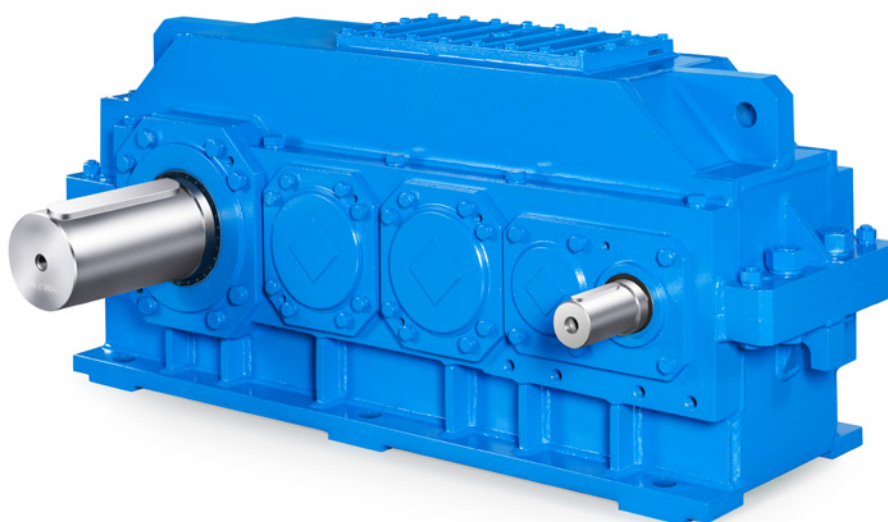


DONLY TRANSMISSION



东力齿轮箱

起重机专用齿轮箱

GEAR UNITS FOR CRANE

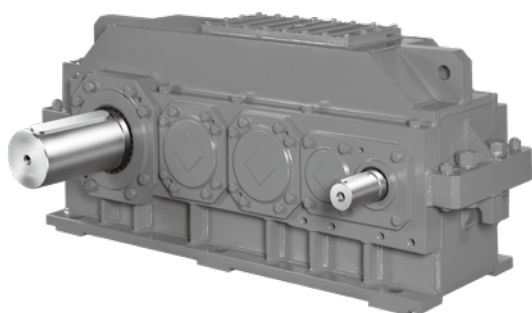
型号 Type DLHK

版本 Edition 2021

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驱动无限可能

DLHK 起重机专用齿轮箱 Gear Units For Crane



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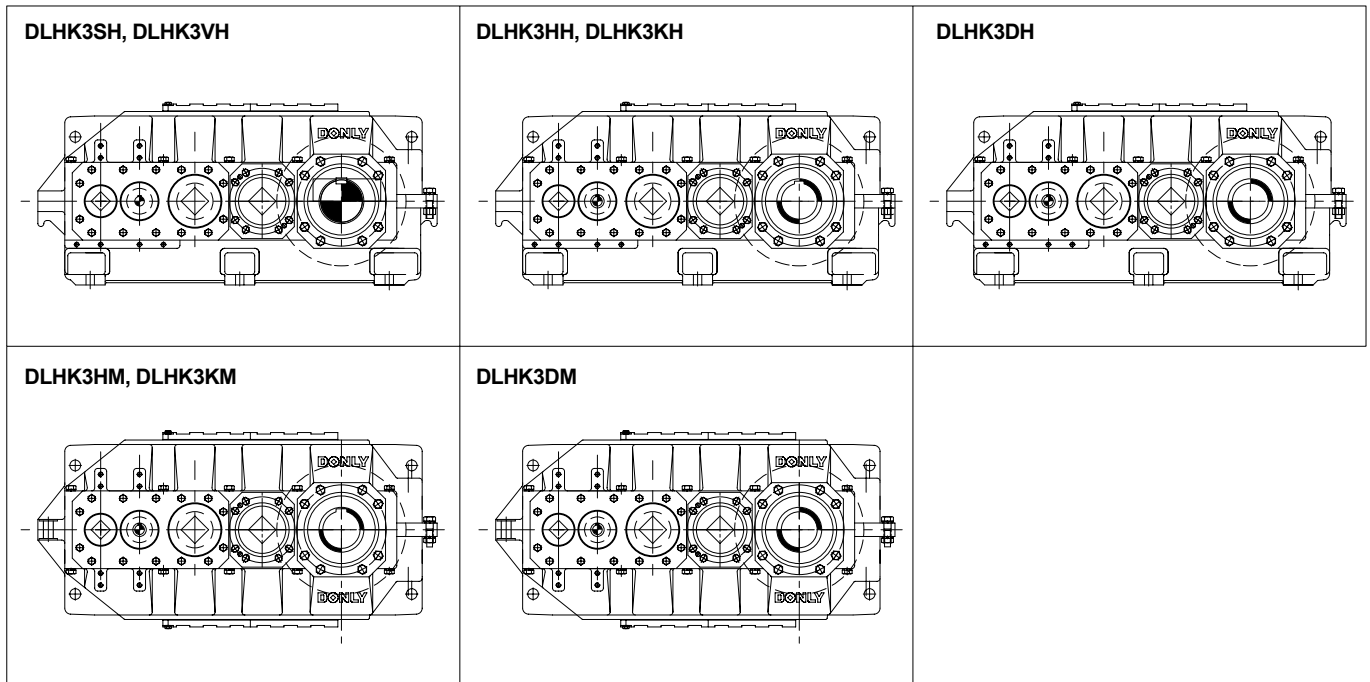
1. 产品说明 Product Description	
1.1 基本类型概述	01
Summary of basic types	
1.2 类型标记	02
Types designation	
1.3 特点	03
Product features	
1.4 一般说明	04
General information	
2. 产品选型 Project Planning	
2.1 选型指南	05
Guidelines for the selection	
2.2 符号说明	06
Key to symbols	
2.3 计算示例	07
Calculation example	
2.4 起重机服务系数	08
Service factors for crane	
2.5 额定功率	12
Nominal power ratings	
2.6 热容量	14
Thermal capacity	
2.7 额定输出扭矩	15
Nominal output torques	
2.8 输出轴 d_2 上允许附加径向力	16
Permissible additional radial forces on output shaft d_2	
3. 布置形式与外形安装尺寸 Assembly And Dimensions	
3.1 布置形式	18
Assembly	
3.2 外形安装尺寸	20
Dimensions of gear units	
4. 实际传动比与转动惯量 Actual Ratios Mass Moments Of Inertia	
4.1 实际传动比	30
Actual ratios	
4.2 转动惯量 J_1	31
Mass moments of inertia J_1	
5. 外部联接说明 External Connection Description	
5.1 电机联接	32
Motor connection	
5.2 鼓形制动器的联接尺寸	33
Connection dimensions for drum brake	
5.3 三点式箱体支撑	34
Three points supporting	

1.1 基本类型概述 起重机专用齿轮箱

类型 DLHK3..., 3 级
类型 DLHK3.H, DLHK3.M
规格 5...14
额定传动比 $i_N = 14...63$

1.1 Summary of basic types Gear units for crane

Types DLHK3..., 3-stage
Types DLHK3.H, DLHK3.M
Sizes 5...14
Nominal ratio $i_N = 14...63$

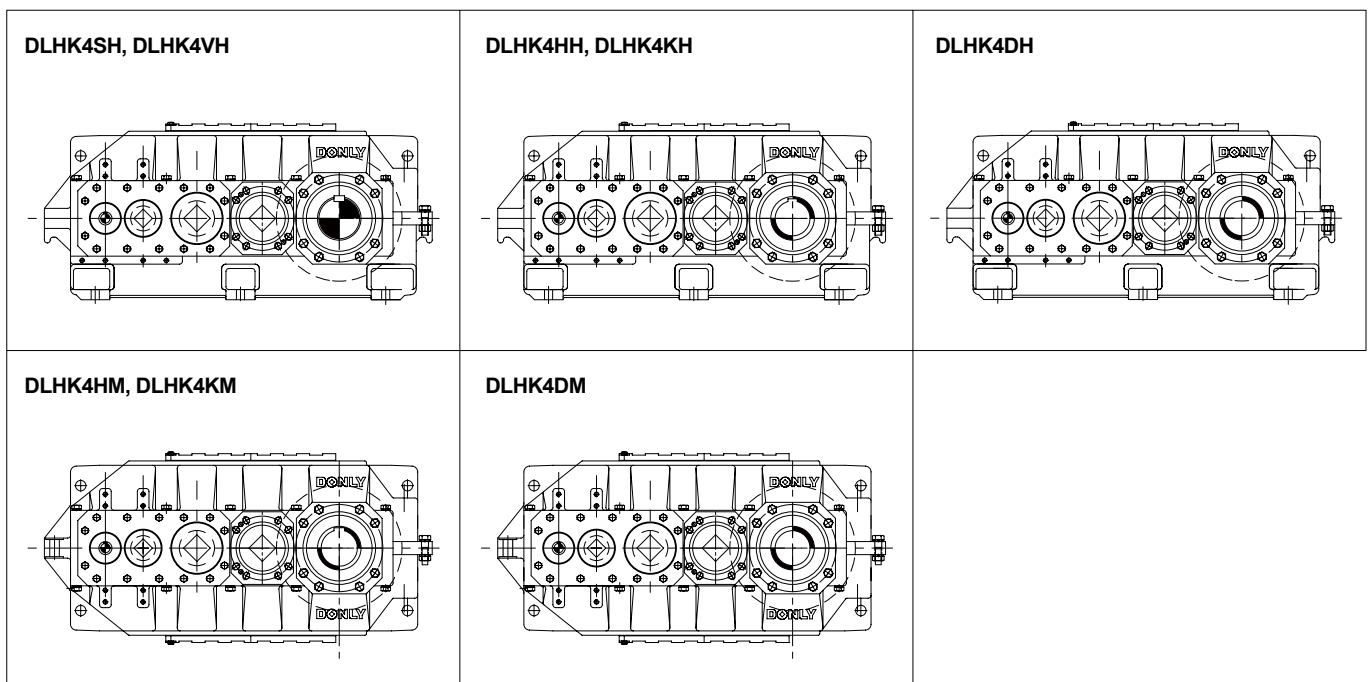


起重机专用齿轮箱

类型 DLHK4..., 4 级
类型 DLHK4.H, DLHK4.M
规格 5...14
额定传动比 $i_N = 20...250$

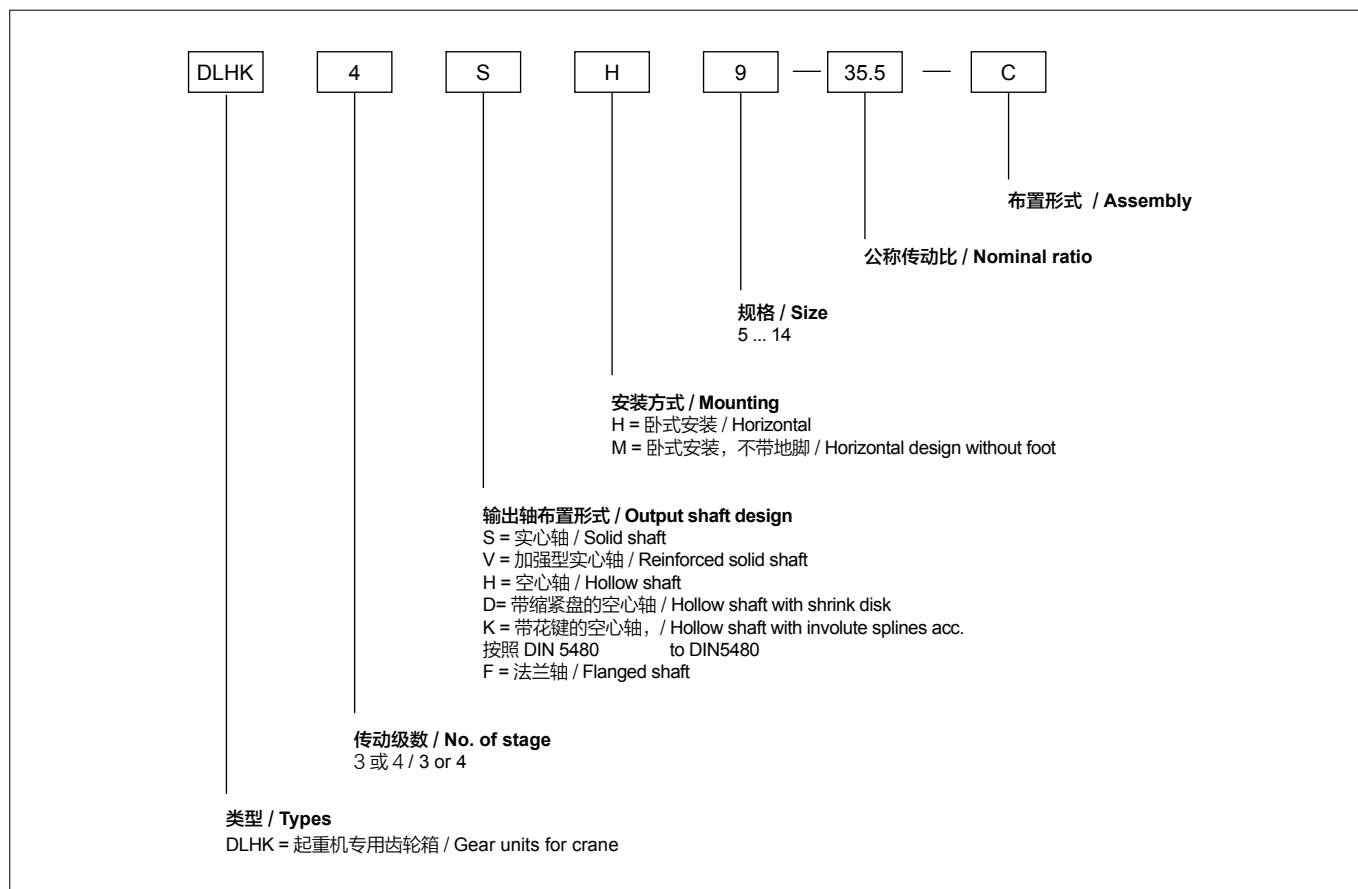
Gear units for crane

Types DLHK4..., 4-stage
Types DLHK4.H, DLHK4.M
Sizes 5...14
Nominal ratio $i_N = 20...250$



1.2 类型标记

1.2 Types designation



订货时需要提供的其它数据: 传动比 i 等。

Further details required in orders: Transmission ratio i etc.

示例 DLHK4SH 9-35.5-C

起重机专用齿轮箱, 4 级, 布置形式 C, 输入轴和输出轴在同一侧, 加长中心距 E=805 mm, 额定传动比 $i_N=35.5$, 实心轴输出, 卧式安装, 规格 9

Example DLHK4SH 9-35.5-C

Gear units for crane, 4-stage, Assembly C, input and output Shaft arranged on one side, total centre distance E=805 mm, $i_N=35.5$, solid output shaft design, horizontal mounting position, size 9

齿轮箱选型, 额定功率, 输出扭矩, 允许的附加径向力 Selection of gear units, Nominal power ratings, Output torques, Permissible additional radial forces	布置形式 Assembly	起重机专用齿轮箱 Gear units for crane DLHK3.H, DLHK3.M	起重机专用齿轮箱 Gear units for crane DLHK4.H, DLHK4.M	中心孔, Centre holes, GB1801 配合精度选择, 平键和平键槽 Selection of GB1801 fits, Parallel keys and keyways
页号 Pages 5~17	页号 Pages 18~19	页号 Pages 20~21	页号 Pages 22~23	页号 Pages 24~25
带缩紧盘, 平键或花键连接的空心轴 Hollow shafts for shrink disks, parallel key or involute splines connections	法兰轴 Flanged shaft	实际传动比 i / 转动惯量 J_1 Actual ratios i / Mass moments of inertia J_1	鼓形制动器, 三支点式箱体支撑的安装尺寸 Fitting dimensions for, drum brake, Three-point housing support	辅助设备方案 Additional variants, Subranges
页号 Pages 26~28	页号 Pages 29	页号 Pages 30~31	页号 Pages 33~34	页号 Pages 35

具有更大扭矩或用于特殊应用情况的起重机专用齿轮箱, 例如配置转换手柄(双传动比或更多传动比)或与行星齿轮箱组合(双电动机驱动)可根据客户要求供货

Gear units for crane for higher torques or special applications, like e.g. with gear shift or fitted planetary gear units (double-motor drive), on request

产品说明

1.3 特点

设计

起重机专用齿轮箱采用了全新设计。这个系列的齿轮箱采用了在产品样本 DLHB 中所述齿轮箱的零部件并且从特殊应用的角度出发进行了补充开发。

其特点在于：

- 具有加长的中心距，这是例如在输送设备和起重设备的传动装置中所需要的；
- 零部件种类减少而规格数量增多；
- 传动功率增大，运转可靠性提高；
- 可以选用 3 级或 4 级布置形式，其传动的范围为 $i_N=14 \dots 250$ ；
- 耐受扭力的箱体可以采用底脚或轴装式结构，同一种齿轮箱规格的 3 级和 4 级布置形式在轴平面的接合部具有相同的箱体尺寸。箱体是用灰口铸铁，在特殊要求下是用球墨铸铁或采用钢板焊接制成的；
- 可以提供采用三支点式箱体支撑的齿轮箱结构；
- 齿轮和轴采用平键连接；
- 带法兰的输出轴有利于在狭小安装空间中与齿轮箱连接。

安装方式

起重机专用齿轮箱采用卧式安装，也可以根据用户要求提供其它安装方式的齿轮箱。

根据用户要求还可以提供与电机连接的法兰盘和扭矩支撑装置。

噪音特性

起重机专用齿轮箱其噪音特性得到了显著的改善：

- 利用计算机程序设计吸收噪音的箱体结构；
- 实现特大的齿面接触比。

散热性能

起重机专用齿轮箱在具有良好的效率和增大了箱体表面的同时还具有有利的温度特性。

在齿轮箱选型方面公司以较低油温峰值作为基础，从而提高了运行的安全性并且由于润滑油使用期限延长而降低了维护保养费用。

库存

起重机专用齿轮箱是按照先进的模块化系统设计的。这样就减少零部件的品种。绝大部分零部件都有库存，从而使我们的产品缩短供货时间。

Product Description

1.3 Product features

Design

- Gear units for crane are a completely new design. This gear units series was developed using components of the gear units acc. to DLHB as a complement for special applications.

