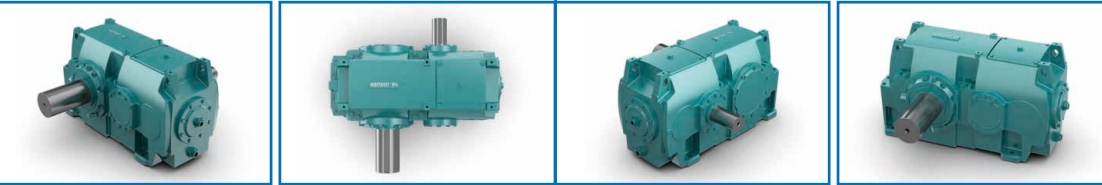


standardized heavy duty single stage gear units

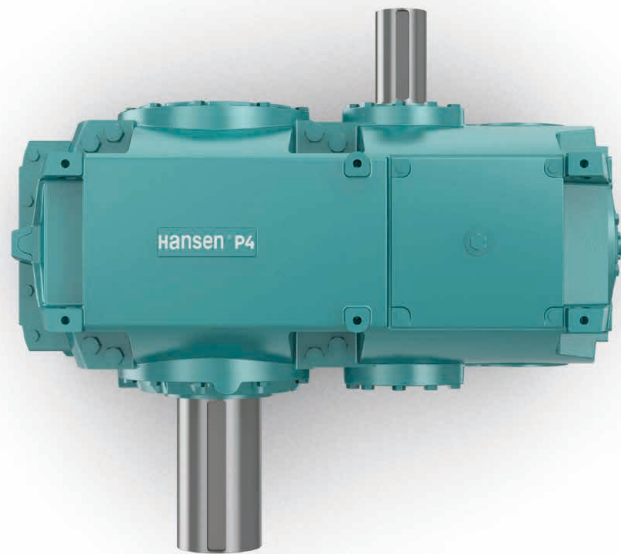


Hansen P4



STANDARDIZED HEAVY DUTY SINGLE STAGE GEAR UNITS

With the new range of heavy duty single stage gear units, Hansen Industrial Transmissions extends its current single stage offering into the multi-megawatt power range. These single stage gear units make use of the proven Hansen P4 technology and are especially suitable to drive large pumps, blowers, compressors, refiners, etc.



■ MATCHING THE DRIVE TO THE APPLICATION

Being able to closely match the optimal working speed is important for the performance of these applications. An extensive and highly optimized gear set range is available to match the customers' requirements; all gear sets are optimized and designed by evaluating their mechanical, dynamic and noise properties. In almost all cases a ratio within 1% of the requested ratio can be selected and supplied within the standard lead time.

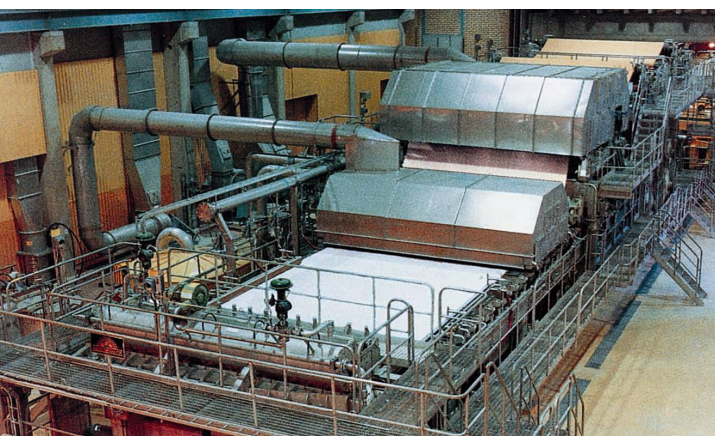
To enhance the robustness of these single stage gear units, the high speed shaft bearing arrangement is designed with a separate thrust bearing to ensure that the axial and radial forces will be accommodated by two separate bearings. As a result the load distribution over the rollers is optimized.

Continuous lubrication and cooling of bearings and gears are critical to ensure long, trouble

free operation of multi-megawatt drives. The pressure lubrication system is especially designed for this product range optimizing oil lubrication of the bearings and oil distribution over the gears, also at high circumferential speeds.

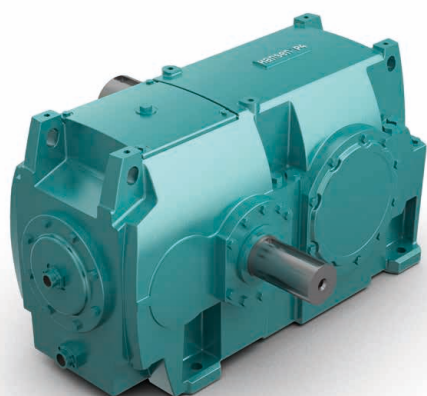
Foaming due to air entrainment is a common problem in case the oil is recirculated through the cooling and lubrication system too quickly. As the gear unit housing forms a large oil sump, the oil has sufficient time to settle and foaming problems are avoided.

