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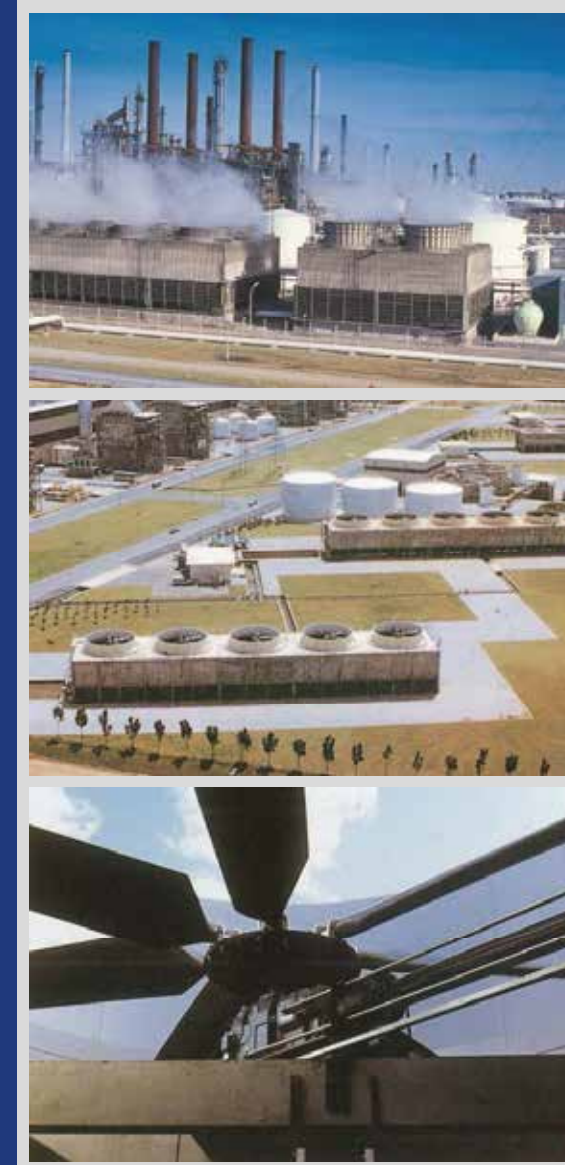
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Hansen P4 Hansen M4ACC

Powerful solutions for cooling towers and air cooled condensers

关于冷却塔和空冷凝汽器的强大解决方案

COMPLETE AND POWERFUL SOLUTIONS FOR COOLING TOWERS

Because of the severe demands placed on cooling tower fan drives, Hansen industrial gearboxes are specially equipped to withstand exacting operating conditions, while still using a maximum of standard components. Taking these operating conditions into account, several accessories are included as standard. Hansen Industrial Transmissions nv designs, creates and services flexible gear units that can be adapted to specific requirements. This way Hansen Industrial Transmissions nv created a range of drive solutions suitable for the international cooling tower market. Proof of the products' reliability is the ISO 9001 quality certificate, showing outstanding quality, supported by an international network of after-sales Services Centres. Using standard components, we offer a range of gear units fully customised to the specific needs of the industry applications.

冷却塔应用的强有力解决方案

由于冷却塔应用对于风机驱动装置的诸多需求，汉森研发，设计和制造了灵活多样的冷却塔用减速机系列，来满足全球市场的需求。

考虑到冷却塔应用的特殊性，许多附件已列入标准配置。特殊配置的标准减速机能够抵御冷却塔的恶劣工作环境。

汉森减速机的可靠性已通过ISO 9001 质量认证。汉森产品质量上乘，技术支持及售后服务网络遍及全球。汉森提供的标准化系列减速机，能够满足用户对于冷却塔应用的特殊需求。



cooling tower

■ HANSEN P4

With the Hansen P4 gear units, fully customized to the specific needs of the cooling tower industry, Hansen Industrial Transmissions nv (H.I.T.) offers a truly functional solution for wet cooling towers and air cooled condensers.

The extended bearing span of the low speed shaft has been standardized to meet the particular needs of these applications: the extended bearing span increases the dynamic stability of the gear unit. The unit's low speed shaft bearings are selected to handle the high axial loads, i.e. the axial thrust from the fan on the low speed shaft. The lubrication system is adapted to very low operating speeds and to windmilling conditions. The overall design of this series of gear units fully complies with the Cooling Tower Institute specifications.

For the wet cooling tower drives, H.I.T. now offers a range of 11 bevel helical gear unit sizes up to 100 kNm, which allows a more accurate selection. They are all well protected for operation in a very humid environment. The increased distance between the propeller and the high speed

input shaft reduces vibrations. A motor can be connected to the outside of the cooling tower using an all-metal disc coupling at the high-speed shaft.

■ HANSEN M4 ACC

Based upon Hansen P4 and Hansen M4 technology, a dedicated design has been developed. Applying the same high quality standards, this gear unit offers a cost efficient solution with optimised gear geometry for lower noise levels. The monobloc concept ensures higher stiffness of the housing. As a standard, these units come with a lantern housing that allows for connection of a motor on the top of the gear unit.

This model is used mainly in air-cooled steam condensation plants which are ideal in dry environments where water resources are scarce. The cooling fan's motor is located in the air stream of the air-cooled refrigerant condenser.

冷 却 塔

■ 汉森 P4

汉森的P4系列减速机，为具有特殊需求冷却塔和空冷凝汽器风机驱动装置提供真正实用的解决方案。

冷却塔用减速机，通过加大低速轴承跨距，增加了减速机承受动载荷的稳定性；特殊配置的低速轴轴承，承受来自风机的轴向载荷的能力更强；特殊设计的润滑系统，能保证在减速机非常低的输入转速和风机在风车状态下得到良好状态下得到良好的润滑。

对于湿冷却塔风机驱动，汉森能提供11种规格直交轴减速机，额定扭矩可达100 kNm。具有性价比高，环境耐受性强，噪音低，重量轻，以及卓越的可靠性等特点。

如果使用全金属膜片联轴器，可以将减速机的驱动电机安装于湿冷却塔外部。

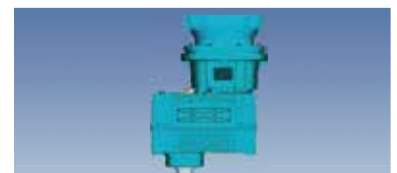


■ 汉森 M4 ACC

汉森在P4 和 M4系列基础之上，又推出了专门为空冷岛研制开发的M4ACC系列减速机。该系列减速机成本低效率高，优化的齿形降低了减速机的噪音水平；整体式箱体具有结构紧凑，散热性好，充分箱面渗油，以及卓越的可靠性等特点。

标准的M4ACC系列减速机配有电机连接法兰，使电机可直联于减速机上。

M4ACC系列减速机适用于水源稀缺的干燥环境，风机驱动装置位于风冷式空冷凝汽器管路的上方。





WHY HANSEN INDUSTRIAL GEARBOXES?

- *Hansen Industrial Transmissions nv matches the drive to the application and offers proven reliability under the most severe conditions.*
- *Carburised and ground gearing of both bevel and helical gears excels in strength, torque capacity, surface durability and low noise performance.*
- *Large overhung load capacity of the gear unit.*
- *A dedicated bearing configuration meets the application requirements.*
- *Bearings and shafts are dimensioned to go the distance, ensuring long bearing life under heavy loads.*
- *Continuous oil circulation through the bearings ensures a long, trouble-free working life for the gear unit.*
- *Hansen P4's unique Oil-Lock™ system offers a maintenance-free sealing on high-speed shaft extensions as a standard.*
- *A greased labyrinth seal on the low speed shaft prevents water and moisture from entering the housing of the gear unit.*
- *The drywell prevents oil leakage on vertical down shafts*
- *The internal construction of the gear unit housing allows for simple and complete oil drainage.*
- *Positioning of the aerating, drainage and filling plugs makes it easy to connect service piping towards the outside of the cooling tower.*
- *The larger units can be easily inspected and serviced on the spot, thanks to covers above the oil level.*
- *One-stop-shopping for complete drive package solutions.*
- *In-depth engineering support and complete documentation before and after the order.*
- *The global service capability of Hansen Industrial Transmissions nv significantly reduces downtime.*

为什么选择汉森?

- 汉森将减速机设计与具体应用相匹配，即使在异常恶劣的工作条件下，仍具有经过验证的可靠性。
- 经过渗碳及磨削的齿轮在刚度，强度，承载能力，表面耐磨性，以及低噪音等方面性能卓越。
- 极强的承受附加载荷能力。
- 专用的轴承配置可满足不同应用的特殊需求。
- 经过尺寸优化的轴和轴承，即使在重载条件下，也能满足用户对轴承寿命的要求。
- 对轴承的连续循环润滑方式，确保减速机长期无故障的运行。
- 汉森P4系列独特的“Oil-Lock”密封，实现了高速轴端密封无渗漏和免维护。
- 低速轴的迷宫密封，杜绝了水和潮气进入减速机。
- 低速轴的“干井”，杜绝了垂直向下的低速轴端有油渗漏。
- 特殊的箱体结构可实现润滑油完全排放无残留。
- 箱体上的通气，排油和加油点，使连接管路到冷却塔外部更便捷。
- 检查孔高于油位，易于对减速机进行现场检修及维护。
- 一站式采购即可获得整套冷却塔驱动的解决方案。
- 订购前后的全面技术支持和完整的技术档案。
- 汉森遍布全球的服务网络，极大的减少了停机时间。

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Hansen P4

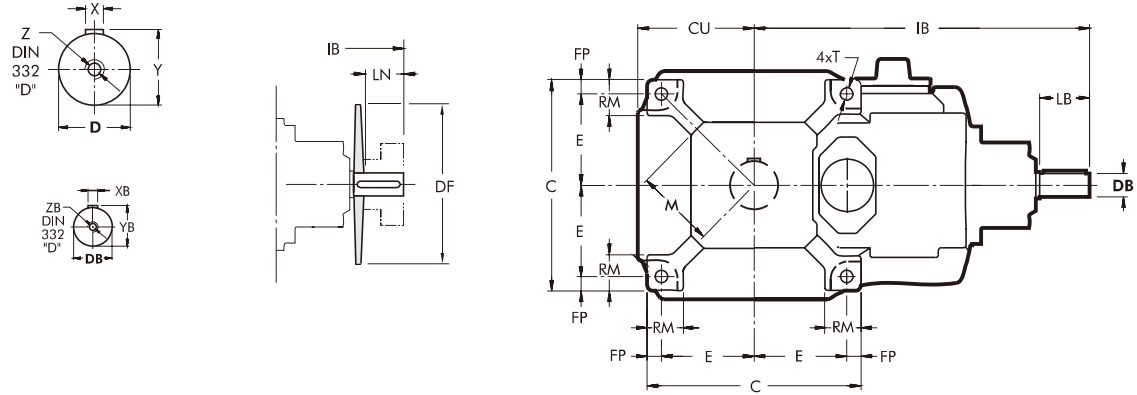
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mm

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2
Intermediate size	中间型号	(X)

The user is responsible for the provision of safety guards and correct installation of all equipment.
Certified dimensions upon request.

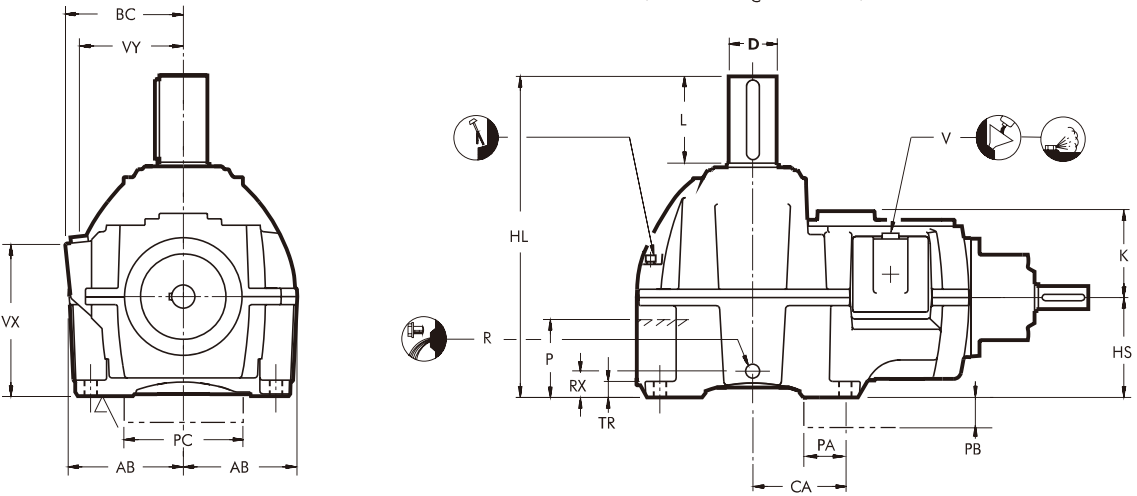
用户负责提供安全防护装置及所有设备的正确安装



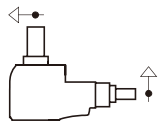
External dimensions are not affected when mounting a back-stop

- (1) Space for pump removal
- (2) LN1 for coupling hub diam. ≤ 150 mm, LN2: for coupling hub diam. > 150 mm
- (3) Approximate values; only the markings on the gear unit dipstick are determinant for the oil level

安装逆止器不影响外形尺寸
(1) 油泵拆卸空间
(2) LN1: 用于法兰孔径小于150mm, LN2: 用于法兰孔径大于150mm.
(3). 参考值。油位见箱体油尺。



CUN



Shaft arrangements (front view)

出轴方式 (主视图)

Type	AB	BC	C	CU	E	FP	HL	HS	IB	K	M	RM	T	TR	kg	Litres
QVRE2X	365	335	690	370	295	50	955	330	1064	237	265	135	42	52	1170	62
QVRF2X	375	377	710	405	305	50	1049	390	1178	269	275	150	48	65	1550	87

Type 型号	Shafts / 轴 Key / 键 ISO/R773-1969										Pump / 油泵			
	D-m7	L	X	Y	Z	DB	LB	XB	YB	ZB	CA	PA (1)	PB (1)	PC (1)
QVRE2X	155	250	40	164	M30	65m6	210	18	69	M20	314	180	20	280
QVRF2X	170	300	40	179	M30	75m6	210	20	79,5	M20	358	170	0	330

Type 型号	Fan / 风扇		Draining / 排油		Ventilation / 透气			Oil level / 油位
	DF	LN LN1 (2) LN2 (2)	R	RX	V	VX	VY	P (3)
QVRE2X	475	182 156	R 1"	53	R 1"	490	292	277
QVRF2X	560	182 156	R 1"	78	R 1"	530	335	332

Hansen P4

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mm

Gear unit
Vertical low speed shaft
Right-angle shafts
Size
Two stages

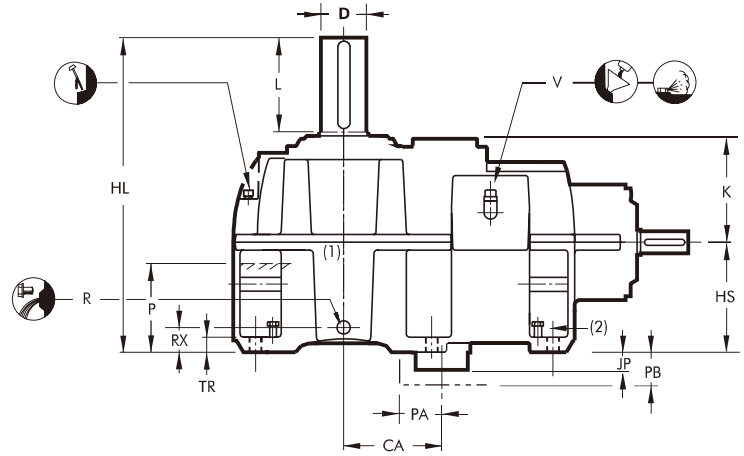
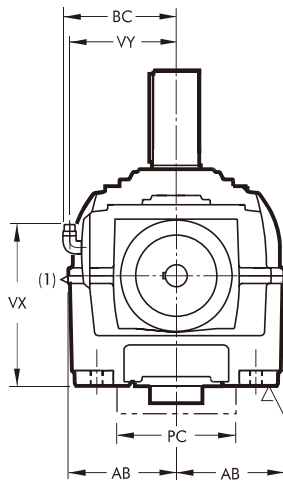
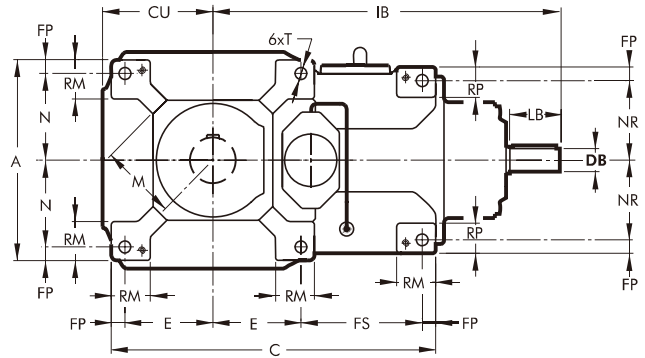
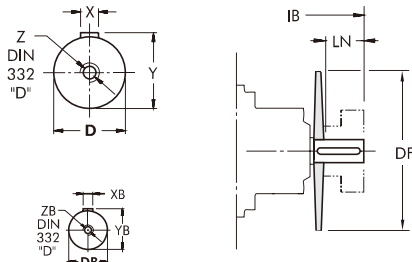
减速机
垂直低速轴
直交轴
规格
二级

Q
V
R
G►H
2

For cooling tower fan drive 冷却塔风机驱动装置

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

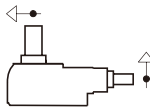
用户负责提供安全防护装置及所有设备的正确安装



External dimensions are not affected when mounting a back-stop
 (1) Grease lubrication point
 (2) 4 x jacking screw
 (3) Space for pump removal
 (5) Approximate values; only the markings on the gear unit dipstick are determinant for the oil level

安装逆止器不影响外形尺寸
 (1) 加油点
 (2) 4个顶起螺栓
 (3) 油泵拆卸空间
 (5) 参考值。油位见箱体油尺。

CUN



Shaft arrangements

(front view)

