

TW Series Heavy Duty Worm Gear Units



RENOLD
Superior Gear Technology

TW Series - Product Features

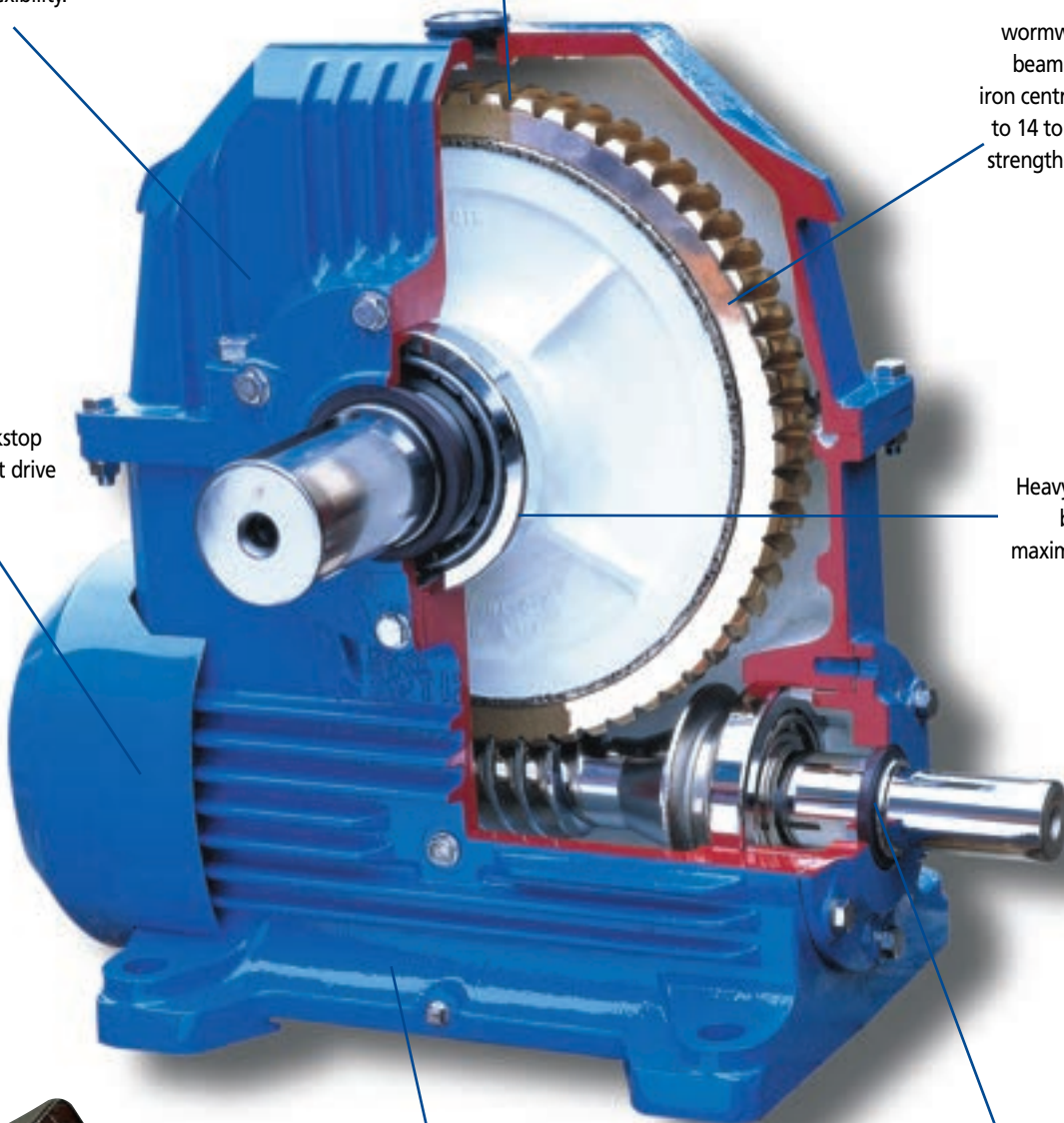
Wide range of gear unit type single and double reduction options for complete design flexibility.

Unique Holroyd tooth form for maximum torque capacity and optimum efficiency.

Phosphor bronze wormwheel rim electron beam welded onto cast iron centre on unit sizes up to 14 to ensure maximum strength under shock load conditions.

Sprag clutch backstop option to prevent drive reversals.

Heavy duty taper roller bearings fitted for maximum load capacity and long life.



Enhanced sealing available using a grease packed labyrinth system for use in hostile environments.

Two piece close grained cast iron gear case for strength and absorption of vibration for quiet running.



Section of electron beam welded wormwheel rim and centre showing the fusion of the bronze wormwheel rim onto the cast iron centre.

This high security fit allows transmission of power under shock load conditions.

Applications

- Conveyors
- Mining
- Timber
- Materials Handling
- Packaging Machines
- Water Treatment
- Foundry Equipment
- General Industrial applications

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ATEX Approval Details

ATEX Approval

RENOLD Gears products for operating in potentially explosive atmospheres.

General

- **RENOLD** Gears units are classified as ATEX Group II Category 2 equipment, which embodies sufficient safeguards to be suitable for use in potentially explosive atmospheres for normal operation and for operation during an expected malfunction.
- It is essential that there is sufficient lubricant to prevent the gears and bearings running 'dry'. Gear units should be inspected daily for signs of oil leakage, overheating or noisy operation.
- Gear units should be cleaned at regular intervals depending on the operating conditions, to ensure that dust coatings never exceed 5mm. Plastic parts should be wiped clean with a damp cloth.
- Oil leaks should be dealt with as quickly as practical. Compound joint faces and shims should be cleaned and thread-locking sealant should be applied to bolts and plugs prior to re-assembly.
- The temperature of any external surfaces must not exceed the

permitted maximum of 135°C (T4).

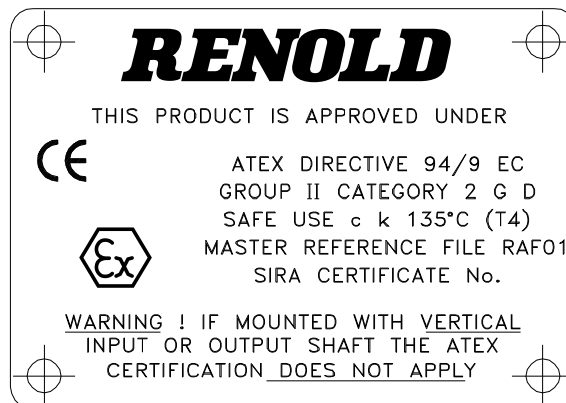
- Higher temperature class T3 is available dependant on unit mounting, ratio and gear type. For further details consult
- **RENOLD** rule, gear units should be mounted with their feet horizontal. For other mountings, particularly with shaft mounted units, consult **RENOLD** Gears.

WARNING: IF MOUNTING WITH VERTICAL INPUT OR OUTPUT SHAFTS, THE ATEX CERTIFICATION DOES NOT APPLY.

Unit Selection

- The gear unit selection procedures must include an additional reliability factor of 1.25 for mechanical ratings and 1.25 for thermal ratings.

ATEX Nameplate



TW Series - General Specification

The **RENOLD** range of TW Series heavy duty units is the result of continuing research and development, and enables significant increases in the power transmission and overhung load capabilities of each unit to be achieved.

Ten standard types of TW Series units are available with centre distances from 10" to 28" and with ratios ranging from 5:1 to 70:1 for single reduction units and from 75:1 to 4900:1 for double reduction units. All units incorporate metric taper roller bearings, and use the finest quality alloy steels for the wormshafts and centrifugally cast phosphor bronze rims for the wormwheels.

Gear Case

The gear cases are of close grained cast iron with all joints and bearing bores accurately machined to ensure oil tightness and precise gear location.

Wormshaft and Wormwheel

The worm is integral with its shaft and manufactured from alloy steel, casehardened on the threads, and ground and polished on the thread profiles.

The wormwheel rim is made from bronze complying with BS 1400 PB2-C (centrifugally cast) and secured to the cast iron centre by the electron beam welding process on the 10" - 14" sizes.

The Holroyd gear form used in the TW Series gear units corresponds to British Standard recommendations but, in addition has an exclusive feature which consists principally of an important modification to the worm threads and wheel teeth which confers additional valuable properties to gear performance. This ensures that our gears will run correctly and transmit true uniform angular velocity when running under all load conditions. The modification also gives a tapered oil entry gap between the teeth, which drags the lubricant between the surfaces and results in more efficient lubrication. Standard worm gears have right-hand threads but left-hand threads can be made to order.

Shafts

Standard shaft extensions are to metric dimensions but imperial shaft extensions for units complying with BS3027: 1968 or to suit the requirements of the North American market are also available. The wheelshaft is produced in carbon steel but, if required by applicational conditions, can be made from high tensile steel. Double extension wormshafts or wheelshafts are also available on request, as well as special shaft extensions.

Bearings

Standard metric taper roller bearings are fitted throughout in the 10", 12" and 14" units, with a face to face arrangement on both the worm and the wheeline to impart the maximum possible stiffness. A similar arrangement is used on the wheeline of the larger sized gear boxes, but on the wormline, a matched set of taper roller bearings is installed at one end to accommodate radial and thrust forces, with a deep groove ball bearing at the opposite end accommodating radial forces only. This bearing is free to move axially in the casing, to allow for expansion of the wormshaft. Where necessary an optional higher capacity bearing arrangement can be specified for the wheeline which considerably increases the overhung load or thrust capacity.

Oil Seals

Viton oil seals are fitted as standard on all TW Series gear units.

Lubrication

Gear and bearings are positively lubricated by oil from the sump in the underdriven and overdriven versions at normal motor speeds. With the vertical and agitator types, grease lubrication is necessary to the wheeline bearings.

For lower speeds it may be necessary to consider grease lubrication of certain bearings, and in this instance it is advisable to consult with Renold Engineers. Full lubrication details can be found under the "Installation & Maintenance" section.

Cooling

Maximum heat dissipation by air cooling is carried out by a radial fan directing air over the ribbed gear case. Where applicational circumstances permit, standard units can be supplied without a fan.

Backstop

A Sprag Clutch Backstop can be fitted internally to certain units when required, or alternatively an externally mounted backstop with manual tension release is available.

To select a worm gear unit the following basic information must be known and, if we are to make the selection, should be submitted in full to our Technical Sales Department.

Power

- a) Prime mover, type and output power (kW).
- b) Gear unit input and output power required (kW).
- c) For input speeds below 250 rev/min consult our Technical Sales Department giving details of required output torque (Nm) and diameter of driven shaft (mm).

Speed

Gear unit input and output rev/min.

Duty

- a) The characteristics of the drive eg. degree of impulsiveness of the driven load.
 - b) Duration of service in hours/day.
 - c) Starting load (kW) and number of starts per day.
 - d) For intermittent duty, reversing or shock loading, state normal power (kW) and frequency.
 - e) Disposition and details of external loads imposed on input/output shafts.
 - f) Working conditions, i.e. clean, dusty, moist, abnormal temperatures etc.
- If the operating conditions are in any way unusual it is advisable to consult our Technical Sales Department.

Enquiry/Ordering Procedure

At the order or enquiry stage, please quote the catalogue reference, shaft assembly number and nominal ratio or exact ratio if this important (see tables). Non standard mounting positions should be indicated with a sketch. Where a double extension wormwheel shaft is required, please state any special requirements regarding alignment of 3 keyways.

Mechanical Rating

The mechanical powers listed are those which the TW Series class units will transmit for 10 hours each day and correspond to a service factor of 1.0. Where non-uniform loading or a working day other than 10 hours is involved, a service factor f_D should be applied to the selection power or torque which is taken from table 2. High numbers

of starts per hour also influence the mechanical selection. Table 3 shows the start factor f_s which should also be applied to the selection power or torque. For guidance a comprehensive list of the various load conditions for a number of applications is given in Table 1. When confirming the mechanical selection powers therefore, the rating must be equal to or greater than calculated power or torque demand \times application service factor f_D (table 1 and table 2) \times starts factor f_s (table 3)

Efficiencies

The efficiency figures are approximate only and are those that could be expected from a gearbox which is fully run-in and operating under full load with the lubricant at its full working temperature. For intermittent rating where the lubricant may remain comparatively cool, the efficiency may be somewhat lower due to the increased oil churning losses associated with the higher viscosity of the cool oil. We shall be pleased to advise on any particular application.

Thermal Rating

The thermal ratings given are those which the gear units will transmit at an ambient temperature of 20°C, when the heat generated within the gearbox is being dissipated at the same rate. Whilst these ratings can be exceeded under start up conditions, this situation could lead to overheating and subsequent damage if continuously applied. Thermal torque ratings do not relate to mechanical gear life and are not affected by running time or momentary shock loads. If the ambient temperature is likely to exceed 20°C, this situation will have to be taken into account in the selection procedure. This is done by applying the thermal service factor given in table 4 when calculating the selection output torque. E.g. Thermal selection torque = continuous torque requirement \times thermal service factor f_T . Where intermittent running is involved it is possible the thermal limitation can be ignored, such as on a crane or winch application, and when this type of operation is being considered full applicational details should be given to Renold for assessment.

Selection Procedure

The ratings tables for the single reduction wormgear units provide mechanical ratings

in terms of input and output power in kW and mechanical and thermal output torque ratings in Newton Meters.

Tables 1 and 2 list the service factors relative to the operational hours each working day and the load classification with regard to the nature of the service. When determining the selection, power absorbed and not the rating of the prime mover should be used.

The procedure is as follows for single reduction units:-

- a) Establish the ratio required by dividing the input speed by the output, choosing the nearest nominal ratio available from tables 7 and 8.

$$\text{Gear ratio} = \frac{\text{Input speed rev/min}}{\text{Output speed rev/min}}$$

- b) Determine the load classification from table 1 and the corresponding mechanical service factor f_D , from table 2 and the starts factor f_s from table 3.

- c) Multiply the actual power absorbed by the mechanical service factor f_D and carefully select the size of unit by comparing this against the mechanical rating appropriate to the ratio and input speed.

$$\text{Selection Output Torque} = \text{actual output torque} \times f_D \times f_s$$

$$\text{or}$$
$$\text{Selection Output Torque} = \frac{\text{absorbed power} \times 9550 \times f_D \times f_s}{\text{output speed (rev/min)}}$$

- d) For continuous operation check that the thermal rating is at least equal to the thermal torque requirement.

External cooling can be offered to increase thermal rate.

$$\text{Thermal torque requirement} = \text{continuous torque} \times \text{thermal service factor } f_T \text{ from table 4.}$$

- e) Check the capability of the unit to withstand external loads applied to the output shaft, see tables 5 and 6.

For the selection of units from the double reduction range, the thermal rating is ignored since at the speeds involved only the mechanical rating needs to be considered.

TW - Series - Selection Examples

Mechanical Selection Torque	Nm =	Actual Torque (Nm) Requirement	X	Mechanical Service (fd) Factor	X	Starts (fs) Factors
Thermal Selection Torque	Nm =	Actual Torque (Nm) Requirement	X	Thermal Service (fr) Factor		
Mechanical Selection Power	(kW) =	Actual Power (kW) Requirement	X	Mechanical Service (fd) Factor	X	Starts (fs) Factor
Thermal Selection Power	(kW) =	Actual Power (kW) Requirement	X	Thermal Service (fr) Factor		

It can be seen from the ratings tables on pages 12 - 27 that both mineral and synthetic oil ratings are included. Depending upon which type of oil is to be used inside the gear unit will determine which ratings are used to make a selection.

Example 1

A right angled underdriven wormgear unit is required to drive a steady load conveyor operating for 24 hours per day under ambient temperature conditions of 20°C. Stops/starts will not exceed 5 per hour. The electric motor speed is 1440 rpm and the conveyor headshaft torque is 13,800 Nm at 30 rpm.

$$1. \text{ Gear Ratio} = \frac{1440}{30} = 48/1$$

The nearest standard ratio is 50/1.

$$2. \text{ Mechanical Service (fd) Factor} = 1.25$$

$$3. \text{ Starts Factor (fs)} = 1.0$$

$$4. \text{ Thermal Service (fr) Factor} = 1.0$$

$$5. \text{ Mechanical Selection (Nm) Torque} = \text{Actual (Nm) Torque} \times (\text{fd}) \times (\text{fs})$$

$$= 13,800 \times 1.25 \times 1$$

$$= 17,250 \text{ Nm.}$$

$$6. \text{ Thermal Selection Torque (Nm)} = \text{Actual (Nm) Torque} \times (\text{fr})$$

$$= 13,800 \times 1$$

$$= 13,800 \text{ Nm.}$$

7. TWU17 unit is selected using 50/1 ratio.

Using mineral oil.

The mechanical torque rating is 23825 Nm and thermal rating is 16,176 Nm. However by using synthetic oil to lubricate the unit the selection would change to: TWU14 at 50/1 ratio. Using synthetic oil.

Example 2

A wormgear unit is required to drive an ore crusher in a mining complex. The duty is 16 hours per day continuous duty, maximum temperatures 30°C. The limit ratio is 30/1 and the prime mover is an electric motor of 45kW at 1440 rpm (1500 rpm).

$$1. \text{ Mechanical Service (fd) Factor} = 2.0$$

$$2. \text{ Starts Factor (fs)} = 1.0$$

$$3. \text{ Thermal Service (fr) Factor} = 1.16$$

$$4. \text{ Mechanical Selection (kW) Power} = \text{Actual (kW) Power} \times (\text{fd}) \times (\text{fs})$$

$$= 45 \times 2.0 \times 1$$

$$= 90 \text{ kW.}$$

$$5. \text{ Thermal Selection (kW) Power} = \text{Actual (kW) Power} \times (\text{fr})$$

$$= 45 \times 1.16$$

$$= 52.2 \text{ kW.}$$

6. The selection for this application would be TW14 unit at 30/1 ratio using synthetic oil. Mechanical power rating = 96 kW. Thermal power rating = 81 kW. If mineral oil had to be used the selection would increase to a TW17 unit.

Example 3

A gear unit is required to raise and lower sluice gate 4/5 times each day. The torque required is 30,000 nm at a speed of 1.5rpm. The electric motor speed is 906 rpm. A selection of both unit and motor power is required.

$$1. \text{ Gear ratio} = \frac{960}{1.5} = 640/1$$

The nearest standard ratio from table 8 is: 750/1.

2. As this unit is a double reduction type - The thermal ratings are ignored.

$$\text{Mechanical Service (fd) Factor} = 1.0$$

$$3. \text{ Starts Factor (fs)} = 1.0$$

$$4. \text{ Mechanical Selection (Nm) Torque} = \text{Actual (Nm) Torque} \times (\text{fd}) \times (\text{fs})$$

$$= 30,000 \times 1 \times 1$$

$$= 30,000 \text{ Nm.}$$

5. A TWDU14 double reduction unit selection for this application having a mechanical rating of 34,000 Nm.

6. The efficiency of this unit is listed at 63%, the input or motor power required to develop 30,000 Nm output:-

$$= \frac{\text{Actual torque} \times \text{input RPM} \times 100}{9500 \times \text{efficiency} \times \text{ratio}}$$

$$= \frac{30,000 \times 960 \times 100}{9500 \times 63 \times 750}$$

$$= 6.38 \text{ kW.}$$

The normal power of the required motor will be 7.5kW.