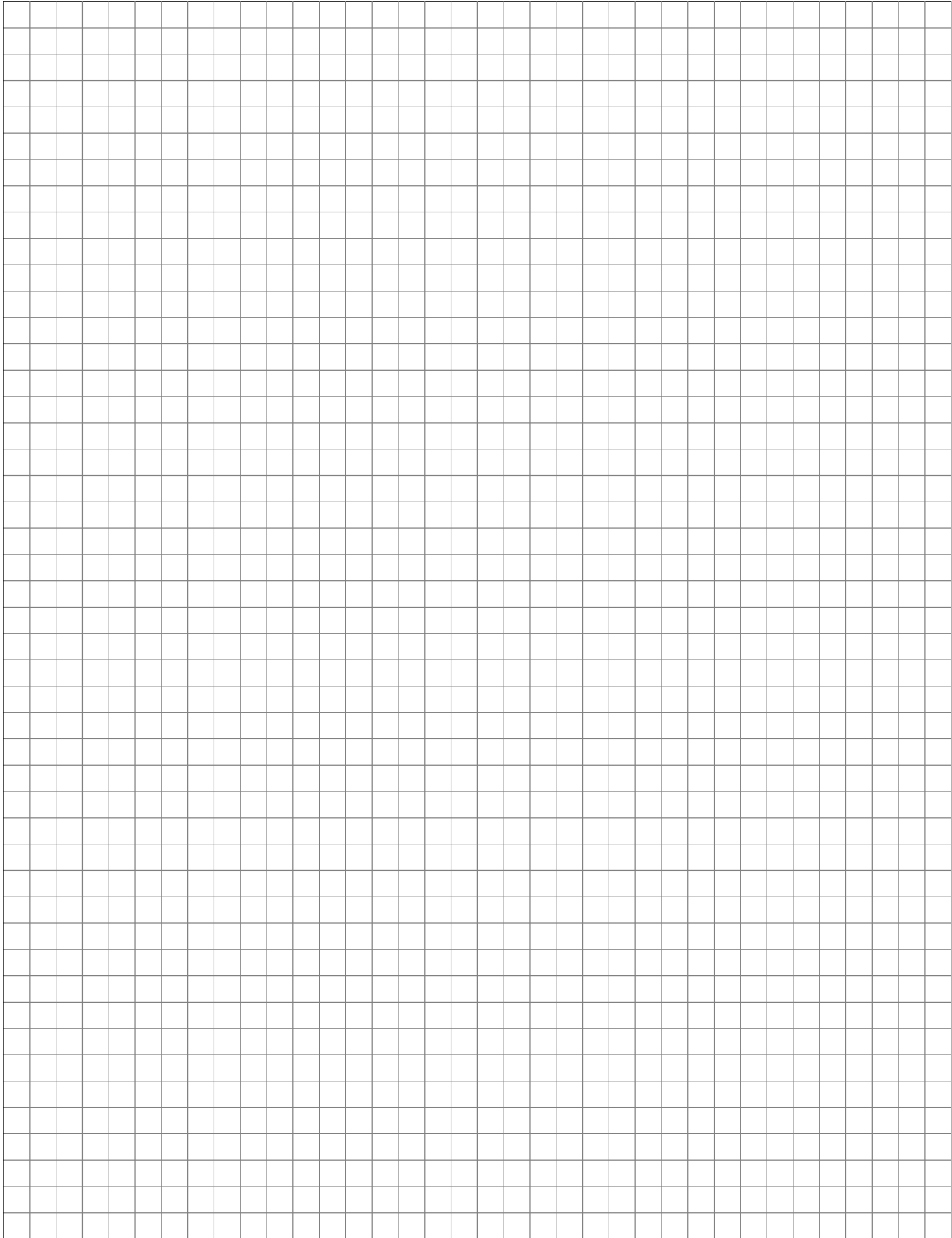
Because high peripheral speeds at the shaft ends quickly wear out (or even burn) standard radial oil seals, the contactless and maintenance-free Oil Lock™ system is used as a standard on the high and the low speed shaft. Grease purged labyrinth seals can be offered upon request.



WHY HANSEN INDUSTRIAL GEARBOXES?

