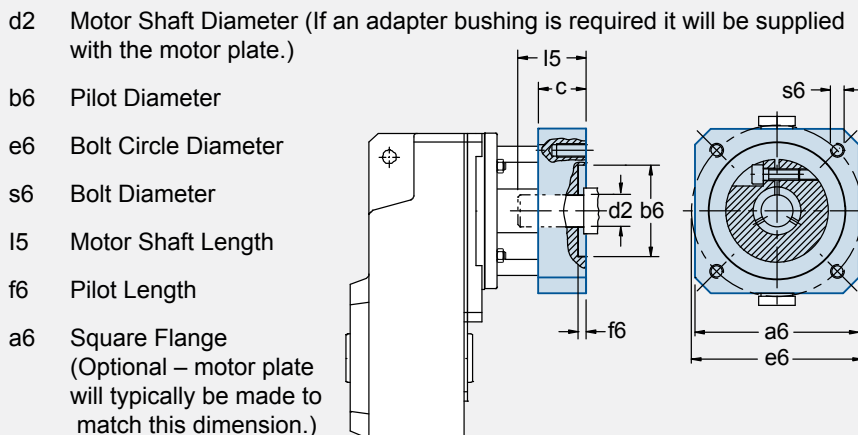
STOBER ServoFit Gearheads fit the motor of your choice with the appropriate motor mounting plate assembled between the motor and the gearhead.

NOTE: When ordering a gearhead:

- Specify the motor manufacturer and part number
- Provide the motor drawing with dimensions, or specify the motor mounting dimensions (per the list shown at right)

For a precise dimension on a specific motor, or for general assistance, we recommend you contact STOBER Technical Support.

Customer Required Dimensions for Properly Sized Motor Mounting Plate



Motor Mounting Plate Dimensions — mm (Gearhead Part Number Specific)

	MT10	MT20	MT30	MT40
Maximum Allowed Motor Shaft Dia. d2	19	24	38	48
Minimum Allowed Motor Plate Thickness c*	21	24	25	33

* Note that the c motor plate thickness is determined by the motor shaft length. The minimum motor plate thickness is the value listed.

F Series Output Options

Diameters in **BOLD BLUE** are configurations readily available from inventory. Contact STOBER for delivery on other output sizes.

			F1	F2	F3	F4	F6
Solid Shaft	Carbon Steel	Inches	1	1-1/4	1-3/8	1-5/8	2-1/8
		Metric	—	—	—	—	—
	Stainless Steel*	Inches	—	—	—	—	—
		Metric	—	—	—	—	—
Hollow Bore	Carbon Steel	Inches	3/4	1	1-1/4	1-1/2	2
		Metric	20	25	30	40	50
	Stainless Steel*	Inches	—	1	1-1/4	1-1/2	—
		Metric	—	—	—	—	—
Wobble Free Bushing (Single & Double Bushings**)	Stainless Steel*	Inches	3/4	1 1-3/16	1 1-3/16 1-1/4 1-3/8 1-7/16 1-1/2	1 1-3/16 1-1/4 1-3/8 1-7/16 1-1/2	1-7/16 1-1/2 1-5/8 1-11/16 1-3/4 1-7/8 1-15/16 2
		Metric	20	30	30 35	40***	40***

* Stainless steel options are ideal for food and beverage or harsh washdown environments.

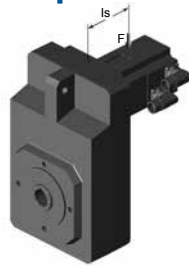
** Double bushings only available with two stage units

*** Double bushing only

F Series: OFFSET – Solid Shaft/Hollow Output

Permissible Motor Tilting Torque

The permissible tilting torque of the motor attached to the gear unit is a result of the static and dynamic load “F” from the motor weight, mass acceleration, and vibration multiplied by the distance from the center of gravity “ l_s ” of the motor.



$$M_{1k} = F \times l_s \leq M_{1K}$$

M_{1K}	MT10	MT20	MT30	MT40
Nm	25	60	125	250
in.lbs	221	531	1106	2212

Permissible Output Shaft Load and Tilting Moments*

	V Solid Shaft Output								A, S, W Hollow Output ¹⁾					
	Z ₂		F _{2A}		F _{2R}		M _{2K}		Z ₂		F _{2A}		M _{2K}	
Unit	mm	in	N	lbs.	N	lbs.	Nm	in.lbs	mm	in	N	lbs.	Nm	in.lbs
F102	35	1.38	1100	247	4200	945	260	2301	30	1.18	900	203	175	1549
F202/F203	41	1.61	1400	351	5400	1215	400	3540	33	1.30	1200	270	250	2213
F302/F303	43	1.69	1900	427	7500	1687	600	5310	33	1.30	1350	304	375	3319
F402/F403	44	1.73	2350	528	9250	2081	800	7080	39	1.54	1900	428	550	4858
F602/F603	44	1.73	3100	697	12,500	2812	1200	10,620	45	1.77	2200	495	800	7080

* Refer to illustration and definitions below.

