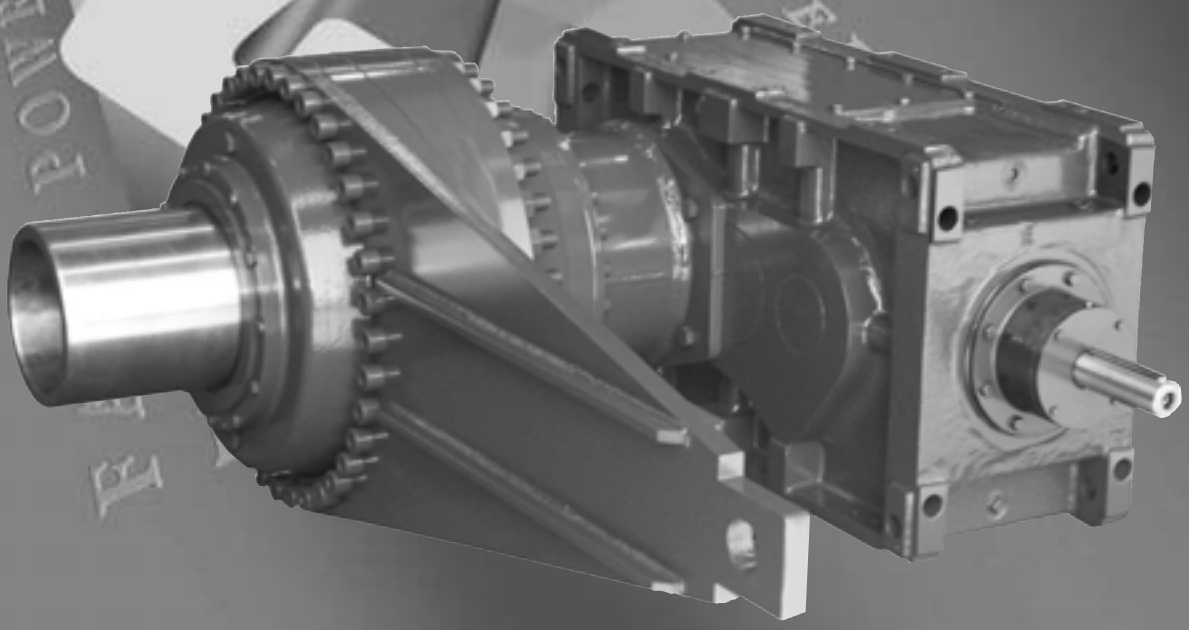
THE FALK CORPORATION

DRIVE ONE - HIGH TORQUE

Redefining flexibility and lowest total cost...
One drive for one world.



FALK®
a good name in industry

DRIVE ONE – HIGH TORQUE
The global solution that changes everything

Drive One redefines lowest total cost torque management for heavy-duty industry. One drive system combines low initial cost with lowest total cost for a wider range of applications than ever before possible. It's exactly what you'd expect from a leader. Something different... something better... for everybody.

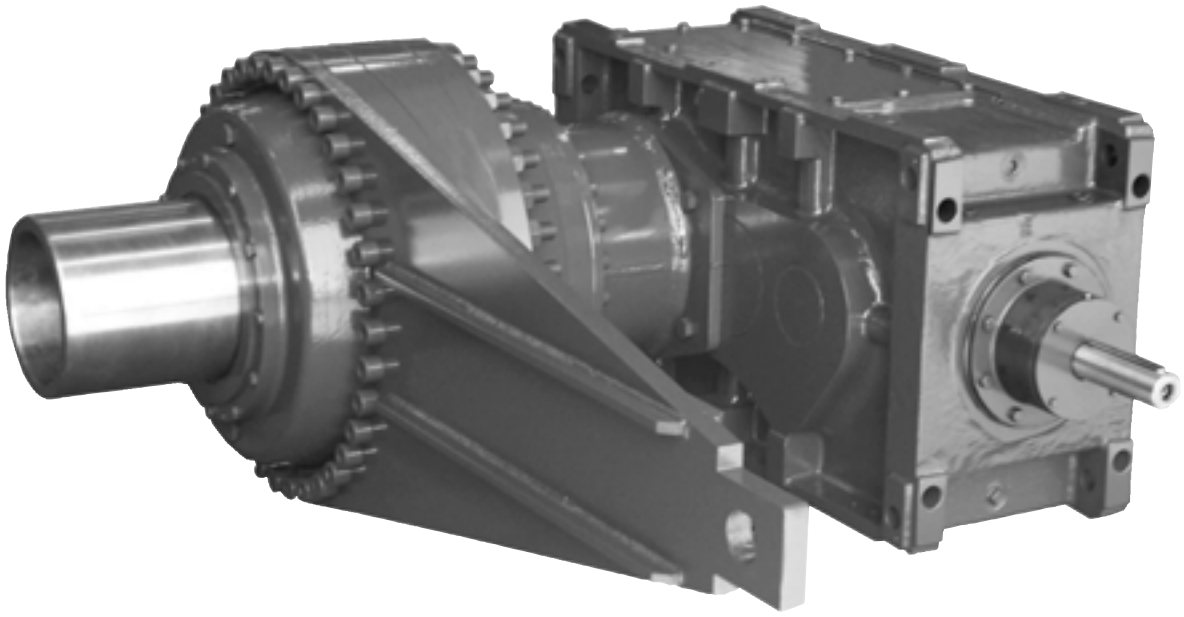
Drive One High Torque Drives provide:

- *Ratios from 145:1 to over 10,000,000:1*
- *A cost effective alternative to hydraulic and conventional drives*
- *Superior efficiency and performance*
- *Compact Size*
- *Standard accessories such as:*
  - *– Motor Flanges*
  - *– Swing Bases*
  - *– Torque Arm Connections*
  - *– Backstops*
  - *– Cooling Fans*
- *Short delivery from stock components*

Drive One provides High Torque solutions for...

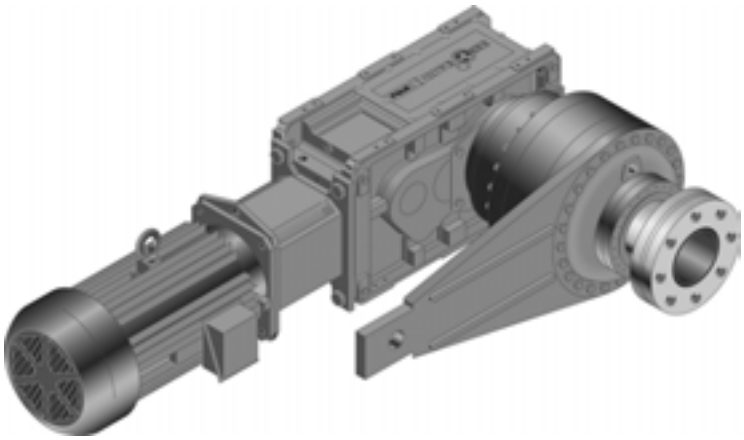
- *Feeders*
- *Drag Conveyors*
- *Belt Conveyors*
- *Mills*
- *Inching Drives*
- *Roll Crushers*
- *Compactors*
- *Horizontal Mixers*
- *Thickeners*
- *Hoists*
- *Anywhere Slow Speeds and High Torques are Needed*

Size	Rating	
	Nm	Lb-In
1160	103 000	910,000
1170	149 000	1,320,000
1180	208 000	1,845,000
1190	282 000	2,495,000
1200	366 000	3,240,000
1210	458 000	4,050,000

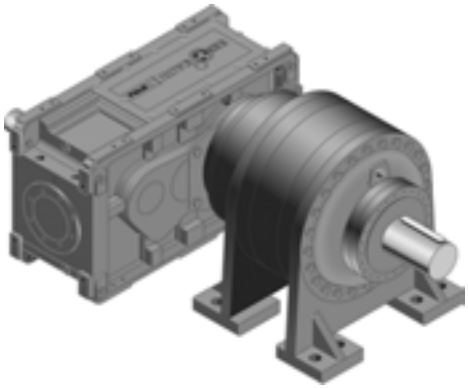


Drive Arrangements Include:

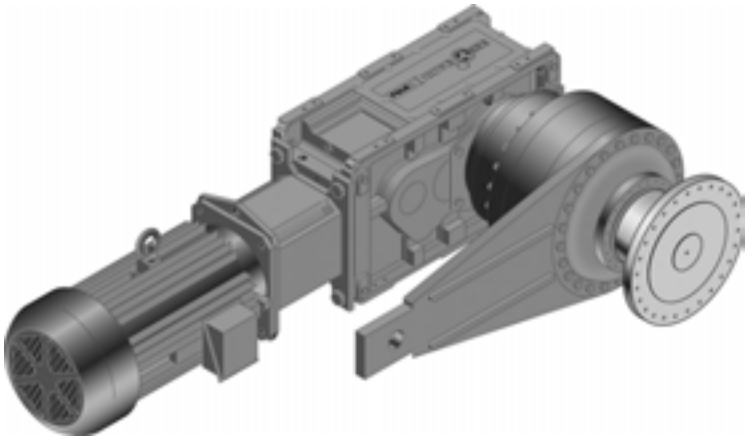
- *Parallel or Right Angle Shaft*
- *Shaft Mounted – Hollow Shaft-Shrink Disc Connected*
- *Base Mounted – Coupling Connected*
- *Shaft Mounted – Rigid Flange Connected*



Shaft Mounted – Hollow Shaft-Shrink Disc Connected



Base Mounted – Coupling Connected



Shaft Mounted – Rigid Flange Connected

Unmatched Falk value

Drive One is the latest example of Falk's relentless commitment to be the global partner of choice to help you reach your operating goals and make your life easier.

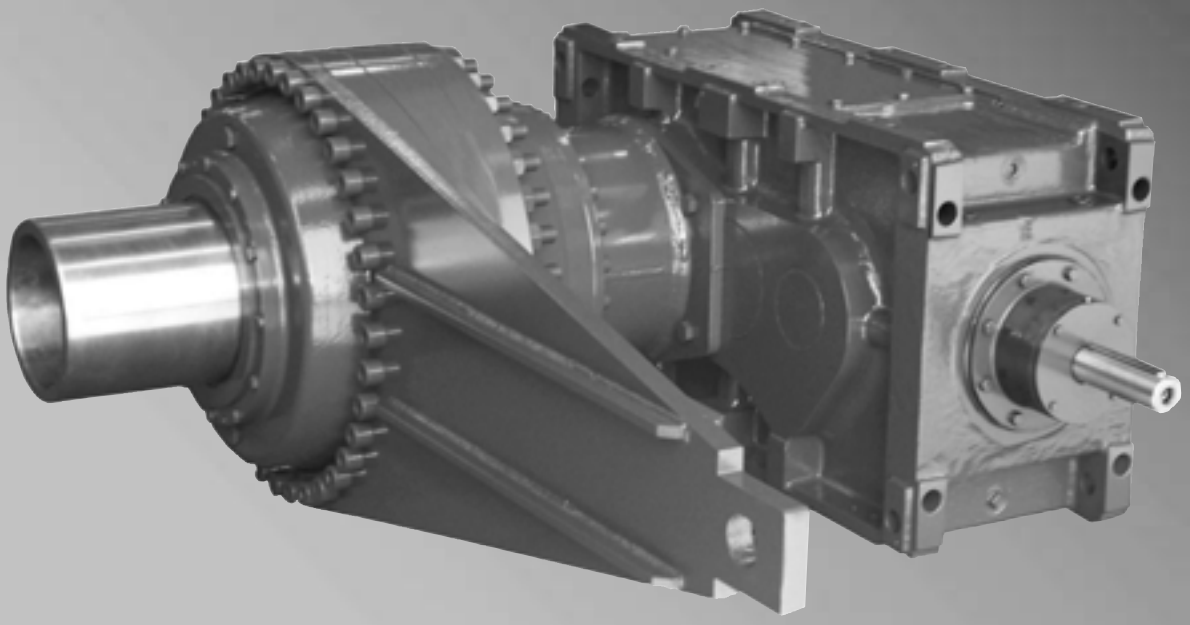
- *Rotate drive in 90° increments to cover every conceivable mounting configuration*
- *Unique TA Taper Bushing enables using a single drive for multiple end-use applications*
- *Innovative, high-efficiency cooling options help extend operating life*
- *One-piece housing reduces noise, vibration, and potential leak paths*
- *TA Tapered Bushing reduces installation time... with positive removal.*

Lowest Total Cost

Drive One offers the best of both worlds – low initial cost and lowest cost over the life of the drive.