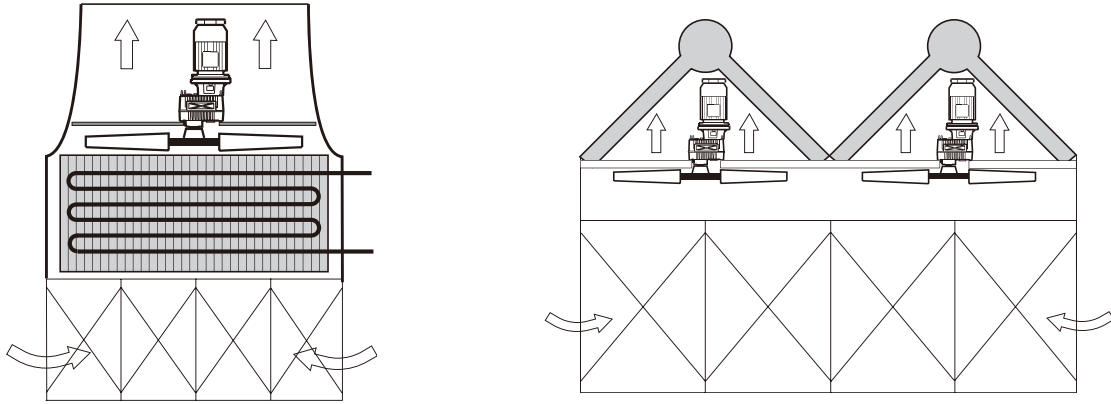
出轴方式
(主视图)

Type	A	AB	BC	C	CU	E	FP	FS	HL	HS	IB	K	M	N	NR	RM	RP	T	TR	kg	Litres
QVRG2	770	405	435	1120	420	305	50	410	1049	390	1241	352	290	335	275	140	120	42	60	1700	109
QVRH2	770	435	435	1232	460	345	50	442	1099	390	1313	352	310	335	275	140	120	42	60	1800	121

Type 型号	Shafts / 轴 Key / 键 ISO/R773-1969											Pump / 油泵				
	D-m7	L	X	Y	Z	DB-m6	LB	XB	YB	ZB	CA	JP	PA (3)	PB (3)	PC (3)	
QVRG2	180	300	45	190	M30	100	210	28	106	M24	341	15	180	85	420	
QVRH2	190	350	45	200	M30	100	210	28	106	M24	413	15	180	85	420	

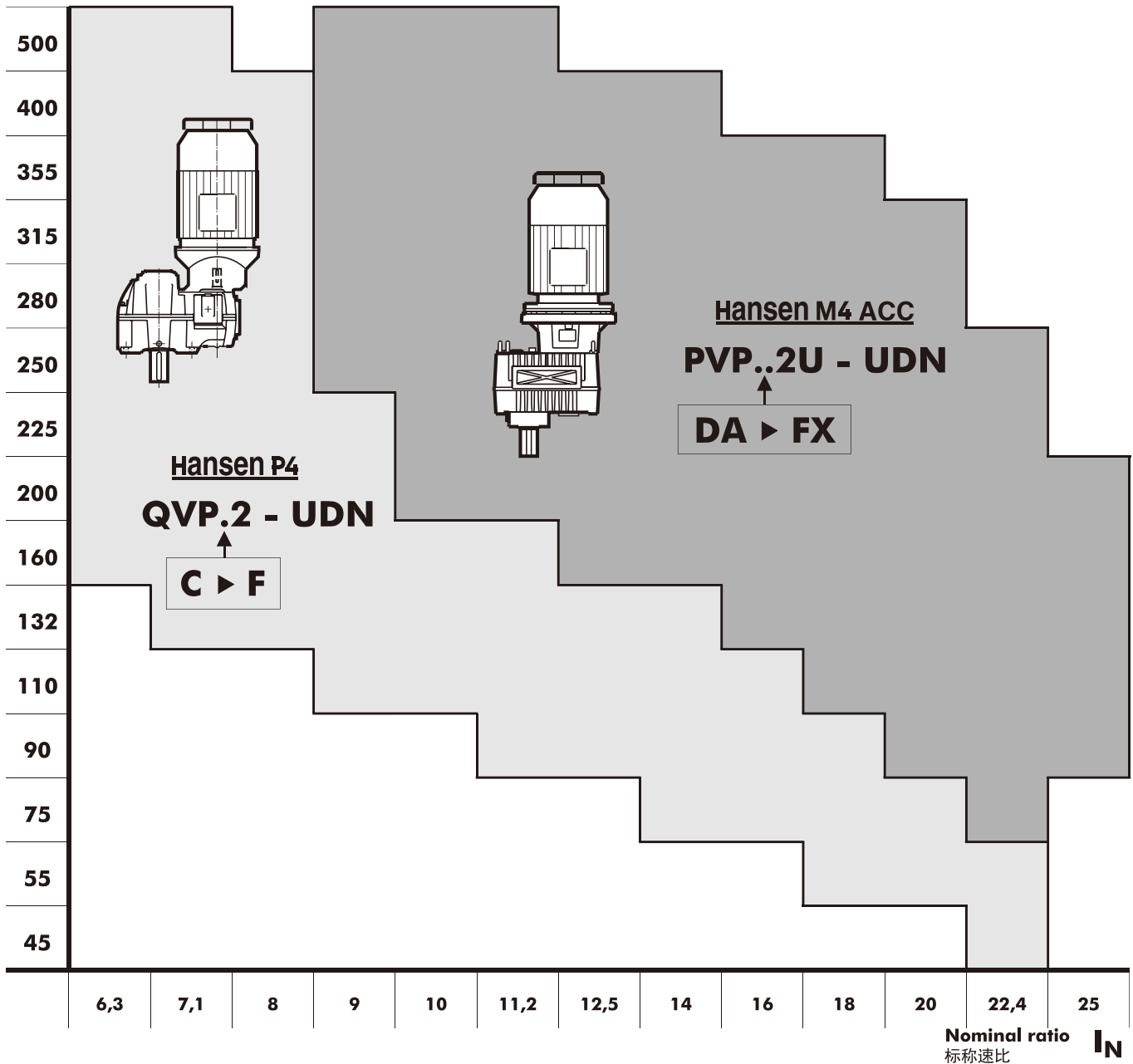
Type 型号	Fan / 风扇		Draining / 排油		Ventilation / 透气			Oil level / 油位
	DF	LN	R	RX	V	VX	VY	P (5)
QVRG2	600	152	R 1"	74	R 1"	475	420	300
QVRH2	600	152	R 1"	74	R 1"	475	420	300

**STANDARDISED GEAR UNITS FOR
 AIR COOLED CONDENSER DRIVES
 PROGRAMME - SELECTION**
 空凝汽器用标准减速机
 选型指南



Motor Power
 电机功率

P_m (kW - 1500 min⁻¹) / SF = 1,75



DESCRIPTION

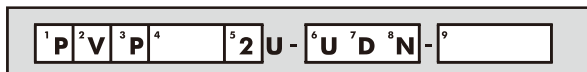
HANSEN M4 ACC GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明

空冷凝汽器驱动装置用
汉森 M4 ACC 减速机

Coding

代码



Type /型号

1 : series
2 :
3 :
4 :
5 :

P : Hansen M4 /汉森M4ACC 系列
V : vertical low speed shaft /垂直低速轴
P : parallel shafts /平行轴
Size : DA-> FX /型号
number of stages: **2** /减速机级数

Ratio /速比

9 : nominal ratio of the gear unit / 标称速比

Shaft arrangement

6 : high speed shaft extension : **U** : up /高速轴出轴向上
7 : low speed shaft extension : **D** : down /低速轴出轴向下
8 : low speed shaft type : **N** : normal solid shaft /低速轴为标准实心轴

The gear unit

Units are designed to comply with the standard CTI-111 specifications for gear units.

The mechanical power ratings shown in the tables relate respectively to input speeds of 1800, 1500, 1200, 1000, 900 and 750 RPM at the high speed shaft. They are also valid for asynchronous speeds which are max. 3% lower than the synchronous speeds.

Interpolation will yield power rating values for intermediate speeds. The power rating for speeds lower than 750 RPM is based on the continuous torque rating of that speed.

For input speeds exceeding 1800 RPM, please refer to us.

Basic components

Helical gears

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

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

Low speed shafts

The low speed shafts are in solid version.

Length of the shaft extension according to customer's specification.

Bearings

Heavy duty roller bearings of the tapered, cylindrical or spherical roller type.

Calculated in compliance with ISO and renowned bearing manufacturers.

The low speed shaft bearings are selected to allow considerable thrust loads. The nominal permissible thrust load F_{xN} mentioned in the table, page 11, is defined for a $SF_{min} = 2$, low speed shaft rotating counter-clockwise and guarantees a calculated bearing life of 100000 hours.

Housings, lantern housings and covers

Made from grey pearlitic cast iron.

Machined on CNC machining centers.

Designed to ensure strength and rigidity.

Unused tapped holes are plugged.

Monobloc housing.

减速机

产品设计符合 CTI-111 标准减速机规格。

表中所示的机械功率分别对应高速轴的不同输入速度：1800, 1500, 1200, 1000, 900和750转/分，这些数据还适用于满载条件下的转速不低于同步转速的3%。

中间转速所对应的机械功率值可通过插值算法得出，转速低于750转/分的机械功率值是根据该转速下的标称连续转矩计算出来的。

如输入速度高于 1800 RPM，请咨询汉森。

主要零部件

斜齿轮

斜齿轮设计按照AGMA标准，具有承载能力高，损耗小，噪音低的特性。

所有齿轮齿轴均采用合金钢制造，经过渗碳处理和精密磨削。

低速轴

低速轴是实心轴。

轴端长度可按照用户要求制造。

轴承

轴承采用重载圆锥，圆柱和球面滚子轴承。

轴承计算寿命按照ISO 和知名轴承制造厂商标准。

低速轴轴承允许承受一定的轴向力 F_{xN} 。额定轴向力见11页，表中数值基于 $SF_{min} = 2$ ，低速轴逆时针旋转，并且轴承寿命达到10万小时。

箱体、法兰式电机座及端盖

箱体材料采用珠光体灰口铸铁。

CNC 制造中心加工。

设计保证强度和刚度。

不使用的螺纹孔都妥善堵塞。

整体式箱体。

DESCRIPTION

HANSEN M4 ACC GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明

空凝汽器驱动装置用 汉森 M4 ACC 减速机

Systems

Lubrication

Lubricants: mineral oils are normally used. Lubricants should always contain adequate EP-additives (refer to Service Manual).
 Pump lubrication for the upper bearings is standard available.
 The lubrication is guaranteed for input speeds down to 50 min⁻¹ (windmilling conditions).
 The gear unit housing acts as a large oil sump.
 Grease point with nipple according to DIN 71412 for grease lubrication of the bearing at side of the low speed shaft end.
 Checking of the oil level is done by means of the gear unit dipstick (always in the plugged position).

Cooling

Heat generated in the gear unit due to losses, can be dissipated by:
 natural cooling through the housing
 additional fan cooling, shaft driven axial fan incorporated in the lantern housing
 Free air entry at the suction side should always be guaranteed
 Thermal checks: refer to us.
 Fill in "Request for quotation" on page 8.

Sealing

Static: generalized use of sealing compound
 inspection cover on the gear unit: re-usable flat seal
 low speed shaft: drywell

Rotary: high speed shaft: standard : dust lip oil seal
 option: regreasable labyrinth
 low speed shaft: standard : double dust lip oil seal
 option: regreasable labyrinth

Motors

The gear units are to be fitted with standard flange mounted IEC motors (type B5). For more information on motors, refer to motor catalogues.
 For Nema motors, refer to us.
 Use of two speed motors: when changing speed with two speed motors, the motor has to be slowed down below the low speed, before energising the slow speed winding.

Optional devices

Some devices can optionally be provided (refer to page 9-10)
 More detailed information about the optional devices is mentioned in separate technical manuals. Refer to us.

Backstop

Built-in backstop to prevent the fan from "windmilling". Internal lubrication is assured. The backstop is accessible after removing the motor and the lantern housing.

Filter

With incorporated pressure relief valve.
 A filter with incorporated pressure relief valve and visual or electrical contamination indicator is available as an option.

Heaters

Electrical heating devices for low temperature start-up are available for Hansen M4 ACC gear units.

系统

润滑系统

润滑剂：通常使用矿物油。润滑剂需含有充足的 EP 添加剂（参阅服务手册）。
 上部轴承由油泵供油润滑是标准配置。
 输入转速低至50RPM（风车效应）时，也能确保润滑。
 减速机箱体作为油箱使用。
 低速轴出轴侧轴承采用油脂润滑，油嘴标准为DIN71412。
 使用减速机的油标尺（一般处于塞紧状态）检查油位。

冷却系统

由于运行产生的热量可以通过以下方式散热：
 箱体的自然冷却。
 附加的风扇冷却，由置于电机法兰中的轴流风扇实现。
 确保电机法兰的风扇吸风口畅通。
 热功率校核，请咨询汉森。
 选型报价表见 8 页。

密封

静态密封：
 · 通常使用密封胶
 · 检查孔盖采用可重复使用的密封垫。
 · 低速轴采用干井密封。

转动密封：
 · 高速轴： 标配：带防尘唇密封
 选装：可重复加脂的迷宫密封
 · 低速轴： 标配：双防尘唇密封
 选装：可重复加脂的迷宫密封

电机

减速机装配标准法兰安装 IEC 电机（B5 型）。更多电机信息请参阅电机目录。
 有关 Nema 电机，请咨询汉森。
 双速电机的使用：利用双速电机变速时，在通电低速绕组前必须将风机转速降低到低速之下。

选装设备

提供某些选装设备（参阅 9 - 10 页），技术手册中有关于选装设备的详细信息。请咨询汉森。

逆止器

内置逆止器可以防止风机随风转动。保证内部可靠润滑。
 拆掉电机和法兰式电机座后可以看到逆止器。

过滤器

配有一体式泄压阀。
 可以选装一体式泄压阀以及可视或电子污染指示器。

加热器

汉森 M4 ACC 减速机可以选装电加热器，以适应低温启动。

DESCRIPTION

HANSEN M4 ACC GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明

空冷凝汽器驱动装置用 汉森 M4 ACC 减速机

Oil level switch

To control the oil level in the gear unit, an oil level switch can be provided. This switch can trigger an alarm signal when the oil level falls beneath a specified limit.

Pressure switch or pressure transmitter

To control the oil pressure, a pressure switch or pressure transmitter can be provided. They can trigger an alarm signal when the oil pressure falls beneath a specified limit.

Pt100

To control the oil bath temperature. The Pt100 can trigger an alarm signal when the oil temperature is higher than a specified limit.

Shipping conditions

Inspection prior to shipment

Test run: all gear units are tested under no load
Conformity Check

Protection

Shaft extension: greased and protected with waxed waterproof paper

Lubricants

Hansen M4 ACC gear units are shipped without oil.
Grease lubrication points are factory filled.

For information relating to **storage, handling, installation, start-up and maintenance**, refer to the service manual which is supplied together with each gear unit.

Protection

Standard protection systems

All units are standard provided with **E3 painting system**.

A three layer paint system consisting of:

- layer 1: a two-component primer
- layer 2: a two-component high build epoxy primer
- layer 3: a two component high build epoxy paint

Designed for gear units installed outdoors in industrial atmospheres with low level of pollution.

The painting system is suitable to be applied in the atmospheric-corrosivity category C2 according to ISO 12944-2 (and ISO 12944-5).

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

Bolts and nuts provided with appropriate protection.

Aggressive environment

For air cooled condenser drives in aggressive environment, an additional protection system can be offered: refer to us.

油位开关

油位开关可以监控减速机内的油位。如果油位降到规定限值之下该开关可以触发警报信号。

压力开关或压力变送器

可以配置一个压力开关或压力变送器以控制油压。如果压力降到某规定限值之下，它们可以触发警报信号。

Pt100 温度传感器

监控油池温度，如果油温超过某规定限值时可以触发警报信号。

运输条件

装运前检查

试运行：空载检测
符合性检查

保护措施

轴伸：利用防水蜡纸加 润滑脂 保护。

润滑剂

汉森 M4 ACC 减速机无油装运。

出厂时所有润滑点已加注润滑脂。

有关储存、操作、安装、启动以及维护的信息请参阅随减速机提供的服务手册。

保护

标准防护

E3喷漆标准是冷却塔用减速机的标准配置。

E3喷漆标准包括三个涂层：

- 第一层：二合一环氧树脂底漆
- 第二层：二合一高厚膜型环氧树脂底漆
- 第三层：二合一高厚膜型环氧树脂漆

E3是针对安装于室外，轻度污染环境的减速机设计的。

E3喷漆系统适用于ISO12944-2和ISO12944-5大气污染标准中的C2。涂漆颜色的不同，不影响涂漆的质量

螺栓和螺母 均提供适当的保护。

恶劣环境

对于安装于恶劣环境中的减速机，请咨询汉森。

汉森可提供更高标准的涂漆。

SELECTION

Mechanical power rating

COOLING TOWER DRIVES

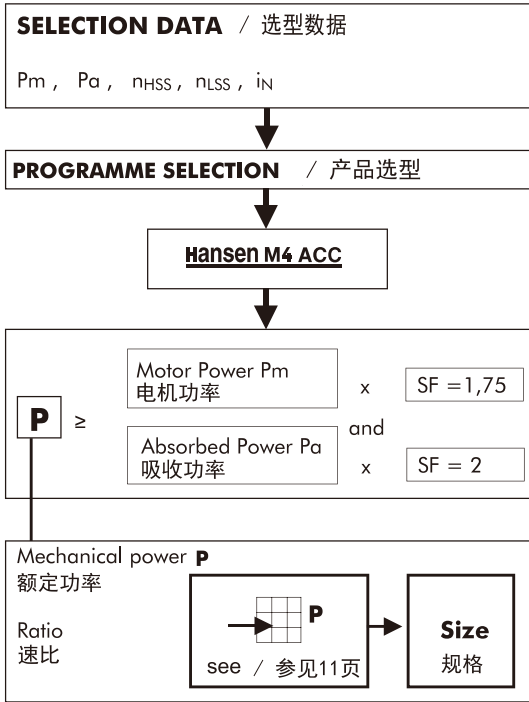
选型

额定功率

冷却塔驱动装置

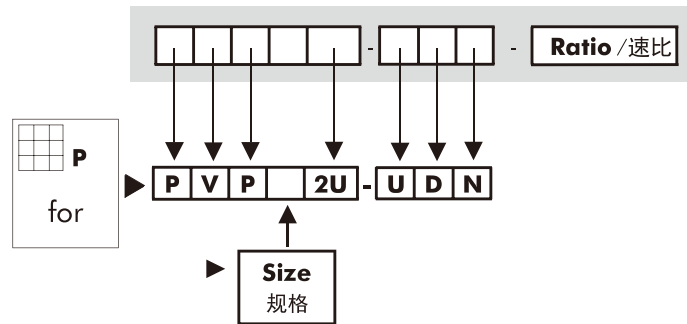
S
E
L
E
C
T
I
O
N
选型

Procedure / 步骤



Reference Data / 参考数据

refer to page 8 / 参见 8 页
refer to page 2 / 参见 2 页
for ratios < 9 refer to us/ 速比 < 9, 请咨询汉森。