¹⁾ Values shown for “W” Style are for double bushings. For single bushings use value $M_{2K} \times 0.5$ and $F_{2A} \times 0.5$

F Series Load/Life/Speed Calculations

The permissible load and tilting moment values are based on an output speed of 20 RPM. For higher speeds the following applies, where n_2 is the desired speed:

$$F_{2AX} = \frac{F_{2A}}{\sqrt[3]{\frac{n_2}{20}}}, \quad F_{2RX} = \frac{F_{2R}}{\sqrt[3]{\frac{n_2}{20}}}, \quad M_{2KX} = \frac{M_{2K}}{\sqrt[3]{\frac{n_2}{20}}}$$

The application input tilting moment should be determined by the following formula:

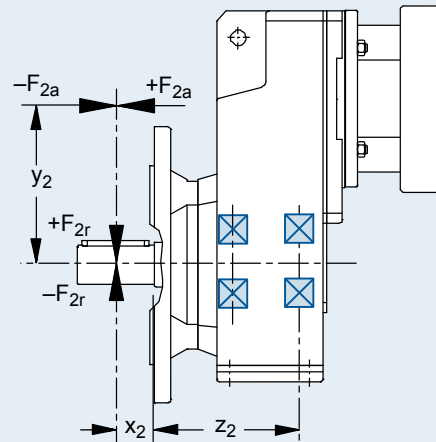
$$M_{2A} = \frac{2 \cdot F_{2a} \cdot y_2 + F_{2rb} \cdot (x_2 + z_2)}{1000} \leq M_{2K}$$

Where:

- F_{2a} Axial Load at Output Shaft
- F_{2A} Permissible Axial Load
- F_{2r} Radial Load at Output Shaft
- F_{2R} Permissible Radial Load
- F_{2RB} Acceleration Permissible Radial Load
- M_{2K} Rated Tilting Torque
- M_{2k} Equivalent Tilting Load
- M_{2KB} Acceleration Tilting Torque
- z_2 Distance Factor

All formulas shown are based on METRIC values

Upper case letters are permissible values. Lower case letters are for existing values.





Overview

F

OFFSET – Solid Shaft/Hollow Output

Overhung Load Calculations

Pulling forces or overhung load of pulleys, sheaves, sprockets, etc. on the reducer output shaft must not exceed the allowable limits shown in the load/life/speed calculations below.

Note: Overhung load is measured at the center of the shaft extension. No overhung load is encountered when a reducer is flange mounted and/or coupling connected to another unit. However, the shafts of all components must be accurately aligned and secured to prevent pre-loading of the bearings and premature bearing failure.

Use the following formula to determine actual overhung load for a given drive:.

Imperial OHL (lbs) = $\frac{126,000 \times \text{HP} \times K}{D \times n}$

Metric OHL (N) = $\frac{19,100 \times \text{kW} \times K}{D \times n}$

Where:

- OHL** Overhung load (N or lbs)
- HP** Horsepower
- kW** Transmitted Kilowatt
- D** Pitch Diameter (inches or meters) of Sprocket, Gear, Sheave, Pulley, etc.
- n** Maximum Shaft RPM
- K** 1.00 Single Chain Drive; 1.25 Timing Belt Drive;
1.25 Spur or Helical Gear Drive; 1.50 V-Belt Drive; 2.50 Flat Belt Drive

F Series: OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J1 kgcm ²	Torsional Stiffness C2 (per arcmin)	
		Nominal ¹⁾ M2N ≤ 2000 RPM		Acceleration M2B		Peak ²⁾ M2PEAK			Continuous		Cyclic				
									EL 1,2,3,4	EL 5,6	All			Δφ	Nm
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.								

