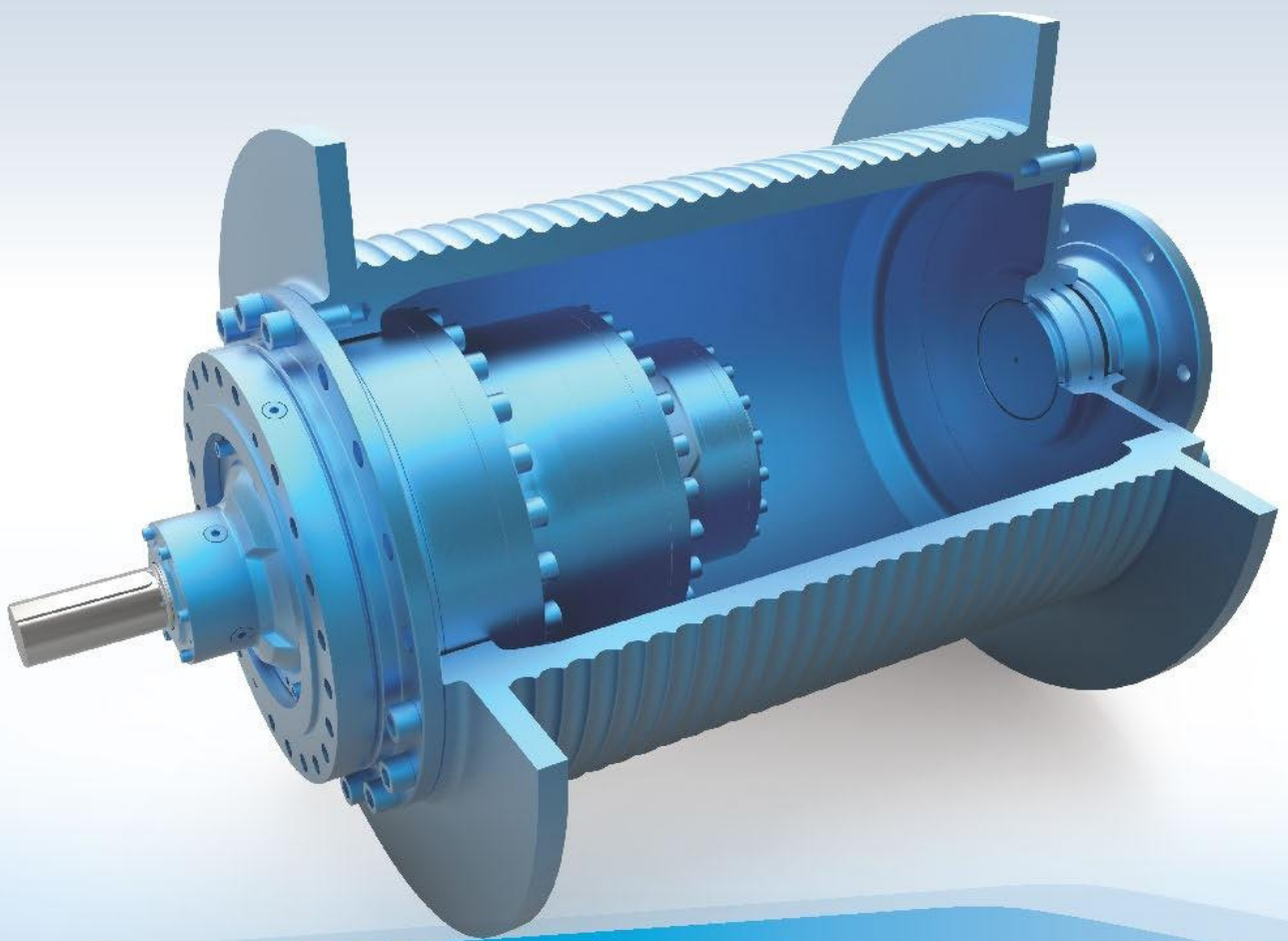
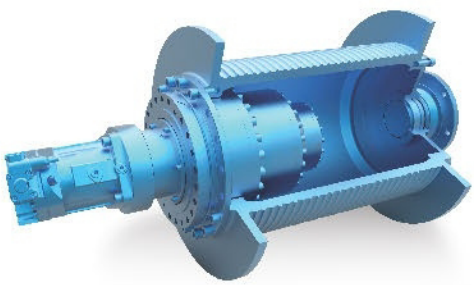


PW Winch Gear Unit

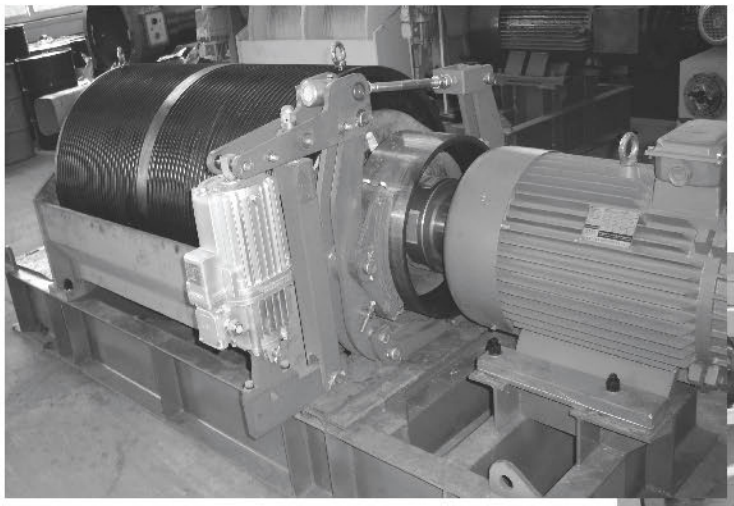
03 / 2016

PW winch gear unit



- PW winch gear unit is the perfect driven device for hoisting winches. Compact dimensions is useful to assemble the PW winch gear unit in the drum and save the space. Especially in the confined space conditions, it is the economic solutions. Boneng PW winch gear units have proved highly successful under extreme bad operating conditions.
- Sun and planet wheels material is excellent alloy steel and processed by carburization and quenching. Internal gear wheel material is excellent alloy steel and processed by hardening. All gears are ground.
- The connection flange of planet carrier and internal gear wheel are made of ductile graphite iron. Optimal design through the computer and the stress analysis.
- All bearings are from famous brand. The bearings have high loading support and safety.
- The input and output are protected with radial shaft seals and V type seals. Viton material improves the seal life.
- High modular design. Volume production is more economic and speeds up the delivery period.
- 2 stage, 3 stage and 4 stage design and wide range of ratio.
- Low noise, high efficiency and long operation life.
- Easy mounting and maintenance.

ISO9001



Harbour and dockyard cranes

Mobile cranes

Construction cranes and conveyors

Material and working elevators

Shipboard and deck cranes

Container gantries

Crawling crane

Offshore cranes

Boneng gear units are modular design, gears use components common to our complete range giving the advantage of volume production, cost savings from standard parts and reducing lead times. High standard producing through the whole range makes sure the excellent loading and safety.

Note: You must conform to the following instructions

- All the construction figures, dimension drawings and other drawings in the catalogue are only the examples, no strict scale defined. (All unit is mm)
- The marked weight is only the average value, no binding.
- To avoid the accident, all the rotation components should be covered by customer according to the local safe rules.
- Read the instructions carefully before operating.
- Fill the lubrication oil before running.
- The oil quantity in the operation is only for reference. The actual oil value should be done as the oil glass level.
- The adhesiveness of lubrication is depended on the operating condition and the ambient temperature.
- Only choose the international famous brand lubrication oil.

