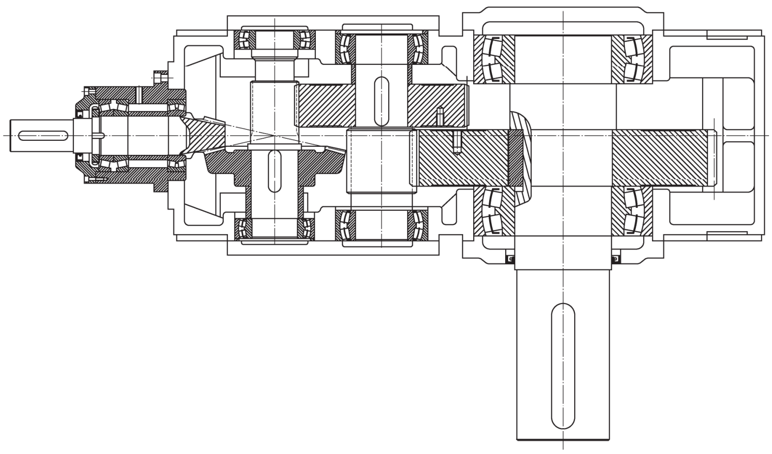
H、B series gear units overview:

- H.B series gear units adopt currency layout and may transform into speeral reducer according to customer's requirement.
- The housing of one size can realize parallel shaft,right-angle shaft modes and horizontal,vertical mounting modes.Variety of components is reducible, the number of reducer's mode is augmentable.
- Sound-absorbable structure, lager surface, big fan reduce temperature and noise, advanced grinding process of cylindrical gear and bevel gear improve stability and transmit power more efficeintly.
- Input mode: motor connected flange, shaft input.
- Output mode: solid shaft with flat key, hollow shaft with flat key, hollow shaft with shrink disk, hollow or solid shaft with involute splines, solid shaft with flange.
- Mounting mode: Foot-mounted, flange-mounted, swing base-mounted, torque-arm-mounted.
- H.B series include sizes 3~26, number of stages is 1~4, ratio is 1.25~450, combining with R series and K series, ratio will be higher.

H.B series reducer structure drawing:



H.B series model expressing example:

B 3 S H 10 – 56–A

- B: Mode(H=Parallel shaft; B=right angle shaft)
- 3: Stage (1, 2, 3, 4)
- S: Output shaft mode(S=solid shaft;H=Parallel shaft with keyway D=hollow shaft with shrink disk)
- H: Mounting mode (H=Foot-mounted, M=Horizontal design without feet V=Flange-mounted)
- 10: Gear unit size
- 56: Natio
- A: Arrangement of output shaft (A、B、C、D、E、F、G、H、I)

HB

Symbol description:

ED=operating cycle per hour, express as percent, for example ED=60%/h

f1=Factor for driven machine (table 1)

f2=Factor for prime mover

f3=Peak torque factor

f4,f5=Ambient temperature factor (table 2,3)

f6,f7=Altitude factor (table 4,5)

f8=Applying oil factor of gear box (table 6)

f9,f10,f11,f12=Thermal capacity factor (table 7,8,9,10)

a1=Size factor (table 11)

a2=Transmission ratio factor (table 12)

P1=Power rating of driven machine

PG1=Thermal capacity for gear units without auxiliary cooling,

PG2=Thermal capacity for gear units with fan cooling,

PG3=Thermal capacity for gear units with built-in cooling coil

PG4=Thermal capacity for gear units with built-in cooling coil and fan

HB series type selection example:

<table>
<tr><th>Steps</th><th>Specification</th><th>Symbol</th><th colspan="6">Calculate parameter</th></tr>
<tr><td>1</td><td>Driven machine factor</td><td>f1</td><td colspan="6">See P05 f1 table</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">Factor for prime mover</td><td rowspan="4">f2</td><td colspan="5">Factor for prime mover</td><td>f_2</td></tr>
<tr><td colspan="5">Electric motors, hydraulic motors, turbines</td><td>1.0</td></tr>
<tr><td colspan="5">Piston engines 4 - 6 cylinders cyclic variation 1 : 100 to 1 : 200</td><td>1.25</td></tr>
<tr><td colspan="5">Piston engines 1 - 3 cylinders cyclic variation up to 1 : 100</td><td>1.5</td></tr>
<tr><td>3</td><td>Permissible input speed</td><td>n1</td><td colspan="6">≤1500</td></tr>
<tr><td>4</td><td>Position of input and output</td><td>H、B</td><td colspan="6">H:Parallel shaft, B: Right-angled shaft.</td></tr>
<tr><td>5</td><td>Determine ration</td><td>i</td><td colspan="6">i=n1/n2</td></tr>
<tr><td>6</td><td>Efficiency</td><td>η</td><td colspan="6">sigle stage:98%, 2-stage:96%, 3-stage:94%, 四级4-stage:92%</td></tr>
<tr><td>7</td><td>Determine input power</td><td>P1</td><td colspan="6">P1=T2 · n1/(9550 · i · η) or P1=P2/ η</td></tr>
<tr><td>8</td><td>By calculation, defermine type in reference to transmission table</td><td>T_{2N}、P_{1N}</td><td colspan="6">T2N≥T2 · f1 · f2 (or) P1N≥P1 · f1 · f2
If not meet: 3.33 · P1 ≥ P1N please consult us.</td></tr>
<tr><td>9</td><td>Determine output mode</td><td></td><td colspan="6">Output mode & mounting position</td></tr>
<tr><td rowspan="4">10</td><td rowspan="4">Check for maximum torque</td><td rowspan="4">T_A</td><td rowspan="4">$P_{1N} \geq T_A \cdot n1 \cdot f3/9550$</td><td rowspan="2">f3</td><td colspan="4">Load peaks per hour</td></tr>
<tr><td>1–5</td><td>6–30</td><td>31–100</td><td>> 100</td></tr>
<tr><td>Steady direction of load</td><td>0.5</td><td>0.65</td><td>0.7</td><td>0.85</td></tr>
<tr><td>Altemating direction of load</td><td>0.7</td><td>0.95</td><td>1.10</td><td>1.25</td></tr>
<tr><td>11</td><td>Verify intensity of shaft</td><td>Fr、Fa</td><td colspan="6">See P05</td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Determine lubrication method and lubrication oil(see attachment)</td><td rowspan="2"></td><td colspan="3">Horizontal</td><td colspan="3">Vertical</td></tr>
<tr><td colspan="3">Immersion, splash, forced lubrication.</td><td colspan="3">A: immersion
B: Pump-forced lubrication</td></tr>
<tr><td>13</td><td>Cooling method</td><td></td><td colspan="6">1 Adequate for gear units without auxiliary cooling, if:
P1≤PG1 × f4 × f6 × f8 × f9

2 Adequate for gear units with fan cooling, if:
P1≤PG2 × f4 × f6 × f8 × f10

3 Adequate for gear units with fitted cooling coil, if:
P1≤PG3 × f5 × f7 × f8 × f11

4 Adequate for gear units with cooling coil and fan, if:
P1≤PG4 × f5 × f7 × f8 × f12

5 For higher thermal capacities, cooling by external oil cooler on request.:
(f4、f5、f6、f7、f8、f9、f10、f11、f12 refer to P213,214)</td></tr>
</table>

* Peak torque: Maximum torque is maximum starting torque, maximum braking torque.

HB

Selection example

Given condition:

Driving machine:

Pm=75KW

n1=1500rpm

TA=720N・m

Driven machine(belt conveyor):

P2=66KW

n2=26rpm

service duration: 12h/day

Start-up: 10times/hour

Working circle ED=100% per hour

Ambient temperature: 30℃

installed in open field

Altitude: 500m

Right-angled shaft

Mounting mode: Horizontal

Shaft amangement: C

Selecting steps:

1.Calculate ratio:

i=n1/n2=1500/26=57.7　　iN=56

2.Determine nominal power:

P1N ≥ P1・f1・f2=P2・f1・f2/η

=66×1.3×1/0.94=91.3kW

Choose B3, size: 9, P1N: 96kW

Verify: 3.33×P1 ≥ P1N

3.33×P1=3.33×P2/η=3.33×66/0.94

= 233.8 kW > P1N

3.Verify peak torque:

$P_{1N} \geq T_A$ • n1 • f3/9550

=720×1500×0.65/9550=73.5kW

P1N=96kW>73.5kW　　Meet requirement.