F102

Two Stage

Noise Level ≤ 55 dB(A) ⁴⁾

4.308	56/13	45	396	45	396	56	496	F102_0043 MT10	3500	3000	6000	11/8	2.1	4.0	35
		61	539	84	746	105	933	F102_0043 MT20			5000		2.7	4.1	37
6.462	84/13	64	563	64	563	79	704	F102_0065 MT10	3500	3000	6000	11/8	1.4	5.1	45
		70	617	105	930	150	1326	F102_0065 MT20			5000		2.0	5.2	46
7.156	322/45	69	613	69	613	87	767	F102_0072 MT10	3700	3600	6000	11/8	1.2	5.3	47
		72	639	105	930	163	1444	F102_0072 MT20	3500	3500	5000		1.8	5.4	48
8.948	1029/115	78	688	83	737	104	921	F102_0089 MT10	3700	3600	6000	11/8	1.0	5.7	50
				105	930	196	1734	F102_0089 MT20	3500	3500	5000		1.6	5.8	51
10.92	273/25	83	735	98	868	123	1085	F102_0110 MT10	4000	4000	6000	11/8	0.9	5.9	53
				105	930	200	1772	F102_0110 MT20	3500	3500	5000		1.5	6.0	53
13.59	231/17	89	791	105	930	146	1297	F102_0135 MT10	4000	4000	6000	11/8	0.8	6.1	54
						200	1772	F102_0135 MT20	3500	3500	5000		1.4	6.2	55
18.46	1495/81	99	876	120	1063	223	1978	F102_0185 MT10	3700	3600	6000	11/6	0.9	7.4	66
						240	2126	F102_0185 MT20	3500	3500	5000		1.5	7.5	66
23.08	3185/138	107	944	120	1063	240	2126	F102_0230 MT10	3700	3600	6000	11/6	0.8	7.5	67
								F102_0230 MT20	3500	3500	5000		1.4	7.6	67
28.17	169/6	114	1009	120	1063	240	2126	F102_0280 MT10	4000	4000	6000	11/6	0.8	7.6	67
								F102_0280 MT20	3500	3500	5000		1.4		
35.05	3575/102	120	1063	120	1063	240	2126	F102_0350 MT10	4000	4000	6000	11/6	0.7	7.7	68
								F102_0350 MT20	3500	3500	5000		1.3		
46.43	325/7	120	1063	120	1063	240	2126	F102_0460 MT10	4000	4000	6000	11/6	0.7	7.7	68
								F102_0460 MT20	3500	3500	5000		1.3		
55.97	2015/36	120	1063	120	1063	240	2126	F102_0560 MT10	4000	4000	6000	11/6	0.7	7.7	68
								F102_0560 MT20	3500	3500	5000		1.3		
70.06	1261/18	120	1063	120	1063	240	2126	F102_0700 MT10	4000	4000	6000	11/6	0.6	7.7	68
								F102_0700 MT20	3500	3500	5000		1.2		
93.63	7865/84	120	1063	120	1063	240	2126	F102_0940 MT10	4000	4000	6000	11/6	0.6	7.7	68
111.9	2015/18	120	1063	120	1063	240	2126	F102_1120 MT10	4000	4000	6000	11/6	0.6	7.7	68
139.8	559/4	120	1063	120	1063	240	2126	F102_1400 MT10	4000	4000	6000	11/6	0.6	7.7	69

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)



Selection Data

F

OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J ₁ kgcm ²	Torsional Stiffness C ₂ (per arcmin)		
		Nominal ¹⁾ M _{2N} ≤ 2000 RPM		Acceleration M _{2B}		Peak ²⁾ M _{2PEAK}			Continuous		Cyclic					
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All			Δφ	Nm	in. lbs.
Nom.	Exact															

F202

Two Stage (continued next page)

Noise Level ≤ 53 dB(A) ⁴⁾

4.680 2616/559	51	452	51	452	64	564	F202_0047 MT10		5000			4.7	6.8	60
	125	1103	200	1769	282	2495	F202_0047 MT20	3100	2600	5000	11/8	5.3	7.2	64
	125	1103	210	1860	282	2495	F202_0047 MT30			4000		10.1	9.1	80
5.552 5341/962	132	1168	210	1860	330	2921	F202_0056 MT20	3100	2600	5000	11/8	4.2	8.5	75
							F202_0056 MT30			4000		9.0	10.3	91
7.167 5777/806	74	653	74	653	92	816	F202_0072 MT10	3600		6000		2.5	10.0	89
	144	1272	210	1860	400	3543	F202_0072 MT20	3500	3100	5000	11/8	3.1	10.4	92
	144	1272	210	1860	400	3543	F202_0072 MT30	3500		4000		7.9	11.9	106
9.006 3161/351	89	793	89	793	112	991	F202_0090 MT10	3600		6000		1.9	11.5	102
	155	1372	210	1860	400	3543	F202_0090 MT20	3500	3100	5000	11/8	2.5	11.8	105
	155	1372	210	1860	400	3543	F202_0090 MT30	3500		4000		7.3	13.0	115
10.80 7303/676	104	917	104	917	129	1147	F202_0110 MT10	3800		6000		1.5	12.5	111
	165	1458	210	1860	400	3543	F202_0110 MT20	3500	3500	5000	11/8	2.1	12.8	113
	165	1458	210	1860	400	3543	F202_0110 MT30	3500		4000		6.9	13.7	121
13.63 109/8	126	1112	126	1112	157	1391	F202_0135 MT10	3800		6000		1.2	13.5	120
	178	1576	210	1860	400	3543	F202_0135 MT20	3500	3500	5000	11/8	1.8	13.7	121
	178	1576	210	1860	400	3543	F202_0135 MT30	3500		4000		6.6	14.3	127
18.65 6360/341	192	1699	192	1699	240	2124	F202_0185 MT10	3600		6000		1.5	16.4	145
	197	1749	270	2392	480	4252	F202_0185 MT20	3500	3100	5000	11/6	2.1	16.5	146
	197	1749	270	2392	480	4252	F202_0185 MT30	3500		4000		6.9	17.0	151
23.43 2320/99			233	2062	291	2578	F202_0230 MT10	3600		6000		1.3	16.9	150
	213	1888	270	2392	480	4252	F202_0230 MT20	3500	3100	5000	11/6	1.9	17.0	151
			270	2392	480	4252	F202_0230 MT30	3500		4000		6.7	17.3	154
28.11 4020/143			269	2387	337	2984	F202_0280 MT10	3800		6000		1.1	17.2	152
	226	2006	270	2392	480	4252	F202_0280 MT20	3500	3500	5000	11/6	1.7	17.3	153
			270	2392	480	4252	F202_0280 MT30	3500		4000		6.5	17.5	155
35.46 390/11					408	3618	F202_0350 MT10	3800		6000		1.0	17.5	155
	240	2126	270	2392	480	4252	F202_0350 MT20	3500	3500	5000	11/6	1.6	17.5	155
					480	4252	F202_0350 MT30	3500		4000		6.4	17.7	156
47.05 1035/22							F202_0470 MT10	4000	3900	6000		0.8	17.7	156
	240	2126	270	2392	480	4252	F202_0470 MT20	3500	3500	5000	11/6	1.4	17.7	157
							F202_0470 MT30	3500	3500	4000		6.2	17.8	157