TW Series - Load Classification by Application

Table 1

Agitators		Sugar (1)	M	Medium duty	M	Individual drives	H	single acting: 1 or 2 cylinders	*
Pure liquids	S	Dredges	M	Skip hoist	M	Reversing	*	double acting: single cylinder	*
Liquids and solids	M	Cable reels	M	Laundry	M	Wire drawing and flattening machine	M	Rotary - gear type	S
Liquids-variable density	M	Conveyors	M	Washers - reversing	M	Wire winding machine	M	Rotary - lobe, vane	S
Blowers	H	Cutter head drives	H	Tumblers	M	Mills, rotary type	M	Rubber and plastics industries	
Centrifugal	S	Jig drives	H	Line shafts	M	Ball (1)	M	Crackers (1)	H
Lobe	M	Manoeuvring winches	M	Driving processing equipment	M	Cement kilns (1)	M	Laboratory equipment	M
Vane	S	Pumps	M	Light	S	Dryers and coolers (1)	M	Mixed mills (1)	H
Brewing and Distilling	S	Screen drive	H	Other line shafts	S	Kilns other than cement	M	Refiners (1)	M
Bottling machinery	S	Stackers	M	Lumber industry	M	Pebble (1)	M	Rubber calenders (1)	M
Brew kettles-continuous duty	S	Utility winches	M	Barkers, hydraulic, mechanical	M	Rod, plain & wedge bar (1)	M	Rubber mill, 2 on line (1)	M
Cookers-continuous duty	S	Dry dock cranes	S	Burner conveyor	M	Tumbling barrels	H	Rubber mill, 3 on line (1)	S
Mash tubs-continuous duty	S	Main hoist	(2)	Chain saw and drag saw	H	Mixers	H	Sheeter (1)	M
Scale hopper-frequent starts	M	Auxiliary hoist	(2)	Chain transfer	H	Concrete mixers continuous	M	Tyre building machines	*
Can filling machines	S	Boom, luffing	(2)	Crane-way transfer	H	Concrete mixers intermittent	M	Tyre and tube press openers	*
Cane knives (1)	M	Rotating, swing or slew	(3)	De-barking drum	H	Constant density	S	Tubers and strainers (1)	M
Car dumpers	H	Tracking, drive wheels	(4)	Edger feed	M	Variable density	M	Warming mills (1)	M
Car pullers	M	Elevators		Gang feed	M	Oil industry	M	Sand muller	M
Classifiers	S	Bucket - uniform load	S	Green chain	M	Chillers	M	Screens	M
Classifiers	M	Bucket - heavy load	M	Live rolls	H	Oil well pumping	*	Air washing	S
Clay working machinery	M	Bucket - continuous	S	Log deck	H	Paraffin filter press	M	Rotary, stone or gravel	M
Brick press	H	Centrifugal discharge	S	Log haul-ine	H	Rotary kilns	M	Travelling water intake	S
Briquette machine	H	Escalators	S	Log haul-well type	H	Paper mills	H	Sewage disposal equipment	M
Clay working machinery	M	Freight	M	Log turning device	H	Agitators (mixers)	M	Bar screens	S
Pug mill	M	Gravity discharge	S	Main log conveyor	S	Barker-auxiliaries hydraulic	M	Chemical feeders	S
Compressors	S	Man lifts	*	Off bearing rolls	M	Barker-mechanical	H	Collectors	S
Centrifugal	M	Passenger	*	Planer feed chains	M	Barking drum	H	Dewatering screws	M
Lobe	S	Extruders (plastic)	M	Planer floor chains	M	Beater and pulper	M	Scum breakers	M
Reciprocating - multi-cylinder	M	Film	S	Planer tilting hoist	M	Bleacher	S	Slow or rapid mixers	M
Reciprocating - single cylinder	H	Sheet	S	Re-saw merry-go-round conveyor	M	Calenders	M	Thickeners	M
Conveyors - uniformly loaded or fed	S	Coating	S	Roll cases	H	Calenders-super	H	Vacuum filters	M
Apron	S	Slab conveyor	S	Slab conveyor	M	Converting machine except cutters, platers	M	Slab pushers	M
Assembly	S	Tubing	S	Small waste conveyor-belt	S	Conveyors	M	Steering gear	*
Belt	S	Blow moulders	M	Small waste conveyor-chain	M	Couch	S	Stokers	S
Bucket	S	Pre-plasticisers	M	Sorting table	M	Cutters, platers	M	Sugar industry	M
Chain	S	Fans	S	Tipple hoist conveyor	M	Cylinders	H	Cane knives (1)	M
Flight	S	Centrifugal	S	Tipple hoist drive	M	Dryers	M	Crushers (1)	M
Oven	S	Cooling towers	M	Transfer conveyors	M	Fell stretcher	M	Mills (1)	M
Screw	S	Induced draft	*	Transfer rolls	M	Fell whipper	M	Textile industry	M
Conveyors - heavy duty not uniformly fed	M	Forced draft	*	Tray drive	M	Jordans	H	Batchers	M
Apron	M	Induced draft	M	Trimmer feed	M	Log haul	H	Calenders	M
Assembly	M	Large, mine etc.	M	Waste conveyor	M	Presses	M	Cards	M
Belt	M	Large, industrial	M	Machine tools	S	Pulp machine reel	M	Dry cans	M
Bucket	M	Light, small diameter	S	Bending roll	H	Stock chest	M	Dryers	M
Chain	M	Feeders	M	Punch press-gear driven	M	Suction roll	M	Dyeing machinery	M
Flight	M	Apron	M	Notching press-belt drive	M	Looms	M	Looms	M
Live roll	*	Belt	M	Plate planners	H	Washers and thickeners	M	Mangles	M
Oven	M	Disc	S	Tapping machine	H	Winders	M	Nappers	M
Reciprocating	H	Reciprocating	H	Other machine tools	M	Printing presses	*	Pads	M
Screw	M	Main drives	M	Auxiliary drives	M	Pullers	S	Range drives	*
Shaker	H	Food industry	M	Metal mills	S	Barge haul	H	Slashers	M
Crane Drives - not dry dock	S	Beef slicer	M	Drawn bench carriage and main drive	M	Pumps	S	Soapers	M
Main hoists	S	Cereal cooker	S	Pinch, dryer and scrubber rolls, reversing	M	Centrifugal	M	Spinners	M
Bridge travel	*	Dough mixer	M	Slitters	H	Proportioning	M	Tenter frames	M
Trolley travel	*	Meat grinder	M	Table conveyors non-reversing group drives	H	Reciprocating	M	Washers	M
Crushers	H	Generators - not welding	S			single acting:		Winders	M
Ore	H	Hammer mills	H			3 or more cylinders	M	Windlass	*
Stone	H	Hoists	H			double acting:			
		Heavy duty	H			2 or more cylinders	M		

Service Factors

Table 2 (Service Factor f_D)

Prime mover (Drive input)	Driven machinery characteristics			
	Duration Service	Steady load	Medium impulsive	Highly impulsive
Electric, Air & Hydraulic Motors or Steam Turbine (Steady input)	Intermittent - 3hrs/day max	0.90	1.00	1.50
	3 - 10 over 10	1.00	1.25	1.75
		1.25	1.50	2.00
Multi-cylinder I.C. engine (Medium impulsive input)	Intermittent - 3hrs/day max	1.00	1.25	1.75
	3 - 10 over 10	1.25	1.50	2.00
		1.50	1.75	2.25
Single-cylinder I.C. engine (Highly)	Intermittent - 3hrs/day max	1.25	1.50	2.00
	3 - 10 over 10	1.50	1.75	2.25
		1.75	2.00	2.50

Table 3 Factor for Starts/Hours (f_S)

Maximum number of starts per hour	5	50	100	300
Starts Factor f_S	1.0	1.1	1.15	1.2

S = Steady

M = Medium Impulsive

H = Highly Impulsive

* = Refer to Renold

(1) = Select on 24 hours per day service factor only.

(2) = Use service factor of 1.00 for any duration of service.

(3) = Use service factor of 1.25 for any duration of service.

(4) = Use service factor of 1.50 for any duration of service.

Note

Machinery characteristics and service factors listed in this catalogue are a guide only. Some applications (e.g. constant power) may require special considerations. Consult Renold Gears.



IMPORTANT

Units to ATEX approval must be selected with a minimum service factor of 1.25.

Table 4 Thermal Service Factor f_T

Ambient °C	10	20	30	40	50	60
Temp °F	50	68	86	105	122	140
Factor f_T	0.87	1.0	1.16	1.35	1.62	1.97

TW Series - Overhung and Thrust Loads

Output shafts of worm gear units are frequently fitted with a spur pinion, chain pinion or belt pulley causing an overhung load to be imposed on the output shaft and bearings. These loads can generally be sustained by the gear unit; however, if the load is greater than the maximum allowable load for the unit, it may be necessary either to select a larger unit or to lessen the effect of the load on the shaft bearings. This can be done in two ways. The pinion can be mounted on a shaft in its own bearings and the shaft coupled to the gear unit; or the wheel shaft may be extended beyond the overhung load and fitted with a outboard bearing. In order to obtain the best possible arrangement for a particular application (where large over hung loads are anticipated) customers are advised to submit details of the load to our Sales Technical Staff for their consideration.

In the interests of good design, the overhung member should be fitted as close as possible to the gear case in order to minimise the stresses and reduce the deflecting moment on the unit.

The maximum imposed axial thrust and overhung loads to which the units can be subjected are given in tables 5 and 6.

Imposed axial thrust loads can also be minimised by the use of flexible couplings on the input and output shafts.

For drives where both imposed thrust and overhung loads are encountered, it is advisable to consult our Technical Sales Staff.

Where a double extension shaft is fitted, the maximum overhung loads listed apply in full to each shaft extension.

The overhung load may be calculated by the following formula:

$$\frac{9.55P \times 10^6 \times F \text{ (Newtons)}}{R \times S}$$

Where P = Power absorbed at output shaft (kW)

S = Speed of output shaft in rev/min

R = Pitch circle radius of chain pinion, spur or helical gear, or belt pulley in mm.

F = Overhung drive application factor as follows:

Chain pinion 1.00

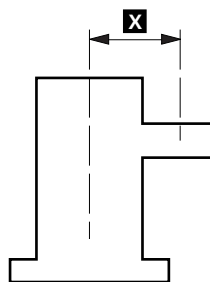
Spur or helical gear 1.25

Vee pulley 1.50

Flat belt pulley 2.00

The overhung load capacities listed in table 5 assume the load is applied mid-way along the output shaft extension, the relevant dimension from the centre line of the unit being as given below.

Unit Size	Dimension X
10	265
12	295
14	355
17	415
20	510
24	565
28	645



TW Series - Overhung and Thrust Capacities**TABLE 5: OUTPUT SHAFT OVERHUNG LOAD CAPACITIES FOR TWU, TWO AND TWV IN NEWTONS****At 1450 rev/min input speed****Centre Distance**

Ratio	Output Speed	10	12	14	17	20	24	28
5	290	37300	40600	45200	59100	81700	122700	161800
10	145	44900	48600	53600	69000	93600	141400	187000
15	95	53300	57800	63500	82700	113100	164000	215100
20	73	62300	67200	72400	94000	126400	184900	240700
25	58	66500	72900	80900	104400	138900	203700	262100
30	48	70900	77800	87500	112200	150700	220200	284300
40	36	78700	89000	97400	127100	168800	245500	312700
50	29	79100	91700	99100	138000	184600	267600	315700
60	24	79100	91700	99600	147100	197000	269100	316600
70	21	79700	92800	101000	147900	198000	271700	371400

At 960 rev/min input speed**Centre Distance**

Ratio	Output Speed	10	12	14	17	20	24	28
5	192	41900	45600	50100	64900	90100	134800	176800
10	96	50800	55200	60500	77500	105300	157300	206400
15	64	60300	65800	71900	93000	127400	183800	239400
20	48	70500	76300	82000	105600	142800	207700	269100
25	38	75200	82700	91500	117400	157100	229400	294000
30	32	77800	88300	97000	126500	170400	248100	309200
40	24	78800	91400	97600	143300	190900	264700	310300
50	19	79100	92000	99300	145900	194500	268300	313600
60	16	79200	92100	99800	146700	196800	268300	314700
70	14	79800	93000	101000	148500	197800	270800	315700

For ratios not included above consult Renold.

The double reduction worm versions of the above will also accept overhung loads and when these are involved send applicational details to our technical department.

The loads listed apply to the standard bearing fitment. Higher loads are available which, when used in conjunction with a high tensile steel shaft, can allow an increase in the values given. When a load has to be supported which is in excess of the value listed, send full applicational details to our technical department.

Table 6: OUTPUT SHAFT THRUST LOAD CAPACITIES FOR TWU, TWO AND TWV IN NEWTONS.**At 1450 and 960 rev/min input speed** Centre Distance

Ratio	10	12	14	17	20
5	36280	34930	37700	46890	80480
10	49370	52060	54210	65280	107530
15	62020	66000	66000	81650	140000
20	65000	66000	66000	94500	140000
25	65000	66000	66000	94500	140000
30	65000	66000	66000	94500	140000
40	65000	66000	66000	94500	140000
50	65000	66000	66000	94500	140000
60	65000	66000	66000	94500	140000
70	65000	66000	66000	94500	140000

Allowable thrust loads for unit sizes 24 and 28 will be supplied upon receipt of information relative to a specific application.

TW Series - Exact Ratios

TABLE 7: NOMINAL AND EXACT REDUCTION RATIOS: SINGLE REDUCTION.

Ratio Nominal Ratio	10	12	14	17	20	24	28
	Exact Ratio						
5	41/8	46/9	51/10	51/10	56/11	61/12	61/12
7.5	44/6	44/6	52/7	52/7	52/7	59/8	59/8
10	39/4	39/4	49/5	49/5	49/5	59/6	59/6
12.5	49/4	49/4	49/4	49/4	49/4	62/5	62/5
15	44/3	44/3	59/4	59/4	59/4	59/4	59/4
20	41/2	41/2	59/3	59/3	59/3	59/3	59/3
25	49/2	49/2	49/2	49/2	49/2	74/3	74/3
30	59/2	59/2	59/2	59/2	59/2	59/2	59/2
35	69/2	69/2	69/2	69/2	69/2	69/2	69/2
40	40/1	40/1	79/2	79/2	79/2	79/2	79/2
45	45/1	45/1	45/1	45/1	45/1	89/2	89/2
50	50/1	50/1	50/1	50/1	50/1	50/1	50/1
60	60/1	60/1	60/1	60/1	60/1	60/1	60/1

TABLE 8: NOMINAL AND EXACT REDUCTION RATIOS: DOUBLE REDUCTION.

Ratio Nominal Ratio	10	12	14	17	20	24	28
	Exact Ratio and Ratio Combinations						
75	31/6 X 44/3 = 76/1	41/8 X 44/3 = 75/1	41/8 X 59/4 = 76/1	41/8 X 59/4 = 76/1	41/8 X 59/4 = 76/1	46/9 X 59/4 = 75/1	51/8 X 59/4 = 75/1
150	29/3 X 44/3 = 142/1	39/4 X 44/3 = 143/1	41/8 X 59/2 = 151/1	39/4 X 59/4 = 143/1	39/4 X 59/4 = 143/1	46/9 X 59/2 = 151/1	51/10 X 59/2 = 150/1
250	29/3 X 49/2 = 237/1	39/4 X 49/2 = 239/1	39/4 X 49/2 = 239/1	39/4 X 49/2 = 239/1	39/4 X 49/2 = 239/1	39/4 X 74/3 = 241/1	49/5 X 74/3 = 241/1
300	31/2 X 41/2 = 317/1	44/3 X 41/2 = 301/1	44/3 X 59/3 = 288/1	39/4 X 59/2 = 287/1	44/3 X 59/3 = 288/1	44/3 X 59/3 = 288/1	59/4 X 59/3 = 290/1
500	41/2 X 49/2 = 502/1	41/2 X 49/2 = 502/1	49/2 X 59/3 = 482/1	49/2 X 59/3 = 482/1	49/2 X 59/3 = 482/1	49/2 X 59/3 = 482/1	49/2 X 59/3 = 482/1
750	30/1 X 49/2 = 735/1	30/1 X 49/2 = 735/1	59/2 X 49/2 = 723/1	49/2 X 59/2 = 723/1	59/2 X 49/2 = 723/1	49/2 X 59/2 = 723/1	59/2 X 74/3 = 727/1
1000	40/1 X 49/2 = 980/1	40/1 X 49/2 = 980/1	40/1 X 49/2 = 980/1	40/1 X 49/2 = 980/1	40/1 X 49/2 = 980/1	40/1 X 74/3 = 986/1	79/2 X 74/3 = 974/1
1500	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1	50/1 X 59/2 = 1475/1
2000	40/1 X 50/1 = 2000/1	40/1 X 50/1 = 2000/1	40/1 X 50/1 = 2000/1	40/1 X 50/1 = 2000/1	40/1 X 50/1 = 2000/1	40/1 X 50/1 = 2000/1	79/2 X 50/1 = 1975/1
2500	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1	50/1 X 50/1 = 2500/1
3000	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1	50/1 X 60/1 = 3000/1
4200	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1	60/1 X 70/1 = 4200/1
4900	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1	70/1 X 70/1 = 4900/1

It is possible to obtain ratios between those shown above - consult the technical sales department, at Renold Gears.

TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 5/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	360	Input kW, Thermal	94	112	134	160	175	210	229	275	317	380	381	457	426	510
		Output Torque Nm, Thermal	2428	2935	3454	4177	4510	5455	5888	7121	8107	9809	9681	11719	10722	12979
		Input kW, Mechanical	164	182	269	314	364	433	540	601	711	790	932	1035	1314	1459
		Output Torque Nm, Mechanical	4264	4776	6970	8218	9429	11291	13969	15645	18303	20500	23849	26710	33497	37517
		Efficiency %	96	96	96	96	96	96	96	96	96	96	96	96	96	96
1500	300.0	Input kW, Thermal	86	103	123	148	163	195	216	259	308	369	380	455	437	523
		Output Torque Nm, Thermal	2676	3236	3819	4619	5063	6124	6679	8078	9477	11465	11624	14067	13308	16103
		Input kW, Mechanical	149	166	243	285	333	405	503	559	667	761	863	959	1225	1361
		Output Torque Nm, Mechanical	4659	5219	7570	8930	10364	12676	15629	17504	20662	23733	26605	29798	37658	42177
		Efficiency %	96	96	96	96	96	96	96	96	96	96	96	96	96	96
1200	240.0	Input kW, Thermal	78	93	110	132	150	179	205	246	286	344	365	438	438	525
		Output Torque Nm, Thermal	3012	3643	4268	5134	5789	7002	7922	9581	11057	13375	14034	16978	16773	20288
		Input kW, Mechanical	134	149	219	256	295	371	448	507	601	709	784	903	1101	1224
		Output Torque Nm, Mechanical	5230	5858	8516	10039	11453	14494	17420	19832	23282	27686	30307	35145	42502	47602
		Efficiency %	95	96	96	96	96	96	96	96	96	96	96	96	96	96
1000	200.0	Input kW, Thermal	68	82	96	116	133	160	187	225	263	316	344	413	427	512
		Output Torque Nm, Thermal	3177	3843	4474	5413	6188	7486	8695	10517	12197	14754	15911	19248	19698	23823
		Input kW, Mechanical	121	135	199	233	271	331	404	464	545	652	717	852	1019	1133
		Output Torque Nm, Mechanical	5644	6322	9266	10924	12604	15496	18835	21771	25334	30541	33293	39844	47300	52976
		Efficiency %	95	96	95	96	96	96	96	96	96	96	96	96	96	96
750	150.0	Input kW, Thermal	53	63	74	88	105	126	151	181	221	265	301	361	392	470
		Output Torque Nm, Thermal	3255	3939	4538	5494	6473	7834	9333	11292	13652	16518	18528	22417	24161	29219
		Input kW, Mechanical	105	117	173	192	236	262	355	395	470	547	601	744	864	969
		Output Torque Nm, Mechanical	6503	7283	10669	11949	14595	16346	22005	24646	29088	34192	37152	46402	53522	60483
		Efficiency %	95	96	95	96	95	96	95	96	96	96	96	96	96	96
500	100.0	Input kW, Thermal	36	43	49	59	72	87	105	126	164	196	233	279	321	385
		Output Torque Nm, Thermal	3251	3938	4468	5415	6634	8035	9651	11685	15074	18248	21426	25935	29656	35874
		Input kW, Mechanical	82	91	134	149	183	203	281	312	377	419	496	576	701	795
		Output Torque Nm, Mechanical	7525	8428	12353	13835	16867	18891	25930	29041	34879	39065	45812	53685	65031	74258
		Efficiency %	94	95	94	95	94	95	95	96	95	96	95	96	96	96
250	50.0	Input kW, Thermal	21	25	28	33	43	51	61	73	92	111	140	168	206	247
		Output Torque Nm, Thermal	3693	4481	4973	6038	7741	9393	11081	13438	16784	20350	25450	30852	37670	45620
		Input kW, Mechanical	54	59	89	94	121	134	184	204	245	272	325	360	467	518
		Output Torque Nm, Mechanical	9687	10849	15986	17151	21927	24558	33427	37438	44689	50052	59256	66367	85646	95923
		Efficiency %	92	93	93	94	93	94	93	94	94	95	94	95	94	95
Max Output Torque Nm	Single Key		11200	12000	17000	24000	41000	51000	72000							
	Standard Shaft		15800	21000	27300	43400	77700	108000	146400							

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 Units to ATEX approval must be selected with a minimum service factor of 1.25.
IMPORTANT


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 7.5/1 Non Preferred Ratio.