4.Verify thermal capacity:

PG1×f4×f6×f8×f9

=70.7kW×0.88×1×1×(1.23-2.80×0.085×0.15)

=74.3kW

P1=P2/η=66kW/0.94=70.2 <74.3kW

So auxiliary cooling devece is unnecessary.

TYPE: B3SH9-56-C

Service Factors

Table 1 — Factor for driven machine — f1

Driven machines	Effective daily operating period under load in hours 0.5	>0.5-10	>10
Waste water treatment			
Thickeners (central drive)	–	–	1.2
Filter presses	1.0	1.3	1.5
Flocculation apparata	0.8	1.0	1.3
Aerators	–	1.8	2.0
Raking equipment	1.0	1.2	1.3
Combined longitudinal and rotary rakes	1.0	1.3	1.5
Pre-thickeners	–	1.1	1.3
Screw pumps	–	1.3	1.5
Water turbines	–	–	2.0
Pumps			
Centrifugal pumps	1.0	1.2	1.3
Positive-displacement pumps			
1 piston	1.3	1.4	1.8
> 1piston	1.2	1.4	1.5
Dredgers			
Bucket conveyors	–	1.6	1.6
Dumping devices	–	1.3	1.5
Carterpillar travelling gears	1.2	1.6	1.8
Bucket wheel excavators			
as pick-up	–	1.7	1.7
for primitive material	–	2.2	2.2
Cutter heads	–	2.2	2.2
Traversing gears	–	1.4	1.8
Plate bending machines	–	1.0	1.0
Chemical industry			
Extruders	–	–	1.6
Dough mills	–	1.8	1.8
Rubber calenders	–	1.5	1.5
Cooling drums	–	1.3	1.4
Mixers for			
uniform media	1.0	1.3	1.4
non-uniform media	1.4	1.6	1.7
Agitators for media with			
uniform density	1.0	1.3	1.5
non-uniform density	1.2	1.4	1.6
non-uniform gas absorption	1.4	1.6	1.8
Toasters	1.0	1.3	1.5
Centrifuges	1.0	1.2	1.3
Metal working mills			
Plate tilters	1.0	1.0	1.2
Ingot pushers	1.0	1.2	1.2
Winding machines	–	1.6	1.6
Cooling bed transfer frames	–	1.5	1.5
Roller straighteners	–	1.6	1.6
Roller tables			
continuous	–	1.5	1.5
intermittent	–	2.0	2.0
Reversing tube mills	–	1.8	1.8
Shears			
continuous	–	1.5	1.5
crank type	1.0	1.0	1.0
Continuous casting drivers	–	1.4	1.4
Rolls			
Reversing blooming mills	–	2.5	2.5
Reversing slabbing mills	–	2.5	2.5
Reversing wire mills	–	1.8	1.8
Reversing sheet mills	–	2.0	2.0
Reversing plate mills	–	1.8	1.8
Roll adjustment drives	0.9	1.0	–