Advantages are:

- extended total centre distance as is, for instance, required in drives of transporting equipment, lifting gears, cranes and elevators;
- more sizes with a reduced variety of parts;
- higher operational reliability combined with increased power capacity;
- 3- or 4- stage design with a transmission ratio range between $i_N = 14 \dots 250$;
- torsionally rigid housing in foot-mounted or shaft-mounted design. The 3 and 4-stage designs of the same gear units size have the same housing dimensions with the parting line at the level of the shaft. The housings are made out of HT250, in special cases out of QT400, or of fabricated steel;
- gear units design for three-point housing support available;
- the gears and shafts are form-fit by parallel keys;
- flanged output shafts to facilitate assembly of gear units in confined spaces.

Mounting position

- Gear units for crane can be supplied for horizontal installation. Other arrangements are also possible on request.
- Motor bell housings and torque supports are possible on request.

Noise

New concepts were applied to clearly improve the noise emission of the gear units for crane by:

- designing noise-absorbing housings by means of the computing program;
- achieving exceptionally large contact ratios.

Thermal conduction

- Gear units for crane not only have a high efficiency but also a favourable thermal conduction.
- The selection of gear units is based on a lower maximum oil temperature. By that, the operational reliability will be increased and the cost of maintenance reduced due to longer oil change intervals.

Storage

Gear units for crane have been designed according to a new unit construction principle. Through this, the variety of parts could be reduced. The parts are mainly on stock enabling the manufacturing plants worldwide to deliver at short term.

产品说明

Product Description

1.4 一般说明

注意事项!

必须严格遵守以下各项!

- 样本附图只属范例，并不具有约束力。公司保留变更尺寸的权利。
- 所注重量仅为平均值，并不具有约束力。
- 为防止意外事故发生，所有旋转部件均应按照使用者所在国家和地区的安全规范由购置方加罩保护。
- 试车之前必须认真阅读操作说明。齿轮箱在供货时已处于准运行状态，运行前需加注润滑油。
- 本样本中所示注油量只作为参考值，实际注油量应以油尺上的标记为准。
- 润滑油粘度应符合齿轮箱铭牌上的数据。
- 只能采用允许品牌的润滑油。
- 齿轮箱在供货时已配置了径向油封。如果需要其他类型的轴封敬请垂询。
- 转动方向是指面向输入轴 d1 的转动方向。
- 当安装在室外时应避免阳光照射。应由配置方配装适当的防护设备。

在尺寸图上所使用的符号说明如下：

-  = 油尺
-  = 通气孔
-  = 放油孔
-  = 加油孔

地脚螺栓的最低强度等级为 8.8 级。





1.4 General information

Attention!

The following items are absolutely to be observed!

- Illustrations are examples only and are not strictly binding. Dimensions are subject to change.
- The weights are mean values and not strictly binding.
- To prevent accidents, all rotating parts should be guarded according to local and national safety regulations.
- Prior to commissioning, the operating instructions must be observed. The gear units are delivered ready for operation but without oil filling.
- Oil quantities given are guide values only. The exact quantity of oil depends on the marks on the oil dipstick.
- The oil viscosity has to correspond to the data given on the name plate.
- Permitted lubricants may be used only.
- The gear units are supplied with radial shaft seals. Other sealing variants on request.
- Directions of rotation referring to input shaft d1.
- In case of outdoor installation, insolation is to be avoided. The customer has to provide adequate protection.

Explanation of symbols used in the dimensioned drawings:

-  = Oil dipstick
-  = Breather
-  = Oil drain
-  = Oil filler

Foundation bolts of min. property class 8.8.

2.1 选型指南

2.1 Guidelines for the selection

1. 确定齿轮箱类型和规格 Determination of gear units type and size	1. 确定传动比 / Find the transmission ratio	
	$i_s = \frac{n_1}{n_2}$	
	1.2 确定齿轮箱额定功率 / Determine nominal power rating of the gear units	
	$P_N \geq P_2 \times f_1 \times f_2$	
	如果不满足下列条件请与我们联系 / It is not necessary to consult us, if:	
	$P_2 \geq 30\% \times P_N$	
	1.3 校核最大扭矩, 例如峰值工作扭矩, 起动扭矩或制动扭矩: Check for maximum torque, e. g. peak operating-, starting- or braking torque:	
	$P_N \geq \frac{T_A \times n_1}{9550} \times f_3$	
2. 确定供油方式 Determination of oil supply	可供选择的润滑油供油方式: ① 飞溅润滑 ② 浸油润滑 所有需润滑的零部件均浸在油中 ③ 强制润滑 (敬请垂询)	Possible oil supply variations: ① Splash lubrication ② Dip lubrication All parts to be lubricated are lying in the oil ③ Forced lubrication (on request)
	3.1 如满足以下条件, 则齿轮箱可不带辅助冷却装置: Adequate for gear units without auxiliary cooling, if:	
3. 确定所需热容量 P_G Determination of required thermal capacity P_G	$P_2 \leq P_G = P_{G1} \times f_4 \times f_6 \times f_8 \times f_9$	
	3.2 按用户要求提供带冷却风扇的齿轮箱; Gear units with fan cooling on request;	
	3.3 按用户要求提供带冷却盘管的齿轮箱; Gear units with cooling coil on request;	

2.2 符号说明

2.2 Key to symbols

符号说明 / Key to symbols	
E_D = 每小时工作周期, 以%表示 (例如 $E_D = 80\% / h$)	E_D = Operating cycle per hour in %, e.g. $E_D = 80\% / h$
f_1 = 工作机系数 (表 2), 见第 10 页	f_1 = Factor for driven machine (table 2), page 10
f_2 = 原动机系数, 见第 8 页	f_2 = Factor for prime mover, page 8
f_3 = 峰值扭矩系数 (表 2), 见第 10 页	f_3 = Peak torque factor (table 2), page 10
f_4 = 环境温度系数 (表 3), 见第 11 页	f_4 = Thermal factors (table 3), page 11
f_6 = 海拔高度系数 (表 4), 见第 11 页	f_6 = Factor for altitude (table 4), page 11
f_8 = 齿轮箱供油系数 (表 5), 见第 11 页	f_8 = Oil supply factor (table 5), page 11
f_9 = 热容量系数 (表 6), 见第 11 页	f_9 = Thermal capacity factor (table 6), page 11
i = 实际传动比	i = Actual ratio
i_N = 额定传动比	i_N = Nominal ratio
i_S = 要求传动比	i_S = Required ratio
n_1 = 输入转速 (r/min)	n_1 = Input speed (r/min)
n_2 = 输出转速 (r/min)	n_2 = Output speed (r/min)
P_G = 要求的热容量	P_G = Required thermal capacity
P_{G1} = 齿轮箱热容量, 不带辅助冷却装置, 见第 14 页	P_{G1} = Thermal capacity for gear units without auxiliary cooling, page 14
P_N = 齿轮箱额定功率 (kW), 见第 12 和 13 页的功率表	P_N = Nominal power rating of gear units (kW), see rating tables page 12 and 13
P_2 = 工作机额定功率 (kW)	P_2 = Power rating of driven machine (kW)
t = 环境温度 (°C)	t = Ambient temperature (°C)
T_A = 输入轴最大扭矩, 例如峰值工作扭矩, 起动扭矩或制动扭矩 (Nm)	T_A = Max. torque occurring on input shaft, e.g. peak operating-, starting- or braking torque (Nm)
T_{2N} = 额定输出扭矩 (kNm), 见第 15 页	T_{2N} = Nominal output torque (kNm), page 15

2.3 计算示例

已知:

原动机

电机功率: $P_1 = 75\text{kW}$
 电机转速: $n_1 = 1000 \text{ r/min}$
 最大起动扭矩: $T_A = 1075\text{Nm}$

工作机

工作机功率: $P_2 = 66\text{kW}$
 转速: $n_2 = 28 \text{ r/min}$
 每天运行时间: 12 h / 日
 FEM 工作级别: $L_3T_8 - M8$
 每小时起动次数: 25
 每小时工作周期: $E_D = 40\%$
 环境温度: 30°C
 室内大空间安装: 风速 $\geq 4\text{m/s}$
 海拔高度: 海平面

齿轮箱设计

起重机专用齿轮箱
 安装方式: 卧式安装
 输入轴和输出轴安装在齿轮箱一侧。
 最小中心距 $E_{\text{erf}} \geq 750 \text{ mm}$, 布置形式 C
 输出轴 d_2 的旋转方向: 逆时针旋转

要求:

选择齿轮箱类型和规格
 1. 选择齿轮箱类型和规格
 1.1 确定传动比

2.3 Calculation example

Known criteria:

Rime mover

Electric motor: $P_1 = 75\text{kW}$
 Motor speed: $n_1 = 1000 \text{ r/min}$
 Max. starting torque: $T_A = 1075\text{Nm}$

Driven machine

Working machine power: $P_2 = 66\text{kW}$
 Speed: $n_2 = 28 \text{ r/min}$
 Duty: 12 h / day
 Classification acc. to FEM: $L_3T_8 - M8$
 Starts per hour: 25
 Operating cycle per hour: $E_D = 40\%$
 Ambient temperature: 30°C
 Installation in a large hall: wind velocity $\geq 4\text{m/s}$
 Altitude: sea level

Gear units design

Gear units for crane
 Mounting position: horizontal
 Input and output shaft arranged on one side.
 Minimum total centre distance $E_{\text{erf}} \geq 750 \text{ mm}$, design C
 Direction of rotation of output shaft d_2 : ccw

Required:

Type and size of gear units
 1. Selection of gear units type and size
 1.1 Calculation of transmission ratio

$$i_s = \frac{n_1}{n_2} = \frac{1000}{28} = 35.7 \quad i_N = 35.5$$

1.2 确定齿轮箱额定功率

1.2 Determination of the gear units nominal power rating

$$P_N \geq P_2 \times f_1 \times f_2 = 66 \times 1.4 \times 1 = 92.4(\text{kW})$$

从额定功率表中选择类型 DLHK4, 齿轮箱规格 9, 对应的 $P_N = 100 \text{ kW}$, 中心距 $E = 805 \text{ mm}$
 (类型 DLHK3: $E = 675 \text{ mm} < E_{\text{erf}} = 750 \text{ mm}$)

Selected from power rating table: type DLHK4, gear units size 9, with $P_N = 100 \text{ kW}$ and total centre distance $E = 805 \text{ mm}$.
 (Type DLHK3: $E = 675 \text{ mm} < E_{\text{erf}} = 750 \text{ mm}$)

$$P_2 \geq 30\% \times P_N \quad 66(\text{kW}) > 30\% \times 100 = 30(\text{kW})$$

如不满足要求, 请咨询我公司
 It is necessary to consult us

1.3 起动扭矩校核

1.3 Checking the starting torque

$$P_N \geq \frac{T_A \times n_1}{9550} \times f_3 = \frac{1075 \times 1000}{9550} \times 0.80 = 90.05(\text{kW}) \quad P_N = 100\text{kW} > 90.05(\text{kW})$$

2. 确定所需热容量 P_G

2. Determination of required thermal capacity P_G

2.1 根据表中给出的 DLHK4 型齿轮箱参数不带辅助冷却装置的
 齿轮箱热容量

2.1 Thermal capacity for gear units without auxiliary cooling, acc.
 To table for type DLHK4

$$P_G = P_{G1} \times f_4 \times f_6 \times f_8 \times f_9 = 100 \times 1.18 \times 1 \times 1 \times 0.91 = 107.4(\text{kW}) > P_2 = 66(\text{kW})$$

结论: 齿轮箱不带辅助冷却装置可以满足要求!

A gear units without auxiliary cooling is sufficient!

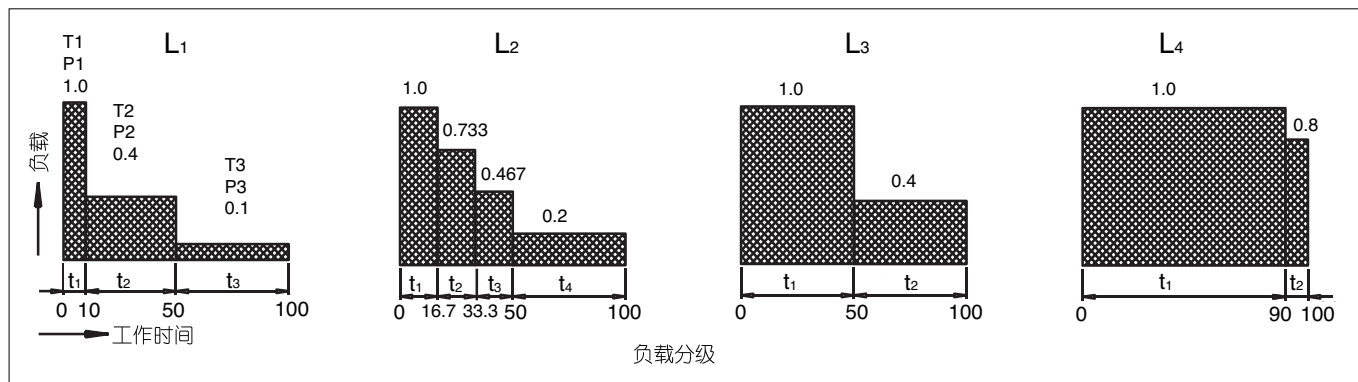
2.4 起重机服务系数

2.4 Service factors for crane

在使用具有可变负载的齿轮箱时，正如通常在起重机工作中的情况，建议按照 FEM 进行分类。这里，工作机系数 f_1 和峰值扭矩系数 f_3 可以根据机械设备的分类组别 M1 ... M8 即根据表 1 中的标准值，并且根据负载（即机械设备负载分级：L₁ ... L₄）和工作时间（工作时间分：T₀ ... T₉ 从第 10 页的表 2 中加以确定。K 表示在可变负载情况下，在一个典型时间周期内的负载分布，其值计算如下：

$$K = \sqrt[3]{\left(\frac{P_1}{P}\right)^3 \cdot \frac{t_1}{t} + \dots + \left(\frac{P_n}{P}\right)^3 \cdot \frac{t_n}{t}}$$

在这里 P₁, P_n 表示在时间周期 t₁...t_n 内工作周期



起重机类型	使用方式 (*)	机械设备类型			
		起升机构	回转机构	往返移动机构	行走机构
装配吊车		M2 - M3	M1 - M2	M1 - M2	M2 - M3
装卸起重机	吊钩	M5 - M6	-	M4 - M5	M5 - M6
装卸起重机	爪式或电磁	M7 - M8	-	M6 - M7	M7 - M8
车间吊车		M6	-	M4	M5
移动吊车, 捣矿机吊车, 废料场吊车	吊钩式或伸展	M8	-	M6 - M7	M7 - M8
卸料平台, 集装箱龙门吊车 其它龙门吊车 (带滑车行走机构和 / 或转动吊臂)	a) 吊钩式或伸展 b) 吊钩	M6 - M7 M4 - M5	M3 - M4 -	M6 - M7 M4 - M5	M4 - M5 M4 - M5
卸料平台, 龙门吊车 (带滑车行走机构和 / 或转动吊臂)	爪式或电磁	M8	M3 - M4	M7 - M8	M4 - M5
造船起重机, 船坞起重机, 拆卸吊车	吊钩	M5 - M6	M4 - M5	M4 - M5	M5 - M6
港口起重机 (旋转式, 龙门吊车) 水上起重机和水上高架起重机	吊钩	M6 - M7	M5 - M6	-	M3 - M4
港口起重机 (旋转式, 龙门吊车) 水上起重机和水上高架起重机	爪式或电磁	M7 - M8	M6 - M7	-	M4 - M5
水上起重机和水上高架起重机 用于很大的负载 (通常在 100 t 以上)		M3 - M4	M3 - M4	-	-
舰船吊车	吊钩	M4	M3 - M4	M2	M3
舰船吊车	爪式或电磁	M5 - M6	M3 - M4	M4 - M5	M3 - M4
建筑工地用塔式起重机		M4	M4	M3	M3
动臂起重机		M2 - M3	M1 - M2	-	-
铁路吊车		M3 - M4	M3 - M3	-	-
汽车或拖拉机吊车	吊钩	M3 - M4	M2 - M3	-	-

注*) 此栏中仅列出了几种典型的使用方法
 原动机系数 f_2 在使用电机或液压马达时可以确定 $f_2=1$,
 在第 10 页上给出的各种系数均为经验值, 应用这些系数以所述机器设备以及普遍熟悉的设计条件和负载条件为前提。如果在特殊条件下应用, 请向我们咨询。
 对于未列出的工作机请向我们咨询。

2.4 起重机服务系数

2.4 Service factors for crane

When using gear units with alternating loads-as they usually exist in crane installations-a classification according to FEM is recommended. For this purpose, the factor for driven machine f_1 and the peak torque factor f_2 can be derived from table 2 on page 10 in accordance with the group of mechanism standard values M1...M8 in table 1 below - depending on the load (state of loading of mechanism $L_1...L_4$) and the duty (classes of utilization of mechanism $T_0...T_9$). To take into account the load distribution in case of alternating loads within a representative period of time t , the cubic mean factor K is calculated by:

$$K = \sqrt[3]{\left(\frac{P_1}{P}\right)^3 \cdot \frac{t_1}{t} + \dots + \left(\frac{P_n}{P}\right)^3 \cdot \frac{t_n}{t}}$$

Here, $P_1 \dots P_n$ is the operating cycle within the time cycle $t_1 \dots t_n$.