- *Low initial cost – 30% less cost per torque delivered*
- *Unique design features 60% fewer parts per size than traditional drives, and uses parts across multiple sizes, helping reduce parts inventories by up to 75%*
- *Reduces spares inventories by up to 40% – one design covers shaft mount, parallel shaft, and right angle applications*
- *Exceptional worldwide availability creates a truly global solution for reducing downtime –stock drives available in 1-2 weeks, made-to- order combinations in 8-10 weeks*
- *Highest reliability guaranteed – only Falk offers a 3-Year Heavy-Duty Warranty standard*
- *Immediate availability of online support, 24 / 7, for selection, parts, installation, maintenance and service – helps minimize administration and transaction costs – to see Falk's leadership in e-resources at work, tour "Club Gearhead" at www.falkcorp.com*

DRIVE ONE HIGH TORQUE – Selection Guide



Selection Guide M161-120, June 2005

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THREE YEAR 3 THREE HEAVY DUTY WARRANTY

Falk Factory Warranty We're so confident in the performance and reliability of our latest generation of Falk heavy-duty products that we're backing this comprehensive offering with the best standard warranty in the business. Our full, 3-year Heavy-Duty Warranty provides "shaft-to-shaft" protection on all Falk components – *including bearings and seals*. It's an industry first... and one more powerful reason why Falk is your ultimate bottom-line gear drive and coupling value.★

★ Warranty extends for 3 years from date of shipment. Does not apply to Falk Omnibox, Ultramite, Fluid Couplings, Renew and spare parts. Warranty applies to Steelflex and Lifelign couplings with the use of Falk Long Term grease.

Basic Information

Safety Notes

Falk Gear Drives The Falk name on the gear drive is the purchaser's assurance that the drive was engineered, rated and manufactured to sound design practices.

The power supplied to the geared drive must be equal to or less than the power for which the drive was selected using the appropriate mechanical service factor for the application. The customer must assume the responsibility of isolating the gear drive from any vibratory or transient load induced by the driven equipment.

Install and operate Falk products in conformance with applicable local and national safety codes and per Falk installation manuals which are shipped with gear drives and are also available upon request. Suitable guards for rotating members may be purchased from Falk as optional accessories. Contact Falk for complete details.

People Conveying Equipment Selection of Falk products for applications whose primary purpose is the transportation of people is not approved. This includes such applications as freight or passenger elevators, escalators, man lift platforms and ski tows and ski lifts.

If the primary purpose of the application is material conveyance and occasionally people are transported, the Falk warranty may remain in effect provided the design load conditions are not exceeded and certification to the appropriate safety codes and load conditions has been obtained by the system designer or end user from the appropriate enforcement authorities.

Gear Drive Mechanical Power Ratings Gear drive mechanical power ratings stated in this selection guide allow 100% overload for starting loads and momentary overloads associated with normal electric motor driven standard applications operating 10 hours per day under uniform conditions, applications where the recommended mechanical service factor per Page 7 of this selection guide is 1,00, and where the actual mechanical service factor of the gear drive versus full motor rated power is equal to or greater than 1,00.

For other **standard** applications not meeting conditions stated in the previous paragraph, determine the appropriate mechanical service factor from Page 7, then calculate an equivalent power by multiplying the actual power transmitted by the previously determined mechanical service factor. For these applications, the mechanical power rating of the gear drive selected must equal or exceed the equivalent power that has been calculated.

For non-standard applications, those where excessive overloads, reversing service, mechanical brakes, or oversize prime movers are present, refer to Page 6, Conditions Affecting Selection, for special instructions.

Gear Drive Basic Thermal Ratings Gear drive basic thermal ratings stated in this selection guide are based on the following assumed conditions:

Ambient temperature is 25°C (77°F).

Altitude is between sea level and 750 meters.

Ambient air velocity is between 0,5 m/s and 1,4 m/s typical of a large indoor room.

Duty cycle is continuous.

Orientation is floor mounted with shafts in same horizontal plane.

Thermal Factors & Procedures, Page 9, permit the calculation of an application adjusted thermal rating for the gear drive when local thermal conditions are different than those stated above. It is not necessary to apply the mechanical service factor to the basic thermal rating when determining the thermal adequacy of a gear drive.

Interpolation of Gear Drive Mechanical Power Ratings and Torque Ratings When the high speed shaft rpm for an actual application falls between two tabulated high speed shaft rpm's found in the selection tables, interpolate to determine gear drive rating.

Stored and Inactive Drives Each gear drive is spin-tested with a rust preventive oil that will protect parts against rust for a period of 4 months in an outdoor shelter or 12 months in a dry building after shipment from Falk.

Periodically inspect stored or inactive drives and spray internal parts with rust inhibitor every six months or more often, if necessary. Drain oil before adding rust inhibitor. Indoor dry storage is recommended.

Drives ordered for extended storage can be treated at Falk with a special preservative and sealed to rust-proof parts for periods longer than those cited above, if specified on the order.

Refer to Falk Service Manual 128-014 for preparation of stored and inactive gear drives.

Conditions Affecting Selection

Non–Standard Selection Procedures

Some applications require special procedures, or are refer to Falk.

Excessive Overloads The maximum momentary or starting load applied to the gear drive must not exceed 200% of the rated load capacity of the gear drive (100% overload). Rated load capacity of the gear drive is defined as the power rating published in this selection guide with a mechanical service factor of 1,00. If the actual maximum momentary or starting load exceeds the conditions stated above, calculate an equivalent input power associated with the excessive overload by dividing the maximum overload by two. The gear drive selected must have a rated load capacity equal to or greater than the equivalent input power.

Frequency of Starts Starting frequency is an important consideration when selecting a gear drive. Applications involving 2 to 3 equally spaced starts per hour must utilize a minimum 1,5 service factor for unloaded starts, and a minimum 1,75 service factor for fully loaded starts. For applications involving more than 3 starts per hour, refer to Falk the application specifics such as starting frequency and maximum starting torque. AC motors also have similar limitations. The addition of a fluid coupling as a soft start device would increase the number of allowable starts.

Reversing Service Applications involving either more than 20 reversals per 10 hour period, or less than 20 reversals per 10 hour period with peak torques greater than 200% of normal load must be referred to Falk.

Brake Equipped Applications When a gear drive is equipped with a "working" brake that is used to decelerate the motion of the system and the brake is located between the prime mover and the gear drive, select the gear drive based on the brake rating or the highest equivalent input power, whichever is greater. If the brake is used for holding only and is applied after the motion of the system has come to rest, the brake rating must be less than 200% of the rated load capacity of the gear drive selected for the application. If the brake rating is greater than 200% of the rated load capacity, refer the application to Falk. Also refer to Falk all applications in which the brake is located at the output shaft of the gear drive.

Oversize Prime Movers Recommended Mechanical Service Factors do not cover applications that require oversize prime movers for high energy or peak loads. Refer such applications to Falk for selection of suitable gear drives.

Speed Variation or Multi-Speed Applications — The gear drives offered in this selection guide are designed to operate with splash lubrication on any single speed application and any ratio shown in the selection guide unless otherwise noted. It is essential that all orders indicate the operating speed requirements and ratio so that the proper internal oil distribution accessories can be supplied for the specific speed.

Falk gear drives use different oil levels for various gear drive sizes, speeds and ratios. Consequently, to operate an existing gear drive at different speeds from those shown on the nameplate, full application and nameplate information must be referred to Falk for review of the lubrication system.

All variable or multi-speed applications will be referred to the Engineering Department to specify lubrication components for adequate lubrication at the slowest speed, without excessive temperature or churning at the highest speed. It is essential that all orders indicate minimum and maximum speeds, as well as the speed duration cycles. A separate motor-driven oil pump (at an extra charge) may be required.

When selecting gear drives for multi-speed or variable speed applications, determine the speed at which the greatest torque is developed and select the gear drive on this basis. If the speed is not listed in the selection table, interpolate to determine the gear drive rating.

Application Adjusted Thermal Rating, Page 9, The Application Adjusted Thermal Rating is the actual power that a gear drive will transmit continually for 3 hours or more without overheating. Although it is not necessary to apply the mechanical service factor when determining thermal adequacy of a gear drive, the Application Adjusted Thermal Rating considers thermal factors associated with the application that will affect the ability of the gear drive to dissipate thermal energy. These thermal factors include ambient temperature, altitude above sea level, ambient air velocity, inlet water temperature (when cooling tubes are offered), gear drive orientation and duty cycle. Thermal factors on Page 9 are used to adjust the Basic Thermal Rating when determining the Application Adjusted Thermal Rating.

A check of the application adjusted thermal rating versus the actual power transmitted is necessary for the following applications:

- Continuous duty application where the gear drive runs continuously without shutdown for 3 hours or more per day.
- Intermittent duty applications where the gear drive operates for 3 hours or more per day, and run time intervals exceed the duration of the immediately following shutdown intervals. If any run time interval equals or exceeds 3 hours, the application is considered continuous duty.

The duty cycle factor permits an upward adjustment of the basic thermal rating associated with intermittent duty applications above, and takes into account simply the % operating time per hour of the gear drive, regardless of duration relationship between run time intervals and down time intervals, and provided no specific run time interval exceeds one hour in duration.

Other short interval intermittent duty applications, not meeting criteria stated above, may generate only modest thermal energy to be dissipated by the gear drive. Refer full application details to Falk for selection of the minimum cooling method that is adequate.

Effects of Solar Energy If a drive operates in the sun at ambient temperatures over 38°C (100°F), then special measures must be taken to protect the drive from solar energy. This protection can consist of a canopy over the gear drive or reflective paint on the gear drive. If neither is possible, a heat exchanger or other cooling device may be required.

Overhung Loads and Thrust Loads Overhung loads and thrust loads must be taken into account when selecting a gear drive. If either an overhung load or thrust load is imposed on the gear drive, or if both an overhung load and thrust load are applied simultaneously, refer application details to Falk for correct gear drive selection.

Product Modifications Falk can supply special product modifications to suit your application needs. Contact your local Falk Representative for housing modifications, special ratios, special shafts, special mounting orientations, accessory modifications and other special application requirements.

Seal Housing Grease All gear drives will be shipped with Falk LTG grease in the seal housing cavities. Where this grease could contaminate products produced by customer processes, such as in the food and drug industries, clearly indicate on your purchase order that, "Gear drive seal housing cavities must not contain grease."

Oil Pump Equipped Application When a gear drive is equipped with an external motor driven oil pump, and the ambient temperature falls below 10°C (50 °F), or the oil viscosity is in excess of 8000 SSU, an oil heater may be required to maintain a satisfactory flow rate at startup to prevent bearing failure. Consult Falk.

Table 1 | Mechanical Service Factors listed by application

for electric motor, steam turbine or hydraulic motor drives . . . recommendations are MINIMUM and normal conditions are assumed

Application	Service 3 to 10 Hour	Service Over 10 Hour
AGITATORS		
Pure Liquids	1.00	1.25
Liquids & Solids	1.25	1.50
Liquids-Variable Density	1.25	1.50
APRON CONVEYORS		
Uniformly Loaded or Fed	1.25	1.50
Heavy Duty	1.25	1.50
APRON FEEDERS	1.25	1.50
ASSEMBLY CONVEYORS		
Uniformly Loaded or Fed	1.25	1.25
Heavy Duty	1.25	1.50
BALL MILLS	See Mills. Rotary	
BARGE HAUL PULLERS	1.75	2.00
BARKING		
Drums (Coupling Connected)		2.00
Mechanical		2.00
BAR SCREENS (Sewage)	1.25	1.25
BATCHERS (Textile)	1.25	1.50
BELT CONVEYORS		
Uniformly Loaded or Fed	1.25	1.25
Heavy Duty	1.25	1.50
BELT FEEDERS	1.25	1.50
BENDING ROLLS (Machine)	1.25	1.50
BLOWERS		
Centrifugal	1.25	1.25
Lobe	1.25	1.50
Vane	1.25	1.50
BOTTLING MACHINERY	1.00	1.25
BREWING	See Table 2	
BRICK PRESS (Clay Working)	1.75	2.00
BRIQUETTE MACHINES (Clay Working)	1.75	2.00
BUCKET		
Conveyors Uniform	1.25	1.50
Conveyors Heavy Duty	1.25	1.50
Elevators Continuous	1.25	1.50
Elevators Uniform	1.25	1.50
Elevators Heavy Duty	1.25	1.50
CALENDERS		
Rubber and Plastic	See Table 2	
Textile	1.25	1.50
CANE KNIVES		1.75
CAN FILLING MACHINES	1.00	1.25
CARD MACHINES (Textile)	1.25	1.50
CAR DUMPERS	1.75	2.00
CAR PULLERS	1.25	1.50
CEMENT KILNS	See Mills. Rotary	
CENTRIFUGAL		
Blowers, Compressors, Discharge Elevators, Fans or Pumps	1.25	1.25
CHAIN CONVEYORS		
Uniformly Loaded or Fed	1.25	1.25
Heavy Duty	1.25	1.50
CHEMICAL FEEDERS (Sewage)	1.25	1.25
CLARIFIERS	1.00	1.25
CLASSIFIERS	1.25	1.50
CLAY WORKING	See Table 2	
COLLECTORS (Sewage)	1.25	1.25
COMPRESSORS		
Centrifugal	1.25	1.25
Lobe	1.25	1.50
Reciprocating		
Multi-Cylinder	1.50	1.75
Single-Cylinder	1.75	2.00
CONCRETE MIXERS		
Continuous	1.25	1.50
Intermittent	1.25	1.50