Driven machines	Effective daily operating period under load in hours 0.5	>0.5-10	>10
Conveyors			
Bucket conveyors	–	1.4	1.5
Hauling winches	1.4	1.6	1.6
Hoists	–	1.5	1.8
Belt conveyors 150 kW	1.0	1.2	1.3
Belt conveyors 150 kW	1.1	1.3	1.4
Goods lifts	–	1.2	1.5
Passenger lifts	–	1.5	1.8
Apron conveyors	–	1.2	1.5
Escalators	1.0	1.2	1.4
Rail travelling gears	–	1.5	–
Frequency converters	–	1.8	2.0
Reciprocating compressors	–	1.8	2.0
Cranes			
Slewing gears	1.0	1.4	1.8
Luffing gears	1.0	1.1	1.4
Travelling gears	1.1	1.6	2.0
Hoisting gears	1.0	1.1	1.4
Derricking jib cranes	1.0	1.2	1.6
Cooling towers			
Cooling tower fans	–	–	2.0
) Blowers (axial and radial)	–	1.4	1.5
Food industry			
Cane sugar production			
Cane knives	–	–	1.7
Cane mills	–	–	1.7
Beet sugar production			
Beet cossettes macerators,	–	–	1.2
Extraction plants, Mechanical refrigerators, Juice boilers,	–	–	1.4
Sugar beet washing machines, Sugar beet cutters	–	–	1.5
Paper machines			
of all-kind	–	1.8	2.0
Pulper drives	On request		
Centrifugal compressors	–	1.4	1.5
Cableways			
Material ropeways	–	1.3	1.4
To- and fro system aerial ropeways	–	1.6	1.8
T-bar lifts	–	1.3	1.4
Continuous ropeways	–	1.4	1.6
Cement industry			
Concrete mixers	–	1.5	1.5
Breakers	–	1.2	1.4
Rotary kilns	–	–	2.0
Tube mills	–	–	2.0
Separators	–	1.6	1.6
Roll crushers	–	–	2.0

1. Design for power rating of driven machine P_2

*) Designed power corresponding to max. torque

**) Load can be exactly classified, for Instance.

***) A check for thermal capacity is absolutely essential

2. The listed factors are empirical values. Prerequisite for their application is that the machinery and equipment mentioned correspond to generally accepted design and load specifications. In case of deviations from standard conditions, please refer to us.
3. For driven machines which are not listed in this table,please refer to us.

HB

Table 2	Thermal factor				f4
Without auxiliary cooling or with fan cooling					
Ambient temperature	Operating cycle per hour (ED) in %				
	100	80	60	40	20
10 ℃	1.11	1.31	1.60	2.14	3.64
20 ℃	1.00	1.18	1.44	1.93	3.28
30 ℃	0.88	1.04	1.27	1.70	2.89
40 ℃	0.75	0.89	1.08	1.45	2.46
50 ℃	0.63	0.74	0.91	1.22	2.07

Table 3	Thermal factor				f5
For cooling with cooling coil, or with fan and cooling coil					
Ambient temperature	Operating cycle per hour (ED) in %				
	100	80	60	40	20
10 ℃	1.05	1.23	1.50	2.03	3.41
20 ℃	1.00	1.17	1.43	1.93	3.25
30 ℃	0.93	1.09	1.33	1.79	3.02
40 ℃	0.87	1.02	1.24	1.68	2.83
50 ℃	0.81	0.95	1.16	1.56	2.63

Table 4	**Factor for altitude**				f6
Without auxiliary cooling or with fan cooling					
Factor	Altitude (metres above MSL)				
	up to 1000	up to 2000	up to 3000	up to 4000	up to 5000
f6	1.0	0.95	0.90	0.85	0.80

Table 5	**Factor for altitude**				f7
For cooling with cooling coil, or with fan and cooling coil					
Factor	Altitude (metres above MSL)				
	up to 1000	up to 2000	up to 3000	up to 4000	up to 5000
f7	1.0	0.98	0.96	0.94	0.92

Table 6 Oil supply factor for vertical gear units. For horizontal gear units f_8 = 1.0, and in case of forced lubrication f_8 = 1.05 f8

Gear unit type	Oil supply	Sizes 4 ... 12				Sizes 13 ... 18			
		Without auxiliary cooling	With fan	With cooling coil	With fan and cooling coil	Without auxiliary cooling	With fan	With cooling coil	With fan and cooling coil
H2.V, H3.V H4.V	Dip lubrication	0.95	*	0.95	*	*	*	*	*
	Forced lubrication	1.15	*	1.05	*	1.15	*	1.05	*
B2.V, B3.V B4.V	Dip lubrication	0.95	0.95	0.95	0.95	*	*	*	*
	Forced lubrication	1.15	1.10	1.10	1.10	1.15	1.10	1.10	1.10