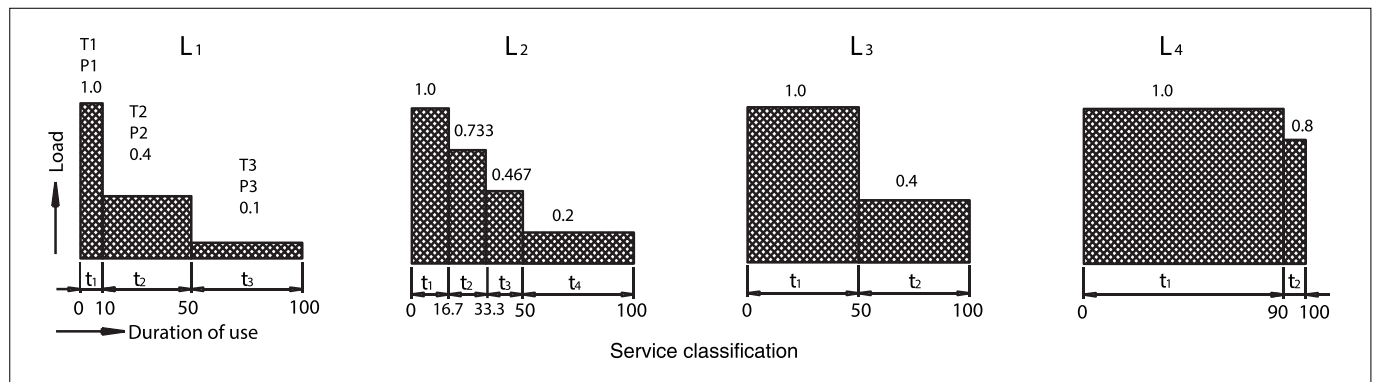


Table 1 Group classification of mechanisms		See FEM 1001 Section I 3rd Edition, Table T.2.1.3.5			
Type of appliance Designation	Particulars concerning nature of use (*)	Type of mechanism			
		Hoisting	Luffing	Traverse	Travel
Assembling cranes		M2 - M3	M1 - M2	M1 - M2	M2 - M3
Stocking and reclaiming transporters	Hook duty	M5 - M6	-	M4 - M5	M5 - M6
Stocking and reclaiming transporters	Grab or magnet	M7 - M8	-	M6 - M7	M7 - M8
Workshop cranes		M6	-	M4	M5
Overhead travelling cranes, pig-breaking cranes, scrapyard cranes	Grab or magnet	M8	-	M6 - M7	M7 - M8
Bridge cranes for unloading, bridge cranes for containers, other bridge cranes (with crab and/or slewing jib crane)	a) Hook or spreader duty b) Hook duty	M6 - M7 M4 - M5	M3 - M4 -	M6 - M7 M4 - M5	M4 - M5 M4 - M5
Bridge cranes for unloading, bridge cranes (with crab and/or slewing jib crane)	Grab or magnet	M8	M3 - M4	M7 - M8	M4 - M5
Drydock cranes, shipyard jib cranes, jib cranes for	Hook duty	M5 - M6	M4 - M5	M4 - M5	M5 - M6
Dockside cranes (slewing, on gantry, ...) floating cranes and pontoon derricks	Hook duty	M6 - M7	M5 - M6	-	M3 - M4
Dockside cranes (slewing, on gantry, ...) floating cranes and pontoon derricks	Grab or magnet	M7 - M8	M6 - M7	-	M4 - M5
Floating cranes and pontoon derricks for very heavy loads (usually greater than 100 t)		M3 - M4	M3 - M4	-	-
Deck cranes	Hook duty	M4	M3 - M4	M2	M3
Deck cranes	Grab or magnet	M5 - M6	M3 - M4	M4 - M5	M3 - M4
Tower cranes for building		M4	M4	M3	M3
Derricks		M2 - M3	M1 - M2	-	-
Railway cranes allowed to run in trains		M3 - M4	M3 - M3	-	-
Automotive cranes	Hook duty	M3 - M4	M2 - M3	-	-

*) Only a few typical cases of use are shown, by way of guidance, in this column. If the system is driven via an electric or hydraulic motor, a factor for prime mover $f_2=1$ may be provided. The factors shown on page 10 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. For driven machines which are not listed in this table, please refer to us.

2.4 起重机服务系数

2.4 Service factors for crane

表 2

Table 2

负载 / Loads		工作机系数 f_1 , 峰值扭矩系数 f_3 Factor for driven machine f_1 , peak torque factor f_3																					
机构负载分级 States of loading of mechanism	定义 Definitions	机构工作级别 4) GROUP classification Of mechanism 4)	服务 系数 Service factors	机构利用等级 / Mechanism utilization grade																			
				T_0		T_1		T_2		T_3		T_4		T_5		T_6		T_7		T_8		T_9	
				总工作时间 (小时) / Service life in hours																			
		≤ 200		> 200 ≤ 400		> 400 ≤ 800		> 800 ≤ 1600		> 1600 ≤ 3200		> 3200 ≤ 6300		> 6300 ≤ 12500		> 12500 ≤ 25000		> 25000 ≤ 50000		> 50000			
轻负载 light L1	很少出现最大负载、持续的负载 Max. load only exceptionally, but only very low loads continuously	$k \leq 0.50$	1) f_1 2) f_3 3) f_3	1.00 0.50 0.80	M1 0.50 0.80	1.00 0.50 0.80	M1 0.50 0.80	1.00 0.50 0.80	M1 0.50 0.80	1.04 0.50 0.80	M2 0.50 0.80	1.08 0.50 0.80	M3 0.50 0.80	1.12 0.50 0.80	M4 0.56 0.80	1.16 0.56 0.80	M5 0.63 0.90	1.20 0.63 0.90	M6 0.71 1.00	1.25 0.71 1.00	M7 0.80 1.12	1.30 0.80 1.12	M8 0.80 1.12
中等负载 medium L2	经常出现最大负载、但是持续的负载是轻负载 Max. load quite often, but low loads continuously	$0.50 < k \leq 0.63$	1) f_1 2) f_3 3) f_3	1.00 0.50 0.80	M1 0.50 0.80	1.00 0.50 0.80	M1 0.50 0.80	1.04 0.50 0.80	M2 0.50 0.80	1.08 0.50 0.80	M3 0.50 0.80	1.12 0.50 0.80	M4 0.50 0.80	1.16 0.50 0.80	M5 0.56 0.80	1.20 0.56 0.80	M6 0.63 0.90	1.25 0.63 0.90	M7 0.71 1.00	1.30 0.71 1.00	1.40 0.71 1.00	M8 0.80 1.12	1.40 0.80 1.12
重负载 heavy L3	频繁出现最大负载、持续的负载是中等负载 Max. load frequently and medium loads continuously	$0.63 < k \leq 0.80$	1) f_1 2) f_3 3) f_3	1.00 0.50 0.80	M1 0.50 0.80	1.04 0.50 0.80	M2 0.50 0.80	1.08 0.50 0.80	M3 0.50 0.80	1.12 0.50 0.80	M4 0.50 0.80	1.16 0.50 0.80	M5 0.50 0.80	1.20 0.56 0.80	M6 0.56 0.80	1.25 0.63 0.90	M7 0.71 1.00	1.30 0.71 1.00	M8 0.80 1.12	1.40 0.80 1.12	1.60 0.9 1.25	M8 0.9 1.25	
特重负载 very heavy L4	负载规律性的近最大负载 Loads regularly nearest to max. load	$0.80 < k \leq 1.00$	1) f_1 2) f_3 3) f_3	1.04 0.50 0.80	M2 0.50 0.80	1.08 0.50 0.80	M3 0.50 0.80	1.12 0.50 0.80	M4 0.50 0.80	1.16 0.50 0.80	M5 0.50 0.80	1.20 0.50 0.80	M6 0.56 0.80	1.30 0.56 0.80	M7 0.63 0.90	1.40 0.63 0.90	M8 0.71 1.00	1.60 0.71 1.00	M8 0.80 1.12	1.80 0.80 1.12	2.00 0.90 1.25	M8 0.90 1.25	

- 1) f_1 = 工作机系数
- 2) f_3 = 在负载方向保持不变时的峰值扭矩系数, 如起升, 变幅机构等
- 3) f_3 = 在负载方向交替改变时的峰值扭矩系数, 如回转, 行走机构等
- 4) = 三次方根平均值 k , $k = \sqrt[3]{km}$ (km 名义载荷谱系数, FEM1.001) 机构工作级别 M1 至 M8 是根据 FEM1.001, 第三版确定的。当采用电机或液压马达驱动时 $f_2 = 1.0$ 。

如果未给出峰值扭矩, 则 $T_{2max} = 1.6 \times T_2$

- 1) f_1 = Factor for driven machine
- 2) f_3 = Peak torque factor for constant load direction, as a rule for hoistinggears, luffing gears, etc.
- 3) f_3 = Peak torque factor for alternating load direction, as a rule for slewing gears, travelling gears, etc.
- 4) Group classification of mechanism k , $k = \sqrt[3]{km}$ (km = nominal load spectrum factor, see FEM 1.001). Groups of mechanism M1 to M8 determined acc. to FEM 1.001, 3rd issue, $f_2 = 1.0$ (drive via electric or hydraulic motor). If no max. torque has been stated, $T_{2max} = 1.6 \times T_2$ has to be determined.

2.4 起重机服务系数

2.4 Service factors for crane

表 3

Table 3

环境温度系数 / Thermal factor					f ₄
不带辅助冷却装置 / Without auxiliary cooling					
环境温度 / Ambient temperature	每小时工作周期 (E _D), 以%计 / Operating cycle per hour(E _D) in %				
	100	80	60	40	20
10°C	1.14	1.20	1.32	1.54	2.04
20°C	1.00	1.06	1.16	1.35	1.79
30°C	0.87	0.93	1.00	1.18	1.56
40°C	0.71	0.75	0.82	0.96	1.27
50°C	0.55	0.58	0.64	0.74	0.98

表 4

Table 4

海拔高度系数 / Factor for altitude					f ₆
不带辅助冷却装置 / Without auxiliary cooling					
系数 / Factor	海拔高度 (m, 海平面上) / Altitude (metres above MSL)				
	至 / up to				
	1000	2000	3000	4000	5000
f ₆	1.0	0.95	0.90	0.85	0.80

表 5

Table 5

供油系数 / Oil supply factor	f ₈
卧式安装齿轮箱: Horizontal gear units:	f ₈ = 1
强制润滑方式: In case of forced lubrication:	f ₈ = 1.05

表 6

Table 6

不带辅助冷却装置齿轮箱的热容量系数 Thermal capacity factor for gear units without auxiliary cooling										f ₉	
齿轮箱类型 Gear units types	n r/min	传动比 Ratio i 由 / 至 from / up to	安装地点 / Place of installation								
			狭小的封闭房间* Small confined spaces*			大房间, 大厅** Large halls, workshops**			露天安装*** In the open***		
			规格 / Sizes			规格 / Sizes			规格 / Sizes		
			5 ... 6	7 ... 12	13 ... 14	5 ... 6	7 ... 12	13 ... 14	5 ... 6	7 ... 12	13 ... 14
DLHK3..	750	14 ... 63	0.71	0.70	0.70	0.83	0.83	0.83	1.00	1.00	1.00
	1000	14 ... 63	0.76	0.74	0.71	0.90	0.89	0.86	1.09	1.09	1.07
	1500	14 ... 25	0.77	0.62	0.54	0.96	0.82	0.67	1.21	1.10	0.95
		28 ... 45 50 ... 63	0.83 0.87	0.78 0.87	0.69 0.84	1.00 1.03	0.96 1.03	0.87 1.00	1.23 1.24	1.20 1.24	1.12 1.23
DLHK4..	750	20 ... 250	0.71	0.72	0.73	0.84	0.85	0.85	1.00	1.00	1.00
	1000	20 ... 250	0.76	0.77	0.78	0.90	0.91	0.91	1.09	1.09	1.09
	1500	20 ... 100	0.79	0.82	0.80	0.98	0.99	0.98	1.21	1.21	1.20
		112 ... 250	0.84	0.86	0.85	1.01	1.02	1.01	1.23	1.23	1.22

*) 风速 ≥ 1m/s

*) Wind velocity ≥ 1m/s

**) 风速 ≥ 2m/s

**) Wind velocity ≥ 2m/s

***) 风速 ≥ 4m/s

***) Wind velocity ≥ 4m/s

产品选型

Project Planning

2.5 额定功率

类型 DLHK3..
规格 5...14

2.5 Nominal power ratings

Types DLHK3..
Sizes 5...14

额定功率 / Nominal power ratings												
i _N	n ₁ r/min	n ₂ r/min	齿轮箱规格 / Gear unit sizes									
			5	6	7	8	9	10	11	12	13	14
			额定功率 P _N (kW) / Nominal power ratings P _N in kW									
14	1500	107	123	-	230	-	381	-	672	-	986	-
	1000	71	82	-	152	-	253	-	446	-	654	-
	750	54	62	-	116	-	192	-	339	-	498	-
16	1500	94	108	-	202	-	335	-	591	-	866	-
	1000	63	73	-	135	-	224	-	396	-	581	-
	750	47	54	-	101	-	167	-	295	-	433	-
18	1500	83	96	126	178	222	295	374	521	652	765	947
	1000	58	65	85	120	150	199	252	352	440	516	639
	750	42	48	64	90	112	150	189	264	330	387	479
20	1500	75	86	114	161	200	267	338	471	589	691	856
	1000	50	58	76	107	134	178	225	314	393	461	571
	750	38	44	58	82	101	135	171	239	298	350	434
22.4	1500	67	77	102	144	179	239	302	421	526	617	765
	1000	45	52	68	97	120	160	203	283	353	415	514
	750	33	38	50	71	88	117	149	207	259	304	377
25	1500	60	69	91	129	160	214	270	377	471	553	685
	1000	40	46	61	86	107	142	180	251	314	369	457
	750	30	35	46	64	80	107	135	188	236	276	342
28	1500	54	62	82	116	144	192	243	339	424	498	616
	1000	36	41	55	77	96	128	162	226	283	332	411
	750	27	31	41	58	72	96	122	170	212	249	308
31.5	1500	48	55	73	103	128	171	216	302	377	442	548
	1000	32	37	49	69	85	114	144	201	251	295	365
	750	24	28	36	52	64	85	108	151	188	221	274
35.5	1500	42	48	64	90	112	150	189	264	330	387	479
	1000	28	32	43	60	75	100	126	176	220	258	320
	750	21	24	32	45	56	75	95	132	165	194	240
40	1500	38	44	58	82	101	135	171	239	298	350	434
	1000	25	29	38	54	67	89	113	157	196	230	285
	750	18.8	22	29	40	50	67	85	118	148	173	215
45	1500	33	38	50	71	88	117	149	207	259	304	377
	1000	22	25	33	47	59	78	99	138	173	203	251
	750	16.7	19	25	36	45	59	75	105	131	154	191
50	1500	30	35	46	64	80	107	135	188	236	276	342
	1000	20	23	30	43	53	71	90	126	157	184	228
	750	15	17	23	32	40	53	68	94	118	138	171
56	1500	27	-	41	-	72	-	122	-	212	-	308
	1000	17.9	-	27	-	48	-	81	-	141	-	204
	750	13.4	-	20	-	36	-	60	-	105	-	153
63	1500	24	-	36	-	64	-	108	-	188	-	274
	1000	15.9	-	24	-	42	-	72	-	125	-	181
	750	11.9	-	18	-	32	-	54	-	93	-	136

2.5 额定功率

类型 DLHK4..
规格 5...14

2.5 Nominal power ratings

Types DLHK4..
Sizes 5...14

额定功率 / Nominal power ratings												
i _N	n ₁ r/min	n ₂ r/min	齿轮箱规格 / Gear unit sizes									
			5	6	7	8	9	10	11	12	13	14
			额定功率 P _N (kW) / Nominal power ratings P _N in kW									
20	1500	75	86	-	161	-	267	-	471	-	691	-
	1000	50	58	-	107	-	178	-	314	-	461	-
	750	38	44	-	82	-	135	-	239	-	350	-
22.4	1500	67	77	-	144	-	239	-	421	-	617	-
	1000	45	52	-	97	-	160	-	283	-	415	-
	750	33	38	-	71	-	117	-	207	-	304	-
25	1500	60	69	91	129	160	214	270	377	471	553	685
	1000	40	46	61	86	107	142	180	251	314	369	457
	750	30	35	46	64	80	107	135	188	236	276	342
28	1500	54	62	82	116	144	192	243	339	424	498	616
	1000	36	41	55	77	96	128	162	226	283	332	411
	750	27	31	41	58	72	96	122	170	212	249	308
31.5	1500	48	55	73	103	128	171	216	302	377	442	548
	1000	32	37	49	69	85	114	144	201	251	295	365
	750	24	28	36	52	64	85	108	151	188	221	274
35.5	1500	42	48	64	90	112	150	189	264	330	387	479
	1000	28	32	43	60	75	100	126	176	220	258	320
	750	21	24	32	45	56	75	95	132	165	194	240
40	1500	38	44	58	82	101	135	171	239	298	350	434
	1000	25	29	38	54	67	89	113	157	196	230	285
	750	18.8	22	29	40	50	67	85	118	148	173	215
45	1500	33	38	50	71	88	117	149	207	259	304	377
	1000	22	25	33	47	59	78	99	138	173	203	251
	750	16.7	19	25	36	45	59	75	105	131	154	191
50	1500	30	35	46	64	80	107	135	188	236	276	342
	1000	20	23	30	43	53	71	90	126	157	184	228
	750	15	17	23	32	40	53	68	94	118	138	171
56	1500	27	31	41	58	72	96	122	170	212	249	308
	1000	17.9	21	27	38	48	64	81	112	141	165	204
	750	13.4	15	20	29	36	48	60	84	105	123	153
63	1500	24	28	36	52	64	85	108	151	188	221	274
	1000	15.9	18	24	34	42	57	72	100	125	147	181
	750	11.9	14	18	26	32	42	54	75	93	110	136
71	1500	21	24	32	45	56	75	95	132	165	194	240
	1000	14.1	16	21	30	38	50	63	89	111	130	161
	750	10.6	12	16	23	28	38	48	67	83	98	121
80	1500	18.8	22	29	40	50	67	85	118	148	173	215
	1000	12.5	14	19	27	33	45	56	79	98	115	143
	750	9.4	11	14	20	25	33	42	59	74	87	107
90	1500	16.7	19	25	36	45	59	75	105	131	154	191
	1000	11.1	13	17	24	30	40	50	70	87	102	127
	750	8.3	10	13	18	22	30	37	52	65	76	95
100	1500	15	17	23	32	40	53	68	94	118	138	171
	1000	10	12	15	21	27	36	45	63	79	92	114
	750	7.5	8.6	11	16	20	27	34	47	59	69	86
112	1500	13.4	15	20	29	36	48	60	84	105	123	153
	1000	8.9	10	14	19	24	32	40	56	70	82	102
	750	6.7	7.7	10	14	18	24	30	42	53	62	76
125	1500	12	14	18	26	32	43	54	75	94	111	137
	1000	8	9.2	12	17	21	28	36	50	63	74	91
	750	6	6.9	9.1	13	16	21	27	38	47	55	68
140	1500	10.7	12	16	23	29	38	48	67	84	99	122
	1000	7.1	8.2	11	15	19	25	32	45	56	65	81
	750	5.4	6.2	8.2	12	14	19	24	34	42	50	62
160	1500	9.4	11	14	20	25	33	42	59	74	87	107
	1000	6.3	7.3	9.6	14	17	22	28	40	49	58	72
	750	4.7	5.4	7.1	10	13	17	21	30	37	43	54
180	1500	8.3	9.6	13	18	22	30	37	52	65	76	95
	1000	5.6	6.5	8.5	12	15	20	25	35	44	52	64
	750	4.2	4.8	6.4	9.0	11	15	19	26	33	39	48
200	1500	7.5	8.6	11	16	20	27	34	47	59	69	86
	1000	5	5.8	7.6	11	13	18	23	31	39	46	57
	750	3.8	4.4	5.8	8.2	10	14	17	24	30	35	43
224	1500	6.7	-	10	-	18	-	30	-	53	-	76
	1000	4.5	-	6.8	-	12	-	20	-	35	-	51
	750	3.3	-	5.0	-	8.8	-	15	-	26	-	38
250	1500	6	-	9.1	-	16	-	27	-	47	-	68
	1000	4	-	6.1	-	11	-	18	-	31	-	46
	750	3	-	4.6	-	8.0	-	14	-	24	-	34