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)

F Series: OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J1 kgcm ²	Torsional Stiffness C2 (per arcmin)	
		Nominal ¹⁾ M2N ≤ 2000 RPM		Acceleration M2B		Peak ²⁾ M2PEAK			Continuous		Cyclic				
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs		EL 1,2,3,4	EL 5,6	All			Δφ	

F202 Two Stage (continued from previous page) Noise Level ≤ 53 dB(A) ⁴⁾

56.73	624/11	240	2126	270	2392	480	4252	F202_0570 MT10	4000	3900	6000	11/6	0.8	17.7	157
								F202_0570 MT20	3500	3500	5000		1.4	17.8	157
								F202_0570 MT30	3500	3500	4000		6.2	17.8	158
70.13	5400/77	240	2126	270	2392	480	4252	F202_0700 MT10	4000	3900	6000	11/6	0.7	17.8	
								F202_0700 MT20	3500	3500	5000		1.3	17.8	158
								F202_0700 MT30	3500	3500	4000		6.1	17.9	
93.82	1032/11	240	2126	270	2392	480	4252	F202_0940 MT10	4000	3900	6000	11/6	0.7	17.9	158
								F202_0940 MT20	3500	3500	5000		1.3		
112.7	1240/11	240	2126	270	2392	480	4252	F202_1130 MT10	4000	3900	6000	11/6	0.7	17.9	158
140.9	1550/11	240	2126	270	2392	480	4252	F202_1410 MT10	4000	3900	6000	11/6	0.6	17.9	158

F203 Three Stage Noise Level ≤ 53 dB(A) ⁴⁾

184.3	16,215/88	240	2126	270	2392	480	4252	F203_1840 MT10	4000	3900	6000	11/7	0.7	17.9	159
222.2	2444/11	240	2126	270	2392	480	4252	F203_2220 MT10	4000	3900	6000	11/7	0.7	17.9	159
274.7	21,150/77	240	2126	270	2392	480	4252	F203_2750 MT10	4000	3900	6000	11/7	0.7	17.9	159
367.5	4042/11	240	2126	270	2392	480	4252	F203_3670 MT10	4000	3900	6000	11/7	0.7	17.9	159
441.5	14,570/33	240	2126	270	2392	480	4252	F203_4420 MT10	4000	3900	6000	11/7	0.6	17.9	159
551.9	36,425/66	240	2126	270	2392	480	4252	F203_5520 MT10	4000	3900	6000	11/7	0.6	17.9	159

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)



Selection Data

F

OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J ₁ kgcm ²	Torsional Stiffness C ₂ (per arcmin)		
		Nominal ¹⁾ M _{2N} ≤ 2000 RPM		Acceleration M _{2B}		Peak ²⁾ M _{2PEAK}			Continuous		Cyclic					
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All			Δφ	Nm	in. lbs.
Nom.	Exact															

F302

Two Stage (continued next page)