Table 7 Thermal capacity factor for gear units without auxiliary cooling f9

Gear unit type	n 1/min	Small confined spaces Wind velocity ≥ 0.5 m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
		Place of installation		
H1	750	0.68 - 0.26 x a_1 x a_2	0.79 - 0.27 x a_1 x a_2	1.00
	1000	0.70 - 0.79 x a_1 x a_2	0.84 - 0.85 x a_1 x a_2	1.14 - 0.81 x a_1 x a_2
	1500	0.72 - 2.50 x a_1 x a_2	0.89 - 2.60 x a_1 x a_2	1.25 - 2.60 x a_1 x a_2
H2	750	0.70 - 0.08 x a_1 x a_2	0.79 - 0.21 x a_1 x a_2	1.00
	1000	0.76 - 1.00 x a_1 x a_2	0.87 - 1.40 x a_1 x a_2	1.12 - 1.30 x a_1 x a_2
	1500	0.83 - 4.10 x a_1 x a_2	0.96 - 4.60 x a_1 x a_2	1.25 - 4.20 x a_1 x a_2
H3	750	0.76	0.81 - 0.06 x a_1 x a_2	1.00
	1000	0.83 - 1.20 x a_1 x a_2	0.90 - 1.36 x a_1 x a_2	1.11 - 1.30 x a_1 x a_2
	1500	0.93 - 4.70 x a_1 x a_2	1.00 - 4.80 x a_1 x a_2	1.27 - 5.10 x a_1 x a_2
H4	750	0.78	0.83	1.00
	1000	0.85	0.91 - 1.60 x a_1 x a_2	1.10 - 2.40 x a_1 x a_2
	1500	0.97 - 10.0 x a_1 x a_2	1.03 - 12.5 x a_1 x a_2	1.27 - 14.0 x a_1 x a_2
B2	750	0.66 - 0.09 x a_1 x a_2	0.77 - 0.14 x a_1 x a_2	1.00
	1000	0.69 - 0.70 x a_1 x a_2	0.81 - 0.77 x a_1 x a_2	1.08 - 0.64 x a_1 x a_2
	1500	0.74 - 3.20 x a_1 x a_2	0.88 - 3.30 x a_1 x a_2	1.20 - 2.90 x a_1 x a_2
B3	750	0.73	0.80 - 0.05 x a_1 x a_2	1.00
	1000	0.79 - 0.63 x a_1 x a_2	0.87 - 0.81 x a_1 x a_2	1.10 - 0.73 x a_1 x a_2
	1500	0.86 - 2.40 x a_1 x a_2	0.95 - 2.60 x a_1 x a_2	1.23 - 2.80 x a_1 x a_2
B4	750	0.77	0.82	1.00
	1000	0.83	0.88	1.09 - 0.29 x a_1 x a_2
	1500	0.92 - 1.70 x a_1 x a_2	0.99 - 2.20 x a_1 x a_2	1.24 - 2.60 x a_1 x a_2

For factor f9<0.5,please refer to us!

Table 8 Thermal capacity factor for gear units with fan f10

Gear unit type	n 1/min	Small confined spaces Wind velocity ≥ 0.5 m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
		Place of installation		
H1	750	0.97 - 0.05 x a_1 x a_2	0.97 - 0.04 x a_1 x a_2	1.00
	1000	1.18 - 0.33 x a_1 x a_2	1.20 - 0.33 x a_1 x a_2	1.23 - 0.32 x a_1 x a_2
	1500	1.53 - 1.00 x a_1 x a_2	1.53 - 0.95 x a_1 x a_2	1.56 - 0.94 x a_1 x a_2
H2	750	0.95 - 0.07 x a_1 x a_2	0.96 - 0.06 x a_1 x a_2	1.00
	1000	1.16 - 0.65 x a_1 x a_2	1.17 - 0.63 x a_1 x a_2	1.21 - 0.55 x a_1 x a_2
	1500	1.54 - 2.40 x a_1 x a_2	1.55 - 2.40 x a_1 x a_2	1.58 - 2.20 x a_1 x a_2
H3	750	0.89 - 0.29 x a_1 x a_2	0.91 - 0.25 x a_1 x a_2	1.00
	1000	1.06 - 1.30 x a_1 x a_2	1.08 - 1.20 x a_1 x a_2	1.17 - 0.93 x a_1 x a_2
	1500	1.38 - 4.20 x a_1 x a_2	1.40 - 4.10 x a_1 x a_2	1.48 - 3.70 x a_1 x a_2
B2	750	0.95	0.96	1.00
	1000	1.13 - 0.15 x a_1 x a_2	1.14 - 0.16 x a_1 x a_2	1.19 - 0.19 x a_1 x a_2
	1500	1.47 - 0.95 x a_1 x a_2	1.48 - 0.92 x a_1 x a_2	1.52 - 0.95 x a_1 x a_2
B3	750	0.94	0.96	1.00
	1000	1.13 - 0.17 x a_1 x a_2	1.14 - 0.18 x a_1 x a_2	1.18 - 0.25 x a_1 x a_2
	1500	1.48 - 1.40 x a_1 x a_2	1.49 - 1.40 x a_1 x a_2	1.52 - 1.40 x a_1 x a_2