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	240	Input kW, Thermal	90	107	132	158	178	213	241	289	349	419	439	525	506	606
		Output Torque Nm, Thermal	3319	4010	4890	5907	6689	8081	9039	10920	13116	15850	16281	19679	18701	22608
		Input kW, Mechanical	120	134	185	205	306	340	492	547	709	788	935	1083	1183	1314
		Output Torque Nm, Mechanical	4459	4994	6856	7679	11530	12193	18547	20773	26714	29920	34911	40736	44017	49300
		Efficiency %	95	96	96	96	96	96	96	96	96	96	96	96	96	96
1500	200.0	Input kW, Thermal	81	97	119	143	162	194	221	265	328	393	422	506	501	600
		Output Torque Nm, Thermal	3594	4342	5309	6414	7313	8835	9952	12022	14791	17874	18858	22791	22311	26966
		Input kW, Mechanical	110	122	170	189	279	310	451	501	652	725	866	1043	1084	1237
		Output Torque Nm, Mechanical	4891	5478	7585	8495	12609	14122	20400	22848	29513	33055	38889	47177	48537	55820
		Efficiency %	95	96	95	96	96	96	96	96	96	96	96	96	96	96
1200	160.0	Input kW, Thermal	72	86	105	126	145	173	203	243	294	352	390	467	479	574
		Output Torque Nm, Thermal	3978	4807	5831	7045	8138	9834	11416	13793	16576	20032	21815	26363	26757	32336
		Input kW, Mechanical	99	110	153	170	252	280	395	439	571	635	767	964	970	1184
		Output Torque Nm, Mechanical	5465	6121	8519	9541	14194	15897	22320	24998	32301	36178	43073	54572	54434	66935
		Efficiency %	95	96	95	96	95	96	96	96	96	96	96	96	96	96
1000	133.3	Input kW, Thermal	63	75	91	109	127	152	182	218	263	315	357	428	450	540
		Output Torque Nm, Thermal	4159	5027	6052	7313	8559	10344	12264	14819	17780	21488	23962	28959	30222	36522
		Input kW, Mechanical	89	99	140	155	230	256	366	407	522	580	682	883	868	1113
		Output Torque Nm, Mechanical	5921	6632	9297	10413	15568	17436	24786	27760	35409	39658	45939	59944	58482	75600
		Efficiency %	95	96	95	96	95	96	96	96	96	96	96	96	96	96
750	100.0	Input kW, Thermal	48	58	69	83	98	118	143	172	214	257	300	359	393	471
		Output Torque Nm, Thermal	4230	5115	6083	7354	8807	10647	12856	15539	19243	23263	26788	32380	35127	42454
		Input kW, Mechanical	74	82	117	130	194	215	312	347	450	501	595	742	740	971
		Output Torque Nm, Mechanical	6533	7317	10317	11555	17399	19486	28108	31482	40620	45495	53396	67026	66463	87880
		Efficiency %	94	95	94	95	95	96	95	96	95	96	96	96	96	96
500	66.7	Input kW, Thermal	32	39	46	55	67	80	98	117	154	185	224	268	306	367
		Output Torque Nm, Thermal	4218	5105	5968	7219	8939	10814	13073	15811	20685	25020	29873	36125	40894	49443
		Input kW, Mechanical	59	65	92	102	152	169	244	270	350	389	469	554	600	757
		Output Torque Nm, Mechanical	7656	8574	12082	13531	20305	22742	32642	36559	47075	52724	62798	74778	80442	102347
		Efficiency %	93	94	94	95	94	95	94	95	95	96	95	96	95	96
250	33.3	Input kW, Thermal	19	23	26	31	40	48	57	68	87	104	132	158	190	228
		Output Torque Nm, Thermal	4824	5846	6670	8079	10448	12657	14947	18099	22089	27626	34802	42138	50153	60705
		Input kW, Mechanical	38	42	60	66	99	109	158	174	229	235	309	342	391	470
		Output Torque Nm, Mechanical	9725	10892	15349	17190	25775	28868	41508	46489	60632	62956	81367	91131	103443	125660
		Efficiency %	91	93	92	93	92	94	93	94	93	94	94	95	94	95
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 10/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	180.0	Input kW, Thermal	80	96	119	143	162	194	220	263	332	398	432	517	508	607
		Output Torque Nm, Thermal	3936	4752	5857	7070	8015	9676	10820	13061	16419	19825	21378	25816	25006	30201
		Input kW, Mechanical	81	90	125	139	237	263	386	429	513	571	797	983	1084	1251
		Output Torque Nm, Mechanical	3974	4450	6129	6864	11703	13107	19100	21392	25428	28479	39571	49243	53698	62517
		Efficiency %	95	96	95	96	95	96	95	96	95	96	96	96	96	96
1500	150.0	Input kW, Thermal	72	86	107	128	147	176	200	239	308	369	409	490	494	591
		Output Torque Nm, Thermal	4228	5106	6297	7603	8683	10483	11808	14254	18279	22070	24324	29373	29282	35361
		Input kW, Mechanical	75	83	115	128	214	238	346	384	461	513	722	891	985	1218
		Output Torque Nm, Mechanical	4391	4917	6786	7601	12178	14244	20512	22973	27439	30731	43092	53625	58735	73197
		Efficiency %	95	95	95	96	95	96	95	96	95	96	96	96	96	96
1200	120.0	Input kW, Thermal	64	76	94	112	130	155	181	217	273	326	371	444	462	553
		Output Torque Nm, Thermal	4649	5614	6855	8277	9577	11564	13451	16195	20208	24401	27581	33306	34354	41484
		Input kW, Mechanical	66	74	103	115	194	215	309	343	407	452	640	790	878	1141
		Output Torque Nm, Mechanical	4842	5423	7565	8473	14313	16031	22868	25612	30238	33867	47753	59425	65527	85871
		Efficiency %	94	95	95	95	95	96	95	96	95	96	96	96	96	96
1000	100.0	Input kW, Thermal	55	66	81	97	113	136	162	194	242	289	335	401	428	512
		Output Torque Nm, Thermal	4844	5851	7080	8551	10021	12102	14326	17297	21482	25942	29874	36077	38178	46102
		Input kW, Mechanical	59	65	93	103	174	194	281	313	372	413	570	704	788	1054
		Output Torque Nm, Mechanical	5153	5771	8114	9087	15442	17295	24984	27982	33095	37067	51016	63486	70552	95203
		Efficiency %	94	95	94	95	95	95	95	96	95	96	95	96	96	96
750	75.0	Input kW, Thermal	43	51	61	73	88	105	127	152	195	233	277	331	366	438
		Output Torque Nm, Thermal	4916	5940	7089	8563	10263	12937	14928	18027	23017	27081	32838	39662	43461	52487
		Input kW, Mechanical	50	55	77	85	145	161	237	263	317	353	499	615	684	904
		Output Torque Nm, Mechanical	5754	6445	8942	10015	17000	19041	27971	31328	37550	42056	59373	73887	81615	108649
		Efficiency %	93	94	94	95	94	95	94	95	95	96	95	96	95	96
500	50.0	Input kW, Thermal	29	34	40	48	60	71	87	103	140	167	204	244	280	335
		Output Torque Nm, Thermal	4904	5929	6946	8396	10394	12562	15123	18271	24564	29682	36120	43644	49668	60003
		Input kW, Mechanical	39	43	60	67	114	126	187	207	250	277	391	482	541	692
		Output Torque Nm, Mechanical	6660	7459	10433	11685	19878	22264	32781	36715	43944	49218	69363	86318	96311	124207
		Efficiency %	92	93	93	94	93	94	94	95	94	95	95	95	95	96
250	25.0	Input kW, Thermal	17	20	23	27	36	43	50	60	78	94	120	144	173	206
		Output Torque Nm, Thermal	5635	6819	7789	9423	12170	14723	17284	20900	27059	32729	41856	50623	60309	72924
		Input kW, Mechanical	25	27	39	43	73	81	119	131	158	175	251	295	347	408
		Output Torque Nm, Mechanical	8318	9316	13125	14700	25051	28058	40769	45661	54769	61342	87476	104030	121689	144479
		Efficiency %	90	92	91	92	91	93	92	93	92	94	93	94	93	94
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.



IMPORTANT Units to ATEX approval must be selected with a minimum service factor of 1.25.


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 12.5/1 Non Preferred Ratio.

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	144.0	Input kW, Thermal	70	84	104	125	145	173	200	239	306	366	373	446	474	566
		Output Torque Nm, Thermal	4269	5152	6374	7692	8887	10724	12261	14796	18785	22673	23066	27836	29295	35631
		Input kW, Mechanical	88	97	134	148	198	220	320	355	428	476	736	908	1002	1166
		Output Torque Nm, Mechanical	5350	5992	8185	9167	12166	13626	19656	22015	26376	29541	45762	56948	62365	73198
		Efficiency %	94	95	94	95	95	95	95	95	95	96	95	95	95	95
1500	120.0	Input kW, Thermal	63	75	93	111	130	156	180	216	281	336	353	421	456	545
		Output Torque Nm, Thermal	4574	5520	6830	8242	9573	11553	13263	16006	20727	25016	26234	31659	33955	40983
		Input kW, Mechanical	80	88	123	137	183	203	290	322	389	432	673	830	919	1123
		Output Torque Nm, Mechanical	5835	6535	9029	10113	13458	15074	21373	23938	28752	32202	50278	62568	68769	84836
		Efficiency %	94	95	94	95	94	95	95	95	95	96	95	96	95	96
1200	96.0	Input kW, Thermal	55	66	81	97	115	137	163	194	246	295	319	382	422	505
		Output Torque Nm, Thermal	5016	6054	7411	8944	10501	12675	14929	18017	22705	27405	29738	35887	39373	47522
		Input kW, Mechanical	70	77	109	121	163	181	258	287	342	380	591	728	812	1001
		Output Torque Nm, Mechanical	6349	7111	9944	11137	14963	16759	23778	26631	31564	35352	55180	68669	76045	94634
		Efficiency %	93	94	94	95	94	95	94	95	95	96	95	95	95	96
1000	80.0	Input kW, Thermal	48	57	70	84	100	119	144	172	217	260	288	345	388	463
		Output Torque Nm, Thermal	5221	6303	7641	9224	10955	13224	15855	19136	23994	28963	32205	38865	43390	52372
		Input kW, Mechanical	62	68	97	107	146	162	236	261	315	350	521	642	718	886
		Output Torque Nm, Mechanical	6719	7525	10573	11842	16044	17969	25946	29060	34837	39018	58331	72589	80716	100447
		Efficiency %	93	94	93	94	94	95	94	95	95	95	95	95	95	96
750	60.0	Input kW, Thermal	37	44	53	63	77	92	113	135	174	208	238	285	328	392
		Output Torque Nm, Thermal	5295	6393	7641	9225	11189	13509	16428	19831	25542	30837	35388	42711	48880	59004
		Input kW, Mechanical	53	58	82	91	123	136	198	219	266	295	465	573	637	786
		Output Torque Nm, Mechanical	7583	8493	11876	13301	17903	20052	28896	32364	39063	43750	69237	86161	95308	118606
		Efficiency %	92	93	93	94	93	94	94	95	94	95	94	95	95	96
500	40.0	Input kW, Thermal	25	30	35	42	53	63	77	91	125	149	176	210	249	298
		Output Torque Nm, Thermal	5284	6383	7486	9042	11320	13673	16588	20031	27139	32777	38904	46968	55636	66484
		Input kW, Mechanical	41	45	64	70	95	106	154	170	206	228	362	434	498	613
		Output Torque Nm, Mechanical	8723	9770	13676	15317	20594	23065	33400	37408	44952	50346	80116	97224	110863	137962
		Efficiency %	91	92	92	93	92	93	93	94	93	94	94	95	94	95
250	20.0	Input kW, Thermal	15	17	20	24	32	37	45	53	70	83	104	124	153	183
		Output Torque Nm, Thermal	6081	7353	8404	10159	13271	16042	18963	22918	29890	36128	45046	54420	66929	80872
		Input kW, Mechanical	26	29	41	45	62	68	99	109	132	145	231	236	317	326
		Output Torque Nm, Mechanical	10819	12118	17122	19177	25972	29089	41969	47006	56358	63121	100466	104030	138742	144479
		Efficiency %	89	90	89	92	90	92	91	92	91	93	92	93	92	94
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.

TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 15/1 Preferred Ratio Unit Sizes 10", 12", 14".

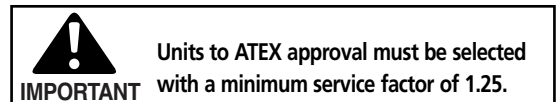
Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	120.0	Input kW, Thermal	62	74	93	111	131	156	180	214	264	315	367	439	438	523
		Output Torque Nm, Thermal	4517	5449	6764	8160	9588	11568	13170	15889	19321	23310	27000	32579	32083	38715
		Input kW, Mechanical	72	79	110	121	183	202	294	326	415	461	639	788	871	1077
		Output Torque Nm, Mechanical	5204	5828	7976	8933	13417	15027	21606	24199	30556	34223	47156	58683	64152	80141
		Efficiency %	93	94	94	95	94	95	94	95	94	95	94	95	95	95
1500	100.0	Input kW, Thermal	56	66	83	99	117	140	161	193	242	289	343	409	419	501
		Output Torque Nm, Thermal	4828	5825	7226	8718	10279	12402	14184	17112	21345	25751	30254	36505	36966	44065
		Input kW, Mechanical	65	72	100	111	167	185	262	291	374	415	579	714	799	1032
		Output Torque Nm, Mechanical	5622	6297	8713	9759	14681	16442	23131	25906	33005	36966	51327	63873	70788	92332
		Efficiency %	93	94	94	94	94	95	94	95	94	95	94	95	95	95
1200	80.0	Input kW, Thermal	49	58	72	86	103	122	145	173	213	254	306	365	386	461
		Output Torque Nm, Thermal	5284	6376	7818	9434	11225	13545	15891	19173	23411	28245	33740	40712	42577	51375
		Input kW, Mechanical	56	62	88	98	149	165	238	264	334	371	500	612	696	909
		Output Torque Nm, Mechanical	6067	6795	9566	10714	16302	18258	26154	29292	36856	41279	55344	68872	77166	101677
		Efficiency %	93	94	93	94	94	95	94	95	94	95	94	95	95	95
1000	66.7	Input kW, Thermal	43	51	62	74	89	106	128	153	188	224	273	326	353	421
		Output Torque Nm, Thermal	5495	6632	8051	9715	11681	14097	16829	20307	24759	29874	36137	43607	46698	56348
		Input kW, Mechanical	51	56	78	86	132	146	214	237	304	337	469	578	648	846
		Output Torque Nm, Mechanical	6520	7303	10124	11339	17348	19429	28160	31359	40120	44935	62311	77542	86186	113562
		Efficiency %	92	93	93	94	93	94	94	95	94	95	94	95	94	95
750	50.0	Input kW, Thermal	33	39	47	56	69	82	100	119	151	180	223	266	297	355
		Output Torque Nm, Thermal	5569	6723	8041	9706	11905	14370	17390	20987	26376	31829	39204	47315	52299	63114
		Input kW, Mechanical	43	47	67	74	112	124	181	200	258	285	399	491	552	720
		Output Torque Nm, Mechanical	7254	8124	11431	12803	19496	21836	31505	35286	75112	50525	70361	87561	97545	128530
		Efficiency %	91	93	92	93	92	94	93	94	93	94	94	95	94	95
500	33.3	Input kW, Thermal	22	26	31	37	47	56	68	81	108	129	163	195	225	268
		Output Torque Nm, Thermal	5560	6715	7877	9511	12035	14532	17533	21165	28033	33838	42692	51538	58946	71152
		Input kW, Mechanical	33	36	52	57	87	96	139	154	196	217	305	375	426	543
		Output Torque Nm, Mechanical	8343	9344	13166	14746	22451	25145	36034	40358	50975	57092	80028	99590	112155	144479
		Efficiency %	90	91	91	92	91	93	92	93	92	94	93	94	93	94
250	16.7	Input kW, Thermal	13	16	18	21	28	34	40	47	61	72	96	115	138	164
		Output Torque Nm, Thermal	6410	7746	8855	10698	14131	17074	20049	24218	30861	37275	49318	59577	71097	85872
		Input kW, Mechanical	21	23	33	36	56	61	90	96	127	139	196	200	271	276
		Output Torque Nm, Mechanical	10330	11570	16362	18326	27965	31321	45207	49113	64279	71992	100492	104030	139891	144479
		Efficiency %	87	89	88	90	89	91	90	91	90	92	91	93	92	93
Max Output Torque Nm	Single Key	11200	12000	17000	24000	41000	51000	72000								
	Standard Shaft	15800	21000	27300	43400	77700	108000	146400								

Notes: Ratings in the grey shaded area require force feed lubrication.

Higher thermal ratings may be obtained using oil coolers.

Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.

High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.



TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 20/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	90.0	Input kW, Thermal	46	55	72	86	106	127	147	174	225	268	307	365	369	439
		Output Torque Nm, Thermal	4594	5541	7192	8873	10252	12364	14106	17012	21766	26252	29661	35776	35510	42833
		Input kW, Mechanical	52	57	81	90	138	153	219	242	321	355	546	605	795	880
		Output Torque Nm, Mechanical	5149	5767	8114	9087	13352	14954	21112	23646	31097	34829	53065	59433	77130	86385
		Efficiency %	91	92	92	93	93	94	93	94	93	94	93	94	93	94
1500	75.0	Input kW, Thermal	42	49	64	76	95	113	131	156	205	244	284	339	350	417
		Output Torque Nm, Thermal	4914	5926	7661	9240	10953	13211	15131	18248	23811	28719	33033	39843	40626	49002
		Input kW, Mechanical	47	51	74	81	127	140	193	213	284	314	486	538	714	791
		Output Torque Nm, Mechanical	5517	6179	8794	9849	14681	16442	22288	24962	32995	36594	56748	63558	83364	93367
		Efficiency %	91	92	92	93	93	94	93	94	93	94	93	94	93	94
1200	60.0	Input kW, Thermal	37	43	56	66	83	99	117	140	179	213	252	300	320	381
		Output Torque Nm, Thermal	5379	6487	8268	9972	11922	14381	16879	20357	25858	31189	36601	44147	46425	55996
		Input kW, Mechanical	41	45	65	72	112	124	179	198	261	289	444	491	651	721
		Output Torque Nm, Mechanical	6062	6746	9635	10791	16111	18044	25850	28952	37937	42489	64701	72466	95051	106457
		Efficiency %	90	92	91	92	92	93	92	93	93	94	93	94	93	94
1000	50.0	Input kW, Thermal	32	38	48	57	72	86	104	123	157	187	224	267	291	346
		Output Torque Nm, Thermal	5994	6747	8503	10256	12385	14941	17831	21507	27177	32781	39032	47083	50638	61080
		Input kW, Mechanical	37	41	58	64	101	111	161	178	236	261	400	443	582	644
		Output Torque Nm, Mechanical	6462	7237	10288	11522	17263	19335	27842	31183	40994	45913	69912	78302	101830	114049
		Efficiency %	90	91	91	92	92	93	92	93	93	94	93	94	93	94
750	37.5	Input kW, Thermal	25	29	36	43	56	66	81	96	125	149	183	217	243	290
		Output Torque Nm, Thermal	5670	6840	8485	10237	12604	15207	18381	22173	28758	34693	42137	50833	56334	67956
		Input kW, Mechanical	31	34	48	53	83	92	134	148	197	218	337	372	492	545
		Output Torque Nm, Mechanical	7117	7971	11281	12635	18901	21169	30666	34346	45378	50823	77992	87351	114463	128199
		Efficiency %	88	90	90	91	91	92	91	93	92	93	93	94	93	94
500	25.0	Input kW, Thermal	17	20	24	29	38	45	55	65	90	106	133	159	184	218
		Output Torque Nm, Thermal	5659	6828	8312	10030	12736	15370	18507	22331	30435	36724	45716	55162	63143	76183
		Input kW, Mechanical	24	26	38	41	65	72	104	115	152	168	258	285	376	413
		Output Torque Nm, Mechanical	8078	9047	12961	14516	21799	24414	35211	39436	51871	58096	88712	99357	129922	144479
		Efficiency %	87	89	88	90	89	91	90	91	91	92	92	93	92	93
250	12.5	Input kW, Thermal	10.0	12	14	17	23	27	32	38	51	60	79	94	113	134
		Output Torque Nm, Thermal	6516	7866	9353	11291	14968	18072	21166	25551	33518	40465	52758	63691	75967	91699
		Input kW, Mechanical	15	17	24	26	41	45	66	73	96	106	164	162	243	239
		Output Torque Nm, Mechanical	9931	11122	15933	17845	26859	30083	43346	48548	63849	71511	110203	110203	163854	163854
		Efficiency %	83	86	85	87	86	88	87	89	88	90	89	91	90	91
Max Output Torque Nm	Single Key		11200	12000	17000	24000	41000	51000	72000							
	Standard Shaft		15800	21000	27300	43400	77700	108000	146400							

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.

TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 25/1 Preferred Ratio Unit Sizes 10", 12", 14".

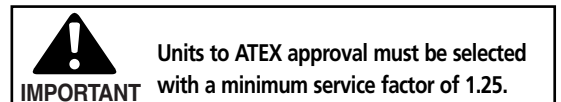
Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	72.0	Input kW, Thermal	42	50	63	74	88	105	121	143	194	230	256	304	322	382
		Output Torque Nm, Thermal	4879	5883	7331	8840	10415	12558	14210	17134	23010	27747	30564	36857	38390	46297
		Input kW, Mechanical	47	52	73	81	108	119	173	191	251	277	398	439	599	661
		Output Torque Nm, Mechanical	5525	6188	8619	9653	12717	14243	20409	22858	29857	33440	47693	53416	71924	80555
		Efficiency %	90	91	91	92	91	92	91	92	92	93	92	93	92	93
1500	60.0	Input kW, Thermal	37	44	56	66	79	94	108	128	176	209	237	281	304	361
		Output Torque Nm, Thermal	5200	6271	7804	9410	11125	13415	15255	18393	25069	30230	33999	40998	43643	52630
		Input kW, Mechanical	43	47	67	73	103	114	162	179	235	260	362	400	550	608
		Output Torque Nm, Mechanical	5954	6668	9339	10459	14571	16320	22974	25731	33586	37616	52234	58502	79493	89032
		Efficiency %	90	91	90	92	91	92	91	92	92	93	92	93	92	93
1200	48.0	Input kW, Thermal	33	39	48	57	69	82	97	115	152	181	210	249	275	327
		Output Torque Nm, Thermal	5677	6846	8416	10148	12107	14599	17026	20530	27112	32695	37624	45370	49524	59722
		Input kW, Mechanical	37	41	58	64	91	100	143	158	207	228	316	349	483	534
		Output Torque Nm, Mechanical	6461	7237	10184	11406	15946	17860	25276	28309	36809	41226	56926	63757	87329	97809
		Efficiency %	89	90	90	91	91	92	91	92	91	93	92	93	92	93
1000	40.0	Input kW, Thermal	29	34	42	49	60	71	86	101	134	159	187	222	249	296
		Output Torque Nm, Thermal	5897	7112	8651	10433	12575	15166	17993	21697	28423	34277	40090	48346	53758	64830
		Input kW, Mechanical	33	37	52	57	81	89	129	142	186	205	284	314	429	474
		Output Torque Nm, Mechanical	6657	7680	10810	12107	16973	19010	27095	30346	39561	44308	61273	68625	92938	104091
		Efficiency %	88	90	89	91	90	91	90	92	91	93	92	93	92	93
750	30.0	Input kW, Thermal	22	26	32	37	46	55	67	79	107	127	152	180	208	247
		Output Torque Nm, Thermal	5973	7205	8631	10410	12796	15433	18555	22377	29996	36178	43234	52142	59461	71713
		Input kW, Mechanical	22	31	43	47	67	73	106	117	154	170	238	263	362	400
		Output Torque Nm, Mechanical	7612	8525	11842	13263	18471	20688	29627	33182	43416	48626	67996	76156	10419	116647
		Efficiency %	87	89	88	90	89	90	89	91	91	92	91	92	92	93
500	20.0	Input kW, Thermal	15	18	21	25	32	38	46	54	76	90	111	132	156	185
		Output Torque Nm, Thermal	5966	7198	8455	10199	12928	15596	18683	22536	31962	38231	46864	56529	66346	80028
		Input kW, Mechanical	22	24	34	37	52	57	83	91	120	132	185	204	282	311
		Output Torque Nm, Mechanical	8598	9630	13561	15189	21245	23794	34069	38157	49915	55904	78286	87680	120229	134657
		Efficiency %	85	87	86	88	87	89	88	90	89	91	90	91	91	92
250	10.0	Input kW, Thermal	9.0	11	12	14	19	23	27	32	43	51	66	78	97	114
		Output Torque Nm, Thermal	6890	8316	9516	11484	15188	18330	21352	25764	34913	42134	50052	65225	79689	96161
		Input kW, Mechanical	14	15	21	23	33	36	52	57	75	82	116	124	179	175
		Output Torque Nm, Mechanical	10389	11635	16470	18446	25895	29003	41474	46451	60630	67906	95410	104030	148060	148060
		Efficiency %	82	84	83	85	84	86	85	87	86	88	87	89	88	90
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.

Higher thermal ratings may be obtained using oil coolers.

Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.

High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.




TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 30/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	60.0	Input kW, Thermal	38	45	57	67	77	91	107	126	165	195	216	256	260	308
		Output Torque Nm, Thermal	5230	6306	7900	9525	10805	13028	14927	17996	23200	27971	30266	36491	36253	43710
		Input kW, Mechanical	41	45	65	71	96	106	154	170	226	249	372	410	535	590
		Output Torque Nm, Mechanical	5682	6364	9024	10107	13522	15145	21651	24249	31900	35728	52487	58785	75337	84377
		Efficiency %	89	91	90	91	90	91	90	91	91	92	91	92	91	91
1500	50.0	Input kW, Thermal	34	40	50	59	69	81	95	113	150	177	200	237	247	292
		Output Torque Nm, Thermal	5554	6697	8366	10087	11514	13882	15957	19239	25280	30480	33740	40679	41506	50043
		Input kW, Mechanical	37	40	58	64	87	96	138	152	203	223	337	371	490	539
		Output Torque Nm, Mechanical	6095	6826	9724	10891	14645	16403	23171	25952	34321	38440	57109	63962	82988	92947
		Efficiency %	89	90	89	91	90	91	90	91	91	92	91	92	91	92
1200	40.0	Input kW, Thermal	29	35	43	51	60	71	85	101	130	154	177	210	225	267
		Output Torque Nm, Thermal	6045	7290	8982	10831	12500	15072	17737	21385	27346	32972	37424	45121	47475	57240
		Input kW, Mechanical	32	35	51	56	76	84	122	134	177	195	292	322	428	472
		Output Torque Nm, Mechanical	6561	7349	10510	11772	15923	17384	25455	28510	37409	41899	61868	69292	90884	101790
		Efficiency %	88	89	89	90	89	90	90	91	90	91	91	92	91	92
1000	33.3	Input kW, Thermal	26	30	37	44	52	62	75	89	114	135	158	187	205	243
		Output Torque Nm, Thermal	6272	7564	9214	11111	12969	15638	18698	22545	28671	34570	39936	48151	51817	62475
		Input kW, Mechanical	28	31	45	49	68	75	109	119	159	175	261	288	379	418
		Output Torque Nm, Mechanical	6904	7732	11076	12405	16861	18884	27156	30415	40100	44912	66291	74246	96373	107938
		Efficiency %	87	89	88	89	88	90	89	90	90	91	90	92	91	92
750	25.0	Input kW, Thermal	20	23	28	33	40	48	59	69	91	108	129	153	172	204
		Output Torque Nm, Thermal	6351	7659	9179	11070	13183	15898	19238	23198	30259	36488	43136	52014	57680	69548
		Input kW, Mechanical	24	26	38	42	57	62	90	98	132	145	221	243	324	356
		Output Torque Nm, Mechanical	7701	8625	12299	13775	18544	20769	19530	33073	44000	49280	74131	83027	109169	122270
		Efficiency %	86	88	87	88	87	89	88	90	89	90	90	91	90	91
500	16.7	Input kW, Thermal	14	16	19	22	28	33	40	47	65	77	95	112	130	154
		Output Torque Nm, Thermal	6351	7662	8995	10850	13316	16061	19349	23335	31966	38552	46800	56438	64654	77966
		Input kW, Mechanical	19	20	29	32	44	48	70	77	103	113	172	189	253	278
		Output Torque Nm, Mechanical	8698	9742	13896	15563	21014	23536	33932	38003	50533	56597	85291	95526	126298	141454
		Efficiency %	83	86	84	87	85	87	86	88	87	89	88	90	89	90
250	8.3	Input kW, Thermal	8.2	9.6	11	13	17	20	24	28	37	44	57	67	81	95
		Output Torque Nm, Thermal	7364	8887	10160	12260	15660	18895	22130	26698	35204	42472	53956	65089	77701	93726
		Input kW, Mechanical	12	12	18	20	28	30	45	48	65	71	109	106	160	156
		Output Torque Nm, Mechanical	10337	11578	16664	18664	25473	28530	41358	46321	61383	68749	103783	104030	154572	154572
		Efficiency %	80	83	81	83	82	84	83	85	84	86	85	87	88	88
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 35/1 Non Preferred Ratio.

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	51.4	Input kW, Thermal	30	35	45	53	63	74	93	110	146	173	192	227	232	274
		Output Torque Nm, Thermal	4658	5615	7171	8645	10041	12104	15008	18093	23766	28651	31080	37469	37313	44984
		Input kW, Mechanical	32	35	50	55	75	82	125	137	193	212	305	336	420	462
		Output Torque Nm, Mechanical	4967	5563	7982	8640	11940	13373	20138	22555	31402	35170	49678	55639	68176	76357
		Efficiency %	86	88	87	89	88	89	89	90	89	91	89	91	89	90
1500	42.9	Input kW, Thermal	27	31	40	48	57	67	83	98	133	157	178	210	220	260
		Output Torque Nm, Thermal	4980	6003	7650	9222	10769	12982	16046	19343	25849	31162	34571	41677	42620	51381
		Input kW, Mechanical	28	31	45	50	67	74	111	122	172	189	275	302	382	420
		Output Torque Nm, Mechanical	5324	5963	8606	9639	12861	14405	21440	24013	33578	37608	53701	60145	74581	83530
		Efficiency %	86	87	87	88	87	89	88	90	89	91	89	91	89	91
1200	34.3	Input kW, Thermal	24	28	35	41	50	59	74	88	115	136	157	186	200	236
		Output Torque Nm, Thermal	5449	6559	8265	9964	11758	14175	17834	21500	27909	33647	38256	46120	48620	58614
		Input kW, Mechanical	25	27	40	43	59	65	98	107	150	165	237	261	334	367
		Output Torque Nm, Mechanical	5719	6405	9302	10419	13987	15665	23495	26314	36518	40900	57894	64842	81566	91354
		Efficiency %	85	87	86	88	87	88	88	89	89	90	89	91	89	91
1000	28.6	Input kW, Thermal	21	24	31	36	43	51	66	77	101	119	140	166	182	215
		Output Torque Nm, Thermal	5666	6831	8504	10252	12236	14751	18800	22665	29227	35237	40760	49140	52969	63858
		Input kW, Mechanical	22	24	35	38	53	57	88	96	135	148	214	235	296	326
		Output Torque Nm, Mechanical	6042	6767	9810	10987	14833	16613	25098	28109	39235	43944	62469	69966	86732	97140
		Efficiency %	84	86	85	87	86	88	87	89	88	90	89	90	89	91
750	21.4	Input kW, Thermal	16	19	23	27	34	40	51	60	81	95	114	135	152	180
		Output Torque Nm, Thermal	5742	6923	8490	10236	12470	15034	19342	23321	30808	37146	43949	52988	58832	70929
		Input kW, Mechanical	19	20	30	32	44	48	73	80	114	125	182	200	255	280
		Output Torque Nm, Mechanical	6696	7500	10890	12197	16407	18376	27664	30984	43525	48748	70390	78837	98940	110813
		Efficiency %	82	84	83	86	85	87	86	88	87	89	88	90	89	90
500	14.3	Input kW, Thermal	11	13	16	18	23	27	35	41	58	68	84	99	115	136
		Output Torque Nm, Thermal	5730	6909	8315	10026	12601	15194	19453	23457	35523	39219	47620	57421	65826	79369
		Input kW, Mechanical	14	16	23	25	34	37	57	62	88	96	140	153	197	216
		Output Torque Nm, Mechanical	7560	8467	12334	13814	18600	20832	31520	35302	49375	55299	79788	86362	113101	126673
		Efficiency %	79	82	81	84	82	85	84	86	86	88	86	88	87	89
250	7.1	Input kW, Thermal	6.7	7.7	9.3	11	14	17	21	25	33	39	50	59	72	84
		Output Torque Nm, Thermal	6594	7953	9341	11266	14768	17811	22243	26828	35823	43211	54887	66200	79048	95336
		Input kW, Mechanical	9.1	9.8	15	16	22	24	36	39	56	60	89	93	125	127
		Output Torque Nm, Mechanical	9029	10112	14829	16608	22503	25203	38254	42845	60023	67226	97118	104030	137899	144479
		Efficiency %	75	78	77	80	78	81	80	83	82	84	83	85	84	86
Max Output Torque Nm	Single Key		11200	12000	17000	24000	41000	51000	72000							
	Standard Shaft		15800	21000	27300	43400	77700	108000	146400							

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.

TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 40/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	45.0	Input kW, Thermal	28	33	42	50	64	75	80	94	132	156	173	205	219	258
		Output Torque Nm, Thermal	5089	6135	7667	9242	11633	14024	14415	17376	24176	29144	31670	38177	39880	48079
		Input kW, Mechanical	33	36	50	55	64	70	103	113	159	175	252	277	372	408
		Output Torque Nm, Mechanical	5925	6636	9180	10281	11718	13125	18644	20881	29255	32765	46336	51897	68469	76685
		Efficiency %	86	87	86	88	88	89	87	88	88	90	88	89	89	90
1500	37.5	Input kW, Thermal	25	30	38	44	57	67	72	84	119	141	160	189	206	243
		Output Torque Nm, Thermal	5414	6526	8142	9814	12328	14862	15477	18656	26260	31656	35175	42403	45259	54559
		Input kW, Mechanical	29	32	45	50	58	63	92	100	141	155	227	249	337	370
		Output Torque Nm, Mechanical	6311	7068	9847	11029	12597	14108	19819	22197	31169	34909	49990	55989	74630	83586
		Efficiency %	85	87	86	87	88	89	87	88	88	89	88	90	89	90
1200	30.0	Input kW, Thermal	22	26	33	38	49	58	64	76	103	122	142	167	186	220
		Output Torque Nm, Thermal	5900	7113	8760	10561	13321	16059	17270	20818	28316	34135	38864	46850	51262	61796
		Input kW, Mechanical	25	28	39	43	50	55	80	88	124	136	195	214	293	321
		Output Torque Nm, Mechanical	6738	7546	10588	11859	13572	15201	21645	24242	33912	37982	53744	60193	81116	90850
		Efficiency %	84	86	85	87	87	88	86	88	88	89	88	89	89	90
1000	25.0	Input kW, Thermal	19	23	28	33	43	50	57	67	91	107	126	149	168	199
		Output Torque Nm, Thermal	6124	7383	8996	10845	13785	16620	18249	21998	29628	35718	41637	49868	55572	66993
		Input kW, Mechanical	23	25	35	38	44	49	73	79	112	123	178	195	263	289
		Output Torque Nm, Mechanical	7201	8065	11180	12522	14292	16607	23294	26089	36621	41016	58621	65655	87346	97861
		Efficiency %	83	85	84	86	86	87	86	87	87	89	88	89	88	90
750	18.8	Input kW, Thermal	15	18	22	25	33	39	45	52	73	85	103	121	140	165
		Output Torque Nm, Thermal	6201	7477	8968	10812	13985	16863	18818	22686	31205	37621	44552	53711	61367	73982
		Input kW, Mechanical	19	21	30	32	38	41	61	67	94	103	151	166	225	247
		Output Torque Nm, Mechanical	7861	8805	12404	13892	15914	17824	25835	28935	40694	45577	65822	73721	98937	110810
		Efficiency %	81	84	82	85	84	86	84	86	86	88	87	89	88	89
500	12.5	Input kW, Thermal	10	12	15	17	23	27	31	36	52	61	76	89	106	125
		Output Torque Nm, Thermal	6193	7472	8785	10593	14126	17034	18944	22840	32925	39699	48233	58154	68361	82422
		Input kW, Mechanical	15	16	23	25	29	32	47	51	72	79	115	126	173	189
		Output Torque Nm, Mechanical	8861	9925	14031	15714	18018	20180	29167	35667	45796	51292	73792	82647	111835	125255
		Efficiency %	79	81	80	82	82	84	82	84	84	86	85	87	86	88
250	6.3	Input kW, Thermal	6.4	7.3	8.7	10	14	17	19	22	30	35	46	53	66	77
		Output Torque Nm, Thermal	7167	8644	9898	11938	16660	20096	21631	26085	36721	43745	55582	67030	82000	98890
		Input kW, Mechanical	9.4	10	15	16	18	20	30	33	46	50	74	80	110	113
		Output Torque Nm, Mechanical	10591	11862	16828	18848	21631	24227	35403	39651	55694	62377	90075	100884	136144	144479
		Efficiency %	74	77	75	78	78	81	78	80	80	83	81	84	82	85
Max Output Torque Nm	Single Key	11200	12000	17000	24000	41000	51000	72000								
	Standard Shaft	15800	21000	27300	43400	77700	108000	146400								

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 45/1 Non Preferred Ratio

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	40.0	Input kW, Thermal	26	30	38	45	55	65	76	89	117	137	164	193	182	214
		Output Torque Nm, Thermal	5196	6263	7635	9203	11234	13542	15375	18532	23952	28871	33354	40206	36398	43874
		Input kW, Mechanical	30	32	45	49	71	78	111	122	162	178	216	237	311	340
		Output Torque Nm, Mechanical	5942	6587	9078	10096	14556	16211	22745	25474	33416	37426	44234	49542	62719	70246
		Efficiency %	84	86	85	86	86	88	86	88	87	88	88	89	86	87
1500	33.3	Input kW, Thermal	23	27	34	40	49	58	68	79	106	125	150	177	173	203
		Output Torque Nm, Thermal	5524	6659	8110	9775	11935	14387	16409	19779	26027	31373	36851	44421	41707	50272
		Input kW, Mechanical	27	29	41	44	64	70	99	108	144	158	194	212	285	312
		Output Torque Nm, Mechanical	6312	7070	9724	10891	15647	17524	24076	26965	35561	39829	47651	53369	69380	77706
		Efficiency %	84	86	84	86	85	87	86	87	87	88	88	89	86	88
1200	26.7	Input kW, Thermal	21	24	30	35	43	50	60	71	92	108	132	156	158	186
		Output Torque Nm, Thermal	6017	7253	8728	10521	12922	15577	18204	21943	28076	33843	40492	48810	47751	57558
		Input kW, Mechanical	23	25	35	38	56	61	88	96	127	139	168	185	251	274
		Output Torque Nm, Mechanical	6737	7545	10466	11721	16933	18965	26648	29846	39123	43818	51696	57899	76350	85513
		Efficiency %	82	85	83	85	85	87	85	87	86	88	87	89	86	88
1000	22.2	Input kW, Thermal	18	21	26	30	37	44	53	62	81	95	117	138	144	169
		Output Torque Nm, Thermal	6244	7528	8694	10805	13387	16138	19171	23109	29384	35421	42946	51770	52154	62865
		Input kW, Mechanical	21	23	32	35	50	55	79	87	115	126	154	168	224	245
		Output Torque Nm, Mechanical	7237	8106	11158	12497	18055	20222	28669	32110	42294	47369	56331	63091	81766	91578
		Efficiency %	81	84	82	84	84	86	84	86	86	87	87	88	86	88
750	16.7	Input kW, Thermal	14	16	20	23	29	34	42	49	65	76	96	112	121	142
		Output Torque Nm, Thermal	6323	7623	8936	10773	13593	16387	19704	23753	30954	37315	40673	55542	58097	70030
		Input kW, Mechanical	17	19	27	29	42	46	66	72	97	106	130	142	190	208
		Output Torque Nm, Mechanical	7842	8783	12249	13719	19825	22204	31500	35280	46679	52280	62709	70234	91893	102920
		Efficiency %	79	82	80	83	82	84	83	85	84	86	86	88	86	87
500	11.1	Input kW, Thermal	9.6	11	13	15	20	23	29	34	47	54	70	82	92	108
		Output Torque Nm, Thermal	6319	7619	8754	10554	13728	16551	19807	23879	32662	39378	49752	59983	65137	78523
		Input kW, Mechanical	13	14	21	22	33	36	51	56	74	80	98	107	146	159
		Output Torque Nm, Mechanical	8817	9875	13847	15509	22463	25158	35534	39798	52141	58398	69539	77884	103847	116309
		Efficiency %	77	80	78	81	80	82	81	83	82	85	84	86	84	86
250	5.6	Input kW, Thermal	5.9	6.8	7.9	9.1	13	15	17	20	27	31	43	49	58	67
		Output Torque Nm, Thermal	7312	8819	9859	11890	16163	19492	22651	27314	35973	43380	57337	69144	78224	94317
		Input kW, Mechanical	8.6	9.1	13	14	21	22	33	35	48	51	63	68	93	101
		Output Torque Nm, Mechanical	10568	11836	16614	18608	26963	30198	42947	48101	63464	71079	85131	95347	125904	141012
		Efficiency %	72	76	73	76	75	78	79	79	78	81	80	82	80	83
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.

TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 50/1 Preferred Ratio Unit Sizes 10", 12", 14".

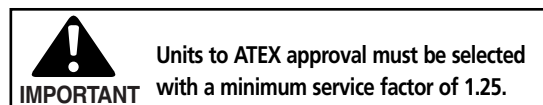
Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	36.0	Input kW, Thermal	24	28	35	41	50	59	68	80	108	127	142	167	172	202
		Output Torque Nm, Thermal	5158	6217	7776	9372	11115	13397	15312	18239	24323	29317	31750	38269	38188	46030
		Input kW, Mechanical	27	29	42	45	64	69	101	109	148	159	245	265	356	385
		Output Torque Nm, Mechanical	5938	6492	9182	10080	14304	15750	22521	24873	33387	36907	55215	61199	79863	88771
		Efficiency %	83	85	84	85	85	86	85	86	86	87	86	87	86	87
1500	30.0	Input kW, Thermal	21	25	32	37	45	52	61	71	98	115	131	154	163	191
		Output Torque Nm, Thermal	5483	6609	8250	9944	11825	14253	16176	19497	26416	31840	35271	42513	43553	52496
		Input kW, Mechanical	24	26	38	41	58	52	89	97	131	143	219	240	322	352
		Output Torque Nm, Mechanical	6304	7060	9838	11018	15427	17278	23825	26684	35492	39751	59513	66655	87356	97839
		Efficiency %	82	84	83	85	84	86	84	86	86	87	86	87	86	87
1200	24.0	Input kW, Thermal	19	22	27	32	39	46	55	64	85	100	116	136	148	173
		Output Torque Nm, Thermal	5973	7199	8871	10693	12818	15451	17981	21662	28481	34329	38977	46980	49604	59789
		Input kW, Mechanical	21	23	33	36	51	56	80	87	117	127	192	210	283	310
		Output Torque Nm, Mechanical	6769	7582	10642	11919	16824	18842	26541	29726	39269	43981	65043	72848	96113	107647
		Efficiency %	81	83	82	84	83	85	84	86	85	87	86	87	86	87
1000	20.0	Input kW, Thermal	16	19	24	28	34	40	48	57	75	87	103	121	134	157
		Output Torque Nm, Thermal	6198	7471	9106	10977	13288	16017	18943	22832	29798	35919	41491	50011	53979	65052
		Input kW, Mechanical	19	21	30	32	46	50	72	79	106	115	174	190	252	275
		Output Torque Nm, Mechanical	7246	8115	11351	12714	17946	20100	28529	31953	42350	47432	70303	78739	102399	114687
		Efficiency %	80	82	81	83	82	84	83	85	85	86	85	87	86	87
750	15.0	Input kW, Thermal	13	15	18	21	27	31	38	44	60	70	84	99	112	132
		Output Torque Nm, Thermal	6276	7556	9076	10941	13498	16272	19486	23488	31380	37827	44689	53868	59867	72162
		Input kW, Mechanical	16	17	25	27	38	41	61	66	88	96	147	160	214	233
		Output Torque Nm, Mechanical	7889	8836	12393	13880	19527	21871	31200	34994	46504	52084	78094	87465	114809	128586
		Efficiency %	89	80	79	82	81	83	81	84	83	85	84	86	85	87
500	10.0	Input kW, Thermal	8.8	10	12	14	18	21	26	31	43	50	62	73	85	100
		Output Torque Nm, Thermal	6272	7562	8891	10719	13631	16434	19593	23620	33103	39908	48376	58318	66896	80640
		Input kW, Mechanical	12	13	19	21	30	32	47	51	68	73	111	121	163	178
		Output Torque Nm, Mechanical	8767	9819	13939	15612	22139	24795	35166	39386	52070	58318	86295	97356	128762	144213
		Efficiency %	75	78	79	79	78	81	79	81	81	83	82	84	83	85
250	5.0	Input kW, Thermal	5.5	6.3	7.4	8.5	12	13	16	18	25	29	38	44	54	63
		Output Torque Nm, Thermal	7257	8751	10021	12084	16035	19335	22393	27000	36460	43693	55728	67193	80259	96766
		Input kW, Mechanical	7.9	8.4	12	13	19	20	30	32	43	47	71	69	105	101
		Output Torque Nm, Mechanical	10531	11795	16729	18736	26552	29738	42348	47429	62950	70505	105737	105737	156728	156728
		Efficiency %	70	73	71	75	73	76	74	77	76	79	77	80	78	81
Max Output Torque Nm	Single Key		11200		12000		17000		24000		41000		51000		72000	
	Standard Shaft		15800		21000		27300		43400		77700		108000		146400	

Notes: Ratings in the grey shaded area require force feed lubrication.

Higher thermal ratings may be obtained using oil coolers.

Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.

High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.



TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 60/1 Preferred Ratio Unit Sizes 10", 12", 14".


Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	30.0	Input kW, Thermal	21	25	32	37	44	51	60	70	87	101	124	145	151	176
		Output Torque Nm, Thermal	5474	6597	8285	9986	11364	13696	15522	18708	22343	26928	32356	38996	38985	46987
		Input kW, Mechanical	23	24	36	38	53	56	86	89	120	125	212	220	310	321
		Output Torque Nm, Mechanical	5890	6287	9403	10074	13847	14895	22267	23946	31013	33267	55811	59764	81274	86745
		Efficiency %	81	83	82	84	83	84	83	84	82	84	84	85	84	85
1500	25.0	Input kW, Thermal	19	22	29	33	39	46	54	62	79	92	114	133	142	166
		Output Torque Nm, Thermal	5802	6993	8752	10549	12072	14550	16556	19954	24484	29509	35882	43247	44380	53489
		Input kW, Mechanical	21	22	33	35	49	52	77	82	108	113	191	201	280	295
		Output Torque Nm, Mechanical	6248	6966	10098	11220	15072	16681	23954	26317	33481	36244	60479	65530	88700	96279
		Efficiency %	80	82	81	83	82	84	82	84	82	84	84	85	84	85
1200	20.0	Input kW, Thermal	17	20	25	29	34	40	48	56	69	81	101	118	129	150
		Output Torque Nm, Thermal	6305	7600	9377	11302	13069	15752	18355	22122	26633	32099	39582	47706	50442	60795
		Input kW, Mechanical	18	20	29	31	43	47	69	74	94	102	166	180	244	266
		Output Torque Nm, Mechanical	6787	7601	10953	12268	16451	18425	26457	29362	36461	40836	65512	73373	96773	108385
		Efficiency %	79	81	80	82	81	83	81	83	82	84	83	85	84	85
1000	16.7	Input kW, Thermal	15	17	21	25	30	35	42	49	61	71	90	105	117	136
		Output Torque Nm, Thermal	6537	7880	9609	11583	13539	16318	19321	23287	28017	33767	42086	50725	54813	66064
		Input kW, Mechanical	16	17	26	28	38	42	62	67	85	92	149	163	216	235
		Output Torque Nm, Mechanical	7163	8023	11603	12995	17432	19523	28255	31646	39259	43970	70534	78998	102514	114816
		Efficiency %	78	80	79	81	80	82	81	83	81	83	83	85	83	85
750	12.5	Input kW, Thermal	12	13	16	19	23	27	33	39	49	57	73	86	98	114
		Output Torque Nm, Thermal	6618	7978	9567	11532	13746	16569	19851	23927	29667	35757	45270	54564	60690	73148
		Input kW, Mechanical	14	15	22	23	32	34	51	55	71	77	125	136	183	198
		Output Torque Nm, Mechanical	7855	8798	12640	14156	18759	21010	30648	34326	43006	48166	77779	87112	114340	128061
		Efficiency %	75	78	77	79	78	80	79	81	80	82	82	84	882	85
500	8.3	Input kW, Thermal	8.1	9.2	11	13	16	19	23	27	36	42	54	63	75	87
		Output Torque Nm, Thermal	6623	7984	9378	11305	13881	16733	19950	24048	31389	37834	48959	59015	67723	81631
		Input kW, Mechanical	11	11	17	18	25	27	40	43	55	59	96	104	139	150
		Output Torque Nm, Mechanical	8698	9741	14129	15824	21326	23885	34613	38766	48151	53929	86842	97264	127284	142559
		Efficiency %	72	76	73	77	75	78	76	79	77	80	79	82	80	83
250	4.2	Input kW, Thermal	5.0	5.7	6.8	7.8	10	12	14	16	21	24	33	38	47	55
		Output Torque Nm, Thermal	7692	9275	10607	12789	16339	19700	22813	27503	34510	41604	56391	67985	81210	97901
		Input kW, Mechanical	6.8	7.1	11	11	16	17	26	27	35	38	61	59	90	87
		Output Torque Nm, Mechanical	10358	11601	16832	18852	25432	28484	41360	46323	57661	64580	104705	104705	155711	155711
		Efficiency %	67	71	68	72	70	73	71	74	72	75	74	77	75	78
Max Output Torque Nm	Single Key		11200	12000	17000	24000	41000	51000	72000							
	Standard Shaft		15800	21000	27300	43400	77700	108000	146400							

Notes: Ratings in the grey shaded area require force feed lubrication.

Higher thermal ratings may be obtained using oil coolers.

Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.

High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.



IMPORTANT Units to ATEX approval must be selected with a minimum service factor of 1.25.


TW Series - Single Reduction - Selection Data

Mineral and Synthetic Oils

Nominal ratio: 70/1 Preferred Ratio Unit Sizes 10", 12", 14".

Input rpm	Output rpm	Gear Ratings	Centre Distance													
			10"		12"		14"		17"		20"		24"		28"	
			Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn	Min	Syn
1800	25.7	Input kW, Thermal	18	21	27	31	36	42	54	62	76	88	103	119	135	157
		Output Torque Nm, Thermal	5082	6125	7649	9218	10427	12566	15666	18879	21977	26486	29808	35924	39546	47661
		Input kW, Mechanical	19	19	30	30	44	44	72	72	107	107	174	174	247	247
		Output Torque Nm, Mechanical	5344	5573	8541	8890	12666	13158	21079	21880	31386	32526	51274	53035	73438	75911
		Efficiency %	76	79	78	80	79	81	80	82	80	82	80	82	82	83
1500	21.4	Input kW, Thermal	16	19	24	28	33	38	48	55	69	80	95	110	127	147
		Output Torque Nm, Thermal	5408	6518	8126	9794	11159	13448	16697	20122	24126	29076	33344	40185	44962	54187
		Input kW, Mechanical	17	18	27	28	40	41	64	66	96	98	156	160	222	227
		Output Torque Nm, Mechanical	5742	6190	9241	9931	13736	14711	22551	24067	33707	35472	55425	58457	79176	84196
		Efficiency %	76	79	78	80	78	80	80	82	80	82	80	82	82	83
1200	17.1	Input kW, Thermal	14	16	21	24	29	33	43	49	61	70	85	98	115	133
		Output Torque Nm, Thermal	5895	7104	8747	10542	12158	14653	18497	22292	26292	31686	37121	44737	51031	61502
		Input kW, Mechanical	15	16	24	26	35	38	57	61	83	89	135	144	192	206
		Output Torque Nm, Mechanical	6169	6910	9994	11182	14968	16710	24761	27579	36348	40402	59880	66166	86475	95597
		Efficiency %	75	77	76	79	77	79	79	81	79	81	80	82	82	83
1000	14.3	Input kW, Thermal	13	14	18	21	25	29	38	44	54	62	76	88	104	121
		Output Torque Nm, Thermal	6119	7374	8984	10827	12638	15231	19462	23456	27689	33370	39707	47854	55399	66766
		Input kW, Mechanical	13	14	21	23	31	34	51	55	75	81	121	131	170	184
		Output Torque Nm, Mechanical	6481	7258	10527	11790	15841	17742	26335	29495	39130	43826	63795	71450	91252	102203
		Efficiency %	74	76	75	78	76	79	78	80	79	81	80	82	81	83
750	10.7	Input kW, Thermal	9.9	11	14	16	20	23	30	34	43	50	62	72	87	101
		Output Torque Nm, Thermal	6195	7467	8957	10795	12867	15508	19988	24091	29354	35377	42995	51817	61267	73840
		Input kW, Mechanical	11	12	18	19	26	28	42	45	63	68	101	107	143	155
		Output Torque Nm, Mechanical	7123	7978	11366	12730	16985	19023	28414	31824	42709	47835	70399	78847	101409	113578
		Efficiency %	71	74	73	76	74	77	76	79	77	79	78	81	80	82
500	7.1	Input kW, Thermal	6.9	7.9	9.6	11	14	16	21	24	32	37	47	54	67	77
		Output Torque Nm, Thermal	6189	7460	8772	10574	12996	15665	20084	24208	31077	37456	46703	56289	68304	82326
		Input kW, Mechanical	8.8	9.3	14	15	21	22	33	35	49	52	78	84	110	119
		Output Torque Nm, Mechanical	7897	8845	12835	14375	19277	21590	32104	35956	48034	53798	79041	88526	113741	127390
		Efficiency %	68	71	69	73	71	74	73	76	74	77	76	79	78	80
250	3.6	Input kW, Thermal	4.4	4.9	5.9	6.6	8.9	10	13	15	19	22	29	33	43	49
		Output Torque Nm, Thermal	7151	8621	9876	11905	15235	18365	22968	27688	34156	41172	53781	64827	81878	98700
		Input kW, Mechanical	5.7	5.9	9.0	9.5	13	14	21	22	31	33	51	53	71	71
		Output Torque Nm, Mechanical	9314	10432	15198	17022	22922	25673	38184	42766	56961	63796	94964	104030	137828	144479
		Efficiency %	62	66	63	67	65	69	67	71	68	72	77	75	73	76
Max Output Torque Nm	Single Key	11200		12000		17000		24000		41000		51000		72000		
	Standard Shaft	15800		21000		27300		43400		77700		108000		146400		

Notes: Ratings in the grey shaded area require force feed lubrication.
 Higher thermal ratings may be obtained using oil coolers.
 Two keys must be specified for the wheel and output shaft when maximum output torque for single key is exceeded.
 High tensile steel output shaft must be specified when maximum output torque for standard shaft is exceeded.

 **IMPORTANT** Units to ATEX approval must be selected with a minimum service factor of 1.25.

TW Series - Double Reduction - Selection Data

Mineral or Synthetic Oil



Units to ATEX approval must be selected with a minimum service factor of 1.25.

Input Speed: 1450 rev/min

Ratio	Output rpm	Gear Ratings	TW Series Unit						
			TWD 10	TWD 12	TWD 14	TWD 17	TWD 20	TWD 24	TWD 28
75	19.0	Input kW, Mechanical	14.7	20.3	31.6	44.7	69.6	109	156
		Output Torque Nm, Mechanical	6137	8787	13470	19204	30196	47768	68331
		Efficiency %	83	84	85	86	87	88	88
150	10.0	Input kW, Mechanical	13.3	20.5	31.4	41.3	73	122	186
		Output Torque Nm, Mechanical	10000	15720	24695	32520	58303	100564	149689
		Efficiency %	79	81	78	83	84	82	83
250	6.0	Input kW, Mechanical	10.2	16.0	24.5	38.8	53.9	85	126
		Output Torque Nm, Mechanical	11887	18836	29561	47284	67800	108500	165000
		Efficiency %	76	76	76	77	79	80	82
300	5.0	Input kW, Mechanical	8.3	13.4	23.0	32.8	44.9	71	107
		Output Torque Nm, Mechanical	12600	19778	33651	47041	67800	108500	165000
		Efficiency %	71	74	76	75	79	80	81
500	3.0	Input kW, Mechanical	6.2	9.4	15.0	21	28.7	45	68.2
		Output Torque Nm, Mechanical	13872	21050	33902	48132	67800	108500	165000
		Efficiency %	67	69	71	72	74	75	76
750	2.0	Input kW, Mechanical	4.9	6.8	10.7	15.2	20.2	32.4	48
		Output Torque Nm, Mechanical	14780	20150	34000	48800	67800	108500	165000
		Efficiency %	62	64	66	67	70	70	72
1000	1.5	Input kW, Mechanical	14.1	5.5	8.6	12.1	16.0	25.4	37
		Output Torque Nm, Mechanical	15607	21050	34000	48800	67800	108500	165000
		Efficiency %	59	60	62	63	66	67	70
1500	1.0	Input kW, Mechanical	30	3.9	6.2	8.8	11.8	18.6	27.4
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	54	56	57	58	60	61	63
2000	0.73	Input kW, Mechanical	2.4	3.3	5.1	7.3	9.6	14.8	21.7
		Output Torque Nm, Mechanical	15284	21050	34000	48800	67800	108500	165000
		Efficiency %	47	48	51	51	54	56	58
2500	0.58	Input kW, Mechanical	2.1	2.7	4.3	6.0	7.9	12.4	18.5
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	44	46	48	49	52	53	54
3000	0.48	Input kW, Mechanical	1.8	2.4	3.8	5.4	7.2	10.9	16.2
		Output Torque Nm, Mechanical	15380	21050	34000	48800	67800	108500	165000
		Efficiency %	42	44	45	45	47	50	51
4200	0.35	Input kW, Mechanical	1.3	2.1	3.2	4.3	6.0	9.2	13.1
		Output Torque Nm, Mechanical	14184	21050	34000	48800	67800	108500	165000
		Efficiency %	36	37	38	41	41	43	46
4900	0.30	Input kW, Mechanical	1.2	1.9	2.9	4.0	5.4	8.3	12.0
		Output Torque Nm, Mechanical	14491	21050	34000	48800	67800	108500	165000
		Efficiency %	33	35	36	38	39	41	43

TW Series - Double Reduction - Selection Data

Mineral or Synthetic Oil



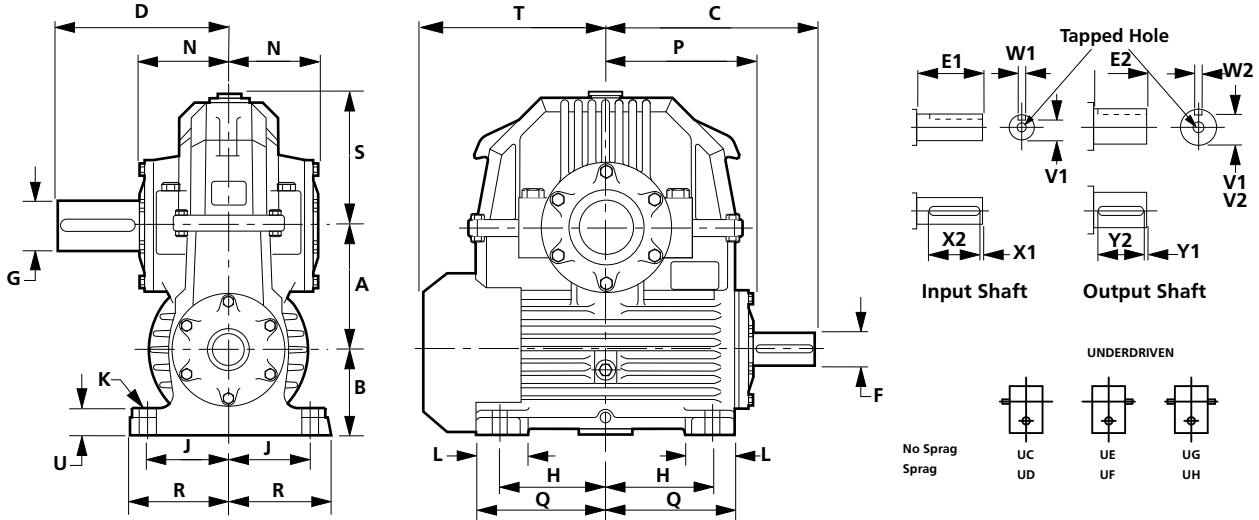
Units to ATEX approval must be selected with a minimum service factor of 1.25.