Application	Service 3 to 10 Hour	Service Over 10 Hour
▲**CONVEYORS—Uniformly loaded or Fed:**		
Apron or Bucket	1.25	1.50
Assembly, Belt, Chain, Flight, Oven, Screw	1.25	1.25
▲**CONVEYORS—Heavy Duty. Not Uniformly Fed**		
Apron, Assembly, Belt, Bucket, Chain, Flight, Oven, Screw	1.25	1.50
CONVEYORS—Severe Duty		
Live Roll	Refer to Falk	
Reciprocating Shaker	1.5	2.00
COOKERS (Brewing & Distilling), (food)	1.25	1.25
COOLING TOWER FANS	Refer to Falk	
▲**CRANES**		
Dry Dock Cranes, Main Hoist, Bridge and Trolley Travel	Refer to Falk	
CRUSHERS		
Ore or Stone	1.75	2.00
Sugar		1.75
DEWATERING SCREENS (Sewage)	1.50	1.50
DISC FEEDERS	1.00	1.25
DISTILLING	See Table 2	
DOUBLE ACTING PUMPS		
2 or more Cylinders	1.25	1.50
Single Cylinder	Refer to Falk	
DOUGH MIXER (Food)	1.25	1.50
DRAW BENCH (Metal Mills)		
Carriage & Main Drive	1.25	1.50
DREDGES	See Table 2	
DRY DOCK CRANES	Refer to Falk	
DRYERS & COOLERS (Mills. Rotary)		1.50
DYEING MACHINERY (Textile)	1.25	1.50
ELEVATORS		
Bucket-Uniform Lood	1.25	1.50
Bucket-Heavy Duty	1.25	1.50
Bucket-Continuous	1.25	1.50
Centrifugal Discharge	1.25	1.25
▲Escalators	**Not Approved**	
▲Freight	**Not Approved**	
Gravity Discharge	1.00	1.25
▲Man Lifts, Passenger	**Not Approved**	
EXTRUDERS (Plastic & Rubber)	See Table 2	
FANS		
Centrifugal	1.25	1.25
Cooling Towers	Refer to Falk	
Forced Draft		1.25
Induced Draft	1.50	1.50
Large (Mine. etc.)	1.50	1.50
Large Industrial	1.50	1.50
Light (Small Diameter)	1.00	1.25
FEEDERS		
Apron. Belt	1.25	1.50
Disc	1.00	1.25
Reciprocating	1.75	2.00
Screw	1.25	1.50
FLIGHT CONVEYORS		
Uniform	1.25	1.25
Heavy	1.25	1.50
FOOD INDUSTRY	See Table 2	
GENERATORS (Not Welding)	1.00	1.25
GRAVITY DISCHARGE ELEVATORS	1.00	1.25
HAMMER MILLS	1.75	2.00
▲**HOISTS**		
Heavy Duty	1.75	2.00
Medium Duty	1.25	1.50
Skip Hoist	1.25	1.50

Application	Service 3 to 10 Hour	Service Over 10 Hour
INDUCED DRAFT FANS	1.50	1.50
KILNS	See Mills. Rotary	
LAUNDRY WASHERS	1.50	2.00
LAUNDRY TUMBLERS	1.25	1.50
LINE SHAFTS		
Driving Processing Equipment	1.25	1.50
Other Line Shafts, Light	1.00	1.25
LIVE ROLL CONVEYORS	Refer to Falk	
LOBE BLOWERS OR COMPRESSORS	1.25	1.50
LOG HAULS (Lumber)		
Incline-well Type	1.75	1.75
LOOMS (Textile)	1.25	1.50
LUMBER INDUSTRY	See Table 2	
MACHINE TOOLS		
Auxiliary Drives	1.00	1.25
Bending Rolls	1.25	1.50
Main Drives	1.25	1.50
Notching Press (Belted)	Refer to Falk	
Plate Planers	1.75	2.00
Punch Press (Geared)	1.75	2.00
Tapping machines	1.75	2.00
MANGLE (Textile)	1.25	1.50
MASH TUBS (Brewing & Distilling)	1.25	1.25
MEAT GRINDERS (Food)	1.25	1.50
METAL MILLS		
Draw Bench Carriages & Main Drives	1.25	1.50
Pinch, Dryer & Scrubber Rolls, Reversing	Refer to Falk	
Slitters	1.25	1.50
Table Conveyors. Non-Reversing Group Drives	1.50	1.50
Non-Reversing Individual Drives	2.00	2.00
Reversing	Refer to Falk	
Wire Drawing & Flattening Machines	1.25	1.50
Wire Winding Machines	1.50	1.50
MILLS. ROTARY		
Ball and Rod Mills with Spur Ring Gear		2.00
with Helical Ring Gear		1.50
Direct Connected		2.00
Cement Kilns, Dryers & Coolers		1.50
Pebble, Plain & Wedge Bar Mills		1.50
Tumbling Barrels	1.75	2.00
MIXER (Also see Agitators)		
Concrete, Cont. & Int	1.25	1.50
Constant Density	1.25	1.50
Variable Density	1.25	1.50
NAPPERS (Textile)	1.25	1.50
OIL INDUSTRY	See Table 2	
ORE CRUSHERS	1.75	2.00
OVEN CONVEYORS		
Uniform	1.25	1.25
Heavy Duty	1.25	1.50
PAPER MILLS	See Table 2	
▲**PASSENGER ELEVATORS**	**Not Approved**	
PEBBLE MILLS		1.50
PLATE PLANERS	1.75	2.00
PRINTING PRESSES	Refer to Falk	
PROPORTIONING PUMPS	1.25	1.50
PUG MILLS (Clay)	1.25	1.50
PULLERS (Barge Haul)	1.75	2.00

Application	Service 3 to 10 Hour	Service Over 10 Hour
PUMPS		
Centrifugal	1.25	1.25
Proportioning	1.25	1.50
Reciprocating		
Single Act., 3 or more Cyl.	1.25	1.50
Double Act., 2 or more Cyl.	1.25	1.50
Single Act., 1 or 2 Cyl.	Refer to Falk	
Double Acting, 1 Cyl.	Refer to Falk	
Rotary: Gear, Lobe, Vane	1.00	1.25
PUNCH PRESSES (Gear Driven)	1.75	2.00
RECIPROCATING		
Conveyors & Feeders	1.75	2.00
RECIPROCATING COMPRESSORS		
Multl-Cylinder	1.50	1.75
Single Cylinder	1.75	2.00
ROD MILLS	See Mills. Rotary	
ROTARY		
Pumps	1.00	1.25
Screens (Sand or Gravel)	1.25	1.50
RUBBER & PLASTICS INDUSTRIES	See Table 2	
SAND MULLERS	1.25	1.50
SCREENS		
Air Washing	1.00	1.25
Rotary—Sand or Gravel	1.25	1.50
Traveling Water Intake	1.00	1.25
SCREW CONVEYORS		
Uniform	1.25	1.25
Heavy Duty or Feeder	1.25	1.50
SCUM BREAKERS (Sewage)	1.50	1.50
SEWAGE DISPOSAL	See Table 2	
SHAKER CONVEYORS	1.75	2.00
SHEETERS (Rubber)		1.50
SINGLE ACTING PUMP		
1 or 2 Cylinders	Refer to Falk	
3 or more Cylinders	1.25	1.50
▲**SKI TOWS & LIFTS**	**Not Approved**	
▲**SKIP HOIST**	1.25	1.50
SLAB PUSHERS	1.50	1.50
SLITTERS (Metal)	1.25	1.50
SLUDGE COLLECTORS (Sewage)	1.25	1.25
SOAPERS (Textile)	1.25	1.50
SPINNERS (Textile)	1.25	1.50
STEERING GEARS	Refer to Falk	
STOKERS	1.00	1.25
STONE CRUSHERS	1.75	2.00
SUGAR INDUSTRY	See Table 2	
TABLE CONVEYORS (Non-Reversing)		
Group Drives	1.50	1.50
Individual Drives	2.00	2.00
Reversing	Refer to Falk	
TENTER FRAMES (Textile)	1.25	1.50
TEXTILE INDUSTRY	See Table 2	
THICKENERS (Sewage)	1.50	1.50
TUMBLING BARRELS	1.75	2.00
VACUUM FILTERS (Sewage)	1.50	1.50
VANE BLOWERS	1.25	1.50
WINCHES (Dredges)	1.25	1.50
WINDERS (Textile)	1.25	1.50
WINDLASS	Refer to Falk	
WIRE		
Drawing Machines	1.25	1.50
Winding Machines	1.50	1.50

▲ Selection of Falk products for applications whose primary purpose is the transportation of people is not approved. This includes such applications as freight or passenger elevators, escalators, man lifts, work lift platforms and ski tows and ski lifts.
If the primary purpose of the application is material conveyance and occasionally people are transported, the Falk warranty may remain in effect provided the design load conditions are not exceeded and certification to the appropriate safety codes and load conditions has been obtained by the system designer or end user from the appropriate enforcement authorities.

Contact Falk for proper selection of a Falk mixer drive.

How to Select

Before making a selection, refer to Basic Information and Conditions Affecting Selection on Pages 5 and 6.

Information Required

The following basic information is required to select a Drive One High Torque gear drive for your application.

Prime Mover Data

- Type – electric or hydraulic motor or engine
- Power rating in kW or hp
- Speed – constant or variable
- Dimensions – if Falk will furnish motor mounting accessory or coupling

Driven Machine Data

- Type – conveyor, kiln, etc.
- Power demand in kW, or hp, or equivalent torque.
- Speed and direction of rotation
- Service – Hours per day; reversals per minute if reversing; minutes per hour (duty cycle) if not continuous

Gear Drive Data

- Type – parallel shaft or right angle
- Solid or Hollow output shaft
- Base or shaft mounted
- Ambient temperature at drive location
- Altitude above sea level
- Ambient air velocity at drive location
- Mounting position – if inclined or non-standard orientation

Shaft Connections

- Shaft diameters and key sizes
- Overhung loads – provide full description of sheave, sprocket, or pinion
- Thrust load and direction

Torque Selection Method

The torque selection method is based on the power rating of the prime mover.

1. Determine the mechanical service factor.
   For engine driven or intermittent applications, refer to Factory.
2. Calculate the required output torque (Nm) using the motor power rating (kW) and the required output speed (rpm).

   $$T\ (Nm) = \frac{9550 \times \text{Input Power (kW)}}{\text{Output Speed (rpm)}}$$

   NOTE: Output speed must not exceed 10 rpm. If output speed exceeds 10 rpm, contact Falk for selection.
3. Calculate the equivalent torque rating by multiplying the required output torque by the mechanical service factor determined in Step 1.
4. Select the gear drive size from the torque rating table.
   Torque Rating Table:
   Parallel shaft drives, see Page 15.
   Right angle shaft drives, see Page 20.
5. Select the gear drive type and assembly. Parallel shaft, see Page 14 and right angle shaft, see Page 19. Note that for shaft mounted assemblies, the required output shaft direction of rotation determines the torque arm location. For assemblies other than those shown, contact Falk.
6. Determine the gear drive nominal ratio.
   Divide the high speed shaft rpm by the low speed shaft rpm to determine your ideal ratio. Choose a nominal ratio that most closely approximates your ideal ratio from the Exact Ratio table. Parallel shaft, see Page 15 and right angle shaft, see Page 20.
7. Check thermal rating using procedures outlined on Page 9. The application adjusted thermal rating must equal or exceed the actual power transmitted.
8. Overhung load (radial load) is imposed by sheaves, sprockets, and open pinions that are mounted directly on the shaft extensions of the gear drive. Gear drive shaft extensions that are flexible coupling connected need not be checked for overhung load, flexible couplings do not impose significant overhung load.Overhung load need not be checked for shaft mounted drives that use a standard torque arm location since the radial and moment loading imposed on these drives are within the capacity of the gear drive. Refer all foot or flange mounted gear drive output shaft overhung loading to Falk.

   Refer all input shaft overhung load applications to Falk.

   Thrust load (axial load) applied to the gear drive is unusual. In these applications, the magnitude of the thrust load, and the direction of thrust load, is supplied by the system designer. Thrust loads must be within the capacity of the gear drive.

   Refer all thrust load applications to Falk.

   Complex shaft loadings involving simultaneous application of overhung load, thrust load, or bending moment (as in mixers and agitators) should be referred directly to Falk.

Example Selections

An example using the **Torque Selection Method** is found on Page 10.

Thermal Factors & Procedures

Checking Thermal Rating

Checking the thermal rating is extremely important. If the gear drive's capacity to dissipate thermal energy is insufficient, it will overheat, and severe damage may occur.

Gear drive basic thermal ratings are defined on Page 5. A discussion of application adjusted thermal rating, and when it is applicable, is found on Page 6.

Application Adjusted Thermal Rating

Once a mechanically adequate gear drive selection has been made per Steps 1-6 on Page 8, determine the application adjusted thermal rating of the gear drive. The application adjusted thermal rating of the gear drive selected must equal or exceed the actual power transmitted.

In most cases, the nameplate power rating of the motor is assumed to equal the actual power transmitted. It is not necessary to apply the mechanical service factor when determining thermal adequacy of a gear drive.

Use the following formula to determine application adjusted thermal rating:

$P_{TA} = P_T \times B_1 \times B_2 \times B_3 \times B_4 \times B_5$ where:

- P_{TA} = Application Adjusted Thermal Rating
- P_T = Basic Thermal Rating
- B_1 = Ambient Temperature Factor (Table 1)
- B_2 = Altitude Factor (Table 2)
- B_3 = Ambient Air Velocity Factor (Table 3)
- B_4 = Duty Cycle Factor (Table 4)
- B_5 = Orientation Factor (Table 5)

Basic Thermal Ratings for parallel shaft gear drives are found on Page 15.

