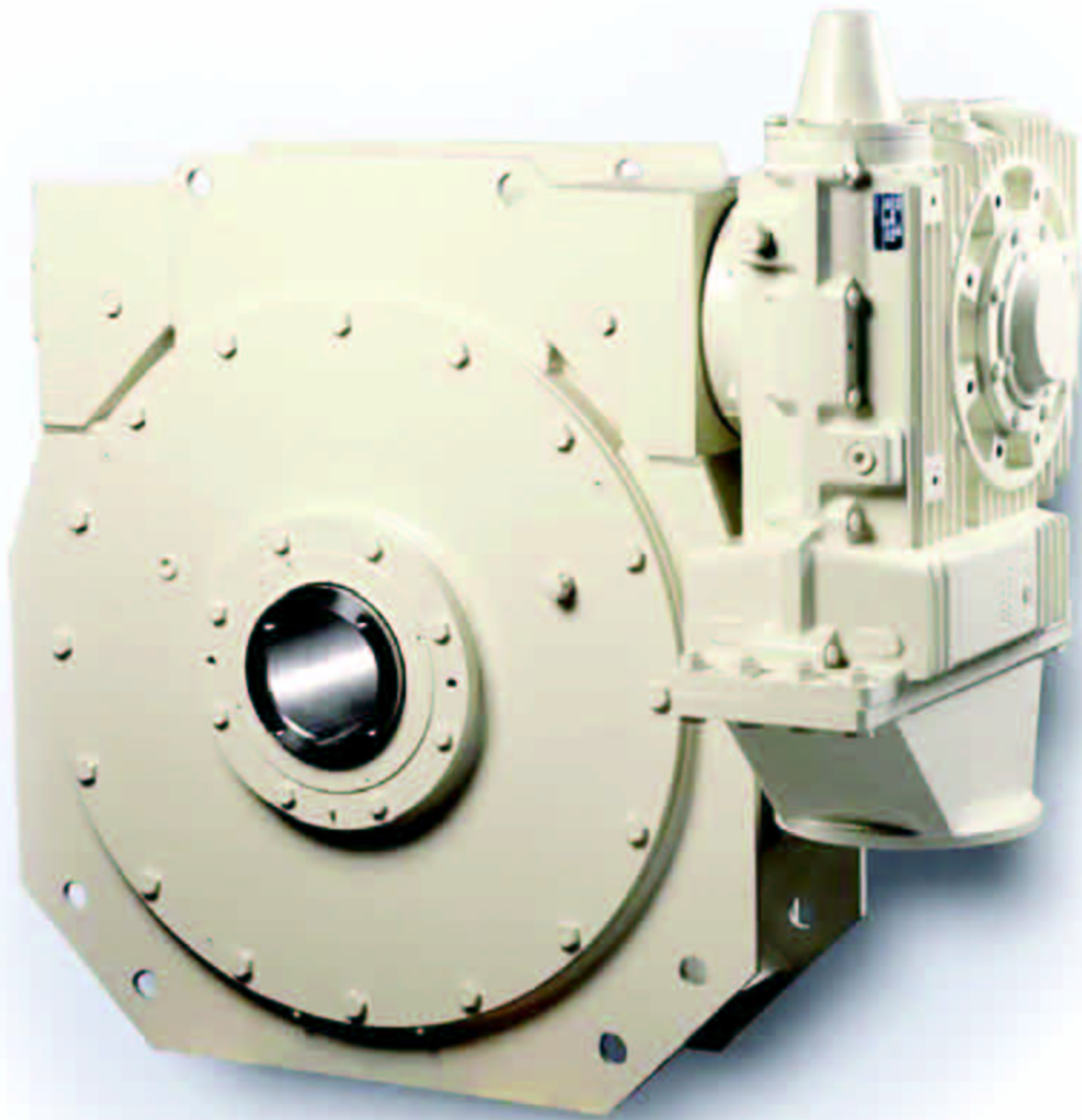


DURAND Gearboxes



NOISELESS

The worm gears operate with a high sliding speed, associated with a large gear overlapping ratio, which makes this type of gear the most silent gear transmission.

STURDY

The high stiffness of the housing, together with the use of largely sized quality components provides the users with the most robust generation of worm gear units. CMD Durand gear units are designed to transmit high torques within limited room.

COMPACTNESS

The compactness of the CMD Durand gear units is an advantage for many applications. They have been designed with the aim at reducing the overall dimensions:

- right angle arrangement of the shafts
- hollow shaft design
- large ratios within a compact volume.



ACCURATE

Nowadays, gear cutting and grinding machines allow the production of high accuracy gears having very low pitch deviation and accurate profile. Great positioning is therefore achievable for applications such as robotics, machine tools, printing machine, etc.

EASY MAINTENANCE

The simple design, associated with easy access to all components reduce drastically the maintenance costs. CMD can specify the selection of lubricant together with maintenance recommendations.

PROCESS MONITORING

CMD has developed a simple system which monitors the absorbed power of the driven machine on a continuous basis.

Generalities and Design p. 3-4

Reducer type selection according to gear ratio p. 5

N range and JUMBOFLEX – Selection method sizes from 160 to 1250 p. 6

Service factor – Classification of machines p. 7

Reversibility and self-locking p. 8

Selection method - Example p. 9

Sizes 160 F/C to 500 F/C – Mechanical rating and thermal capacity p. 11-13

Overall dimensions sizes from 160 to 500 F/C Type p. 14

Multi reduction reducers p. 15

JUMBOFLEX – Mechanical rating and thermal capacity p. 17-19

JUMBOFLEX overall dimension F Type p. 20

JUMBOFLEX overall dimension MH1 Type p. 21

JUMBOFLEX overall dimension MH2 Type p. 22

Torque arm p. 24

Base kits p. 25

Dynamometric shock absorbers p. 26

Hollow shaft with shrink rim assembly p. 27

Gear motors p. 28

Maximum admissible torque C_o p. 29

Mounting – Installation – Lubrication – Commissioning p. 30

Reducers – Requested information for inquiries p. 31

Data and application p. 33-37

Worm gear sets – Requested information for inquiries p. 38

Main machine tools p. 39

Applications p. 41-52

The **CMD Durand technology** is constantly evolving and being optimised, thanks to several decades of experience in cooperation with the end users.

CMD is considered as a specialist for medium and large size of worm gears and offers a wide range of worm gearboxes that complies with very demanding industrial applications: metal, sugar, cement, waste recycling, environment, material handling, machine tools industries...

Whenever the standard range is not adapted, CMD can modify the standard design or provide a custom design to comply with specific requirements: high accuracy, high torques, specific dimensions, specific kinematic design...

This catalogue describes in details the N series, from size 160 to 500, the type F or FN (hollow output shaft) and the type C or FNC (solid output shaft) as well as the range of large reducers JUMBOFLEX sizes 550 to 1250.

Large reduction ratios are made possible by combining several reducers.

Various accessories such as reaction torque arms, temperature sensors, torque and load sensors, couplings... are available to adapt the standard units to customer's requirements.

Method of selection, mechanical and thermal nominal ratings are given for N series reducers.

For customers that will to integrate worm gear set in their machine, we recommend that selection is made using catalogue center distance and ratio. However, CMD also manufacture specific centre distance and gear ratio in order to meet specific requirements – please consult CMD.

GEARS

CMD Durand as a specialist of worm gears, has selected the **A** profile (DIN3975) for optimising the length of contact, Hertz contact pressures and lubrication.

The torque rating is calculated in accordance with BS721-Durand standard.

Thermal rating is calculated in consideration of the design parameters and the performances of lubricants that have been tested on CMD Durand test bench.

The worm shaft is made of alloyed steel forgings, its threads are case carburised and ground on CNC machines of the latest generation, warranting very high accuracy.

The worm wheel teeth are made of high mechanical properties and low friction bronze.

Gear contact pattern is simulated on computer in order to optimise the oil film thickness and the adaptation of the teeth surfaces under load from the very first running hours.

HOUSING

The very compact housings are made of high quality cast iron GSL, GJS or cast steel GE 280 for specific applications.

Robust design allows the unit to withstand high internal and external loads. The internal arrangement of the housing insures automatic lubrication of bearings.

The housing allows multiple position mounting and accommodates various optional items.

BEARINGS

CMD Durand has a long experience in using roller bearings that withstand the thrust loads generated by worm gears. These bearings are also selected to withstand the external loads (radial, axial...) that vary from one application to another. The selection of bearings and their mounting arrangement insure optimal gear meshing.

LUBRICATION

CMD Durand has tested both test bench and at site a large number of synthetic and mineral oils which results have been used to determine the ratings given in this catalogue.

CMD Durand gear units that are lubricated by synthetic Polyglycol oils offer the highest performances in terms of transmitted power, efficiency and durability. For most of applications, splashing lubrication is sufficient enough.

For applications which require oil circulation and injection, CMD provides a complete lubrication system inclusive of pumps, monitoring and accessories.

Because of the running position of the reducer and due to low speed operation, bearings are sometimes lubricated by EP grease.

Note: CMD Durand provides general or specific lubrication instructions.

SEALING

Joint sealants compatible with Polyglycol synthetic oils are used for sealing joint faces.

The sealing of the rotating parts is performed by standard Nitrile or Viton seal rings.

COUPLINGS

CMD Durand worm gearboxes can be fitted with flexible grid couplings Winflex 9000 and/or Flexident crown gear couplings.

CMD catalogues for couplings are available upon request.



Winflex



Flexident

QUALITY CONTROL

All our products benefit from the following permanent checking:

- raw material / bought in material inspection
- incoming goods inspection
- manufacturing inspections
- gear teeth contact pattern inspection
- final dimensional inspection
- final inspection with running test
- protective packing in accordance with ISO 9001:2000

ACCESSORIES AND OPTIONS

Numerous accessories and optional items can be supplied to fit our CMD Durand reducers, such as:

- special hollow shaft
- double output shaft with standard or custom dimension
- shrink disk arrangement for hollow shaft
- reaction torque arm
- shock absorber (with safety switch)
- torque, temperature sensors etc...
- backstop, free wheel
- lubrication system with accessories
- mechanical fan, heat exchanger
- flange for motors
- special centre distance and gear ratios

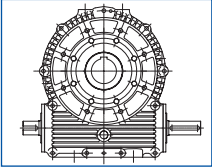
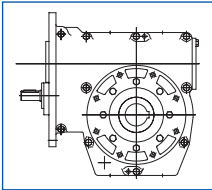
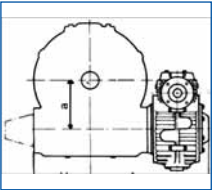
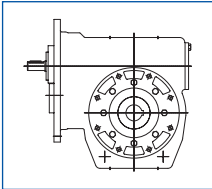
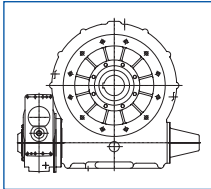
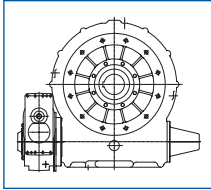


CETIMPhoto - C. Barret



Reducer type selection according to gear ratio u

Single unit or multi reduction units

u	Worm reducer (1)	Multi reduction worm reducers (2)	MH reducer (3)	Multi reduction worm reducers + MH (4)			
5 7.5 10 12.5	N range F/C Type Jumboflex						
15 20	 $u = \text{from } 5 \text{ to } 60$ Overall dimensions refer to page 14 and 20	N range F/C Type Jumboflex	N range MHF1, MHC1 Type Jumboflex  $u = \text{from } 15 \text{ to } 230$ Overall dimensions refer to page 21 and 22	N range F/C Type Jumboflex			
25 30 40 50 60							
80							
180							
225 230					 $u = \text{from } 25 \text{ to } 3600$ Overall dimensions refer to page 15	MHF2, MHC2 Type Jumboflex  $u = \text{from } 50 \text{ to } 800$	Primary MH1  $u = \text{from } 80 \text{ to } 18000$
800							
3600				Primary MH2			
10800				 $u = \text{from } 225 \text{ to } 48000$			
48000							

Reducers (1) to (4): available sizes from 160 to 1250, option for gear motors
 For selection of Reducers (2) (3) (4) consult CMD
 Reversibility and self-locking class refer to page 8

1. Selection of the gear ratio

u = High Speed shaft rotation speed, N_1 (HS) / Low Speed shaft rotation speed, N_2 (LS).

The rating selection tables, pages 11-13 and 17-19, provide the standard gear ratios.

$$u = N_1 / N_2$$

Note: for final selection of gear ratio, it is required to check that the reversibility condition is in conformity with the application page 8.

2. Selection of the service factor SF

The service factor **SF** is determined according to the application and the service conditions. For a large number of application, **SF** is calculated on the tables provided on page 7.

$$SF = F_A \times F_H \times F_L \times F_D$$

3. Calculation of the required torque rating

The required torque rating **Mts** equals the transmitted torque **M2** multiplied by the service factor **SF**:

$$Mts = M2 \times SF$$

4. Reducer size selection

Select in the mechanical ratings table the standard ratio which is the closest to the calculated ratio obtained in 1.

On the line corresponding to the chosen gear ratio and to the input speed **N1**, select the size of the reducer having a torque rating **Mt2** equals to, or higher than the calculated torque (paragraph 3). Check that the following condition is fulfilled:

$$Mt2 \geq Mts$$

5. Checking of reducer thermal power

The thermal power of the running reducer equals the absorbed power time series of factors provided page 7.

$$P_{ths} = P_a \times F_T \times F_M \times F_P$$

Allowable thermal power **Pth** is given on the lower table of the page corresponding to selected reducer page 4.

On the line corresponding to the chosen gear ratio u and to the input speed **N1**, check the value of **Pth** (without fan), **Pthv** (with fan) or **Pthc** (with lubrication circuit), and verify that:

$$P_{th} \geq P_{ths}$$

$$P_{thv} \geq P_{ths} \text{ (N range)}$$

$$P_{thc} \geq P_{ths} \text{ (Jumboflex)}$$

6. Checking of maximum permissible torque

The maximum permissible peak torque **Co** at the output shaft of the reducer, inclusive of inertias, must be higher than the maximum peak torque of the application **M2maxi**.

$$Co > M2maxi$$

Note:

In the specific case of power transmission using several reducers simultaneously, it is recommended to apply a correction factor **Fr** that takes into account the unequal load sharing on each reducer (example: travel drive, cranes...).

$Fr = 1.15$ to 1.3 in case of drive with 2 to 4 reducers.

$Fr = 1.3$ to 1.6 in case of drive with more than 4 reducers.



SERVICE FACTOR SF FOR MECHANICAL RATING SELECTION

$$SF = F_A \times F_H \times F_L \times F_D$$

Service conditions	Driven machines
Uniform U	Screw conveyors – Belt or bucket conveyors with uniform loading – Light elevators – Travel drive for machine tools – Shearing press driving gears – Sheet cutting drives – Generators – Packing machines – Mixers for light liquids or homogeneous materials – Light centrifugal pumps – Fans.
Light shocks L	Calanders – Heavy centrifugal machines – Main drives for machine tools – Belt or bucket conveyors with non-uniform loading, for instance mixed materials – Heavy elevators – Cranes slewing drives – Extruders – Rotary kilns – Strip mills (continuous mill for zinc plates, aluminium angle bars and plates) – Mixers for heavy liquids or non-homogeneous materials – Centrifugal pumps – Processing pumps – Piston pumps – Industrial and mining fans.
Medium shocks M	Light ball mills – Lifting gears – Rubber extruders – Blooming mills – Wood processing machines (multiple blade sawing machines, rough turning machines) – Intermittent operation mixers for rubber and plastic materials – Single cylinder pumps.
Heavy shocks H	Roller mills – Heavy vertical mills – Pellet wheel drives – Mining screens – Quarry and mining crushers – Dredges – Bucket elevators – Heavy plates shearing machines – Peeling machines – Cold rolling mills – Heavy drilling machines – Steel processing machines – Heavy rubber mixers – Heavy processing pumps – Brick extruders – Bucket wheels.

Application factor F_A

Daily duty cycles				
Hours	U	L	M	H
$3 \leq h < 8$	0.8	1	1.25	1.50
$8 \leq h \leq 12$	1	1.25	1.50	1.75
$h > 12$	1.25	1.50	1.75	2

Life factor F_H

Required service life	F_H	Required service life	F_H
8000 h	0.70	50000 h	1.25
10000 h	0.75	75000 h	1.43
25000 h	1	100000 h	1.57

Lubricant factor F_L

Synthetic oil PolyGlycol	1
Mineral oil EP	1.25

Starting condition factor F_D

Number of starts or reversings per hour					
Starts/h	10	100	200	300	400
F_D	1	1.1	1.15	1.2	1.3

THERMAL RATING FACTORS

Ambient temperature factor F_T

is related to the ambient temperature and type of lubricant

Ambient temp.	°C	0	10	20	30	40	50
Synthetic oil PolyGlycol	F_T	0.78	0.87	1	1.16	1.40	1.75
Mineral oil EP	F_T	1	1.14	1.33	1.60	2	2.70

Loading cycle factor F_M

is related to the ratio:

$$\% = \left(\frac{\text{total operation time under load during one cycle}}{\text{total cycle time}} \right) \times 100$$

%	100	80	60	40	20
F_M	1	0.90	0.80	0.70	0.60

Operating position factor F_P

is related to the position of the high speed shaft and the output shaft relatively to the ground.

Reducer position					
F_P	1	1	1	1.15	1.25



Operating as a speed reducer:

The worm shaft is driving the wheel connected to the driven machine. The power is transmitted by the worm shaft to the wheel.

Operating as speed increaser:

The worm wheel is driving and transmit power to the worm shaft.

Reversibility:

This property is applicable for both directions of rotation. Operation as speed increaser in this case is possible. Reversibility allows the driven load to become the driving element (for instance, slowing down an heavy inertia machine).

Self-locking:

This property is applicable for both direction of rotation. Operation as speed increaser in this case is impossible. Self locking prevents the driven load from becoming a driving element: this safety condition is required for lifting application (for instance).

In stopped condition the self-locking is called *“static self-locking”* whereas in running conditions is called *“dynamic self-locking”*.

In case of dynamic self-locking, if the driven load becomes the driving element, the reducer will stop running, immediately or after a very short while, depending on the resisting torques in the drive chain. The complete dynamic self-locking condition is practically never reached, unless in the specific case of high ratios and speeds close to zero.