Noise Level ≤ 53 dB(A) ⁴⁾

4.644 4992/1075	180	1596	198	1756	291	2576	F302_0046 MT20	3000	2600	4500	11/8	9.4	8.0	71
	207	1832	349	3094	650	5758	F302_0046 MT30					14.2	10.4	92
5.720 143/25	222	1963	244	2163	346	3069	F302_0057 MT20	3000	2600	4500	11/8	6.9	10.1	89
			277	2455			F302_0057 MT30					11.7	12.5	111
7.172 208/29	239	2117	306	2711	422	3741	F302_0072 MT20	3500	3100	5000	11/8	5.1	12.3	109
			338	2992	422	3741	F302_0072 MT30					9.9	14.5	129
8.986 5616/625	258	2282	350	3100	510	4516	F302_0090 MT20	3500	3100	5000	11/8	3.8	14.4	128
							F302_0090 MT30					8.6	16.2	144
10.79 1456/135	274	2426	350	3100	590	5225	F302_0110 MT20	3500	3500	5000	11/8	3.1	15.8	140
							F302_0110 MT30					7.9	17.3	153
13.38 7696/575	127	1127	127	1127	159	1409	F302_0135 MT10	3700		5500	11/8	1.9	16.9	149
	294	2607	350	3100	650	5758	F302_0135 MT20					2.5	17.2	152
	294	2607	350	3100	650	5758	F302_0135 MT30					7.3	18.3	162
18.77 4900/261	329	2918	450	3986	800	7086	F302_0190 MT20	3500	3100	5000	11/6	3.1	19.8	175
							F302_0190 MT30					7.9	20.5	182
23.52 588/25	355	3146	450	3986	800	7086	F302_0240 MT20	3500	3100	5000	11/6	2.6	20.5	182
							F302_0240 MT30					7.4	21.0	186
28.23 6860/243	377	3343	450	3986	800	7086	F302_0280 MT20	3500	3500	5000	11/6	2.2	20.9	185
							F302_0280 MT30					7.0	21.2	188
35.03 7252/207	333	2951	333	2951	416	3689	F302_0350 MT10	3700		5500	11/6	1.3	21.1	187
	400	3543	450	3986	800	7086	F302_0350 MT20					1.9	21.2	188
	400	3543	450	3986	800	7086	F302_0350 MT30					6.7	21.4	190
47.19 1274/27			422	3738	528	4673	F302_0470 MT10	4000	3900	6000	11/6	1.1	21.4	190
	400	3543	450	3986	800	7086	F302_0470 MT20					1.7	21.5	190
			450	3986	800	7086	F302_0470 MT30					6.5	21.6	191
56.49 4067/72					611	5414	F302_0560 MT10	4000	3900	6000	11/6	1.0	21.6	191
	400	3543	450	3986	800	7086	F302_0560 MT20					1.6	21.6	191
					800	7086	F302_0560 MT30					6.4	21.7	192

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)

F Series: OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J1 kgcm ²	Torsional Stiffness C2 (per arcmin)	
		Nominal ¹⁾ M2N ≤ 2000 RPM		Acceleration M2B		Peak ²⁾ M2PEAK			Continuous		Cyclic				
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All				

F302 Two Stage (continued from previous page) Noise Level ≤ 53 dB(A) ⁴⁾

70.36	2744/39	400	3543	450	3986	723	6402	F302_0700 MT10	4000	3900	6000	11/6	0.9	21.6	192
						800	7086	F302_0700 MT20	3500	3500	5000		1.5	21.7	
						800	7086	F302_0700 MT30	3500	3500	4000		6.3	21.7	
93.64	4214/45	400	3543	450	3986	800	7086	F302_0940 MT10	4000	3900	6000	11/6	0.8	21.7	192
								F302_0940 MT20	3500	3500	5000		1.4	21.7	192
								F302_0940 MT30	3500	3500	4000		6.2	21.8	193
112.8	3724/33	400	3543	450	3986	800	7086	F302_1130 MT10	4000	3900	6000	11/6	0.7	21.8	193
								F302_1130 MT20	3500	3500	5000		1.3	21.8	193
140.6	7595/54	400	3543	450	3986	652	5771	F302_1410 MT10	4000	3900	6000	11/6	0.7	21.8	193

F303 Three Stage Noise Level ≤ 53 dB(A) ⁴⁾

182.4	73,892/405	400	3543	450	3986	800	7086	F303_1820 MT20	3500	3500	5000	11/7	1.4	21.8	193
184.8	29,939/162	400	3543	450	3986	800	7086	F303_1850 MT10	4000	3900	6000	11/7	0.7	21.8	193
218.4	11,7943/540	400	3543	450	3986	800	7086	F303_2180 MT20	3500	3500	5000	11/7	1.4	21.8	193
221.2	191,149/864	400	3543	450	3986	800	7086	F303_2210 MT10	4000	3900	6000	11/7	0.7	21.8	193
272.1	159,152/585	400	3543	450	3986	800	7086	F303_2720 MT20	3500	3500	5000	11/7	1.4	21.8	193
275.6	32,242/117	400	3543	450	3986	800	7086	F303_2760 MT10	4000	3900	6000	11/7	0.7	21.8	193
362.1	24,4412/675	400	3543	450	3986	800	7086	F303_3620 MT20	3500	3500	5000	11/7	1.4	21.8	193
366.8	99,029/270	400	3543	450	3986	800	7086	F303_3670 MT10	4000	3900	6000	11/7	0.7	21.8	193
442.0	43,757/99	400	3543	450	3986	800	7086	F303_4420 MT10	4000	3900	6000	11/7	0.7	21.8	193
550.9	356,965/648	400	3543	450	3986	651	5771	F303_5510 MT10	4000	3900	6000	11/7	0.7	21.8	193

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)



Selection Data

F

OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J ₁ kgcm ²	Torsional Stiffness C ₂ (per arcmin)		
		Nominal ¹⁾ M _{2N} ≤ 2000 RPM		Acceleration M _{2B}		Peak ²⁾ M _{2PEAK}			Continuous		Cyclic					
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All			Δφ	Nm	in. lbs.
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.									