Input Speed: 960 rev/min

Ratio	Output rpm	Gear Ratings	TW Series Unit						
			TWD 10	TWD 12	TWD 14	TWD 17	TWD 20	TWD 24	TWD 28
75	12.8	Input kW, Mechanical	11.9	16.2	25.6	35.6	50.5	82	119
		Output Torque Nm, Mechanical	7302	9971	16078	22577	32403	53068	77644
		Efficiency %	81	82	83	84	85	86	87
150	6.4	Input kW, Mechanical	9.4	16.2	27	31	54.6	91	138
		Output Torque Nm, Mechanical	10824	18926	27317	37115	66912	108200	165000
		Efficiency %	77	78	76	80	82	80	80
250	3.8	Input kW, Mechanical	7.3	11.3	17.4	25.9	35	53.3	83
		Output Torque Nm, Mechanical	13028	20574	32453	48800	67800	108500	165000
		Efficiency %	71	72	74	75	77	78	79
300	3.2	Input kW, Mechanical	6.6	10.1	15.4	22.7	29.9	46.6	70
		Output Torque Nm, Mechanical	13596	21050	34000	48800	67800	108500	165000
		Efficiency %	69	71	74	72	76	78	79
500	1.9	Input kW, Mechanical	4.6	6.4	9.9	14.0	19	29.5	44.3
		Output Torque Nm, Mechanical	14877	21050	34000	48800	37800	108500	165000
		Efficiency %	64	66	68	69	71	73	74
750	1.3	Input kW, Mechanical	3.6	4.8	7.3	10.3	13.7	22.0	32
		Output Torque Nm, Mechanical	15817	21050	34000	48800	37800	108500	165000
		Efficiency %	59	61	63	64	67	67	70
1000	0.96	Input kW, Mechanical	2.8	3.8	5.8	8.1	10.8	10.9	24.7
		Output Torque Nm, Mechanical	15847	21050	34000	48800	37800	108500	165000
		Efficiency %	56	57	59	60	63	64	67
1500	0.64	Input kW, Mechanical	2.2	2.7	4.2	5.9	7.9	12.5	18.4
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	47	52	54	55	57	58	60
2000	0.48	Input kW, Mechanical	1.8	2.4	3.5	5.1	6.6	10.2	15.0
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	44	45	48	48	51	53	55
2500	0.38	Input kW, Mechanical	1.5	2.0	3.0	4.3	5.6	8.6	12.8
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	41	43	45	45	48	50	51
3000	0.32	Input kW, Mechanical	1.3	1.7	2.7	3.9	5.1	7.9	11.5
		Output Torque Nm, Mechanical	15817	21050	34000	48800	67800	108500	165000
		Efficiency %	39	41	42	42	44	46	48
4200	0.23	Input kW, Mechanical	1.0	1.5	2.3	3.1	4.3	6.5	9.2
		Output Torque Nm, Mechanical	14899	21050	34000	48000	67800	108500	165000
		Efficiency %	33	34	35	38	38	40	42
4900	0.19	Input kW, Mechanical	0.9	1.3	2.0	2.7	3.7	5.6	8.2
		Output Torque Nm, Mechanical	15091	21050	34000	48800	67800	108400	165000
		Efficiency %	31	32	33	35	36	38	40

TW Series - Single Reduction - Dimensions (mm)

TYPE TWU UNDERDRIVEN



Catalogue Number	A		B	C	D	F	G	H	J
	in.	mm.							
TWU 10	10.0	254.0	171.5	419	349	60.011/60.030	100.013/100.035	215.9	165.1
TWU 12	12.0	304.8	190.5	470	387	65.011/65.030	110.013/110.035	260.3	184.2
TWU 14	14.0	355.6	215.9	552	457	75.011/75.030	120.013/120.035	298.5	215.9
TWU 17‡	17.0	431.8	254.0	648	521	80.011/80.030	140.015/140.040	381.0	254.0
TWU 20‡	20.0	508.0	292.1	762	660	100.013/100.035	170.015/170.040	444.5	292.1
TWU 24‡	24.0	609.6	355.6	914	711	110.013/110.035	190.017/190.046	533.4	393.7
TWU 28§	28.0	711.2	406.4	1041	813	130.015/130.040	210.017/210.046	609.6	457.2

Catalogue Number	K	L	N	P	Q	R	S	T	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWU 12	38.5	102	198	335	302	229	318	427	30	12.5	507
TWU 14	44.5	127	235	400	362	270	375	505	86	18.6	840
TWU 17‡	44.5	152	286	481	438	324	448	603	89	34.1	1397
TWU 20‡	48	152	349	559	514	381	521	692	102	70.5	2034
TWU 24‡	52	209	419	632	584	483	597	800	114	132.0	3632
TWU 28§	52	216	465	716	660	559	740	889	127	168.0	5029

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWU 10	119	53/52.8	17.939/17.982	5	100	M20X42
TWU 12	130	58/57.8	17.939/17.982	10	100	M20X42
TWU 14	148	67.5/67.3	19.926/19.978	5	125	M20X42
TWU 17‡	171	71/70.8	21.926/21.978	10	140	M24X50
TWU 20‡	200	90/89.8	27.926/27.978	10	160	M24X50
TWU 24‡	286	100/99.8	27.926/27.978	10	220	M24X50
TWU 28§	291	119/118.8	31.912/31.974	10	220	M24X50

Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
167	90/98.8	27.926/27.978	3	160	M24X50
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

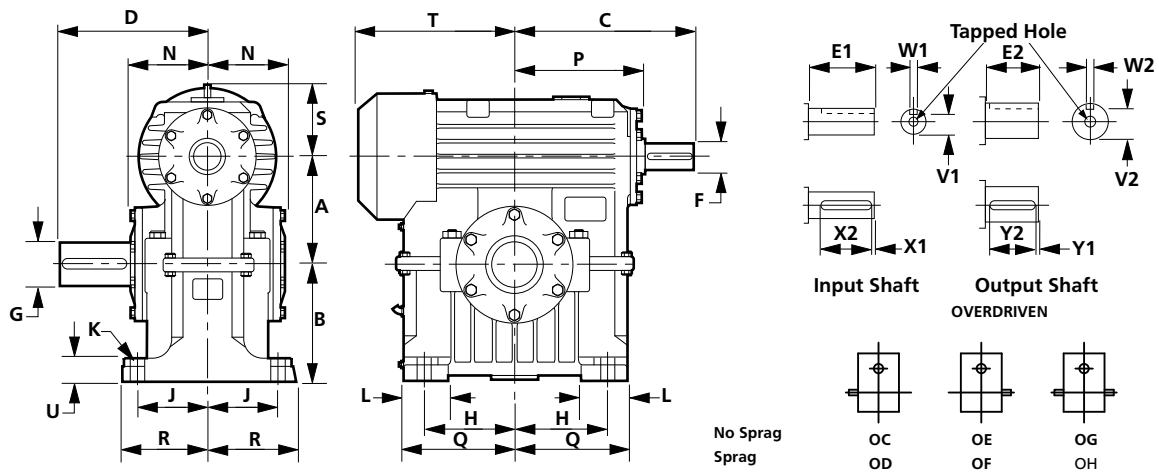
‡ Units with central mounting pads. § Units with central mounting pad and bolt hole via K.

If non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.

FOR DETAILS OF UNITS WITH FLANGE MOUNTING MOTORS REFER TO PAGE 38.

TW Series - Single Reduction - Dimensions (mm)

TYPE TWO OVERDRIVEN



Catalogue Number	A		B	C	D	F	G	H	J
	in.	mm.							
TWO 10	10.0	254.0	273.1	419	349	60.011/60.030	100.013/100.035	215.9	165.1
TWO 12	12.0	304.8	336.6	470	387	65.011/65.030	110.013/110.035	260.3	184.2
TWO 14	14.0	355.6	393.7	552	457	75.011/75.030	120.013/120.035	298.5	215.9
TWO 17‡	17.0	431.8	469.9	648	521	80.011/80.030	140.015/140.040	381.00	254.0
TWO 20‡	20.0	508.0	546.1	762	660	100.013/100.035	170.015/170.040	444.5	292.1
TWO 24‡	24.0	609.6	622.3	914	711	110.013/110.035	190.017/190.046	533.4	393.7
TWO 28§	28.0	711.2	736.6	1041	813	130.015/130.040	210.017/210.046	609.6	457.2

Catalogue Number	K	L	N	P	Q	R	S	T	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWO 12	38.5	114	198	335	302	229	168	427	60	14.5	489
TWO 14	44.5	152	235	400	362	270	181	505	86	23.2	836
TWO 17‡	44.5	178	286	481	438	324	216	603	89	27.3	1408
TWO 20‡	48	178	349	559	514	381	254	692	102	90.9	2032
TWO 24‡	52	203	419	632	584	483	279	806	114	155.0	3632
TWO 28§	52	216	465	716	686	559	298	889	127	292.1	5029

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWO 10	119	53/52.8	17.939/17.982	5	100	M20X42
TWO 12	130	58/57.8	17.939/17.982	10	100	M20X42
TWO 14	148	67.5/67.3	19.926/19.978	5	125	M20X42
TWO 17‡	171	71/70.8	21.926/21.978	10	140	M24X50
TWO 20‡	200	90/89.8	27.926/27.978	10	160	M24X50
TWO 24‡	286	100/99.8	27.926/27.978	10	220	M24X50
TWO 28§	291	119/118.8	31.912/31.974	10	220	M24X50

Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
167	90/98.8	27.926/27.978	3	160	M24X50
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

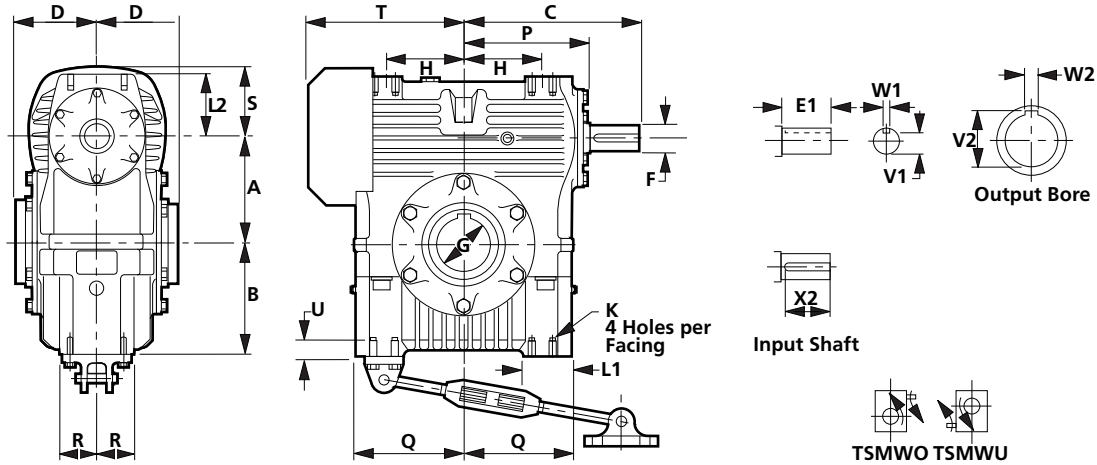
‡ Units with central mounting pads. § Units with central mounting pad and bolt hole via K.

If non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.

FOR DETAILS OF UNITS WITH FLANGE MOUNTING MOTORS REFER TO PAGE 38.

TW Series - Single Reduction - Dimensions (mm)

TYPE TSMW SHAFT MOUNTED



TORQUE ARM AND FIXING DIMENSIONS SEE PAGE 39

Catalogue Number	A		B	C	D	F	G		H
	in.	mm.							
TSMW 10	10.0	254.0	266.7	419	194	60.011/60.030	125.043/125.083	187	
TSMW 12	12.0	304.8	317.5	470	211	65.011/65.030	150.043/150.083	213	
TSMW 14	14.0	355.6	368.3	552	232	75.011/75.030	165.043/165.083	254	
TSMW 17	17.0	431.8	438.2	648	276	80.011/80.030	180.043/180.083	333	
TSMW 20	20.0	508.0	520.7	762	327	100.013/100.038	200.050/200.096	433	
TSMW 24	24.0	609.6	628.7	914	387	110.013/110.035	230.050/230.096	501	

Catalogue Number	K	L1	L2	P	Q	R	S	T	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TSMW 12	M12	127	159	335	295	95	190	427	30	22.7	499
TSMW 14	M12	152	171	400	356	102	196	505	33	33	832
TSMW 17	M12	152	184	481	425	108	226	603	25	60	1384
TSMW 20	M20	162	216	559	514	127	262	699	47	*	*
TSMW 24	M24	171	260	632	584	152	314	800	54	*	*

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TSMW 10	119	53/52.8	17.939/17.982	5	100	M20X42
TSMW 12	130	58/57.8	17.939/17.982	10	100	M20X42
TSMW 14	148	67.5/67.3	19.926/19.978	5	125	M20X42
TSMW 17	171	71/70.8	21.926/21.978	10	140	M24X50
TSMW 20	200	90/89.8	27.926/27.978	10	220	M24X50
TSMW 24	286	100/99.8	27.926/27.978	10	220	M24X50

Output Shaft

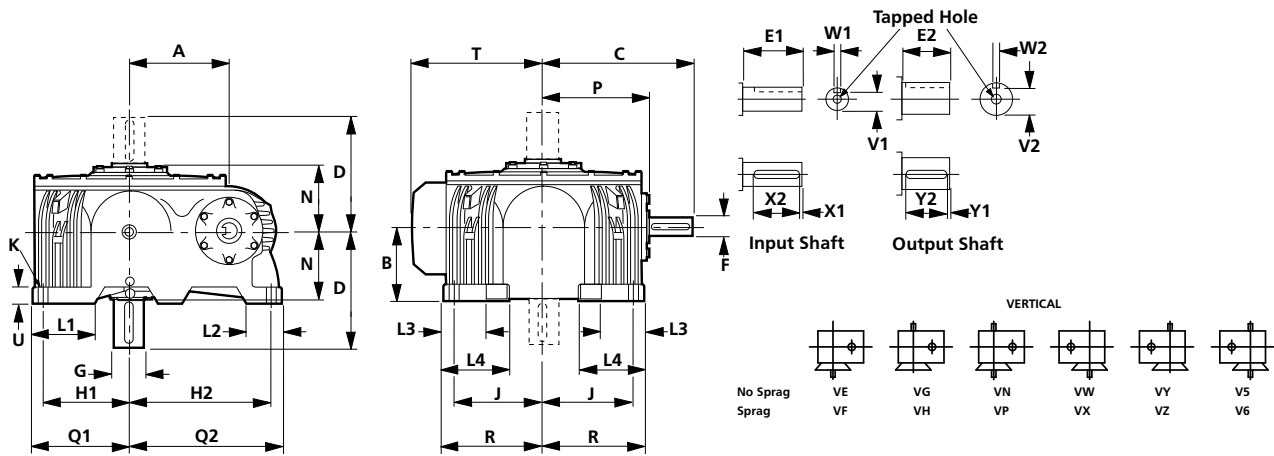
V2	W2
132.4/132.631	969/32.031
158.4/158.735	969/36.031
174.4/174.739	969/40.031
190.4/190.744	969/45.031
210.4/210.744	969/45.031
241.4/241.749	969/50.031

If non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.
FOR DETAILS OF UNITS WITH FLANGE MOUNTING MOTORS REFER TO PAGE 38.

* DETAILS ON REQUEST

TW Series - Single Reduction - Dimensions (mm)

TYPE TWV VERTICAL



Catalogue Number	A		B	C	D	F	G		H1	H2	J	K
	in.	mm.										
TWV 10	10.0	254.0	190.5	419	349	60.011/60.030	100.013/100.035	228.6	400.1	228.6	32.5	
TWV 12	12.0	304.8	215.9	470	387	65.011/65.030	110.013/110.035	263.5	463.5	263.5	38.5	
TWV 14	14.0	355.6	254.0	552	457	75.011/75.030	120.013/120.035	320.7	520.7	317.5	44.5	
TWV 17	17.0	431.8	311.2	648	521	80.011/80.030	140.015/140.040	393.7	616.0	393.7	44.5	
TWV 20	20.0	508.0	362.0	762	660	100.013/100.035	170.015/170.040	463.6	727.1	463.6	48	
TWV 24	24.0	609.6	444.4	914	711	110.013/110.035	190.017/190.046	552.5	863.6	552.5	52	
TWV 28	28.0	711.2	508.0	1041	813	130.015/130.040	210.017/210.046	635.0	965.2	635.0	52	

Catalogue Number	L1	L2	L3	L4	N	P	Q1	Q2	R	T	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWV 10	165	116	117	165	182	296	263	443	264	378	41	15.0	350
TWV 12	191	149	133	191	202	335	302	511	302	435	51	18.6	501
TWV 14	235	146	137	235	235	400	368	572	368	502	61	50.0	848
TWV 17	289	149	168	289	289	481	451	670	448	603	76	77.3	1453
TWV 20	337	191	216	337	349	559	530	791	527	692	83	155	2070
TWV 24	394	216	260	394	413	632	616	927	616	806	102	218	3681
TWV 24	432	254	305	432	465	716	711	1041	699	902	114	432	5089

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWV 10	119	53/52.8	17.939/17.982	5	100	M20X42
TWV 12	130	58/57.8	17.939/17.982	10	100	M20X42
TWV 14	148	67.5/67.3	19.926/19.978	5	125	M20X42
TWV 17	171	71/70.8	21.926/21.978	10	140	M24X50
TWV 20	200	90/89.8	27.926/27.978	10	160	M24X50
TWV 24	286	100/99.8	27.926/27.978	10	220	M24X50
TWV 28	286	119/118.8	31.912/31.974	10	220	M24X50

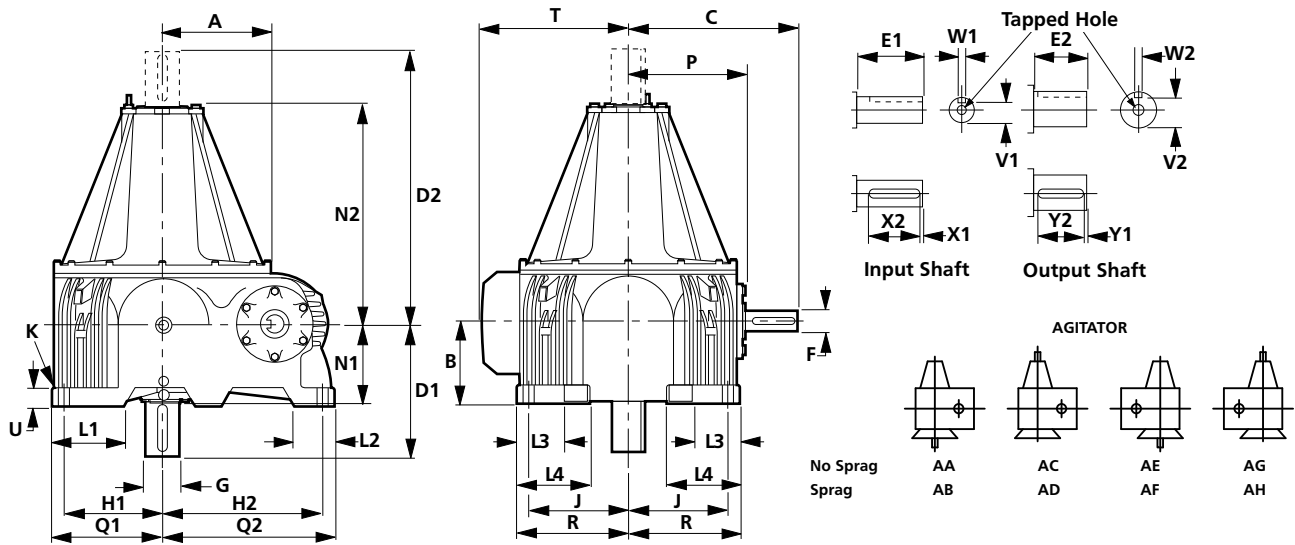
Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
167	90/89.8	27.926/27.978	3	160	M24X42
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

If non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.
 FOR DETAILS OF UNITS WITH FLANGE MOUNTING MOTORS REFER TO PAGE 38.