Reversibility class

The table below is to be used for the selection of the gear ratio of the reducer which is required to fulfil the reversibility or self-locking condition. For specific cases, please consult CMD.

Reversibility class table		Maximum thread angle for each reversibility class, depending on reduction ratio and centre distance.								
Class #	Definition	Class	u / size	160	200	250	315	400	450	500
1	Full static and dynamic reversibility	1	5	39	41	41				
			7.5	29	31	31	34	41	39	41
2	Static and dynamic reversibility Fast reverse effect	2	10	23	24	26	28	31	32	31
			12.5	19	21	20	23	26	29	27
3	Poor static reversibility Dynamic reversibility Fast reverse effect under vibrations	3	15	16	17	16	20	22	24	24
			20	12	13	13	15	17	18	18
4	Static self-locking Fast reverse effect under vibrations Poor dynamic reversibility (*)	4	25	9	9	10	12	14	14	14
			30	8	9	8	10	11	13	12
5	Static self-locking Fast reverse effect under vibrations Very poor dynamic reversibility (*)	5	40	6	6	7	8	8	9	9
			50	4	5	5	6	7	8	8
			60	4	4	4	5	6	6	7

(*) relative to worm shaft rotation (low speed)

◆ for larger sizes, consult CMD

Note: for standard applications where reversibility is required, we recommend classes 1 and 2. When full static self-locking is required, select classes 4 and 5 and install a safety brake. For multi reduction reducers, the reversibility ability of the whole drive is achieved if all reducers are reversible. The self-locking ability is achieved if the larger unit is self-locking (preferably, the smaller units should be self-locking as well).

Efficiency

For a given ratio, the efficiency increases with the size of the gearbox, the sliding velocity (worm shaft speed) and the lead angle. Polyglycol synthetic oil also provides optimum efficiency.

The efficiency η_R of the reducer lubricated with synthetic polyglycol lubricant can be estimated as follows:

$$\eta_R = \frac{M_{t2} \cdot N_2}{9550 \cdot P_1}$$

M_{t2} output torque (N.m)
 N_2 output shaft rotation (rpm)
 P_1 input power on worm shaft (kW)

Example:

- application: conveyor drive
- 24h continuous duty, uniform load
- ambient temperature 30°C
- motor rating 55 kW @ 1500 rpm
- output shaft rotation N2 = 47 rpm
- absorbed power Pa = 52 kW @ 1480 rpm
- efficiency $\eta = 0.93$
- output torque M2 = 9830 Nm
- required life 50000 hrs
- maximum output peak torque M2 maxi = 25000 Nm
- operating position: S (the worm shaft is horizontal, above the worm wheel)
- lubricant: Polyglycol synthetic oil PG

1) Gear ratio u

$$u = N1 / N2 = 1480 / 47 = 31.5$$

Select exact ratio 30 refer to page 12
(Standard gear ratio refer to page 29)

2) Service factor SF

$$SF = F_A \times F_H \times F_L \times F_D$$

$$F_A = 1.25 \quad F_H = 1.25 \quad F_L = 1 \quad F_D = 1$$

$$SF = 1.25 \times 1.25 \times 1 \times 1 = 1.56$$

3) Selection torque

$$Mts = M2 \times SF = 9830 \times 1.56 = 15\,335 \text{ Nm}$$

4) Sizing of the reducer

Select the size of the reducer from the mechanical power ratings table, on pages 11 to 13.

For $u = 30$ and $N1 = 1500$, the size **315** is selected, on page 12.

The condition $Mt2 > MTs$ is fulfilled.

5) Thermal power rating

The required thermal rating is

$$P_{ths} = P_a \times F_T \times F_M \times F_P$$

$$\text{Facteurs } F_T = 1.16 \quad F_M = 1 \quad F_P = 1$$

$$P_{ths} = 52 \times 1.16 \times 1 \times 1 = 60.3 \text{ kW}$$

The power rating is indicated in the table on the bottom of page 12. The thermal rating for gearbox 315, ratio 30 is $P_{thv} = 62 \text{ kW @ 1500 rpm with fan}$.

The condition $P_{thv} > P_{ths}$ is fulfilled.

6) Verification of the maximum peak torque on the output shaft: Co

Refer to Co table on page 29: for unit size 315 and gear ratio 30, the maximum admissible peak torque Co is 51130 Nm which is higher than the required 25000 Nm.

The condition $Co > M2_{maxi}$ is fulfilled.





Worm gear units – N range

Sizes from 160 to 500



Worm gear units N range sizes 160 F/C to 500 F/C Type

Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, $F_p = 1$, $F_m = 1$.

Size	160		200		250		315		400		450		500			
Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2		
5	1800	360	57	1 524	101	2 687	160	4 237	265	7 825	Consult CMD					
	1500	300	52	1 664	92	2 938	146	4 646	243	8 584						
	1200	240	46	1 843	82	3 260	130	5 167	216	9 548						
	1000	200	42	1 996	74	3 536	118	5 612	196	10 369						
	750	150	36	2 250	63	3 992	100	6 351	167	11 731						
	500	100	28	2 637	50	4 689	79	7 480	131	13 771						
	375	75	23	2 906	41	5 175	66	8 271	109	15 230						
	200	40	15	3 535	27	6 315	43	10 130	72	18 656						
	50	10	5.8	5 185	10	9 308	17	15 021	24	24 253						
7.5	1800	240	51	2 017	88	3 482	146	5 703	247	9 120	480	17 701	595	24 125	837	32 945
	1500	200	46	2 188	79	3 782	133	6 208	225	9 968	438	19 380	543	26 404	766	36 136
	1200	160	41	2 407	70	4 167	117	6 856	200	11 035	390	21 530	483	29 342	683	40 260
	1000	133.3	37	2 593	63	4 495	106	7 408	180	11 946	353	23 339	437	31 797	620	43 804
	750	100	31	2 905	53	5 044	90	8 333	153	13 458	299	26 343	370	35 861	527	49 553
	500	66.7	24	3 336	41	5 805	69	9 623	119	15 631	233	30 668	288	41 641	410	57 732
	375	50	20	3 659	34	6 376	57	10 590	99	17 237	194	33 874	239	45 983	342	63 884
	200	26.7	13	4 413	22	7 710	38	12 855	65	21 004	127	41 395	157	56 172	225	78 335
	50	6.7	4.7	6 284	8.3	11 028	14	18 512	24	30 500	35	44 071	44	60 546	59	79 414
10	1800	180	41	2 178	72	3 778	140	6 978	229	12 035	402	21 067	575	29 010	613	32 130
	1500	150	37	2 355	65	4 090	127	7 571	207	13 070	365	22 955	523	31 657	558	35 112
	1200	120	33	2 580	57	4 488	112	8 330	183	14 388	322	25 320	464	35 029	496	38 955
	1000	100	30	2 774	51	4 831	101	8 977	165	15 518	290	27 339	418	37 860	448	42 190
	750	75	25	3 070	43	5 355	84	9 998	138	17 264	243	30 476	351	42 325	377	47 203
	500	50	19	3 510	33	6 136	65	11 496	106	19 871	188	35 163	272	48 945	292	54 706
	375	37	16	3 839	27	6 720	54	12 619	88	21 824	156	38 678	225	53 912	243	60 339
	200	20	10	4 606	18	8 084	35	15 243	57	26 391	102	46 904	148	65 547	159	73 544
	50	5	3.7	6 439	6.5	11 349	13	21 588	21	37 378	35	61 670	50	85 875	59	105 493
12.5	1800	144	38	2 356	70	4 393	111	7 123	195	12 187	349	23 651	529	33 316	587	41 265
	1500	120	34	2 542	63	4 746	100	7 706	176	13 212	316	25 683	480	36 250	534	44 949
	1200	96	30	2 783	56	5 200	88	8 448	155	14 518	278	28 172	424	39 921	471	49 534
	1000	80	27	2 972	50	5 560	79	9 044	139	15 565	249	30 215	380	42 867	423	53 263
	750	60	22	3 283	41	6 150	66	10 024	116	17 285	208	33 572	318	47 712	354	59 367
	500	40	17	3 746	32	7 030	50	11 484	89	19 852	160	38 580	245	54 945	274	68 487
	375	30	14	4 091	26	7 687	42	12 576	74	21 773	132	42 330	203	60 365	227	75 322
	200	16	9.2	4 897	17	9 220	27	15 125	48	26 262	86	51 093	132	73 040	148	91 316
	50	4	3.4	6 777	6.2	12 806	10	21 081	18	36 816	29	66 921	47	100 702	54	128 555

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size	160		200		250		315		400		450		500			
Ratio u	N1	N2	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv		
5	1800	360	31	49	48	77	78	124	119	190	Consult CMD					
	1500	300	29	47	47	74	76	120	116	185						
	1200	240	28	40	44	64	72	105	112	162						
	1000	200	26	35	42	57	70	94	108	145						
	750	150	24	30	39	48	65	79	101	123						
	500	100	21	23	34	38	57	63	90	99						
	375	75	19	20	31	32	52	54	82	85						
	200	40	16	16	25	25	43	43	67	67						
	50	10	10	10	16	16	27	27	42	42						
7.5	1800	240	26	41	42	66	68	109	113	180	185	294	221	352	253	402
	1500	200	25	40	40	64	66	105	110	175	181	288	217	345	250	397
	1200	160	23	34	38	55	63	91	106	152	175	252	210	303	243	351
	1000	133.3	22	30	36	49	60	81	101	136	169	227	203	273	237	318
	750	100	20	25	33	41	56	68	94	115	158	193	190	232	224	274
	500	66.7	18	20	29	32	49	54	84	92	141	155	171	188	203	223
	375	50	16	17	27	28	45	47	77	80	130	134	157	163	187	194
	200	26.7	13	13	22	22	37	37	62	62	106	106	128	128	154	154
	50	6.7	9	9	14	14	24	24	40	40	67	67	81	81	97	97
10	1800	180	22	35	35	56	60	95	98	156	165	262	205	327	222	354
	1500	150	21	33	34	54	58	92	95	151	160	255	201	319	219	348
	1200	120	20	28	32	46	55	80	90	131	154	222	194	280	212	307
	1000	100	19	25	30	41	53	71	87	117	148	199	187	251	206	277
	750	75	17	21	28	34	49	59	80	98	138	169	175	214	194	237
	500	50	15	16	25	27	43	47	71	78	123	135	157	172	176	193
	375	37	14	14	22	23	39	41	65	68	113	117	144	149	162	168
	200	20	11	11	18	18	32	32	53	53	92	92	117	117	133	133
	50	5	7.4	7.4	12	12	21	21	34	34	59	59	75	75	85	85
12.5	1800	144	19	30	31	50	50	80	86	136	142	227	189	300	188	298
	1500	120	18	29	30	48	48	77	83	132	138	220	184	292	184	293
	1200	96	17	24	28	41	46	66	79	114	133	192	177	255	179	258
	1000	80	16	22	27	36	44	59	76	102	127	171	170	229	173	232
	750	60	15	18	25	30	41	50	70	86	119	145	159	194	163	199
	500	40	13	14	22	24	36	40	62	69	106	116	142	156	147	161
	375	30	12	12	20	21	33	34	57	59	97	100	130	135	135	140
	200	16	9.7	9.7	16	16	27	27	47	47	79	79	106	106	111	111
	50	4	6.5	6.5	11	11	18	18	30	30	51	51	68	68	71	71

Note: P1 is the absorbed power on the worm shaft, for transmitting Mt2 on the low speed shaft.



Worm gear units N range sizes 160 F/C to 500 F/C Type

Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, $F_p = 1$, $F_m = 1$.

Size	160		200		250		315		400		450		500			
	Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	
15	1800	120	31	2 406	55	4 252	99	7 666	174	13 577	267	20 886	466	35 113	611	47 644
	1500	100	28	2 592	49	4 585	90	8 281	157	14 673	241	22 629	422	38 142	553	51 752
	1200	80	24	2 813	43	4 982	78	9 021	138	15 997	211	24 708	370	41 739	485	56 674
	1000	66.7	22	2 999	38	5 318	70	9 647	123	17 117	189	26 469	331	44 760	434	60 795
	750	50	18	3 305	32	5 869	58	10 674	102	18 956	158	29 360	277	49 725	363	67 566
	500	33.3	14	3 760	24	6 689	45	12 204	79	21 696	121	33 670	213	57 132	280	77 670
	375	25	11	4 099	20	7 301	37	13 348	65	23 745	100	36 895	176	62 677	231	85 235
	200	13.3	7.4	4 888	13	8 727	24	16 015	42	28 525	65	44 425	115	75 632	151	102 911
	50	3.3	2.7	6 677	4.7	11 963	9	22 097	15	39 436	24	61 645	35	88 778	43	112 843
	20	1800	90	25	2 533	50	5 059	80	8 104	132	13 585	257	26 389	373	37 210	477
1500		75	23	2 711	45	5 420	71	8 696	118	14 592	231	28 429	336	40 152	430	53 167
1200		60	20	2 936	39	5 878	62	9 448	103	15 870	202	30 972	294	43 784	376	58 042
1000		50	18	3 126	35	6 265	56	10 084	92	16 950	180	33 124	263	46 857	336	62 137
750		37.5	15	3 437	29	6 899	46	11 125	77	18 722	150	36 654	219	51 902	280	68 859
500		25	11	3 899	22	7 840	35	12 675	59	21 358	116	41 910	168	59 416	216	78 872
375		18.8	9.2	4 244	18	8 543	29	13 831	49	23 326	95	45 838	139	65 034	178	86 360
200		10	6.1	5 103	12	10 294	19	16 715	32	28 235	63	55 653	90	78 139	117	105 071
50		2.5	2.2	6 796	4.3	13 756	6.9	22 438	11	37 998	19	64 404	29	96 324	35	120 835
25		1800	72	23	2 760	41	5 077	72	9 005	114	14 392	227	29 021	343	43 856	371
	1500	60	20	2 950	37	5 435	65	9 654	102	15 440	204	31 168	309	47 257	334	51 371
	1200	48	18	3 192	32	5 888	57	10 476	89	16 768	178	33 874	269	51 438	291	55 909
	1000	40	16	3 395	29	6 271	50	11 170	79	17 890	158	36 162	241	54 975	260	59 747
	750	30	13	3 729	24	6 898	42	12 308	66	19 730	132	39 912	200	60 774	216	66 039
	500	20	10	4 223	18	7 829	32	13 998	51	22 464	101	45 488	154	69 402	166	75 402
	375	15	8	4 592	15	8 524	27	15 259	42	24 504	83	49 651	127	75 847	137	82 395
	200	8	5.4	5 464	10	10 167	18	18 245	27	29 337	54	59 512	83	91 123	89	98 968
	50	2	2	7 269	3.6	13 579	6.4	24 463	10	39 414	19	80 102	30	123 100	32	133 654
	30	1800	60	19	2 722	34	4 882	58	8 459	111	16 487	199	29 963	290	41 253	338
1500		50	17	2 906	30	5 217	52	9 061	99	17 672	178	32 185	261	44 377	304	55 220
1200		40	15	3 138	26	5 641	45	9 823	87	19 174	156	34 958	227	48 245	265	60 106
1000		33.3	13	3 333	23	5 999	40	10 467	77	20 443	139	37 300	203	51 514	237	64 206
750		25	11	3 653	19	6 585	34	11 521	64	22 522	115	41 139	169	56 873	197	70 926
500		16.7	8.4	4 127	15	7 454	26	13 087	49	25 610	89	46 843	129	64 841	151	80 920
375		12.5	6.9	4 481	12	8 101	21	14 254	41	27 913	73	51 100	107	70 789	125	88 382
200		6.7	4.5	5 283	8	9 573	14	16 901	27	33 139	47	60 764	69	84 517	81	105 335
50		1.7	1.7	7 003	2.9	12 737	4.7	20 839	9	40 904	15	72 037	24	111 763	27	131 659

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size	160		200		250		315		400		450		500			
	Ratio u	N1	N2	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	
15	1800	120	16	25	26	42	42	67	75	119	130	207	165	263	195	310
	1500	100	15	24	25	40	41	65	73	116	126	201	161	257	190	303
	1200	80	14	21	24	35	39	56	69	100	121	174	155	224	183	265
	1000	66.7	14	18	23	31	37	50	66	89	116	156	149	201	177	238
	750	50	13	15	21	26	34	42	61	75	108	132	139	170	165	202
	500	33.3	11	12	19	20	30	33	54	60	96	106	124	137	148	163
	375	25	10	10	17	18	28	29	50	52	88	91	114	118	136	141
	200	13.3	8.3	8.3	14	14	23	23	41	41	72	72	93	93	111	111
	50	3.3	5.6	5.6	9.3	9.3	15	15	27	27	47	47	60	60	72	72
	20	1800	90	12	20	21	33	34	54	59	94	102	163	135	214	159
1500		75	12	19	20	31	33	52	57	91	99	158	131	209	155	246
1200		60	11	16	19	27	31	45	55	79	95	137	126	182	149	215
1000		50	11	14	18	24	30	40	52	70	92	123	121	163	143	193
750		37.5	9.7	12	16	20	28	34	49	59	85	104	113	138	134	164
500		25	8.6	9.4	14	16	24	27	43	47	76	83	101	111	120	132
375		18.8	7.8	8.1	13	14	22	23	39	41	70	72	92	96	110	114
200		10	6.5	6.5	11	11	18	18	32	32	57	57	76	76	90	90
50		2.5	4.5	4.5	7.5	7.5	12	12	22	22	38	38	49	49	59	59
25		1800	72	9.7	15	16	25	27	43	48	77	90	143	108	172	139
	1500	60	9.3	15	15	24	26	42	47	74	87	138	105	168	135	215
	1200	48	8.8	13	15	21	25	36	45	64	83	120	101	146	129	187
	1000	40	8.4	11	14	19	24	32	43	57	80	107	97	131	125	167
	750	30	7.7	9.5	13	16	22	27	40	48	74	90	91	111	116	142
	500	20	6.9	7.6	11	13	20	22	35	39	66	72	81	89	104	114
	375	15	6.3	6.6	10	11	18	19	32	34	60	63	75	77	95	99
	200	8	5.3	5.3	8.7	8.7	15	15	27	27	50	50	61	61	78	78
	50	2	3.7	3.7	6	6	10	10	18	18	33	33	41	41	51	51
	30	1800	60	9.2	15	15	24	23	36	40	64	73	116	101	160	112
1500		50	8.8	14	15	23	22	35	39	62	71	113	98	156	109	173
1200		40	8.3	12	14	20	21	30	37	54	68	98	94	135	105	151
1000		33.3	7.9	11	13	18	20	27	36	48	65	88	90	121	101	136
750		25	7.3	8.9	12	15	19	23	33	41	61	74	84	103	95	116
500		16.7	6.5	7.1	11	12	17	18	30	33	54	60	75	83	85	93
375		12.5	5.9	6.2	10	10	15	16	27	28	50	52	69	72	78	81
200		6.7	5	5	8.2	8.2	13	13	23	23	41	41	57	57	64	64
50		1.7	3.5	3.5	5.7	5.7	8.8	8.8	15	15	28	28	38	38	43	43

Note: P1 is the absorbed power on the worm shaft, for transmitting Mt2 on the low speed shaft.