C
H
E
C
K
校
核

Start-up torque T_S / 启动力矩

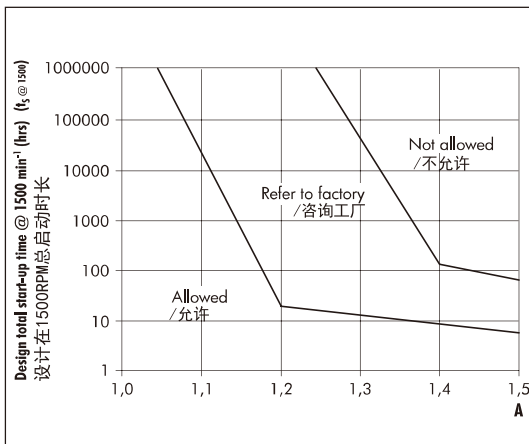


$$T = \frac{P \times 9,55}{n}$$

Mechanical torque of the gear unit (kNm)
减速机额定扭矩
P: mechanical power rating (kW), see page 11
减速机额定功率, 参见11页
n: shaft speed (min⁻¹)
轴转速

Note: make sure that T_S , T and n refer to the same shaft (speed);
注意: 计算时须确认启动扭矩 T_S , T 和 n 是同一个轴的数据。

Total start-up time t_S / 总启动时间



Design total start-up time @ 1500 min⁻¹ refers to the total start-up time over the design lifetime of the gear unit, taking into account: 设计在1500RPM总启动时长时, 参见减速机的设计寿命与总启动时长的关系, 并考虑下列因素:

- number of start-ups / 启动次数
- duration of a single start-up / 每次启动时间
- input speed equal to 1500 min⁻¹ / 输入转速等于1500RPM

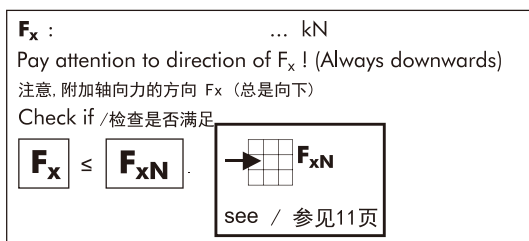
For other input speeds (n_1), following equation can be applied:
其他输入转速按下列公式计算:

$$t_S @ n_1 = \frac{1500}{n_1} \times t_S @ 1500$$

$$A = \frac{T_S}{T}$$

T_S : start-up torque (kNm) / 启动扭矩
 T : mechanical torque rating of the gear unit (kNm) / 额定扭矩

Thrust load / 轴向力



Thermal rating see pages 7, 12
热功率校核见 7, 12页

SELECTION

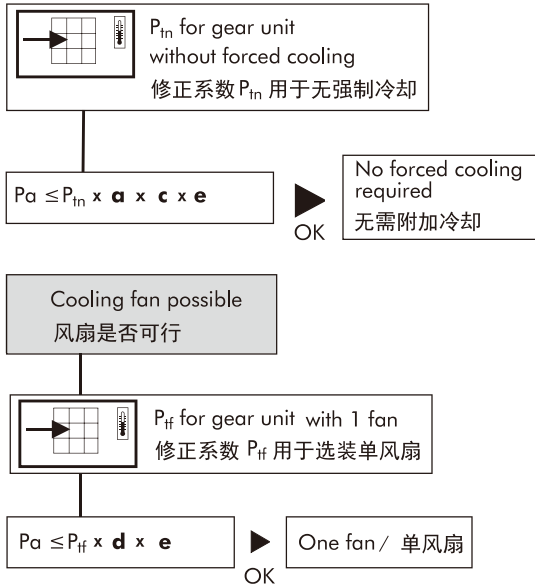
Thermal power rating

COOLING TOWER DRIVES

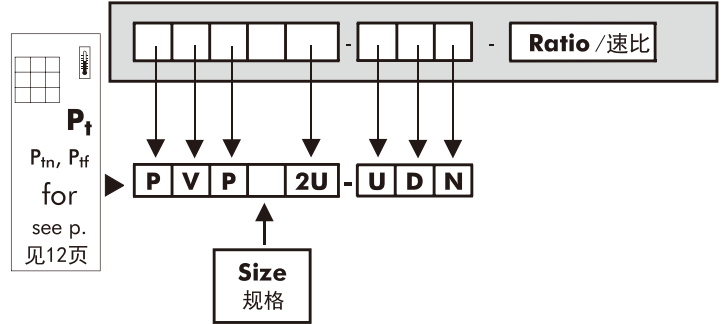
选型
热功率
冷却塔驱动装置



Thermal check / 热功率校核



Reference Data / 参考数据



factor **a** for ambient temperature without forced cooling
修正系数 **a** 用于环境温度下无强制冷却

Ratio 速比	环境温度 / Ambient temperature in °C			
	15 to 25	25 to 35	35 to 45	
6,3 → 11,2	1	0,81	0,68	0,55
12,5 → 18	1	0,85	0,71	0,66
≥ 20	1	0,87	0,75	0,74
Size / 规格	DA ▶ FX	DA ▶ FX	DA ▶ DX	EA ▶ FX

factor **b** for duration of service
修正系数 **b** 用于运行时间

h/year 小时/年	小时/天 h/day (max)				
	3		10		> 16
1000	1,2	1,3	1,15	1,2	1,15
2000	-	-	1,1	1,1	1,1
≥ 4000	-	-	-	-	1
Size / 规格	DA ▶ DX	EA ▶ FX	DA ▶ DX	EA ▶ FX	DA ▶ FX

factor **c** for air circulation (without fan)
修正系数 **c** 用于自然风无风扇环境

Mounting 安装环境	Air flow 风速		
Indoors- small enclosure 室内狭小环境	≥ 0,5 m/s	0,73	0,70
Indoors- normal working areas 室内正常工作环境	≥ 1,4 m/s	1	1
Outdoors- protected against sun 室外有防晒措施	≥ 3,0 m/s	1,33	1,36
Size / 规格		DA ▶ DX	EA ▶ FX

factor **d** for ambient temperature with forced cooling
修正系数 **d** 用于环境温度下带强制冷却

	Number of stages 级数	环境温度 / Ambient temperature in °C			
		15 to 25	25 to 35	35 to 45	45 to 55
with forced cooling 带强制冷却	2	1	0,86	0,72	0,59

REQUEST FOR QUOTATION AIR COOLED CONDENSER DRIVES

空冷凝汽器询价选型

1. LOAD PARAMETERS / 载荷参数

Motor power / 电机功率 Pm = kW at min⁻¹

Absorbed power/ 吸收功率 Pa = kW

Absorbed torque / 吸收扭矩 Ta = kNm

Running time in h/day / 运行时间 ≤3 ≤10 >10

Peak torque in excess of 200% Ta = %

峰值扭矩超过200% Ta

Number of starts/stops per 10 hours :

每 10 小时启动/停止次数:

2. SPEED / 转速

High speed shaft (HSS) / 高速轴 (HSS)

Constant speed(s) n1(HSS) = or/and min⁻¹

恒速

Variable speed ≤ n1(HSS) ≤ min⁻¹

变速

Direction of rotation: CW

旋向

Low speed shaft (LSS) / 低速轴 (LSS)

Constant speed(s) / 恒速 n2(LSS) = or/and min⁻¹

Variable speed / 变速 ≤ n2(LSS) ≤ min⁻¹

Tolerance on speed LSS ± % ± min⁻¹

LSS 输出转速偏差

Direction of rotation: CCW

旋向

3. SHAFT CONFIGURATION : / 出轴方式

Parallel shafts / 平行轴

4. THRUST LOAD ON LOW SPEED SHAFT

低速轴载荷 Y N

Weight of fan and coupling = kN

风扇及联轴器重量

Aerodynamic thrust load towards gear unit = + kN

空气推力朝向减速机

5. INSTALLATION PARAMETERS / 安装参数

Ambient temperature (°C) near the gear unit : min:

环境温度 max:

Structure see page 31 / 见 31 页 open closed

冷却塔结构

Air speed near the gear unit : m/s

减速机周围风速

Location / 安装环境

Direct sun exposure / 直接暴露于日光下 Y N

Atmosphere: corrosion category (according to ISO 12944-2):

气体腐蚀类别 (按照ISO12944-2)

Electric installation AC V Hz

电器安装 3 Ph

Main power supply / 主电源

Auxiliary power supply / 辅助电源

Protection requirement: / 防护等级

Insulation: / 绝缘等级

6. NOISE (gear unit + motor) / 噪音(减速机 + 电机)

Max. noise power: / 声能 dBA

Max. noise pressure: / 声压 dBA at m

7. OPTIONAL SPECIFICATIONS / 可选项

Additional cooling / 需要额外冷却

Fan / 风扇

Options to be indicated on pages 9 -10

所有选项 见 9-10 页

Motor mount IEC frame:

电机安装 IEC 型号规格

Shafts inch

Painting (see page 5) / 喷漆 (见 5 页)

(only to be specified if not in accordance with selected corrosion category)

(如不作选择, 将根据气体腐蚀分类选定)

		Corrosion category according to ISO 12944-2 气体腐蚀类别 (按照ISO12944-2)								
		C1			C2			C3		
		L (*)	M	H	L	M	H	L	M	H
Selection / 选择	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									

		Corrosion category according to ISO 12944-2 气体腐蚀类别 (按照ISO12944-2)								
		C4			C5-I			C5-M		
		L (*)	M	H	L	M	H	L	M	H
Selection / 选择	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									
	<input type="checkbox"/>									

(*) : Durability range according to ISO 12944-1

L : low

M : medium

H : high

Note : the durability range is **NOT** a "guarantee time".

Durability is a technical consideration that can help the owner set up a maintenance programme

(*) : 喷漆耐久性按照 ISO 12944-1

L: 低

M: 中

H: 高

注意: 耐久性并不是保质期。只是从技术方面考虑, 为用户制定设备维护保养计划提供参考。

Not allowable materials

不允许用的材料

Al

Cu

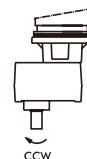
Other

8. BACKSTOP REQUIRED

逆止器

Y

N

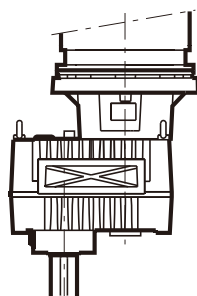


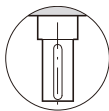
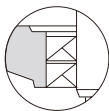
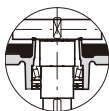
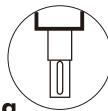


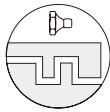

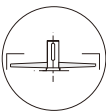
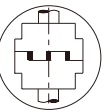


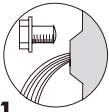


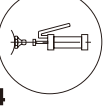
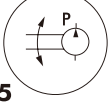
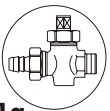





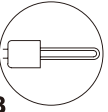
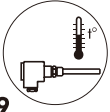

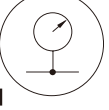
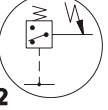
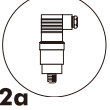
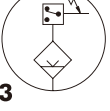

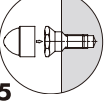
Hansen M4 ACC

Gear unit	减速机	P
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	DA ▶ FX
Two stages	二级	2U

For air cooled condenser fan drives 空冷凝汽器风机驱动装置

Accessories and options 配置和选项



	Standard accessories 标准配置	Optional accessories 可选配置
Low speed shaft 低速轴	1  2  3 	1a  2a  4 
High speed shaft 高速轴		5  6  7  8 
Housing 箱体	9  10  11  12  13  14  15 	11a  12a  12b  12c  16  17  18  19  20  21  22  22a  23  24  25 

Gear unit	减速机	P
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	DA ▶ FX
Two stages	二级	2U

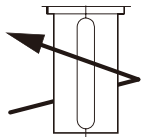
For air cooled condenser fan drives 空冷凝汽器风机驱动装置

Accessories and options 配置和选项

: optional

: 选装

1	normal solid output shaft	1	标准实心低速轴
1a	<input type="checkbox"/> extended solid output shaft	1a	<input type="checkbox"/> 加长实心低速轴
2	double oil seal or	2	双油封
2a	<input type="checkbox"/> regreasable labyrinth (DIN 71412)	2a	<input type="checkbox"/> 可重复加脂迷宫密封 (DIN71412)
3	drywell	3	干井
4	<input type="checkbox"/> thrust washer with bolt	4	<input type="checkbox"/> 安装螺栓加止推垫圈
5	<input type="checkbox"/> regreasable labyrinth (DIN 71412)	5	<input type="checkbox"/> 可重复加脂迷宫密封 (DIN71412)
6	<input type="checkbox"/> built-in backstop	6	<input type="checkbox"/> 内置逆止器
7	<input type="checkbox"/> axial fan	7	<input type="checkbox"/> 轴流风扇
8	<input type="checkbox"/> elastic block-type coupling	8	<input type="checkbox"/> 弹性块联轴器
9	oil filling plug	9	加油点油堵
10	dipstick with magnet	10	磁性油尺
11	draining plug	11	排油点油堵
11a	<input type="checkbox"/> drain cock with hose coupling	11a	<input type="checkbox"/> 放油阀带软管接头
12	breather plug or	12	呼吸器
12a	<input type="checkbox"/> anti-humidity breather plug or	12a	<input type="checkbox"/> 防潮呼吸器
12b	<input type="checkbox"/> dust-proof breather plug or	12b	<input type="checkbox"/> 防尘呼吸器
12c	<input type="checkbox"/> special breather with anti-humidity filter	12c	<input type="checkbox"/> 特殊防潮呼吸器
13	gear unit inspection cover	13	检查孔盖
14	grease point (DIN 71412)	14	加脂点 (DIN71412)
15	pump lubrication	15	油泵润滑
16	<input type="checkbox"/> oil sight glass	16	<input type="checkbox"/> 油位镜
17	<input type="checkbox"/> mounting pin	17	<input type="checkbox"/> 安装定位销
18	<input type="checkbox"/> heater	18	<input type="checkbox"/> 加热器
19	<input type="checkbox"/> Pt100 for oil sump temperature	19	<input type="checkbox"/> 油浴用Pt100温度传感器
20	<input type="checkbox"/> oil filter	20	<input type="checkbox"/> 过滤器
21	<input type="checkbox"/> pressure gauge	21	<input type="checkbox"/> 压力表
22	<input type="checkbox"/> pressure switch or	22	<input type="checkbox"/> 压力开关
22a	<input type="checkbox"/> pressure transmitter	22a	<input type="checkbox"/> 压力变送器
23	<input type="checkbox"/> oil level switch	23	<input type="checkbox"/> 油位开关
24	<input type="checkbox"/> vibration switch for condenser fan	24	<input type="checkbox"/> 风机用震动开关
25	<input type="checkbox"/> SPM nipple	25	<input type="checkbox"/> SPM测震动接口



Gear unit	减速机	P
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	DA ▶ FX
Two stages	二级	2U
Mechanical power ratings	额定功率	P (kW)
Rated thrust load	附加轴向力	F _{xN} (kN)

i _N	min ⁻¹		P (kW)						F _{xN} (kN)						i _{ex} J (kgm ²)											
			Size - 规格						Size - 规格						Size - 规格											
	n ₁	n ₂	DA	DX	EA	EX	FA	FX	DA	DX	EA	EX	FA	FX	DA	DX	EA	EX	FA	FX						
9	1800	200	545	685	780	985	1220	1455	23	21,5	36	32	60	60	8,7468	8,5447	8,9662	8,621	8,7546	8,2989						
	1500	165	455	580	650	820	1015	1215	24,5	22,5	37	34	60	60												
	1200	135	360	465	520	655	810	970	26,5	24	40	37	60	60												
	1000	110	305	400	440	555	685	820	27,5	25	41	39	60	60												
	900	100	275	350	390	495	610	730	27,5	25,5	42	39	60	60							0,0654	0,1018	0,1267	0,2012	0,2615	0,4144
750	83	230	290	325	410	505	605	29	27	43	41	60	60													
10	1800	180	480	600	700	865	1050	1390	24	23,5	36	35	60	60	9,916	9,9755	10,0741	9,8311	10,1693	9,5812						
	1500	150	400	500	580	725	875	1160	25,5	24,5	38	37	60	60												
	1200	120	320	400	465	580	705	930	27	24,5	40	38	60	60												
	1000	100	270	340	400	485	590	780	27,5	26,5	42	39	60	60												
	900	90	240	300	350	435	525	695	28,5	26,5	43	40	60	60							0,0559	0,0824	0,1082	0,1661	0,2136	0,3401
750	75	200	250	290	360	440	580	30	28	45	42	60	60													
11,2	1800	160	435	555	630	775	975	1250	25	23	38	36	60	60	11,0695	10,7877	11,1515	11,0676	11,0222	10,7315						
	1500	135	360	460	525	645	810	1040	26	23,5	39	37	60	60												
	1200	105	290	370	420	515	650	830	27,5	25	41	39	60	60												
	1000	89	245	320	355	435	545	700	28,5	26,5	43	40	60	60												
	900	80	215	275	315	385	485	625	29	27,5	44	42	60	60							0,0486	0,0733	0,0957	0,1417	0,1929	0,2873
750	67	180	230	265	320	405	520	30	28	45	43	60	60													
12,5	1800	145	385	495	560	690	850	1080	25,5	23,5	39	36	60	60	12,5294	12,2297	12,6222	12,4352	12,6296	12,4656						
	1500	120	320	410	465	575	710	900	27	24,5	40	38	60	60												
	1200	96	255	325	375	460	570	720	28,5	26	42	40	60	60												
	1000	80	220	280	320	390	475	605	29,5	27,5	44	41	60	60												
	900	72	195	245	280	345	425	540	30	28	45	43	60	60							0,042	0,0621	0,0837	0,1201	0,1656	0,2328
750	60	160	205	235	290	355	450	30	29	45	44	60	60													
14	1800	130	340	440	490	625	790	995	26	24,5	40	38	60	60	14,3137	13,6524	14,4198	13,7652	13,5965	13,5111						
	1500	105	280	365	410	520	660	830	27,5	25	42	39	60	60												
	1200	86	225	295	330	415	525	665	29	27	44	41	60	60												
	1000	71	195	245	280	350	445	560	30	28	45	43	60	60												
	900	64	170	220	245	315	395	500	30	29	45	43	60	60							0,0364	0,0535	0,0715	0,1054	0,1518	0,2092
750	54	145	185	205	265	330	415	30	29,5	45	45	60	60													
16	1800	115	315	390	455	555	670	875	27	24,5	41	39	60	60	15,3633	15,4529	15,6863	15,5806	15,6013	15,4815						
	1500	94	265	325	380	460	560	730	28	26,5	42	40	60	60												
	1200	75	210	260	305	370	450	580	29,5	27,5	44	42	60	60												
	1000	63	180	220	265	320	375	490	30	28,5	45	44	60	60												
	900	56	160	195	225	280	335	435	30	29,5	45	44	60	60							0,0334	0,0458	0,0647	0,0913	0,1285	0,1781
750	47	135	165	190	230	280	365	30	30	45	45	60	60													
18	1800	100	255	345	375	485	555	790	28	26	43	39	60	60	17,451	17,6536	18,0148	17,7994	17,0069	16,6667						
	1500	83	220	285	320	405	465	655	29	27	44	41	60	60												
	1200	67	170	230	250	325	370	525	30	28,5	45	43	60	60												
	1000	56	150	195	220	275	320	445	30	29,5	45	45	60	60												
	900	50	130	170	190	245	280	395	30	30	45	45	60	60							0,0289	0,0394	0,0551	0,0773	0,1153	0,1625
750	42	110	140	155	205	230	330	30	30	45	45	60	60													
20	1800	90	225	320	350	450	510	670	30	26	45	40	60	60	20,0686	18,9481	19,6706	19,3627	20,0586	19,1242						
	1500	75	185	265	295	375	425	560	30	27,5	45	41	60	60												
	1200	60	150	215	235	300	340	445	30	29	45	44	60	60												
	1000	50	125	180	195	265	285	375	30	30	45	45	60	60												
	900	45	110	160	175	230	255	335	30	30	45	45	60	60							0,028	0,0359	0,054	0,0696	0,1108	0,1366
750	38	95	135	145	190	215	280	30	30	45	45	60	60													
22,4	1800	80	185	255	285	375	445	555	30	28	45	42	60	60	22,6863	21,5229	22,6311	22,237	21,725	20,8472						
	1500	67	155	220	240	320	375	465	30	29	45	44	60	60												
	1200	54	125	170	190	250	300	370	30	30	45	45	60	60												
	1000	45	105	145	160	220	250	320	30	30	45	45	60	60												
	900	40	95	130	140	190	225	280	30	30	45	45	60	60							0,0274	0,0309	0,0526	0,0588	0,109	0,1222
750	33	75	105	120	160	185	230	30	30	45	45	60	60													
25	1800	72		230		360		530		30		44		60												
	1500	60		190		300		440		30		45		60												
	1200	48		155		240		355		30		45		60							24,4314			24,1412		24,3789
	1000	40		130		200		300		30		45		60												
	900	36		115		180		265		30		45		60							0,0297			0,0573		0,1164
750	30		95		150		220		30		45		60													


i_N Nominal ratio / 标称速比
 n_{1, 2} Nominal speed (rpm) / 标称转速
 i_{ex} Exact ratio / 精确速比
 J Moments of inertia J related to the HSS / 高速轴转动惯量