产品选型

Project Planning

2.6 热容量

类型 DLHK3..., DLHK4..
规格 5...14

2.6 Thermal capacity

Types DLHK3..., DLHK4..
Sizes 5...14

热容量 / Thermal capacity											
类型 DLHK3.. 1) / Types DLHK3.. 1)											
传动比 Ratio i_N		齿轮箱规格 / Gear unit sizes									
		5	6	7	8	9	10	11	12	13	14
		无辅助冷却装置的热容量 P_G (kW) Thermal capacity P_G (in kW) dependent on kind of cooling P_{G1} : without auxiliary cooling									
14	P_{G1}	76.0	-	120.0	-	165	-	223	-	319	-
16	P_{G1}	73.9	-	116.0	-	160	-	217	-	310	-
18	P_{G1}	72.0	95.3	113.0	147.0	155	180	211	283	302	349
20	P_{G1}	70.1	92.1	110.0	140.0	150	175	205	276	294	340
22.4	P_{G1}	68.4	89.9	106.0	137.0	146	170	200	268	285	330
25	P_{G1}	67.0	87.0	102.0	130.0	140	164	194	260	277	320
28	P_{G1}	64.9	84.1	98.8	126.0	136	159	188	253	268	310
31.5	P_{G1}	63.5	81.4	96.0	122.0	131	155	182	245	260	300
35.5	P_{G1}	61.8	79.1	92.2	117.0	126	148	176	238	252	290
40	P_{G1}	59.9	75.6	88.7	112.0	122	143	170	230	244	280
45	P_{G1}	58.0	72.3	85.6	108.0	117	138	164	222	235	270
50	P_{G1}	56.2	69.8	82.0	104.0	112	133	159	214	227	260
56	P_{G1}	-	66.9	-	99.3	-	127	-	207	-	250
63	P_{G1}	-	64.1	-	94.2	-	122	-	200	-	240

热容量 / Thermal capacity											
类型 DLHK4.. 1) / Types DLHK4.. 1)											
传动比 Ratio i_N		齿轮箱规格 / Gear unit sizes									
		5	6	7	8	9	10	11	12	13	14
		无辅助冷却装置的热容量 P_G (kW) Thermal capacity P_G (in kW) dependent on kind of cooling P_{G1} : without auxiliary cooling									
20	P_{G1}	51.5	-	79.2	-	111.0	-	154.0	-	215	-
22.4	P_{G1}	50.7	-	78.0	-	109.0	-	151.0	-	212	-
25	P_{G1}	49.6	64.1	76.3	97.0	107.0	126.0	148.0	185	208	243
28	P_{G1}	48.7	63.0	75.0	95.0	104.0	123.0	146.0	182	204	238
31.5	P_{G1}	47.8	61.7	73.5	93.0	102.0	121.0	143.0	178	200	233
35.5	P_{G1}	46.8	60.5	72.0	91.0	100.0	118.0	140.0	175	196	229
40	P_{G1}	45.9	59.3	70.6	89.0	98.0	116.0	137.0	172	193	224
45	P_{G1}	44.9	58.1	69.1	87.1	96.0	113.0	134.0	168	189	220
50	P_{G1}	43.9	57.1	67.6	85.1	94.0	111.0	131.0	165	185	215
56	P_{G1}	43.0	55.5	66.1	83.2	91.9	109.0	128.0	162	181	211
63	P_{G1}	42.2	54.6	65.0	81.3	89.7	106.0	125.0	158	178	206
71	P_{G1}	41.2	53.2	63.4	79.4	87.8	104.0	123.0	155	174	201
80	P_{G1}	40.3	52.1	62.0	77.5	85.4	102.0	120.0	152	170	197
90	P_{G1}	39.5	51.1	60.8	75.6	83.4	99.4	117.0	148	166	192
100	P_{G1}	38.4	49.6	59.1	73.8	81.4	97.0	114.0	145	163	188
112	P_{G1}	37.7	48.7	58.0	71.9	79.4	94.7	111.0	142	159	183
125	P_{G1}	36.7	47.3	56.4	70.0	77.2	92.3	108.0	138	155	178
140	P_{G1}	35.8	46.2	55.0	68.1	75.2	90.0	105.0	135	151	174
160	P_{G1}	34.8	45.0	53.6	66.1	73.0	87.8	102.0	132	148	170
180	P_{G1}	33.9	43.8	52.1	64.0	71.0	85.3	99.2	128	144	165
200	P_{G1}	33.1	47.7	50.9	62.2	69.0	83.0	96.3	125	140	160
224	P_{G1}	-	46.6	-	60.2	-	80.7	-	121	-	156
250	P_{G1}	-	45.5	-	58.4	-	78.4	-	118	-	151

2.7 额定输出扭矩

类型 DLHK3..., DLHK4..
规格 5...14

2.7 Nominal output torques

Types DLHK3..., DLHK4..
Sizes 5...14

额定输出扭矩 / Nominal output torques										
类型 DLHK3.. / Types DLHK3..										
传动比 Ratio i_N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
	输出扭矩 T_{2N} (kNm) / Nominal output torques T_{2N} in kNm									
14	11	-	20.5	-	34	-	60	-	88	-
16	11	-	20.5	-	34	-	60	-	88	-
17	11	14.5	20.5	25.5	34	43	60	75	88	109
20	11	14.5	20.5	25.5	34	43	60	75	88	109
22.4	11	14.5	20.5	25.5	34	43	60	75	88	109
25	11	14.5	20.5	25.5	34	43	60	75	88	109
28	11	14.5	20.5	25.5	34	43	60	75	88	109
31.5	11	14.5	20.5	25.5	34	43	60	75	88	109
35.5	11	14.5	20.5	25.5	34	43	60	75	88	109
40	11	14.5	20.5	25.5	34	43	60	75	88	109
45	11	14.5	20.5	25.5	34	43	60	75	88	109
50	11	14.5	20.5	25.5	34	43	60	75	88	109
56	-	14.5	-	25.5	-	43	-	75	-	109
63	-	14.5	-	25.5	-	43	-	75	-	109

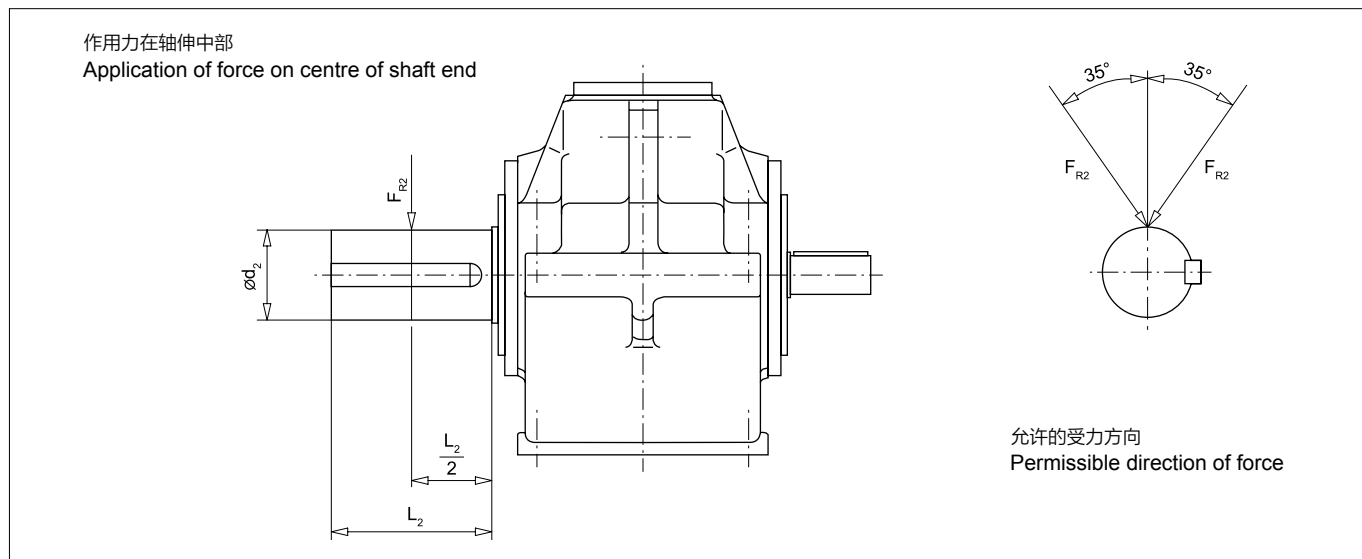
额定输出扭矩 / Nominal output torques										
类型 DLHK4.. / Types DLHK4..										
传动比 Ratio i_N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
	输出扭矩 T_{2N} (kNm) / Nominal output torques T_{2N} in kNm									
20	11	-	20.5	-	34	-	60	-	88	-
22.4	11	-	20.5	-	34	-	60	-	88	-
25	11	14.5	20.5	25.5	34	43	60	75	88	109
28	11	14.5	20.5	25.5	34	43	60	75	88	109
31.5	11	14.5	20.5	25.5	34	43	60	75	88	109
35.5	11	14.5	20.5	25.5	34	43	60	75	88	109
40	11	14.5	20.5	25.5	34	43	60	75	88	109
45	11	14.5	20.5	25.5	34	43	60	75	88	109
50	11	14.5	20.5	25.5	34	43	60	75	88	109
56	11	14.5	20.5	25.5	34	43	60	75	88	109
63	11	14.5	20.5	25.5	34	43	60	75	88	109
71	11	14.5	20.5	25.5	34	43	60	75	88	109
80	11	14.5	20.5	25.5	34	43	60	75	88	109
90	11	14.5	20.5	25.5	34	43	60	75	88	109
100	11	14.5	20.5	25.5	34	43	60	75	88	109
112	11	14.5	20.5	25.5	34	43	60	75	88	109
125	11	14.5	20.5	25.5	34	43	60	75	88	109
140	11	14.5	20.5	25.5	34	43	60	75	88	109
160	11	14.5	20.5	25.5	34	43	60	75	88	109
180	11	14.5	20.5	25.5	34	43	60	75	88	109
200	11	14.5	20.5	25.5	34	43	60	75	88	109
224	-	14.5	-	25.5	-	43	-	75	-	109
250	-	14.5	-	25.5	-	43	-	75	-	109

2.8 输出轴 d_2 上允许附加径向力

类型 DLHK3..., DLHK4..

2.8 Permissible additional radial forces on output shaft d_2 ¹⁾

Types DLHK3..., DLHK4..



允许的附加径向力 F_{R2} (kN) 作用在输出轴轴伸中部²⁾
Permissible additional radial forces F_{R2} in kN with application of force on centre of shaft end²⁾

类型 Type	布置形式 Assembly	齿轮箱规格 ¹⁾³⁾ / Gear unit sizes ¹⁾³⁾									
		5	6	7	8	9	10	11	12	13	14
DLHK3S	A/B/G/H	18	18	26	26	18	40	50	50	130	130
	C/D	29	29	40	40	40	60	85	85	190	190
DLHK4S	A/B/G/H	29	29	40	40	40	60	85	85	190	190
	C/D	18	18	26	26	18	40	50	50	130	130
DLHK3V	A/B/G/H	-	-	55	55	65	75	110	110	170	170
	C/D	-	-	65	65	80	95	135	135	210	210
DLHK4V	A/B/G/H	-	-	65	65	80	95	135	135	210	210
	C/D	-	-	55	55	65	75	110	110	170	170

1) 表中的数值为最小值。在给出作用点和作用方向时在绝大多数情况下可以允许更大的附加力。必须向我公司查询。

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) 当力不是作用在轴端中间部位时见第 17 页。

2) For application of force outside the centre of the shaft end, see page 17.

3) 应采用强度等级 8.8 级以上的底脚螺栓。
基础应干燥和去除油脂。
根据需求可以提供作用在齿轮箱输入轴 d_1 上的允许的附加径向力。

3) Use foundation bolts of min. property class 8.8.
Foundation must be dry and grease-free.
Permissible additional radial forces on input shaft d_1 on request.

2.8 输出轴 d_2 上允许附加径向力

类型 DLHK3..., DLHK4..

2.8 Permissible additional radial forces on output shaft d_2

Types DLHK3..., DLHK4..

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

F_{RZ2} 允许的外部轴向力
 Permissible external radial force
 F_{R2} 允许附加径向力, 按照第 16 页的表格
 Permissible additional radial force acc. to table on page 16
 K 作用力系数, 根据下表确定
 Factor of application of force acc. to table

规格 Size	作用力系数 k / Factor of application of force k														
	距离 z (mm) / Distance z in mm														
	-200	-150	-100	-75	-50	-25	0	25	50	75	100	150	200	250	300
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

布置形式与外形安装尺寸

Assembly And Dimensions

3.1 布置形式

3 级
类型 DLHK3, 规格 5...14

3.1 Assembly

Three stages
Types DLHK3, Sizes 5...14

DLHK3SH 实心轴 / Solid shaft			DLHK3VH 加强型实心轴 / Reinforced solid shaft	
A	B	C	D	E
F	G	H	I	
DLHK3HH 空心轴 / Hollow shaft			DLHK3HM 平键槽 GB/T1096 / Keyway GB/T1096	
A	B	G		
DLHK3KH 带花键的空心轴 to DIN5480*) / DLHK3KM Hollow shaft with involute splines acc. to DIN5480*)				
A	B	C		
D	G	H		
DLHK3DH 带缩紧盘的空心轴 *) / DLHK3DM Hollow shaft for shrink disk*)				
A	B	C		
D	G	H		
配置电机安装法兰 / With motor bell housing				
LS	RS	BS		

1) 箭头所示工作机轴的引入方向。

1) The arrow indicates the direction of insertion of the driven machine shaft.

3.1 布置形式

4 级
类型 DLHK4, 规格 5...14

3.1 Assembly

Four stages
Types DLHK4, Sizes 5...14

DLHK4SH 实心轴 / Solid shaft			DLHK4VH 加强型实心轴 / Reinforced solid shaft		
A	B	C	D	E	
F	G	H	I		
DLHK4HH 空心轴 / Hollow shaft			DLHK4HM 平键槽 GB/T1096 / Keyway GB/T1096		
A	B	G			
DLHK4KH 带花键的空心轴 to DIN5480*) / DLHK4KM Hollow shaft with involute splines acc. to DIN5480*)					
A	B	C			
D	G	H			
DLHK4DH 带缩紧盘的空心轴 *) / DLHK4DM Hollow shaft for shrink disk*)					
A	B	C			
D	G	H			
配置电机安装法兰 With motor bell housing					
LS	RS	BS			

1) 箭头所示工作机轴的引入方向。

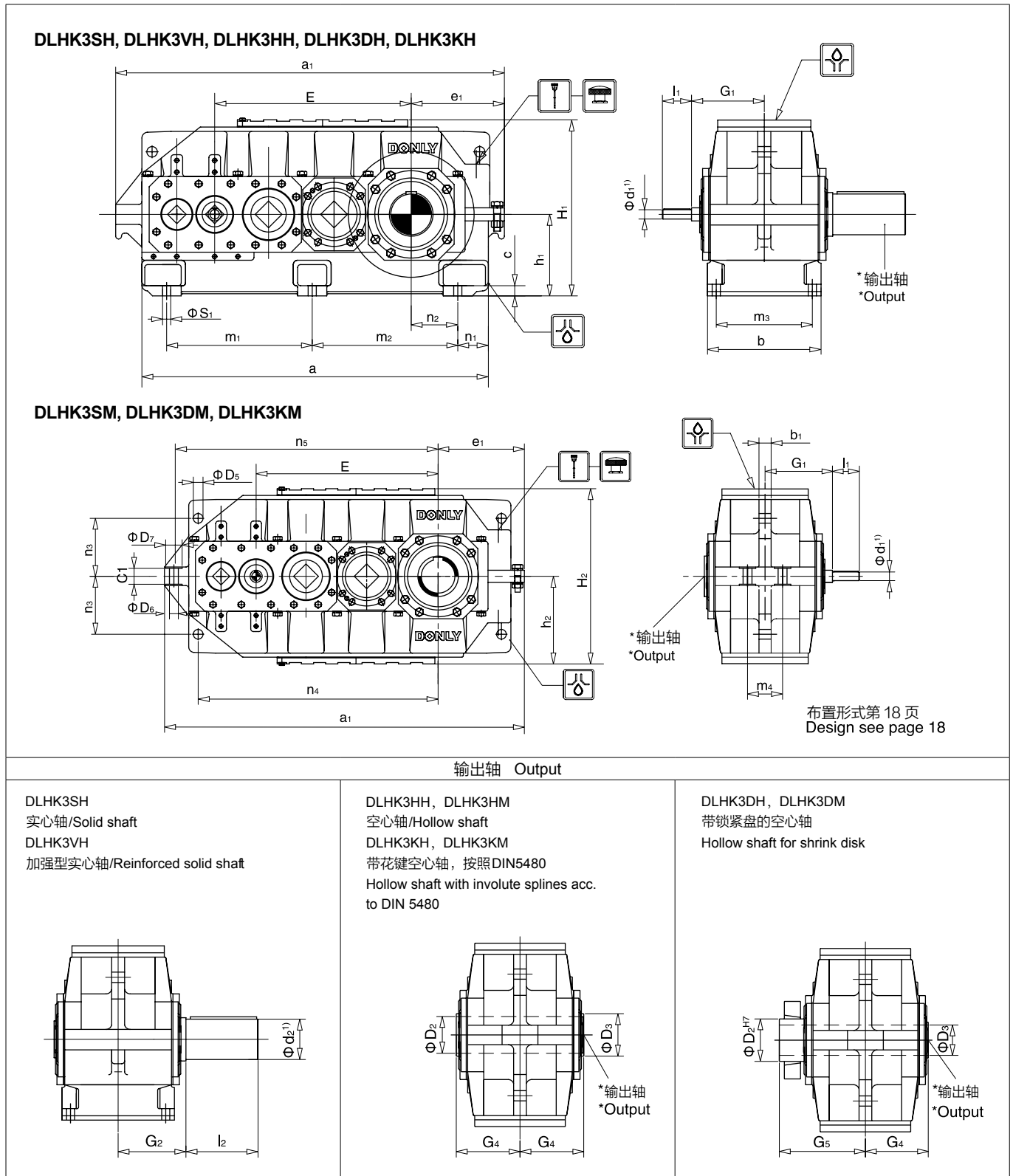
1) The arrow indicates the direction of insertion of the driven machine shaft.