Reducer DURAND N range

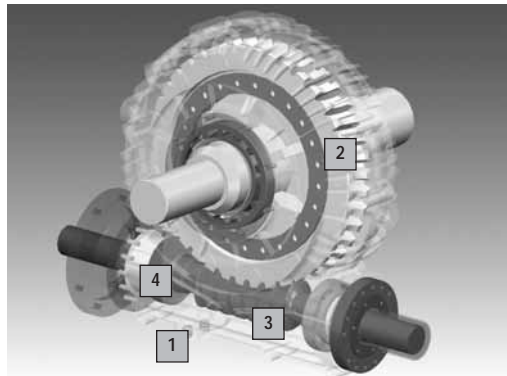
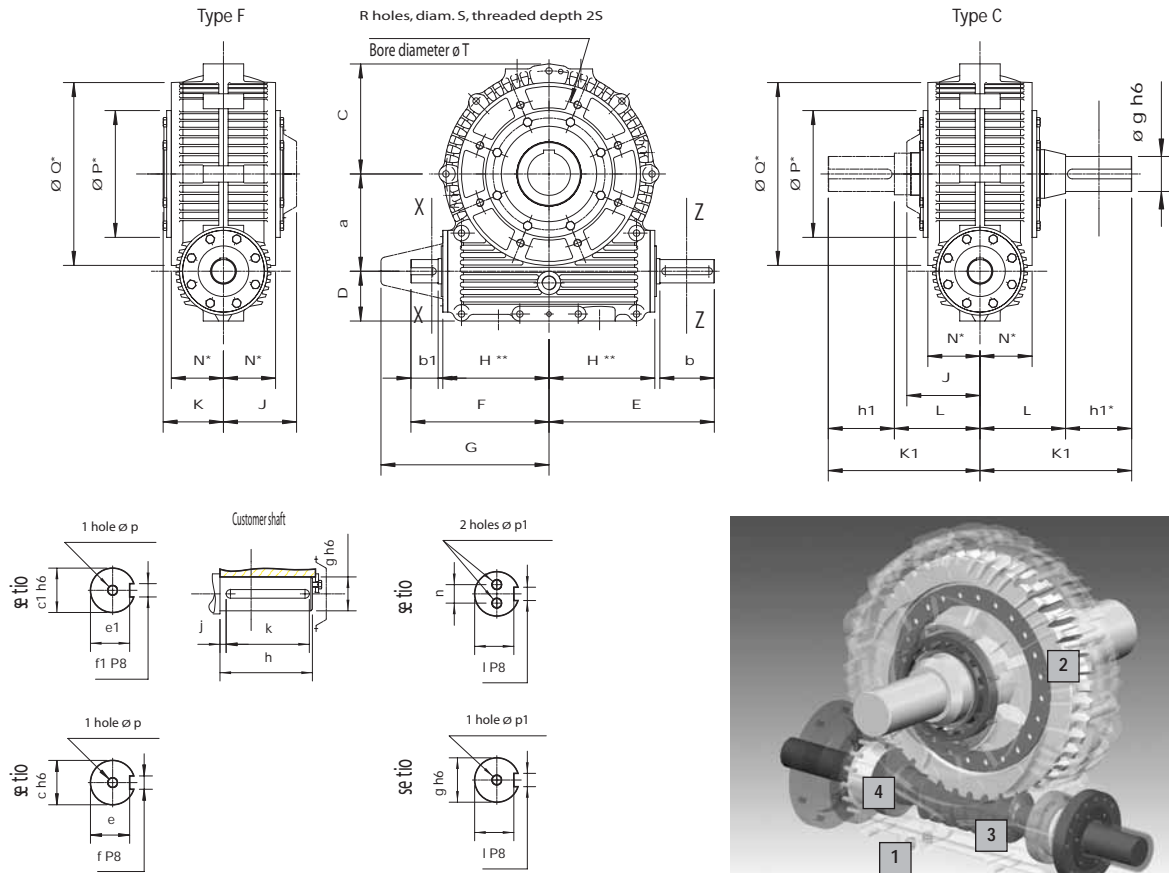
Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, Fp = 1, Fm = 1.

Size	160				200				250				315				400				450				500			
Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2		
40	1800	45	14	2 620	28	5 249	48	9 070	85	16 259	140	27 366	204	39 229	263	51 953												
	1500	37.5	13	2 793	25	5 603	43	9 694	76	17 403	126	29 370	183	42 173	236	55 879												
	1200	30	11	3 013	22	6 050	38	10 483	67	18 851	109	31 853	160	45 776	206	60 731												
	1000	25	10	3 198	20	6 428	33	11 150	59	20 074	98	33 949	143	48 819	184	64 791												
	750	18.8	8.3	3 501	16	7 045	28	12 239	49	22 075	81	37 382	119	53 803	153	71 441												
	500	12.5	6.4	3 949	13	7 959	21	13 856	38	25 045	62	42 478	91	61 205	117	81 319												
	375	9.4	5.4	4 325	10	8 726	18	15 211	32	27 534	52	46 723	76	67 438	98	89 544												
	200	5	3.5	4 987	6.8	10 080	12	17 610	20	31 957	33	54 327	49	78 500	63	104 315												
	50	1.3	1.3	6 605	2.5	13 391	4.3	23 486	7.6	42 796	10	60 618	15	86 289	19	114 282												
50	1800	36	13	2 888	23	5 249	42	9 492	67	15 632	117	27 737	187	44 607	235	55 706												
	1500	30	12	3 076	21	5 598	37	10 138	60	16 707	104	29 688	168	47 891	212	59 928												
	1200	24	10	3 314	18	6 040	33	10 955	52	18 068	91	32 136	146	51 907	185	65 241												
	1000	20	9.1	3 515	16	6 413	29	11 644	47	19 215	81	34 201	130	55 297	165	69 601												
	750	15	7.6	3 842	14	7 022	24	12 771	39	21 092	67	37 580	109	60 845	138	76 741												
	500	10	5.9	4 327	11	7 923	19	14 441	30	23 875	52	42 591	83	69 077	106	87 342												
	375	7.5	4.9	4 693	8.7	8 604	16	15 701	25	25 977	43	46 376	69	75 297	88	95 356												
	200	4	3.2	5 407	5.7	9 935	10	18 173	16	30 102	27	53 816	44	87 547	57	111 181												
	50	1	1.2	7 151	2.2	13 189	3.8	24 220	6	40 198	10	72 036	16	117 565	21	149 999												
60	1800	30	11	2 780	20	5 171	36	9 447	69	18 713	112	31 289	159	44 786	151	42 809												
	1500	25	10	2 959	18	5 512	32	10 084	61	19 986	100	33 460	142	47 986	135	45 932												
	1200	20	8.5	3 186	16	5 943	28	10 888	53	21 596	87	36 182	124	51 932	118	49 738												
	1000	16.7	7.6	3 377	14	6 306	25	11 567	48	22 954	78	38 478	110	55 261	105	52 950												
	750	12.5	6.4	3 688	12	6 899	21	12 676	40	25 173	65	42 232	92	60 706	87	58 204												
	500	8.3	5.0	4 171	9.0	7 818	16	14 396	31	28 614	50	48 053	71	69 148	67	66 350												
	375	6.3	4.1	4 466	7.5	8 381	13	15 452	25	30 729	41	51 635	58	74 350	55	71 375												
	200	3.3	2.7	5 143	4.9	9 673	8.7	17 878	16	35 590	26	59 871	37	86 315	35	82 933												
	50	0.8	0.9	5 740	1.6	11 065	3.0	20 978	5.4	40 890	9.3	75 693	14	114 933	13	110 592												
> 60	Multi reduction reducers – MH type reducers Consult CMD																											

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size	160				200				250				315				400				450				500			
Ratio u	N1	N2	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv	Pth	Pthv		
40	1800	45	6.7	11	11	18	19	31	31	50	55	88	72	114	86	137												
	1500	37.5	6.4	10	11	17	19	30	30	49	54	85	70	112	84	133												
	1200	30	6.1	8.8	10	15	18	26	29	42	51	74	67	97	81	117												
	1000	25	5.8	7.8	10	13	17	23	28	38	50	67	65	87	78	105												
	750	18.8	5.4	6.6	9.1	11	16	19	26	32	46	57	61	74	73	89												
	500	12.5	4.8	5.3	8.2	9.0	14	15	23	26	42	46	55	60	66	72												
	375	9.4	4.5	4.6	7.5	7.8	13	13	22	22	38	40	50	52	61	63												
	200	5	3.8	3.8	6.3	6.3	11	11	18	18	32	32	42	42	50	50												
	50	1.3	2.8	2.8	4.5	4.5	7.7	7.7	13	13	22	22	28	28	34	34												
50	1800	36	6	8.7	9	14	15	24	27	43	49	78	59	95	64	102												
	1500	30	5.3	8.4	8.6	14	15	23	26	41	47	75	58	92	63	100												
	1200	24	5	7.2	8.2	12	14	20	25	36	45	65	56	80	61	88												
	1000	20	4.8	6.5	7.9	11	13	18	24	32	44	59	54	72	59	79												
	750	15	4.5	5.4	7.3	9	13	15	22	27	41	50	50	62	56	68												
	500	10	4	4.40	6.6	7.2	11	12	20	22	37	40	45	50	50	55												
	375	7.5	3.7	3.9	6.1	6.3	10	11	18	19	34	35	42	43	47	49												
	200	4	3.2	3.2	5.2	5.2	8.8	8.8	16	16	28	28	35	35	39	39												
	50	1	2.4	2.4	3.8	3.8	6.4	6.4	11	11	20	20	24	24	27	27												
60	1800	30	4.6	7.4	7.5	12	13	20	23	36	42	66	52	83	64	102												
	1500	25	4.5	7.1	7.3	12	12	20	22	35	40	64	51	81	62	99												
	1200	20	4.3	6.2	7	10	12	17	21	30	39	56	49	71	60	87												
	1000	16.7	4.1	5.5	6.7	9	11	15	20	27	37	50	47	64	58	78												
	750	12.5	3.8	4.7	6.2	7.6	11	13	19	23	35	43	44	54	54	66												
	500	8.3	3.4	3.8	5.6	6.2	9.6	11	17	19	31	35	40	44	49	54												
	375	6.3	3.2	3.30	5.2	5.4	8.9	9.2	16	16	29	30	37	38	45	47												
	200	3.3	2.8	2.8	4.5	4.5	7.6	7.6	13	13	24	24	31	31	38	38												
	50	0.8	2.1	2.1	3.4	3.4	5.6	5.6	9.6	9.6	17	17	22	22	26	26												
> 60	Multi reduction reducers – MH type reducers Consult CMD																											

Note: P1 is the absorbed power on the worm shaft, for transmitting Mt2 on the low speed shaft.



SIZE	a	C	D	E	F	G	H**	J	K	K1	L	N*	P*	Q*	R	S	T
160 F&C	160	190	98	305	245	312	187	148	122	300	160	103	234	310	8	M16	270
200 F&C	200	226	102	345	295	352	226	165	135	330	190	114	285	380	8	M16	325
250 F&C	250	283	128	425	355	432	272	188	155	390	220	134	326	470	8	M20	395
315 F&C	315	352	143	480	420	487	328	225	185	470	260	160	326	500	12	M20	400
400 F&C	400	442	170	590	560	597	408	250	210	550	300	185	385	710	12	M24	630
450 F&C	450	503	200	660	620	667	435	290	250	590	340	225	385	800	12	M30	710
500 F&C	500	555	200	710	670	717	485	325	280	650	350	245	440	900	12	M30	800

Position	Designation
1	Housing
2	Worm wheel
3	Worm shaft
4	Bearings

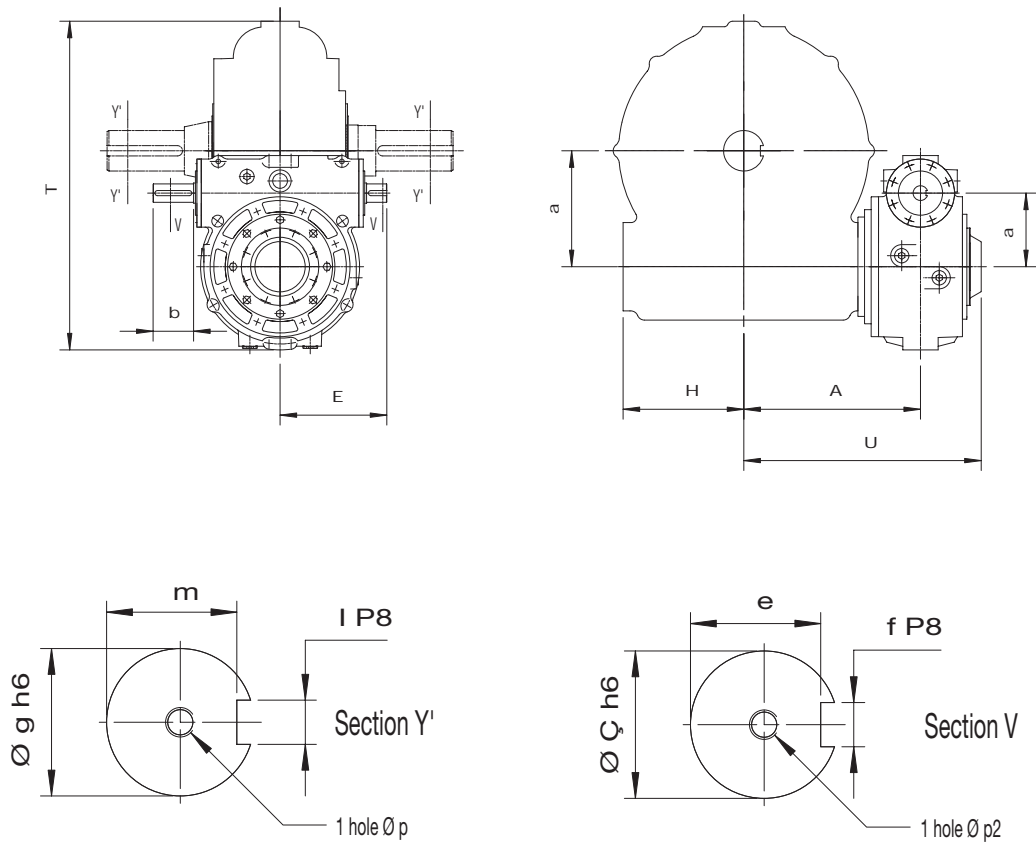
SIZE	b	b1	c	c1	e	e1	f	f1	g	h	h1	j	k	l	m	n	p	p1
160 F&C	110	50	40	40	35	35	12	12	70	240	140	20	200	20	62.5	40	M12	M12
200 F&C	110	60	50	50	44.5	44.5	14	14	90	265	140	20	230	25	81	50	M12	M12
250 F&C	140	70	60	60	53	53	18	18	110	305	170	20	270	28	100	60	M14	M14
315 F&C	140	80	70	70	62.5	62.5	20	20	140	365	210	20	330	36	128	75	M16	M16
400 F&C	170	140	90	70	81	62.5	25	20	160	415	250	10	400	40	147	100	M16	M16
450 F&C	210	170	110	90	100	81	28	25	160	495	250	10	480	40	147	100	M16	M16
500 F&C	210	170	110	90	100	81	28	25	180	555	300	10	530	45	165	120	M20	M20

WEIGHT (kg)	
Type F	Type C
130	150
200	250
325	385
500	625
950	1145
1365	1575
1850	2135

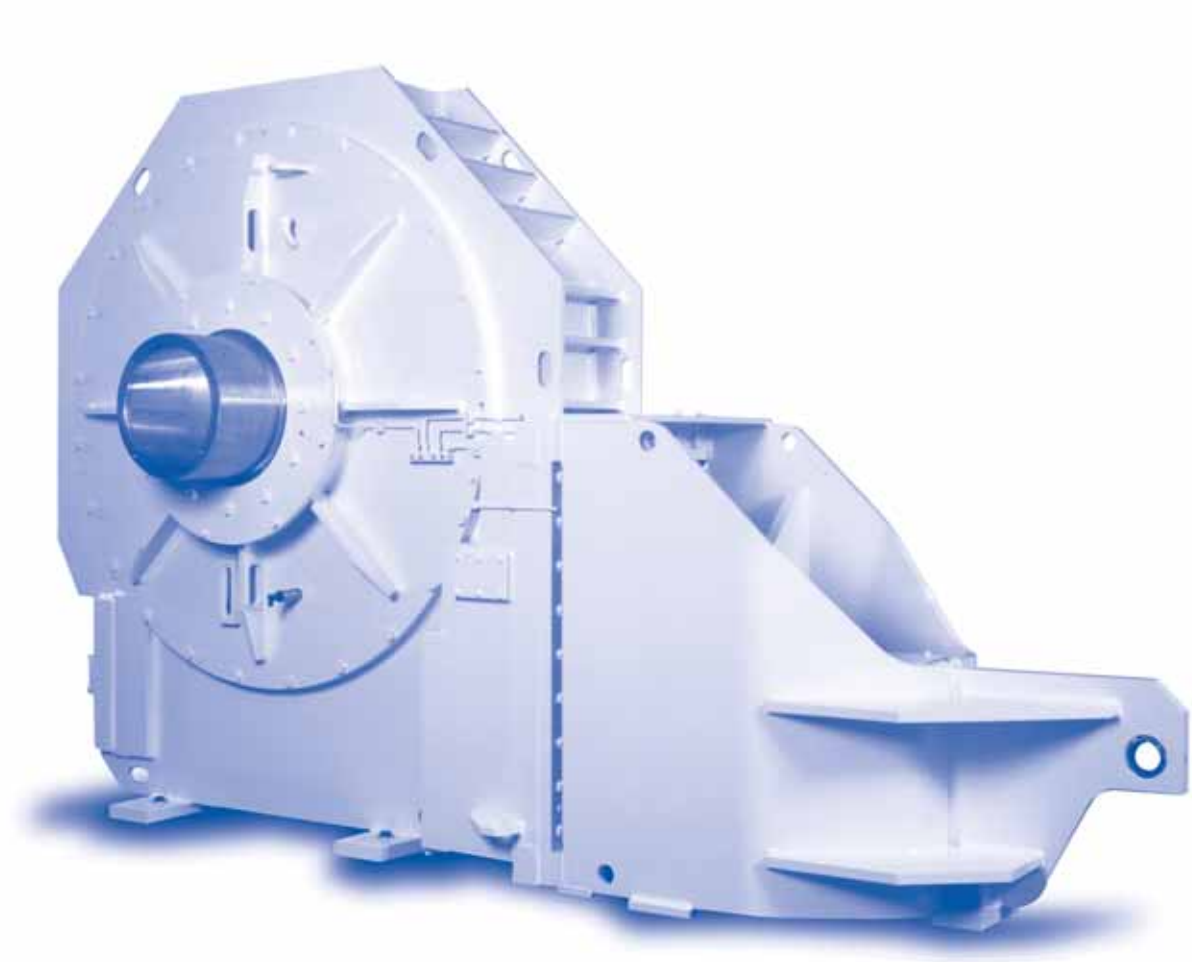
* Mounting bases dimensions.