Basic Thermal Ratings for right angle shaft gear drives are found on Page 20.

For the gear drive you have selected mechanically, choose an auxiliary cooling method whose application adjusted thermal rating equals or exceeds the actual power transmitted. If no listed cooling method is adequate, contact Falk for selection of an optional heat exchanger, or consider a larger gear drive with greater thermal capacity.

TABLE 1 — Ambient Temperature Factor – B_1

(For all cooling methods)

Ambient Temperature ★	Factor with no Auxiliary Cooling or with Fan
10°C	1,17
15°C	1,12
20°C	1,06
25°C	1,00
30°C	0,94
35°C	0,88
40°C	0,81
45°C	0,74
50°C	0,66

★ Factors for other ambient temperatures can be interpolated.

TABLE 2 — Altitude Factor – B_2

(For air cooled methods, no cooling tubes)

Altitude Above Sea Level – Meters	Factor
0	1,00
750	0,95
1500	0,90
2250	0,85
3000	0,81
3750	0,76
4500	0,72
5250	0,68

TABLE 3 — Ambient Air Velocity Factor † – B_3

(For no auxiliary cooling)

Sustained Ambient Air Velocity † m/s	Installed Environment	Factor for no Auxiliary Cooling
< 0,5	Confined Space	0,75
0,5 to 1,4	Large Indoor Room	1,00
1,4 to 3,7	Large Indoor Room	1,40
> 3,7	Outdoors	1,90

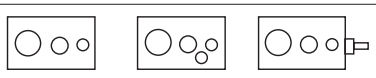
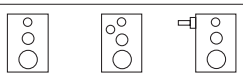
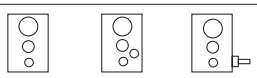
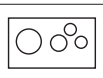
† The sustained ambient air velocity must be a continuous flow of air directly onto the gear drive. If the air flow cannot be relied upon to be continuous, an ambient air velocity factor of 1.00 must be used.

TABLE 4 — Duty Cycle Factor ‡ – B_4

% Operating Time Per Hour	Factor With or Without Auxiliary Cooling
100%	1,00
80%	1,05
60%	1,15
40%	1,35
20%	1,80

♦ The duty cycle factor must be based on the percentage of each hour that the drive is operating. For example: a gear drive operating for 48 minutes of every hour of the day has an 80% duty cycle, but a drive operating for 4 hours and resting for 4 hours has a 100% duty cycle. Where the % Operating Time Per Hour falls between values tabulated above, use the next higher % Operating Time.

TABLE 5 — Orientation Factor – B_5 - Horizontal Output Drives Only

Input Speed rpm	HS Shaft at Same Height as LS Shaft			HS Shaft over LS Shaft			LS Shaft over HS Shaft			1st Int Shaft over HS Shaft
										
	DH2	DH3	DB3	DH2	DH3	DZ3	DH2	DH3	DZ3	DH3
1800		1,00								
1500		1,00								
1200		1,00								
1000		1,00		REFER TO FALK			REFER TO FALK			
900		1,00								
700		1,00								
600		1,00								

Torque Selection Example

An apron feeder conveyor operates 24 hours per day, 7 days per week. The gear drive required will be driven by a 45 kW motor at 1475 rpm. The required low speed shaft speed is 5.5 rpm. The ambient temperature never exceeds 32°C. The approximate air velocity is 0,9 to 1,3 meters per second, and the conveyor operates in a large indoor room at an altitude of 3000 meters. The space available is best suited for a right angle shaft, horizontal mounted gear drive. Customer prefers a shaft mounted drive with a hollow low speed shaft and a shrink disc. Driven shaft direction of rotation is CW, facing driven shaft. Select a gear drive for this application.

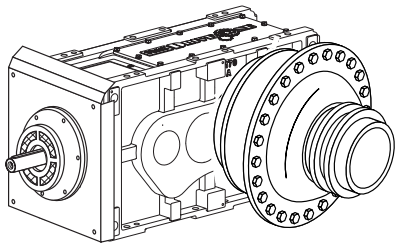
1. The service factor is 1,50 for a continuous duty apron feeder conveyor, from Page 7, Table 1.
   A. Required output torque $= \frac{9550 \times 45 \text{ kW}}{5.5 \text{ rpm}} = 78\,136 \text{ Nm}$
2. The equivalent torque is 1,50 x 78 100 = 117 150 Nm.
3. Using the torque rating table on Page 20, the selected gear drive size is M1170, which has a rating of 149 000 Nm and exceeds the equivalent torque of 117 150 Nm.
4. The ideal ratio is 1475 ÷ 5,5 = 268,2. The nearest standard nominal ratio is 280:1 from the exact ratio table on Page 20.
5. The required driven shaft CW direction of rotation translate to CCW when facing the end of the gear drive output shaft. Per the shaft assemblies on Page 19, the selection would be a DBP with assembly No. 0045 or 0046 with the torque arm in the 3 o'clock position.
6. The basic thermal capacity with no auxiliary cooling for an M1170DBP, 280:1, at 1475 rpm from the table on Page 20 is 113 kW. The ambient temperature facto (B1) from Table 1, Page 9, is 0,92. The altitude factor (B2) from Table 2, Page 9, is 0,81. The ambient air velocity factor (B3) is 1,00 from Table 3, Page 9. The duty cycle factor (B4) is 1,00 from Table 4, Page 9. The orientation factor (B5) is 1,00 from Table 5, Page 9.
7. The application adjusted thermal capacity is 113 x 0,92 x 0,81 x 1,00 x 1,00 x 1,00 = 84 kW, which exceeds the power rating of the motor (45kW). Therefore, no additional cooling is required.
8. It is not necessary to check overhung load or thrust capacity of the gear drive for this example. The input shaft is flexible coupling connected to the motor and the radial and moment loading on the output shaft are within the gear drive capacity since standard torque arm location is being used. No thrust load is present.

Accessory & Option Information

Cooling Accessories

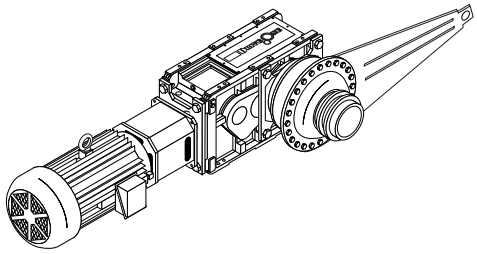
Shaft Driven Cooling Fans

Falk shaft driven cooling fans provide a simple and inexpensive way to utilize the full mechanical rating of gear drives by lowering the operating temperatures, thus increasing thermal power capacity. Cooling fans have been successfully used on electric motors and other related machinery for many years. They eliminate the need for water or electrically powered cooling, pumps, and external piping. The sound level at standard motor rpm is about the same as that from fans on totally enclosed, fan cooled driving motors. Less than 0.25% of cataloged power rating is required to drive the fans. Shaft driven fans are available for use with DB right-angle drives. Contact Falk for dimensions, arrangements, and clearances for shaft driven fans.



Flange Motor Adapters

Falk flanged motor adapters are available for Types DH and DB drives. This adapter allows a flange-mounted motor to be directly mounted to the high speed side of the drive.



Motor Brackets

Falk motor brackets may be used for Types DH and DB. These motor brackets provide an economical "soft" mounting for standard NEMA T-frame and IEC B3 induction motors. It is expected that the weight, location, and starting torque of the motor will cause cantilevered motor brackets to deflect or twist to varying degrees. They are engineered to be within acceptable deflection limits as determined by the Falk Corporation. However, because the motor bracket is a "soft" motor support, deflection and vibration magnitudes of the bracket may exceed levels normally considered acceptable for rigidly, "hard" mounted machinery.

Bedplates

A bedplate is recommended to insure proper alignment of a base mounted drive with the motor. Falk can provide fabricated steel bedplates for all popular sizes of standard type DH and DB drives. These bedplates accommodate standard NEMA and IEC motors within the power range of the drive and many of the larger non-NEMA motors. Special bedplates can be designed and manufactured for unique motor and special accessory combinations.

Supports for tachometers, brakes, timing devices, foot-mounted fluid couplings, or other accessories can be added. Contact Falk for further details on this accessory.

AirMax Breather

The AirMax breather gives moisture and particulate protection for enclosed gear drives.

Other Available Accessories:

Electric Fans

Backstops

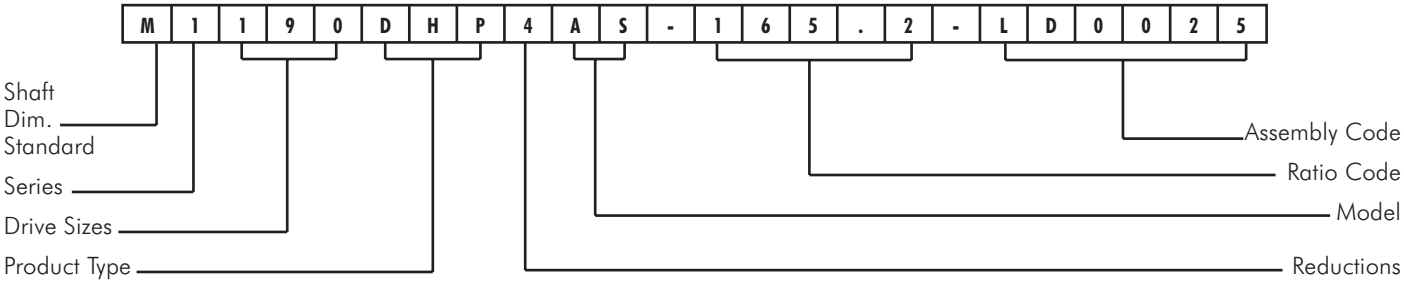
Motor Mounts

Oil Sight Gauges

Oil Drain Valves

Contact Falk for further details on these accessories.

Drive One Nomenclature



Shaft Dimensional Standard

M = Standard metric input and output shafts (diameter/bore, length, key & keyway)

Series

1000 Series

Drive Sizes

130 thru 210

Product Type

D = Drive One designation

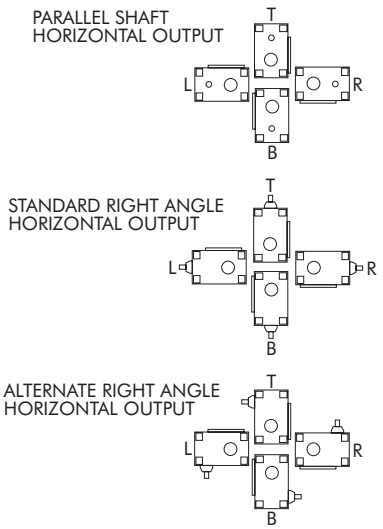
Input Shaft/Output Shaft Configuration

H = Parallel, horizontal L.S. shaft
B = Right angle, horizontal L.S. shaft (input & output shafts in same plane)
Z = Right angle, horizontal L.S. shaft (input & output shafts not in same plane) - Sizes M1130-M1190

Output Shaft Type

P = Planetary secondary, hollow LS shaft with shrink disc
R = Planetary secondary, solid LS shaft, for flange mounting
B = Planetary secondary, solid LS shaft, for foot mounting
F = Planetary secondary, solid LS shaft, moment connection

HOUSING/SHAFT ORIENTATION



Reductions

Number of reductions/Stages in gear drive

Model

Model Code 1

Initial Model A. Subsequent models B, C, D, etc.

Model Code 2

N = Having no special features or housing rework
R = Having housing reworked for standard option (e.g. backstop, etc.)
S = Having special feature or features

Ratio Code

Exact ratio expressed as (5) characters including decimal point

Examples: 1,321:1, 14,95:1, 155,7:1, 1196,:1.

Assembly Code

Assembly Code 1 - Housing/Shaft Orientation

T = Horizontal output - 12 o'clock position (HSS over LSS)
R = Horizontal output - 3 o'clock position (HSS to right of LSS)
B = Horizontal output - 6 o'clock position (HSS under LSS)
L = Horizontal output - 9 o'clock position (HSS to left of LSS)

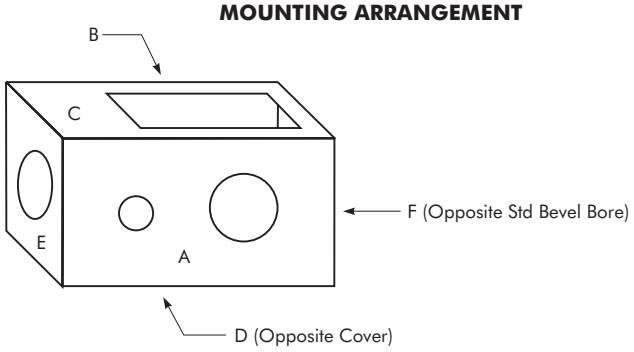
Assembly Code 2 - Mounting Arrangement

C, D, E, F = Mounted via C, D, E, F, housing face (see housing faces)

Assembly Code 3, 4, 5, 6 - Assembly Number

See assembly figures

MOUNTING ARRANGEMENT



How to Order

The following information is required to order a *Drive One* gear drive to meet your application requirements. Much of the information listed below is also used to make a selection and is repeated here in the event a selection will be made by a Falk district office. Note that it is not necessary to specify nomenclature, as described on Page 12, when ordering a *Drive One* gear drive.