F402

Two Stage (continued next page)

Noise Level ≤ 53 dB(A) ⁴⁾

4.678 1408/301	182 1608	200 1769	303 2683	F402_0047 MT20	4000		16.0	9.9	88
	342 3033	474 4200	781 6921	F402_0047 MT30	2700 2300 4000	10/7	20.8	13.9	123
	342 3033	550 4872	781 6921	F402_0047 MT40	3500		24.8	21.0	186
5.813 3784/651	226 1998	248 2198	366 3238	F402_0058 MT20	4000		11.4	13.4	119
	368 3260	550 4872	943 8353	F402_0058 MT30	2700 2300 4000	10/7	16.2	17.9	159
	368 3260	550 4872	943 8353	F402_0058 MT40	3500		20.2	25.0	221
7.202 605/84	279 2475	307 2723	436 3864	F402_0072 MT20	3200	4500	8.1	17.4	154
	395 3502	550 4872	1100 9744	F402_0072 MT30	3200 2800 4000	10/7	12.9	22.1	195
	395 3502	550 4872	1100 9744	F402_0072 MT40	3000	3500	16.9	28.5	253
8.980 440/49	348 3086	383 3395	526 4660	F402_0090 MT20	3200	4500	5.9	21.7	192
	425 3769	550 4872	1100 9744	F402_0090 MT30	3200 2800 4000	10/7	10.7	26.1	231
	425 3769	550 4872	1100 9744	F402_0090 MT40	3000	3500	14.7	31.5	279
10.83 682/63	406 3593	462 4092	610 5405	F402_0110 MT20	3500 3100 5000		4.6	25.1	222
	453 4011	550 4872	1100 9744	F402_0110 MT30	3500 3100 4000	10/7	9.4	29.0	257
	453 4011	550 4872	1100 9744	F402_0110 MT40	3000 3000 3500		13.4	33.4	296
13.57 5984/441	445 3941	550 4872	740 6552	F402_0135 MT20	3500 3100 5000		3.5	28.8	255
	488 4325	550 4872	1100 9744	F402_0135 MT30	3500 3100 4000	10/7	8.3	31.9	283
	488 4325	550 4872	1100 9744	F402_0135 MT40	3000 3000 3500		12.3	35.2	311
18.62 3575/192			1128 9990	F402_0185 MT20	3200	4500	4.5	32.7	290
	543 4806	700 6201	1400 12,401	F402_0185 MT30	3200 2800 4000	10/5	9.3	34.8	308
			1400 12,401	F402_0185 MT40	3000	3500	13.3	36.7	325
23.21 325/14			1360 12,046	F402_0230 MT20	3200	4500	3.6	34.6	307
	584 5173	700 6201	1400 12,401	F402_0230 MT30	3200 2800 4000	10/5	8.4	36.1	320
			1400 12,401	F402_0230 MT40	3000	3500	12.4	37.4	331
27.99 2015/72				F402_0280 MT20	3500 3100 5000		3.0	35.8	317
	622 5505	700 6201	1400 12,401	F402_0280 MT30	3500 3100 4000	10/5	7.8	36.9	326
				F402_0280 MT40	3000 3000 3500		11.8	37.8	335
35.08 2210/63				F402_0350 MT20	3500 3100 5000		2.5	36.8	326
	670 5936	700 6201	1400 12,401	F402_0350 MT30	3500 3100 4000	10/5	7.3	37.5	332
				F402_0350 MT40	3000 3000 3500		11.3	38.1	338

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)

F Series: OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J1 kgcm ²	Torsional Stiffness C2 (per arcmin)	
		Nominal ¹⁾ M2N ≤ 2000 RPM		Acceleration M2B		Peak ²⁾ M2PEAK			Continuous		Cyclic				
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.								
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All	ΔΦ		Nm	in. lbs.