TW Series - Single Reduction - Dimensions (mm)

TYPE TWA AGITATOR



Catalogue Number	A		B	C	D1	D2	F	G	H1	H2	J	K	L1
	in.	mm.											
TWA 10	10.0	254.0	190.5	419	349	829	60.011/60.030	100.013/100.035	228.6	400.1	228.6	32.5	173
TWA 12	12.0	304.8	215.9	470	387	923	65.011/65.030	110.013/110.035	263.5	463.6	263.5	38.5	191
TWA 14	14.0	355.6	254.0	552	457	1047	75.011/75.030	120.013/120.035	320.7	520.7	317.5	44.5	235
TWA 17	17.0	431.8	311.2	648	521	1181	80.011/80.030	140.015/140.040	393.7	616.0	393.7	44.5	289
TWA 20	20.0	508.0	362.0	762	660	1305	100.013/100.035	170.015/170.040	463.6	727.1	463.6	48	337
TWA 24	24.0	609.6	444.5	914	711	1486	110.013/110.035	190.017/190.046	552.5	863.6	552.5	52	394
TWA 28	28.0	711.2	508.0	1014	813	1168	130.015/130.040	210.017/210.046	635.0	965.0	635.0	52	432

Catalogue Number	L2	L3	L4	N1		N2	P	Q1	Q2	R	T	U	Oil Capacity (approx) Litres	Weight (approx) Kg
				no pump	with pump									
TWA 10	116	117	165	182	279	635	296	263	443	264	378	41	15.0	436
TWA 12	149	133	191	202	298	714	335	302	511	302	435	51	18.6	611
TWA 14	146	137	235	235	330	800	400	368	572	368	502	64	50.0	1060
TWA 17	149	168	289	289	381	923	481	451	670	448	603	76	77.3	1816
TWA 20	191	216	337	349	438	1121	559	530	791	527	692	83	155	2588
TWA 24	216	260	394	413	495	1184	632	616	927	616	806	102	218	4602
TWA 28	254	302	432	484	-	840	716	711	1041	699	902	114	432	6389

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWA 12	130	58/57.8	17.939/17.982	10	100	M20X42
TWA 14	148	67.5/67.3	19.926/19.978	5	125	M20X42
TWA 17	171	71/70.8	21.926/21.978	10	140	M24X50
TWA 20	200	90/89.8	27.926/27.978	10	160	M24X50
TWA 24	286	100/99.8	27.926/27.978	10	220	M24X50
TWA 28	291	119/118.8	31.912/31.974	10	220	M24X50

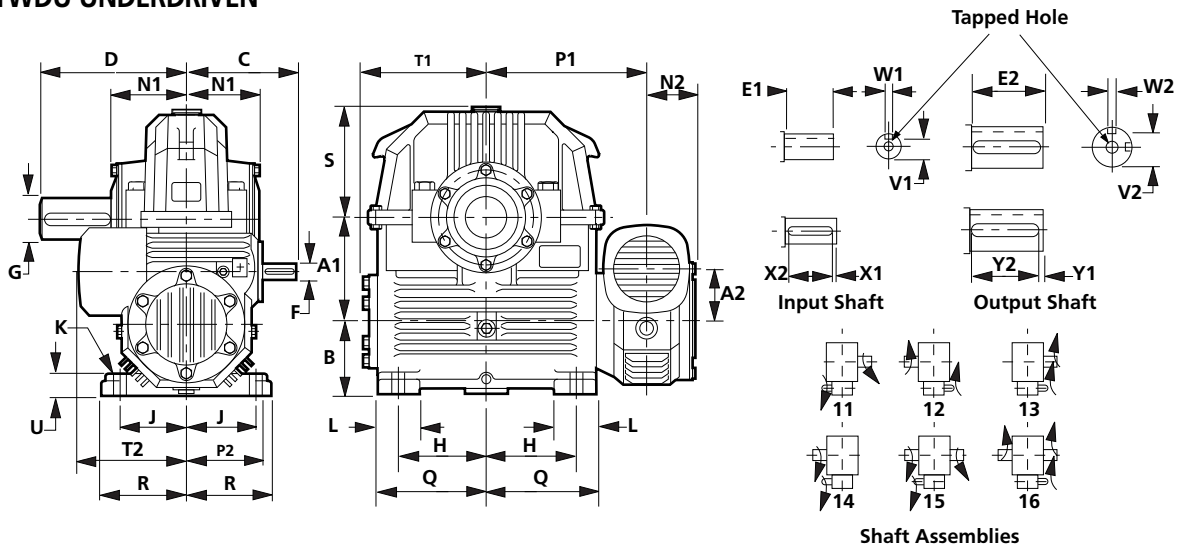
Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

If non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.
FOR DETAILS OF UNITS WITH FLANGE MOUNTING MOTORS REFER TO PAGE 38.

TW Series - Double Reduction - Dimensions (mm)

TYPE TWDU UNDERDRIVEN



Shaft Assemblies

Catalogue Number	A1		A2		B	C	D	F	G	H	J	K
	in.	mm.	in.	mm.								
TWDU 10	10.0	254.0	5.00	127.0	171.5	260	349	38.002/38.018	100.013/100.035	215.9	165.1	32.5
TWDU 12	12.0	304.8	6.00	152.4	190.5	279	387	40.002/40.018	110.013-110.035	260.4	184.2	38.5
TWDU 14	14.0	355.6	7.00	177.8	215.9	318	457	45.002/45.018	120.013/120.035	298.5	215.9	44.5
TWDU 17‡	17.0	431.8	8.00	203.2	254.0	343	521	50.002/50.018	140.015/140.040	381.0	254.0	44.5
TWDU 20‡	20.0	508.0	10.00	254.0	292.1	419	660	60.011/60.030	170.015/170.040	444.5	292.1	48
TWDU 24‡	24.0	609.6	12.00	304.8	355.6	470	711	65.011/65.030	190.017/190.046	533.4	393.7	52
TWDU 28§	28.0	711.2	14.00	355.6	406.4	552	813	75.011/75.030	210.017/120.046	609.6	457.2	52

Catalogue Number	L	N1	N2	P1	P2	Q	R	S	T1	T2	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWDU 12	102	198	140	435	200	302	229	318	335	283	60	4.9/12.5	601
TWDU 14	127	235	156	495	229	362	270	375	401	311	86	7.7/18.6	956
TWDU 17‡	152	286	162	591	248	438	324	448	483	333	89	10.4/34.1	1577
TWDU 20‡	152	349	188	680	297	514	381	521	559	378	95	14.4/70.5	2280
TWDU 24‡	203	419	182	775	335	584	483	597	632	432	144	*	*
TWDU 28§	216	465	165	876	400	660	559	740	751	508	127	*	*

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWDU10	76	33/32.8	9.949/9.985	5	63	M12X28
TWDU 12	76	35/34.8	11.939/11.982	5	63	M16X36
TWDU 14	89	39.5/39.3	13.939/13.982	5	80	M16X36
TWDU 17	95	44.5/44.3	13.939/13.982	5	80	M16X36
TWDU 20	119	53/52.8	17.939/17.982	5	100	M20X42
TWDU 24	130	58/57.8	17.939/17.982	10	100	M20X42
TWDU 28	148	67.5/37.3	19.926/19.978	5	125	M20X42

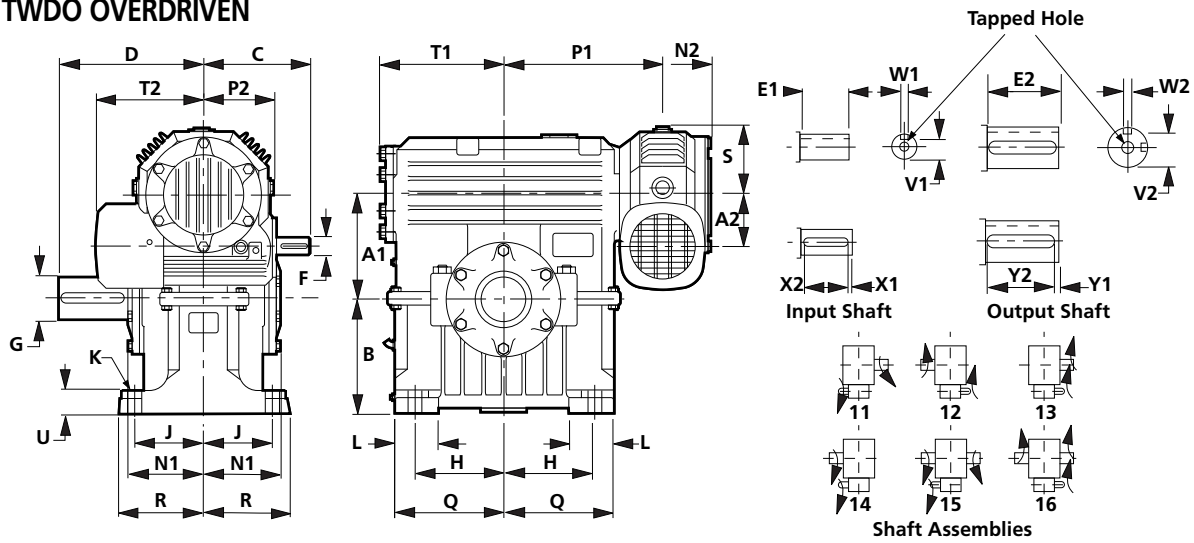
Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
167	90/89.8	27.926/27.978	3	160	M24X50
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.192/49.974	10	250	M30X60

Wheelshafts have two output keys as a standard feature. ‡ 2nd reduction units with blank central mounting pads. § 2nd reduction unit with central mounting pad and bolt hole dia K. If a non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil. * Figures on request. FOR DETAILS OF UNITS WITH FLANGE MOUNTING REFER TO PAGE 38.

TW Series - Double Reduction - Dimensions (mm)

TYPE TWDO OVERDRIVEN



Catalogue Number	A1		A2		B	C	D	F	G		H	J	K
	in.	mm.	in.	mm.									
TWDO 10	10.0	254.0	5.00	127.0	273.1	260	349	38.002/38.018	100.013/100.035	215.9	165.1	32.5	
TWDO 12	12.0	304.8	6.00	152.4	336.6	279	387	40.002/40.018	110.013/110.035	260.4	184.2	38.5	
TWDO 14	14.0	355.6	7.00	177.8	393.7	318	457	45.002/45.018	120.013/120.035	298.5	215.9	44.5	
TWDO 17‡	17.0	431.8	8.00	203.2	469.9	343	521	50.002/50.018	140.015/140.040	381.0	254.0	44.5	
TWDO 20‡	20.0	508.0	10.00	254.0	546.1	419	660	60.011/60.030	170.015/170.040	444.5	292.1	48	
TWDO 24‡	24.0	609.6	12.00	304.8	622.3	470	711	65.011/65.030	190.017/190.046	533.4	393.7	52	
TWDO 28§	28.0	711.2	14.00	355.6	736.6	552	813	75.011/75.030	210.017/210.046	609.6	457.2	52	

Catalogue Number	L	N1	N2	P1	P2	Q	R	S	T1	T2	U	Oil Capacity (approx) Litres	Weight (approx)
													Kg
TWDO 10	102	182	127	384	184	264	206	165	297	257	54	2.1/9.1	406
TWDO 12	114	198	140	435	200	302	229	184	335	283	60	2.5/14.6	583
TWDO 14	152	235	156	495	229	362	270	213	401	311	86	3.6/23.2	952
TWDO 17‡	178	286	162	591	248	438	324	236	483	333	89	4.4/54.6	1588
TWDO 20‡	178	349	188	680	297	514	381	278	559	378	102	6.9/90	2278
TWDO 24‡	203	419	182	775	335	584	483	*	632	432	114	*	*
TWDO 28§	216	465	165	876	400	660	559	*	751	508	127	*	*

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWDO 10	76	33/32.8	9.949/9.985	5	63	M12X28
TWDO 12	76	35/34.8	11.939/11.982	5	63	M16X36
TWDO 14	89	39.5/39.3	13.939/13.982	5	80	M16X36
TWDO 17	95	44.5/44.3	13.939/13.982	5	80	M16X36
TWDO 20	119	53/52.8	17.939/17.982	5	100	M20X42
TWDO 24	130	58/57.8	17.939/17.982	10	100	M20X42
TWDO 28	148	67.5/67.3	19.926/19.978	5	125	M20X42

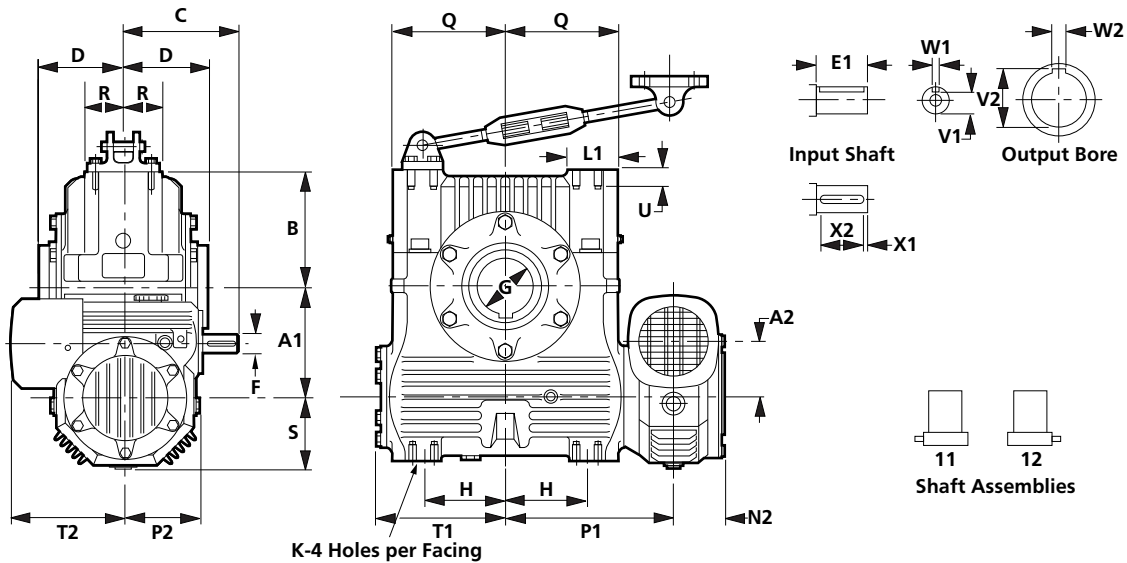
Output Shaft

	E2	V2	W2	Y1	Y2	Tapped Hole
	167	90/89.8	27.926/27.978	3	160	M24X50
	181	100/99.8	27.926/27.978	3	160	M24X50
	208	109/108.8	31.912/31.974	5	180	M24X50
	216	128/127.8	35.912/35.974	10	200	M30X60
	302	157/156.7	39.912/39.974	10	250	M30X60
	289	175/174.7	44.912/44.974	10	250	M30X60
	330	193/192.7	49.192/49.974	10	250	M30X60

Wheelshafts have two output keys as a standard feature. ‡ 2nd reduction units with blank central mounting pads. § 2nd reduction unit with central mounting pad and bolt hole dia K. If a non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil. * Figures on request. FOR DETAILS OF UNITS WITH FLANGE MOUNTING REFER TO PAGE 38.

TW Series - Double Reduction - Dimensions (mm)

TYPE TSMWD SHAFT MOUNTED



K-4 Holes per Facing

TORQUE ARM AND FIXING DIMENSIONS SEE PAGE 39

Catalogue Number	A1		A2		B	C	D	F	G	H	K
	in.	mm.	in.	mm.							
TSMWD 10	10.0	254.0	5.00	127.0	266.7	260	194	38.002/38.018	125.043/125.083	187	M12
TSMWD 12	12.0	304.8	6.00	152.4	317.5	279	211	40.002/40.018	150.043/150.083	213	M12
TSMWD 14	14.0	355.6	7.00	177.8	368.3	318	232	45.002/45.018	165.043/165.083	254	M12
TSMWD 17	17.0	431.8	8.00	203.2	438.2	343	276	50.002/50.018	180.043/180.083	333	M12
TSMWD 20	20.0	508.0	10.00	254.0	520.7	419	327	65.011/65.030	200.013/200.096	433	M20
TSMWD 24	24.0	609.6	12.00	607.8	628.7	470	387	75.011/75.030	230.050/230.096	501	M24

Catalogue Number	L1	N2	P1	P2	Q	R	S	T1	T2	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TSMWD 12	127	140	435	200	295	95	184	335	283	30	4.9/14.6	593
TSMWD 14	152	156	495	229	356	102	213	401	311	33	7.7/23.2	948
TSMWD 17	152	162	591	248	425	108	236	483	333	25	10.4/54.6	1564
TSMWD 20	162	188	680	297	514	127	278	559	378	47	*	*
TSMWD 24	171	182	775	335	584	152	*	632	432	54	*	*

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TSMWD 12	76	35/34.8	11.939/11.982	5	63	M16X36
TSMWD 14	89	39.5/39.3	13.939/13.982	5	80	M16X36
TSMWD 17	95	44.5/44.3	13.939/13.982	5	80	M16X36
TSMWD 20	119	53/52.8	17.939/17.982	5	100	M20X42
TSMWD 24	130	58/57.8	17.939/17.982	10	100	M20X42

Output Shaft

V2	W2
158.4/158.7	35.969/36.031
174.4/174.7	39.969/40.031
190.4/190.7	44.969/45.031
210.4/210.7	44.969/45.031
241.4/241.7	49.969/50.031

Flanged Torque Restraint available - details on request

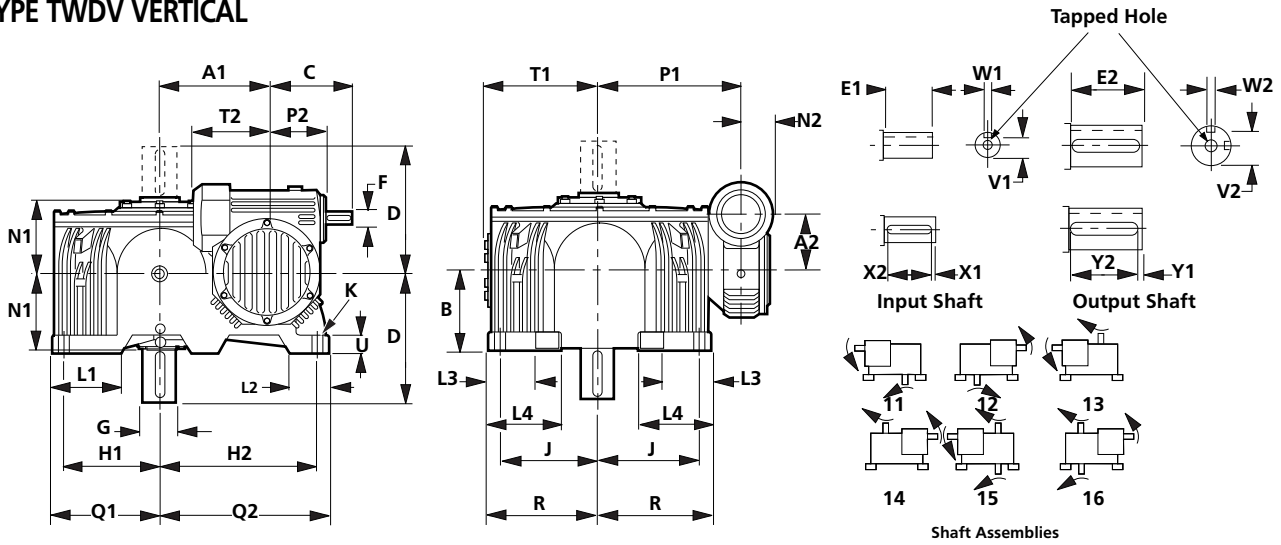
If a non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil.

FOR DETAILS OF UNITS WITH FLANGE MOUNTING REFER TO PAGE 38.