Gear Drive

- Size, type and ratio.
- High Speed Shaft rpm and Low Speed Shaft rpm.
- Service Factor.
- External shaft loads – thrust and overhung load.
- Factors affecting thermal performance – ambient temperature, altitude, ambient air velocity, duty cycle, gear drive orientation and inlet water temperature (if cooling water is to be used).
- Auxiliary equipment required – couplings, backstops, etc.
- Mounting position and shaft assembly number (see Page 14 for parallel shaft drives and Page 19 right-angle drives).

Motor – Prime Mover

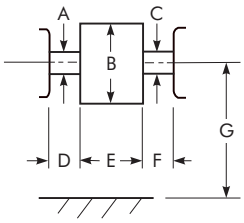
- Type – motor or engine.
- Power rating – kW.
- Speed – rpm.
- Frame size – dimension prints if Falk is to furnish mounting surface and/or mount the equipment.
- Motor – type, class, weight, or any special characteristics (such as brakemotor, explosion-proof, etc.).
- Identify if motor is to be furnished or installed by Falk.

Driven Machine

- Required power or torque.
- Speed – rpm.
- Application description – belt conveyor, agitator, etc.
- Service – duty cycle, hours per day, reversals per minute if reversing.
- Ambient temperature and operating conditions – outdoor, taconite dust, etc.

Auxiliary Equipment Furnished By Falk

- Motors – if Falk is to furnish, provide complete specifications.
- Bedplates – supply drawing of motor and any auxiliary equipment not supplied by Falk.
- Flange motor adapters or motor brackets – supply drawing of motor.
- Motor mount – supply drawing of motor and the required belt centers and mounting arrangement.
- Backstops – specify direction of rotation of the low speed shaft (CW or CCW) when facing the drive from the end of the exposed low speed shaft extension. Also specify backstop location (right or left side facing HS end).
- Electric fan position, Hz and volts.
- Couplings – specify size, type, drive and driven hub bores and keyways.
- Coupling guards – furnish description of couplings and/or other equipment to be guarded, and all dimensions A through G below.
- Swing base – supply frame size or drawing of the motor and HS coupling size or shaft gap.



B & E...Max Cplg Dim
D & F..Exposed Shaft

Special or specification requirements

Advise Falk of any special project related specifications such as: noise level specifications, bearing L_{10} requirements, etc.

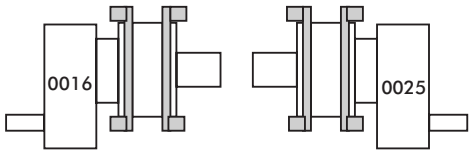
Types DHB, DHF, DHP & DHR Parallel Shaft

Shaft Assemblies

Please specify from the views below, the desired assembly number. Contact Falk for inclined, wall mounted, or other non-standard orientations.

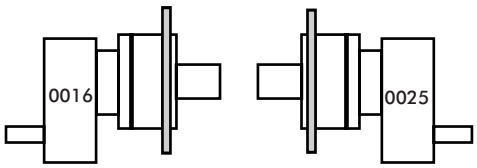
Type DHB Assemblies

Foot Mounted
Solid LS Shaft



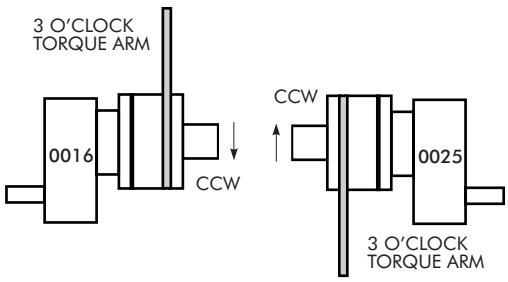
Type DHR Assemblies

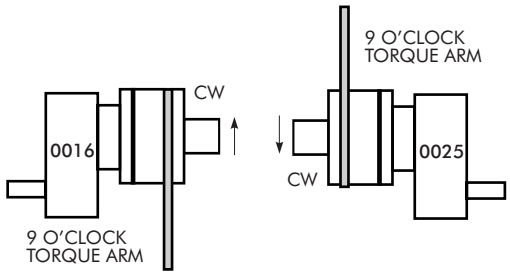
Flange Mounted
Solid LS Shaft



Type DHF Assemblies

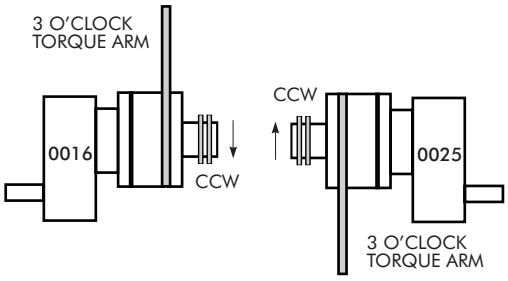
Shaft Mounted with Torque Arm
Solid LS Shaft

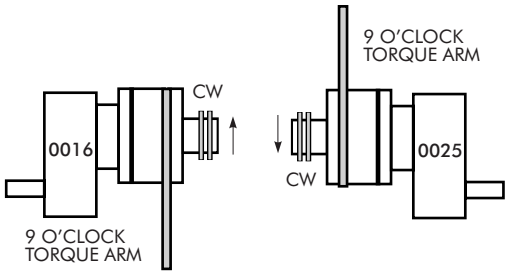




Type DHP Assemblies

Shaft Mounted with Torque Arm
Hollow LS Shaft with Shrink Disc





Type DHB, DHF, DHP & DHR Parallel Shaft

Torque Ratings – Nm/Quadruple Reduction

DRIVE SIZE	Output Torque Rating (Output Speed 10 rpm or Less)
M1160	103 000
M1170	149 000
M1180	208 000
M1190	282 000
M1200	366 000
M1210	458 000

Type DHB, DHF, DHP & DHR Parallel Shaft

Basic Thermal Ratings ★ – kW/Quadruple Reduction

High Speed Shaft rpm	Nominal Ratio Range	DRIVE SIZE					
		M1160	**M1170**	**M1180**	**M1190**	**M1200**	**M1210**
1800	160 - 315	107	125	151	171	227	227
	355 - 710	76	90	118	133	185	185
1500	160 - 315	101	116	143	161	215	215
	355 - 710	72	86	110	125	173	173
1200	160 - 315	95	110	136	153	205	205
	355 - 710	69	82	105	119	164	164
1000	160 - 315	91	105	131	147	197	197
	355 - 710	67	80	101	114	157	157

★ Basic thermal ratings listed are based on an ambient temperature of 25°C (77°F) and an elevation from sea level to 750 meters. Application adjusted thermal ratings must be calculated using the application adjusted thermal factors on Page 9 before comparing to the required load. For auxiliary cooling, contact Falk.

Type DHB, DHF, DHP & DHR Parallel Shaft

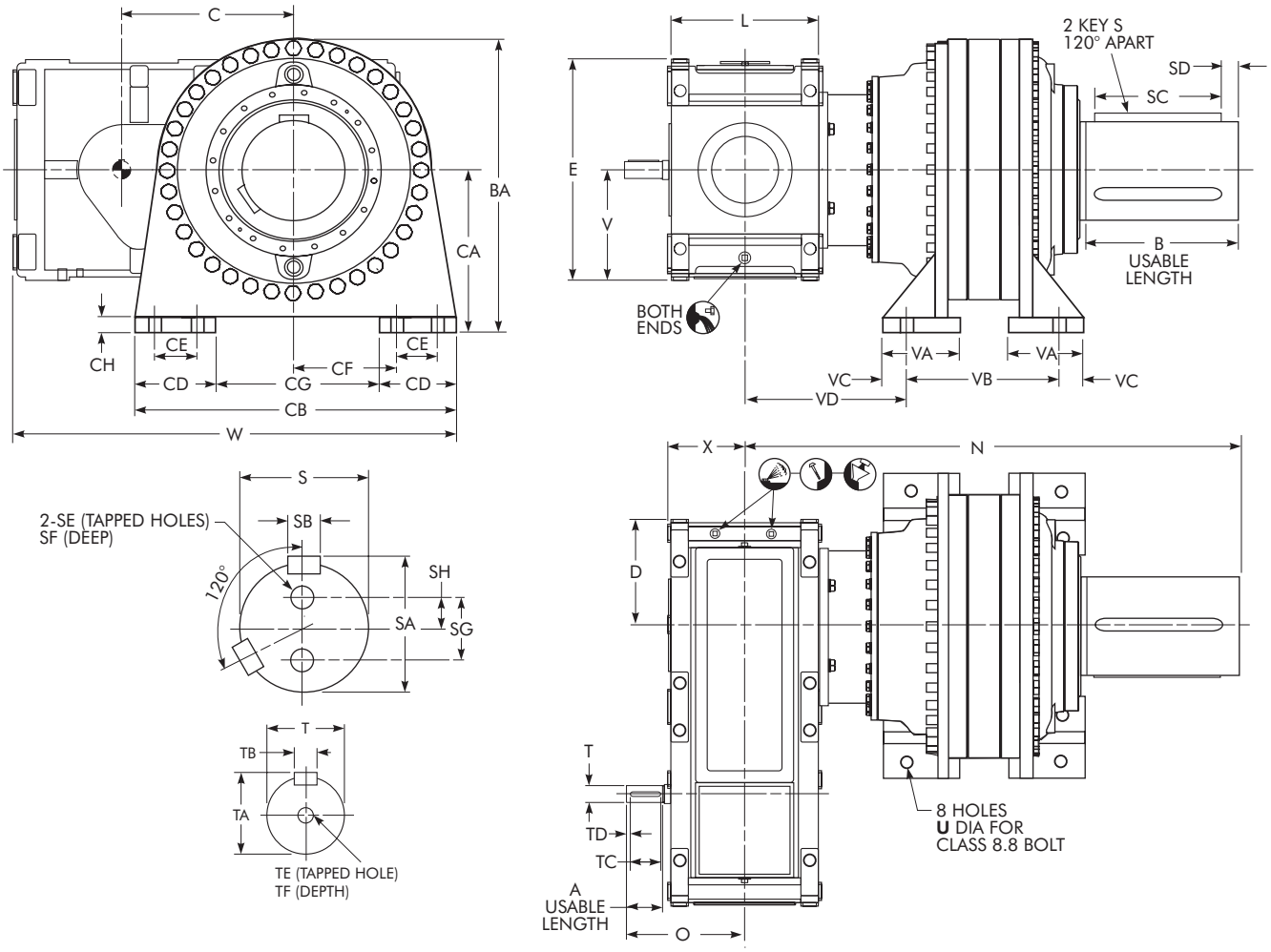
Exact Ratios – Quadruple Reduction

Nominal Ratio ‡	DRIVE SIZE					
	M1160	**M1170**	**M1180**	**M1190**	**M1200**	**M1210**
160	156,7	154,8	173,4	165,2	163,8	163,6
180	177,0	172,8	191,4	189,6	183,4	184,0
200	199,0	195,7	217,8	208,1	204,7	206,1
224	215,9	220,9	244,7	232,2	228,6	229,9
250	241,8	246,1	267,5	262,3	252,9	256,8
280	276,2	272,5	302,3	285,1	284,5	284,1
315	311,8	304,3	333,6	327,2	318,5	319,6
355	350,7	344,6	379,6	359,2	355,3	357,9
400	380,6	389,0	426,5	400,7	397,0	399,3
450	426,2	433,3	466,2	452,7	461,6	446,0
500	490,2	477,5	531,3	514,9	516,9	518,6
560	551,3	540,9	604,8	565,4	576,6	581,0
630	598,2	610,6	679,4	630,5	644,1	647,9
710	669,9	680,2	742,4	712,4	. . .	723,5

‡ Lower ratios are available. For 10 rpm or less output speed with a total ratio requirement of less than 160:1, contact Falk. Higher ratios are also available. Contact Falk for selection.