The functional label of gear unit

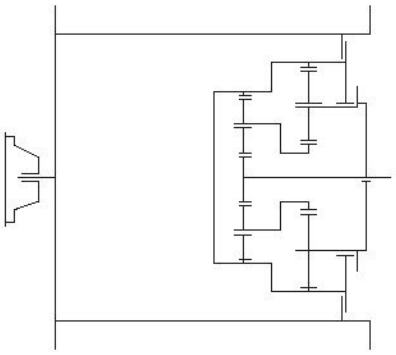

Oil glass


Breather


Oil inlet

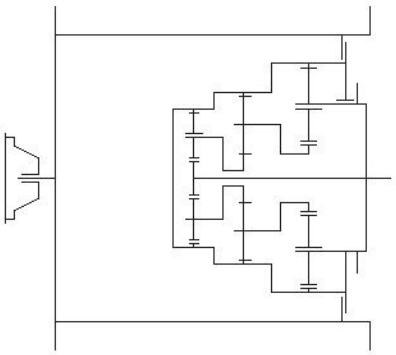

Oil outlet

Contents



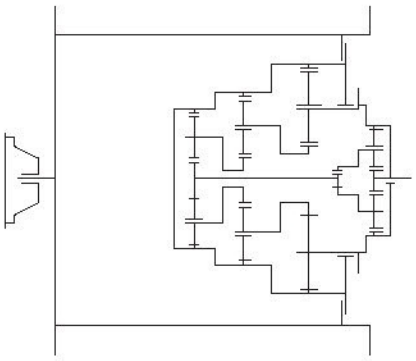
2 stage planetary gearbox

Output torques: 11.6 to 155 KN.m
Rope load: 67 to 408KN
Ratio from i=13 to 28
Gear unit mounted inside winch drum.
Input and output in opposite sense of rotation



3 stage planetary gearbox

Output torques: 25 to 236 KN.m
Rope load: 116 to 566 KN
Ratio from i=45 to 141
Gear unit mounted inside winch drum.
Input and output in opposite sense of rotation



4 stage planetary gearbox

Output torques: 47 to 1500 KN.m
Rope load: 180 to 1950 KN
Ratio from i=167 to 940
Gear unit mounted inside winch drum.
Input and output in opposite sense of rotation

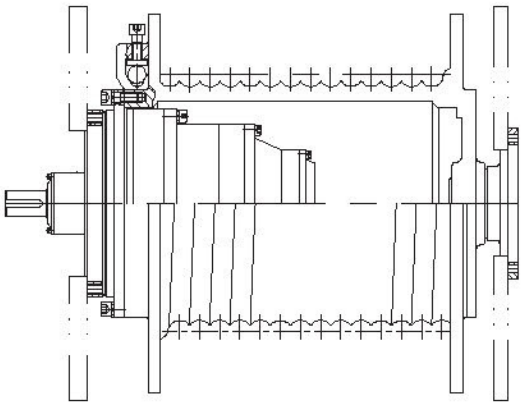
Remark: Mechanical efficiency of every stage is 98%, bearings for rope drum and the seal rings mechanical efficiency is 99%
For example: the total mechanical efficiency for 2 stage winch planetary gear unit $\eta = 0.98 \times 0.98 \times 0.99 = 0.95$

2 Type description

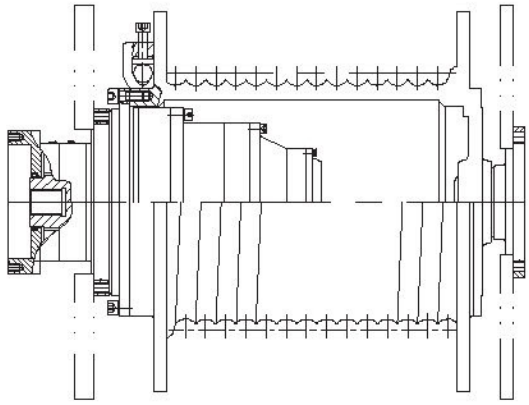
PW 3 27 — 90 — H + UV32 — V1

- Gear box type
  PW
- Planetary gear transmit stage
  2/3/4 stage
- Size
- Nominal ratio
- Input part
  H—hydraulic motor input
  Shaft (motor) input without mark
- Accessories and special request
- Version Number
  (technical update)

3 Input mode



Motor input foot mounted



Hydraulic motor input，foot mounted

Pw with electric motor input and hydraulic motor input.

If hydraulic motor input, input shaft material is DIN 5480 involute splines, equipped with the hydraulic pressure release and loose-spring multi disc brake parking system. This fail safe device is a self contained piston/brake with release pressure of 15 bar, 300 bar max. line transient pressure of 0.5 bar permitted.

Remark: PW complete range can be equipped with kinds of motors, such as high speed motor (one, two or three drive units), cycloidal motor, low speed with big torque motor etc, can meet customer' s different demand. For details, please consult Boneng.

4 Integrated Rope Drum

4.1 Drum categories:

1) Drum with normal grooves (figure 1) and with special grooves (figure 2).
2) Rope groove has right hand lead and left hand. The default lead is right hand (figure 1).
3) Drum with special grooves can avoid the difficulties encountered in multi-layer winding on to grooves of the usual kind. As the crossover points of the rope in each layer always lie in the same section of the drum and the lift of the rope into the next layer is precisely defined. 8 and more layers can be accommodated without difficulty.

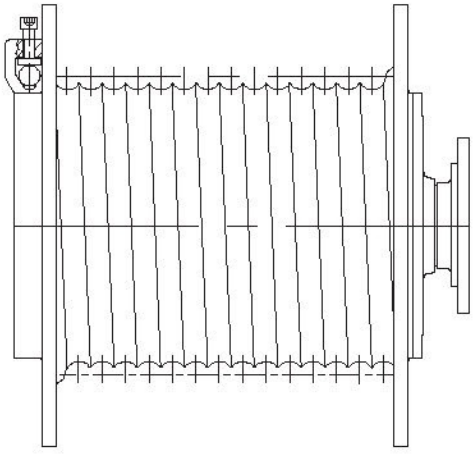


Figure 1

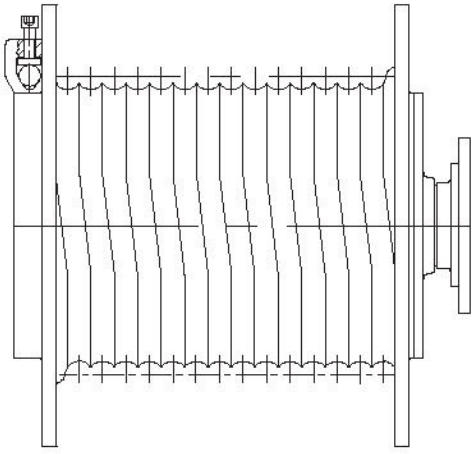


Figure 2

4.2 Rope fixing: on the outside of the drum flange

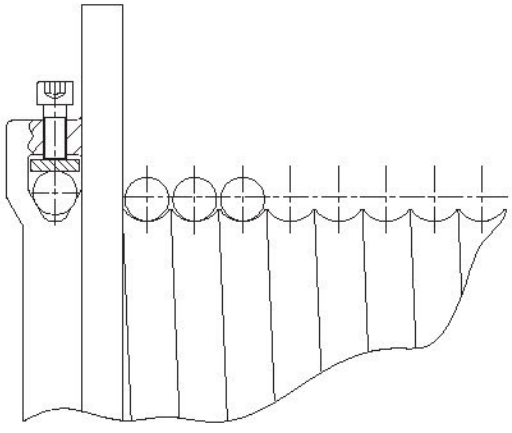


Figure 3

4.3 To achieve acceptable rope winding, the deflection angle α must be kept in the allowable value (figure 4)
Attent followings:

1) Rope lay should be in the opposite sense to drum lead.
2) The deflection angle α must with special grooves be not less than 0,5° in order to prevent the rope from riding up the drum flange and to ensure that it is guided securely on to the next layer.
3) The deflection angle α must not exceed 1,5° in order to prevent the rope in the first layer being pulled against the grooves and, where a number of layers occur, to enable even winding up to the drum flanges.