** Dimension H indicates the overall dimension when there is no second shaft extension.

Other dimensions of low speed shaft are possible upon request. C type reducer is a F type reducer having the hollow shaft filled up with solid shaft.



	A	E	H	U	T	a	a'	b	c	e	f	p	g	m	l	p2	Weight (kg)
80 U-160F 80 U-160C	275	177.5	187	370	450	160	80	60	25	21	8	M8	60	53	18	M12	160 180
100 U-200F 100 U-200C	330	217.5	226	440	546	200	100	80	30	26	8	M8	70	62.5	20	M12	240 290
125 U-250F 125 U-250C	390	275	272	510	680	250	125	110	40	35	12	M10	90	81	25	M14	390 450
160 F-315F 160 F-315C	470	305	328	618	857	315	160	110	40	35	12	M12	110	100	28	M16	640 765
200 F-400F 200 F-400C	560	345	408	725	1068	400	200	110	50	44.5	14	M12	140	128	36	M16	1165 1360
200 F-450F 200 F-450C	590	345	435	755	1179	450	200	110	50	44.5	14	M12	140	128	36	M16	1590 1800
250 F-450F 250 F-450C	615	425	435	803	1236	450	250	140	60	53	18	M14	140	128	36	M16	1720 1930
200 F-500F 200 F-500C	645	345	485	810	1281	500	200	110	50	44.5	14	M12	160	147	40	M20	2085 2370
250 F-500F 250 F-500C	665	425	485	853	1338	500	250	140	60	53	18	M14	160	147	40	M20	2215 2500



Jumboflex Worm Reducer

Sizes from 560 to 1250



JUMBOFLEX Worm Reducer

Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, $F_p = 1$, $F_m = 1$.

Size	560		630		710		800		900		1000		1120		1250	
Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2
7.5	1500	150	906	43.9	1 190	57.7	Consult CMD									
	1200	160	809	49.0	1 064	64.5										
	1000	133.3	735	53.4	967	70.3										
	750	100	626	60.5	824	79.8										
	500	66.7	488	70.6	644	93.2										
	375	50	407	78.2	537	103.3										
	200	26.7	269	96.0	355	127.1										
	50	6.7	101	140.8	134	186.8										
	10	1.3	29	194.0	37	249.5										
	10	1500	150	921	57.9	1 242										
1200	120	819	64.4	1 106	87.0											
1000	100	742	69.9	1 002	94.5											
750	75	625	78.3	845	106.2											
500	50	486	91.0	658	123.5											
375	37.5	404	100.5	547	136.4											
200	20	265	122.8	360	166.9											
50	5	99	176.8	134	240.9											
10	1	25	213.6	34	292.3											
12.5	1500	120	826	64.6	1 083	84.9										
	1200	96	732	71.5	961	94.0										
	1000	80	659	77.2	865	101.6										
	750	60	554	86.3	728	113.7										
	500	40	429	99.8	565	131.8										
	375	30	356	110.0	469	145.3										
	200	16	234	133.9	308	177.1										
	50	4	86	190.2	113	252.0										
	10	0.8	24	249.3	32	342.6										
	1200	120	826	64.6	1 083	84.9										
1000	100	742	69.9	1 002	94.5											
750	75	625	78.3	845	106.2											
500	50	486	91.0	658	123.5											
375	37.5	404	100.5	547	136.4											
200	20	265	122.8	360	166.9											
50	5	99	176.8	134	240.9											
10	1	25	213.6	34	292.3											
1500	120	826	64.6	1 083	84.9											
1200	96	732	71.5	961	94.0											
1000	80	659	77.2	865	101.6											
750	60	554	86.3	728	113.7											
500	40	429	99.8	565	131.8											
375	30	356	110.0	469	145.3											
200	16	234	133.9	308	177.1											
50	4	86	190.2	113	252.0											
10	0.8	24	249.3	32	342.6											

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size	560		630		710		800		900		1000		1120		1250	
Ratio u	N1	N2	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc
7.5	1500	150	307	906	394	1 190	Consult CMD									
	1200	160	301	809	388	1 064										
	1000	133.3	294	735	380	967										
	750	100	279	626	362	824										
	500	66.7	255	488	332	644										
	375	50	236	407	308	537										
	200	26.7	195	269	255	355										
	50	6.7	123	101	161	134										
	10	1.3	78	29	101	39										
	10	1500	150	274	921	356										
1200	120	267	819	349	1 106											
1000	100	261	742	341	1 002											
750	75	247	625	325	845											
500	50	225	486	296	658											
375	37.5	208	404	274	547											
200	20	171	265	227	360											
50	5	109	99	144	134											
10	1	70	28	91	38											
12.5	1500	120	238	826	312	1 083										
	1200	96	232	732	305	961										
	1000	80	226	659	297	865										
	750	60	214	554	283	728										
	500	40	194	429	258	565										
	375	30	180	356	238	469										
	200	16	148	234	197	308										
	50	4	95	86	126	113										
	10	0.8	61	25	81	32										
	1200	120	826	64.6	1 083	84.9										
1000	100	742	69.9	1 002	94.5											
750	75	625	78.3	845	106.2											
500	50	486	91.0	658	123.5											
375	37.5	404	100.5	547	136.4											
200	20	265	122.8	360	166.9											
50	5	99	176.8	134	240.9											
10	1	25	213.6	34	292.3											
1500	120	826	64.6	1 083	84.9											
1200	96	732	71.5	961	94.0											
1000	80	659	77.2	865	101.6											
750	60	554	86.3	728	113.7											
500	40	429	99.8	565	131.8											
375	30	356	110.0	469	145.3											
200	16	234	133.9	308	177.1											
50	4	86	190.2	113	252.0											
10	0.8	24	249.3	32	342.6											

Note: P1 is the absorbed power on the worm shaft, for transmitting Mt2 on the low speed shaft.



JUMBOFLEX Worm Reducer

Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, Fp = 1, Fm = 1.

Size		560		630		710		800		900		1000		1120		1250		
Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2
15	1500	100	709	64.0	998	90.3	1 325	119.9	Consult CMD									
	1200	80	626	70.5	881	99.5	1 171	132.3										
	1000	66.7	563	75.9	793	107.3	1 055	142.9										
	750	50	472	84.7	666	119.9	888	160.1										
	500	33.3	365	97.8	515	138.6	688	185.4										
	375	25	303	107.7	427	152.6	571	204.4										
	200	13.3	198	130.7	280	185.5	375	249.0										
	50	3.3	72	183.9	102	261.5	137	352.1										
10	0.7	19	218.3	25	306.6	30	423.4											
20	1500	75	554	66.0	798	95.3	1 068	127.6										
	1200	60	488	72.4	703	104.7	941	140.5										
	1000	50	438	77.9	631	112.8	847	151.5										
	750	37.5	366	86.7	529	125.6	711	169.1										
	500	25	283	99.7	408	144.7	550	195.2										
	375	18.8	234	109.5	338	159.0	455	214.7										
	200	10	153	132.4	221	192.4	298	260.4										
	50	2.5	56	183.4	80	266.9	108	362.4										
10	0.5	16	240.7	22	342.2	31	476.5											
25	1500	60	453	68.9	613	93.6	842	128.7										
	1200	48	398	75.6	539	102.7	741	141.5										
	1000	40	357	81.2	484	110.5	666	152.3										
	750	30	299	90.1	405	122.8	558	169.8										
	500	20	230	103.5	312	141.1	431	195.5										
	375	15	191	113.5	258	154.8	357	214.7										
	200	8	125	137.1	170	187.4	235	260.4										
	50	2	45	187.1	61	256.0	85	356.9										
10	0.4	13	246.2	18	338.0	24	472.4											
30	1500	50	385	67.3	525	92.1	718	126.2										
	1200	40	338	73.7	461	100.9	631	138.5										
	1000	33.3	303	79.0	413	108.4	567	149.0										
	750	25	253	87.6	345	120.3	475	165.7										
	500	16.7	195	100.4	266	137.9	366	190.4										
	375	12.5	161	110.0	220	151.2	303	208.9										
	200	6.7	105	131.9	144	181.5	198	251.3										
	50	1.7	38	179.6	52	247.5	72	343.7										
10	0.3	11	234.6	15	324.4	21	452.1											

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size		560		630		710		800		900		1000		1120		1250		
Ratio u	N1	N2	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc
15	1500	100	219	709	289	998	377	1 325	Consult CMD									
	1200	80	213	626	282	881	371	1 171										
	1000	66.7	207	563	275	793	362	1 055										
	750	50	196	472	261	666	345	888										
	500	33.3	178	365	237	515	316	688										
	375	25	164	303	219	427	293	571										
	200	13.3	135	198	181	280	243	375										
	50	3.3	87	72	116	102	156	137										
10	0.7	57	21	75	29	100	39											
20	1500	75	175	554	232	798	304	1 068										
	1200	60	170	488	227	703	299	941										
	1000	50	165	438	221	631	292	847										
	750	37.5	156	366	209	529	278	711										
	500	25	142	283	190	408	254	550										
	375	18.8	131	234	176	338	236	455										
	200	10	108	153	146	221	196	298										
	50	2.5	70	56	94	80	127	108										
10	0.5	47	16	62	23	83	31											
25	1500	60	136	453	181	613	239	842										
	1200	48	132	398	177	539	234	741										
	1000	40	129	357	173	484	229	666										
	750	30	122	299	164	405	219	558										
	500	20	111	230	150	312	200	431										
	375	15	103	191	139	258	186	357										
	200	8	85	125	115	170	155	235										
	50	2	56	45	76	61	102	85										
10	0.4	38	13	51	18	67	24											
30	1500	50	123	385	164	525	216	718										
	1200	40	120	338	160	461	212	631										
	1000	33.3	117	303	156	413	207	567										
	750	25	110	253	148	345	197	475										
	500	16.7	100	195	135	266	181	366										
	375	12.5	93	161	125	220	168	303										
	200	6.7	77	105	104	144	140	198										
	50	1.7	51	38	69	52	92	72										
10	0.3	35	11	46	15	62	21											



JUMBOFLEX Worm Reducer

Mechanical power ratings P1 in kW, Output torque Mt2 in Nm, worm shaft rotation speed N1 and worm wheel rotation speed N2 in rpm, Service factor = 1, design life = 25000 h, polyglycol synthetic oil, Fp = 1, Fm = 1.

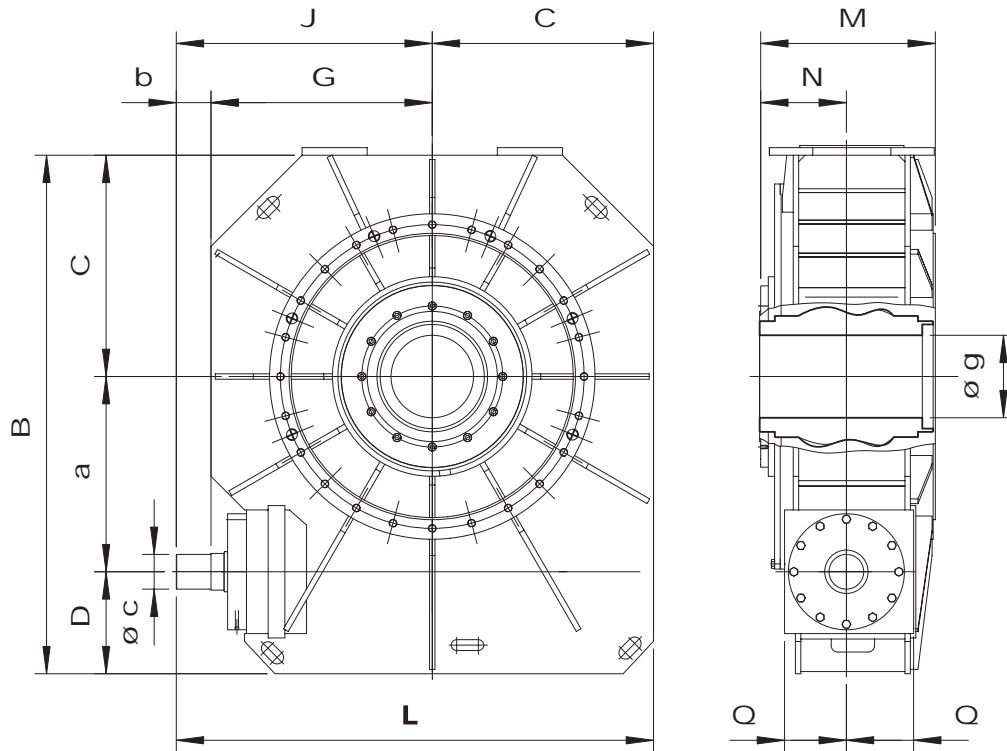
Size	560		630		710		800		900		1000		1120		1250			
Ratio u	N1	N2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2	P1	Mt2		
40	1500	37.5	322	78.9	427	105.3	590	130.2	819	181.2	1 047	243.7	1 347	312.4	Consult CMD			
	1200	30	282	86.3	374	115.3	518	142.5	719	198.7	921	267.5	1 187	343.7				
	1000	25	253	92.5	336	123.7	464	153.1	646	213.5	826	287.8	1 067	370.4	1 483	516.7	1 687	784.5
	750	18.8	211	102.3	281	137.1	388	169.8	541	237.4	693	320.8	898	414.3	1 249	578.8		
	500	12.5	163	117.0	216	156.8	299	194.5	417	272.4	535	368.5	695	477.8	969	669.5	1 311	909.9
	375	9.4	136	128.8	181	172.9	247	213.0	345	298.6	448	408.5	582	530.7	813	744.3	1 100	1 012.5
	200	5	88	150.9	116	202.6	160	253.1	223	355.4	287	480.7	374	626.2	521	879.8	706	1 198.6
	50	1.3	33	205.0	43	275.8	59	344.9	82	485.6	105	658.3	137	861.7	191	1 213.8	258	1 657.8
	10	0.3	8	219.7	12	323.3	15	379.4	20	540.3	26	718.8	35	992.4	50	1 417.3	68	1 976.6
50	1500	30	278	78.4	376	106.8	508	144.6	689	196.8	908	260.0	1 059	329.4	1 509	416.7	Consult CMD	
	1200	24	244	85.6	330	116.7	446	158.3	605	215.7	798	285.5	932	362.2	1 329	458.5		
	1000	20	218	91.6	296	125.1	400	169.9	543	231.7	717	307.0	838	390.0	1 194	493.9	1 561	648.5
	750	15	182	101.2	247	138.3	335	188.5	455	257.7	602	342.5	705	435.8	1 005	552.4	1 315	726.1
	500	10	141	115.5	190	158.0	258	215.7	352	295.3	465	393.4	551	507.0	778	637.2	1 020	839.8
	375	7.5	117	126.3	158	172.9	214	236.2	292	323.8	386	431.8	452	549.8	647	702.0	849	926.1
	200	4	75	147.7	102	202.4	138	277.1	188	380.4	249	508.3	292	648.6	416	828.6	545	1 094.7
	50	1	28	200.2	38	274.8	52	377.5	70	519.7	93	696.5	109	889.1	150	1 108.6	201	1 510.1
	10	0.2	8.4	256.9	11	353.7	15	487.1	21	672.2	27	903.4	29	1 029.6	34	1 108.6	46	1 548.5
60	1500	25	227	75.5	306	102.8	416	139.9	563	190.1	757	256.4	899	325.7	1 198	435.8	1 581	577.4
	1200	20	199	82.3	268	112.2	365	152.9	494	208.0	664	281.0	791	357.7	1 054	479.2	1 393	635.8
	1000	16.7	178	88.0	240	120.1	327	164.0	442	223.2	596	301.9	710	384.7	947	516.0	1 252	685.3
	750	12.5	149	97.0	201	132.6	273	181.5	370	247.7	500	336.1	597	429.3	797	576.5	1 054	766.8
	500	8.3	115	111.1	155	151.9	212	208.4	287	284.9	388	387.2	463	494.7	620	666.3	821	888.7
	375	6.3	95	119.9	127	164.0	174	225.1	236	308.0	318	419.1	380	536.1	509	722.8	674	964.8
	200	3.3	61	140.0	82	191.7	112	263.6	152	361.4	205	492.6	246	631.6	329	853.0	436	1 140.3
	50	0.8	23	188.3	31	258.2	42	356.2	57	489.6	77	669.5	92	859.5	123	1 164.0	163	1 560.1
	10	0.2	6.9	240.8	9.2	331.4	13	458.9	17	632.2	23	866.7	28	1 116.1	37	1 514.9	49	2 034.7

Thermal power ratings Pth (without cooling fan), Pthv (with cooling fan) in kW, ambient T° 20°C, polyglycol synthetic oil.