For factor f10<0.5,please refer to us!

“*” On request。

Table 9 Thermal capacity factor for gear units with cooling coil				f_{11}
Gear unit type	n 1/min	Place of installation		
		Small confined spaces Wind velocity ⩾0.5m/s	Large halls,workshops Wind velocity ⩾ 1.4 m/s	In the open Wind velocity ⩾ 4.0 m/s
H1	750	0.87	0.91	1.00
	1000	0.97 - 0.02 x a_1 x a_2	1.03 - 0.05 x a_1 x a_2	1.16 - 0.10 x a_1 x a_2
	1500	1.15 - 0.19 x a_1 x a_2	1.22 - 0.23 x a_1 x a_2	1.39 - 0.33 x a_1 x a_2
H2	750	0.88	0.91	1.00
	1000	1.01	1.06 - 0.08 x a_1 x a_2	1.17 - 0.24 x a_1 x a_2
	1500	1.27 - 0.79 x a_1 x a_2	1.33 - 0.88 x a_1 x a_2	1.47 - 1.10 x a_1 x a_2
H3	750	0.89	0.91	1.00
	1000	1.04	1.07	1.18 - 0.38 x a_1 x a_2
	1500	1.38 - 0.78 x a_1 x a_2	1.34 - 1.10 x a_1 x a_2	1.47 - 1.60 x a_1 x a_2
B2	750	0.86	0.90	1.00
	1000	0.98	1.02	1.15 - 0.09 x a_1 x a_2
	1500	1.14	1.19 - 0.05 x a_1 x a_2	1.38 - 0.37 x a_1 x a_2
B3	750	0.88	0.91	1.00
	1000	1.03	1.06	1.17 - 0.18 x a_1 x a_2
	1500	1.28 - 0.35 x a_1 x a_2	1.32 - 0.48 x a_1 x a_2	1.46 - 0.84 x a_1 x a_2

For factor f11<0.5,please refer to us!

Table 10 Thermal capacity factor for gear units with fan and cooling coil				f_{12}
Gear unit type	n 1/min	Place of installation		
		Small confined spaces Wind velocity ⩾0.5m/s	Large halls,workshops Wind velocity ⩾ 1.4 m/s	In the open Wind velocity ⩾ 4.0 m/s
H1	750	0.98	0.98	1.00
	1000	1.19 - 0.09 x a_1 x a_2	1.20 - 0.09 x a_1 x a_2	1.22 - 0.09 x a_1 x a_2
	1500	1.56 - 0.31 x a_1 x a_2	1.56 - 0.30 x a_1 x a_2	1.57 - 0.29 x a_1 x a_2
H2	750	0.97	0.98	1.00
	1000	1.19 - 0.25 x a_1 x a_2	1.20 - 0.25 x a_1 x a_2	1.22 - 0.25 x a_1 x a_2
	1500	1.59 - 1.06 x a_1 x a_2	1.59 - 1.00 x a_1 x a_2	1.61 - 1.00 x a_1 x a_2
H3	750	0.94	0.95	1.00
	1000	1.14 - 0.46 x a_1 x a_2	1.15 - 0.47 x a_1 x a_2	1.20 - 0.48 x a_1 x a_2
	1500	1.51 - 2.10 x a_1 x a_2	1.52 - 2.00 x a_1 x a_2	1.57 - 2.00 x a_1 x a_2
B2	750	0.97	0.98	1.00
	1000	1.17 - 0.08 x a_1 x a_2	1.18 - 0.08 x a_1 x a_2	1.21 - 0.12 x a_1 x a_2
	1500	1.55 - 0.47 x a_1 x a_2	1.55 - 0.47 x a_1 x a_2	1.58 - 0.52 x a_1 x a_2
B3	750	0.97	0.97	1.00
	1000	1.17 - 0.08 x a_1 x a_2	1.18 - 0.10 x a_1 x a_2	1.21 - 0.19 x a_1 x a_2
	1500	1.56 - 0.84 x a_1 x a_2	1.57 - 0.85 x a_1 x a_2	1.60 - 0.92 x a_1 x a_2