- *We match the drive to the application and offer proven reliability under the most severe conditions.*
- *In depth engineering and support and complete documentation before and after the order.*
- *One-stop-shopping for complete drive package solutions.*
- *The horizontal split housing design makes it easy to open for inspection and service on the spot.*
- *Easy to remove inspection cover with O-seal above the oil level*
- *Connection points for the cooling group provided as a standard*
- *A wide range of intermediate ratios is available.*
- *Worldwide Hansen Industrial gearboxes services network 24/24h-7/7 services@hansenindustrialgearboxes.com or +32 3 450 12 34*





HANSEN P4 GEAR UNITS

Heavy duty single stage gear units

CONTENTS

Description	2
Selection	
Procedure	3
Application classification - Service Factor SF	4
Mechanical power ratings	5
Exact ratios i_{ex} and moments of inertia WR^2	5
Bearing life	6
Lubrication	7
Dimensional drawings	
Hansen P4 heavy duty single stage gear units	8
Connection for lubrication system	9
Options	9

DESCRIPTION

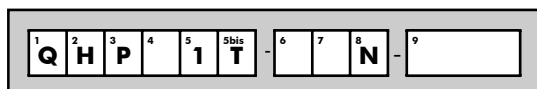
Heavy duty single stage gear units

The gear unit

The mechanical power ratings shown in the tables relate respectively to input speeds of 1800, 1500, 1200 and 1000 RPM at the high speed shaft. They are also valid for asynchronous speeds which are max. 3% lower than the synchronous speeds.

Interpolation will yield power rating values for intermediate speeds. For all other input speeds, please refer to Hansen Industrial Transmissions nv (H.I.T.).

Coding



Type

- 1 : series **Q** : Hansen P4
 2 : **H** : horizontal low speed shaft
 3 : **P** : parallel shafts
 4 : Size: **G, H, J, K**
 5 : number of stages: **1**
 5bis: **T** : heavy duty single stage gear unit with horizontal split housing

Shaft arrangement

- 6 : high speed shaft extension: **L**: left
 R: right
 7 : low speed shaft extension: **L**: left
 R: right
 8 : low speed shaft extension: **N**: normal solid shaft

Ratio

- 9 : nominal ratio

Basic components

Helical gears

Designed and rated in accordance with AGMA for maximum load capacity, minimum losses and quiet operation.

All geared components are manufactured from alloy steel, gas carburized, hardened and precision ground.

Within the published range special ratios within 1% of the requested ratio can generally be offered.

Low speed shafts

The low speed shaft is only available in solid version.

Bearings

Heavy duty bearings of the cylindrical or spherical roller bearing type and 4-point contact ball bearing type.

Bearing life calculated in compliance with DIN ISO 281 Bld 1 : 2003-04

Bearing life:

The absorbed power Pa in the table at page 6 relates to the bearing life L_{10nm} as indicated.

For other bearing life and the related maximum absorbed power Pa, refer to Hansen Industrial Transmissions nv.

Housings and covers

Made from grey pearlitic cast iron.

Machined on CNC machining centers.

Designed to ensure strength and rigidity.

Systems

Lubrication

Lubricants: mineral and synthetic oils

Lubricants should always contain adequate EP-additive. See service manual for the list of approved oils.

Pressure lubrication of gears and controlled lubrication for bearings is standard.

Cooling

Heat generated in the gear unit due to losses, can be dissipated by:

- oil to water cooling system or
- oil to air cooling system

Contact Hansen Industrial Transmissions nv for detailed information.

Sealing

Static: • Generalized use of sealing compound
 • Inspection cover: O-ring

Rotary: • Oil Lock™: - dual purpose labyrinth
 - maintenance free
 - oil return to sump
 • Grease purged labyrinth seal optional

Shipping conditions

Inspection prior to shipment

- No load test
- Conformance check to the order acknowledgment

Protection

Standard painting system

- As a standard, Hansen gear units are provided with a painting system that is suitable to be applied in the atmospheric-corrosivity category "C1" according to ISO 12944-2 (and ISO 12944-5).

The choice of colour has no influence on the technical quality of the painting system.

Other painting systems can be offered to meet the required atmospheric-corrosivity category for your application.

- Inner side housing: oil resistant paint
- Inner components: sprayed with rust preventive oil

Shaft extensions

Protected with rust preventing coating

Lubricants

- Units are shipped without oil
- Grease lubrication points are factory filled

For information relating to storage, handling, installation, starting-up and maintenance, refer to the Service Manual which is supplied with each unit.

SELECTION

Procedure

Heavy duty single stage gear units

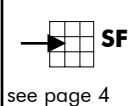
S
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C
K

Mechanical power rating

SELECTION DATA
 $P_m, P_a, n_{HSS}, n_{LSS}, i_N$

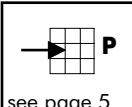
SERVICE FACTOR
 Application
 Load conditions
 Prime mover



see page 4

$$P \geq \begin{matrix} \text{Actual absorbed power } P_a \\ \text{and} \\ \text{Motor power } P_m \end{matrix} \times SF_{min}$$

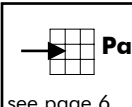
Mechanical power rating **P**



see page 5

Ratio → **Size**

Required bearing life and absorbed power **Pa**



see page 6

Ratio → **Size**

Q H P 1 T - . . N - Ratio

Largest size

Lubrication:
 Refer to page 7 for an indication of the lubrication boundaries. Refer to Hansen Industrial Transmissions nv for in depth verification.