3.2 外形安装尺寸

3 级
 类型 DLHK3.H, DLHK3.M
 类型 DLHK3, 规格 5...14, 卧式安装

3.2 Dimensions of gear units

Three stages
 Types DLHK3.H, DLHK3.M
 Sizes 5...14, Horizontal



1) 轴径 ≤ Φ100, 公差为 m6, 轴径 > Φ100, 公差为 n6, 有关细节见第 24-25 页
 2) 平键槽, 按照 GB/T1096

1) Shaft diameter ≤ Φ100, Tolerance m6; Shaft diameter > Φ 100, Tolerance n6, For details, see pages 24-25.
 2) Keyway GB/T1096

布置形式与外形安装尺寸

Assembly And Dimensions

3 级
 类型 DLHK3.H, DLHK3.M
 类型 DLHK3, 规格 5...14, 卧式安装

Three Stages
 Types DLHK3.H, DLHK3.M
 Sizes 5...14, Horizontal

规格 Size	尺寸 (mm) / Dimensions in mm													
	输入轴 / Input												G ₁	
	i _N = 14-25		i _N = 18-31.5		i _N = 28 - 35.5		i _N = 35.5 - 45		i _N = 40 - 50		i _N = 50 - 63			
d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	d ₁ ⁽¹⁾	l ₁	
5	50	80			38	60			32	60				155
6			50	80			38	60			32	60		155
7	55	90			45	80			40	70				190
8			55	90			45	80			40	70		190
9	65	105			55	90			50	80				230
10			65	105			55	90			50	80		230
11	80	140			70	120			60	105				270
12			80	140			70	120			60	105		270
13	90	160			80	140			70	120				315
14			90	160			80	140			70	120		315

规格 Size	尺寸 (mm) / Dimensions in mm												
	齿轮箱 / Gear units												h ₂
	a	a ₁	b	b ₁	c	c ₁	D ₅ H9	D ₆	D ₇	e ₁	E	h ₁	
5	887	1015	255	30	30	49	24	26	48	278	472	220	245
6	972	1100	255	30	30	49	24	26	48	328	507	230	255
7	1025	1155	320	30	30	59	24	33	61	272	577	240	265
8	1106	1235	320	30	30	59	24	33	61	308	622	280	305
9	1190	1335	390	45	35	69	36	33	61	320	675	280	325
10	1290	1435	390	45	35	69	36	33	61	370	725	320	365
11	1418	1570	470	65	45	79	40	39	71	370	815	320	365
12	1556	1710	470	65	45	79	40	39	71	440	885	380	425
13	1647	1830	545	80	55	89	48	39	71	430	950	380	435
14	1783	1970	545	80	55	89	48	39	71	500	1020	440	495

规格 Size	尺寸 (mm) / Dimensions in mm												
	齿轮箱 / Gear units												s ₁
	H ₁	H ₂	m ₁	m ₂	m ₃	m ₄	n ₁	n ₂	n ₃	n ₄	n ₅		
5	465	490	375	375	215	100	60	158	170	635	705	22	
6	485	510	420	420	215	100	55	213	180	670	740	22	
7	505	530	430	430	270	110	80	140	190	770	845	26	
8	585	610	470	470	270	110	80	175	225	810	890	26	
9	605	650	500	500	330	130	95	160	215	890	980	33	
10	685	730	550	550	330	130	95	210	255	940	1030	33	
11	685	730	605	605	400	150	104	200	250	1060	1160	39	
12	805	850	675	675	400	150	104	270	310	1130	1230	39	
13	815	870	712.5	712.5	465	170	110	240	300	1240	1355	45	
14	935	990	782.5	782.5	465	170	110	310	360	1305	1425	45	

规格 Size	尺寸 (mm) / Dimensions in mm															润滑油量 Oil		重量 Weight		
	输出轴 / Output															DLHK3. H	DLHK3. M	DLHK3. H	DLHK3. M	
	DLHK3SH			DLHK3VH			DLHK3HH/ DLHK3HM		DLHK3KH /DLHK3KM				DLHK3DH/DLHK3DM							
	d ₂ ⁽¹⁾	G ₂	l ₂	d ₂ ⁽¹⁾	G ₂	l ₂	D ₂ ⁽²⁾ H7	G ₄	D ₂ 花键 Involute splines		D ₃	G ₄	D ₂	D ₃	G ₄	G ₅	L	L	kg	kg
5	100	165	210	-	-	-	95	165	N 95x3x30x30x9H		100	165	100	100	165	240	20	18	380	370
6	110	165	210	-	-	-	105	165	N 95x3x30x30x9H		110	165	110	110	165	240	24	22	440	430
7	120	195	210	130	195	250	115	195	N120x3x30x38x9H		120	195	120	120	195	280	32	28	605	595
8	130	195	250	130	195	250	125	195	N120x3x30x38x9H		130	195	130	130	195	285	40	36	690	675
9	140	235	250	150	235	250	135	235	N140x3x30x45x9H		145	235	140	145	235	330	50	45	955	890
10	160	235	300	170	235	300	150	235	N140x3x30x45x9H		155	235	150	155	235	350	60	55	1100	1035
11	170	270	300	180	270	300	165	270	N170x5x30x32x9H		170	270	165	170	270	400	85	75	1535	1475
12	180	270	300	190	270	350	180	270	N170x5x30x32x9H		185	270	180	185	270	405	115	105	1820	1750
13	200	335	350	220	335	350	190	335	N190x5x30x36x9H		195	335	190	195	335	480	135	120	2400	2270
14	210	335	350	230	335	410	210	335	N190x5x30x36x9H		215	335	210	215	335	480	170	155	2860	2710

布置形式与外形安装尺寸

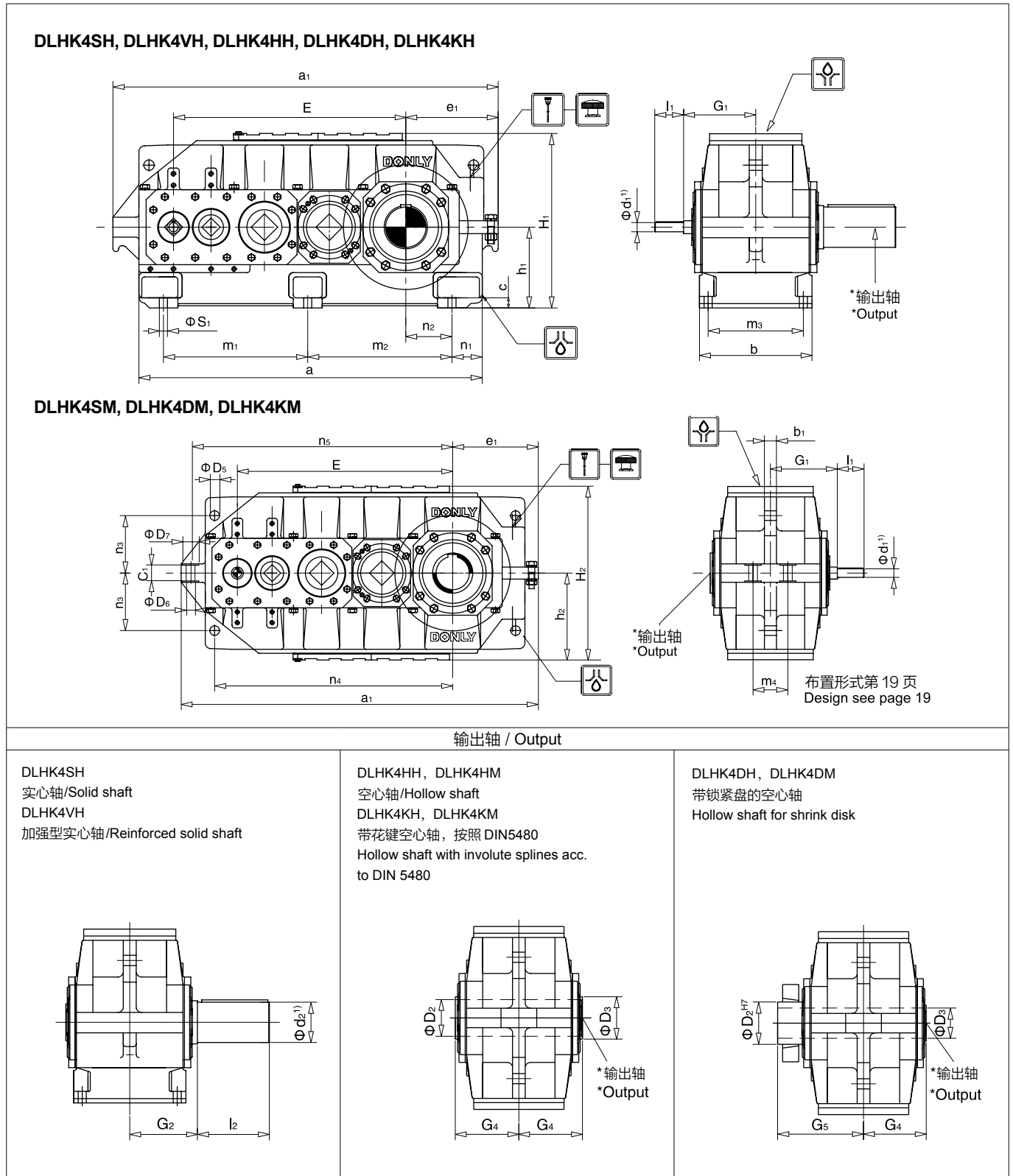
Assembly And Dimensions

3.2 外形安装尺寸

4 级
 类型 DLHK4.H, DLHK4.M
 类型 DLHK4, 规格 5...14, 卧式安装

3.2 Dimensions of gear units

Four Stages
 Types DLHK4.H, DLHK4.M
 Sizes 5...14, Horizontal



1) 轴径 ≤ Φ100, 公差为 m6, 轴径 > Φ100, 公差为 n6, 有关细节见第 24-25 页
 2) 平键槽, 按照 GB/T1096

1) Shaft diameter ≤ Φ100, Tolerance m6; Shaft diameter > Φ 100, Tolerance n6, For details, see pages 24-25
 2) Keyway GB/T1096

3.2 外形安装尺寸

4 级
 类型 DLHK4.H, DLHK4.M
 类型 DLHK4, 规格 5...14, 卧式安装

3.2 Dimensions of gear units

Four Stages
 Types DLHK4.H, DLHK4.M
 Sizes 5...14, Horizontal

规格 Size	尺寸 (mm) / Dimensions in mm												
	输入轴 / Input												
	i _N = 20 - 100		i _N = 25- 125		i _N = 112-125		i _N = 140- 160		i _N = 140- 200		i _N 180 - 250		G ₁
d ₁ ¹⁾	l ₁	d ₁ ¹⁾	l ₁	d ₁ ¹⁾	l ₁	d ₁ ¹⁾	l ₁	d ₁ ¹⁾	l ₁	d ₁ ¹⁾	l ₁		
5	40	70			30	50			24	40			155
6			40	70			30	50			24	40	155
7	45	80			35	60			30	50			190
8			45	80			35	60			30	50	190
9	60	105			45	80			35	60			230
10			60	105			45	80			35	60	230
11	70	120			50	80			42	70			270
12			70	120			50	80			42	70	270
13	85	140			60	105			50	80			315
14			85	140			60	105			50	80	315

规格 Size	尺寸 (mm) / Dimensions in mm												
	齿轮箱 / Gear units												
	a	a ₁	b	b ₁	c	c ₁	D ₅ H ₉	D ₆	D ₇	e ₁	E	h ₁	h ₂
5	887	1015	255	30	30	49	24	26	48	278	562	220	245
6	972	1100	255	30	30	49	24	26	48	328	597	230	255
7	1025	1155	320	30	30	59	24	33	61	272	687	240	265
8	1106	1235	320	30	30	59	24	33	61	308	732	280	305
9	1190	1335	390	45	35	69	36	33	61	320	805	280	325
10	1290	1435	390	45	35	69	36	33	61	370	855	320	365
11	1418	1570	470	65	45	79	40	39	71	370	975	320	365
12	1556	1710	470	65	45	79	40	39	71	440	1045	380	425
13	1647	1830	545	80	55	89	48	39	71	430	1135	380	435
14	1783	1970	545	80	55	89	48	39	71	500	1205	440	495

规格 Size	尺寸 (mm) / Dimensions in mm												
	齿轮箱 / Gear units												
	H ₁	H ₂	m ₁	m ₂	m ₃	m ₄	n ₁	n ₂	n ₃	n ₄	n ₅	s ₁	
5	465	490	375	375	215	100	60	158	170	635	705	22	
6	485	510	420	420	215	100	55	213	180	670	740	22	
7	505	530	430	430	270	110	80	140	190	770	845	26	
8	585	610	470	470	270	110	80	175	225	810	890	26	
9	605	650	500	500	330	130	95	160	215	890	980	33	
10	685	730	550	550	330	130	95	210	255	940	1030	33	
11	685	730	605	605	400	150	104	200	250	1060	1160	39	
12	805	850	675	675	400	150	104	270	310	1130	1230	39	
13	815	870	712.5	712.5	465	170	110	240	300	1240	1355	45	
14	935	990	782.5	782.5	465	170	110	310	360	1305	1425	45	

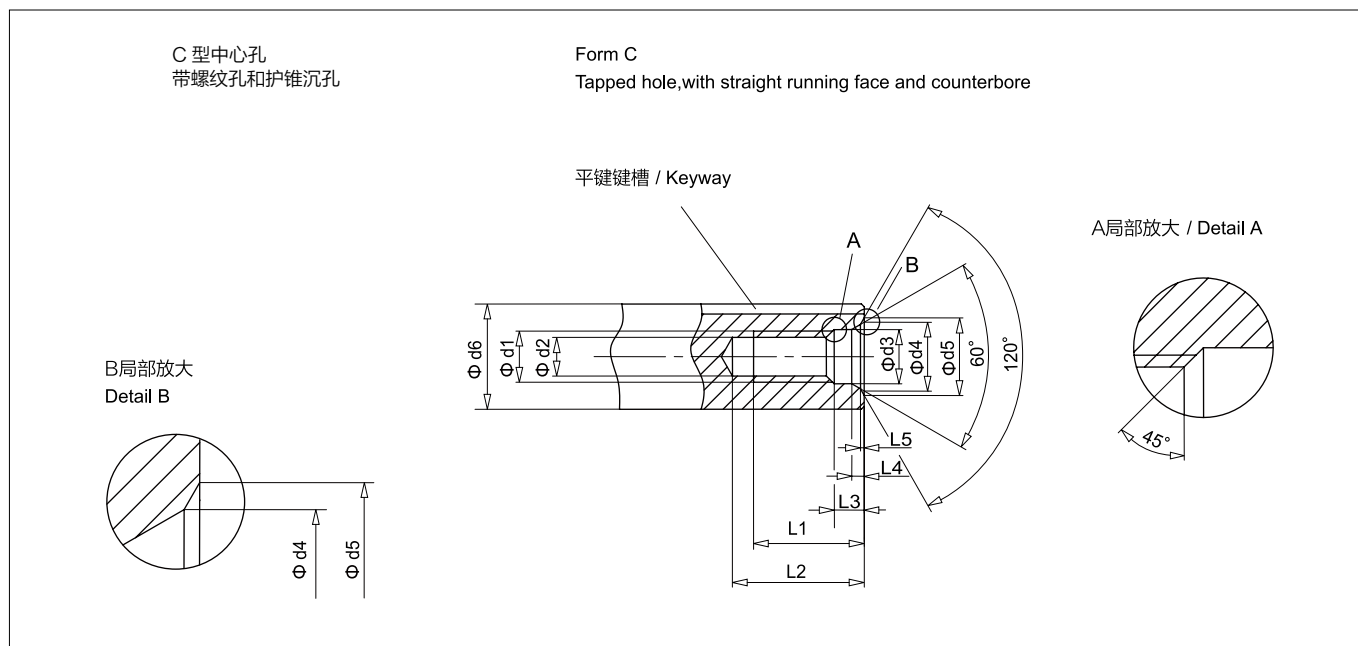
规格 Size	尺寸 (mm) / Dimensions in mm															润滑油量 Oil		重量 Weight					
	输出轴 / Output															DLHK4. H	DLHK4. M	DLHK4. H	DLHK4. M				
	DLHK4SH			DLHK4VH			DLHK4HH/ DLHK4HM		DLHK4KH / DLHK4KM					DLHK4DH/ DLHK4DM									
	d ₂ ¹⁾	G ₂	l ₂	d ₂ ¹⁾	G ₂	l ₂	D ₂ ²⁾ H7	G ₄	D ₂ 花键 Involute splines					D ₃	G ₄	D ₂	D ₃	G ₄	G ₅	L	L	kg	kg
5	100	165	210	-	-	-	95	165	N 95x3x30x30x9H					100	165	100	100	165	240	20	18	385	375
6	110	165	210	-	-	-	105	165	N 95x3x30x30x9H					110	165	110	110	165	240	24	22	445	435
7	120	195	210	130	195	250	115	195	N120x3x30x38x9H					120	195	120	120	195	280	32	28	615	605
8	130	195	250	130	195	250	125	195	N120x3x30x38x9H					130	195	130	130	195	285	40	36	700	685
9	140	235	250	150	235	250	135	235	N140x3x30x45x9H					145	235	140	145	235	330	50	45	975	910
10	160	235	300	170	235	300	150	235	N140x3x30x45x9H					155	235	150	155	235	350	60	55	1120	1055
11	170	270	300	180	270	300	165	270	N170x5x30x32x9H					170	270	165	170	270	400	85	75	1565	1505
12	180	270	300	190	270	350	180	270	N170x5x30x32x9H					185	270	180	185	270	405	115	105	1850	1780
13	200	335	350	220	335	350	190	335	N190x5x30x36x9H					195	335	190	195	335	480	135	120	2445	2315
14	210	335	350	230	335	410	210	335	N190x5x30x36x9H					215	335	210	215	335	480	170	155	2910	2760