Hansen M4 ACC	Gear unit	减速机	P
	Vertical low speed shaft	垂直低速轴	V
	Parallel shafts	平行轴	P
	Size	规格	DA ▶ FX
	Two stages	二级	2U

Thermal power ratings

额定热功率

P_t (kW)

i_N	min⁻¹ n₁		Size - 规格					
			DA	DX	EA	EX	FA	FX
9 ↓ 11,2	1800	- 1	185	200	225	245	255	285
	1500	- 1	185	200	225	245	260	300
	1200	- 1	175	190	220	240	265	310
	1000	- 1	170	185	215	235	260	300
	900	- 1	170	180	210	230	255	295
	750	- 1	160	175	205	220	245	290
12,5 ↓ 16	1800	- 1	155	175	190	220	225	255
	1500	- 1	155	175	185	220	225	260
	1200	- 1	150	165	180	210	220	255
	1000	- 1	145	165	180	205	215	250
	900	- 1	140	160	175	200	210	245
	750	- 1	130	150	165	195	205	235
18 ↓ 25	1800	- 1	145	150	155	175	185	205
	1500	- 1	140	150	155	170	185	205
	1200	- 1	135	145	150	170	185	205
	1000	- 1	130	140	145	160	180	200
	900	- 1	125	135	140	160	180	195
	750	- 1	120	130	135	150	170	190



Number of fans. / 风扇数量
Correction factors - see p. 7 / 修正系数- 见 7 页

For Pt-values of gear units / 减速机的Pt值
with fan: refer to us. / 带风扇: 请咨询汉森

i_N Nominal ratio / 标称速比
n_{1,2} Nominal speed (rpm) / 标称转速

Hansen M4 ACC

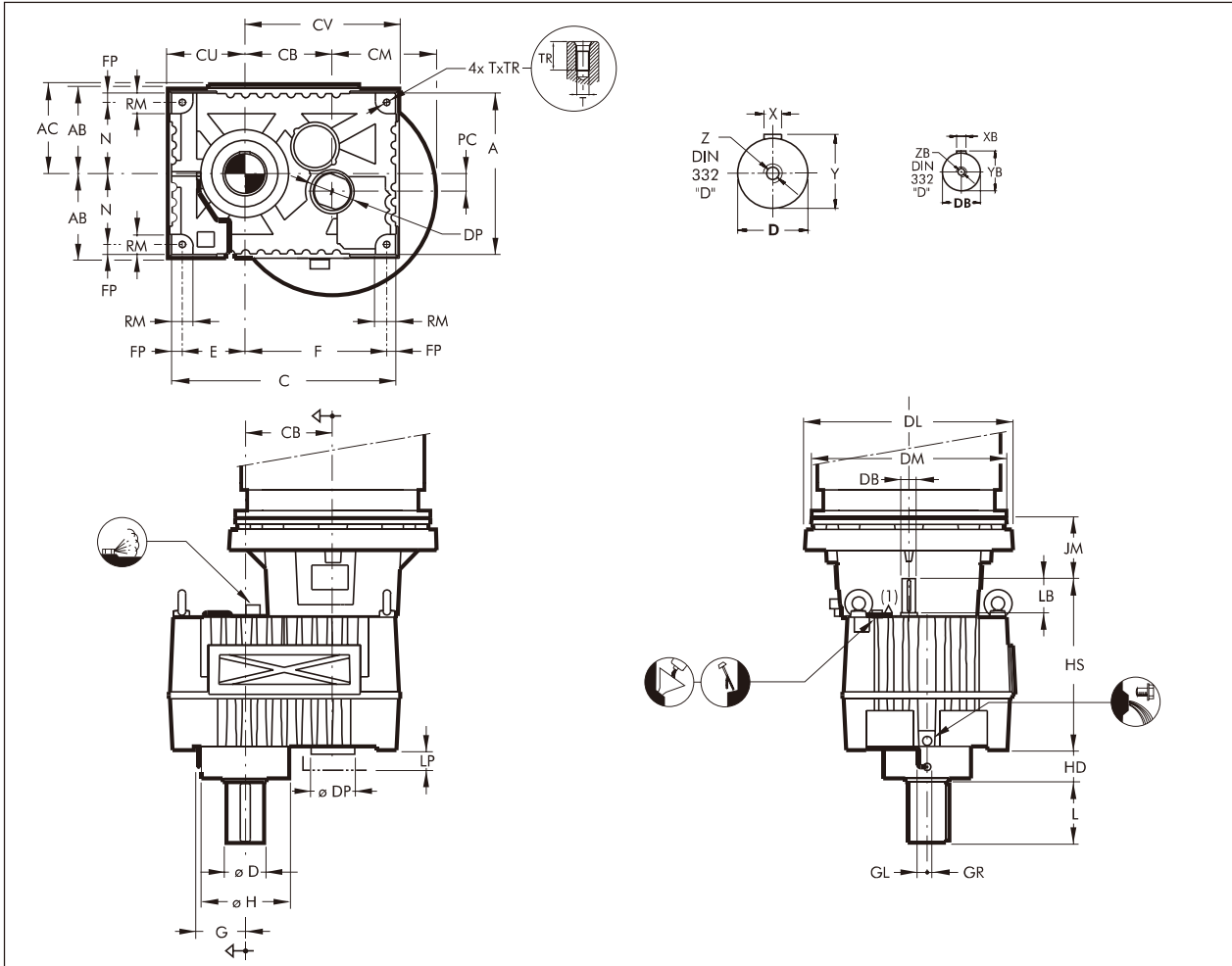
97PU0-VP2N4001N3C

mm

Gear unit	减速机	P
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	DA ▶ FX
Two stages	二级	2U

Without filter 不带过滤器

For air cooled condenser fan drives 空冷凝汽器风机驱动装置



Shaft arrangements / 出轴方式 (front view / 主视图)

(1) Centralised grease points 集成加脂点

Type	A	AB	AC	C	CB	CU	CV	E	F	FP	G	GL	GR	H	HD	HS	N	RM	T	TR	kg	Litres
PVPDA2U	590	315	335	770	281	250	555	190	500	40	170	50	20	290	141	695	255	85	M30	53	750	28
PVPDX2U	600	315	335	845	323	285	595	225	530	45	185	50	20	315	141	695	255	85	M30	53	820	31
PVPEA2U	670	350	365	850	321	285	600	220	540	45	190	50	20	330	156	735	290	90	M30	53	950	32
PVPEX2U	670	350	365	925	358	320	640	255	580	45	205	50	20	365	156	735	290	90	M30	53	1060	35
PVPFA2U	720	375	390	920	364	315	640	240	570	55	210	50	20	375	111	820	305	105	M36	64	1320	47
PVPFX2U	720	375	390	1015	406	360	690	285	620	55	210	50	20	375	111	820	305	105	M36	64	1430	54

Type 型号	Shafts - 轴 Keys / 键标准 DIN 6885-T1										Pump - 油泵			Motor - 电机				
	D-m7	L	X	Y	Z	DB-m6	LB	XB	YB	ZB	DP	LP	PC	IEC	DM	DL	CM	JM
PVPDA2U	115	210	32	122	M24	58	145	16	62	M20	150	65	40	250	550	710	355	145
PVPDX2U	135	250	36	143	M30	58	145	16	62	M20	150	65	38	280	550	710	355	145
PVPEA2U	135	250	36	143	M30	65	145	18	69	M20	150	65	68	315	660	710	355	175
PVPEX2U	155	250	40	164	M30	65	145	18	69	M20	150	65	74	355	800	850	425	215
PVPFA2U	175	300	45	185	M30	75	145	20	79,5	M20	150	65	91					
PVPFX2U	175	300	45	185	M30	75	145	20	79,5	M20	150	65	93					

Hansen M4 ACC

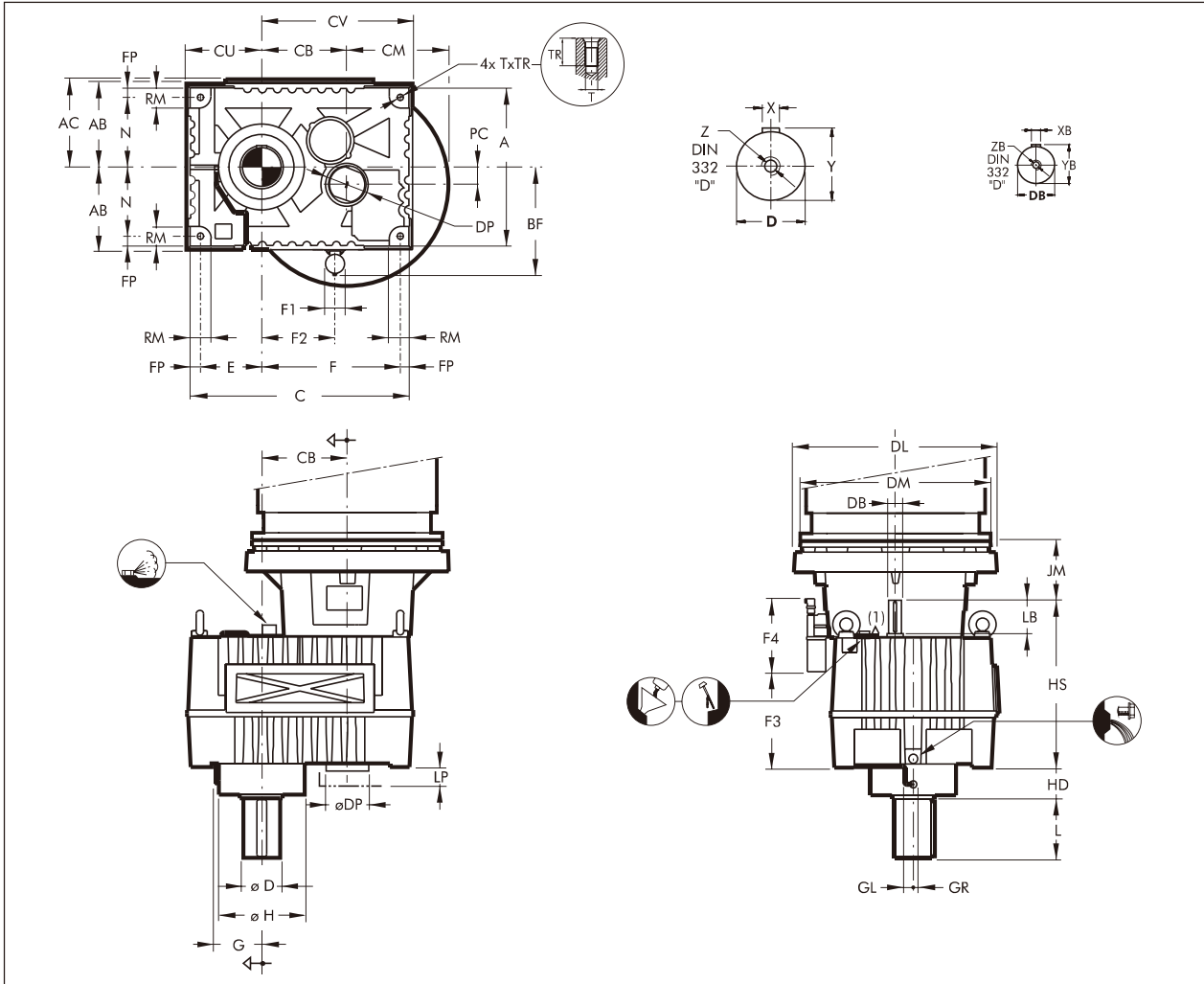
97PU0-VP2N4011N3C

mm

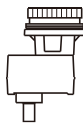
Gear unit	减速机	P
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	DA ▶ FX
Two stages	二级	2U

With filter 带过滤器

For air cooled condenser fan drives 空冷凝汽器风机驱动装置



UDN



Shaft arrangements / 出轴方式 (front view / 主视图)

(1) Centralised grease points 集成加脂点

Type	A	AB	AC	BF	C	CB	CU	CV	E	F	FP	F1	F2	F3	F4	G	GL	GR	H	HD	HS	N	RM	T	TR	kg	Litres
PVPEA2U	590	315	335	415	770	281	250	555	190	500	40	80	231	364	340	170	50	20	290	141	695	255	85	M30	53	750	28
PVPDA2U	600	315	335	415	845	323	285	595	225	530	45	80	273	364	340	185	50	20	315	141	695	255	85	M30	53	820	31
PVPDX2U	670	350	365	435	850	321	285	600	220	540	45	80	271	404	340	190	50	20	330	156	735	290	90	M30	53	950	32
PVPEX2U	670	350	365	440	925	358	320	640	255	580	45	80	309	404	340	205	50	20	365	156	735	290	90	M30	53	1060	35
PVPFA2U	720	375	390	465	920	364	315	640	240	570	55	80	314	489	340	210	50	20	375	111	820	305	105	M36	64	1320	47
PVPFX2U	720	375	390	465	1015	406	360	690	285	620	55	80	357	489	340	210	50	20	375	111	820	305	105	M36	64	1430	54

Type 型号	Shafts - 轴 Keys / 键标准 DIN 6885-T1					Pump - 油泵			Motor - 电机									
	D-m7	L	X	Y	Z	DB-m6	LB	XB	YB	ZB	DP	LP	PC	IEC	DM	DL	CM	JM
PVPEA2U	115	210	32	122	M24	58	145	16	62	M20	150	65	40	250	550	710	355	145
PVPDA2U	135	250	36	143	M30	58	145	16	62	M20	150	65	38	280	550	710	355	145
PVPDX2U	135	250	36	143	M30	65	145	18	69	M20	150	65	68	315	660	710	355	175
PVPEX2U	155	250	40	164	M30	65	145	18	69	M20	150	65	74	355	800	850	425	215
PVPFA2U	175	300	45	185	M30	75	145	20	79,5	M20	150	65	91					
PVPFX2U	175	300	45	185	M30	75	145	20	79,5	M20	150	65	93					

DESCRIPTION

HANSEN P4 GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明
空冷凝汽器驱动用
汉森P4减速机

The gear unit

Units are designed to comply with the standard CTI specifications. The mechanical power ratings shown in the tables relate respectively to input speeds of 1800, 1500, 1200, 1000, 900 and 750 RPM at the high speed shaft. They are also valid for asynchronous speeds which are max. 3% lower than the synchronous speeds. Interpolation will yield power rating values for intermediate speeds. The power rating for speeds lower than 750 RPM is based on the continuous torque rating of that speed. For input speeds exceeding 1800 RPM, please refer to us.

Coding



Type

- 1 : series **Q** : Hansen P4
 2 : **V** : vertical low speed shaft
 3 : **P** : parallel shafts
 4 : **Size**: C, ..., F
 5 : number of stages: **2**
 5 bis : / : normal execution (no code)

Shaft arrangement

- 6 : high speed shaft extension: **U**: up
 7 : low speed shaft extension: **D**: down
 8 : low speed shaft type: **N**: normal solid shaft

Ratio

- 9 : nominal ratio

Basic components

Helical gears

Designed and rated in accordance with AGMA for maximum load capacity, minimum losses and quiet operation. All geared components are manufactured from alloy steel, gas carburized, hardened and precision ground.

Low speed shafts

The low speed shafts are in solid version. Extended shafts are available upon request.

Bearings

Heavy duty roller bearings of the tapered, cylindrical or spherical roller type. Calculated in compliance with ISO and renowned bearing manufacturers. The low speed shaft bearings are selected to allow considerable thrust loads. The nominal permissible thrust load F_{xN} mentioned in the tables, page 23, is defined for a $SF_{min} = 2$, low speed shaft rotating counter-clockwise and guarantees a calculated bearing life of 100000 hours.

Housings, bearing housings and covers

Made from grey pearlitic cast iron.
 Machined on CNC machining centers.
 Designed to ensure strength and rigidity.
 Unused tapped holes are plugged.
 Horizontal split housing.