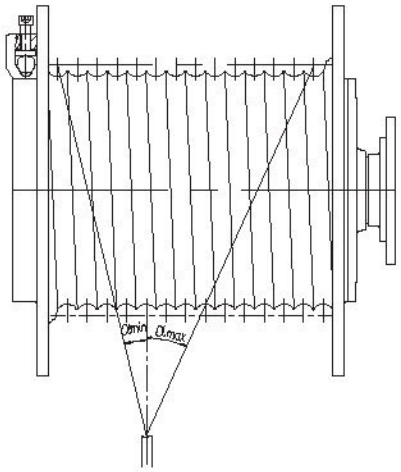


Figure 4

4.4 The computing formula between drum and rope (figure 5):
Rope drum diameter D1= 20 x d or as specified
Drum flange diameter D2= D1 + 2 (Z + 1) d
Length of rope (including 3 safety turns)

$$Ls = \left(\frac{L2}{P} - a\right)(D1 + 0.866 * d\ (z-1))\ \frac{z * \pi}{1000}$$

LS =(L2/P ▮ a)(D1 + 0,866* d (z–1)) z * π/100
LS = Length of rope [m]
L2 = Length of drum [mm]
D1 = Diameter of drum [mm]
d = Diameter of rope [mm]
p = Pitch of rope groove [mm]
z = Number of rope layers
a = 1 for normal grooves , a= 0,5 for special grooves

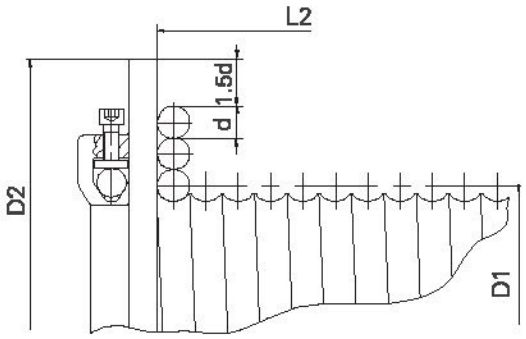


Figure 5

5 valve explanation

According to different working condition, the drive motor should be equipped with the valve to make sure the hoisting winch running safely.
There are two different valves:
One is the motor integrated valve with open hydraulic system. The valve can control the load while it is descending, lighten the pressure and opening the brake automatically..
Another is the tube explosion-proof valve with close hydraulic system. The valve can lock the motor when the tube is exploded and prevent the fail save motor.

5.1The motor integrated valve with open hydraulic system

The motor integrated valve is the standard valve for the hoisting winch drive, we suggest the customer to use the valve in advance. If customer need only use one of the valve function, it should be customized.

5.1.1 Motor integrated valve

The motor integrated valve can lighten the pressure, control the load and open the integrated motor brake automatically. Valve working principle drawing: the balance valve is on the oil port B side of motor (figure 6), the balance valve is on the oil port A side of motor (figure 7).
When filling the oil on motor A side and pull the rope, should select the valve as figure 6; When filling the oil on motor B side and pull the rope, should select the valve as figure 7.

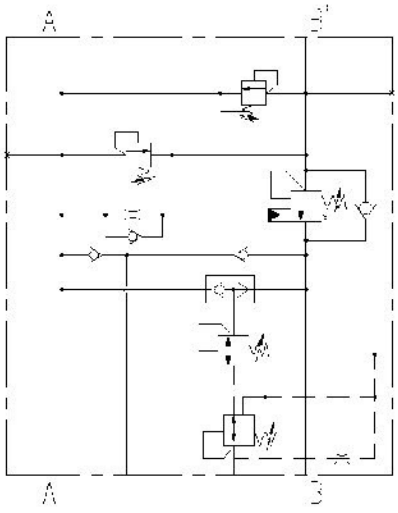


Figure 6 motor integrated valve

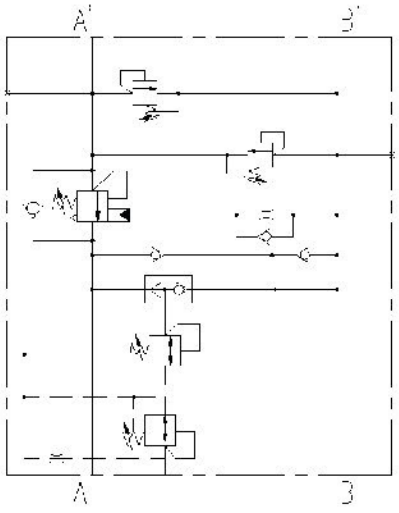


Figure 7 motor integrated valve

Valve function:

1) When the hoisting winch is operating with negative loading, we should mount the balance valve on the motor to prevent the hoisting winch from stalled glide and keep the stable operating.
2) When the rope pulling force is changing and the load is unstable, it will cause the hydraulic pressure wave and there is the higher pressure, we should mount the cushion valve to release the pressure to prevent the hydraulic system damaged.
3) Brake is mounted to prevent the hoisting winch from slipping when the hoisting winch stops running and is locked well. The brake in the motor integrated valve can open automatically when the hoisting winch is operating and will close automatically when the hoisting winch is stopping.

Remark: the balance valve mounting position is very important. How to confirm the mounting position is on the A side or B side of motor, you can refer to the winding direction on the rope drums.

5.2The motor integrated valve with close hydraulic system

The close hydraulic system can achieve the hydrostatic brake through the hydraulic pump, and motor can absorb the brake torque, usually balance valve is not suggested to keep from the hydraulic oil temperature too high. If customer has this special demand, the technical testing should be done.

5.2.1 The tube explosion-proof valve

To ensure the correct using hoisting winch, we suggest customer to use the tube explosion-proof valve. It can cut off the returned oil port of motor when the hydraulic tube is split. The counter pressure of the returned oil port will make the dynamic brake on the motor to prevent the hoisting winch from slipping.
The tube explosion-proof valve working principle drawing: the tube explosion-proof valve is on the oil port A side of motor (figure 8), the tube explosion-proof valve is on the oil port B side of motor (figure 9).