F402 Two Stage (continued from previous page) Noise Level ≤ 53 dB(A) ⁴⁾

46.94	845/18	700	6201	700	6201	1400	12,401	F402_0470 MT20	3500	3500	5000	10/5	2.0	37.6	333
								F402_0470 MT30	3500	3500	4000		6.8	38.0	337
								F402_0470 MT40	3000	3000	3500		10.8	38.4	340
55.97	2015/36	700	6201	700	6201	1400	12,401	F402_0560 MT20	3500	3500	5000	10/5	1.8	37.9	336
								F402_0560 MT30	3500	3500	4000		6.6	38.2	338
								F402_0560 MT40	3000	3000	3500		10.6	38.5	341
70.06	1261/18	700	6201	700	6201	1400	12,401	F402_0700 MT20	3500	3500	5000	10/5	1.6	38.2	338
								F402_0700 MT30	3500	3500	4000		6.4	38.4	340
								F402_0700 MT40	3000	3000	3500		10.4	38.5	341
93.33	280/3	700	6201	700	6201	1400	12,401	F402_0930 MT20	3500	3500	5000	10/5	1.5	38.4	340
								F402_0930 MT30			4000		6.3	38.5	341
112.3	1235/11	700	6201	700	6201	1400	12,401	F402_1120 MT20	3500	3500	5000	10/5	1.4	38.5	341
								F402_1120 MT30			4000		6.2	38.6	342
139.8	559/4	700	6201	700	6201	1271	11,262	F402_1400 MT20	3500	3500	5000	10/5	1.3	38.6	342

F403 Three Stage Noise Level ≤ 53 dB(A) ⁴⁾

181.5	4901/27	700	6201	700	6201	1400	12,401	F403_1820 MT20	3500	3500	5000	10/6	1.4	38.6	342
183.9	39,715/216	700	6201	700	6201	941	8334	F403_1840 MT10	3800	3500	5500	10/6	0.7	38.6	342
216.4	11,687/54	700	6201	700	6201	1400	12,401	F403_2160 MT20	3500	3500	5000	10/6	1.4	38.6	342
219.2	94,705/432	700	6201	700	6201	1122	9937	F403_2190 MT10	3800	3500	5500	10/6	0.7	38.6	342
270.9	36569/135	700	6201	700	6201	1400	12,401	F403_2710 MT20	3500	3500	5000	10/6	1.4	38.7	342
274.4	59,267/216	700	6201	700	6201	1400	12,401	F403_2740 MT10	3800	3500	5500	10/6	0.7	38.7	342
360.9	3248/9	700	6201	700	6201	1400	12,401	F403_3610 MT20	3500	3500	5000	10/6	1.4	38.7	343
365.6	3290/9	700	6201	700	6201	1400	12,401	F403_3660 MT10	3800	3500	5500	10/6	0.7	38.7	343
434.1	14,326/33	700	6201	700	6201	1400	12,401	F403_4340 MT20	3500	3500	5000	10/6	1.4	38.7	343
439.7	58,045/132	700	6201	700	6201	1400	12,401	F403_4400 MT10	3800	3500	5500	10/6	0.7	38.7	343
547.4	26,273/48	700	6201	700	6201	1271	11,261	F403_5470 MT10	3800	3500	5500	10/6	0.7	38.7	343

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)



Selection Data

F

OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J ₁ kgcm ²	Torsional Stiffness C ₂ (per arcmin)		
		Nominal ¹⁾ M _{2N} ≤ 2000 RPM		Acceleration M _{2B}		Peak ²⁾ M _{2PEAK}			Continuous		Cyclic					
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All			Δφ	Nm	in. lbs.
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.									

F602

Two Stage (continued next page)

Noise Level ≤ 61 dB(A) ⁴⁾

4.546	1273/280	419	3711	461	4082	790	6998	F602_0045 MT30 F602_0045 MT40	2500	2100	3500	10/7	42.2	16.0	141
		567	5020	632	5598								46.2	27.1	240
5.673	1407/248	523	4631	575	5094	956	8472	F602_0057 MT30 F602_0057 MT40	2500	2100	3500	10/7	30.5	22.2	196
		610	5405	765	6778								34.5	34.9	310
7.159	3551/496	659	5840	726	6428	1161	10,287	F602_0072 MT30 F602_0072 MT40	2900	2500	4000 3500	10/7	22.2	29.9	265
				929	8230								26.2	43.3	384
8.995	1943/216	349	3091	384	3401	1404	12,440	F602_0090 MT20	2900	2500	4000	10/7	12.1	29.4	260
		711	6302	912	8077			F602_0090 MT30			4000		16.9	38.1	338
		711	6302	1000	8858			F602_0090 MT40			3500		20.9	50.9	450
10.82	2077/192	420	3718	462	4090	1600	14,173	F602_0110 MT20	3300	2800	4500	10/7	9.1	36.0	319
		757	6702	1000	8858			F602_0110 MT30			4000		13.9	44.7	396
		757	6702	1000	8858			F602_0110 MT40			3500		17.9	56.1	497
13.61	871/64	502	4451	581	5145	1600	14,173	F602_0135 MT20	3300	2800	4500	10/7	6.6	44.2	392
		817	7235	1000	8858			F602_0135 MT30			4000		11.4	52.1	461
		817	7235	1000	8858			F602_0135 MT40			3500		15.4	61.2	542
18.52	3445/186	905	8018	1100	9744	2000	17,716	F602_0185 MT30	2900	2500	4000	10/5	13.6	63.0	558
								F602_0185 MT40			3500		17.6	69.8	619
23.27	1885/81	903	7998	993	8798	2000	17,716	F602_0230 MT20	2900	2500	4000	10/5	6.6	62.7	555
		977	8652	1100	9744			F602_0230 MT30			4000		11.4	67.6	599
		977	8652	1100	9744			F602_0230 MT40			3500		15.4	72.4	642
27.99	2015/72	1039	9200	1100	9744	2000	14,571	F602_0280 MT20	3300	2800	4500	10/5	5.4	66.6	590
							17,716	F602_0280 MT30			4000		10.2	70.4	623
							17,716	F602_0280 MT40			3500		14.2	73.9	654
35.21	845/24	1100	9744	1100	9744	2000	17,514	F602_0350 MT20	3300	2800	4500	10/5	4.2	70.2	622
							17,716	F602_0350 MT30			4000		9.0	72.8	645
							17,716	F602_0350 MT40			3500		13.0	75.1	666
46.72	1495/32	1100	9744	1100	9744	2000	17,716	F602_0470 MT20	3500	3200	5000	10/5	3.1	73.1	648
								F602_0470 MT30			4000		7.9	74.7	662
								F602_0470 MT40			3500		11.9	76.1	674
55.71	390/7	1100	9744	1100	9744	2000	17,716	F602_0560 MT20	3500	3200	5000	10/5	2.7	74.3	659
								F602_0560 MT30			4000		7.5	75.5	669
								F602_0560 MT40			3500		11.5	76.5	677