Thermal rating:
 An external cooling group is required: refer to Hansen Industrial Transmissions nv

SELECTION

Application classification - Service Factor SF

Heavy duty single stage gear units

APPLICATION	SF min			
	10h		24h	
	24h		24h	
	on Pa	on Pm	on Pa	on Pm
Blowers				
Centrifugal			1.5	1.25
Lobe, vane			1.5	1.25
Compressors				
Centrifugal			1.5	1.25
Lobe	1.5	1.25	1.75	1.25
Waterring	1.5	1.25	1.75	1.5
Reciprocating, multi-cylinder	1.75	1.5	1.75	1.5
Reciprocating, single-cylinder	2	1.75	2	1.75
Crushers				
Stone, ore, concrete		2		2.25
garbage		1.5		1.75
Energy conversion				
Frequency converters		1.5		1.75
Water turbines (small)			2	1.75
Fans				
Dry cooling towers	1.75	1.5	2	1.75
Wet cooling towers	1.75	1.5	2	1.75
Large fans (industrial, mining)	1.5	1.25	1.75	1.25
Mills				
Ball, rod	1.75	1.5	2	1.75
Autogene	2	1.5	2	1.75
Pulp and Paper				
Breaker stack			1.5	1.25
Chipper				2.5
Calenders			1.5	1.25
Super calenders			1.5	1.25
Coating rolls			1.5	1.25
Couch			1.5	1.25
Dryers (anti-friction bearings)			1.5	1.25
Lumpbreaker			1.5	1.25
Metering rolls			1.5	1.25
Presses (felt/suction)			1.5	1.25
Presses: size press			1.5	1.25
Reel (surface type)			1.5	1.25
Refiner				1.5
Spools (Starter/MT, Hope/ Paper rolls)			1.25	1.25
Thermal rolls			1.5	1.25
Vacuum pump				
Centrifugal				1.75
Waterring				1.75
Piston				2
Windup, unwind			1.75	1.5
Wire: turning, return			1.5	1.25
Pumps				
Centrifugal			1.5	1.25
Proportioning			1.5	1.25
Rotary gear type, lobe, vane			1.5	1.25
Reciprocating, multi-cylinder	1.5	1.25	1.75	1.5
Reciprocating, single-cylinder	1.75	1.5	2	1.75

Pa = absorbed power

Pm = nameplate rating of the electric drive motor (or generator) at the motor (or generator) rated base speed.

- These minimum service factors SF are empirical values based on AGMA specifications and our experience. They apply for "State of the art" designed driven machines and normal operating conditions. They apply for electric motors as prime movers. If prime mover is a multicylinder combustion motor, 0,25 has to be added to the SF. For multiple drives consider the actual load sharing. Refer to us for special designed applications or special operating conditions.

- Other applications not listed : refer to Hansen Industrial Transmissions nv

Q	H	P	G ▶ K	1	T
Gear unit	Horizontal L.S.S.	Parallel shafts	Size	Single stage	

Heavy duty single stage gear units

Mechanical power ratings

P (hp)

i_N	rpm		P (hp)				i_{ex}		WR² (lb.in²)	
			Size - Taille - Bauggröße - Tamaño				Size - Taille - Bauggröße - Tamaño			
	n_1	n_2	G	H	J	K	G	H	J	K
2.5	1800	720	7650	10200	12250	16250				
	1500	600	6450	8600	10300	13550	2.4783	2.48	2.48	2.5417
	1200	480	5200	6900	8350	10850	5500	10000	14000	25000
	1000	400	4350	5750	7000	9050				
2.8	1800	640	7000	9250	11250	14700				
	1500	540	5900	7700	9450	12250	2.7895	2.7826	2.7826	2.8182
	1200	430	4750	6150	7650	9800	4800	9000	12500	22000
	1000	360	4000	5150	6400	8200				
3.15	1800	570	6450	8300	10600	12850				
	1500	480	5450	6950	8900	10800	3.1176	3.0952	3.1579	3.1304
	1200	380	4400	5550	7200	8750	4500	8000	11000	19000
	1000	320	3700	4600	6050	7350				
3.55	1800	510	4850	7300	9100	10850				
	1500	420	4050	6100	7650	9100	3.55	3.5263	3.5789	3.5652
	1200	340	3300	4900	6200	7350	3900	6900	9800	17000
	1000	280	2750	4050	5200	6200				
4	1800	450	4350	5950	8350	10050				
	1500	375	3650	5000	7000	8450	4.0556	3.95	3.9375	3.9524
	1200	300	2950	4000	5650	6800	3300	6200	8700	14800
	1000	250	2450	3400	4750	5750				
4.5	1800	400	4000	5500	7150	8950				
	1500	330	3350	4600	6000	7500	4.2941	4.4444	4.4375	4.4737
	1200	265	2700	3700	4850	6050	3100	5400	7500	13000
	1000	220	2300	3100	4100	5100				
5	1800	360		4350	5500	8150				
	1500	300		3650	4600	6850		4.9474	4.9474	4.9375
	1200	240		2950	3750	5550		4700	6600	11000
	1000	200		2500	3150	4650				
5.6	1800	320			5000	7450				
	1500	270			4200	6300			5.4667	5.2667
	1200	215			3400	5050			5900	10000
	1000	180			2850	4250				