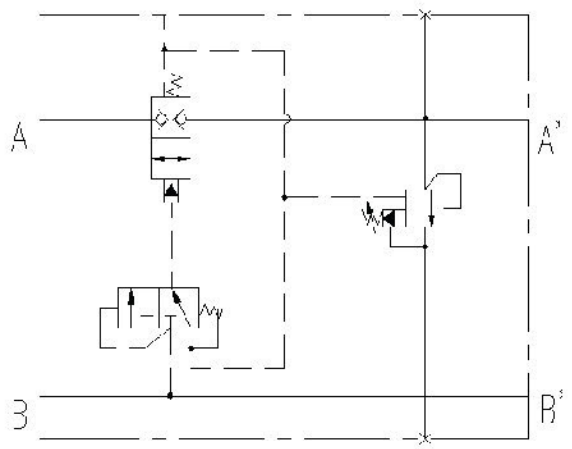


Figure 8 The tube explosion-proof valve

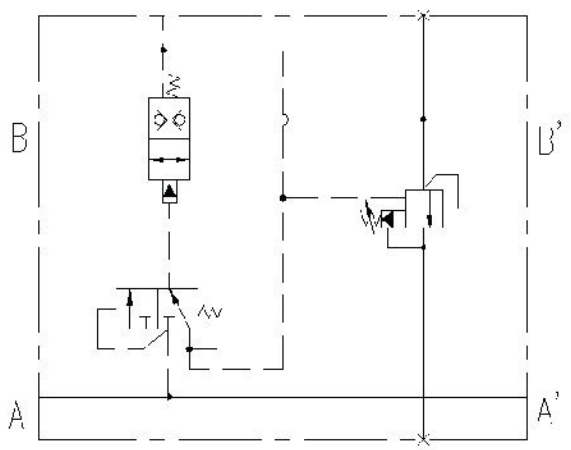
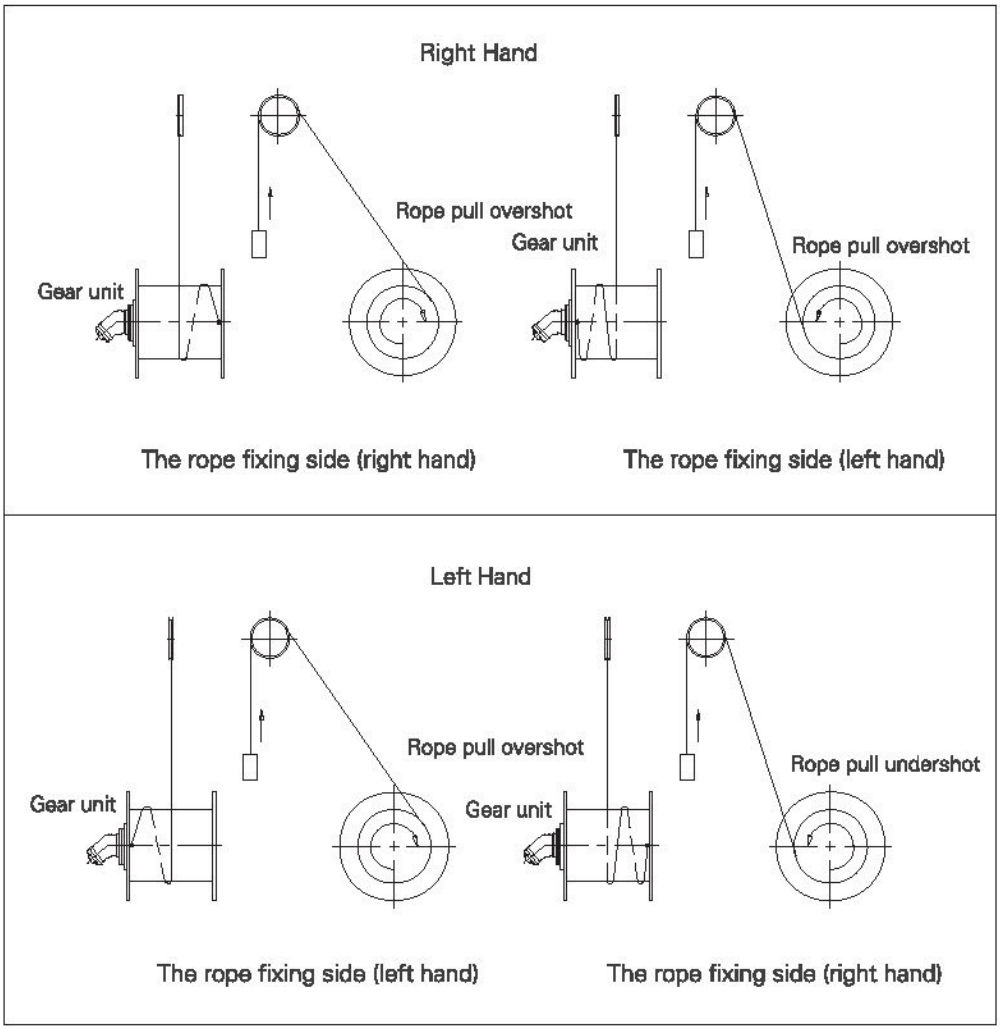


Figure 9 The tube explosion-proof valve

When filling the oil on motor B side and pull the rope, should select the valve as figure 8;
When filling the oil on motor A side and pull the rope, should select the valve as figure 9.

Remark: the tube explosion-proof valve mounting position is very important. How to confirm the mounting position is on the A side or B side of motor, you can refer to the winding direction on the rope drums.

5.3 Winding direction on the rope drums.



Rope direction	Rope groove lead	Rope pull mode	Gear unit output	Gear unit input	Motor rotation	Motor inlet oil port	Balance valve/ explosion-proof valve mounting position
Draw rope	Right hand	overshot	CW	CCW	CW	A□ (B□)	A□ (B□)
	Right hand	undershot	CCW	CW	CCW	B□ (A□)	B□ (A□)
	Left hand	undershot	CW	CCW	CW	A□ (B□)	A□ (B□)
	Left hand	undershot	CCW	CW	CCW	B□ (A□)	B□ (A□)
Release rope	Right hand	overshot	CCW	CW	CCW	B□ (A□)	A□ (B□)
	Right hand	undershot	CW	CCW	CW	A□ (B□)	B□ (A□)
	Left hand	overshot	CCW	CW	CCW	B□ (A□)	A□ (B□)
	Left hand	undershot	CW	CCW	CW	A□ (B□)	B□ (A□)

Remark: 1) Gear unit output and input direction in above table: when facing the gear unit input shaft.

2) The motor rotation in above table: when facing the motor output shaft.

3) The drum rotation: When facing the gear unit input shaft, the gear unit output shaft rotation is the drum rotation.

6 Type selection explanation

6.1Operation Instruction

PW rated dynamic output torques Tdyn max are based on FEM Standards 1/3rd edition (FEM – Federation Europeenne de la Manutention). Drive unit group M5, load conditions L2 (P=constant, =15rpm), running time classification T5. Ambient temperature +20 C° .

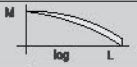
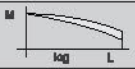
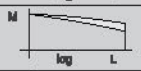
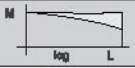
If the hoisting winch is classified others, the output torque must be multiplied by the factor K.