Size	560		630		710		800		900		1000		1120		1250			
Ratio u	N10	N2	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc	Pth	Pthc		
40	1500	37.5	82	322	110	427	182	590	241	819	300	1 047	355	1 347	Consult CMD			
	1200	30	80	282	107	374	178	518	237	719	296	921	353	1 187				
	1000	25	78	253	105	336	174	464	232	646	290	826	348	1 067	453	1 483	583	1 687
	750	18.8	74	211	100	281	165	388	221	541	279	693	337	898	440	1 249		
	500	12.5	68	163	92	216	151	299	203	417	257	535	314	695	412	969	549	1 311
	375	9.4	63	136	85	181	140	247	189	345	240	448	294	582	387	813	518	1 100
	200	5	53	88	72	116	117	160	159	223	202	287	249	374	329	521	442	706
	50	1.3	36	33	49	43	78	59	105	82	134	105	166	137	219	191	293	258
	10	0.3	26	10	34	13	53	17	71	24	90	30	111	40	145	56	192	75
50	1500	30	75	278	99	376	130	508	172	689	222	908	248	1 059	399	1 509	Consult CMD	
	1200	24	73	244	97	330	128	446	169	605	220	798	247	932	397	1 329		
	1000	20	71	218	94	296	125	400	166	543	217	717	244	838	393	1 194	519	1 561
	750	15	67	182	90	247	120	335	159	455	209	602	237	705	381	1 005	506	1 315
	500	10	62	141	82	190	110	258	147	352	194	465	223	551	356	778	475	1 020
	375	7.5	57	117	77	158	103	214	138	292	182	386	210	452	335	647	448	849
	200	4	48	75	65	102	87	138	117	188	155	249	180	292	285	416	383	545
	50	1	33	28	44	38	59	52	79	70	105	93	123	109	191	154	256	201
	10	0.2	24	8	31	11	42	15	55	21	72	27	85	33	128	42	170	58
60	1500	25	66	227	88	306	116	416	153	563	198	757	222	899	286	1 198	373	1 581
	1200	20	64	199	86	268	113	365	151	494	196	664	221	791	285	1 054	374	1 393
	1000	16.7	63	178	84	240	111	327	148	442	192	596	219	710	283	947	371	1 252
	750	12.5	59	149	80	201	106	273	142	370	185	500	212	597	275	797	363	1 054
	500	8.3	54	115	73	155	98	212	131	287	172	388	199	463	259	620	343	821
	375	6.3	51	95	68	127	91	174	123	236	161	318	187	380	245	509	325	674
	200	3.3	43	61	58	82	77	112	104	152	137	205	161	246	211	329	280	436
	50	0.8	30	23	40	31	53	42	71	57	94	77	111	92	145	123	192	163
	10	0.2	22	7	29	9	38	13	50	17	66	23	77	28	100	37	132	49

Gear ratio > 60 consult CMD

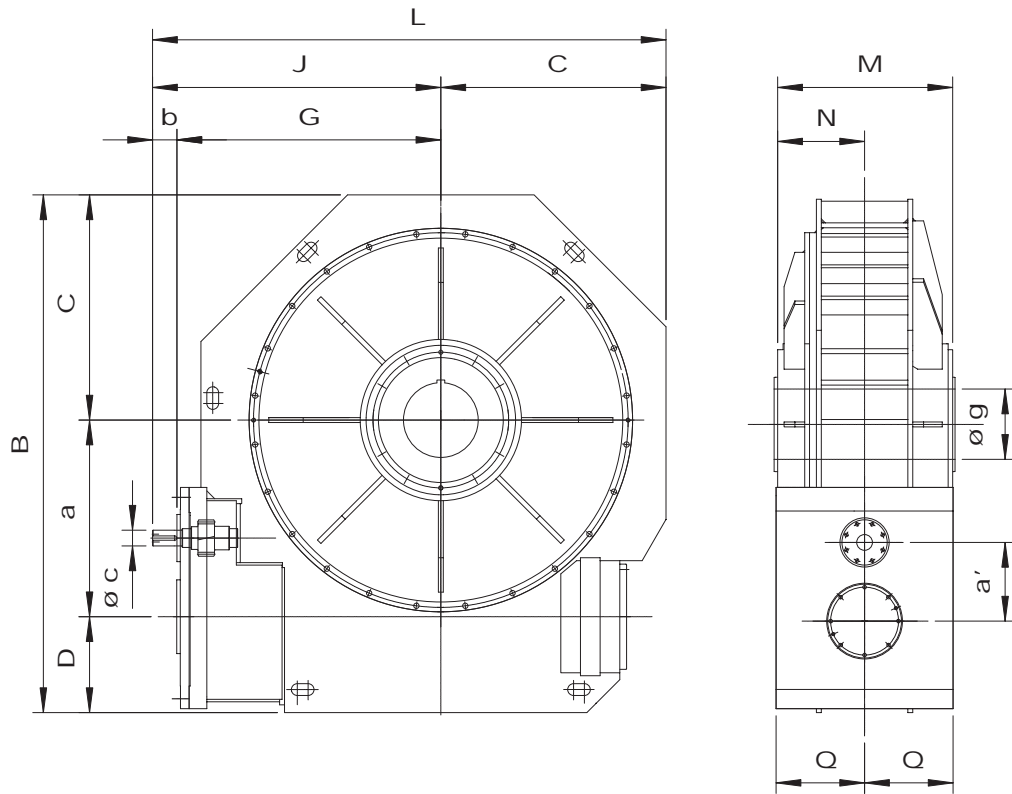
Note: P1 is the effective power on the high speed shaft (worm) for transmitting the torque T2 to low speed shaft.



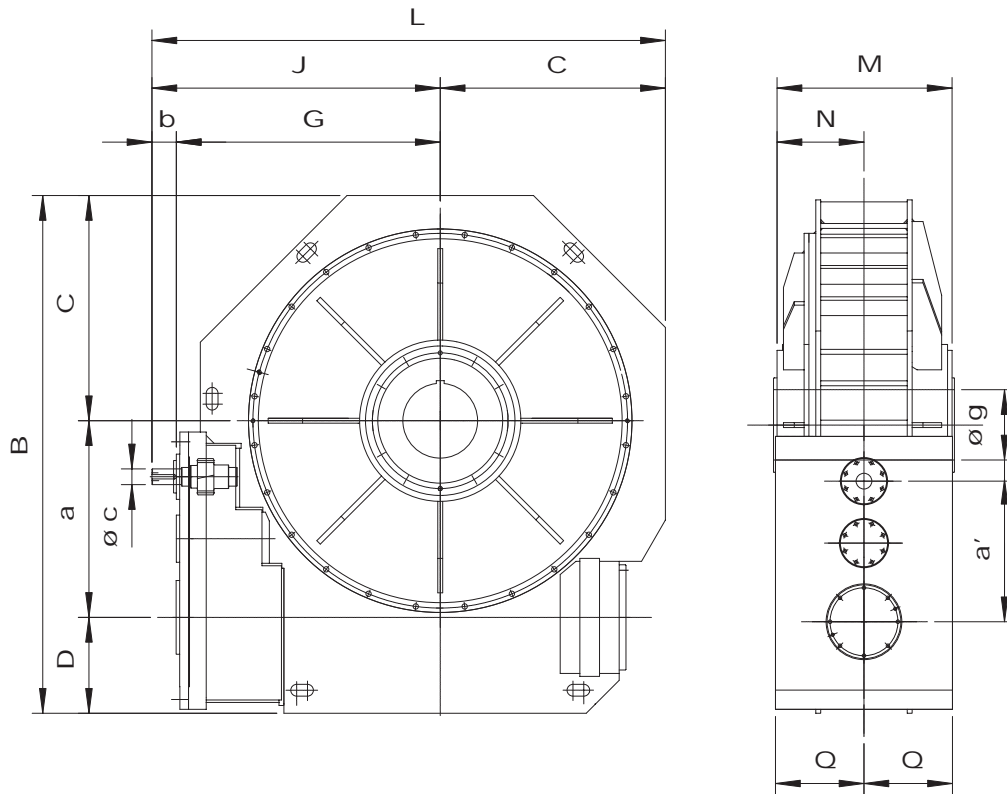
Size	560	630	710	800	900	1000	1120	1250
B	1500	1625	1870	2060	2300	2520	2770	3090
C	655	710	820	920	1000	1120	1250	1400
D	285	285	340	340	400	400	400	440
G	660	730	830	930	1030	1130	1260	1410
J	870	940	1080	1180	1330	1430	1560	1710
L	1525	1650	1900	2100	2330	2550	2810	3110
M	630	710	800	900	1000	1120	1250	1400
N	315	355	400	450	500	560	625	700
Q	200	200	225	225	270	285	285	320
a	560	630	710	800	900	1000	1120	1250
b	210	210	250	250	300	300	300	300
c	110	110	140	140	160	160	180	180
g	200	220	250	280	320	360	400	450
Weight (kg)	2560	3280	4300	5600	7500	9200	12700	16500



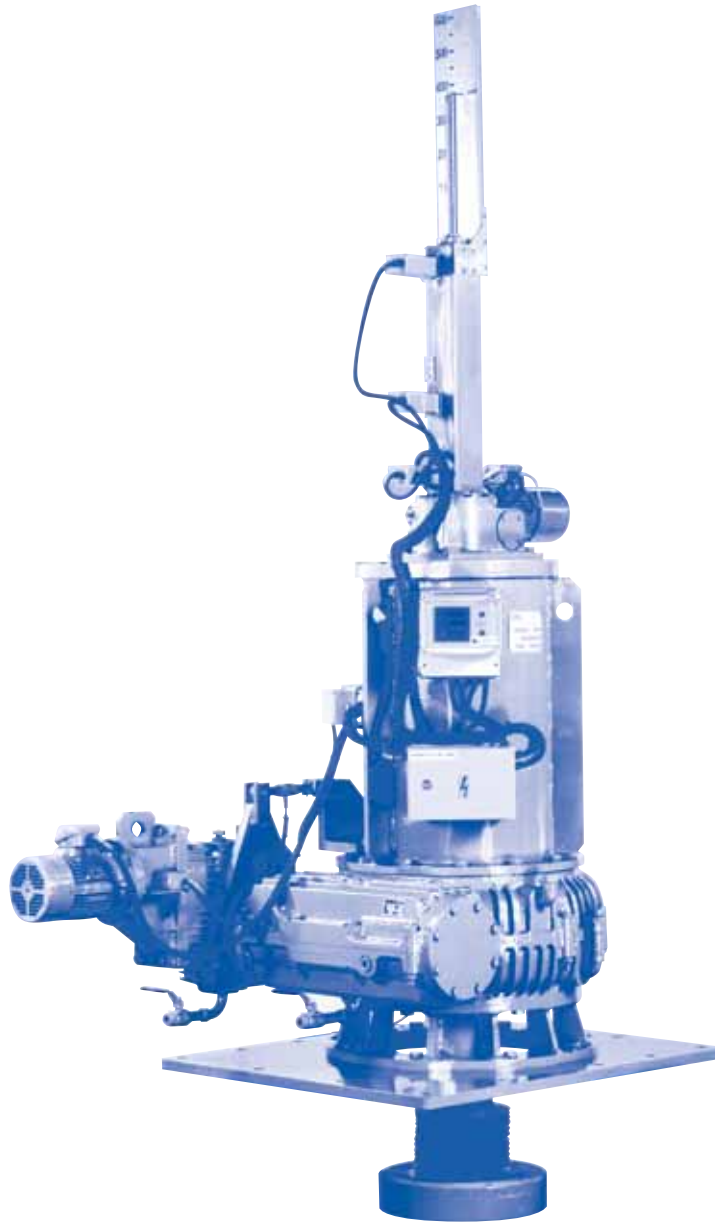
Jumboflex overall dimensions sizes from 560 to 1250 MH1 Type



Size	560	630	710	800	900	1000	1120	1250
B	1545	1670	1910	2100	2350	2570	2890	3170
C	655	710	820	920	1000	1120	1250	1400
D	330	330	380	380	450	450	520	520
G	840	940	1000	1090	1230	1330	1470	1620
J	980	1080	1160	1250	1400	1500	1680	1830
L	1635	1790	1980	2170	2800	2620	2930	3230
M	630	710	800	900	1000	1120	1250	1400
N	315	355	400	450	500	560	625	700
Q	300	300	345	345	450	450	520	520
a	560	630	710	800	900	1000	1120	1250
a'	250	250	315	315	400	400	500	500
b	140	140	160	160	170	170	210	210
c	70	70	80	80	90	90	110	110
g	200	220	250	280	320	360	400	450
Weight (kg)	3000	3800	5000	6500	8500	11000	13750	18000



Size	560	630	710	800	900	1000	1120	1250
B	1545	1670	1910	2100	2350	2570	2890	3170
C	655	710	820	920	1000	1120	1250	1400
D	330	330	380	380	450	450	520	520
G	940	1040	1130	1120	1400	1500	1750	1900
J	1080	1180	1270	1360	1560	1660	1920	2070
L	1735	1890	2090	2280	2560	2780	3170	3470
M	630	710	800	900	1000	1120	1250	1400
N	315	355	400	450	500	560	625	700
Q	300	300	345	345	450	450	520	520
a	560	630	710	800	900	1000	1120	1250
a'	450	450	565	565	715	715	900	900
b	140	140	140	140	160	160	170	170
c	60	60	70	70	80	80	90	90
g	200	220	250	280	320	360	400	450
Weight (kg)	3200	4000	5300	6800	9000	11400	14200	18500

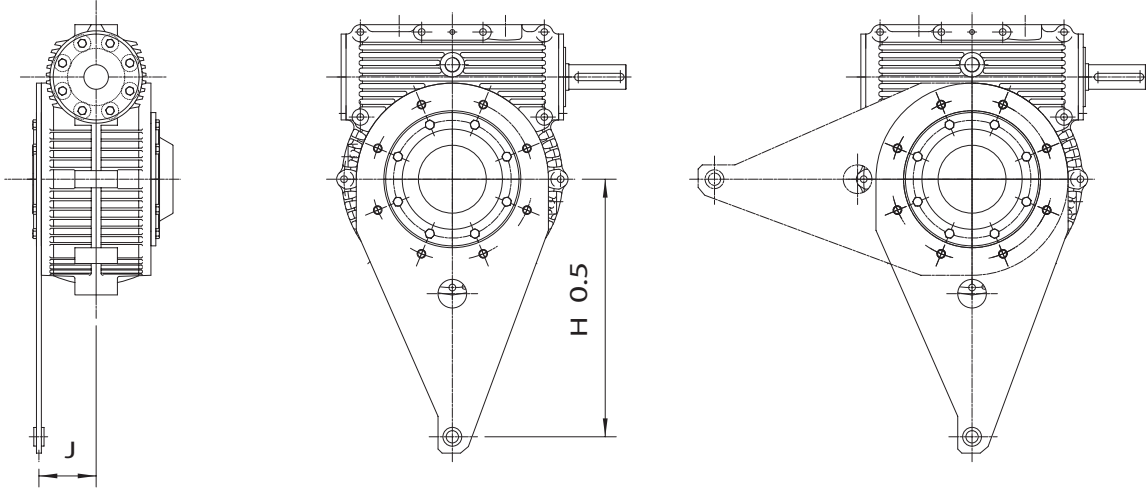


Accessory kits

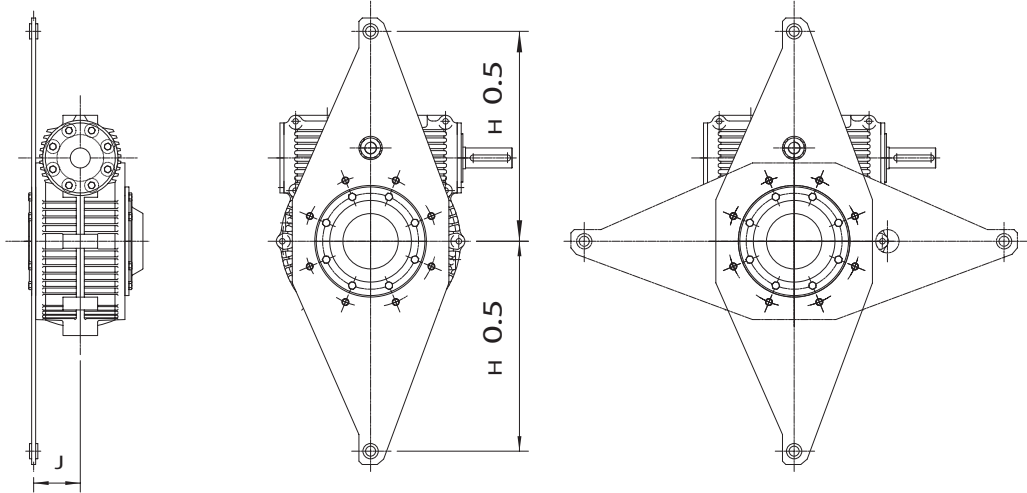


Reaction torque arm – Reducers sizes from 160 to 500, F Type

SO, SI, SII Type (N range)

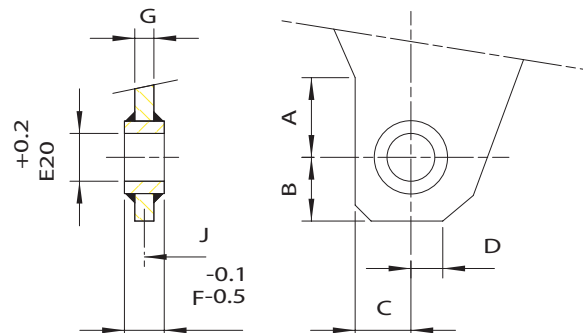


DO, DI Type (N range)