减速机

产品设计符合标准CTI 参数规格。

表中所示的机械功率分别对应高速轴的不同输入速度：1800，1500，1200，1000，900和750转/分，这些数据还适用于满载条件下的转速不低于同步转速的3%。

中间转速所对应的机械功率值可通过插值算法得出，转速低于750转/分的机械功率值是根据该转速下的标称连续转矩计算出来的。输入转速超过 1800 RPM 的情形请咨询汉森。

编码



型号

- 1: 系列 **Q**: 汉森 P4
 2: **V**: 垂直低速轴
 3: **P**: 平行轴
 4: 规格: Z、A、B、...、F
 5: 级数: 2
 5 bis: /: 常规型式 (无代码)

轴布置

- 6: 高速轴出轴方向: **U**: 上
 7: 低速轴出轴方向: **D**: 下
 8: 低速轴类型: **N**: 普通实心轴

速比

- 9: 标称速比

零部件

斜齿轮

斜齿轮设计按照AGMA标准，具有承载能力高，损耗小，噪音低的特性。

所有齿轮齿轴均采用合金钢制造，经过渗碳处理和精密磨削。

低速轴

低速轴是实心轴。
 可根据客户要求确定轴端延长的长度。

轴承

轴承采用重载圆锥，圆柱和球面滚子轴承。
 轴承计算寿命按照ISO 和知名轴承制造厂商标准。

低速轴轴承允许承受一定的轴向力 F_{xN} 。额定轴向力见23页，表中数值基于 $SF_{min} = 2$ ，低速轴逆时针旋转，并且轴承寿命达到10万小时。

箱体、法兰式电机座及端盖

箱体材料采用珠光体灰口铸铁。
 CNC 制造中心加工。
 设计保证强度和刚度。
 不使用的螺纹孔都妥善堵塞。
 水平分割式箱体。

DESCRIPTION

HANSEN P4 GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明
空冷凝汽器驱动用
汉森P4减速机

Systems

Lubrication

Lubricants: mineral oils are normally used. Lubricants should always contain adequate EP-additives (refer to Service Manual).
Pump lubrication for the upper bearings is standard.
Grease point with nipple according to DIN 71412 for grease lubrication of the bearing at side of the low speed shaft end.
The gear unit housing acts as a large oil sump.
Checking of the oil level is done by means of the gear unit dipstick (always in the plugged position).

Cooling

Heat generated in the gear unit due to losses, can be dissipated by:
natural cooling through the housing
additional fan cooling: an electrically driven axial fan can be incorporated (see pages 21-22)
Characteristics of electrically driven fans: standard
3 phase, 50 Hz, 400 V \pm 10%, insulation class: IP 55
Free air entry at the suction side should always be guaranteed

Thermal checks see page 19.

Sealing

Static: generalized use of sealing compound
inspection cover on the gear unit: O-ring
low speed shaft: drywell

Rotary: high speed shaft: dust lip oil seal
low speed shaft: dust lip oil seal

Motors

Parallel shaft gear units are to be fitted with standard flange mounted IEC motors (type B5).
For more information on motors, refer to motor catalogues.
For Nema motors, refer to us.
Use of two speed motors: when changing speed with two speed motors, the motor has to be slowed down below the low speed, before energising the slow speed winding.

Optional devices

Some devices can optionally be provided (refer to pages 21-22)
More detailed information about the optional devices is mentioned in separate technical manuals.
Refer to us.

Backstop

Built-in backstop to prevent the fan from "wind-milling". Internal lubrication is assured.

Filter

With incorporated pressure relief valve.
A filter with incorporated pressure relief valve and visual or electrical contamination indicator is available as an option.

Heaters

Electrical heating devices for low temperature start-up are available.

系统

润滑系统

润滑剂：通常使用矿物油。润滑剂需含有充足的 EP 添加剂（参阅服务手册）。
上部轴承由油泵供油润滑是标准配置。
减速机箱体作为油箱使用。
低速轴出轴侧轴承采用油脂润滑，油嘴标准为DIN71412。
通过减速机的油标尺（一般处于塞紧状态）检查油位。

冷却系统

由于运行产生的热量可以通过以下方式散热：

- 箱体的自然冷却。
- 附加风扇冷却：可选电动轴流风扇（见21-22页）。
电动轴流风扇：标准3极，50HZ，400V，防护等级：IP55，安装时须保证风扇吸风侧的空气流通正常。

热功率校核，见19页。

密封

- 静态密封：
- 通常使用密封胶
 - 检查孔盖采用可重复使用的密封垫。
 - 低速轴采用干井密封。
- 转动密封：
- 高速轴：带防尘唇密封
 - 低速轴：带防尘唇密封

电机

减速机装配标准法兰安装 IEC 电机（B5 型）。更多电机信息请参阅电机目录。

有关 Nema 电机，请咨询汉森。

双速电机的使用：利用双速电机变速时，在通电低速绕组前必须将风机转速降低到低速之下。

选装设备

提供某些选装设备（见21-22页），技术手册中有关于选装设备的详细信息。请咨询汉森。

逆止器

内置逆止器可以防止风机随风转动。保证内部可靠润滑。
拆掉电机和法兰式电机座后可以看到逆止器。

过滤器

- 配有一体式泄压阀。
- 可以选装可视或电子污染指示器。

加热器

可以选装电加热器，以适应低温启动。

DESCRIPTION

HANSEN P4 GEAR UNITS FOR AIR COOLED CONDENSER DRIVES

说明
空冷凝汽器驱动用
汉森P4减速机

Flow switch

When gear units are pump lubricated, a flow switch can be provided to check the oil flow to the gear unit. This switch can trigger an alarm signal when the oil supply is inadequate. The gear unit has to be stopped at once and the cause of the interruption of the oil supply has to be removed.

Oil level switch

To control the oil level in the gear unit, an oil level switch can be provided. This switch can trigger an alarm signal when the oil bath falls beneath a specified limit.

Pt100

To control the oil bath temperature. The Pt100 can trigger an alarm signal when the oil temperature is higher than a specified limit.

Shipping conditions

Inspection prior to shipment

Test run: all gear units are tested under no load
Conformity Check

Protection

Shaft extension: greased and protected with waxed
waterproof paper

Lubricants

Hansen P4 gear units are shipped without oil.
Grease lubrication points are factory filled.

For information relating to **storage, handling, installation, start-up and maintenance**, refer to the service manual which is supplied together with each gear unit.

Protection

Standard protection systems

All units are standard provided with **E3 painting system**.

A three layer paint system consisting of:

- layer 1: a two-component primer
- layer 2: a two-component high build epoxy primer
- layer 3: a two component high build epoxy paint

Designed for gear units installed outdoors in industrial atmospheres with low level of pollution.

The painting system is suitable to be applied in the atmospheric-corrosivity category C2 according to ISO 12944-2 (and ISO 12944-5).

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

Bolts and nuts provided with appropriate protection.

Aggressive environment

For air cooled condenser drives in aggressive environment, an additional protection system can be offered: refer to us.

流量开关

如果减速机采用泵润滑，可以选择流量开关检查通往减速机的流量状况。如果供油不充分，该开关能够触发警报信号。减速机必须立即停止运行，同时迅速清除阻碍流量的因素。

油位开关

油位开关可以监控减速机内的油位。如果油位降到规定限值之下该开关可以触发警报信号。

Pt100 温度传感器

监控油温度，如果油温超过某规定限值时可以触发警报信号。

运输条件

装运前检查

试运行：空载检测
符合性检查

保护措施

轴伸：采用防水蜡纸加注润滑脂保护。

润滑剂

汉森 P4 减速机均无油装运。

出厂时所有润滑点已加注润滑脂。

有关储存、操作、安装、启动以及维护的信息请参阅减速机提供的服务手册。

保护

标准防护

E3喷漆标准是冷却塔用减速机的标准喷漆系统。

E3标准包括三个涂层：

- 第一层：二合一环氧树脂底漆
- 第二层：二合一高厚膜型环氧树脂底漆
- 第三层：二合一高厚膜型环氧树脂漆

E3是针对安装于室外，轻度污染环境的减速机设计的。

E3喷漆系统适用于ISO12944-2和ISO12944-5大气污染标准中的C2。

涂漆颜色的不同，不影响涂漆的质量

螺栓和螺母 均提供适当的保护。

恶劣环境

对于安装于恶劣环境中的减速机，请咨询汉森。

汉森可提供更高标准的涂漆。

SELECTION
Mechanical power rating
FOR AIR COOLED CONDENSER DRIVES

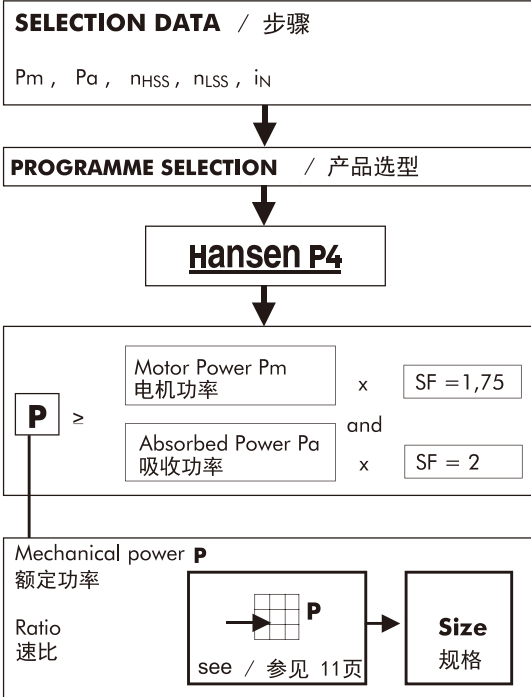
选型
额定功率
空冷凝汽器驱动用

Procedure / 步骤

Reference Data / 参考数据

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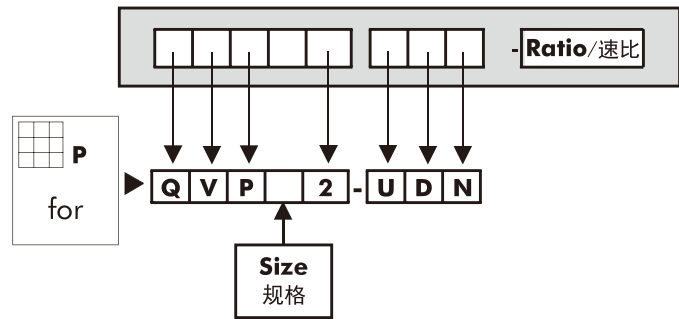
选型



refer to page 20 / 参见 20 页

refer to page 2 / 参见 2 页

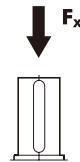
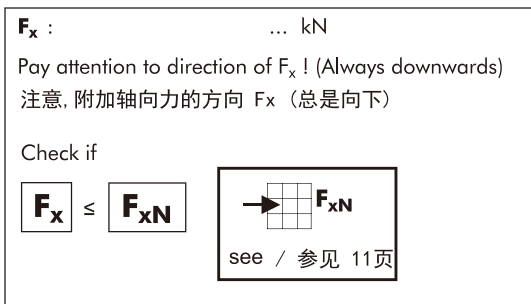
for ratios < refer to us / 速比 < 6, 3, 请咨询汉森。



C
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校
核

Thrust load / 附加轴向力



Thermal rating see pages 19, 24
 热功率校核见19, 24页

SELECTION

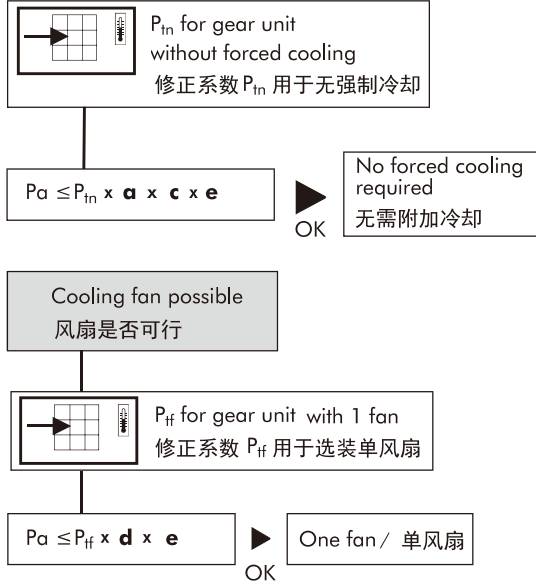
Thermal power rating

FOR AIR COOLED CONDENSER DRIVES

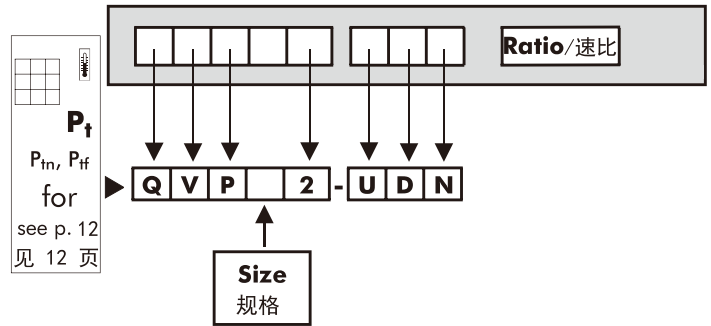
选型
热功率
空冷凝汽器驱动用



Thermal check / 热功率校核



Reference Data / 热功率计算参数



factor **a** for ambient temperature without forced cooling
修正系数 **a** 用于环境温度下无强制冷却

Ratio 速比	环境温度 / Ambient temperature in °C			
	15 to 25	25 to 35	35 to 45	
6,3 → 11,2	1	0,81	0,68	0,55
12,5 → 18	1	0,85	0,71	0,66
≥ 20	1	0,87	0,75	0,74
Size / 规格	C ▶ F	C ▶ F	C ▶ D	E ▶ F

factor **b** for duration of service
修正系数 **b** 用于运行时间

h/year 小时/年	小时/天 h/day (max)				
	3	10	>16		
1000	1,2	1,3	1,15	1,2	1,15
2000	-	-	1,1	1,1	1,1
≥ 4000	-	-	-	-	1
Size / 规格	C ▶ F	C ▶ F	C ▶ D	E ▶ F	C ▶ F

factor **c** for air circulation (without fan)
修正系数 **c** 用于自然风无风扇环境

Mounting 安装环境	Air flow 风速		
Indoors- small enclosure 室内狭小环境	≥ 0,5 m/s	0,73	0,70
Indoors- normal working areas 室内正常工作环境	≥ 1,4 m/s	1	1
Outdoors- protected against sun 室外有防晒措施	≥ 3,0 m/s	1,33	1,36
Size / 规格		Z ▶ D	E ▶ H

factor **d** for ambient temperature with forced cooling
修正系数 **d** 用于环境温度下带强制冷却

	Number of stages 级数	环境温度 / Ambient temperature in °C			
		15 to 25	25 to 35	35 to 45	45 to 55
with forced cooling 带强制冷却	2	1	0,86	0,72	0,59

REQUEST FOR QUOTATION AIR COOLED CONDENSER DRIVES 空冷凝汽器询价选型

1. LOAD PARAMETERS / 载荷参数

Motor power / 电机功率 Pm = kW at min⁻¹
Absorbed power/ 吸收功率 Pa = kW
 Absorbed torque / 吸收扭矩 Ta = kNm
Running time in h/day / 运行时间 ≤3 ≤10 >10
 Peak torque in excess of 200% Ta = %
 峰值扭矩超过200% Ta
 Number of starts/stops per 10 hours :

2. SPEED / 转速

High speed shaft (HSS) / 高速轴 (HSS)
 Constant speed(s) n1(HSS) = or/and min⁻¹
 恒速
 Variable speed ≤ n1(HSS) ≤ min⁻¹
 变速
 Direction of rotation: CW
 旋向

Low speed shaft (LSS) / 低速轴 (LSS)
 Constant speed(s) / 恒速 n2(LSS) = or/and min⁻¹
 Variable speed / 变速 ≤ n2(LSS) ≤ min⁻¹
 Tolerance on speed LSS ± % ± min⁻¹
 LSS 输出转速偏差
 Direction of rotation: CCW
 旋向

3. SHAFT CONFIGURATION : / 出轴方式

Right-angle shafts / 直交轴

4. THRUST LOAD ON LOW SPEED SHAFT Y N

低速轴载荷
 Weight of fan and coupling = kN
 风扇及联轴器重量
 Aerodynamic thrust load towards gear unit = + kN
 风扇及联轴器重量

5. INSTALLATION PARAMETERS / 安装参数

Ambient temperature (°C) near the gear unit : min:
 环境温度
 max:
Structure see page 31 / 见 31 页 open closed
 冷却塔结构

Air speed near the gear unit : m/s
 减速机周围风速

Location / 安装环境
 Direct sun exposure / 直接暴露于日光下 Y N

Atmosphere: corrosion category (according to ISO 12944-2):

Electric installation AC V Hz
 电器安装 3 Ph

Main power supply / 主电源

Auxiliary power supply / 辅助电源

Protection requirement: / 防护等级

Insulation: / 绝缘等级

6. NOISE (gear unit + motor) / 噪音(减速机 + 电机)

Max. noise power: / 声能 dBA
 Max. noise pressure: / 声压 dBA at m

7. OPTIONAL SPECIFICATIONS / 可选项

Additional cooling / 需要额外冷却
 Fan / 风扇

Options to be indicated on pages 21-22
 所有选项 见 21-22 页

Motor mount IEC frame:

Shafts inch
 英制低速轴

Painting (see pag 17) 喷漆 (见 17 页)

(only to be specified if not in accordance with selected corrosion category)
 (如不作选择, 将根据气体腐蚀分类选定)

		Corrosion category according to ISO 12944-2 气体腐蚀类别 (按照 ISO12944-2)								
Selection / 选择	System	C1			C2			C3		
		L (*)	M	H	L	M	H	L	M	H
<input type="checkbox"/>	E2									
<input type="checkbox"/>	E3									
<input type="checkbox"/>	E4									
	EE3									
	EE4									

		Corrosion category according to ISO 12944-2 气体腐蚀类别 (按照 ISO12944-2)								
Selection / 选择	System	C4			C5-I			C5-M		
		L (*)	M	H	L	M	H	L	M	H
<input type="checkbox"/>	E2									
<input type="checkbox"/>	E3									
<input type="checkbox"/>	E4									
<input type="checkbox"/>	EE3									
<input type="checkbox"/>	EE4									

(*) : Durability range according to ISO 12944-1

L : low

M : medium

H : high

Note : the durability range is **NOT** a "guarantee time".