Remark: for intermediate ratios not listed in this table, refer to Hansen Industrial Transmissions nv.

- i_N Nominal ratio
- $n_{1,2}$ Nominal speed
- i_{ex} Exact ratio
- WR²** Moments of inertia WR² related to the high speed shaft

Q	H	P	G ▶ K	I	T
Gear unit	Horizontal L.S.S.	Parallel shafts	Size	Single stage	

Heavy duty single stage gear units

Maximum absorbed power

Pa (hp)

Bearing life

L10nm

			Pa (hp)											
			Gear unit size											
i_N	rpm		G	H	J	K	G	H	J	K	G	H	J	K
	n₁	n₂	L10nm : 40,000 h				L10nm : 60,000 h				L10nm : 100,000 h			
2.5	1800	720	4300	5200	6400	7450	4000	4850	6000	6900	3700	4500	5450	6150
	1500	600	3650	4400	5500	6400	3400	4100	5100	5950	3100	3800	4700	5350
	1200	480	3000	3600	4500	5250	2800	3350	4200	4850	2550	3100	3850	4400
	1000	400	2550	3050	3800	4450	2350	2850	3500	4100	2150	2600	3250	3750
2.8	1800	640	4000	4800	5900	6850	3750	4500	5500	6300	3450	4150	5050	5650
	1500	540	3400	4100	5100	5850	3200	3800	4700	5450	2900	3500	4350	4950
	1200	430	2800	3350	4150	4800	2600	3100	3850	4500	2400	2850	3550	4050
	1000	360	2350	2850	3500	4050	2200	2600	3250	3750	2000	2400	3000	3450
3.15	1800	570	3600	4400	5450	6550	3350	4100	5100	6150	3100	3800	4650	5600
	1500	480	3050	3750	4700	5650	2850	3500	4350	5250	2600	3200	4000	4850
	1200	380	2500	3050	3850	4600	2300	2850	3550	4300	2150	2600	3250	3950
	1000	320	2100	2600	3250	3900	1950	2400	3000	3600	1800	2200	2750	3300
3.55	1800	510	3100	4000	4900	5900	2800	3700	4600	5550	2550	3450	4200	5050
	1500	420	2600	3400	4200	5100	2400	3150	3900	4750	2150	2900	3650	4350
	1200	340	2200	2750	3450	4150	1950	2600	3200	3900	1800	2400	2950	3550
	1000	280	1850	2350	2950	3550	1700	2200	2700	3250	1500	2000	2500	3000
4	1800	450	2650	3750	4600	5400	2450	3500	4300	5050	2200	3250	3950	4600
	1500	375	2300	3200	3950	4650	2100	3000	3700	4350	1900	2750	3400	4000
	1200	300	1900	2600	3250	3800	1700	2450	3000	3550	1550	2250	2750	3250
	1000	250	1600	2200	2750	3250	1500	2050	2550	3000	1300	1900	2350	2750
4.5	1800	400	2550	3400	4150	4900	2300	3150	3900	4600	2100	2950	3550	4200
	1500	330	2150	2900	3550	4250	1950	2700	3300	3950	1800	2450	3050	3650
	1200	265	1800	2350	2950	3450	1600	2200	2700	3200	1450	2000	2500	2950
	1000	220	1550	2000	2500	2950	1400	1850	2300	2700	1250	1700	2100	2500
5	1800	360		3150	3650	4600		2950	3350	4300		2700	3000	3950
	1500	300		2700	3150	3950		2500	2900	3700		2300	2600	3400
	1200	240		2200	2600	3250		2050	2400	3050		1850	2150	2800
	1000	200		1850	2250	2750		1700	2050	2550		1600	1800	2350
5.6	1800	320			3150	4350			2900	4050			2600	3700
	1500	270			2750	3750			2500	3450			2250	3200
	1200	215			2250	3050			2100	2850			1850	2600
	1000	180			1950	2600			1800	2400			1600	2200