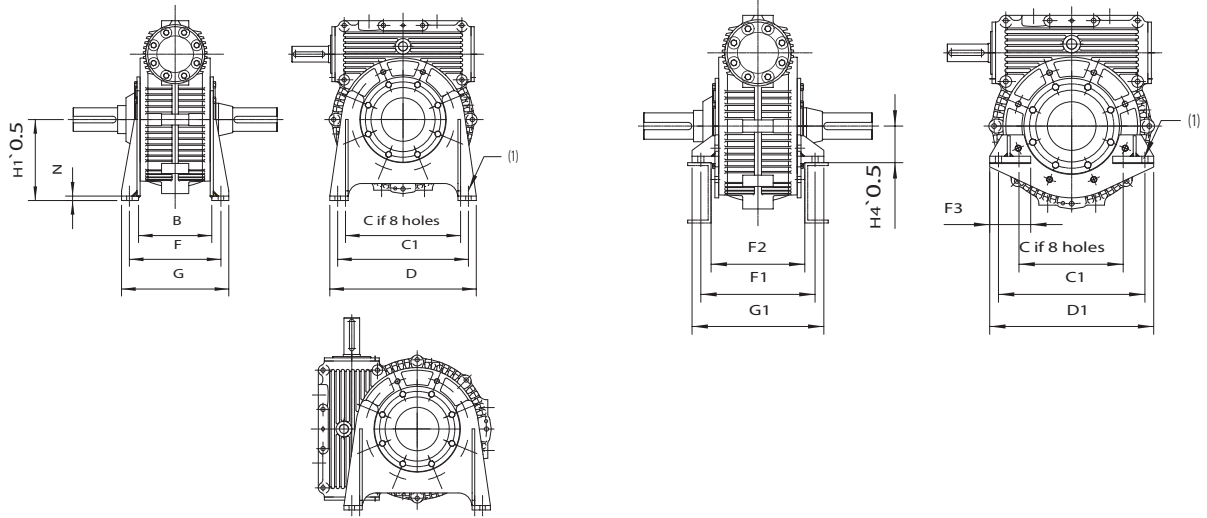
Size	G	H	J	SO	SI	SII	DO	DI
160 F	12	400	109	•			•	
200 F	12	500	120	•	•		•	
250 F	12	630	140	•	•		•	
315 F	20	800	170		•	•		•
400 F	20	1000	195		•	•		•
450 F	20	1120	235		•	•		•
500 F	20	1250	255		•	•		•

	A	B	C	D	E	F
SO/DO	35	30	30	25	30	20
SI/DI	50	40	35	30	30	25
SII	60	50	50	40	40	30



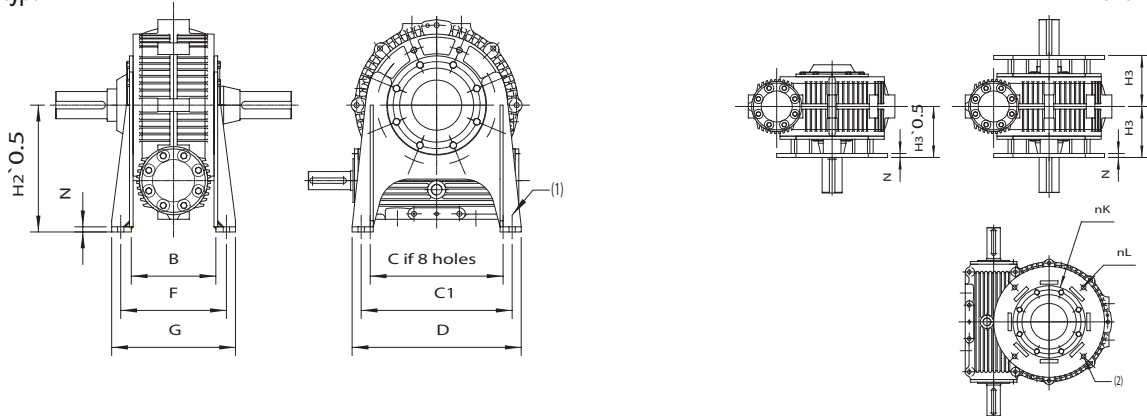
for 160C to 560C ST type

R type



I type

V and W type

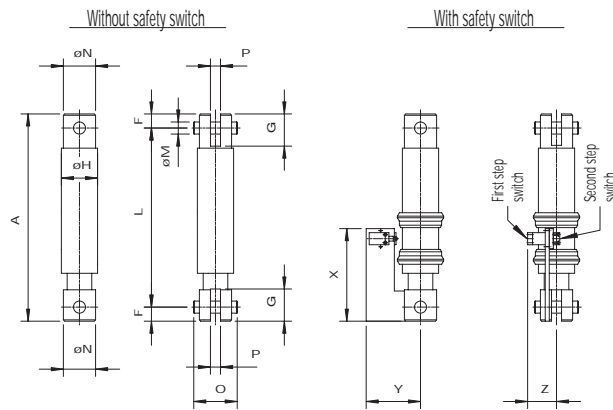


Size	B	C	C1	C2	D	D1	F	F1	F2	F3
160C	250		320	350	370	400	280	320	240	110
200C	330		400	400	450	450	300	350	270	110
250C	420		500	500	560	560	350	390	320	140
315C	480		630	630	710	710	440	500	400	165
400C	480	600	800	800	900	900	530	560	440	200
450C		670	900	900	1000	1000	600	630	530	
500C	620	750	1000	1000	1120	1120	670	710	590	225

Size	G	G1	H1	H2	H3	H4	J	K	L	M	N
160C	326	370	220	300	165	100	17	234	280	340	15
200C	350	400	260	340	200	115	17	285	370	430	15
250C	410	450	310	420	230	125	21	326	440	500	20
315C	500	580	400	500	270	140	25	475	560	640	25
400C	610	640	475	630	360	160	25	600	700	800	25
450C	700	750	560	710	400	180	32	670	800	900	30
500C	750	790	600	750	420	200	32	750	900	1000	30

(1) 4 holes ØJ for sizes 160 to 315
8 holes ØJ for sizes 400 to 500

(2) 4 holes ØJ for sizes 160 to 250
8 holes ØJ for sizes 315 to 500



Function

- Withstand the reaction on the output shaft and provide load damping. Load is estimated by measuring the shock absorber load variation (L1, L2, ...).
- Vibration damper and shock absorber.
- Safety: safety and alarm switch(es) for motor power cut off.
- Double way damping: compression and tension.

Designation

- CMD shock absorber is first designated by O, I or II referring to its dimension, see table 2. The following number is the first step switch off load (in daN). The letter C indicates that this is the latest version.
- Admissible loads

L0 = centre distance between fastening pins at rest position

P0 = preloading. This load does not affect the length L0

P1 = minimum load for activation of the switch, corresponds to L1

P2 = maximum load for adjustment of the switch in case of repeated shocks, with frequency higher than 30 per hour, corresponds to L2

P3 = maximum load for adjustment of the switch in case of repeated shocks, with frequency lower than 30 per hour, corresponds to L3

P4 = maximum load for adjustment of the switch in case of continuous loading, without shocks, corresponds to L4

Shock absorber	Q	P0 N	L0 mm	P1 N	L1 mm	P2 N	L2 mm	P3 N	L3 mm	P4 N	L4 mm	Pmax N	Lmax mm
O 80 C	36	480	295	800	3	1100	6.2	1950	16.6	2600	26.9	3200	37.3
O 200 C	44	1000	295	2000	3	2300	3.8	4000	10.1	5400	16.4	6600	22.8
O 285 C	28	1350	295	2850	3	3350	4	6450	10.6	9400	17.3	12250	23.9
O 825 C	32	2800	295	8250	3	10800	4.6	13300	6.1	19350	9.9	25250	13.7
I 570 C	30	2700	445	5700	5	6550	6.7	12500	18	18100	29.2	23450	40.5
I 1545 C	36	5600	445	15450	5	21000	8.1	25800	10.8	37250	17.6	48250	24.3
II 840 C	40	4800	650	8400	5	11800	10.2	22900	27.2	33350	44.2	43950	61.2
II 2300 C	44	9900	650	23000	5	24350	5.6	47200	15	69150	24.3	90550	33.7
II 3500 C	45	14500	650	23800	5	33000	6.4	66000	12.8	99000	19.1	132000	25.5

Shock absorber	A	F	G	H	L	M ^{0.1} _{0.2}	N	O	P ^{+0.5} _{-0.1}
OC	345	25	58	71	295	20	60	78	20
IC	515	35	78	90	445	30	80	108	25
IIC	740	45	100	118	650	40	100	128	30

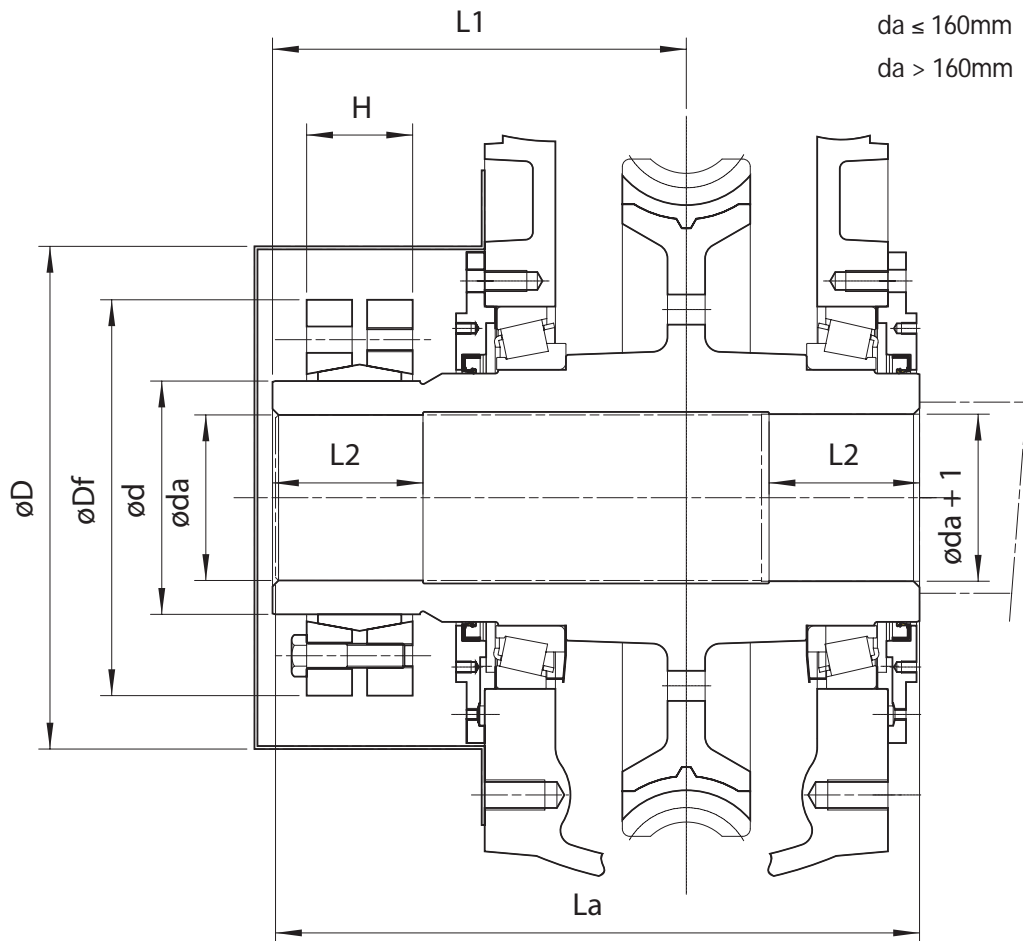
Shock absorber	Switch	X	Y	Z
OC	POC	160	125	75
IC	PIC	230	135	75
IIC	PIIC	265	145	75

Z : uniquement en cas de contacteur double alarme

	Shock absorber			Switch		
	OC	IC	IIC	POC	PIC	PIIC
Weight (kg)	7	17.5	41	0.8	0.9	1.1

Q : quantité de rondelles ressorts par amortisseur

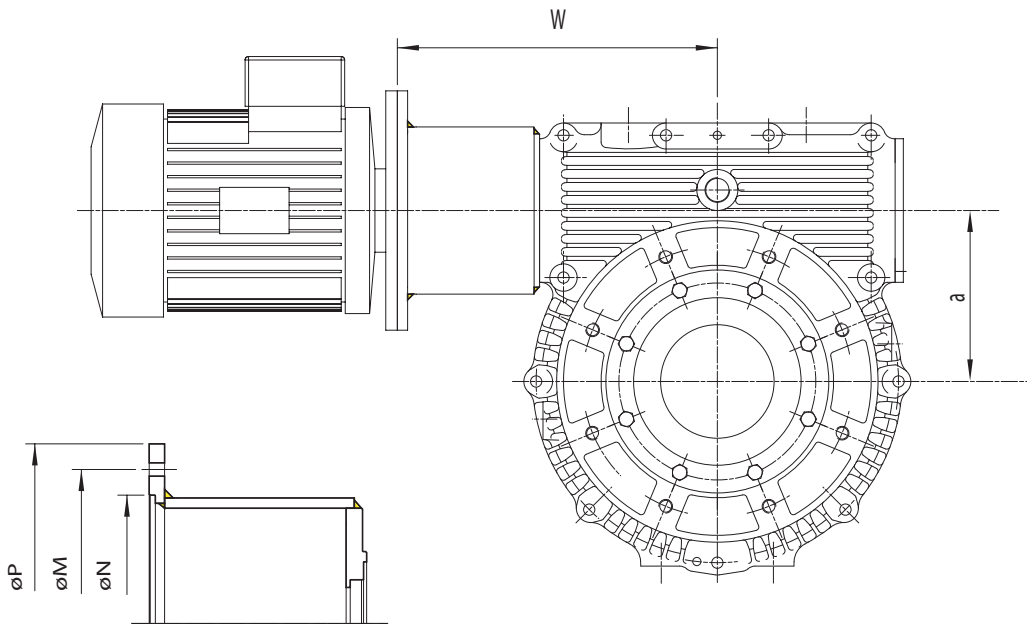
NOTA :
 $da \leq 160\text{mm} \rightarrow \text{H7h6}$
 $da > 160\text{mm} \rightarrow \text{H6g6}$



SIZE	a mm	La mm	D mm	L mm	L1 mm	d mm	Df mm	H mm	L2 mm
160 F	75	295	240	200	190	100	170	43	60
200 F	95	320	293	250	210	125	215	53	70
250 F	110	400	335	290	275	155	263	80	100
315 F	140	495	355	360	340	185	330	112	140
400 F	150	555	410	395	375	200	350	112	160
450 F	155	635	410	435	415	200	350	112	160
500 F	180	720	460	500	470	240	405	144	170

Special mounting, consult CMD		
da max	dmax	Shrink disk
85	110	110
100	125	125
130	165	165
145	185	185
165	210	220
170	210	220
200	250	260

Note: it must be checked that the torque to be transmitted is lower than C_o (consult CMD).
 Larger bore diameters are possible upon request.



Size	Reducer	Motor (IEC standard)		Motor flange			
	a	W	Type	Type	M	N	P
160 MF	160	308	100	F 215	215	180	250
		308	112	F 215	215	180	250
		328	132	F 265	265	230	300
		358	160	F 300	300	250	350
		358	160	F 350	350	300	400
		358	180	F 300	300	250	350
		358	180	F 350	350	300	400
200 MF	200	358	112	F 215	215	180	250
		378	132	F 265	265	230	300
		408	160	F 300	300	250	350
		408	160	F 350	350	300	400
		408	180	F 300	300	250	350
		408	180	F 350	350	300	400
		438	200	F 350	350	300	400
250 MF	250	438	132	F 265	265	230	300
		468	160	F 300	300	250	350
		468	160	F 350	350	300	400
		468	180	F 300	300	250	350
		468	180	F 350	350	300	400
		468	200	F 350	350	300	400
		498	200	F 400	400	350	450
		498	225	F 400	400	350	450
		498	225	F 500	500	450	550

For other sizes, consult CMD



Worm reducers – N range – Standard ratios u

Size Ratio	160	200	250	315	400	450	500
5	31/6	31/6	36/7	40/7	Refer to CMD		
7.5	31/4	31/4	38/5	43/6	50/7	55/7	61/8
10	31/3	31/3	39/4	41/4	51/5	49/5	51/5
12.5	37/3	37/3	38/3	49/4	53/4	49/4	55/4
15	31/2	31/2	46/3	46/3	46/3	59/4	61/4
20	41/2	41/2	41/2	41/2	61/3	59/3	61/3
25	51/2	51/2	51/2	51/2	51/2	51/2	51/2
30	30/1	30/1	61/2	61/2	61/2	57/2	61/2
40	40/1	40/1	40/1	40/1	81/2	79/2	81/2
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

Worm reducers – N range – Maximum admissible output peak torque Co

Size Ratio	160	200	250	315	400	450	500
5	6960	12500	20720	30320	Refer to CMD		
7.5	9380	18540	29310	39430	55090	75680	99270
10	11640	21220	33860	55190	77090	107340	149930
12.5	10910	19360	35970	46530	83650	125880	162360
15	12270	22540	31410	55690	93610	110970	141050
20	10530	20600	35290	61280	80505	120410	151040
25	8740	17270	32220	57380	106740	179610	170590
30	13110	25540	26020	51130	90050	139700	164570
40	9520	19970	36580	65940	75770	107860	142850
50	8810	17110	34080	56190	101090	188620	225040
60	7180	13830	26220	51110	94620	148590	175850

JUMBOFLEX worm reducers – Standard ratios u

Size Ratio	560	630	710	800	900	1000	1120	1250
7.5	47/6	47/6	47/6	47/6	49/6	57/7	57/7	69/8
10	51/5	51/5	54/5	54/5	54/5	61/6	65/6	65/6
12.5	51/4	51/4	51/4	51/4	51/4	63/5	63/5	63/5
15	59/4	59/4	59/4	59/4	59/4	59/4	63/4	71/5
20	59/3	59/3	59/3	59/3	62/3	62/3	62/3	73/4
25	51/2	51/2	51/2	51/2	51/2	74/3	74/3	74/3
30	59/2	59/2	59/2	59/2	59/2	61/2	65/2	65/2
40	43/1	43/1	75/2	75/2	79/2	79/2	79/2	79/2
50	50/1	50/1	50/1	50/1	50/1	55/1	95/2	95/2
60	60/1	60/1	60/1	60/1	60/1	65/1	65/1	65/1

Note:
For other ratios,
consult CMD.