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)

F Series: OFFSET – Solid Shaft/Hollow Output

Reducer Ratio (i)		Output Torque						Part Number* (Gearhead + Input)	Maximum Input Speed RPM			Backlash ⁴⁾ (arcmins)	Input Inertia J1 kgcm ²	Torsional Stiffness C2 (per arcmin)	
		Nominal ¹⁾ M2N ≤ 2000 RPM		Acceleration M2B		Peak ²⁾ M2PEAK			Continuous		Cyclic				
		Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.		EL 1,2,3,4	EL 5,6	All				
Nom.	Exact	Nm	in. lbs.	Nm	in. lbs.	Nm	in. lbs.				Δφ		Nm	in. lbs.	

F602 Two Stage (continued from previous page) Noise Level ≤ 61 dB(A) ⁴⁾

69.64	975/14	1100	9744	1100	9744	2000	17,716	F602_0700 MT20	3500	3200	5000	10/5	2.2	75.4	668
								F602_0700 MT30	3500	3200	4000		7.0	76.2	675
								F602_0700 MT40	3000	3000	3500		11.0	76.8	680
93.33	280/3	1100	9744	1100	9744	2000	17,716	F602_0930 MT20	3500	3200	5000	10/5	1.8	76.3	676
								F602_0930 MT30	3500	3200	4000		6.6	76.7	679
								F602_0930 MT40	3000	3000	3500		10.6	77.1	683
112.2	9425/84	1100	9744	1100	9744	2000	17,716	F602_1120 MT20	3500	3200	5000	10/5	1.6	76.6	679
								F602_1120 MT30			4000		6.4	76.9	681
139.8	559/4	1100	9744	1100	9744	2000	17,716	F602_1400 MT20	3500	3200	5000	10/5	1.5	76.9	681
								F602_1400 MT30			4000		6.3	77.1	683

F603 Three Stage Noise Level ≤ 61 dB(A) ⁴⁾

180.6	8671/48	1100	9744	1100	9744	2000	17,716	F603_1810 MT20	3500	3200	5000	10/6	1.5	77.1	683
215.4	1508/7	1100	9744	1100	9744	2000	17,716	F603_2150 MT20	3500	3200	5000	10/6	1.5	77.2	684
269.3	1885/7	1100	9744	1100	9744	2000	17,716	F603_2690 MT20	3500	3200	5000	10/6	1.4	77.2	684
360.9	3248/9	1100	9744	1100	9744	2000	17,716	F603_3610 MT20	3500	3200	5000	10/6	1.4	77.3	685
433.8	54,665/126	1100	9744	1100	9744	2000	17,716	F603_4340 MT20	3500	3200	5000	10/6	1.4	77.3	685
540.4	16,211/30	1100	9744	1100	9744	2000	17,716	F603_5400 MT20	3500	3200	5000	10/6	1.4	77.3	685

¹⁾ Maximum torque for continuous input RPM - horizontal output position.

²⁾ Maximum momentary torque for emergency stops or heavy shock load. (Admissible stops per life of gearhead = 1,000 stops maximum.)

³⁾ Backlash shown standard/reduced

⁴⁾ dB(A) measured at 1 meter distance with 2000 RPM input.

* Motor shaft adapter code (shaft diameter max - mm): MT10 (19), MT20 (24), MT30 (38), MT40 (48)