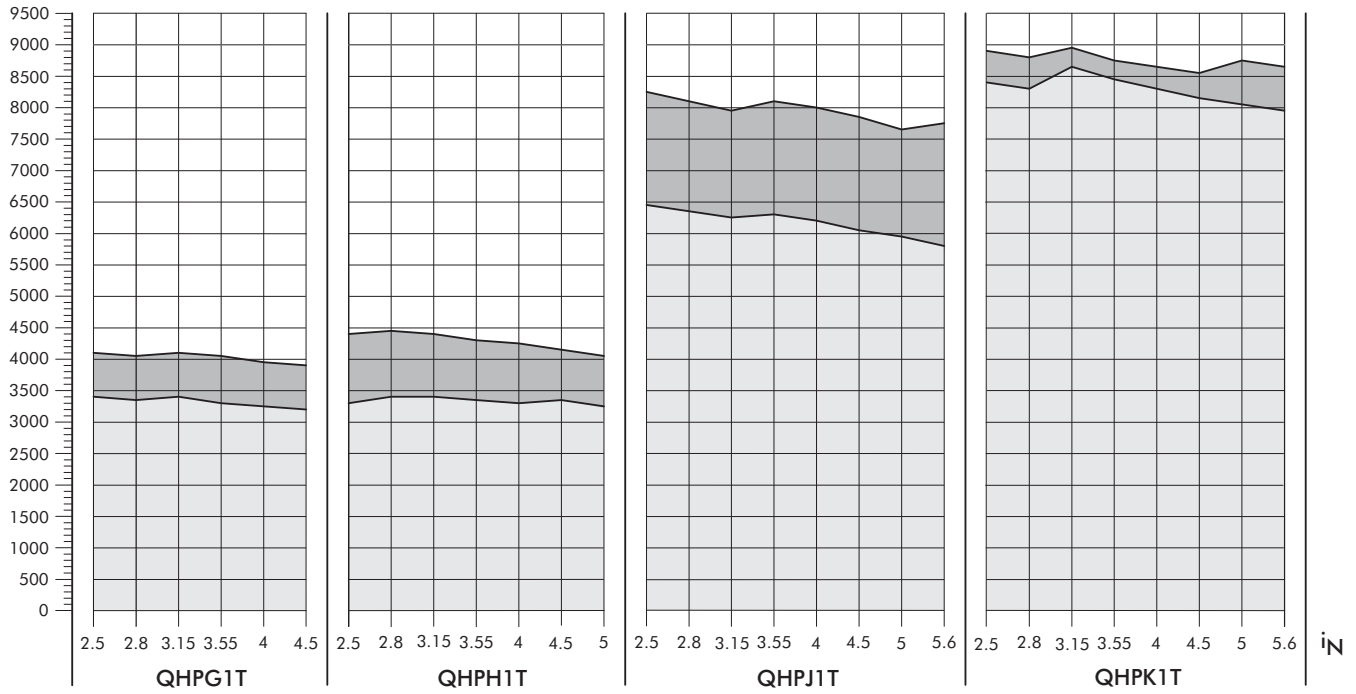
i_N Nominal ratio
n_{1,2} Nominal speed

Q Gear unit	H Horizontal L.S.S.	P Parallel shafts	G ▶ K Size	1 Single stage	T
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Heavy duty single stage gear units

Lubrication

P_a (hp)



The above mentioned graph gives an indication of the lubrication boundaries. Refer to Hansen Industrial Transmissions nv for an in-depth verification.

- Gear unit's oil volume is sufficiently large to lubricate the gear unit.
- Special measures should be taken to ensure the lubrication. Refer to Hansen Industrial Transmissions nv.
- Additional external oil volume is required.

Graph valid under the following conditions:

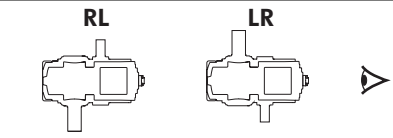
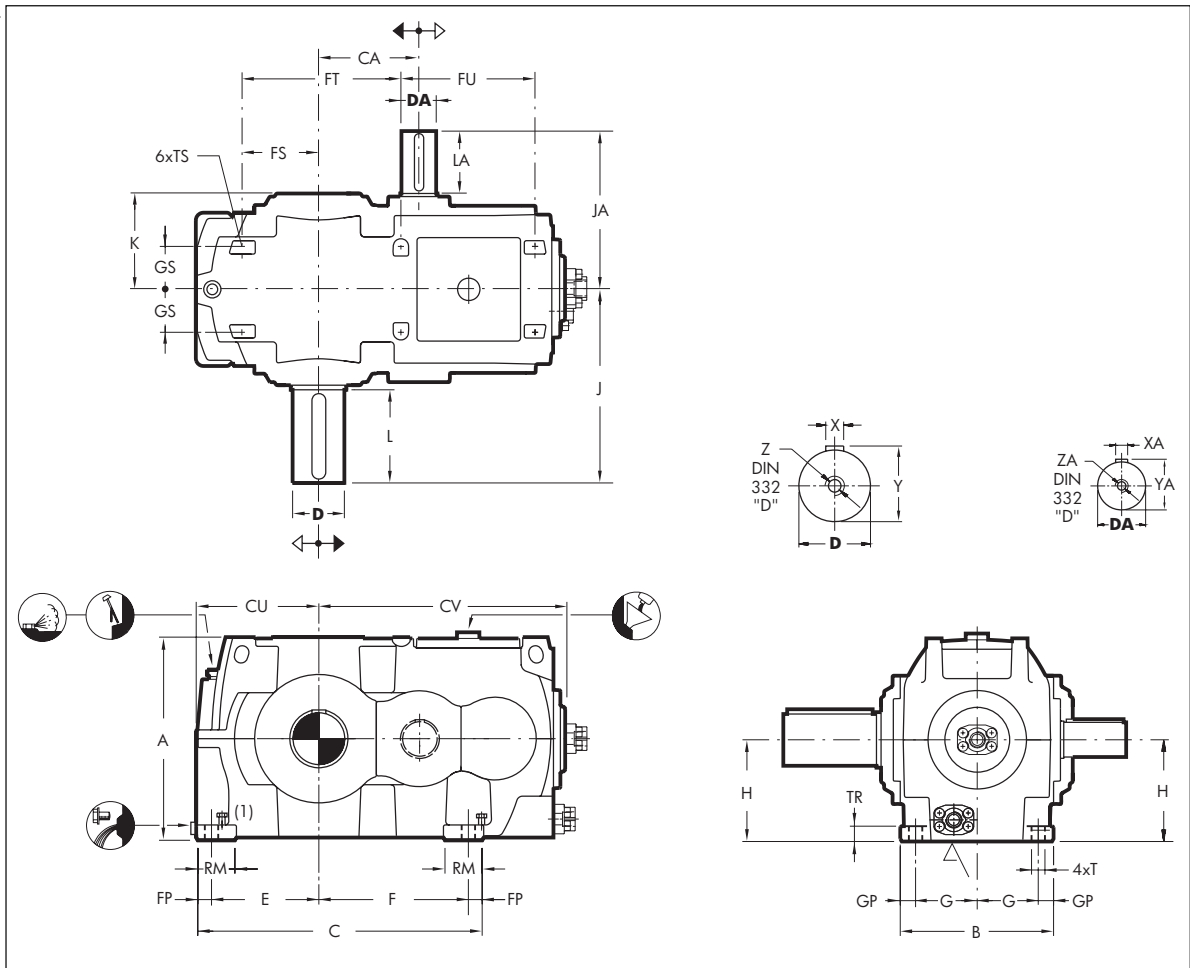
- Oil temperature at gear unit's oil inlet: 160° F
- Input speed n_1 : 1800 or 1200 rpm
- Viscosity of mineral oil: ISO VG 220
- Motor pump 60Hz - 1800 rpm

i_N Nominal ratio
 P_a Absorbed power

Heavy duty single stage gear units

The user is responsible for the provision of **safety guards** and correct installation of all equipment.

Certified dimensions upon request.



Shaft arrangements
(top view)

(1) 4 x jacking screw for gear unit sizes J and K

(2) Shaft tolerances: as per ISO 286-2

Keys in shaft extensions as per DIN 6885 T1.

Shafts are always supplied with keys attached.

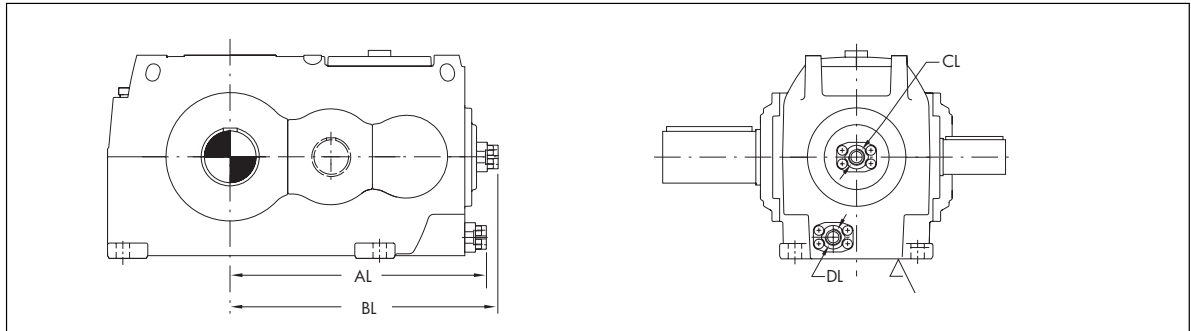
Note: optional imperial shaft extensions are available upon request.