Durability is a technical consideration that can help the owner set up a maintenance programme

(*) : 喷漆耐久性按照 ISO 12944-1

L: 低

M: 中

H: 高

注意: 耐久性并不是保质期。只是从技术方面考虑, 为用户制定设备维护保养计划提供参考。

Not allowable materials

不允许用的材料

Al
 Cu
 Other

8. BACKSTOP REQUIRED

逆止器

Y N

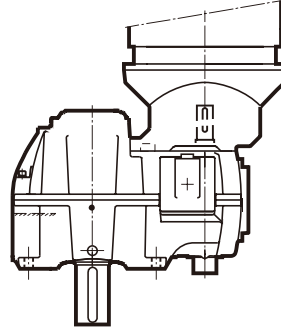


Hansen P4

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	C ▶ F
Two stages	二级	2

For air cooled condenser fan drives 空冷凝汽器风机驱动装置

Accessories and options 配置和选项



	Standard accessories 标准配置	Optional accessories 可选配置
Low speed shaft 低速轴		
Intermediate shaft 中间轴		
High speed shaft 高速轴		
Housing 箱体		

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	C ▶ F
Two stages	二级	2

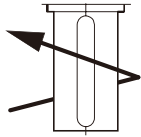
For air cooled condenser fan drives 空冷凝汽器风机驱动装置

Accessories and options 配置和选项

: optional

:选项

1 normal solid output shaft	1 标准实心轴
1a <input type="checkbox"/> extended solid output shaft	1a <input type="checkbox"/> 加长实心低速轴
2 drywell	2 干井
3 <input type="checkbox"/> built-in backstop	3 <input type="checkbox"/> 逆止器
4 <input type="checkbox"/> standard elastic block-type coupling	4 <input type="checkbox"/> 标准弹性块联轴器
5 dipstick	5 油尺
6 breather plug or	6 呼吸器
6a <input type="checkbox"/> anti-humidity breather plug or	6a <input type="checkbox"/> 防潮呼吸器
6b <input type="checkbox"/> dust-proof breather plug	6b <input type="checkbox"/> 防尘呼吸器
7 oil filling plug	7 加油塞
8 draining plug (with magnet) or	8 磁性油塞
8a <input type="checkbox"/> drain cock with hose coupling	8a <input type="checkbox"/> 放油阀带软管接头
9 pump lubrication	9 油泵润滑
10 gear unit inspection cover	10 检查孔盖
11 grease point (DIN 71412)	11 加脂点 (DIN71412)
12 <input type="checkbox"/> axial fan with electric motor	12 <input type="checkbox"/> 轴流电风扇
13 <input type="checkbox"/> oil level glass	13 <input type="checkbox"/> 油位镜
14 <input type="checkbox"/> flow switch	14 <input type="checkbox"/> 流量开关
15 <input type="checkbox"/> oil level switch	15 <input type="checkbox"/> 油位开关
16 <input type="checkbox"/> heater	16 <input type="checkbox"/> 加热器
17 <input type="checkbox"/> oil filter	17 <input type="checkbox"/> 过滤器
18 <input type="checkbox"/> Pt 100 meter for oil sump temperature	18 <input type="checkbox"/> 油浴用Pt100 温度传感器



Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	C ▶ F
Two stages	二级	2
Mechanical power ratings 额定功率		P (kW)
Rated thrust load 附加轴向力		F_{xN} (kN)


i _N	min ⁻¹		P (kW)				F _{xN} (kN)				i _{ex}		J (kgm ²)	
	n ₁	n ₂	Size - 规格				Size - 规格				Size - 规格		Size - 规格	
	C	D	E	F	C	D	E	F	C	D	E	F		
6,3	1800	285	360	546	940	1350	27	26,5	35	66	6,2296	6,4156	6,1875	6,4699
	1500	240	320	470	790	1150	28,5	28,5	38	70				
	1200	190	265	400	640	940	30	31	42	76				
	1000	160	230	340	530	790	30	31	46	81				
	900	145	205	310	480	710	31	32	46	84				
	750	120	175	260	400	600	32	33	48	86				
7,1	1800	255	330	490	820	1200	27,5	27,5	36	68	7,1594	7,2524	7,1188	7,0074
	1500	210	290	430	690	1000	29	29	39	73				
	1200	170	240	360	550	820	29,5	30	44	79				
	1000	140	200	300	460	690	30	31	46	85				
	900	125	180	270	420	620	31	32	46	86				
	750	105	150	225	350	520	32	33	48	88				
8	1800	225	320	460	770	1150	28,5	29	38	70	7,7364	7,9673	7,6261	7,9849
	1500	190	270	410	650	950	29,5	31	42	76				
	1200	150	225	330	520	770	30	31	46	82				
	1000	125	190	280	440	640	31	32	47	85				
	900	115	175	250	390	580	31	33	48	86				
	750	94	145	210	330	490	32	34	49	89				
9	1800	200	285	420	670	1000	29	29,5	40	74	8,8911	9,0065	8,7738	8,6483
	1500	165	240	360	560	830	29,5	30	43	79				
	1200	135	195	290	450	670	30	31	46	85				
	1000	110	160	245	380	560	31	32	47	87				
	900	100	145	220	340	510	32	33	48	88				
	750	83	120	185	285	430	33	34	50	91				
10	1800	180	260	390	610	890	30	30	43	78	9,7673	10,059	9,7903	10,326
	1500	150	225	330	510	740	30	31	46	83				
	1200	120	185	265	410	600	31	33	48	86				
	1000	100	155	220	340	500	32	34	49	88				
	900	90	140	200	310	450	33	34	50	90				
	750	75	115	165	260	380	34	36	52	92				
11,2	1800	160	230	340	520	780	29,5	31	45	81	11,225	11,371	11,264	11,183
	1500	135	190	285	440	650	31	32	46	85				
	1200	105	155	230	350	520	32	33	48	88				
	1000	89	130	195	295	440	32	34	49	90				
	900	80	115	175	265	400	33	35	50	91				
	750	67	97	145	225	330	34	36	52	94				
12,5	1800	145	210	310	490	710	31	32	46	84	12,54	12,73	12,176	13
	1500	120	180	260	410	590	31	33	48	86				
	1200	96	145	210	330	480	32	34	50	89				
	1000	80	120	175	275	400	33	35	51	91				
	900	72	110	160	250	360	34	36	52	93				
	750	60	91	135	210	300	36	37	53	95				
14	1800	130	180	275	420	620	31	32	47	86	14,412	14,39	14,009	14,08
	1500	105	150	230	350	520	32	33	48	88				
	1200	86	120	185	285	420	33	34	50	91				
	1000	71	100	155	240	350	34	35	51	93				
	900	64	91	140	215	320	35	36	52	94				
	750	54	76	115	180	265	38	39	54	97				
16	1800	115	175	245	380	580	31	33	48	86	15,557	16,461	15,745	16,036
	1500	94	145	205	320	480	32	34	50	89				
	1200	75	115	165	255	390	34	35	52	92				
	1000	63	98	135	215	330	35	37	53	94				
	900	56	88	125	195	295	36	38	54	95				
	750	47	74	105	160	245	39	41	58	98				
18	1800	100	145	210	330	510	32	34	48	88	17,879	18,608	18,115	17,368
	1500	83	120	175	275	420	33	35	50	91				
	1200	67	97	140	220	340	34	36	52	94				
	1000	56	81	120	185	285	37	38	54	96				
	900	50	73	105	165	255	38	41	56	98				
	750	42	61	90	140	215	41	43	60	100				
20	1800	90	135	200	310	470	33	34	50	89	19,969	20,069	19,671	20,059
	1500	75	115	170	255	390	34	35	52	92				
	1200	60	92	135	205	310	36	37	54	95				
	1000	50	77	115	175	260	38	40	55	97				
	900	45	69	100	155	235	40	42	58	98				
	750	38	58	85	130	195	43	45	63	105				
22,4	1800	80	115	175	265	410	33	35	50	91	22,949	22,686	22,631	21,725
	1500	67	95	145	220	340	35	36	52	94				
	1200	54	76	115	180	275	38	39	54	97				
	1000	45	64	98	150	230	40	42	58	99				
	900	40	57	88	135	205	42	44	61	100				
	750	33	48	74	110	170	45	47	66	110				

i_N Nominal ratio / 标称速比
 n_{1, 2} Nominal speed (rpm) / 标称转速
 i_{ex} Exact ratio / 精确速比
 J Moments of inertia J related to the HSS / 高速轴转动惯量

Hansen P4

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	C ▶ F
Two stages	二级	2

Thermal power ratings 热功率校核 P_t (kW)

i_N	min^{-1} n_1		Size - 规格			
			C	D	E	F
6,3 ↓ 9	1800	-	46	46		
		1	175	230	340	360
	1500	-	70	86	69	
		1	190	260	360	430
	1200	-	84	110	120	140
		1	195	270	370	460
	1000	-	90	120	140	170
1		190	265	370	460	
900	-	92	120	145	185	
	1	190	265	360	460	
	750	-	92	125	150	200
		1	180	255	350	450
10 ↓ 14	1800	-	67	80	73	71
		1	170	235	320	390
	1500	-	76	96	105	125
		1	175	235	330	400
	1200	-	81	105	125	160
		1	170	235	320	400
	1000	-	82	110	130	170
1		165	230	310	390	
900	-	81	110	135	170	
	1	160	225	310	380	
	750	-	78	105	135	180
		1	150	215	295	370
16 ↓ 22,4	1800	-	65	82	87	105
		1	140	200	255	330
	1500	-	67	89	100	130
		1	135	200	255	330
	1200	-	67	91	110	140
		1	130	190	250	320
	1000	-	66	90	110	150
1		125	185	235	310	
900	-	64	88	110	150	
	1	120	180	230	300	
	750	-	62	85	110	150
		1	115	170	220	290



Number of fans. / 风扇数量
Correction factors - see p. 19 / 修正系数见 19 页

i_N

Nominal ratio / 标称速比

$n_{1,2}$

Nominal speed (rpm) / 标称转速

Hansen P4

97QU-VP2N40013 A

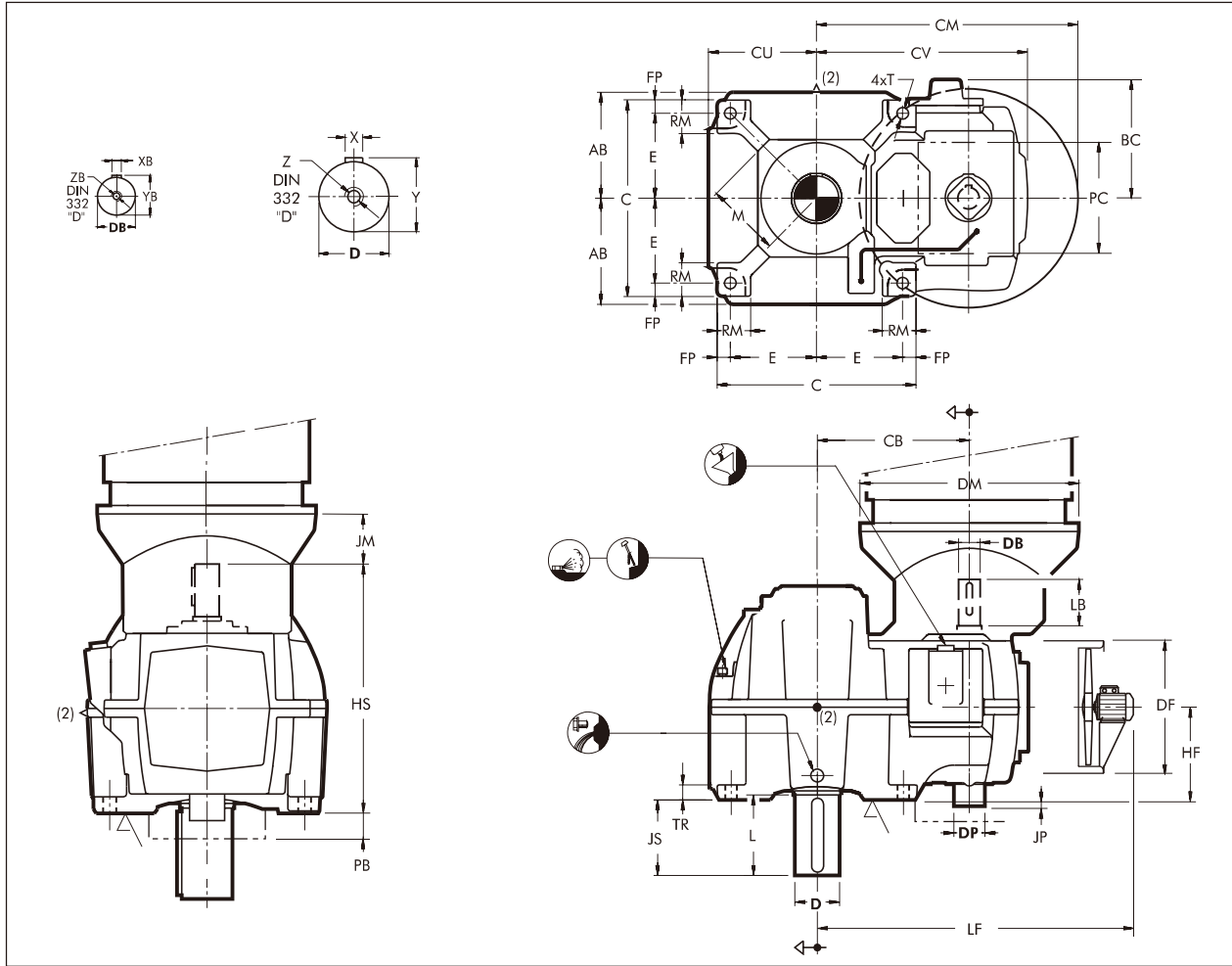
mm

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Parallel shafts	平行轴	P
Size	规格	C ▶ F
Two stages	二级	2

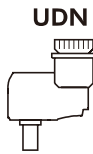
For air cooled condenser fan drives 空冷凝汽器风机驱动装置

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

用户负责提供安全防护装置及所有设备的正确安装



- (1) Space for pump removal
- (2) Grease lubrication point
- (3) +90 mm for explosion proof execution



Shaft arrangements / 出轴方式
(front view / 主视图)

- (1). 油泵拆卸空间
- (2). 加油点
- (3). 对于防爆要求须加 90mm

Type	AB	BC	C	CB	CU	CV	E	FP	HS	JS	M	RM	T	TR	kg	Litres
QVPC2	255	280	470	345	260	487	200	35	520	204	165	95	28	38	410	29
QVPD2	285	290	530	397	290	553	225	40	605	207	195	95	35	40	590	34
QVPE2	320	335	600	459	326	637	260	40	665	245	225	105	35	45	880	55
QVPF2	365	372	690	525	370	720	295	50	735	243	265	135	42	52	1200	80

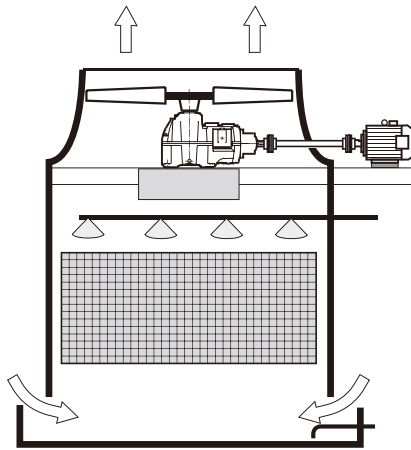
Type 型号	Shafts - 轴 Keys - 键标准 DIN 6885-T1										Fan- 风扇			Pump - 油泵			
	D-m6	L	X	Y	Z	DB	LB	XB	YB	ZB	DF	HF	LF (3)	DP (1)	JP	PB (1)	PC (1)
QVPC2	105	210	28	111	M24	48k6	110	14	51,5	M16	410	212	910	110	29	75	110
QVPD2	115	210	32	122	M24	58m6	140	16	62	M20	480	245	980	110	19	65	110
QVPE2	135	250	36	143	M30	65m6	140	18	69	M20	510	280	1050	145	-1	50	145
QVPF2	155	250	40	164	M30	75m6	140	20	79,5	M20	560	320	1145	145	6	60	145

MOTOR - 电机		Hansen P4								Coupling 联轴器
IEC CEI V1	DM	QVPC2		QVPD2		QVPE2		QVPF2		
		CM	JM	CM	JM	CM	JM	CM	JM	
225	450	570	145							
250	550	620	145	672	145	734	145			
280	550	620	145	672	145	734	145			
315	660	675	175	727	175	789	175	855	175	
355	800					859	215	925	215	

Refer to us
请咨询汉森

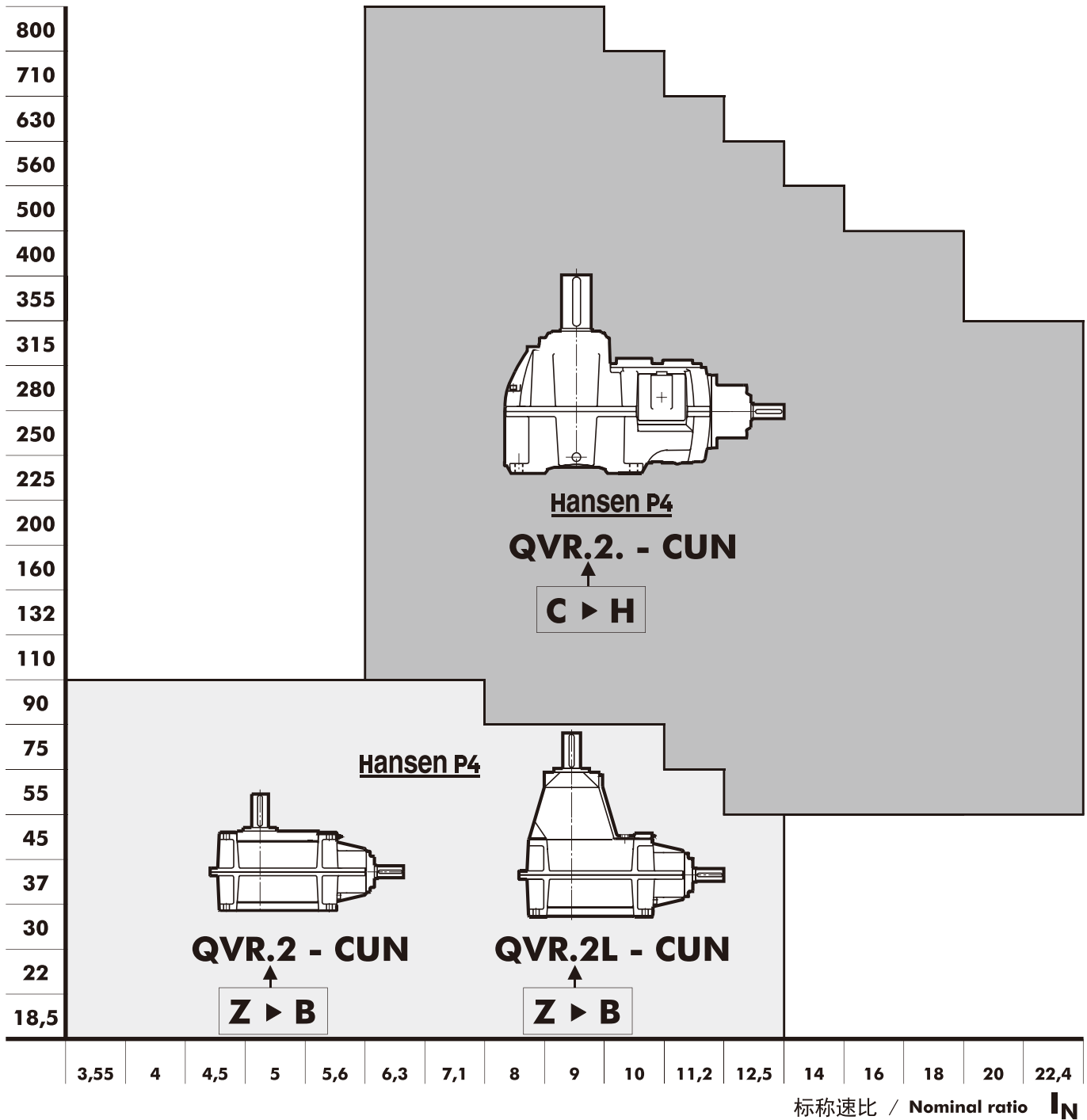
**STANDARDISED GEAR UNITS FOR
COOLING TOWER DRIVES
PROGRAMME - SELECTION**

冷却塔用标准减速机
选型指南



Motor Power / 电机功率

P_m (kW - 1500 min⁻¹) / SF = 1,75



DESCRIPTION

HANSEN P4 GEAR UNITS FOR COOLING TOWER DRIVES

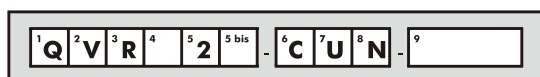
说明

冷却塔风机用汉森 P4 减速机

The gear unit

Units are designed to comply with the standard CTI specifications. The mechanical power ratings shown in the tables relate respectively to input speeds of 1800, 1500, 1200, 1000, 900 and 750 RPM at the high speed shaft. They are also valid for asynchronous speeds which are max. 3% lower than the synchronous speeds. Interpolation will yield power rating values for intermediate speeds. The power rating for speeds lower than 750 RPM is based on the continuous torque rating of that speed. For input speeds exceeding 1800 RPM, please refer to us.