T_2: output torque (N.m)
Fnom: rope load (N)
Dw: rope strands diameter (m)

$$T_2 = \frac{Fnom^* Dw}{2}$$

T_{2k}: output torque with multiplied factor K (N.m)
K: application factor (the relative factor for drive unit group and load conditions)
$T_{2k} = T_2 \cdot K$
Note: $T_{2k} \leqslant T_{dyn\ max}$ (designed torque or sample torque)

6.2Application factor K (running time classification and load conditions)

Running time classification	Symbol	T2	T3	T4	T5	T6	T7	T8
	Mean running time per day in hours, related to one yea	0.25to0.5	0.5to1	1to2	2to4	4to8	8to16	Over16
	Life in hours 8 years,200 days/year	400 to 800	800 to 1600	1600 to 3200	3200 to 6300	6300 to 12500	12500 to 25000	25000 to 50000
Load conditions	Collective coefficient Km	Drive unit class Application Factor K						
L1	 To 0.125	M1 0.90	M2 0.90	M3 0.90	M4 0.92	M5 0.92	M6 1.1	M7 1.36
L2	 0.125 to 0.250	M2 0.90	M3 0.92	M4 0.96	M5 1	M6 1.07	M7 1.3	M8 1.6
L3	 0.250 to 0.500	M3 1.05	M4 1.09	M5 1.17	M6 1.23	M7 1.28	M8 1.53	M8 1.89
L4	 0.500 to 1.000	M4 1.32	M5 1.36	M6 1.46	M7 1.53	M8 1.58	M8 1.8	M8 2.22

6.3he load spectrum for the Crane (figure 10)

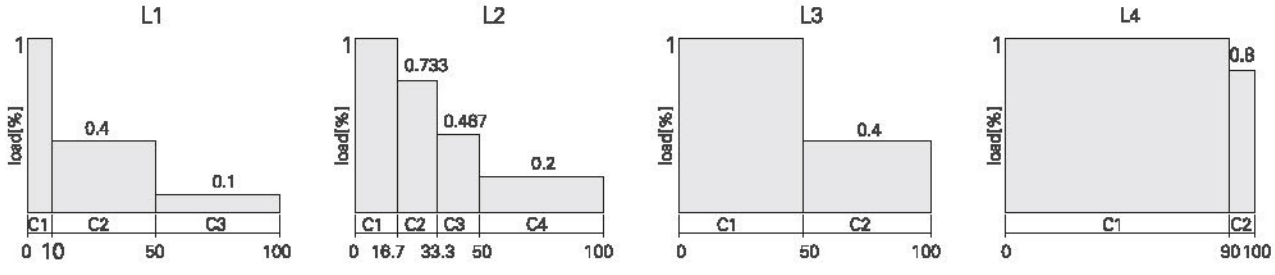


Figure 10 Crane load spectrum

6.4Classification Guidance According FEM section I, 3rd edition, table T.2.1.3.5

Type of Crane (name)	Working accessories	Type of mechanism				
		Hoisting	Slewing	Luffing	Traverse	Travel
Erection cranes		M2-M3	M2-M3	M1-M2	M1-M2	M2-M3
Stocking and reclaiming transporters	Hook duty	M5-M6	M4	-	M4-M5	M5-M6
Stocking and reclaiming transporters	Grab or magnet	M7-M8	M6	-	M6-M7	M7-M8
Workshop cranes	Grab or magnet	M6	M4	-	M4	M5
Overhead travelling cranes, pigbreaking cranes, scrapyard cranes	Hook or magnet	M8	M6	-	M6-M7	M7-M8
Bridge cranes for unloading, bridge cranes for containers	Hook	M6-M7	M5-M6	M3-M4	M6-M7	M4-M5
Other bridge cranes, (with crab and/or slewing jib crane)	Grab or magnet	M4-M5	M4-M5	-	M4-M5	M4-M5
Bridge cranes for unloading, bridge cranes, (with crab and/or slewing jib crane)	Hook	M8	M5-M6	M3-M4	M7-M8	M4-M5
Drydock cranes, shipyard jib cranes, jib cranes for dismantling		M5-M6	M4-M5	M4-M5	M4-M5	M5-M6
Dockside cranes (slewing, on gantry, etc.), floating cranes and pontoon derricks	Hook duty	M6-M7	M5-M6	M5-M6	-	M3-M4
Dockside cranes (slewing, on gantry, etc.), floating cranes and pontoon derricks	Grab or magnet	M7-M8	M6-M7	M6-M7	-	M4-M5
Floating cranes and pontoon derricks for very heavy loads (usually greater than 100 t)		M3-M4	M3-M4	M3-M4	-	-
Deck cranes	Hook	M4	M3-M4	M3-M4	M2	M3
Deck cranes	Grab or magnet	M5-M6	M3-M4	M3-M4	M4-M5	M3-M4
Tower cranes for building		M4	M5	M4	M3	M3
Derricks		M2-M3	M1-M2	M1-M2	-	-
Railway cranes allowed to run in train		M3-M4	M2-M3	M2-M3	-	-
Mobile cranes	Hook	M3-M4	M3-M4	M2-M3	-	-

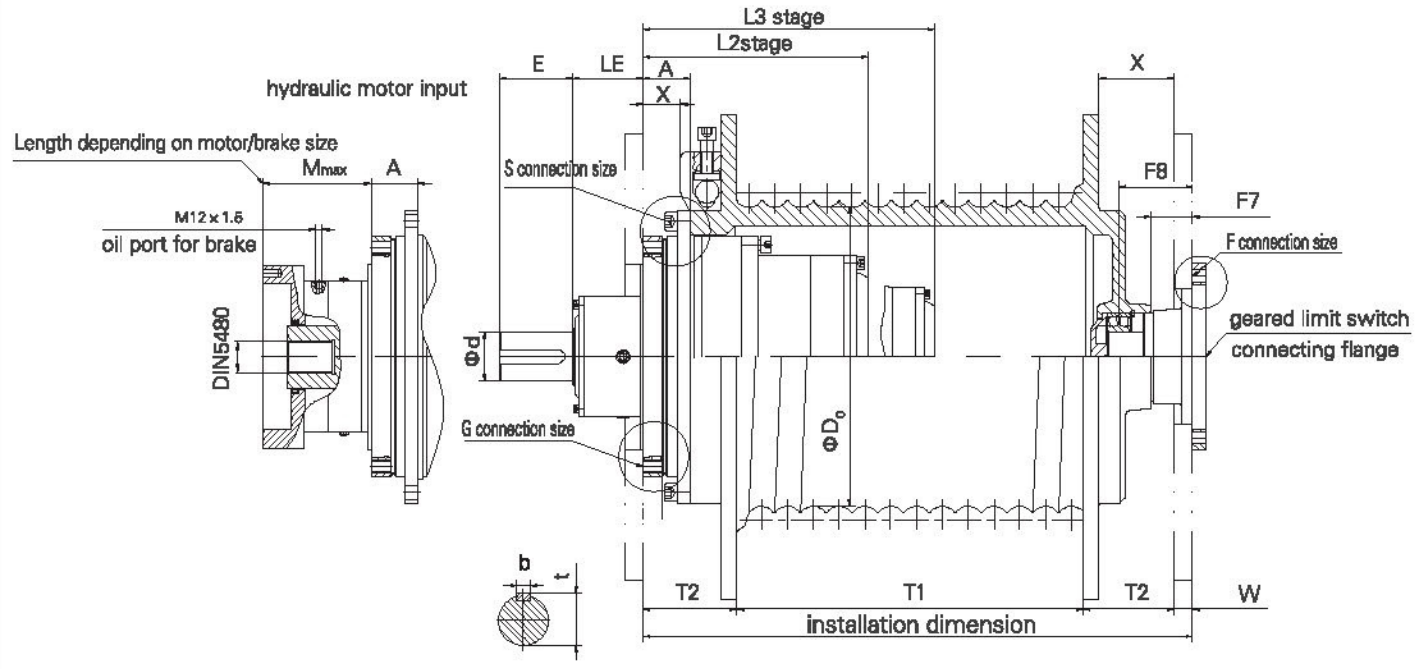
Note: Above are only some typical applications for hoisting winch.