C 型轴伸中心孔

Centre holes form C

按照 GB/T145-2001

in shaft ends GB/T145-2001



Ød ₆ ³⁾ 推荐直径范围 Recommended diameters		尺寸 (mm) / Dimensions in mm 齿轮箱 / Gear units											
大于 above	至 to	C 型中心孔 C centering	d1	d2	d3	d4	d5	L1	L2		L3	L4	L5
			7H	1)				+2	min	max	+1	≈	≈
16	21	CM 6	M6	4.9	6.4	9.6	10.5	16	20	22	5	2.8	0.4
21	24	CM 8	M8	6.6	8.4	12.2	13.2	20	25	28	6	3.3	0.4
24	30	CM 10	M10	8.3	10.5	14.9	16.3	24	30	34	7.5	3.8	0.6
30	38	CM 12	M12	10.1	13	18.1	19.8	28	37	42	9.5	4.4	0.7
38	50	CM 16	M16	13.8	17	23	25.3	36	45	50	12	5.2	1
50	85	CM 20	M20	17.2	21	28.4	31.3	42	53	59	15	6.4	1.3
85	130	CM 24	M24	20.7	25	34.2	38	50	63	68	18	8	1.6
130 ²⁾	225 ²⁾	CM 30	M30 ²⁾	26.2	31	44	48	60	77	83	17	11	1.9
225 ²⁾	320 ²⁾	CM 36	M36 ²⁾	31.6	37	55	60	74	93	99	22	15	2.3
320 ²⁾	500 ²⁾	CM 42	M42 ²⁾	37.1	43	65	71	84	105	111	26	19	2.7
500 ²⁾	710 ²⁾	CM 48	M48 ²⁾	42.5	49	76	83	94	115	121	30	23	3.2

- 1) 螺纹底孔直径按 GB/T196 第一系列确定
- 2) 不是按照标准 GB/T145-2001 确定的尺寸
- 3) 工件加工后最终直径

- 1) Drill diameters for tapping-size holes acc.to GB/T196 PT.1
- 2) Dimension not acc.to GB/T145-2001
- 3) Diameter of the finished work piece

平键和平键槽

Parallel keys and keyways

配合精度的选择 / Selection of Fits					
配合精度的选择 Selection of Fits	轴 / Shaft		轴公差 Shaft tolerance	孔公差 Bore tolerance	
	d				
	大于 / above	至 / to			
轴公差按照公司标准 Shaft tolerance acc. to Donly standard	mm		k6	H7	
	25	25	m6		
	100	100	n6		

对于重载工作条件，如带载反向回转，建议采用比较紧密的配合，轮毂键槽宽度亦应选择 GB/T1801 P9 公差等级。

For heavy-duty operating conditions, e.g. reversing under load, it is recommended that a tighter fit and for the hub keyway width, the GB/T1801 P9 tolerance is selected.

为此，用户应给出相关信息

In this case, the customer should give the relevant information.

平键紧固方式，采用无锥度连接 Drive type fastening without taper action	直径 Diameter d		宽度 Width	高度 Height	轴键槽深度 Depth of keyway in shaft	轮毂键槽深度 Depth of keyway in hub
	大于 above	至 to	b 1)	h	t ₁	d+t ₂ GB/T1095
	mm					
平键和平键槽按照 GB/T1096, GB/T1095 Parallel key and keyway acc. to GB/T1096, GB/T1095	17	22	6	6	3.5	d+2.8
	22	30	8	7	4	d+3.3
	30	38	10	8	5	d+3.3
	38	44	12	8	5	d+3.3
	44	50	14	9	5.5	d+3.8
	50	58	16	10	6	d+4.3
	58	65	18	11	7	d+4.4
	65	75	20	12	7.5	d+4.9
	75	85	22	14	9	d+5.4
	85	95	25	14	9	d+5.4
	95	110	28	16	10	d+6.4
	110	130	32	18	11	d+7.4
	130	150	36	20	12	d+8.4
	150	170	40	22	13	d+9.4
	170	200	45	25	15	d+10.4
	200	230	50	28	17	d+11.4
	230	260	56	32	20	d+12.4
	260	290	63	32	20	d+12.4
	290	330	70	36	22	d+14.4
	330	380	80	40	25	d+15.4
	380	440	90	45	28	d+17.4

1) 轮毂平键槽宽度 b 的公差带应按 GB/T1801 JS9 确定，重载条件下应按 GB/T1801 P9 确定。
1) The tolerance zone for the hub keyway width b for parallel keys is GB/T1801 JS9 or GB/T1801 P9 for heavy-duty operating conditions.

布置形式与外形安装尺寸

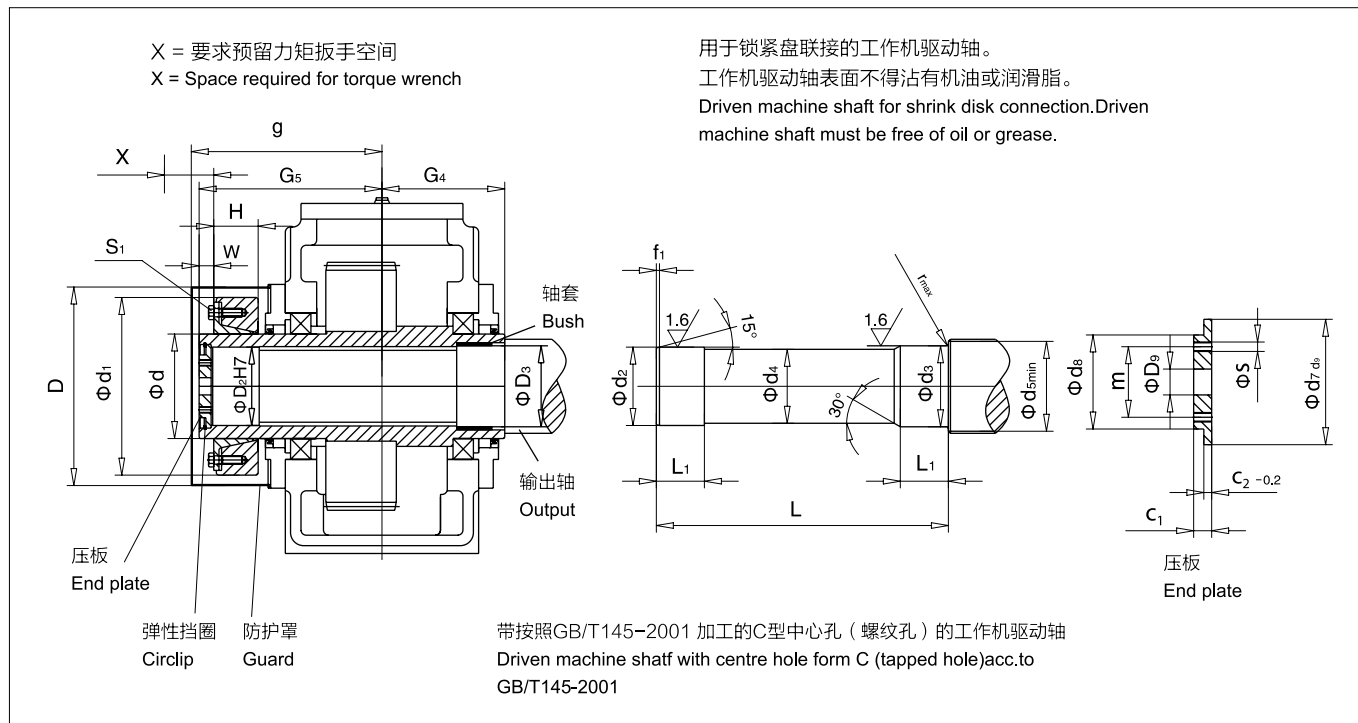
Assembly And Dimensions

带缩紧盘的空心轴

类型 DLHK3.., DLHK4..
规格 5...14

Hollow shafts with shrink disks

Types DLHK3.., DLHK4..
Sizes 5...14



类型 / Types DLHK3.H, DLHK3.M, DLHK4.H, DLHK4.M																													
齿轮箱规格 Gear unit sizes	工作棚艇 Driven machine shaft					压板 End plate								弹性挡圈 Circlip 数量 Qty	空心轴 Hollow shaft				锁紧盘 1) Shrink disk (JB/ZQ4194-2006)				螺钉 Screw D	防护罩 Guard g					
	d ₂	d ₃	d ₄	d ₅	f ₁	L	L ₁	r	c ₁	c ₂	d ₇	d ₈	D ₉		m	s	D ₂	D ₃	G ₄	G ₅	类型 Type	d			d ₁	H	W	S ₁	
	mm																		mm										
5	100 h6	100 h6	99.5	114	5	383	53	2	20	8	105	80	26	55	M10	2	105x4	100	100	165	240	125x215	125	215	53	20	M12	275	260
6	110 h6	110 h6	109.5	124	5	383	58	3	20	8	115	85	26	60	M10	2	115x4	110	110	165	240	140x230	140	230	58	20	M14	285	255
7	120 h6	120 h6	119.5	134	5	453	68	3	20	8	125	90	26	65	M12	2	125x4	120	120	195	280	155x263	155	263	62	23	M14	330	305
8	130 h6	130 h6	129.5	145	6	458	73	3	20	8	135	100	26	70	M12	2	135x4	130	130	195	285	165x290	165	290	68	23	M16	340	305
9	140 h6	145 m6	139.5	160	6	539	82	4	23	10	150	110	33	80	M12	2	150x4	140	145	235	330	175x300	175	300	68	28	M16	360	355
10	150 h6	155 m6	149.5	170	6	559	92	4	23	10	160	120	33	90	M12	2	160x4	150	155	235	350	200x350	200	350	85	28	M16	395	365
11	165 g6	170 m6	164.5	185	7	644	112	4	23	10	175	130	33	90	M12	2	175x4	165	170	270	400	220x370	220	370	103	30	M20	435	420
12	180 g6	185 m6	179.5	200	7	649	122	4	23	10	190	140	33	100	M16	2	190x4	180	185	270	405	240x405	240	405	107	30	M20	450	420
13	190 g6	195 m6	189.5	213	7	789	137	5	23	10	200	150	33	110	M16	2	200x4	190	195	335	480	260x430	260	430	119	30	M20	500	505
14	210 g6	215 m6	209.5	233	8	784	147	5	28	14	220	170	33	130	M16	2	220x5	210	215	335	480	280x460	280	460	132	30	M20	525	505

1) 锁紧盘不在供货范围之内。
如果需要请另行订购。
在订货时锁紧盘以散件形式提供。
在工作机侧的锁紧盘请垂询

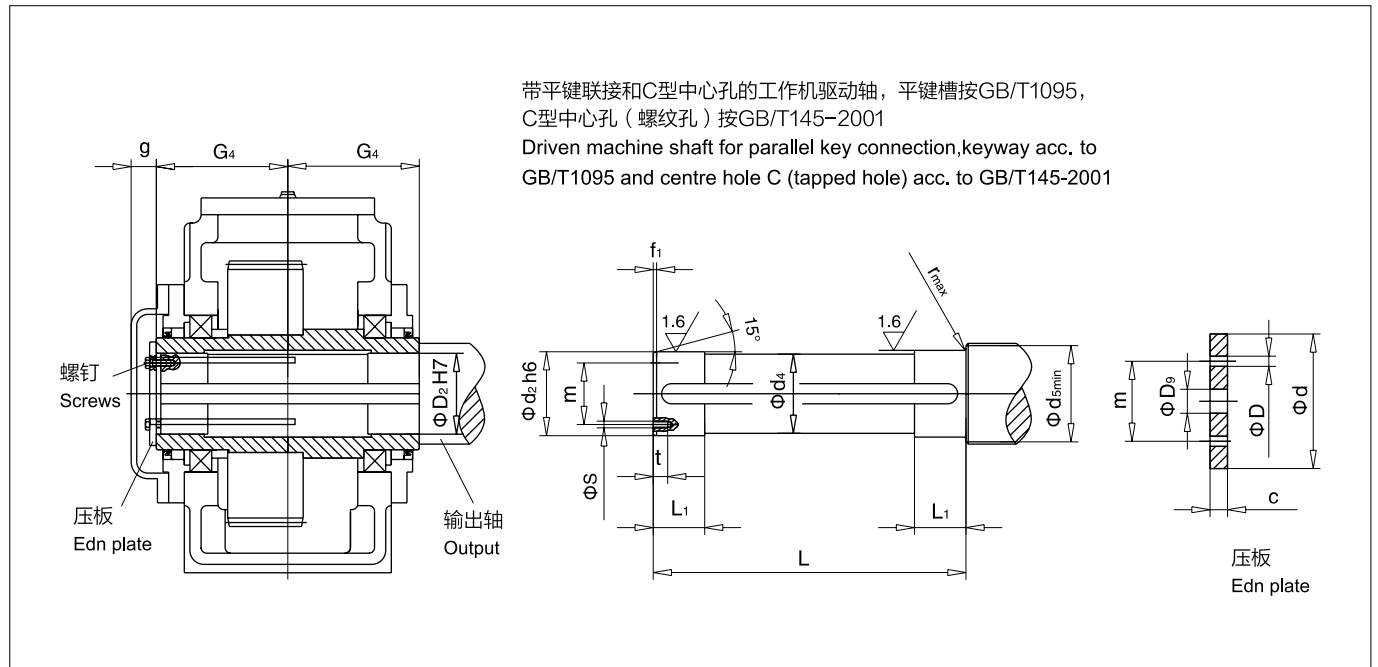
1) Shrink disk does not belong to our scope of supply.
Please order separately, if required.
In case of order, shrink disk will be supplied as loose item.
Shrink disk on machine side on request.

带平键联接的空心轴

类型 DLHK3.., DLHK4..
规格 5...14

Hollow shafts for parallel key connection

Types DLHK3.., DLHK4..
Sizes 5...14



类型 / Types DLHK3.H, DLHK3.M, DLHK4.H, DLHK4.M

齿轮箱规格 Gear unit sizes	工作机驱动轴 Driven machine shaft									压板 End plate					螺钉 Screws		空心轴 Hollow shaft		
	d ₂	d ₄	d ₅	f ₁	L	L ₁	r	s	t	c	D	D ₃	d	m	规格 / Size	数量 Qty	D ₂	G ₄	g
	mm																mm		
5	95	94.5	105	5	328	40	1.6	M10	18	10	11	26	120	70	M10×25	2	95	165	40
6	105	104.5	116	5	328	45	1.6	M10	18	10	11	26	120	70	M10×25	2	105	165	40
7	115	114.5	126	5	388	50	1.6	M12	20	12	13.5	26	140	80	M12×30	2	115	195	40
8	125	124.5	136	6	388	55	2.5	M12	20	12	13.5	26	150	85	M12×30	2	125	195	40
9	135	134.5	147	6	467	60	2.5	M12	20	12	13.5	33	160	90	M12×30	2	135	235	45
10	150	149.5	162	6	467	65	2.5	M12	20	12	13.5	33	185	110	M12×30	2	150	235	45
11	165	164.5	177	7	537	70	2.5	M16	28	15	17.5	33	195	120	M16×40	2	165	270	45
12	180	179.5	192	7	537	75	2.5	M16	28	15	17.5	33	220	130	M16×40	2	180	270	45
13	190	189.5	206	7	667	80	3	M16	28	18	17.5	33	230	140	M16×40	2	190	335	45
14	210	209.5	226	8	667	85	3	M16	28	18	17.5	33	250	160	M16×40	2	210	335	45

平键不在供货范围之内。如果需要请另行订购。

Parallel key does not belong to our scope of supply. Please order separately, if required.