Type DHB4 Quadruple Reduction

Size M1160 – M1210/Dimensions — Millimeters



DRIVE SIZE ★	Ratios	A	B	BA	C	CA	CB	CD	CE	CF	CG	CH	D	E	L	N	O
M1160	160,0-710,0	80	300	780	430	425	850	230	120	250	390	40	280	560	405	1283	302
M1170	160,0-710,0	110	300	780	485	425	850	230	120	250	390	40	300	630	410	1306	334
M1180	160,0-710,0	110	425	965	560	530	1020	270	150	300	480	50	335	670	470	1574	365
M1190	160,0-710,0	110	425	965	630	530	1020	270	150	300	480	50	375	750	510	1633	387
M1200	160,0-630,0	140	550	1185	700	640	1250	350	200	350	550	60	475	900	570	1939	445
M1210	160,0-710,0	140	550	1185	725	640	1250	350	200	350	550	60	450	900	570	1987	445

DRIVE SIZE ★	Ratios	Low Speed Shaft									High Speed Shaft †							U	V	VA	VB	VC	VD	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	SG	SH	T	TA	TB	TC	TD	TE	TF									
M1160	160,0-450,0	230 h7	241	50	280	10	M24	50	150	75	35 k6	38	10	70	5	M12	28	M30	280	200	432	50	472	1135	213	2286
	500,0-710,0										30 j6	33	8			M10	22									
M1170	160,0-710,0	230 h7	241	50	280	10	M24	50	150	75	40 k6	43	12	90	10	M16	36	M30	315	200	452	50	475	1225	215	2550
M1180	160,0-710,0	290 h7	302	63	400	12,5	M24	50	200	100	45 k6	48,5	14	90	10	M16	36	M42	335	260	550	75	524	1405	245	4043
M1190	160,0-450,0	290 h7	302	63	400	12,5	M24	50	200	100	55 m6	59	16	90	10	M20	42	M42	375	260	590	75	546	1515	265	4468
	500,0-710,0										42 k6	45	12			M16	36									
M1200	160,0-630,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	65 m6	69	18	110	10	M20	42	M48	450	280	645	80	663	1775	295	6997
M1210	160,0-710,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	65 m6	69	18	110	10	M20	42	M48	450	280	693	80	663	1800	295	7265

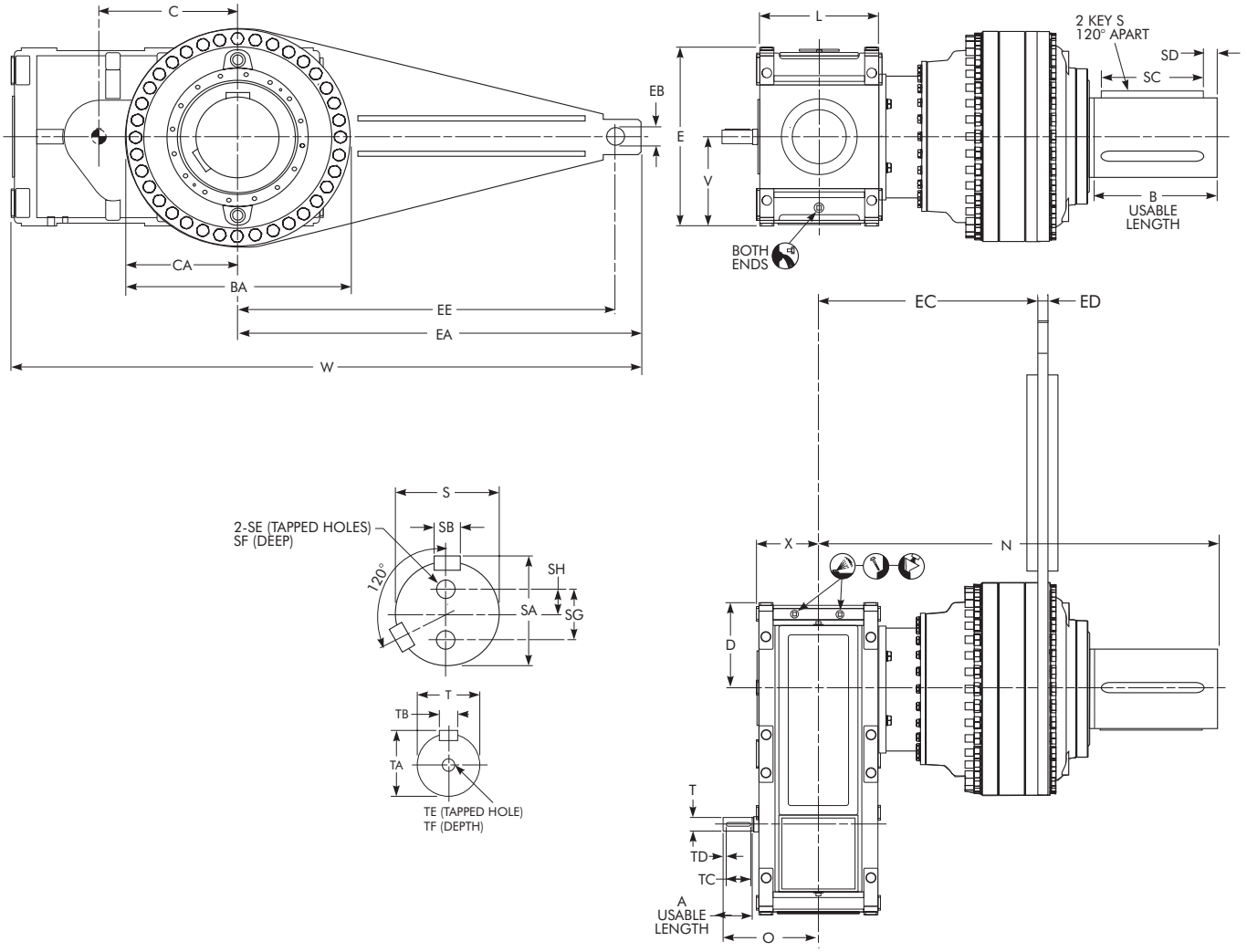
★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

‡ 8 - SE (Tapped Holes), SF (Deep) on SG (Bolt Circle).

Type DHF4 Quadruple Reduction

Size M1160 – M1210/Dimensions — Millimeters



DRIVE SIZE ★	Ratios	A	B	BA	C	CA	D	E	EA	EB	EC	ED	EE	L	N	O
M1160	160,0-710,0	80	300	710	430	355	280	560	1390	65 H9	783	35	1300	405	1283	302
M1170	160,0-710,0	110	300	710	485	355	300	630	1390	65 H9	803	35	1300	410	1306	334
M1180	160,0-710,0	110	425	870	560	435	335	670	1700	70 H9	921	40	1600	470	1574	365
M1190	160,0-710,0	110	425	870	630	435	375	750	1700	70 H9	983	40	1600	510	1633	387
M1200	160,0-630,0	140	550	1090	700	545	475	900	1910	75 H9	1135	60	1800	570	1939	445
M1210	160,0-710,0	140	550	1090	725	545	450	900	1910	75 H9	1183	60	1800	570	1987	445

DRIVE SIZE ★	Ratios	Low Speed Shaft									High Speed Shaft †							V	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	SG	SH	T	TA	TB	TC	TD	TE	TF				
M1160	160,0-450,0	230 h7	241	50	280	10	M24	50	150	75	35 k6	38	10	70	5	M12	28	280	2100	213	2315
	500,0-710,0										30 j6	33	8			M10	22				
M1170	160,0-710,0	230 h7	241	50	280	10	M24	50	150	75	40 k6	43	12	90	10	M16	36	315	2190	215	2580
M1180	160,0-710,0	290 h7	302	63	400	12,5	M24	50	200	100	45 k6	48,5	14	90	10	M16	36	335	2595	245	4009
M1190	160,0-450,0	290 h7	302	63	400	12,5	M24	50	200	100	55 m6	59	16	90	10	M20	42	375	2705	265	4434
	500,0-710,0										42 k6	45	12			M16	36				
M1200	160,0-630,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	65 m6	69	18	110	10	M20	42	450	3060	295	6956
M1210	160,0-710,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	65 m6	69	18	110	10	M20	42	450	3085	295	7224

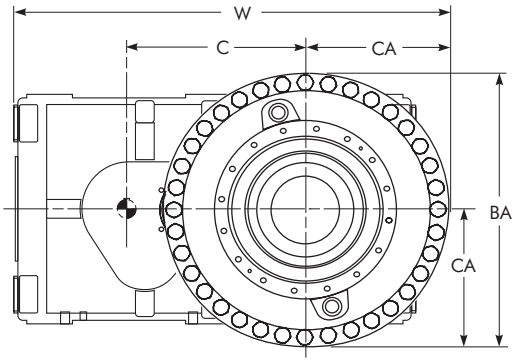
★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

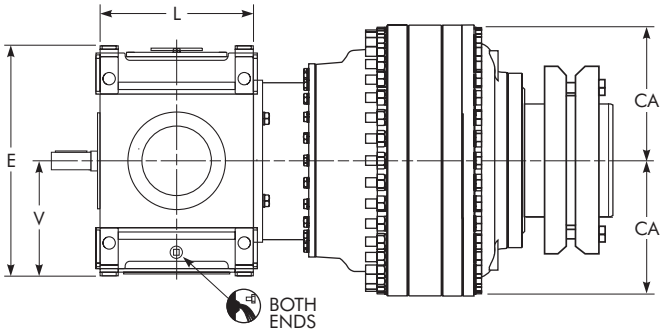
† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

‡ 8 - SE (Tapped Holes), SF (Deep) on SG (Bolt Circle).

Type DHP4 Quadruple Reduction

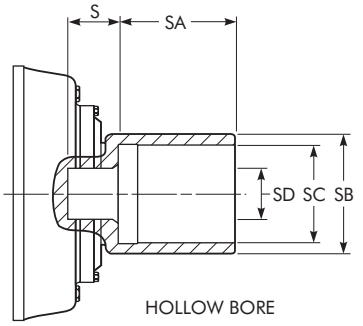
Size M1170 – M1210/Dimensions — Millimeters

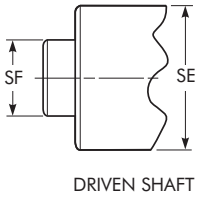


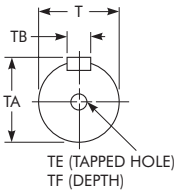


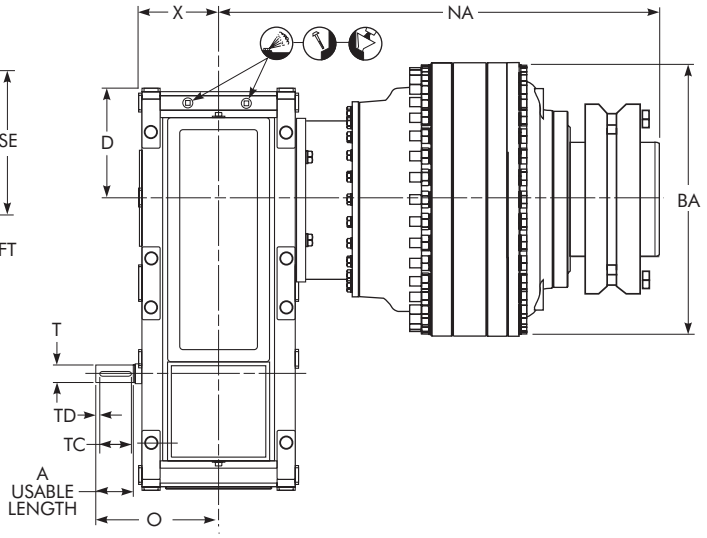
HOLLOW BORE AND DRIVEN SHAFT DETAIL

Refer to Page 24 for torque arm dimensions.









DRIVE SIZE ★	Ratios	A	BA	C	CA	D	E	L	NA	O
M1160	160,0-710,0	80	710	430	355	280	560	405	1226	302
M1170	160,0-710,0	110	710	485	355	300	630	410	1249	334
M1180	160,0-710,0	110	870	560	435	335	670	470	1414	365
M1190	160,0-710,0	110	870	630	435	375	750	510	1476	387
M1200	160,0-630,0	140	1090	700	545	475	900	570	1688	445
M1210	160,0-710,0	140	1090	725	545	450	900	570	1736	445

DRIVE SIZE ★	Ratios	Low Speed Hollow Bore					Driven Shaft		High Speed Shaft †							V	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	T	TA	TB	TC	TD	TE	TF				
M1160	160,0-450,0	101	230	280 f7	230 H7	120 H7	230 g6	120 f6	35 k6	38	10	70	5	M12	28	280	1065	213	2422
	500,0-710,0								30 j6	33	8			M10	22				
M1170	160,0-710,0	101	230	280 f7	230 H7	120 H7	230 g6	120 f6	40 k6	43	12	90	10	M16	36	315	1155	215	2687
M1180	160,0-710,0	155	300	360 f7	295 H7	210 H7	295 g6	210 f6	45 k6	48,5	14	90	10	M16	36	335	1330	245	4223
M1190	160,0-450,0	155	300	360 f7	295 H7	210 H7	295 g6	210 f6	55 m6	59	16	90	10	M20	42	375	1440	265	4648
	500,0-710,0								42 k6	45	12			M16	36				
M1200	160,0-630,0	170	335	390 f7	320 H7	190 H7	320 g6	190 f6	65 m6	69	18	110	10	M20	42	450	1695	295	7229
M1210	160,0-710,0	170	335	390 f7	320 H7	190 H7	320 g6	190 f6	65 m6	69	18	110	10	M20	42	450	1720	295	7497

★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

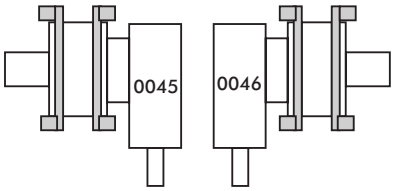
Types DBB, DBF, DBP & DBR Right Angle Shaft

Shaft Assemblies & Rotations

Please specify from the views below, the desired assembly number. Contact Falk for inclined, wall mounted, or other non-standard orientations.