7 Transmission capacity

Nominal ratio	Exact ratoio	type PW	20	22	24	25	26	27	29	31	32	33	34	36	38	40
1_N	1_{ex}	T dynamic kN • m	11.6	19.4	25.5	36	48	63	105	155	236	311	406	644	1100	1500
		T static kN • m	18.5	31	41	57.5	77	101	168	248	377.5	497.5	649.5	1030.5	1760	2400
13	13.11	2 stage					☆	☆	☆	☆						
15	15.14						☆	☆	☆	☆						
18	18.22						☆	☆	☆	☆						
20	20.45						☆	☆	☆	☆						
23	23.47						☆	☆	☆	☆						
28	27.79						☆	☆	☆	☆						
45	44.97	3 stage					☆	☆	☆	☆	☆					
52	51.56						☆	☆	☆	☆	☆					
59	59.10						☆	☆	☆	☆	☆					
71	70.57						☆	☆	☆	☆	☆					
79	78.88						☆	☆	☆	☆	☆					
84	84.23						☆	☆	☆	☆	☆					
90	90.13						☆	☆	☆	☆	☆					
105	105.18						☆	☆	☆	☆	☆					
120	120.13						☆	☆	☆	☆	☆					
141	141.49						☆	☆	☆	☆	☆					
167	167.48	4 stage					☆	☆	☆	☆						
192	192.03						☆	☆	☆	☆	☆					
220	220.1						☆	☆	☆	☆	☆					
262	262.1						☆	☆	☆	☆	☆					
273	273.16						☆	☆	☆	☆	☆					
293	292.54						☆	☆	☆	☆	☆					
313	312.95						☆	☆	☆	☆	☆					
334	333.74						☆	☆	☆	☆	☆					
349	349.31						☆	☆	☆	☆	☆					
374	373.52						☆	☆	☆	☆	☆					
393	392.59						☆	☆	☆	☆	☆					
417	416.91						☆	☆	☆	☆	☆					
445	445.46						☆	☆	☆	☆	☆					
476	475.62						☆	☆	☆	☆	☆					
509	508.98						☆	☆	☆	☆	☆					
532	531.54						☆	☆	☆	☆	☆					
559	559.49						☆	☆	☆	☆	☆					
594	593.94						☆	☆	☆	☆	☆					
625	625.27						☆	☆	☆	☆	☆					
678	678.38						☆	☆	☆	☆	☆					
699	698.68						☆	☆	☆	☆	☆					
798	798						☆	☆	☆	☆	☆					
841	841.37						☆	☆	☆	☆	☆					
940	939.89						☆	☆	☆	☆	☆					

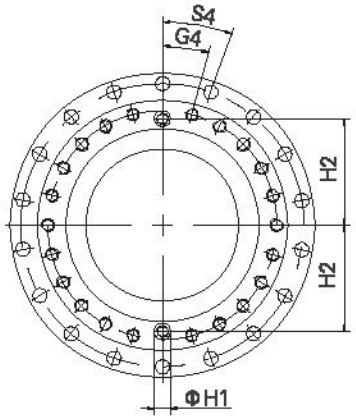
Note: No slowdown than please contact!

8 Dimension Drawing

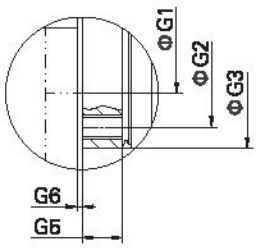


Type	Nominal Gear unit ratings Output torque (KN.m)			G Flange connection 10.9 Gear unit to frame bolts class 0.9						S Flange connection 8.8 Gear unit to drum Bolts class 8.8						F Flange connection 8.8 Drum flange to frame bolts class 8.8							
	T动态 单线	T静态 最大	单线 拉力	G1	G2	G3	G4	G5	G6	S1	S2	S3	S4	S5	S6	F1	F2	F3	F4	F5	F6	F7	F8
PW	Tdyn max	Tstatic max	Fnom KN	Location	Pitch diameter	outer diameter	fixing			Location	Pitch diameter	outer diameter	fixing			Location	Pitch diameter	outer diameter	fixing				
20	11.6	18.5	69	Please contact																			
22	19.4	31	98																				
24	25.5	41	119																				
25	36	57.5	147																				
26	48	77	184	330h7	390 ± 0.2	425	15° 22*M20	30	5	440h7	480 ± 0.2	520	15° 24*φ22	20	9	260h7	310 ± 0.2	360	60° 6*φ22	25	15	50	92
27	63	101	220	355h7	420 ± 0.2	460	15° 22*M24	38	5	470h7	520 ± 0.2	560	20° 18*φ26	24	9	260h7	310 ± 0.2	360	60° 6*φ22	25	15	50	92
29	105	168	313	430h7	480 ± 0.2	530	15° 22*M24	38	5	550h7	590 ± 0.2	630	15° 24*φ26	24	9	300h7	350 ± 0.2	400	60° 6*φ22	30	15	50	104
31	155	248	408	515h7	565 ± 0.2	615	15° 24*M30	47	5	640h7	690 ± 0.2	750	15° 24*φ33	30	9	325h7	375 ± 0.2	425	60° 6*φ26	35	15	70	134
32	236	377.5	566	580h7	630 ± 0.2	680	15° 24*M30	47	5	700h7	755 ± 0.2	815	15° 24*φ33	30	9	325h7	375 ± 0.2	425	60° 6*φ26	35	15	70	134
33	311	497.5	660	Please contact																			
34	406	649.5	787																				
36	644	1030.5	1073																				
38	1100	1760	1520																				
40	1500	2400	1950																				