For factor f12<0.5,please refer to us!

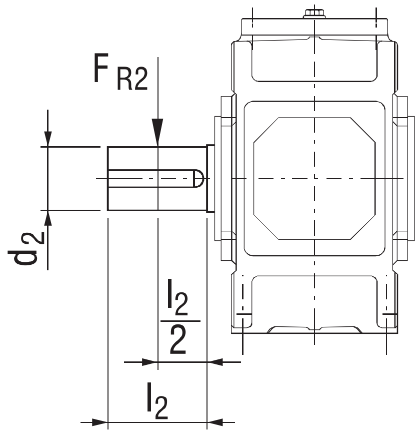
Table 11					Size factor						a1
Size	3	4	5	6	7	8	9	10	11	12	13	14
a_1	0.024	0.030	0.050	0.055	0.065	0.075	0.085	0.095	0.135	0.160	0.190	0.200
Size	15	16	17	18	19	20	21	22	23	24	25	26
a_1	0.270	0.290	0.320	0.345	0.370	0.390	0.530	0.610	Please refer to us.			

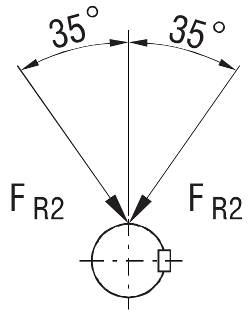
Table 12						Transmission ratio factor							a2
i	H1SH	i	H2SH	i	H3SH	i	H4SH	i	B2SH	i	B3SH	i	B4SH
1.25	13.000	6.3	1.800	22.4	0.320	100	0.020	5	3.500	12.5	0.950	80	0.110
1.4	12.000	7.1	1.600	25	0.310	112	0.015	5.6	2.800	14	0.850	90	0.100
1.6	10.000	8	1.400	28	0.270	125	0.012	6.3	2.400	16	0.800	100	0.090
1.8	8.500	9	1.100	31.5	0.230	140	0.009	7.1	1.900	18	0.750	112	0.080
2	8.000	10	0.890	35.5	0.190	160	0.007	8	1.600	20	0.700	125	0.070
2.24	7.000	11.2	0.740	40	0.170	180	0.004	9	1.350	22.4	0.650	140	0.060
2.5	6.500	12.5	0.630	45	0.160	200	0.002	10	1.200	25	0.550	160	0.050
2.8	6.000	14	0.530	50	0.110	224	0	11.2	1.100	28	0.450	180	0.040
3.15	3.500	16	0.450	56	0.080	250	0	12.5	0.950	31.5	0.380	200	0.030
3.55	3.300	18	0.370	63	0.050	280	0	14	0.850	35.5	0.330	224	0.020
4	2.900	20	0.330	71	0.045	315	0	16	0.800	40	0.300	250	0.010
4.5	2.100	22.4	0.320	80	0.040	355	0	18	0.750	45	0.270	280	0
5	1.600	25	0.310	90	0.035	400	0			50	0.200	315	0
5.6	1.600	28	0.270	100	0.020	450	0			56	0.150	355	0
				112	0.015					63	0.130	400	0
										71	0.120		
										80	0.110		
										90	0.100		

Note: Gear units installed in open field will avoid direct sunshine by equiping a shelter.