JUMBOFLEX worm reducers – Maximum admissible output peak torque Co

Size Ratio	560	630	710	800	900	1000	1120	1250
7.5	232800	311920	424690	573380	788740	910810	1241490	1332430
10	266980	365360	476020	660580	921620	1059570	1405460	1879790
12.5	311640	428080	602410	848500	1044790	1251160	1735470	2328320
15	272830	383210	529210	737910	1040310	1482240	1960380	2171400
20	300930	427720	595680	834900	1114400	1568320	2171930	2340490
25	370970	540940	766700	1083210	1506830	1271490	1786290	2456430
30	316530	456650	643190	892480	1270320	1707090	2239480	3088720
40	274650	404110	474290	675330	898440	1240510	1771640	2470790
50	388010	544450	784770	1093140	1207770	1287000	1385740	1935590
60	308610	459240	634690	919250	1307520	1626720	2291990	3145610

Maximum admissible
output peak torque
Co can be reached
occasionally,
specifically during
starting or braking
phases, taking into
account all inertias
of the drive system.

Before being packed and dispatched, CMD gear-boxes are submitted to a bench test as well as a conformity test in accordance with customer specifications.

Installation

When couplings are used for the shaft connection between the reducer and the motor and/or machine, during positioning, the shafts should be carefully aligned, following the instructions for mounting the couplings Winflex and Flexident.

In case of heat exposure, it is advised to install a protective screen.

Lubrication

Technical manual B-11-4303 for "lubrication, commissioning, maintenance and storage of worm gears" is supplied with all the delivered units.

Data sheet B-11-4304 indicates the lubricants recommended by CMD Durand.

Our units are supplied without oil, and it is therefore the responsibility of the user to fill them with the correct amount of oil required for operation. Refer to technical manual B-11-4303, for standard applications. In some cases, CMD may supply a specific manual which must be followed.

For most applications, we recommend the use of synthetic oil PolyGlycol, of grade 220 (220 cSt at 40°C), dedicated to gear lubrication. For heavy duty applications heavy loads at low speed: the oil viscosity has to be higher – follow the specific instructions for the application or consult CMD.

Bearings are lubricated with oil or EP grease, depending on the speeds and operating position of the reducer. In most cases, color stickers indicate the filling plugs, level plugs and drain plugs.

Commissioning

It is recommended that during the commissioning of any gearbox the unit is put under load progressively, in order to ease the contact pattern adaptation. This specification is highly recommended for applications where the reducer is fully loaded at start (wire mills, extruding machines, lifting...).

When the reducer is lubricated with an external lubrication system, that unit must be started before starting the reducer itself, in order to insure a proper lubrication of the gears and bearings well before the reducer is put under load.

Storing

The internal components of the reducer are protected by a layer of the lubricant used for testing, and anti-corrosion substance, suitable for up to 3 months protection.

The outside non coated surfaces of the reducers are covered with a protective film.

For longer storage period or in case of harsh climatic conditions, extra care must be taken, please inquire CMD.

The reducer must be stored in a dry place, where the temperature shall be over 5°C in all circumstances. The floor must be free from vibrations.



Company name:
 Address:
 Telephone No./Fax N./e-mail address:

Reference No.: Date:
 Contact name:

Application:

Additional information, sketch:

Data:

Service factor SF =
 Installed power P1 = kW
 Absorbed power Pa = kW
 Input speed N1 = min⁻¹
 Output speed N2 = min⁻¹
 Gear ratio u =
 Acceptable ratio tolerance ± 4% Required tolerance = %
 Nominal output torque M2 = Nm
 Maximum output torque M2max = Nm
 Starting torque / Nominal torque: Md/M2 =
 Electric motor Other :
 Braking torque Cf = Nm

Reversible Self-locking No preference

Inertia of the driven machine (mR²):
 J = kg.m² (IS units)

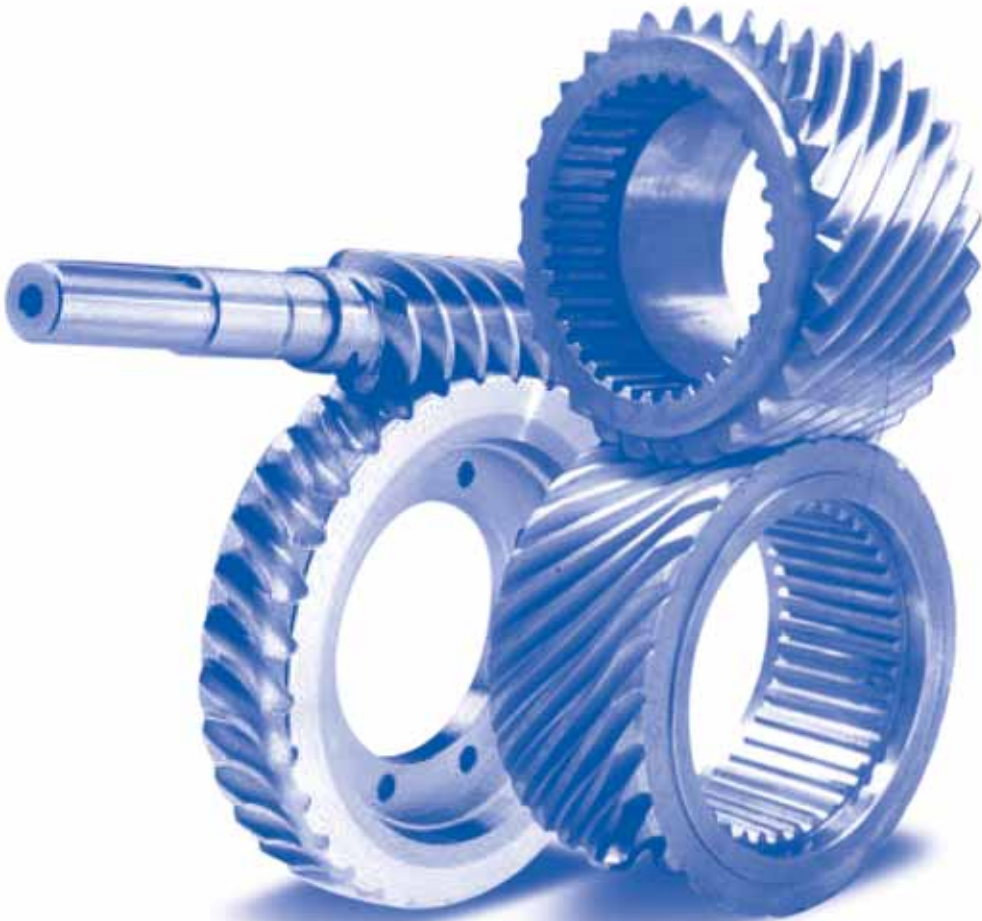
Operating conditions:

Required lifetime H = hours
 Rotation way: 1 direction 2 directions
 (1 direction: please indicate on a sketch)
 Number of starts F_D = / hour
 Type of load: Uniform Light shocks
 Medium shocks Heavy shocks
 External loads on shaft: radial axial
 (please indicate on a sketch)
 Ambient temperature to = °C
 Harsh environment: Yes No :
 Other particulars:

Options:

Housing: Cast iron GJL Cast iron GJS Cast steel GE280
 Other :
 Hollow shaft Solid shaft
 Operation position (sketch):

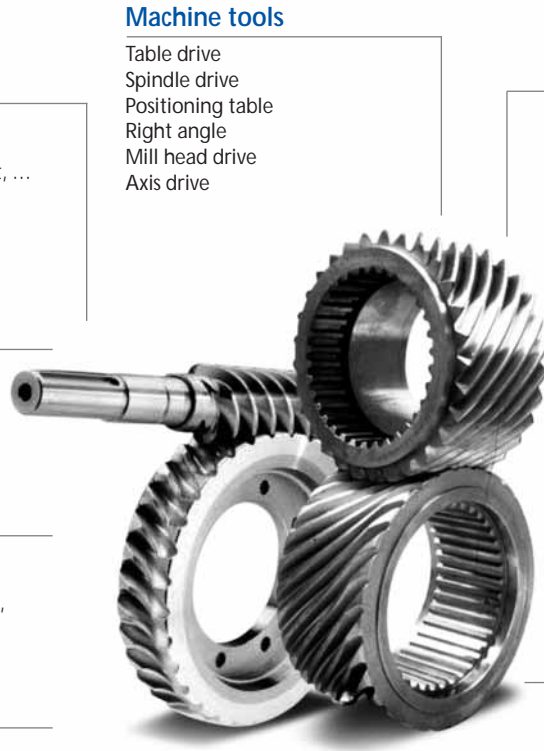
Accessories:



Worm Gear Sets



For more than 60 years, CMD Durand has been known as the specialist of worm gears. CMD Durand designs and supplies a wide range of worm gears of high quality for numerous applications in the mechanical as well as the precision industries. The worm shafts and the worm wheels are designed according to CMD standard within accuracy class required.



Robotic

Orientation,
Welding robot,
Handling robot, ...

Machine tools

Table drive
Spindle drive
Positioning table
Right angle
Mill head drive
Axis drive

Energy

Coal pulverizing vertical mills
for power plants
Speed increasers for
hydro-electric turbines

Rubber industry

Presses, mixers, extruders

Material handling

Winches, elevators,
slewing drives,
lifts, screw jacks

Steel industry

Mill roller adjustment drives,
shearing machine drives,
bending machines, wire mills,
drawing machines

Transportation

Axle drives, traction drives,
cabin lift

Army industry

Gun tank turret drive,
vehicle wheel drives

Film industry

Film extruders

Navy

Propeller drive,
automatic steering drive

Astronomy - Space industry

Antenna drives, satellite tracker,
positioning drives, precision metrology table

The technology and dimensions of the gears are those of CMD Durand standard reducers. CMD Durand may as well offer specific gears in accordance with client specific construction (centre distances, gear ratios, gearing backlash and precision).

The required accuracy level is guaranteed by the manufacturing process, based on CNC machines and internal quality control system.



CMD standard and dimensions

- Standard range of centre distance:
50, 63, 80, 100, 125, 200, 250, 280, 315, 355, 400, 450, 500, 560, 630, 710, 800, 900, 1000, 1120, 1250
- Standard ratios:
5, 7.5, 10, 12.5, 15, 20, 25, 30, 40, 50, 60
- Gearing accuracy class in accordance with DIN 3974, ISO 1328:
Grade: 7 (general machinery)
Grade: 3 4 5 6 (accurate machinery)
- Axial module: 1 to 36 mm
- Worm shaft made of alloyed steel, thread being heat treated (induction, case carburised or nitriding), the threads are finished on Klingelnberg or Durand grinding machines.
- The worm wheel is made out of dye cast (GK, GM) or centrifugal (GZ) nickel bronze, in order to get the highest possible mechanical properties and durability.

Special worm gear sets – CMD capacities

- Worm outside diameter: 30 to 420 mm
- Worm Wheel outside diameter: 50 to 3000 mm

Center distance, gear ratio and size of the customer equipment can be specific and defined according to customer specification and drawings.

Center distance: 30 to 1600 mm

Gear ratio: according to customer request

Worm shaft and worm wheel material according to customer request

Specific backlash or adjustable backlash (CMD Y Type)

Adjustable backlash worm set – Y Type

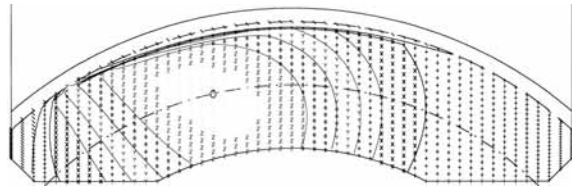


Thanks to its own design software, **CMD** can work out specific gear designs, of any size, in accordance to customer's requirements.

The contact pattern of the worm gear teeth is simulated on a computer, in accordance with the **CMD** standards. A specific contact pattern, in location and area, can be achieved in order to respond to specific demands.

The gear cutting process used on CNC Pfauter or Durand machines allows to achieve the best contact pattern for oil film formation as well as optimal adaptation of the working teeth flanks under load, which is effective from the first hours.

Durand worm gears are controlled in accordance to QA standards, guaranteeing the required accuracy class.

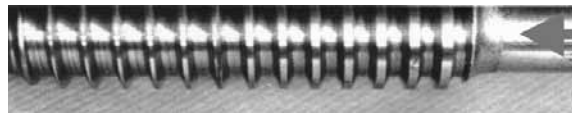


When the angular clearance of the gearbox is specified, and possibly has to be adjusted during the time period of operation, the **CMD Y** type worm set is the solution.

The **CMD Y** type worm set backlash is adjustable. Its gear cutting quality is of a high grade, and allows a very smooth and constant power transmission.

Adjustment of the CMD Y Type worm set backlash

For each axial position of the worm shaft, the worm set has a different backlash value. This backlash is constant when the worm shaft rotates. The bearings special arrangement makes the adjustment easy.



Application examples

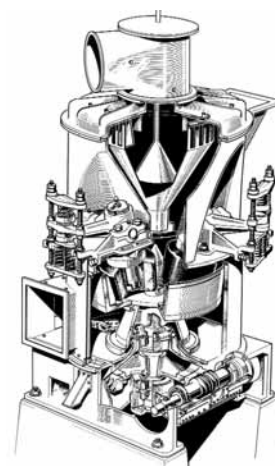


Power transmission under high vibration conditions Coal mills

Nearly 600 **CMD** large worm gear sets are currently in operation on vertical coal mills manufactured by BHEL, ANSALDO and ALSTOM. These mills are used in power plants and mills. The **CMD** worm sets drive the table onto which the rollers or balls are milling the material.

Technical specifications:

- A wide range of center distance 27" to 54" (686 to 1372 mm)
- Ratio from 10/1 to 20/1
- Transmitted power from 300kW @ 1000rpm to 600kW @ 600rpm
- Design life = 100 000 hours, based on continuous 24h/24 running
- Accuracy class DIN 7
- Worm is made of alloy forging steel, case carburised and ground
- High tensile centrifugal bronze casting is used for the worm



Voith photo

Power transmission in a distorted structure

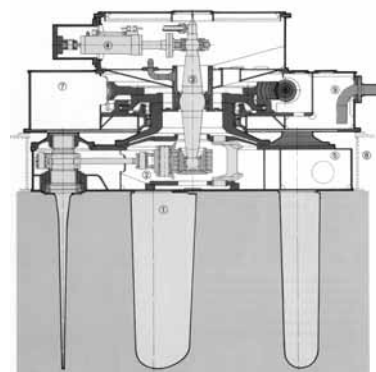
VOITH has selected **CMD** to supply large worm sets driving its marine propellers. This choice was made because of the severe running conditions under which a very high precision level must be achieved:

- 1- very low noise level, demanding gear accuracy class DIN 5 for the shaft and DIN 6 for the wheel (OD 1625 mm).
- 2- The contact pattern of the worm set (its position and area), tested in **CMD** manufacturing plant without load, was first defined and simulated according to the optimised final contact pattern required under the nominal application load.

In order to simulate the evolution of the contact pattern according to the load, **CMD** had to take into account the displacement of the wheel vs the shaft. This displacement is due to the forces acting onto the vertical blades during the vessel propelling, and to the vessel structure deformation.

Technical characteristics:

- Center distance from 670 to 900 mm
- Reduction ratio from 9 to 14
- Transmitted power from 500kW @ 1200 rpm to 900 kW @ 810 rpm
- Gear teeth accuracy class DIN 5 for the worm shaft, DIN 6 for the wheel
- Worm shaft is made of alloy forging steel, case carburised and ground: outside diameter from 200 to 300 mm
- High tensile centrifugal bronze casting is used for the worm wheels which can have an outside diameter from 1220 to 1625 mm



Fast moving positioning – Handling robots



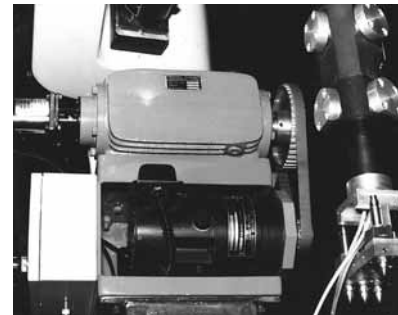
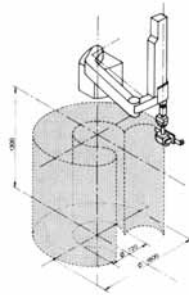
The French company Allibert mounts handling robots on its plastic objects moulding dyes. These robots are used to extract the pieces from the dye, and position them for various operations (finishing, control, packing...). These robots use **CMD JR** type worm sets.

The **CMD JR** type worm set is designed with a reduced teeth backlash. It drives the main rotation shaft of the robot with an inching motor. The worm shaft is connected to an incoder, controlling the shaft position.

Albora photo

Technical characteristics:

- Center distance 100 to 160 mm
- Reduction ratio from 60/1 to 100/1
- Gear backlash 0.036 to 0.058 mm
- Kinematic angle tolerance of the drive shaft: 1.5 to 2 minutes
- Number of cycles: 200 to 600 per hour



Precision positioning – radar antenna drives

The French radio astronomy center of Nancay (France) – world fame for astronomy research – uses many antennæ for sun observation. A very high kinematic precision is requested for these antennas drives.

The antennæ rotation drives use **CMD Durand 0** backlash worm sets. They are mounted into **CMD** specifically designed housings.



Technical data:

- Center distance 125 mm
- Reduction ratio 60/1
- Continuous running 24h/24, 1 rotation per day



Another application – Drive systems for satellite trackers

2 worm gear screw packs monitor the orientation and the elevation of the trackers.

Technical data:

Elevation worm gear screw pack

- Reduction ratio 280/1, power 1.1 / 4.9 kW at 655 / 2670 rpm
- Stroke 2 790 mm, speed 110/440 mm/min
- Dynamic load 220 kN, static load 480 kN

Orientation worm gear screw pack:

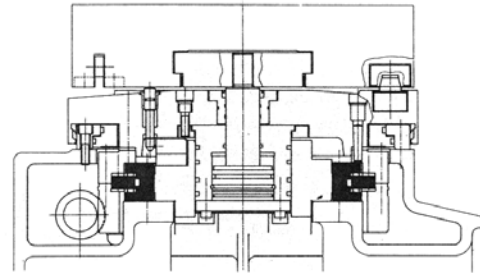
- Reduction ratio 600/1, power 0.37 kW at 1500 rpm
- Stroke 1 300 mm, speed 24 mm/min
- Dynamic load 200 kN, static load 270 kN

Kinematic consistency – Machine tools table drive



CMD Durand designs and manufactures Y type high quality worms set with backlash adjustment for several CNC machines makers (Mazak, Mitsubishi, Huron-Graffenstaden...).