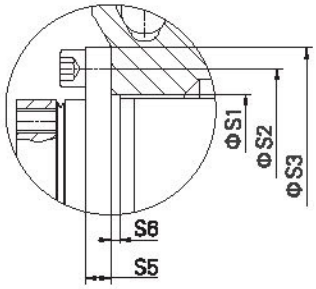
备注： 未注尺寸请垂询



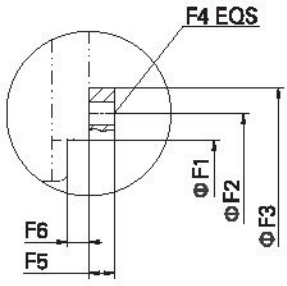
G Flange connection



S Flange connection



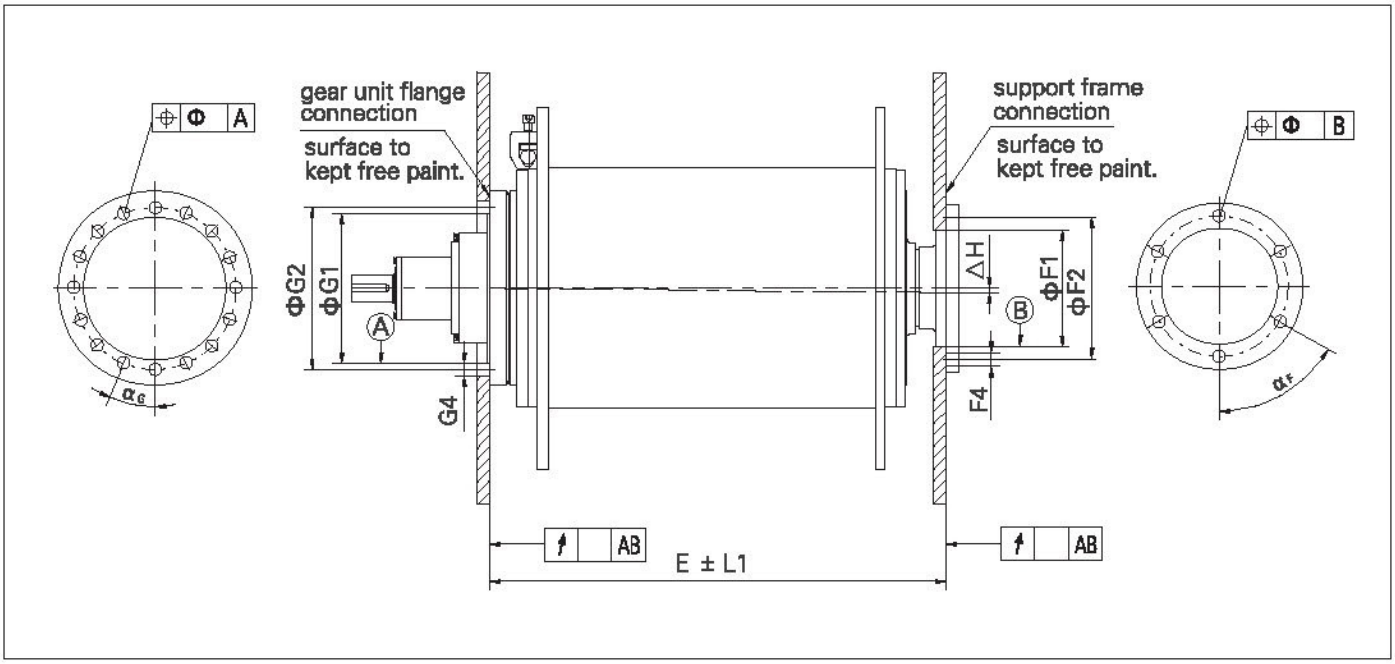
F Flange connection



installation dimension																									图号
shaft (motor) input									Maximit motor input Mmax	A	L		T1min		D_0 Approx min	X min	T2	W suggestion	oil pump connection		weight (kg)			PM
2 stage			3 stage			4 stage					2 stage L2	3 stage L3	2 stage	3 stage					H1	H2	2 stage	3 stage	4 stage	
d	E	LE	d	E	LE	d	E	LE																	
Please contact																									20
																									22
																									24
																									25
95m6	170	139.5	65m6	140	104.5	65m6	140	238	209	75	426	555	355	480	520	20	120	20	30	184	365	385	415	26
95m6	170	135	65m6	140	100	65m6	140	233.5	204	90	431	560	345	475	570	20	140	20	30	195.5	400	415	445	27
110m6	210	165	95m6	170	165	75m6	140	281	209	90	507	685	420	595	670	25	145	25	30	233	630	720	730	29
110m6	210	142	95m6	170	142	75m6	140	258	186	110	530	708	425	600	770	30	180	30	38	235	805	890	920	31
——	——	——	110m6	210	130	75m6	140	251	321	110	——	800	——	695	830	30	180	30	38	268	——	1320	1360	32
Please contact																									33
																									34
																									36
																									38
																									40

9 Assemble method

To ensure correct operation of the winch, the winch gear unit must be in the same line with the frame fixing hole centers and the flange pieces square to the base plate. The relative location between frame mounting central hole and flange mounting surface shouldn't be changed more when they are operating in different environment and outer force. The working tolerance and allowed max. deflections for the support frame are given in the accompanying table.



Type PW	gear unit flange connection			support frame connection			L1	Maximum permitted deviation ΔH from the central line in relation to L1							Type PW
	⏥ AB	⌖ Φ A	α_G	⏥ AB	⌖ Φ B	α_F		250	500	750	1000	1500	2000	2500	
20	0.1	0.4	20°	0.2	0.3	60°	2	0.1	0.2	0.2	0.3	0.4			20
22	0.1	0.4	15°	0.2	0.3	60°	2		0.2	0.2	0.3	0.4			22
24	0.1	0.4	15°	0.2	0.3	60°	2			0.2	0.3	0.4	0.5		24
25	0.1	0.5	15°	0.4	0.5	60°	2			0.2	0.3	0.4	0.5		25
26	0.1	0.5	15°	0.4	0.5	60°	3			0.2	0.3	0.4	0.5		26
27	0.1	0.5	15°	0.4	0.5	60°	3				0.3	0.4	0.5		27
29	0.1	0.5	15°	0.4	0.5	60°	3				0.3	0.4	0.5		29
31	0.2	0.5	15°	0.6	0.5	60°	3				0.3	0.4	0.5		31
32	0.2	0.5	15°	0.6	0.5	60°	3				0.3	0.4	0.5	0.7	32
33	0.2	0.5	12°	0.6	0.5	60°	3				0.3	0.4	0.5	0.7	33
34	0.2	0.5	10°	0.6	0.5	60°	3				0.3	0.4	0.5	0.7	34
36	0.3	0.5	10°	0.8	0.5	60°	3				0.3	0.4	0.5	0.7	36
38	0.3	0.5	10°	0.8	0.5	30°	3					0.4	0.5	0.7	38
40	0.3	0.5	10°	0.8	0.5	30°	3					0.4	0.5	0.7	40

10 Lubrication

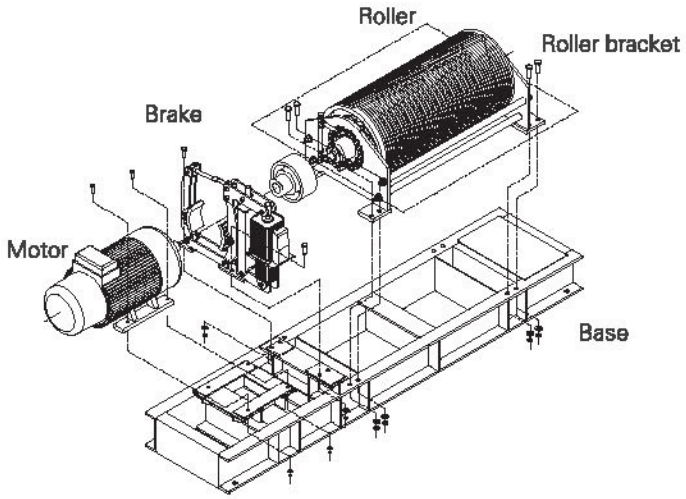
Lubrication viscosity (heavy industrial gear oil) [VG20 (Code: UV32); VG460 (Code: UV46)]

Ambient temperature℃	−20℃ ~ +40℃	+30℃ ~ +50℃
Viscosity	VG320	VG460

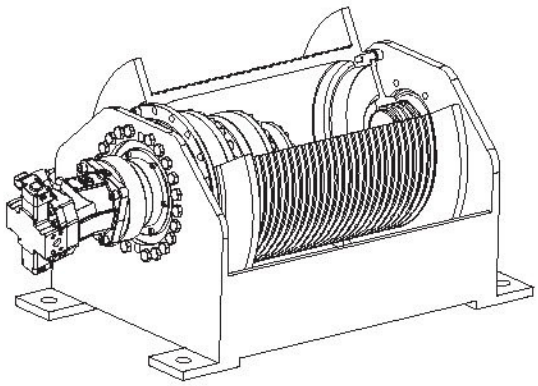
Note: 1. The bearing on the support frame is lubricated by grease.
2. Above table viscosity is only for the temperature under 40℃。
3. Ambient temperature is −10℃, must use synthetic oil.
4. To make sure the long use life, we suggest to use synthetic oil.
5. If the ambient temperature is not in the range of table, please consult BONENG.