* DETAILS ON REQUEST

TW Series - Double Reduction - Dimensions (mm)

TYPE TWDV VERTICAL



Catalogue Number	A1		A2		B	C	D	F	G	H1	H2	J	K	L1
	in.	mm.	in.	mm.										
TWDV 10	10.0	254.0	5.00	127.0	190.5	260	349	38.002/38.018	100.013/100.035	228.6	400.1	228.6	32.5	173
TWDV 12	12.0	304.8	6.00	152.4	215.9	279	387	40.002/40.018	110.013/110.035	263.5	463.6	263.5	38.5	191
TWDV 14	14.0	355.6	7.00	177.8	254.0	318	457	45.002/45.018	120.013/120.035	320.7	520.7	317.5	44.5	235
TWDV 17	17.0	431.8	8.00	203.2	311.2	343	521	50.002/50.018	140.015/140.035	393.7	616.0	393.7	44.5	289
TWDV 20	20.0	508.0	10.00	254.0	362.0	419	660	60.011/60.018	170.015/170.035	463.6	727.1	463.6	48	337
TWDV 24	24.0	609.6	12.00	304.8	444.5	470	711	65.011/65.018	190.017/190.046	552.5	863.6	552.5	52	394
TWDV 28	28.0	711.2	14.00	355.6	508.0	552	813	75.011/75.018	210.017/210.046	635.0	965.2	635.0	52	432

Catalogue Number	L2	L3	L4	N1	N2	P1	P2	Q1	Q2	R	T1	T2	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWDV 12	149	133	191	202	140	435	200	302	511	302	335	283	51	4.9/18.6	595
TWDV 14	146	137	235	235	156	495	229	368	572	368	401	311	64	7.7/50.0	964
TWDV 17	149	168	289	289	162	591	248	451	670	448	483	333	76	10.4/77.3	1633
TWDV 20	191	216	337	349	188	680	297	530	791	527	559	378	83	14.4/155	2316
TWDV 24	216	260	394	413	182	775	335	616	927	616	632	432	102	*	*
TWDV 28	254	305	432	465	165	876	400	711	1041	699	751	508	114	*	*

Input Shaft

Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWDV 10	76	33/32.8	9.949/9.985	5	63	M12X28
TWDV 12	76	35/34.8	11.939/11.982	5	63	M16X36
TWDV 14	89	39.5/39.3	13.939/13.982	5	80	M16X36
TWDV 17	95	44.5/44.3	13.939/13.982	5	80	M16X36
TWDV 20	119	53/52.8	17.939/17.982	5	100	M20X42
TWDV 24	130	58/57.8	17.939/17.982	10	100	M20X42
TWDV 28	148	67.5/37.3	19.926/19.978	5	125	M20X42

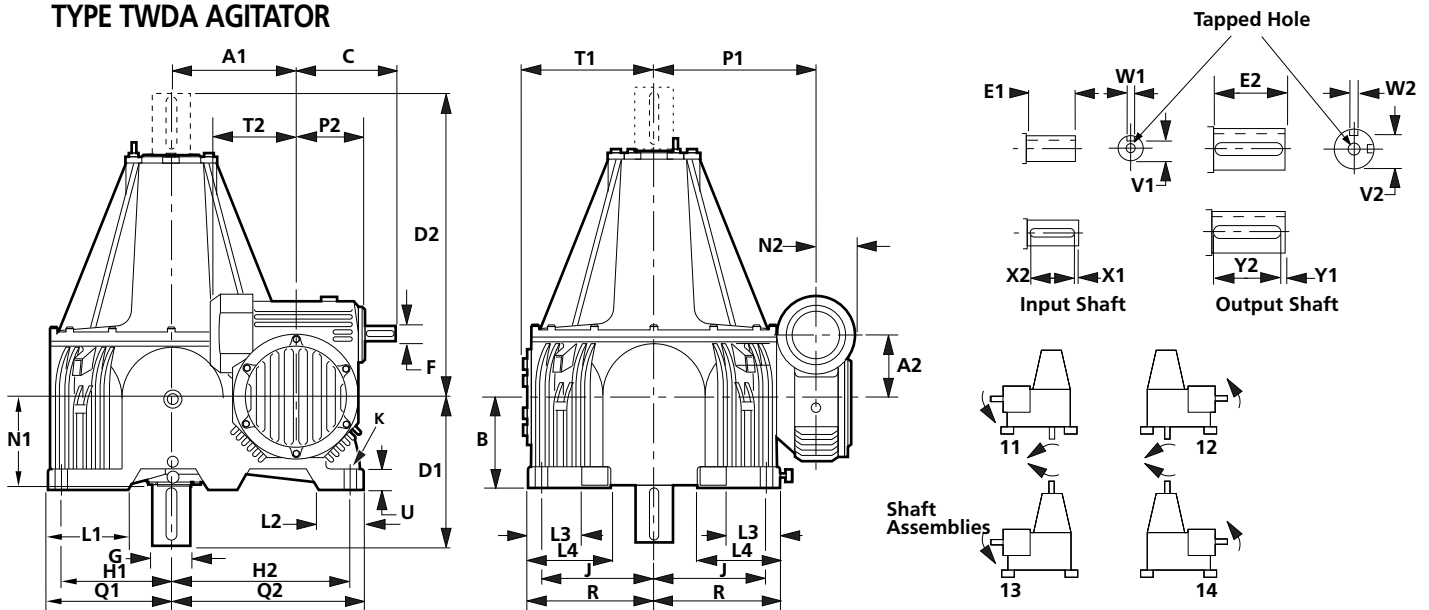
Output Shaft

E2	V2	W2	Y1	Y2	Tapped Hole
167	90/89.8	27.926/27.978	3	160	M24X50
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

Wheelshafts have two output keys as a standard feature. † 2nd reduction units with blank central mounting pads. § 2nd reduction unit with central mounting pad and bolt hole dia K. If a non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil. * DETAILS ON REQUEST. FOR DETAILS OF UNITS WITH FLANGE MOUNTING REFER TO PAGE 38.

TW Series - Double Reduction - Dimensions (mm)

TYPE TWDA AGITATOR



Catalogue Number	A1		A2		B	C	D1	D2	F	G	H1	H2	J	K	L1
	in.	mm.	in.	mm.											
TWDA 10	10.0	254.0	5.00	127.0	190.5	260	349	829	38.002/38.018	100.013/100.035	228.6	400.1	228.6	32.5	173
TWDA 12	12.0	304.8	6.00	152.4	215.9	279	387	926	40.002/40.018	110.013/110.035	263.5	463.6	263.5	38.5	191
TWDA 14	14.0	355.6	7.00	177.8	254.0	318	457	1047	45.002/45.018	120.013/120.035	320.7	520.7	320.7	44.5	235
TWDA 17	17.0	431.8	8.00	203.2	311.2	343	521	1181	50.002/50.018	140.015/140.035	393.7	616.0	393.7	44.5	289
TWDA 20	20.0	508.0	10.00	254.0	362.0	419	660	1305	60.011/60.018	170.015/170.035	463.6	727.1	463.6	48	337
TWDA 24	24.0	609.6	12.00	304.8	444.5	470	711	1486	65.011/65.018	190.017/190.046	552.5	863.6	552.5	52	394
TWDA 28	28.0	711.2	14.00	355.6	508.0	552	813	1168	75.011/75.018	210.017/210.046	635.0	965.2	635.0	52	432

Catalogue Number	L2	L3	L4	N1	N2	P1	P2	Q1	Q2	R	T1	T2	U	Oil Capacity (approx) Litres	Weight (approx) Kg
TWDA 12	149	133	191	202	140	435	200	302	511	302	335	283	51	4.9/18.6	705
TWDA 14	146	137	235	235	156	495	229	368	572	368	401	311	64	7.7/50.0	1176
TWDA 17	149	168	289	289	162	591	248	451	670	448	483	333	76	10.4/77.3	1996
TWDA 20	191	216	337	349	188	680	297	530	791	527	559	378	83	14.4/155	2834
TWDA 24	216	260	394	413	182	775	335	616	927	616	632	432	102	*	*
TWDA 28	254	305	432	465	165	876	400	711	1041	699	751	508	114	*	*

Input Shaft

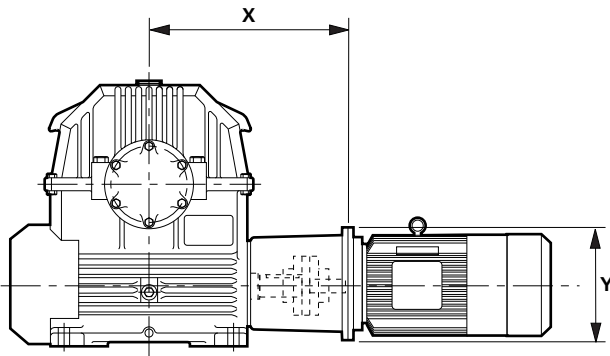
Catalogue Number	E1	V1	W1	X1	X2	Tapped Hole
TWDA 10	76	33/32.8	9.949/9.985	5	63	M12X28
TWDA 12	76	35/34.8	11.939/11.982	5	63	M16X36
TWDA 14	89	39.5/39.3	13.939/13.982	5	80	M16X36
TWDA 17	95	44.5/44.3	13.939/13.982	5	80	M16X36
TWDA 20	119	53/52.8	17.939/17.982	5	100	M20X42
TWDA 24	130	58/57.8	17.939/17.982	10	100	M20X42
TWDA 28	148	67.5/67.3	19.926/19.978	5	125	M20X42

Output Shaft

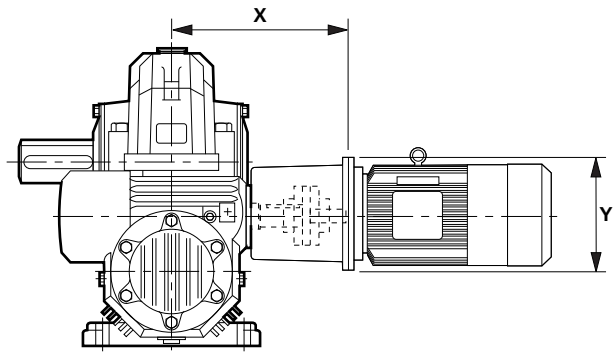
E2	V2	W2	Y1	Y2	Tapped Hole
167	90/89.8	27.926/27.978	3	160	M24X50
181	100/99.8	27.926/27.978	3	160	M24X50
208	109/108.8	31.912/31.974	5	180	M24X50
216	128/127.8	35.912/35.974	10	200	M30X60
302	157/156.7	39.912/39.974	10	250	M30X60
289	175/174.7	44.912/44.974	10	250	M30X60
330	193/192.7	49.912/49.974	10	250	M30X60

Wheelshafts have two output keys as a standard feature. ‡ 2nd reduction units with blank central mounting pads. § 2nd reduction unit with central mounting pad and bolt hole dia K. If a non reversible unit is essential, a sprag clutch backstop should be fitted. Weights quoted are without oil. * Details on request. FOR DETAILS OF UNITS WITH FLANGE MOUNTING REFER TO PAGE 38.

TW Series - Motorised - Dimensions (mm)



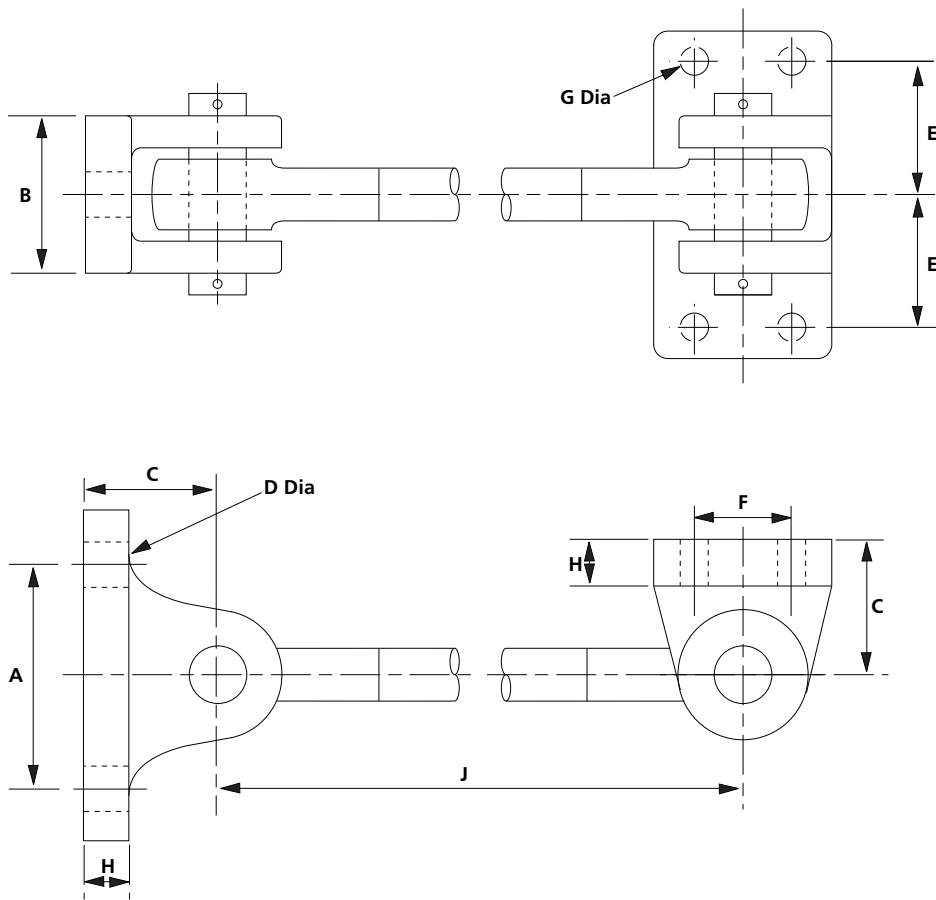
Unit types TW10, TW12, TW14, TW17.



Unit types TWD10, TWD12, TWD14, TWD17, TWD20, TWD24, TWD28.

SINGLE REDUCTION				
Unit Size	Motor Reference	Couplings Catalogue No.	X (mm)	Y (mm)
TW 10	D160/F300	D71 BB NP	539	350
	D180/F300	D71 BB NP	539	350
	D200/F350	D71 BB NP	539	400
	D225/F400	D71 BB NP	569	450
TW 12	D180/F300	D71 BB NP	609	350
	D200/F350	D71 BB NP	609	400
	D225/F400	D71 BB NP	639	450
TW 14	D200/F350	D89 BB NP	691	400
	D225/F400	D89 BB NP	715	450
TW 17	D225/F400	D108 BB NP	835	450
DOUBLE REDUCTION				
TWD 10	D100/F215	D52 BB NP	327	250
	D112/F215	D52 BB NP	327	250
	D132/F265	D52 BB NP	343	300
	D160/F300	D52 BB NP	375	350
TWD 12	D100/F215	D52 BB NP	346	250
	D112/F215	D52 BB NP	346	250
	D132/F265	D52 BB NP	362	300
	D160/F300	D52 BB NP	394	350
TWD 14	D132/F265	D52 BB NP	400	300
	D160/F300	D52 BB NP	432	350
	D180/F300	D71 BB NP	432	350
TWD 17	D132/F265	D52 BB NP	425	300
	D160/F300	D52 BB NP	457	350
	D180/F300	D71 BB NP	457	350
	D200/F350	D71 BB NP	457	400
TWD 20	D160/F300	D71 BB NP	539	350
	D180/F300	D71 BB NP	539	350
	D200/F350	D71 BB NP	539	400
	D225/F400	D71 BB NP	569	450
TWD 24	D160/F300	D71 BB NP	609	350
	D180/F300	D71 BB NP	609	350
	D200/F350	D71 BB NP	609	400
	D225/F400	D71 BB NP	639	450
TWD 28	D180/F300	D89 BB NP	691	350
	D200/F350	D89 BB NP	691	400
	D225/F400	D89 BB NP	715	450

TW Series - Torque Arm - Dimensions (mm)



Size	A	B	C	D	E	F	G	H	J
T10	114.3	76.2	57.2	22	63.5	50.8	13.5	20.6	762/915
T12									
T14	127.0	88.9	76.2	26	76.2	57.2	13.5	25.4	762/915
T17									
T20	228.6	136.5	117.48	39	98.4	88.9	22	38.1	865/1010
T20	266.7	165.1	133.35	42	120.7	95.25	26	44.4	1040/1180

SUITABLE FOR UNIT TYPES TSMW AND TSMWD

Initial Running

All worm gear units are supplied without oil and should be filled to correct level with suitable lubricant before running.

First Filling

Single Reduction Units

When installed and before running, the unit should be filled with new lubricant to the correct level as follows.

With the gear stationary, remove the filler and breather plug and oil level plug. Fill until the lubricant level is visible at the indicator (if fitted) or until lubricant overflows from oil level aperture.

Replace and secure both plugs. Care should be taken to avoid overfilling, as this may cause subsequent leakage.

Double Reduction Units

The 1st and 2nd stage reduction gears are positively and independently lubricated by oil from the sumps in the 1st and 2nd reduction gear cases. It is important, therefore, that both 1st and 2nd stage reduction gear cases are filled with oil following the procedure given above for single reduction units.

Starting Up

All units have been subjected to a short test before despatch to the customer but it takes many hours running under full load for the gear to attain its highest efficiency. The gear may if necessary be put to work immediately on full load, but if circumstances permit it is better for the ultimate life of the gear to run it in under gradually increasing load. Attaining the full load after about 20 to 40 hours.

Reasonable precautions should however, be taken to avoid overloads in the early stage of running. Temperature rise on the initial run will be higher than that eventually attained after the gear is fully run in.

Routine Maintenance

The oil level in the unit should be regularly maintained, and should be checked at least once a month. To avoid false readings, examination of the oil level should be made with the gear stationary, and to maintain free ventilation of the unit under all conditions, the breather hole in the filler plug should be kept clear at all times. In the case of double reduction units, ensure that maintenance requirements given above are applied to both 1st and 2nd stage reduction gears.

Changing Oil

The oil should be changed completely at intervals depending upon the working conditions.

Storage

All worm gear units stored or left inactive for long periods should be adequately protected, particularly those on exposed sites and those operating in corrosive atmospheres.

The following precautions will generally be adequate, but advice on the protection of particular units will be given, if required.

If empty of oil: spray the gear case interior with rust preventative oil; compatible with lubricant recommended for service conditions. If filled with oil: operate at full speed once per month for not less than 10 minutes to ensure liberal coating of all internal parts with oil.

For indefinite storage: completely fill unit with oil ensuring complete submersion of all internal components. Shafts should be occasionally turned by hand. When unit is returned to service, drain and refill with new oil to correct level.

External shaft extensions and oil seals can be protected by the use of grease impregnated tape.

Full long term storage specification details can be obtained from Renold on request.

Spare Parts

Information relating to spare parts is available on request.

RENOLD TW Series - Lubrication Information

The correct fill of oil for the unit size and mounting position can be found in either the appropriate catalogue or the Installation and Maintenance Guide. Only good quality oils should be used, such as those listed below, as the use of inferior or unsuitable products may cause rapid wear and possible damage to the gearbox. Some EP additives such as Sulphur can attack Bronze especially at operating temperatures above 80°C and therefore should be avoided.

Oils with three viscosity ranges (Light, medium and heavy) are listed below, the correct choice depends on the application, operating speed, load and temperature. Temperature and speed can often be the main factor as they effect the operating viscosity. If the unit runs below the catalogue rating and operates at a temperature below 60°C then a light grade oil should be used. Operating at catalogue rating with temperatures up to 90°C requires a medium grade and with higher temperatures and loading, heavy grade oils should be used. When using POA oils this temperature can be increased by about 5°C.

If the unit is operating with gear speeds below 2.5 m/s (500ft/min) then the next higher grade should be used. Using too heavy a grade than required will result in reduced efficiency, too light a grade will result in premature wear, if in doubt ask Renold Gears

Technical Department. Which Oil to Select

There are three main oils Mineral, Synthetic (Polyalphaolefin) and Synthetic (Polyglycol). Mineral oils tend to be cheaper, have a lower life and are less efficient. Synthetic (Polyalphaolefin) can operate over a higher temperature range, are more efficient, give higher ratings and have a longer life and as such are preferred.

The use of Synthetic (Polyglycol) are not recommended without prior discussion with Renold as special paints and seals are required.

If necessary a list of recommended food grade oils is available on request.

If a Sprag Clutch backstop is fitted internally to the gear unit, oils with EP type additives must not be used.

The oils shown below are all suitable for use with Sprag Clutch backstops.

Mineral Oil	Light		Medium		Heavy	
		Temp°C		Temp°C		Temp°C
Mobil DTE	BB	-7 to 90	AA	2 to 90	HH	2 to 90
Castrol Alpha ZN	220	-9 to 120	320	-9 to 120	460	-9 to 120
Shell Vitrea	220	-24 to 120	320	-18 to 120	460	-15 to 120
Esso Teresso	220	-18 to 120	320	-12 to 120	460	-9 to 120
Kluberoil GEM 1	220	-18 to 100	320	0 to 100	460	0 to 100

Synthetic (Polyalphaolefin)	Light		Medium		Heavy	
		Temp°C		Temp°C		Temp°C
Mobil Gear SHC	630	-42 to 160	632	-42 to 160	634	-39 to 160
Castrol Alpha T	220	-36 to 80	320	-33 to 80	460	-33 to 80
Shell Omala RL	220	-40 to 80	320	-40 to 80	460	-40 to 80
Esso Teresso SHP	220	-42 to 150	320	-36 to 150	460	-30 to 150

Notes

Notes

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