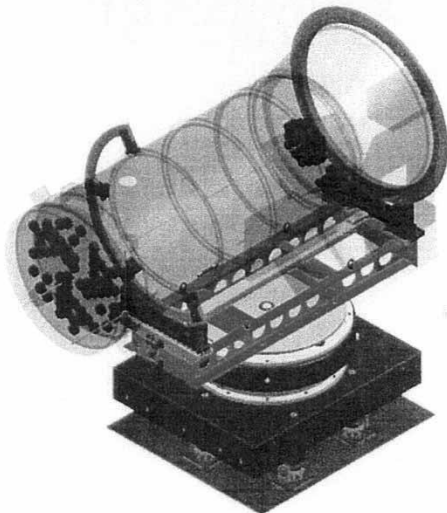
The worm set drives the supporting table. A great kinematic consistency as well as angular position accuracy are demanded.



Mechanical data:

- Center distance 200 to 665 mm
- Reduction ratio 120 to 180/1
- Accuracy class DIN 4

Kinematic precision Dividing table



The CNES (French Space Engineering Centre) has awarded to **CMD** Durand the design and manufacture of CNC dividing tables of a very high precision grade.

The worm set is driving the rotation of a gauging device used for the official approval of a CNES spectrometer.

Technical data:

- Center distance 395 mm • Reduction ratio 120/1- Adjustable backlash Y type worm set • Accuracy class ISO 2
- Rotation speed : 0.2 rpm • Rotation angle +/- 180°

Accuracy:	requested	obtained
Verticality:	± 1"	< ± 1"
Angle:	± 1"	< ± 1/3", equivalent to 0.0001°, represents less than 1.75 mm on 1 km distance

Company name:

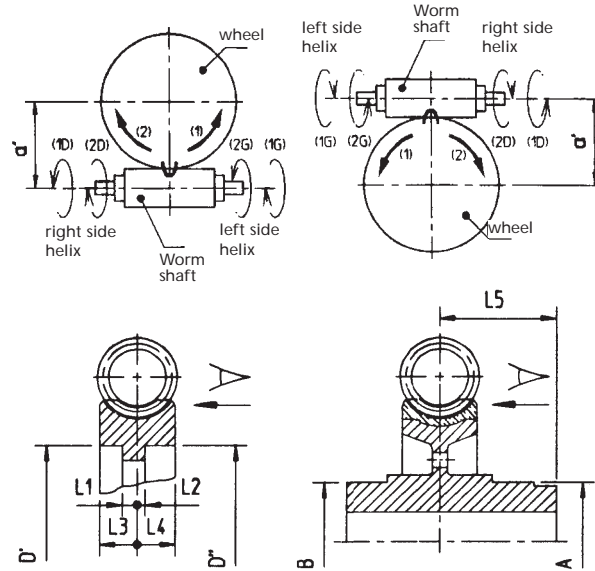
Address:

Telephone / fax / e-mail:

Reference:

Date:

Name:



- Required theoretical center distance $a_w =$ _____ mm ou $a_w =$ _____ inch
- Housing center distance if known: No Yes : nominal value = _____ mm Tolérance : _____ mm
- Gear ratio $u =$ _____
- Thread helix direction: right (standard) left
- Accuracy class: standard class 7 other class: 6 5 4 3
- Accuracy standard: DIN 3974 other : _____

- Operating as a REDUCER (the worm drives the wheel): Yes No
- Operating as an INCREASER (the wheel drives the worm): Yes No
- Operating as a REDUCER and an INCREASER: Yes No

- Rotation direction of the wheel direction (1) direction (2) direction (1) and (2)
(Refer to sketch above)
- Gear teeth backlash: CMD standard required backlash minimum = _____ mm maximum = _____ mm
- Attached drawings or references: _____

- Y type adjustable backlash gear set:
(backlash setting obtained by axial movement of the worm in its bearings)
No
Yes : Please mention input and output shafts on the above sketch.
- Attached drawings or references: _____

Please indicate on the above sketch the required dimensions and rotation direction.

(1) (2) par rapport à l'Observateur ←

Cocher les cases concernées ☒



*MAZAK INTEGREX 30
Lathe*



*OKUMA MA 50HB-E
Machining center*



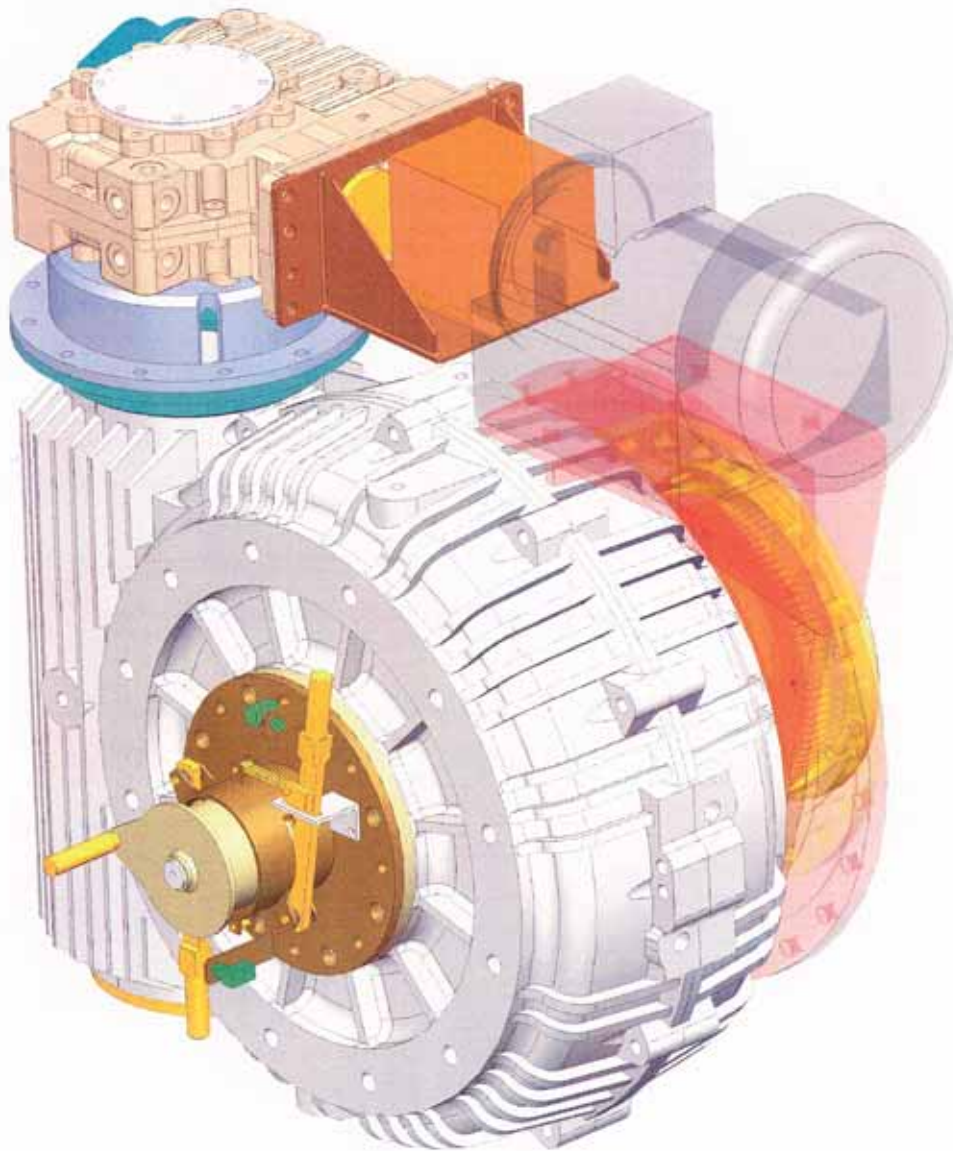
*Hobbing PFAUTER P1000
Bronze wheels*



*Worm grinding machine
KLINGELNBERG HNC35S*



*Hob grinding machine
KLINGELNBERG SNC 50*



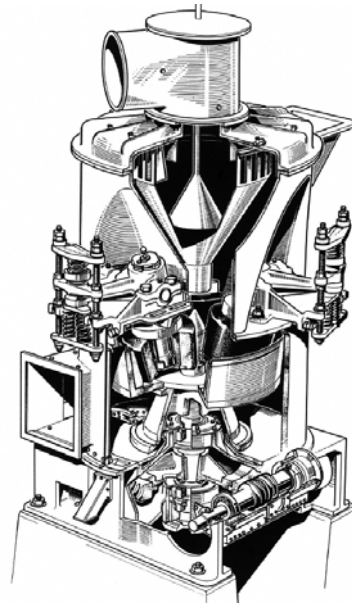
Applications

Complete range of worm gear sets:

- Worm shaft is made of forging steel, case carburised and finish ground
- Worm wheel is made of high speed centrifugal bronze for sizes:
 - 27" centre distance = 686 mm
 - 36" centre distance = 914 mm
 - 41" centre distance = 1041 mm
 - 48" centre distance = 1219 mm
 - 54" centre distance = 1371 mm

Gear ratios: 54/5 – 65/4 – 76/5 – 94/5
104/5 – 94/7 and 100/7

Our capacity is limited to 1600 mm centre distance.



Almost 600 **CMD** Durand worm gear sets were delivered for Raymond coal pulverizers to the main world manufacturers. These gears are used in power plants and mills. The milling of the raw material is obtained with suspended rollers, pressed onto the rotating table, which is driven by the CMD Durand worm gear set.



Dual output shaft worm gearbox, multi purpose drive

- Each gearbox has a center distance = 200 mm with a reduction ratio $i = 4$ and is driving 2 cylinders simultaneously. The combination of several gearboxes on the printing machine allows high quality of two-colour and four-colour printing.
- Technical specification: 80kW, output speed 500 rpm, continuous 24h/24 running.
- Each shaft's angular position is fixed against the other's, thanks to an internal clutch system which can be actuated instantly. A second clutch system allows the "inching" running, in order to mount the printing plates onto the cylinders.
- The worm shaft can move axially inside its housing, allowing a compensation of the paper expansion when it is wet. The printing accuracy obtained is ± 0.03 mm.
- Several sensors integrated in the equipment make sure the system is running safely.



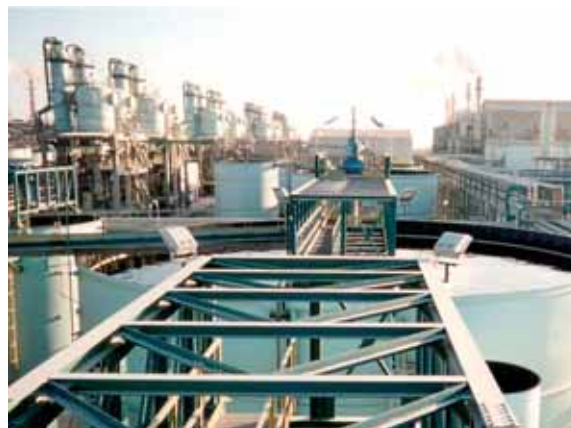
Gear motor, with a vertical output shaft, with guaranteed sealing obtained by internal slinger.

Torque range from 20 000 Nm to 1 000 000 Nm and more.

Very high reduction ratio : $i = 10\,000/1$, ... $30\,000/1$, ...etc.

Output speed ≤ 0.1 rpm

The spline shaft of the clarifier slides into the low speed shaft of the gearbox, enabling the adjustment of the drag scraper's position vs the bottom of the tank. This position is determined by the action of a lifting jack that is able to lift up to 100 tons and more. The position of the jack is monitored by limit switches (mechanical and electrical), and is visually displayed on the gearbox.



Range of geared motors, with 2 or 3 stages of worm gear reduction:

- Cast iron housing
- Continuous (24h/24) running
- Running 3 months per year
- Low Speed shaft torque from 20 000 to 120 000 Nm, speed of 1 rpm
- Torque from 80 000 to 600 000 Nm, speed of 0.4 rpm for the largest gearboxes.

The electrical motor is fixed on the primary stage gearbox. The whole gearbox is floating on the mixer's shaft.

The secondary gearbox's torque is compensated by the torque reaction arm, and shock absorber, which is equipped with:

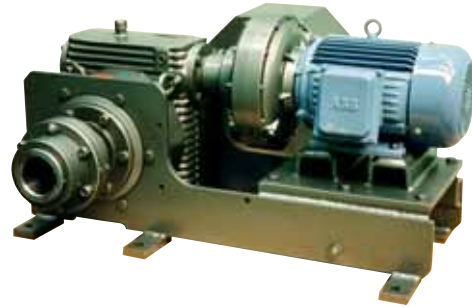
- either 1 or 2 safety sensors
- or 1 electronic sensor allowing:
 - permanent display of the transmitted torque
 - peak torques memorizing
 - electrical outputs for online monitoring

The simplicity and robustness of the **CMD** Durand worm gearbox guarantee its reliability for this application.



The main functions can be:

- Start a high inertia machine
(Ex: large fan)



- Start and drive at low speed
(Ex: vessel drive shaft, high capacity diesel engines...)



- Start, drive at low speed, position
(Ex: Mills, kilns, conveyors...)



- Start, drive, slow down, stop
(Ex: gas turbine)

Options:

- hydraulic coupling for high inertia start.
- One way clutch, gear clutch...
- Telescopic gear coupling, cardan shaft, etc... for compensating the thermal expansion of the driven shaft.
- Braking system.



The center distance between the 2 cylinders of a steel mill is adjusted by a screw jack system, driven by the worm wheel of a worm gearbox. The equipment of a mill can be:

- 2 screw jacks worm gearboxes for the adjustment of the horizontal mill.
- 4 screw jacks worm gearboxes for the adjustment of the vertical mill.

The screw jack worm gearboxes include the following components:

- Steel housing.
- Low speed hub made of steel or GJS cast iron with a large bore and 6 or 8 wide parallel splines.
- Oil injection lubrication.
- The splines are lubricated against sliding heating.

2 opposite gearboxes on the same mill driven by the same motor secure the synchronization. They are connected with a clutch in order to allow parallelism setting.

Housing has to be strong enough in order to cope with:

- The high torque transmitted when un-locking.
- The high axial forces transmitted by the screw when setting under load.



586FSP reducer



Manesmann Demag doc.

Shearing machine

The **JUMBOFLEX** worm gearbox, size 900, drives the crankshaft/rod system of the 600 tons **PINCHART DENY** shearing machine.

Technical data:

- Centre distance 900 mm
- Reduction ratio 66
- Dynamic output torque 424 080 Nm at 10 rpm
- Maximum peak torque 1 291 630 Nm
- The oil injection system insures lubrication of the gears and bearings with synthetic oil.



Bull block driving

The “**Bull block**” worm gearboxes are used to draw the copper and steel tubes to the required dimensions.

The tubes are wound up around a coil mounted on the gearbox low speed shaft. The tube drawing force is obtained by the gearbox output torque, and can reach up to 17 tons for steel tubes.

Technical characteristics:

- Centre distance 610, 630, 800 mm
- Reduction ratio 9 to 17
- Variable output speed from 0 to 525 rpm
- Continuous running 24h/24
- Maximum output torque 129 200 Nm at 29.3 rpm (steel tubes)

The running conditions are extremely severe: the starting load can be very high, and requires a specifically adapted contact pattern in order to have a sufficient oil film at start.



Jumboflex worm gearbox drive (sizes from 560 to 1250)

2 JUMBOFLEX gearboxes drive the crankshaft/rod system of each automotive press, used by German car manufacturers.

Worm gearbox technical data:

- JUMBOFLEX worm gearbox, size 900, weight 7300 kg
- Reduction ratio = 20
- Nominal Output torque 190 000 Nm at 15 rpm
- Maximum output torque 570 000 Nm
- Continuous (24h/24) running. Required service life = 80 000 hours.
- Reduced backlash is required, as well as torsional rigidity of the shafts.

A primary gearbox insures a primary reduction ratio, and speed synchronization between the 2 gearboxes.

The worm gear solution was chosen because of its specific advantages:

- A compact right angle function with a reduction ratio of 20.
- A very high torsional rigidity of the input and output shafts.
- Smoothness of gearing.



ERFURT doc.



JUMBOFLEX reducer

**Gear motor range
315C-125UXCB2403 Type**

Kiln feeding rollers drives, capacity of 7 tons per hour, 24 hrs daily duty, 365 days per year. Power 1.5 kW @ 1500 rpm. The motor is equipped with speed variator and speed encoder to enable the speed regulation of each feeding roller.

The reducer is designed with a very high reduction ratio of 27 644. The output speed is from 0.003 to 0.1 rpm (that is 0.2 to 0.6 rph). The maximum output torque is 36 000 Nm.

The following additional functions or devices are also included:

- torque limiter
- output speed control with feedback signal
- manual unlocking device



Steel case gear motors with high reduction ratios (7 000/1 to 12 000/1)

Lifting load on chain up to 70/80 tons. Lifting speed 0.2 m/min.

The gear motors are supplied fully equipped with chain wheel and chain. The chain is designed with a security factor of 5 on nominal load.



Accessories supplied:

- brake motor with manual release
- permanent electronic control of the load on the chain, including:
 - permanent load display
 - four output relays (max load, min load...)
 - 4-20 mA outputs for plc control
- chain limit switches
- control of gate angle
- standby set, comprising portable gear motor and electrical generator



Main drive doubling

Improvement of existing installation:

- 46 cabins of 12 passengers
- 1,500 passengers per hour
- total length 4 942 m, from 880 to 2 360 m @ speed 6 m/s.

Drive system characteristics:

- there are two main DC motors (1 300 HP @ 1 361 rpm) and one stand-by diesel motor (500 HP @ 1.68 m/s)
- nominal output torque is 320 000 Nm @ 26 rpm. Starting torque is 500 000 Nm
- splash lubrication + cooling circuit
- the transmission is achieved by means of one worm gear reducer type JUMBOFLEX 900F, ratio 61/8, and two primary reducers type ERMASTER R2HC38F, ratio 6.986/1

A special clutch device with double gearing, designed by **CMD**, capable of withstanding the 500 000 Nm output torque, insures transfer from one DC motor to the other in a minimum time.

A security system prevents from any potential mishandling (switching from main to stand-by drive)