11 Accessories (on request)

- ☐ Drum (without grooves, with normal grooves, with special grooves)
- ☐ Drum support
- ☐ Base plate
- ☐ Motor
- ☐ Hydraulic motor
- ☐ Brake
- ☐ Valve
- ☐ Encoder



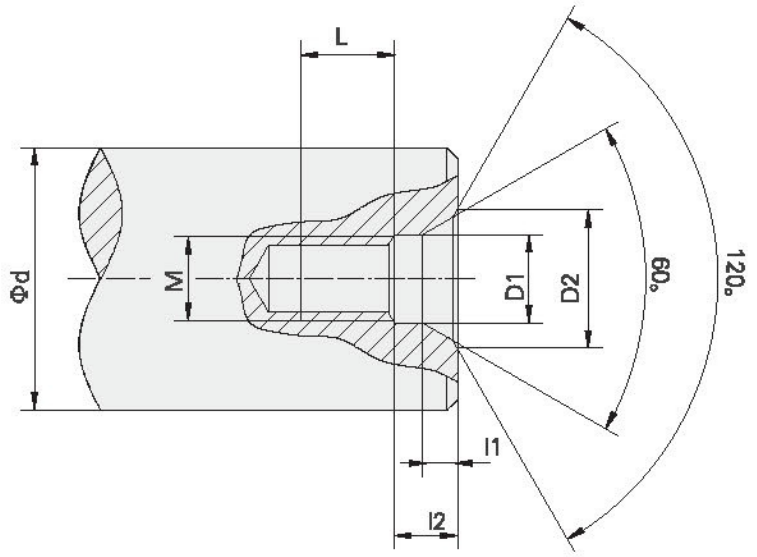
Integrated motor drive



Integrated hydraulic motor drive

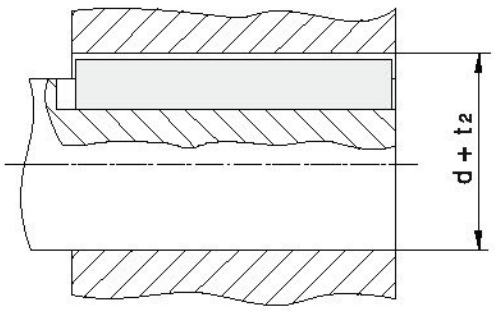
12 Shaft end central hole：

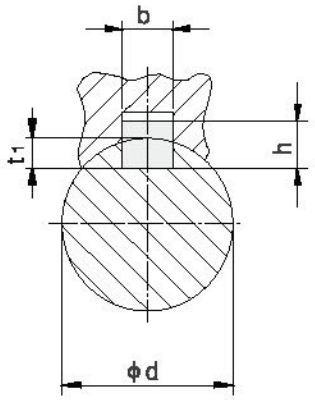
C type screw central hole



d	M	L	l2	l1	D1	D2
7< d ≤10	M3	10	2.6	1.8	3.2	5.8
10< d ≤13	M4	10	3.2	2.1	4.3	7.4
13< d ≤16	M5	10	4	2.4	5.3	8.8
16< d ≤21	M6	12	5	2.8	6.4	10.5
21< d ≤24	M8	12	6	3.3	8.4	13.2
24< d ≤30	M10	15	7.5	3.8	10.5	16.3
30< d ≤38	M12	20	9.5	4.4	13	19.8
38< d ≤50	M16	25	12	5.2	17	25.3
50< d ≤85	M20	30	15	6.4	21	31.3
85< d ≤130	M24	35	18	8	25	38
130< d ≤225	M30	45	18	11	31	48

13 Key and Keyway dimension





d	b	h	t_1	d + t_2
8< d ≤ 10	3	3	1.8	d + 1.4
10 < d ≤ 12	4	4	2.5	d + 1.8
12 < d ≤ 17	5	5	3	d + 2.3
17 < d ≤ 22	6	6	3.5	d + 2.8
22 < d ≤ 30	8	7	4	d + 3.3
30 < d ≤ 38	10	8	5	d + 3.3
38 < d ≤ 44	12	8	5	d + 3.3
44 < d ≤ 50	14	9	5.5	d + 3.8
50 < d ≤ 58	16	10	6	d + 4.3
58 < d ≤ 65	18	11	7	d + 4.4
65 < d ≤ 75	20	12	7.5	d + 4.9
75 < d ≤ 85	22	14	9	d + 5.4
85 < d ≤ 95	25	14	9	d + 5.4
95 < d ≤ 110	28	16	10	d + 6.4
110 < d ≤ 130	32	18	11	d + 7.4
130 < d ≤ 150	36	20	12	d + 8.4
150 < d ≤ 170	40	22	13	d + 9.4
170 < d ≤ 200	45	25	15	d + 10.4
200 < d ≤ 230	50	28	17	d + 11.4
230 < d ≤ 260	56	32	20	d + 12.4

14 Design data table

Company name: _____

Address: _____

Contact: _____

Tel: _____ Fax: _____

Application: _____ (e.g. Quay crane, crane, mobile crane,ship offshore harbor cranes etc.)

Used for: _____ (e.g. Hoisting, luffing, pulling winch)

Operating condition	Technical data
Line pull at drum (first rope layer)F1: [KN]	卷Diameter of rope drum: [mm] (first rope layer)
Top rope layer line pull F2: [KN]	Rope diameter d: [mm]
Max. testing loading number of rope layor F: [KN]	Drum lead: ☐ right ☐ left ☐ normal groove ☐ special groove ☐ grooveless
Rope speed with rated loading V: [m/min]	
Rope speed without loading V: [m/min]	
Rope numbers on the drum n:	
Total line pull at drum F: [KN]	Position of rope anchor: ☐ drive side ☐ opposite to drive
Rope length Ls : [mm] (including 3 safety turns)	
Ratio i	Length of drum between flanges L2: [mm]

Classify as FEM1.001---ISO4301

Drive unit group M: The load spectrum L: Running time classification T :

Drive unit

☐electric motor drive: Type: Power P: _____ [KW] Rated speed n: _____ [rpm] Starting torque MA: _____ [Nm] Breakdown torque Tk: _____ [Nm] Power on time ED: _____ [%] Starting per hour: _____	☐ hydraulic motor drive Type: Available oil flow q_v: _____ [L/min] Available differential pressure ΔP: _____ [bar] DisplacementV_g: _____ [cm^3]

Brake

Apply as ☐ parking brake	Actuation ☐ hydraulically Min. release pressure _____ [bar] Max. release pressure _____ [bar]
☐ service brake	☐ electric/ magnetic

Scope of supply (on request)

☐ gear unit ☐ hydraulic motor

☐ drum frame ☐ brake

☐ drum ☐ valve

☐ motor ☐ encoder

Remarks and special request: _____