布置形式与外形安装尺寸

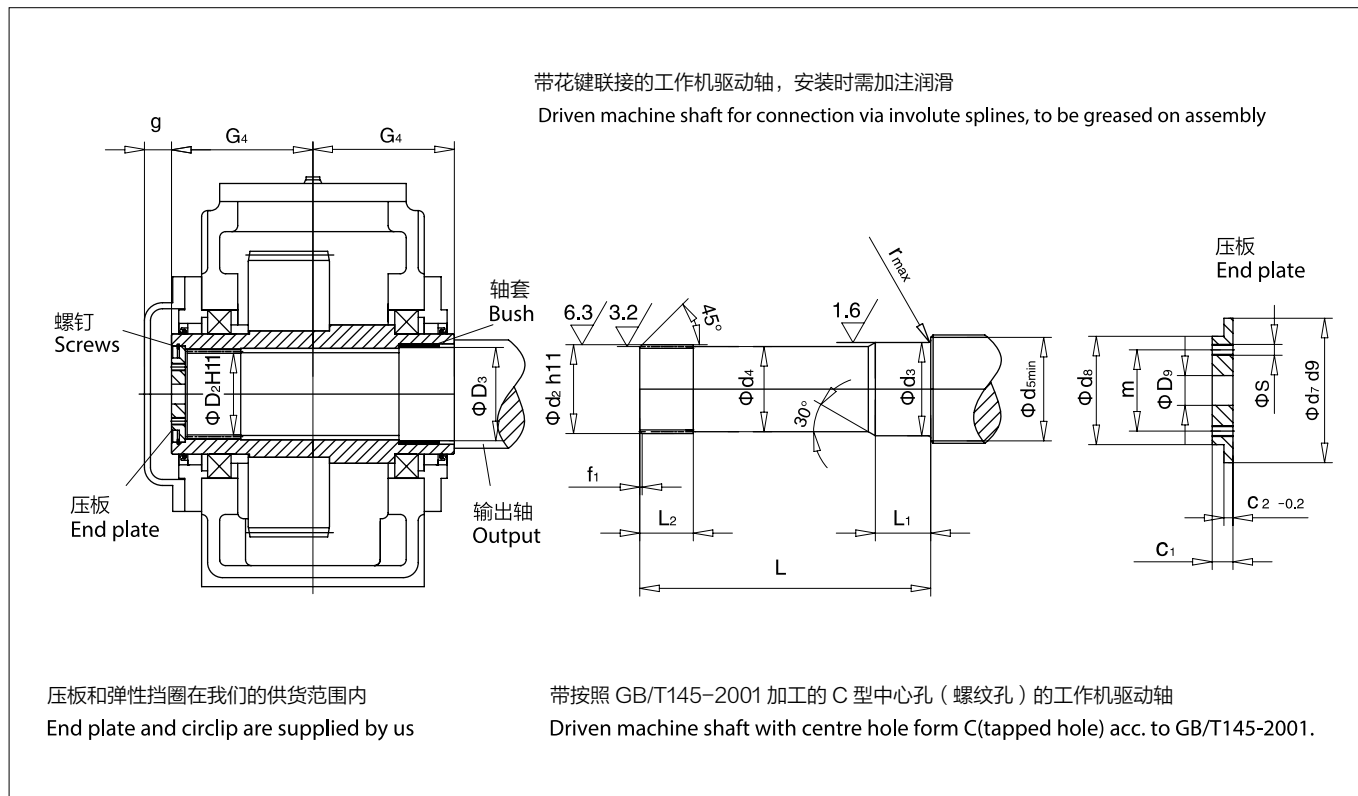
Assembly And Dimensions

带花键的空心轴，按照 DIN 5480

类型 DLHK3.., DLHK4..
规格 5...14

Hollow shafts with involute splines acc. to DIN 5480

Types DLHK3.., DLHK4..
Sizes 5...14



类型 /Types DLHK3.H,DLHK3.M,DLHK4.H,DLHK4.M																								
齿轮箱规格 Gear unit sizes	渐开线花键 Involute splines DIN5480	工作机驱动轴 Driven machine shaft										压板 End plate							弹性挡圈 Circlip	空心轴 Hollow shaft				螺钉 Screw
		d ₂	d ₃	d ₄	d ₅	f ₁	L	L ₁	L ₂	r	c ₁	c ₂	d ₇	d ₈	D ₉	m	s	数量 Qty		D ₂	D ₃	G ₄	g	
		mm										mm								mm				
5	W 95x3x30x30x8f	94.4	100 h6	93	114	3	308	53	90	2	20	8	105	80	26	55	M10	2	105×4	89	100	165	40	M 24
6	W 95x3x30x30x8f	94.4	110 h6	93	124	3	308	58	90	3	20	8	105	80	26	55	M10	2	105×4	89	110	165	40	M 24
7	W120x3x30x38x8f	119.4	120 h6	118	134	3	368	68	105	3	20	8	125	90	26	65	M12	2	125×4	114	120	195	40	M 24
8	W120x3x30x38x8f	119.4	130 h6	118	145	3	368	73	105	3	20	8	125	90	26	65	M12	2	125×4	114	130	195	40	M 24
9	W140x3x30x45x8f	139.4	145 m6	138	160	3	444	82	125	4	23	10	150	110	33	80	M12	2	150×4	134	145	235	45	M 30
10	W140x3x30x45x8f	139.4	155 m6	138	170	3	444	92	125	4	23	10	150	110	33	80	M12	2	150×4	134	155	235	45	M 30
11	W170x5x30x32x8f	169	170 m6	168	185	5	514	112	150	4	23	10	175	130	33	90	M12	2	175×4	160	170	270	45	M 30
12	W170x5x30x32x8f	169	185 m6	168	200	5	514	122	150	4	23	10	175	130	33	90	M12	2	175×4	160	185	270	45	M 30
13	W190x5x30x36x8f	189	195 m6	188	213	5	644	137	180	5	23	10	200	150	33	110	M16	2	200×4	180	195	335	45	M 30
14	W190x5x30x36x8f	189	215 m6	188	233	5	644	147	180	5	23	10	200	150	33	110	M16	2	200×4	180	215	335	45	M 30

平键不在供货范围之内。如果需要请另行订购。

Parallel key does not belong to our scope of supply. Please order separately, if required.

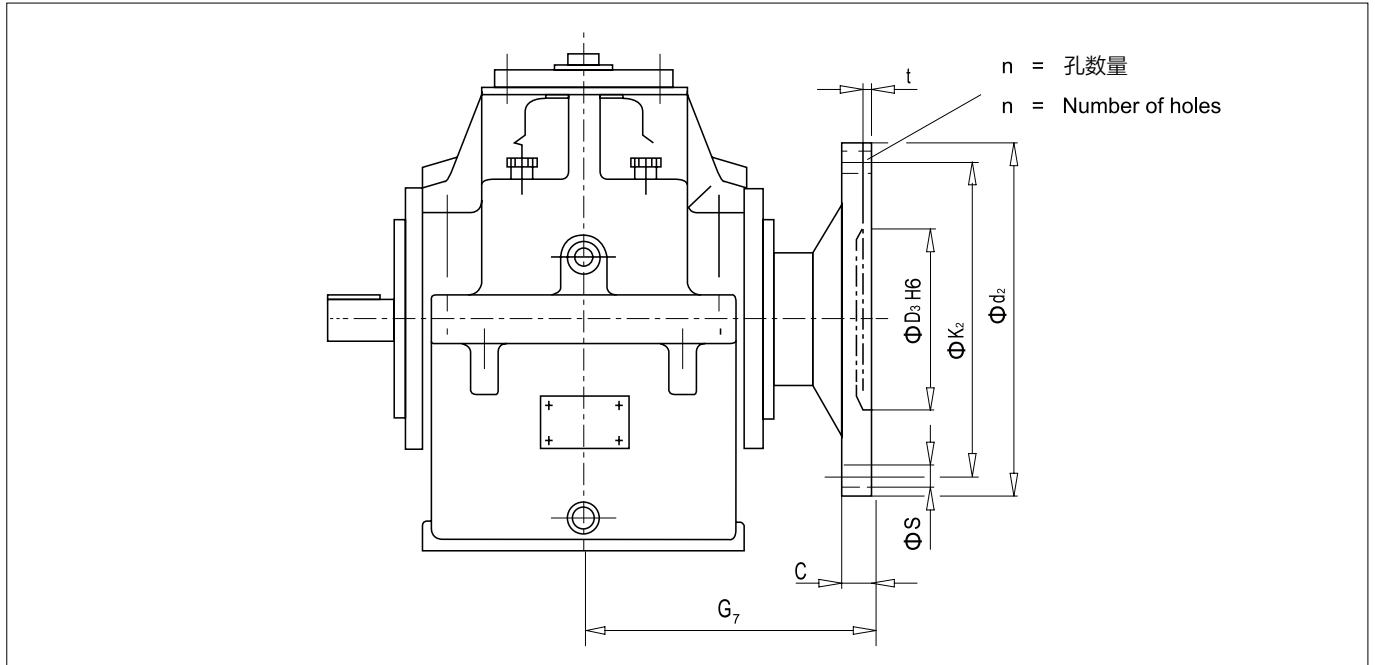
法兰输出轴齿轮箱

类型 DLHK3.., DLHK4..
规格 5...14

With flanged shaft d_2

Types DLHK3.., DLHK4..
Sizes 5...14

DLHK.FH, DLHK.FM



齿轮箱规格 Gear unit sizes	c mm	d_2 mm	D_3 mm	k_2 mm	n	s mm	t mm	G_7 mm	附加重量 Add. weight kg
5	25	300	150	260	16	22	10	255	35
6	25	320	160	280	18	22	10	255	40
7	30	370	180	320	16	26	10	300	50
8	30	390	190	340	18	26	10	300	55
9	38	430	220	380	20	26	12	350	85
10	38	470	240	420	22	26	12	350	90
11	42	510	260	450	18	33	12	400	130
12	42	540	280	480	22	33	12	400	140
13	48	580	310	500	20	33	14	480	160
14	48	620	310	540	24	33	14	480	170

实际传动比与转动惯量

Actual Ratios Mass Moments Of Inertia

4.1 实际传动比

类型 DLHK3.., DLHK4..
规格 5...14

4.1 Actual ratios

Types DLHK3.., DLHK4..
Sizes 5...14

实际传动比 i / Actual ratios i										
类型 DLHK3.. / Types DLHK3..										
i _N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
实际传动比 i / Actual ratios i										
14	13.945	-	14.258	-	13.886	-	14.598	-	13.788	-
16	16.133	-	15.711	-	16.031	-	16.293	-	16.042	-
18	17.792	17.266	18.265	17.880	17.700	17.357	18.248	18.769	17.813	17.071
20	19.688	19.974	20.283	19.701	19.607	20.039	20.529	20.948	19.856	19.861
22.4	21.875	22.028	22.623	22.903	23.040	22.125	23.225	23.462	22.240	22.054
25	24.427	24.375	25.270	25.434	25.826	24.509	26.459	26.394	24.306	24.583
28	27.443	27.083	28.010	28.369	27.409	28.800	28.332	29.860	28.438	27.535
31.5	31.063	30.243	31.226	31.688	31.050	32.283	32.174	34.019	31.818	30.093
35.5	35.486	33.977	35.055	35.123	34.714	34.261	37.032	36.427	35.875	35.208
40	39.861	38.458	39.690	39.157	39.316	38.813	40.145	41.366	38.224	39.394
45	45.208	43.935	45.416	43.958	45.000	43.393	45.620	47.613	43.750	44.417
50	48.382	49.352	48.815	49.770	48.375	49.145	52.463	51.615	49.412	47.325
56	-	55.972	-	56.950	-	56.250	-	58.654	-	54.167
63	-	59.902	-	61.213	-	60.469	-	67.452	-	61.176

实际传动比 i / Actual ratios i										
类型 DLHK4.. / Types DLHK4..										
i _N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
实际传动比 i / Actual ratios i										
20	20.733	-	21.053	-	20.031	-	20.599	-	21.067	-
22.4	22.384	-	23.162	-	22.491	-	22.697	-	22.745	-
25	26.010	25.749	26.065	26.626	23.830	24.951	25.129	26.435	26.939	26.164
28	28.081	27.713	28.677	29.044	26.756	28.114	27.688	29.182	29.084	28.161
31.5	32.525	32.303	33.130	32.965	32.704	29.683	33.476	32.249	31.782	33.456
35.5	35.115	34.767	36.449	35.960	36.220	33.446	36.886	35.599	34.313	36.009
40	40.804	40.394	41.018	41.899	38.905	40.736	40.839	42.961	40.639	39.471
45	44.054	43.476	45.127	45.705	43.683	45.900	44.998	47.425	43.875	42.482
50	53.221	50.676	51.740	51.875	49.636	48.461	52.313	52.410	51.802	50.471
56	57.459	54.542	56.923	56.588	55.732	54.604	57.641	57.855	55.927	54.321
63	68.819	66.097	64.754	65.435	66.009	61.827	68.377	67.135	65.350	64.334
71	74.299	71.140	71.241	71.380	74.115	69.665	75.342	74.110	70.554	69.243
80	77.052	85.468	77.307	81.894	76.517	82.221	79.750	87.751	81.603	81.160
90	92.285	91.989	87.941	89.334	90.627	92.644	94.604	96.868	95.352	87.353
100	99.634	95.398	96.752	96.941	101.256	95.646	104.239	102.536	102.946	101.033
112	115.040	114.612	110.761	111.220	115.245	112.886	116.902	121.408	114.639	118.421
125	124.201	123.356	121.858	121.324	129.398	127.195	128.808	134.022	123.769	127.457
140	147.908	142.872	145.898	140.081	147.888	143.550	148.588	150.024	145.157	142.375
160	159.688	153.773	160.515	152.806	166.050	161.747	163.722	165.611	156.717	153.238
180	184.084	183.693	183.523	184.518	188.325	184.212	187.341	190.688	179.375	180.276
200	204.567	197.708	197.184	201.281	201.547	207.563	201.364	210.500	192.828	194.031
224	-	227.914	-	230.132	-	235.406	-	240.866	-	222.083
250	-	253.273	-	247.263	-	251.934	-	258.896	-	238.740

4.2 转动惯量 J_1

类型 DLHK3.., DLHK4..
规格 5...14

转动惯量 J_2 (kgm²) 是指相对于齿轮箱输出轴 d_2 的转动惯量, 可按下列公式计算: $J_2 = i_N^2 \times J_1$

转动惯量 J_1 (kgm²) 是指相对于齿轮箱不带冷却风扇的输入轴 d_1 的转动惯量。

如果输入轴带有冷却风扇, 则应加上 J_L 。

敬请垂询带法兰轴的齿轮箱。

4.2 Mass moments of inertia J_1

Types DLHK3.., DLHK4..
Sizes 5...14

The mass moment of inertia J_2 in kgm² refers to the output shaft d_2 of a gear units and is calculated with the following formula: $J_2 = i_N^2 \times J_1$

The mass moment of inertia J_1 in kgm² refers to the input shaft d_1 of a gear units without fan.

For shaft d_1 with fan, J_L has to be added.

Values for gear units with flanged shaft on request

相对于齿轮箱输入轴 d_1 的转动惯量 J_1 (kgm ²) Mass moments of inertia J_1 in kgm ² referring to shaft d_1										
类型 / Types DLHK3..										
i_N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
相对于齿轮箱输入轴 d_1 的转动惯量 J_1 (kgm ²) / Mass moments of inertia J_1 in kgm ² referring to shaft d_1										
14	0.0307	-	0.0807	-	0.1804	-	0.4692	-	1.0609	-
16	0.0256	-	0.0660	-	0.1483	-	0.4106	-	0.9246	-
18	0.0228	0.0317	0.0576	0.0841	0.1300	0.1876	0.3589	0.4907	0.8047	1.0988
20	0.0203	0.0264	0.0501	0.0685	0.1138	0.1538	0.2921	0.4283	0.6985	0.9555
22.4	0.0165	0.0234	0.0435	0.0597	0.0975	0.1345	0.2521	0.3733	0.6041	0.8297
25	0.0145	0.0208	0.0384	0.0518	0.0819	0.1174	0.2242	0.3026	0.5308	0.7186
28	0.0112	0.0169	0.0314	0.0448	0.0664	0.1004	0.1808	0.2605	0.4107	0.6201
31.5	0.0096	0.0148	0.0250	0.0395	0.0557	0.0842	0.1536	0.2313	0.3515	0.5441
35.5	0.0081	0.0115	0.0211	0.0323	0.0469	0.0682	0.1287	0.1865	0.2972	0.4205
40	0.0068	0.0098	0.0176	0.0257	0.0381	0.0571	0.1101	0.1581	0.2572	0.3593
45	0.0057	0.0082	0.0149	0.0216	0.0349	0.0480	0.0940	0.1322	0.2167	0.3033
50	0.0048	0.0069	0.0135	0.0180	0.0290	0.0389	0.0788	0.1130	0.1760	0.2625
56	-	0.0058	-	0.0152	-	0.0357	-	0.0963	-	0.2208
63	-	0.0049	-	0.0138	-	0.0296	-	0.0806	-	0.1791

相对于齿轮箱输入轴 d_1 的转动惯量 J_1 (kgm ²) Mass moments of inertia J_1 in kgm ² referring to shaft d_1										
类型 / Types DLHK4..										
i_N	齿轮箱规格 / Gear unit sizes									
	5	6	7	8	9	10	11	12	13	14
相对于齿轮箱输入 d_1 轴的转动惯量 J_1 (kgm ²) / Mass moments of inertia J_1 in kgm ² referring to shaft d_1										
20	0.0197	-	0.0525	-	0.1279	-	0.3309	-	0.7216	-
22.4	0.0196	-	0.0522	-	0.1268	-	0.3283	-	0.7165	-
25	0.0161	0.0202	0.0430	0.0540	0.1015	0.1314	0.2743	0.3408	0.5655	0.7386
28	0.0160	0.0200	0.0428	0.0536	0.1008	0.1297	0.2725	0.3370	0.5624	0.7318
31.5	0.0096	0.0164	0.0246	0.0440	0.0586	0.1038	0.1507	0.2810	0.3584	0.5758
35.5	0.0096	0.0163	0.0245	0.0437	0.0582	0.1026	0.1497	0.2784	0.3563	0.5716
40	0.0082	0.0098	0.0208	0.0252	0.0487	0.0599	0.1293	0.1544	0.2937	0.3655
45	0.0081	0.0097	0.0207	0.0250	0.0484	0.0592	0.1286	0.1530	0.2924	0.3626
50	0.0061	0.0083	0.0154	0.0212	0.0360	0.0495	0.0919	0.1318	0.2112	0.2980
56	0.0060	0.0082	0.0154	0.0211	0.0359	0.0491	0.0915	0.1308	0.2104	0.2962
63	0.0053	0.0061	0.0129	0.0157	0.0315	0.0366	0.0796	0.0935	0.1852	0.2138
71	0.0053	0.0061	0.0129	0.0156	0.0314	0.0363	0.0793	0.0929	0.1847	0.2128
80	0.0038	0.0053	0.0099	0.0130	0.0231	0.0318	0.0609	0.0806	0.1348	0.1868
90	0.0034	0.0053	0.0086	0.0130	0.0209	0.0317	0.0545	0.0802	0.1217	0.1861
100	0.0034	0.0039	0.0086	0.0100	0.0208	0.0233	0.0544	0.0616	0.1215	0.1360
112	0.0021	0.0034	0.0053	0.0087	0.0126	0.0210	0.0320	0.0550	0.0724	0.1226
125	0.0021	0.0034	0.0053	0.0086	0.0126	0.0209	0.0319	0.0548	0.0722	0.1222
140	0.0014	0.0021	0.0037	0.0054	0.0086	0.0127	0.0219	0.0323	0.0486	0.0729
160	0.0014	0.0021	0.0037	0.0053	0.0086	0.0127	0.0219	0.0322	0.0485	0.0727
180	0.0012	0.0014	0.0032	0.0037	0.0073	0.0087	0.0185	0.0221	0.0445	0.0489
200	0.0010	0.0014	0.0026	0.0037	0.0062	0.0086	0.0171	0.0220	0.0375	0.0488
224	-	0.0012	-	0.0032	-	0.0074	-	0.0187	-	0.0447
250	-	0.0010	-	0.0026	-	0.0062	-	0.0172	-	0.0377