Type	A	B	C	CA	CU	CV	E	F	FP	FS	FT	FU	G	GP	GS	H	J	JA	K	RM	T	TR	TS	Weight lb	Oil US gal
QHPG1T	29.92	21.65	37.99	13.425	15.75	33.39	13.78	20.28	1.97	9.45	19.17	19.17	8.86	1.97	6.30	14.76	25.55	21.26	12.32	5.12	1.65	2.36	M20	3740	23
QHPH1T	29.92	21.65	42.80	16.260	17.72	36.22	15.75	23.11	1.97	11.42	24.02	19.17	8.86	1.97	6.30	14.76	27.76	21.26	12.32	5.12	1.65	2.36	M20	4840	24
QHPJ1T	35.83	25.20	46.26	16.417	19.29	38.74	14.37	24.41	3.74	11.54	22.83	21.65	10.63	1.97	7.48	17.72	29.61	25.04	14.33	7.48	1.65	2.36	M24	5940	39
QHPK1T	35.83	25.20	51.30	19.488	21.26	41.81	16.34	27.48	3.74	13.50	27.87	21.65	10.63	1.97	7.48	17.72	32.17	25.04	14.53	7.48	1.65	2.36	M24	7040	41

Type	Shafts (2)									
	D-m6	L	X	Y	Z	DA-m6	LA	XA	YA	ZA
QHPG1T	7.0866	11.81	1.77	7.48	M30	4.7244	8.27	1.26	5.00	M24
QHPH1T	7.4803	13.78	1.77	7.87	M30	4.7244	8.27	1.26	5.00	M24
QHPJ1T	8.2677	13.78	1.97	8.70	M30	5.5118	9.84	1.42	5.83	M30
QHPK1T	9.0551	16.14	1.97	9.49	M30	5.5118	9.84	1.42	5.83	M30

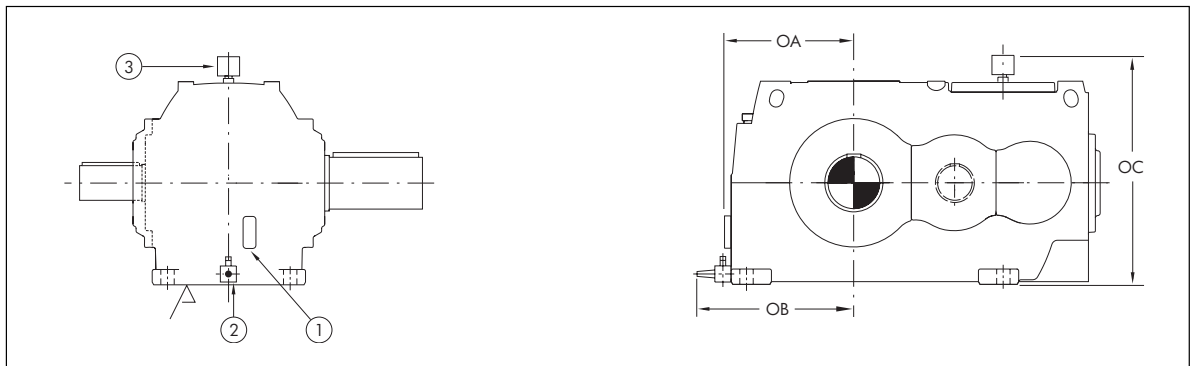
Heavy duty single stage gear units

Connection for lubrication system - SAE flange



Type	AL	BL	CL	DL
QHPG1T	33.19	34.92	1 1/2NPT	2NPT
QHPH1T	36.02	37.76	1 1/2NPT	2NPT
QHPJ1T	38.54	40.28	1 1/2NPT	2NPT
QHPK1T	41.61	43.35	1 1/2NPT	2NPT

Options



Type QHP.1T			Size			
Position			G	H	J	K
Oil sight glass	①	OA	16.93	18.90	20.47	22.44
Drain cock	②	OB	20.08	22.05	26.18	28.15
Dust-proof breather plug	③	OC	35.63	35.63	41.93	41.93

The above mounting positions and dimensions may vary for gear units equipped with other additional accessories.

Hansen Industrial Transmissions nv commits to be a pioneering innovator.

The production of high performance gear units stems from an interactive partnership with our clients, the end users and the actively engaged manpower of our global enterprise. Embracing design, manufacturing and customer services, Hansen Industrial Transmissions has grown into a world leader in its field.

Today, we set standards for both product and working environment, inciting a knowing environment to seize all new and inspiring technologies.



Sumitomo Drive Technologies
Always on the Move



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