Coding



Type

- 1 : series **Q** : Hansen P4
 2 : **V** : vertical low speed shaft
 3 : **R** : right-angle shafts
 4 : **Size**: Z, A, B, ... H
 5 : number of stages: **2**
 5 bis: / : standard gear unit (no code)
 L : extended bearing housing (sizes Z, A, B)
 X : intermediate size

Shaft arrangement

- 6 : high speed shaft extension: **C**: right-angle
 7 : low speed shaft extension: **U**: up
 8 : low speed shaft type: **N**: normal solid shaft

Ratio

- 9 : nominal ratio

Basic components

Helical and spiral bevel gears

Designed and rated in accordance with AGMA for maximum load capacity, minimum losses and quiet operation. All geared components are manufactured from alloy steel, gas carburized, hardened and precision ground.

Low speed shafts

The low speed shafts are in solid version. Extended shafts are available upon request. For all executions, input and output shafts are located in the same vertical plane.

Bearings

Heavy duty roller bearings of the tapered, cylindrical or spherical roller type. Calculated in compliance with ISO and renowned bearing manufacturers. The low speed shaft bearings are selected to allow considerable thrust loads. The nominal permissible thrust load F_{xN} mentioned in the tables, pages B16 is defined for a $SF_{min} = 2$, low speed shaft rotating clockwise and guarantees a calculated bearing life of 100000 hours.

Housings, bearing housings and covers

Made from grey pearlitic cast iron. Machined on CNC machining centers. Designed to ensure strength and rigidity. Unused tapped holes are plugged. Horizontal split housing.

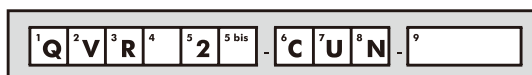
减速机

减速机设计符合CTI标准。

表中所示的机械功率分别对应高速轴的不同输入速度：1800, 1500, 1200, 1000, 900和750转/分，这些数据还适用于满载条件下的转速不低于同步转速的3%。

中间转速所对应的机械功率值可通过插值算法得出，转速低于750转/分的机械功率值应根据该转速下的标称转矩计算。输入转速超过1800 RPM请咨询汉森。

编码



型号

- 1: 系列 **Q**: 汉森 P4
 2: **V**: 垂直低速轴
 3: **R**: 直交轴
 4: 规格: Z、A、B、...H
 5: 级数: 2
 5 bis: /: 常规型式 (无代码)
 L: 加大的轴承座 (规格 Z、A、B)
 X: 中间型号

轴布置

- 6: 高速轴出轴方向: **C**: 直角
 7: 低速轴出轴方向: **U**: 上
 8: 低速轴类型: **N**: 普通实心轴

速比

- 9: 标称速比

零部件

斜齿轮和螺旋伞齿轮

斜齿轮设计按照AGMA标准，具有承载能力高，损耗小，噪音低的特性。所有齿轮齿轴均采用合金钢制造，经过渗碳处理和精密磨削。

低速轴

低速轴是实心轴。可根据客户要求确定轴端延长的长度。各种型式，输入轴和输出轴位于同一个垂直平面中。

轴承

轴承采用重载圆锥，圆柱和球面滚子轴承。轴承计算寿命按照ISO和知名轴承制造厂商标准。低速轴轴承允许承受一定的轴向力 F_{xN} 。额定轴向力见B16页，表中数值基于 $SF_{min} = 2$ ，低速轴逆时针旋转，并且轴承寿命达到10万小时。

箱体、法兰式电机座及端盖

采用珠光体灰铸铁。采用NC加工工具制造。设计保证强度和刚度。不使用的螺纹孔都妥善堵塞。水平分割式箱体。

SELECTION

Mechanical power rating

COOLING TOWER DRIVES

选型

额定功率

冷却塔驱动装置

Systems

Lubrication

Lubricants: mineral oils are normally used. Lubricants should always contain adequate EP-additives (refer to Service Manual). Pump lubrication for the upper bearings is standard or optionally available.

The gear unit housing acts as a large oil sump

Low speed shafts are provided with a regreasable labyrinth. Grease nipples, if any, are according to DIN 71412. When using external service piping, the nipple can be moved outside the fan stack.

Checking of the oil level is done by means of the gear unit dipstick (always in the plugged position).

To expedite routine maintenance of wet cooling tower fan drives, service piping outside the fan stack (not provided by Hansen Industrial Transmissions nv), is recommended. This piping is arranged so that the oil can be drained and refilled from outside the stack. The standard breather and draining plug, fitted in the gear unit on delivery, should be removed and plugged in outside the stack (away from the direct stream of moist air).

For ease of maintenance a dipstick outside the fan stack is recommended.

Periodically, the external dipstick should be checked against the gear unit dipstick.

Cooling

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

- natural cooling through the housing
- additional fan cooling: a shaft driven axial fan can be incorporated (see page 35)
- Free air entry at the suction side should be guaranteed

Thermal checks see page 31.

Sealing

- Static: Generalized use of sealing compound
Inspection cover on the gear unit: O-ring
- Rotary: High speed shaft: depending on gear unit type
Refer to description of each type of gear unit on pages
- Oil Lock™: - dual purpose labyrinth
- maintenance free
- oil return to sump
- Low speed shaft: - dust lip oil seal
- grease purged labyrinth

Motors

Right-angle gear units are driven by foot mounted IEC motors (type B3).

For more information on motors, refer to motor catalogues.

For Nema motors, refer to us.

Use of two speed motors: when changing speed with two speed motors, the motor has to be slowed down below the low speed, before energising the slow speed winding.

Optional devices

Some devices can optionally be provided (refer to pages 33 up to 36). More detailed information about the optional devices is mentioned in separate technical manuals. Refer to us.

系统

润滑系统

润滑剂：通常使用矿物油。润滑剂需含有充足的 EP 添加剂（参阅服务手册）。

上部轴承由润滑油泵供油润滑为标准或选装配置。

减速机箱体起到大油池的作用。

润滑脂加注点集中布置，可选装自动润滑脂加注器。

向上延长的低速轴配置可加注润滑脂的迷宫式密封。

油嘴符合 DIN 71412 标准。使用外部供给管路时，油嘴可以移出冷却塔组外面。

可以利用减速机油标尺（必须一直塞紧）或油面塞检查油面高度。

为了方便湿式冷却塔风机驱动日常维护，可以选择将供给管路设置于冷却塔外。该管路的设计使加油排油都可以在塔外进行。减速机发货时配置的标准通气阀塞和排放塞应该移除并装到冷却塔外部（避免潮气直接进入）。

为了便于维护可以选择塔外部的油标尺。

外部油标尺应该定期对照减速机油标尺检查。

冷却系统

由于运行产生的热量可以通过以下方式散热：

箱体的自然冷却。

附加风扇冷却。可以装配轴驱动轴流式风扇（见 35 页）。

须保证风扇吸风侧气流畅通。

热功率校核见 31 页。

密封

静态密封：通常使用封口胶
减速机检查盖：O 型密封圈

转动密封：高速轴：取决于减速机类型。
详见各种减速机的描述。

Oil Lock™：-两用迷宫密封
-免维护
-机油回流至箱体内部

低速轴：-唇式防尘密封
-迷宫式密封

电机

正交轴减速机由底脚安装式 IEC 电机（B3 类型）驱动。

平行轴减速机配置标准法兰安装式 IEC 电机（B5 类型）。

更多电机信息请参阅电机目录。

关于 Nema 电机，请咨询汉森。

双速电机的使用：利用双速电机变速时，在通电低速绕组前必须将风机转速降低到低速之下。

选装设备

可选装某些设备（参见 33 - 36 页）。有关加热器、流量开关以及油位开关的详细信息请参见另外的技术手册。请咨询汉森。

SELECTION

Mechanical power rating

COOLING TOWER DRIVES

选型

额定功率

冷却塔驱动装置

Backstop

Built-in backstop to prevent the fan from "wind-milling". Internal lubrication is assured.

Filter

With incorporated pressure relief valve.
A filter with incorporated pressure relief valve and visual or electrical contamination indicator is available as an option.

Heaters

Electrical heating devices for low temperature start-up are available for Hansen P4 gear units from sizes C to H.

Flow switch

When gear units are pump lubricated, a flow switch can be provided to check the oil flow to the gear unit. This switch can trigger an alarm signal when the oil supply is inadequate. The gear unit has to be stopped at once and the cause of the interruption of the oil supply has to be removed.

Oil level switch

To control the oil level in the gear unit, an oil level switch can be provided. This switch can trigger an alarm signal when the oil bath falls beneath a specified limit.

Pt100

To control the oil bath temperature. The Pt100 can trigger an alarm signal when the oil temperature is higher than a specified limit.

Shipping conditions

Inspection prior to shipment

Test run: all gear units are tested under no load
Conformity Check

Protection

Shaft extension: greased and protected with waxed waterproof paper

Lubricants

Hansen P4 gear units are shipped without oil.
Grease lubrication points are factory filled.

For information relating to **storage, handling, installation, start-up and maintenance**, refer to the service manual which is supplied together with each gear unit.

Protection

Standard protection systems

All units are standard provided with **E3 painting system**.

A three layer paint system consisting of:

- layer 1: a two-component primer
- layer 2: a two-component high build epoxy primer
- layer 3: a two component high build epoxy paint

Designed for gear units installed outdoors in industrial atmospheres with low level of pollution.

The painting system is suitable to be applied in the atmospheric-corrosivity category C2 according to ISO 12944-2 (and ISO 12944-5).

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

Bolts and nuts provided with appropriate protection.

Aggressive environment

For wet cooling tower drives in aggressive environment, an additional protection system can be offered: refer to us.

逆止器

内置逆止器可以防止风机“随风转动”。保证内部可靠润滑。

过滤器

配有一体式泄压阀。
可以选装可视或电子污染指示器。

加热器

尺寸从 C 到 H 的汉森 P4 减速机都可以配置电加热器，以适应低温启动。

流量开关

如果减速机采用泵润滑，可以选择流量开关检查通往减速机的流量状况。如果供油不充分，该开关能够触发警报信号。减速机必须立即停止运行，同时迅速清除阻碍流量的因素。

油位开关

可以配置一个油位开关以控制减速机内的油位。如果油池液位降到某设定限值之下，该开关可以触发警报信号。

Pt100 温度传感器

监控油温度，如果油温超过某规定限值时可以触发警报信号。

运输条件

装运前检查

试运行：空载检测
符合性检查

保护措施

轴伸：利用防水蜡纸加润滑脂保护。

润滑剂

汉森 P4 减速机均无油装运。
出厂时所有润滑点已加注润滑脂。

有关**储存、操作、安装、启动以及维护**的信息请参阅随减速机提供的服务手册。

保护

标准防护

E3喷漆标准是冷却塔用减速机的标准喷漆系统。

E3标准包括三个涂层：

- 第一层：二合一环氧树脂底漆
- 第二层：二合一高厚膜型环氧树脂底漆
- 第三层：二合一高厚膜型环氧树脂漆

E3是针对安装于室外，轻度污染环境的减速机设计的。

E3喷漆系统适用于ISO12944-2和ISO12944-5大气污染标准中的C2。涂漆颜色的不同，不影响涂漆的质量

螺栓和螺母均提供适当的保护。

恶劣环境

对于安装于恶劣环境中的减速机，请咨询汉森。
汉森可提供更高标准的涂漆。

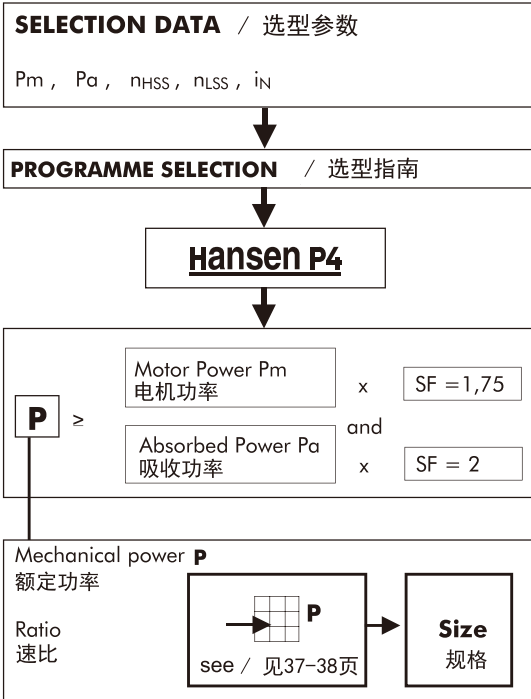
SELECTION
Mechanical power rating
COOLING TOWER DRIVES

选型
额定功率
冷却塔驱动装置

Procedure / 步骤

Reference Data / 参考数据

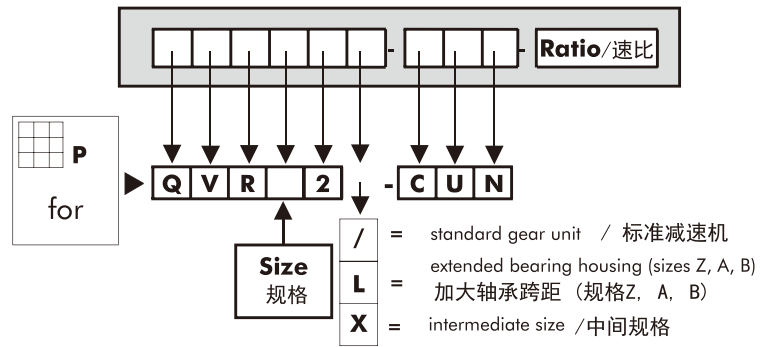
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refer to page 32 / 参见 32 页

refer to page 26 / 参见 26 页

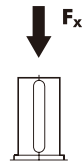
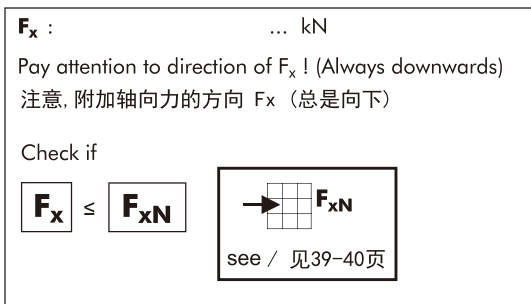
for ratio's < smallest ratio in the rating tables (P.42) refer to us
 速比 < 第 42 页列表时, 请咨询汉森.



C
H
E
C
K

校
核

Thrust load / 附加轴向力



* Remark: values for P and F_x (p.39-40) are the same for QVR.2 and QVR.2L

* 注释: QVR.2 和 QVR.2L 在 (39-40 页) 表中, P 和 F_x 数值相同。

Thermal rating / 热功率校核

see pages / 参见 31, 41 页

SELECTION

Thermal power rating

COOLING TOWER DRIVES

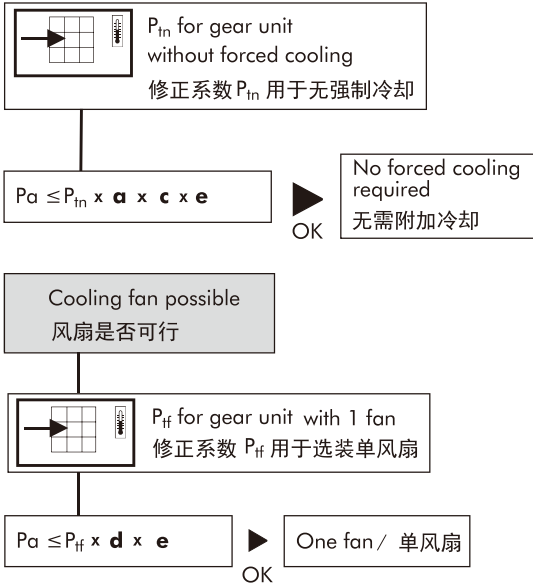
选型

额定热功率

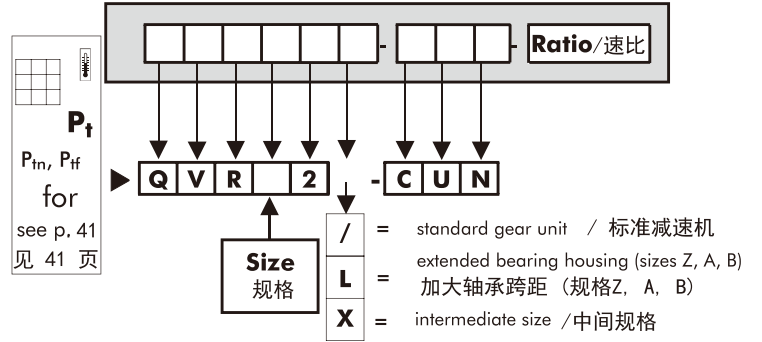
冷却塔驱动装置



Thermal check / 热功率校核



Reference Data / 热功率计算参数



factor **a** for ambient temperature without forced cooling
修正系数 **a** 用于环境温度下无强制冷却

Ratio 速比	环境温度 / Ambient temperature in °C			
	10 to 25	25 to 35	35 to 45	
6,3 ▶ 11,2	1	0,81	0,68	0,55
12,5 ▶ 18	1	0,85	0,71	0,66
≥ 20	1	0,87	0,75	0,74
Size / 规格	Z ▶ H	Z ▶ H	Z ▶ D	E ▶ H

factor **c** for air circulation (without fan)
修正系数 **c** 用于自然风无风扇环境

Mounting 安装环境	Air flow 风速		
Indoors- small enclosure 室内狭小环境	≥ 0,5 m/s	0,73	0,70
Indoors- normal working areas 室内正常工作 环境	≥ 1,4 m/s	1	1
Outdoors- protected against sun 室外有防晒措施	≥ 3,0 m/s	1,33	1,36
Size / 规格		Z ▶ D	E ▶ H

Air flow to be selected according to the structure:

Open structure: gear units installed in an open steel frame structure allowing the cooling tower air flow to pass over the gear unit's housing.