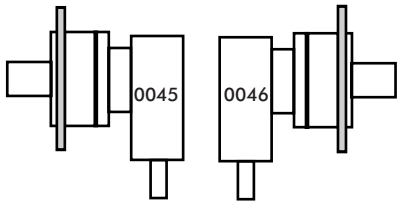
Type DBB Assemblies

Foot Mounted
Solid LS Shaft



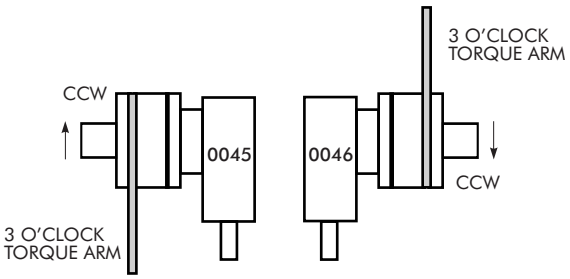
Type DBR Assemblies

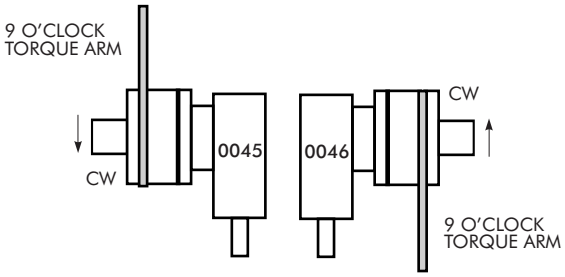
Flange Mounted
Solid LS Shaft



Type DBF Assemblies

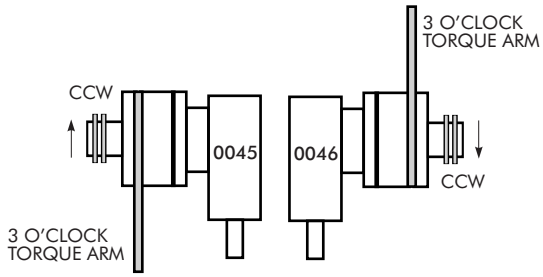
Shaft Mounted with Torque Arm
Solid LS Shaft

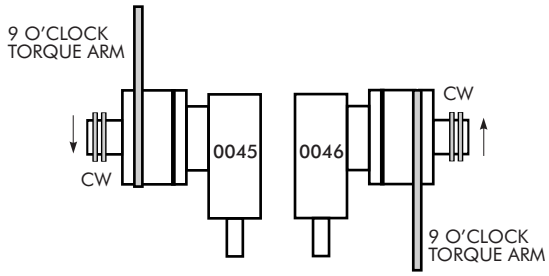




Type DBP Assemblies

Shaft Mounted with Torque Arm
Hollow LS Shaft with Shrink Disc





Type DBB, DBF, DBP & DBR Right Angle Shaft
Torque Ratings – Nm/Quadruple Reduction

DRIVE SIZE	Output Torque Rating (Output Speed 10 rpm or Less)
M1160	103 000
M1170	149 000
M1180	208 000
M1190	282 000
M1200	366 000
M1210	458 000

Type DBB, DBF, DBP & DBR Right Angle Shaft
Basic Thermal Ratings ★ – kW/Quadruple Reduction

High Speed Shaft rpm	Nominal Ratio Range	DRIVE SIZE					
		M1160	**M1170**	**M1180**	**M1190**	**M1200**	**M1210**
1800	160 - 280	102	118	139	158	205	205
	315 - 630	73	89	110	129	176	176
1500	160 - 280	98	113	135	154	201	201
	315 - 630	69	85	107	125	172	172
1200	160 - 280	94	110	131	150	197	197
	315 - 630	66	82	104	122	169	169
1000	160 - 280	91	107	128	147	194	194
	315 - 630	64	80	101	120	167	167

★ Basic thermal ratings listed are based on an ambient temperature of 25°C (77°F) and an elevation from sea level to 750 meters. Application adjusted thermal ratings must be calculated using the application adjusted thermal factors on Page 9 before comparing to the required load. For auxiliary cooling, contact Falk.

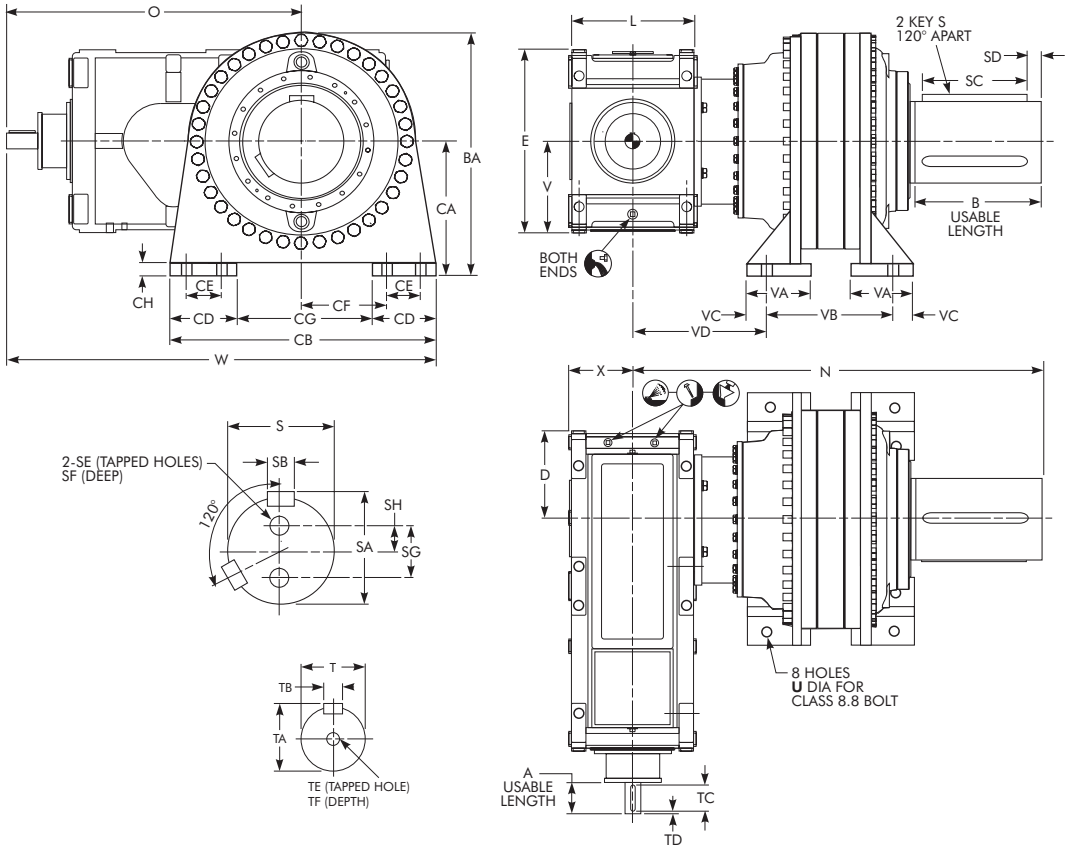
Type DBB, DBF, DBP & DBR Right Angle Shaft
Exact Ratios – Quadruple Reduction

Nominal Ratio ‡	DRIVE SIZE					
	M1160	**M1170**	**M1180**	**M1190**	**M1200**	**M1210**
160	152,6	155,2	170,3	164,6	160,4	158,9
180	171,3	174,4	188,6	182,2	179,4	180,3
200	190,1	195,4	206,7	201,7	200,7	201,6
224	213,7	215,7	239,2	232,2	224,3	225,5
250	244,0	245,3	268,5	256,6	252,4	252,1
280	275,4	273,8	296,4	294,4	282,7	283,6
315	309,8	310,1	337,3	323,2	315,4	317,6
355	336,2	350,1	378,9	360,6	352,2	354,3
400	376,5	390,0	414,2	407,3	403,2	395,8
450	440,4	430,5	467,6	464,5	451,6	453,1
500	495,5	487,5	531,8	509,9	503,8	507,4
560	537,5	550,3	598,0	569,1	562,5	566,3
630	602,2	613,1	653,6	642,6	. . .	632,1
710	. . .	. . .	. . .	. . .	. . .	. . .

‡ Lower ratios are available. For 10 rpm or less output speed with a total ratio requirement of less than 160:1, contact Falk. Higher ratios are also available. Contact Falk for selection.

Type DBB4 Quadruple Reduction

Size M1160 – M1210/Dimensions — Millimeters



DRIVE SIZE ★	Ratios	A	B	BA	CA	CB	CD	CE	CF	CG	CH	D	E	L	N	O
M1160	160,0-400,0	165	300	780	425	850	230	120	250	390	40	280	560	405	1283	1029
	450,0-630,0	155														1019
M1170	160,0-400,0	180	300	780	425	850	230	120	250	390	40	300	630	410	1306	1087
	450,0-630,0	170														1081
M1180	160,0-400,0	200	425	965	530	1020	270	150	300	480	50	335	670	470	1574	1215
	450,0-630,0	180														1195
M1190	160,0-400,0	220	425	965	530	1020	270	150	300	480	50	375	750	510	1633	1325
	450,0-630,0	200														1305
M1200	160,0-560,0	250	550	1185	640	1250	350	200	350	550	60	475	900	570	1939	1525
M1210	160,0-630,0	250	550	1185	640	1250	350	200	350	550	60	450	900	570	1987	1550

DRIVE SIZE ★	Ratios	Low Speed Shaft									High Speed Shaft †							U	V	VA	VB	VC	VD	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	SG	SH	T	TA	TB	TC	TD	TE	TF									
M1160	160,0-400,0	230 h7	241	50	280	10	M24	50	150	75	55 m6	59	16	145	10	M20	42	M30	280	200	432	50	472	1454	213	2286
	450,0-630,0										40 k6	43	12	135		M16	36							1444		
M1170	160,0-400,0	230 h7	241	50	280	10	M24	50	150	75	55 m6	59	16	160	10	M20	42	M30	315	200	452	50	475	1512	215	2606
	450,0-630,0										50 k6	53,5	14	140		M16	36							1506		
M1180	160,0-400,0	290 h7	302	63	400	12,5	M24	50	200	100	70 m6	74,5	20	180	10	M20	42	M42	335	260	550	75	524	1725	245	4106
	450,0-630,0										55 m6	59	16	160										1705		
M1190	160,0-400,0	290 h7	302	63	400	12,5	M24	50	200	100	80 m6	85	22	180	15	M20	42	M42	375	260	590	75	546	1835	265	4520
	450,0-630,0										65 m6	69	18	160	10									1815		
M1200	160,0-355,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	110 m6	116	28	200	20	M24	50	M48	450	280	645	80	663	2150	295	7122
	400,0-560,0										75 m6	80	20	180	10	M20	42									
M1210	160,0-400,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	110 m6	116	28	200	20	M24	50	M48	450	280	693	80	663	2175	295	7390
	450,0-630,0										75 m6	80	20	180	10	M20	42									

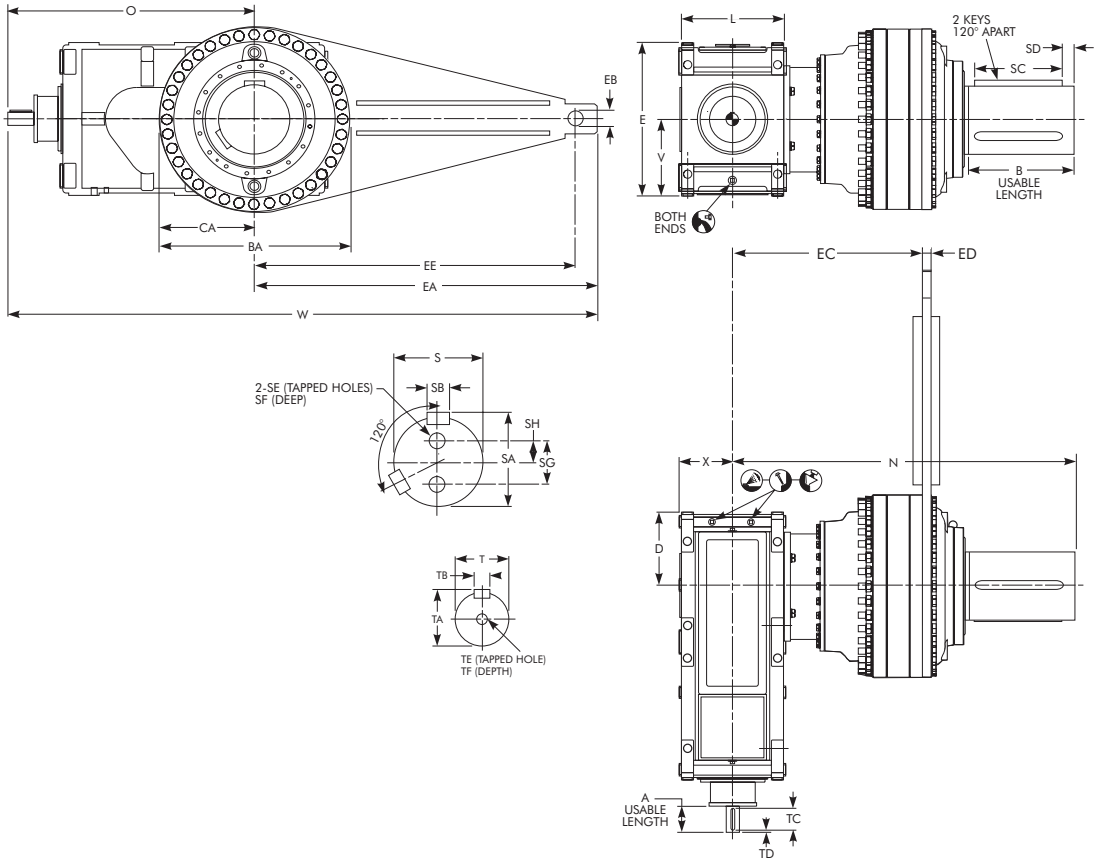
★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

‡ 8 - SE (Tapped Holes), SF (Deep) on SG (Bolt Circle).