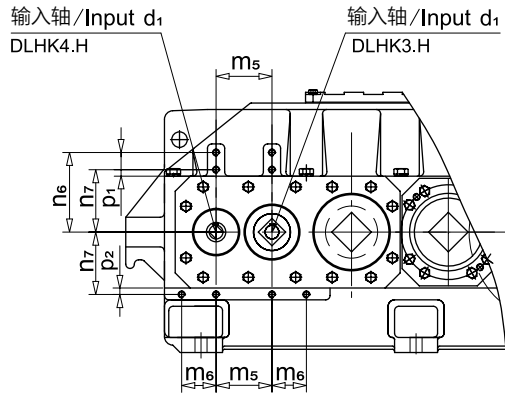
5.1 电机联接

类型 DLHK3.., DLHK4..
规格 5...14

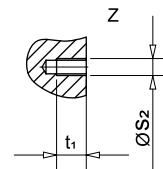
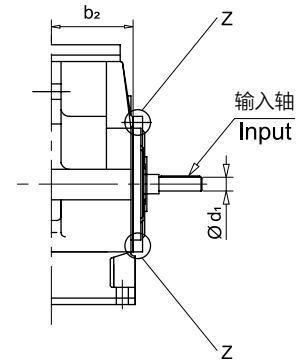
5.1 Motor connection

Types DLHK3.., DLHK4..
Sizes 5...14

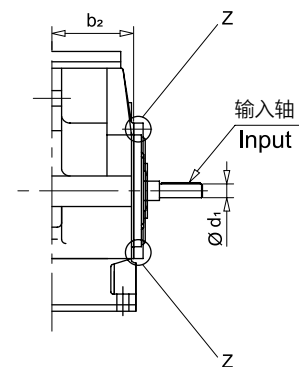
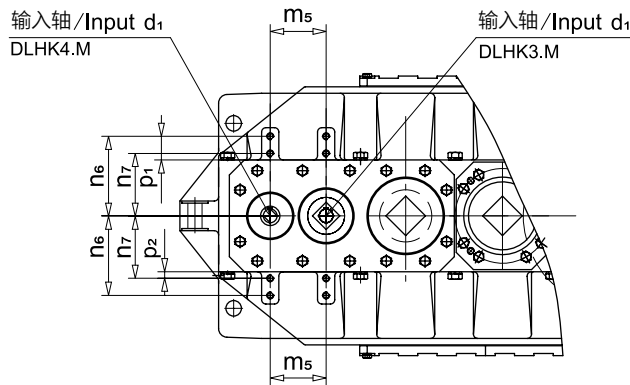
DLHK3.H, DLHK4.H



两侧均有用于固定法兰的孔
Holes for flange mounting on both sides



DLHK3.M, DLHK4.M



规格 Size	尺寸 (mm) / Dimensions in mm								
	b ₂	m ₅	m ₆	n ₆	n ₇	p ₁	p ₂	s ₂	t ₁
5	127.5	90	60	120	90	50	20	M16	24
6	127.5	90	60	120	90	50	20	M16	24
7	150	110	60	140	105	65	30	M20	29
8	150	110	60	140	105	65	30	M20	29
9	185	130	80	165	125	67.5	27.5	M20	29
10	185	130	80	165	125	67.5	27.5	M20	29
11	215	160	95	205	140	95	30	M20	29
12	215	160	95	205	140	95	30	M20	29
13	272.5	185	110	250	160	117.5	27.5	M20	29
14	272.5	185	110	250	160	117.5	27.5	M20	29

5.2 鼓形制动器的联接尺寸

类型 DLHK3.., DLHK4..
规格 5...14

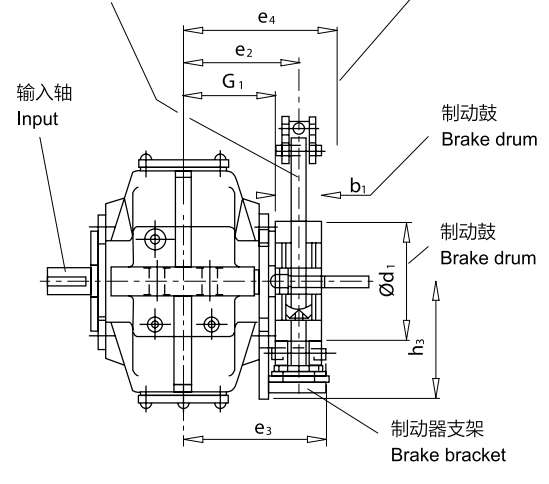
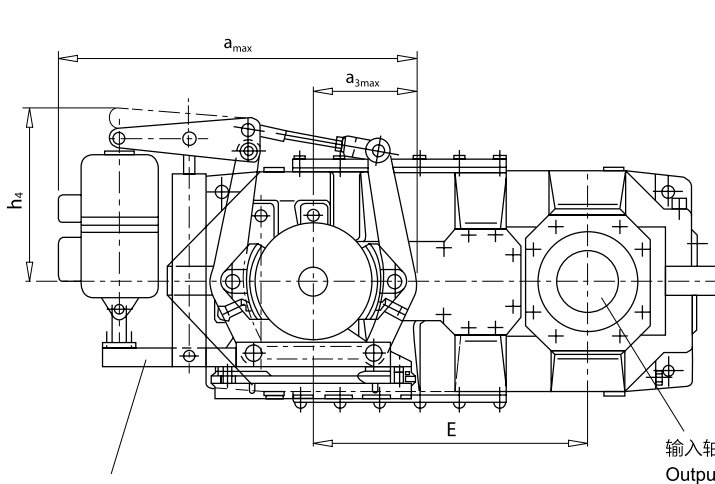
5.2 Connection dimensions for drum brake

Types DLHK3.., DLHK4..
Sizes 5...14

DLHK3.M, DLHK4.M

制动器, 未画上制动器弹簧和通风设备
(通风设备宽度尺寸 b_{max} 按照JB/T6406-2006)
Brake shown without brake spring and without thrustor
(Width b_{max} of thrust or acc, to JB/T6406-2006)

通风设备的外边缘
Outer eedge of thrustor



外部双夹具鼓形制动器, 按照JB/T6406-2006
(附图上未画上精调整装置)
External double-shoe drum brake acc, to JB/T6406-2006
(Automatic wear compensation not shown in the illustration)

规格 Size	鼓形制动器 按照 JB/ T6406 Drum brake acc. to JB/T6406 类 型 / 规格 Types / Sizes	制动鼓 Brake drum $d_1 b_1$ mm		尺寸 (mm) / Dimensions in mm							
				a_{max}	a_{3max}	G_1	e_2	e_3	e_4	h_3	h_4
5/6	YWZ5-200	200	80	615	165	160	200	245.5	278	212	315
	YWZ5-250	250	100	740	200	160	210	264	305	242	370
	YWZ5-315	315	125	835	245	160	222.5	286.5	317	282	430
7/8	YWZ5-250	250	100	740	200	200	250	304	345	245	370
	YWZ5-315	315	125	835	245	195	257.5	321.5	352	285	430
9/10	YWZ5-315	315	125	835	245	235	297.5	361.5	392	295	430
	YWZ5-400	400	160	980	300	235	315	393.5	430	345	495
11/12	YWZ5-315	315	125	835	245	280	342.5	406.5	437	300	430
	YWZ5-400	400	160	980	300	275	355	433.5	470	350	495
	YWZ5-500	500	200	1125	365	275	375	471	490	410	530
13/14	YWZ5-315	315	125	835	245	315	377.5	441.5	472	350	430
	YWZ5-400	400	160	980	300	315	395	473.5	510	360	495
	YWZ5-500	500	200	1125	365	315	415	511	530	420	530

	齿轮箱规格 / Gear unit sizes										
	5	6	7	8	9	10	11	12	13	14	
	中心距 (mm) / Total centre distance E in mm										
DLHK3.M	472	507	577	622	675	725	815	885	950	1020	
DLHK4.M	562	597	687	732	805	855	975	1045	1135	1205	

外部联接说明

External Connection Description

5.3 三点式箱体支撑

类型 DLHK3.., DLHK4..
规格 5...14

5.3 Three points supporting

Types DLHK3.., DLHK4..
Sizes 5...14

DLHK.SM, DLHK.VM

配置 1 个或 2 个轴端的实心轴
Solid shaft with one or two shaft ends

其他连接尺寸见第 20~23 页
For other fitting dimensions, see pages 20~23

规格 Size	尺寸 (mm) / Dimensions in mm			
	b ₃	D ₆ (h9)	f ^{+0.2}	G ₆
5	325	185	20	210
6	325	195	20	210
7	390	225	25	250
8	390	230	25	250
9	460	260	30	290
10	460	290	30	290
11	550	310	40	345
12	550	330	40	345
13	635	365	40	400
14	635	365	40	400

采用三点式箱体支撑具有如下特点:

两个支撑点位于至输出轴侧与机箱孔同心的轮毂连接部位, 第三个支撑点则在输入轴侧的机箱端, 允许至结合部。

优点:

- 在装配时或在原动力作用下机箱不会变形。
- 在安装时齿轮箱自动滑动至适当部位并通过方形夹固定在输出轴轮毂上并用螺栓固定在第三个支撑点上。
- 输出端附加力不是通过机箱壁而是直接通过轮毂轴承加以传导。
- 输出轴和电机轴的同心度在拆卸齿轮箱后保持不变。

The three-point housing support shows the following characteristics:

Two contact points at the hub shoulders in coaxial relation to the output side housing bore, third contact point at the input side housing end, tolerated in relation to the parting line.

Advantages:

- Deformation of the housing during assembly or under the influence of motive forces is impossible.
- During installation, the gear units moves itself into the mounting sition. At the output side hubs, it is fastened by means of shackles, and at the third contact point by means of a bolt.
- The forces on the output side are not transmitted via the housing walls but directly via the hub bearings.
- After each removal of the gear units, input shaft and motor shaft remain alignment.

箱体支撑 (布置形式示例)
Housing support (Example)

固定轴承侧按照可接近程度加以选择
Select fixed bearing side in accordance with accessibility

轮毂支撑 / Hub support 接触部位 / Contact point

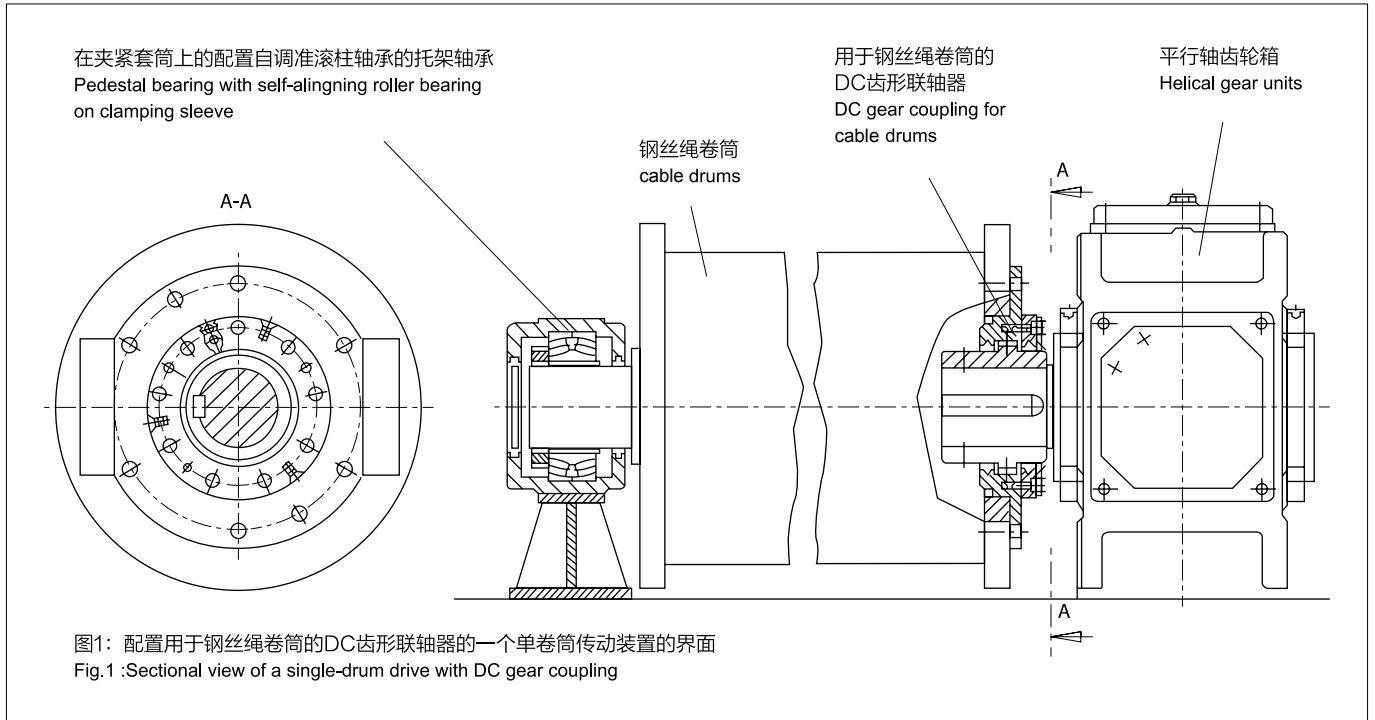
固定轴承 Y / Fixed bearing Y 浮动轴承 Z / Floating bearing Z
局部放大 / Detail 局部放大 / Detail

在箱体上 / at the housing X 局部放大 / Detail X

在轮毂支撑上 / at the hub support

用于钢丝绳卷筒的 DC 齿形联轴器

DC Gear coupling for cable drums

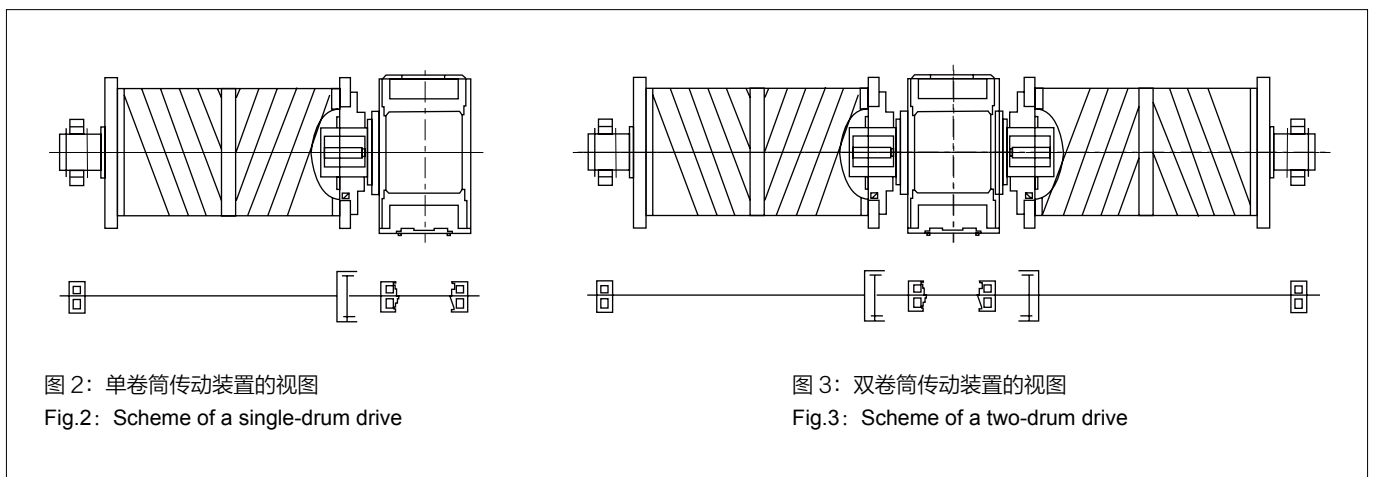


用于钢丝绳卷筒的 DC 齿形联轴器其作用在于传输扭矩和承载径向载荷。采用这种联轴器可以补偿在起重设备上在升降机构卷筒和减速机之间出现的轴对中偏差。这种类型的偏差是由装配误差承载元件的形变，制造误差等产生的。设计元件快速和安全的装配（不包括松动部件）。

DC gear couplings for cable drums serve to transmit torques and absorb radial loads. The couplings compensate alignment errors which occur in crane installations between hoisting gear drum and gear units. Such deviations may be caused by assembly faults, deformation of the supporting members, defects due to workmanship, etc. The design permits fast and safe assembly (no loose parts).

联轴器的外部部件（联轴器法兰）安装和用螺栓固定在卷筒边壁上。扭矩经联轴器法兰平面传输到升降机构卷筒上焊接的部件上（见图 1 中的 A-A 截面）。在传动装置（图 2 和图 3）中 DC 联轴器起着浮动轴承的作用。因此外部的卷筒轴承作为固定轴承应用。这里建议采用自调准滚柱轴承以便能够补偿角对中偏差。

The external part of the coupling (coupling flange) is inserted into and fastened to the lateral drum wall. The torque is transmitted to the segments welded on the hoisting gear drum through driving faces on the coupling flange (see figure 1, sectional view A-A). In the drive arrangements shown in figures 2 and 3 the DC coupling acts as floating bearing. Therefore, the outer drum bearing has to be a fixed bearing. For this purpose, the use of a self-aligning roller bearing is recommended which would also absorb any possible angular displacement.



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