Permissible Additional Radial Forces on Output Shaft:

Permissible Additional Radial Forces on Output Shaft d2





Permissible direction of force

Permissible additional radial forces F_{R2} in kN with application of force on centre of shaft end

Type	Design	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
H1SH	A / B	*	—	*	—	*	—	*	—	*	—	*	—	*	—	*	—
H2S.	A / B / G / H	—	10	22	22	30	30	30	45	64	64	150	150	140	205	205	205
	C / D	—	10	13	13	18	18	10	28	35	35	112	112	85	135	135	135
H3S.	A / B / G / H	—	—	29	29	40	40	40	60	85	85	190	190	185	265	265	265
	C / D	—	—	18	18	26	26	18	40	50	50	150	150	120	185	185	190
H4S.	A / B	—	—	—	—	26	26	18	40	50	50	150	150	120	185	185	190
	C / D	—	—	—	—	40	40	40	60	85	85	190	190	185	265	265	265
B2S.	A / C	—	13	27	27	37	37	38	55	78	78	160	160	150	210	210	210
	B / D	—	12	15	15	17	17	10	30	35	38	110	110	75	145	100	100
B3S.	A / C	—	14	29	29	40	40	40	60	85	85	190	190	185	265	265	265
	B / D	—	9	18	18	26	26	18	40	50	50	150	150	120	185	185	190
B4S.	A / C	—	—	29	29	40	40	40	60	85	85	190	190	185	265	265	265
	B / D	—	—	18	18	26	26	18	40	50	50	150	150	120	185	185	190

Note: 1)Values in tables are minimum values. If the angle of application of force and the direction of rotation are given, significantly higher additional forces can mostly be allowed. Please consult us.

2)* On request.

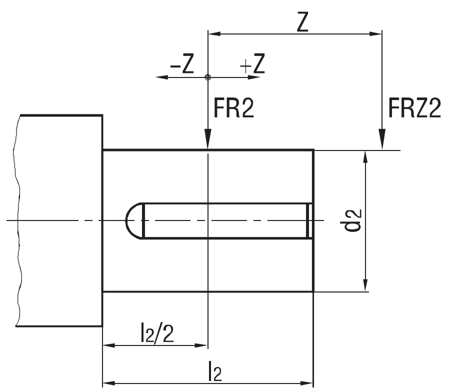
3)**For application of force outside the centre of the shaft end, see P216.

4)Use foundation bolts of min. property class 8.8.Foundation must be dry and grease-free.Permissible additional radial forces on input shaft d1 on request.

Permissible Additional Radial Forces on Output Shaft d2

Application of force outside the centre of the shaft end

$F_{RZ2} = F_{R2} \times k$



F_{RZ2} Permissible external radial force

F_{R2} Permissible additional radial force acc. to table

k Factor of application of force acc. to table

Size	Distance z (mm)														
	- 200	- 150	- 100	- 75	- 50	- 25	0	25	50	75	100	150	200	250	300
3					1.21	1.09	1.00	0.85	0.74	0.65	0.58	0.48			
4					1.17	1.08	1.00	0.86	0.76	0.68	0.62	0.52	0.44		
5、6				1.22	1.14	1.06	1.00	0.88	0.79	0.72	0.66	0.56	0.49	0.43	
7、8				1.19	1.12	1.06	1.00	0.89	0.81	0.74	0.68	0.58	0.51	0.46	0.41
9、10			1.22	1.15	1.10	1.05	1.00	0.90	0.82	0.76	0.70	0.61	0.54	0.48	0.44
11、12			1.18	1.13	1.08	1.04	1.00	0.91	0.84	0.78	0.73	0.64	0.57	0.51	0.47
13、14		1.24	1.15	1.11	1.07	1.03	1.00	0.92	0.86	0.80	0.75	0.67	0.60	0.55	0.50
15、16		1.20	1.12	1.09	1.06	1.03	1.00	0.93	0.87	0.82	0.77	0.69	0.63	0.58	0.53
17、18	1.25	1.17	1.11	1.08	1.05	1.03	1.00	0.94	0.88	0.84	0.79	0.72	0.66	0.60	0.56

Factor of application of force k