Type DBF4 Quadruple Reduction

Size M1160 – M1210/Dimensions — Millimeters



DRIVE SIZE ★	Ratios	A	B	BA	CA	D	E	EA	EB	EC	ED	EE	L	N	O
M1160	160,0-400,0	165	300	710	355	280	560	1390	65 H9	783	35	1300	405	1283	1029
	450,0-630,0	155													1019
M1170	160,0-400,0	180	300	710	355	300	630	1390	65 H9	803	35	1300	410	1306	1087
	450,0-630,0	170													1081
M1180	160,0-400,0	200	425	870	435	335	670	1700	70 H9	921	40	1600	470	1574	1215
	450,0-630,0	180													1195
M1190	160,0-400,0	220	425	870	435	375	750	1700	70 H9	983	40	1600	510	1633	1325
	450,0-630,0	200													1305
M1200	160,0-560,0	250	550	1090	545	475	900	1910	75 H9	1135	60	1800	570	1939	1525
M1210	160,0-630,0	250	550	1090	545	450	900	1910	75 H9	1183	60	1800	570	1987	1550

DRIVE SIZE ★	Ratios	Low Speed Shaft									High Speed Shaft †							V	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	SG	SH	T	TA	TB	TC	TD	TE	TF				
M1160	160,0-400,0	230 h7	241	50	280	10	M24	50	150	75	55 m6	59	16	145	10	M20	42	280	2419	213	2315
	450,0-630,0										40 k6	43	12	135		M16	36		2409		
M1170	160,0-400,0	230 h7	241	50	280	10	M24	50	150	75	55 m6	59	16	160	10	M20	42	315	2477	215	2636
	450,0-630,0										50 k6	53,5	14	140		M16	36		2471		
M1180	160,0-400,0	290 h7	302	63	400	12,5	M24	50	200	100	70 m6	74,5	20	180	10	M20	42	335	2915	245	4072
	450,0-630,0										55 m6	59	16	160					2895		
M1190	160,0-400,0	290 h7	302	63	400	12,5	M24	50	200	100	80 m6	85	22	180	15	M20	42	375	3025	265	4487
	450,0-630,0										65 m6	69	18	160	10				3005		
M1200	160,0-355,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	110 m6	116	28	200	20	M24	50	450	3435	295	7081
	400,0-560,0										75 m6	80	20	180	10	M20	42				
M1210	160,0-400,0	360 h7	375	80	520	15	M24 ‡	50 ‡	220 ‡	110	110 m6	116	28	200	20	M24	50	450	3460	295	7349
	450,0-630,0										75 m6	80	20	180	10	M20	42				

★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

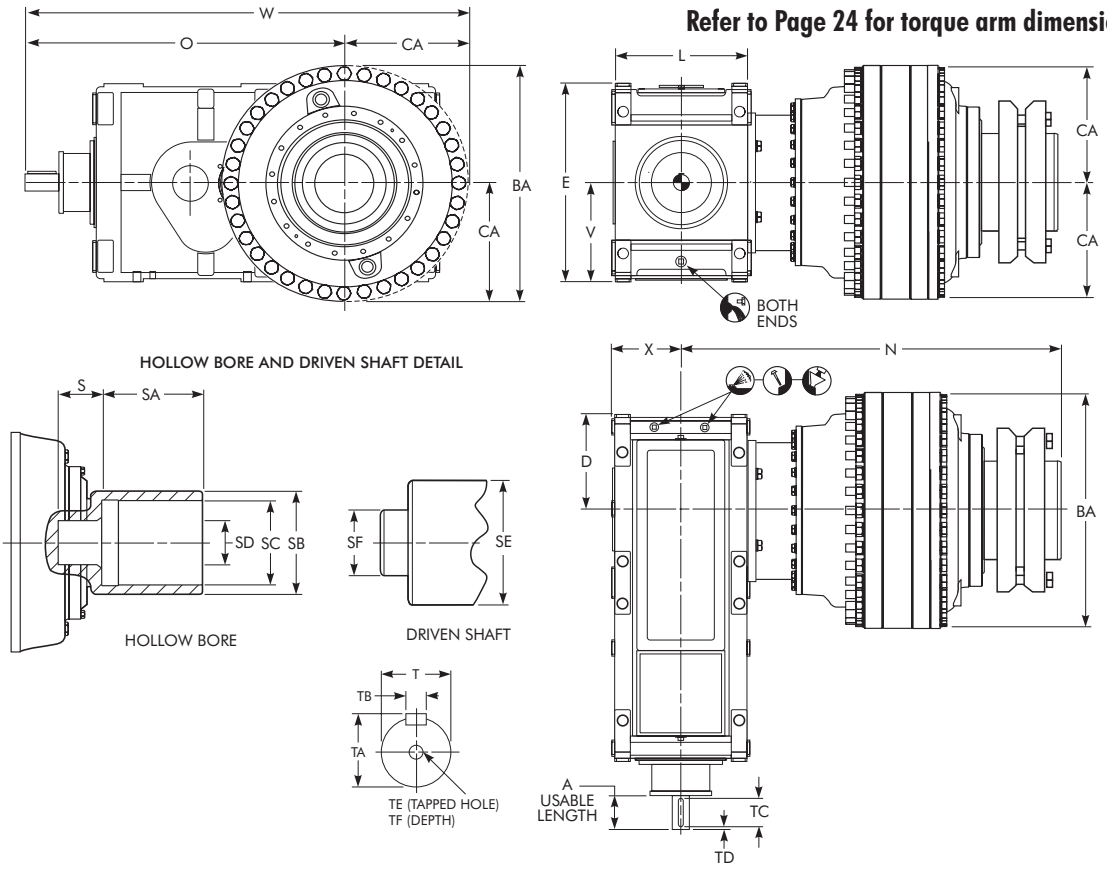
† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

‡ 8 - SE (Tapped Holes), SF (Deep) on SG (Bolt Circle).

Type DBP4 Quadruple Reduction

Size M1160 – M1210/Dimensions — Millimeters

Refer to Page 24 for torque arm dimensions.



DRIVE SIZE ★	Ratios	A	BA	CA	D	E	L	N	O
M1160	160,0-400,0	165	710	355	280	560	405	1226	1029
	450,0-630,0	155							1019
M1170	160,0-400,0	180	710	355	300	630	410	1249	1087
	450,0-630,0	170							1081
M1180	160,0-400,0	200	870	435	335	670	470	1414	1215
	450,0-630,0	180							1195
M1190	160,0-400,0	220	870	435	375	750	510	1476	1325
	450,0-630,0	200							1305
M1200	160,0-560,0	250	1090	545	475	900	570	1688	1525
M1210	160,0-630,0	250	1090	545	450	900	570	1736	1550

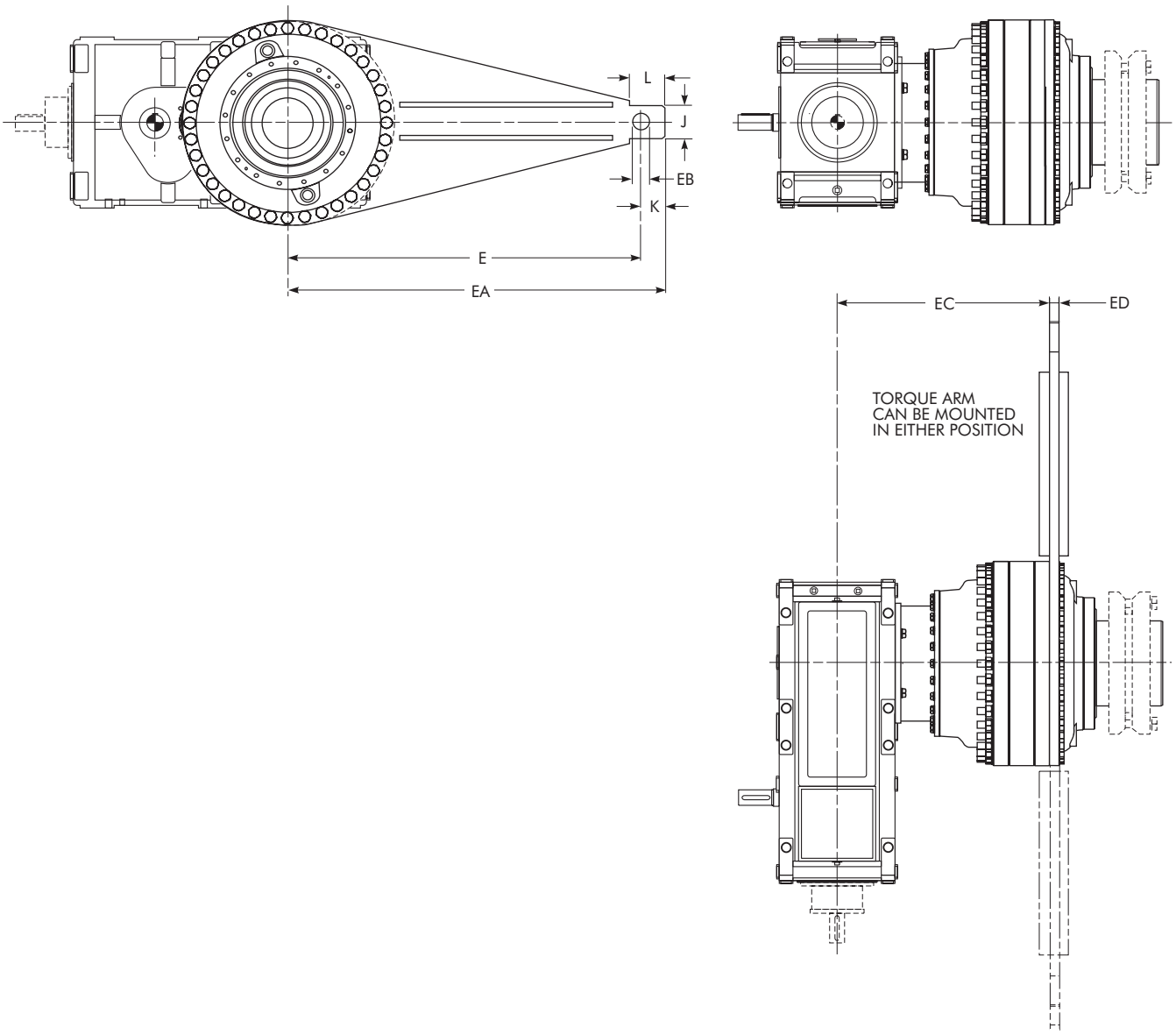
DRIVE SIZE ★	Ratios	Low Speed Hollow Bore					Driven Shaft		High Speed Shaft †							V	W	X	Approx Wt kg
		S	SA	SB	SC	SD	SE	SF	T	TA	TB	TC	TD	TE	TF				
M1160	160,0-400,0	101	230	280 f7	230 H7	120 H7	230 g6	120 f6	55 m6	59	16	145	10	M20	42	280	1384	213	2422
	450,0-630,0								40 k6	43	12	135		M16	36		1374		
M1170	160,0-400,0	101	230	280 f7	230 H7	120 H7	230 g6	120 f6	55 m6	59	16	160	10	M20	42	315	1442	215	2743
	450,0-630,0								50 k6	53,5	14	140		M16	36		1436		
M1180	160,0-400,0	155	300	360 f7	295 H7	210 H7	295 g6	210 f6	70 m6	74,5	20	180	10	M20	42	335	1650	245	4286
	450,0-630,0								55 m6	59	16	160					1630		
M1190	160,0-400,0	155	300	360 f7	295 H7	210 H7	295 g6	210 f6	80 m6	85	22	180	15	M20	42	375	1760	265	4701
	450,0-630,0								65 m6	69	18	160	10				1740		
M1200	160,0-355,0	170	335	390 f7	320 H7	190 H7	320 g6	190 f6	110 m6	116	28	200	20	M24	50	450	2070	290	7354
	400,0-560,0								75 m6	80	20	180	10	M20	42				
M1210	160,0-400,0	170	335	390 f7	320 H7	190 H7	320 g6	190 f6	110 m6	116	28	200	20	M24	50	450	2095	290	7622
	450,0-630,0								75 m6	80	20	180	10	M20	42				

★ Drawings are representative of this series of drives and do not agree in exact detail for all sizes. Gear drives are for horizontal floor mounted operation unless specifically stated otherwise. Consult Falk for other mountings. Dimensions are for reference only and are subject to change without notice unless certified.

† Key Sizes per ISO/R773-1969, Form A. Tapped center hole to DIN 332, threads 6H.

Type DH & DB Quadruple Reduction

Torque Arm/Dimensions — Millimeters



DRIVE SIZE ★	E	EA	EB	EC	ED	J	K	L	Approx Wt kg
M1160	1300	1390	65 H9	783	35	130	90	145	183
M1170	1300	1390	65 H9	803	35	130	90	145	183
M1180	1600	1700	70 H9	921	40	140	100	130	268
M1190	1600	1700	70 H9	983	40	140	100	130	268
M1200	1800	1910	75 H9	1135	60	150	110	145	525
M1210	1800	1910	75 H9	1183	60	150	110	145	525

★ Dimensions are for reference only and are subject to change without notice unless certified.