Closed structure: gear units installed on a solid concrete plinth or enclosed steel frame. This structure prevents the cooling tower air flow from passing over the gear unit's housing.

按照冷却塔结构选择风速:

开放式结构: 减速机安装于开放式的钢结构基础, 冷却塔内的气流通过减速机箱体。

封闭式结构: 减速机安装于封闭式的钢结构或水泥基础。冷却塔内的气流不通过减速机箱体。

factor **d** for ambient temperature with forced cooling
修正系数 **d** 用于环境温度下带强制冷却

	Number of stages 级数	环境温度 / Ambient temperature in °C			
		15 to 25	25 to 35	35 to 45	45 to 55
with forced cooling 带强制冷却	2	1	0,86	0,72	0,59

factor **e** for relative air humidity
修正系数 **e** 相对湿度系数

Relative air humidity / 空气相对湿度	
< 100%	= 100%
1	1,15

REQUEST FOR QUOTATION COOLING TOWER DRIVES

冷却塔驱动装置询价单

1. LOAD PARAMETERS / 载荷参数

Motor power / 电机功率 $P_m =$ kW at min^{-1}

Absorbed power / 吸收功率 $P_a =$ kW

Absorbed torque / 吸收扭矩 $T_a =$ kNm

Running time in h/day / 运行时间 ≤ 3 ≤ 10 > 10

Peak torque in excess of 200% $T_a =$ %

峰值扭矩超过200% T_a

Number of starts/stops per 10 hours :

每 10 小时启动/停止次数

2. SPEED / 转速

High speed shaft (HSS) / 高速轴 (HSS)

Constant speed(s) $n1(\text{HSS}) =$ or/and min^{-1}

Variable speed $\leq n1(\text{HSS}) \leq$ min^{-1}

Direction of rotation: CW

旋向

Low speed shaft (LSS) / 低速轴 (LSS)

Constant speed(s) / 恒速 $n2(\text{LSS}) =$ or/and min^{-1}

Variable speed / 变速 $\leq n2(\text{LSS}) \leq$ min^{-1}

Tolerance on speed LSS \pm % \pm min^{-1}

LSS 输出转速偏差

Direction of rotation: CCW

旋向

3. SHAFT CONFIGURATION : / 出轴方式

Right-angle shafts / 直交轴

4. THRUST LOAD ON LOW SPEED SHAFT

低速轴载荷

Weight of fan and coupling = kN

Aerodynamic thrust load towards gear unit = + kN

风扇及联轴器重量

5. INSTALLATION PARAMETERS / 安装参数

Ambient temperature (°C) near the gear unit : min:

环境温度

max:

Structure see page 31 / 见 31 页 open closed

冷却塔结构

Air speed near the gear unit : m/s

减速机周围风速

Location / 安装环境

Direct sun exposure / 直接暴露于日光下 Y N

Atmosphere: corrosion category (according to ISO 12944-2):

气体腐蚀类别(按照ISO12944-2)

Electric installation AC V Hz

电器安装

3 Ph

Main power supply / 主电源

Auxiliary power supply / 辅助电源

Protection requirement: / 防护等级

Insulation: / 绝缘等级

6. NOISE (gear unit + motor) / 噪音(减速机 + 电机)

Max. noise power: / 声能 dBA

Max. noise pressure: / 声压 dBA at m

7. OPTIONAL SPECIFICATIONS / 可选项

Additional cooling / 需要额外冷却

Fan / 风扇

Options to be indicated on pages 35-38)

所有选项 见35-38页

Motor mount IEC frame:

电机安装 IEC 型号规格

Shafts inch

英制低速轴

Painting (see page 29) 喷漆 (见 29 页)

(only to be specified if not in accordance with selected corrosion category)

(如不作选择, 将根据气体腐蚀分类选定)

		Corrosion category according to ISO 12944-2 气体腐蚀类别(按照ISO12944-2)								
Selection / 选择	System	C1			C2			C3		
		L (*)	M	H	L	M	H	L	M	H
<input type="checkbox"/>	E2									
<input type="checkbox"/>	E3									
<input type="checkbox"/>	E4									
	EE3									
	EE4									

		Corrosion category according to ISO 12944-2 气体腐蚀类别(按照ISO12944-2)								
Selection / 选择	System	C4			C5-I			C5-M		
		L (*)	M	H	L	M	H	L	M	H
<input type="checkbox"/>	E2									
<input type="checkbox"/>	E3									
<input type="checkbox"/>	E4									
<input type="checkbox"/>	EE3									
<input type="checkbox"/>	EE4									

(*) : Durability range according to ISO 12944-1

L : low

M : medium

H : high

Note : the durability range is NOT a "guarantee time".

Durability is a technical consideration that can help the owner set up a maintenance programme

(*) : 喷漆耐久性按照 ISO 12944-1

L: 低

M: 中

H: 高

注意: 耐久性并不是保质期。只是从技术方面考虑, 为用户制定设备维护保养计划提供参考。

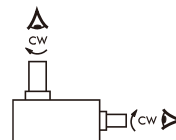
Not allowable materials

不允许用的材料

Al

Cu

Other



8. BACKSTOP REQUIRED

逆止器

Y

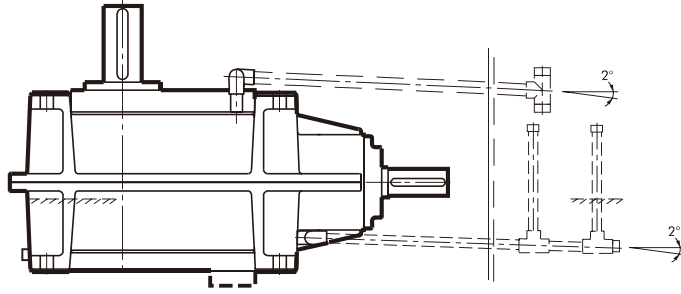
N

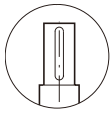
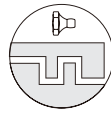

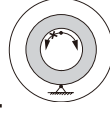

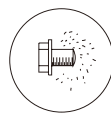
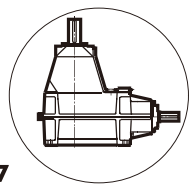
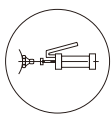
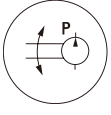


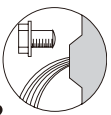

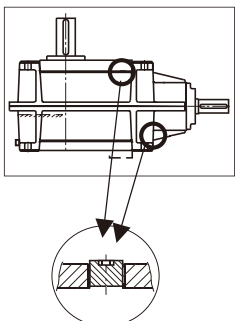


Hansen P4

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ B
Gear sets	二级	2 (L)

For cooling tower fan drive 冷却塔风机驱动装置

Accessories and options 配置和选项



	Standard accessories 标准配置	Optional accessories 可选配置
Low speed shaft 低速轴	1  2 	
High speed shaft 高速轴	3 	4 
Housing 箱体	5  6 	7  8  9 
Outside the cooling tower 冷却塔外部	10  11  12  13  14 	15  16 

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ B
Gear sets	二级	2 ()

For cooling tower fan drive	冷却塔风机驱动装置
Accessories and options	配置和选项

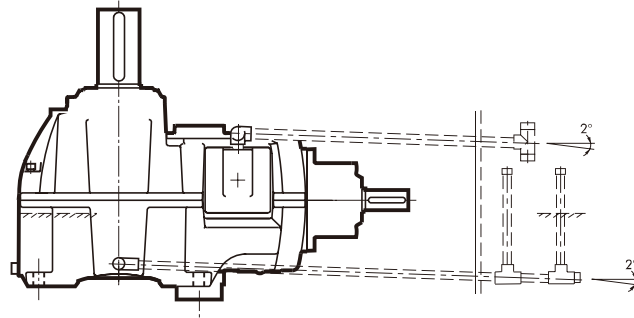
: optional

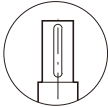



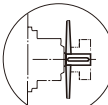


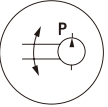

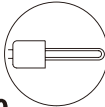
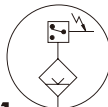
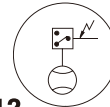
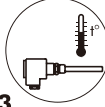


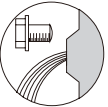

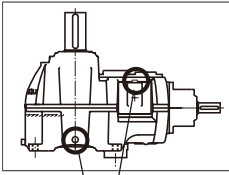



选项

1	normal solid output shaft	1	标准实心轴
2	regreasable labyrinth (DIN 71412)	2	可重复加脂迷宫密封 (DIN71412)
3	oil seal and labyrinth	3	标准油封加迷宫密封
4	<input type="checkbox"/> backstop,	4	<input type="checkbox"/> 逆止器
5	dipstick	5	油尺
6	magnetic plug	6	磁性油塞
7	<input type="checkbox"/> extended bearing housing: QVR.2L	7	<input type="checkbox"/> 加大轴承跨距箱体
8	<input type="checkbox"/> centralized lubrication points (DIN 71412)	8	<input type="checkbox"/> 集成式加脂点 (DIN71412)
9	<input type="checkbox"/> pump lubrication	9	<input type="checkbox"/> 油泵润滑
Located outside the cooling tower		冷却塔外部装置	
10	breather plug	10	呼吸器
11	oil filling plug	11	加油塞
12	draining plug	12	放油塞
13	draining plug for water of condensation.	13	冷凝水排放塞
14	tapped holes with plug in the housing for external tubing connection .	14	箱体螺纹孔可连接外部管路
15	<input type="checkbox"/> external dipstick. To be calibrated with gear unit dipstick.	15	<input type="checkbox"/> 冷却塔外部油尺 油位以减速机油尺为准
16	<input type="checkbox"/> oil level glass (supplied loose), not to be used together with anti-humidity breather.	16	<input type="checkbox"/> 油位镜 不可与防潮呼吸器同时用

Hansen P4

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	C ▶ H
Gear sets	二级	2
Intermediate size	中间型号	(X)
For cooling tower fan drive	冷却塔风机驱动装置	
Accessories and options	配置和选项	



	Standard accessories 标准配置	Optional accessories 可选配置
Low speed shaft 低速轴	 	
High speed shaft 高速轴	 <p>OIL-LOCK™</p>	 
Housing 箱体	   	   
Outside the cooling tower 冷却塔外部	     	 

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	C ▶ H
Gear sets	二级	2
Intermediate size	中间型号	(X)
For cooling tower fan drive	冷却塔风机驱动装置	
Accessories and options	配置和选项	

: optional

: 选项

1	normal solid output shaft	1	标准实心轴
2	regreasable labyrinth (DIN 71412)	2	可重复加脂迷宫密封 (DIN 71412)
3	Oil-Lock™ seal	3	Oil-Lock™ 标准油封
4	<input type="checkbox"/> backstop	4	<input type="checkbox"/> 逆止器
5	<input type="checkbox"/> axial fan	5	<input type="checkbox"/> 轴流风扇
6	dipstick magnetic plug	6	油尺 磁性油塞
8	pump lubrication	8	油泵润滑
9	inspection cover	9	检查孔盖
10	<input type="checkbox"/> heater	10	<input type="checkbox"/> 加热器
11	<input type="checkbox"/> oil level switch	11	<input type="checkbox"/> 集成式加脂点
12	<input type="checkbox"/> flow switch	12	<input type="checkbox"/> 流量开关
13	<input type="checkbox"/> Pt 100 meter for oil sump temperature	13	<input type="checkbox"/> 油浴用Pt100 温度传感器
Located outside the cooling tower		冷却塔外部装置	
14	breather plug	14	呼吸器
15	oil filling plug	15	加油点
16	draining plug	16	放油点
17	draining plug for water of condensation.	17	冷凝水排放点
18	tapped holes with plug in the housing for external tubing connection .	18	箱体螺纹孔可连接外部管路
19	<input type="checkbox"/> external dipstick. To be calibrated with gear unit dipstick.	19	<input type="checkbox"/> 冷却塔外部油尺 以减速机油尺为准
20	<input type="checkbox"/> oil level glass (supplied loose), not to be used together with anti-humidity breather.	20	<input type="checkbox"/> 油位镜 不可与防潮呼吸器同时用

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2

Intermediate size	中间型号	(X)
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power ratings	额定功率	P (kW)
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i _N	min ⁻¹		Size - 规格										
	n ₁	n ₂	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
3,55	1800	510	97	145	225								
	1500	420	82	125	190								
	1200	340	66	99	155								
	1000	280	55	83	130								
	900	255	50	75	115								
	750	210	42	63	98								
4	1800	450	97	145	225								
	1500	380	82	125	190								
	1200	300	66	99	155								
	1000	250	55	83	130								
	900	225	50	75	115								
	750	190	42	63	98								
4,5	1800	400	97	145	225								
	1500	330	82	125	190								
	1200	265	66	99	155								
	1000	220	55	83	130								
	900	200	50	75	115								
	750	165	42	63	98								
5	1800	360	97	145	225								
	1500	300	82	125	190								
	1200	240	66	99	155								
	1000	200	55	83	130								
	900	180	50	75	115								
	750	150	42	63	98								
5,6	1800	320	94	145	225								
	1500	270	80	125	190								
	1200	215	66	99	155								
	1000	180	55	83	130								
	900	160	50	75	115								
	750	135	42	63	98								
6,3	1800	285	87	145	225	350	590	810		1100		2050	
	1500	240	74	125	190	300	510	710		920		1700	
	1200	190	60	99	155	255	410	580		760		1400	
	1000	160	50	83	130	215	340	490		630		1150	
	900	145	45	75	115	195	310	440		570		1050	
	750	120	38	63	98	160	260	370		480		880	
7,1	1800	255	78	145	225	310	530	810		1100		1800	
	1500	210	65	125	190	275	440	690		920		1550	
	1200	170	52	99	155	230	360	550		750		1250	
	1000	140	44	83	130	195	300	460		630		1050	
	900	125	39	75	115	180	270	420		570		930	
	750	105	33	63	96	150	225	350		480		780	
8	1800	225	71	105	175	295	480	760	810	970	1100	1650	2100
	1500	190	59	90	145	255	410	640	710	840	920	1400	1800
	1200	150	48	72	115	210	330	510	580	670	760	1150	1450
	1000	125	40	60	97	175	275	430	490	570	660	950	1200
	900	115	36	54	88	160	245	390	440	520	600	850	1100
	750	94	30	46	73	135	205	320	370	440	500	710	920
9	1800	200	62	105	165	270	420	660	800	910	1100	1500	1850
	1500	165	52	90	140	230	350	550	670	780	920	1250	1550
	1200	135	42	72	110	190	285	440	540	640	760	1000	1250
	1000	110	35	60	94	160	240	370	450	540	650	840	1050
	900	100	31	54	85	145	215	330	410	490	590	750	940
	750	83	27	46	71	120	180	280	340	410	490	630	780
10	1800	180	56	120	170	245	390	610	770	800	1050	1300	1750
	1500	150	47	100	145	210	320	510	650	680	890	1100	1450
	1200	120	38	81	120	170	260	410	520	560	710	870	1200
	1000	100	32	68	99	145	215	340	440	460	590	730	990
	900	90	29	61	89	130	195	310	390	420	540	660	890
	750	75	24	51	75	115	165	260	330	350	450	550	740
11,2	1800	160	49	96	155	220	340	530	640	760	990	1150	1500
	1500	135	41	81	130	190	280	440	540	650	830	960	1250
	1200	105	33	65	105	155	225	360	430	520	670	770	1000
	1000	89	28	54	87	130	190	300	360	430	560	650	840
	900	80	25	49	78	115	170	270	330	390	510	580	760
	750	67	21	41	65	97	145	225	275	330	420	490	640

Hansen P4

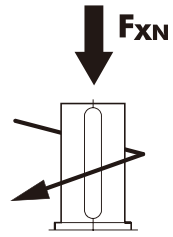
Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2

Intermediate size	中间型号	(X)
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power ratings	额定功率	P (kW)
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i _N	min ⁻¹		Size - 规格										
	n ₁	n ₂	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
12,5	1800	145	45	68	110	195	295	480	620	640	850	980	1350
	1500	120	37	56	92	165	245	400	520	540	710	830	1100
	1200	96	30	45	74	135	200	320	420	430	570	670	900
	1000	80	25	38	62	115	165	270	350	360	480	560	750
	900	72	23	34	56	105	150	245	320	330	430	510	680
	750	60	19	29	47	86	125	205	265	270	360	420	560
14	1800	130				175	275	420	520	610	790	910	1150
	1500	105				150	230	360	430	510	660	760	960
	1200	86				120	185	285	350	410	530	610	780
	1000	71				100	155	240	295	340	440	510	650
	900	64				92	140	215	265	310	400	460	580
	750	54				77	115	180	220	255	330	380	490
16	1800	115				145	210	330	480	470	640	730	980
	1500	94				120	175	280	400	390	540	620	830
	1200	75				97	140	225	320	320	440	500	670
	1000	63				82	120	190	270	265	370	420	560
	900	56				74	105	170	245	240	330	380	510
	750	47				62	90	145	205	200	275	320	420
18	1800	100				140	210	330	420	470	620	730	910
	1500	83				120	175	280	350	390	520	600	760
	1200	67				96	140	225	280	320	410	480	610
	1000	56				80	120	190	235	265	340	400	510
	900	50				72	105	170	210	240	310	360	460
	750	42				60	90	140	175	200	260	300	380
20	1800	90							330		470		730
	1500	75							280		390		620
	1200	60							225		320		500
	1000	50							190		265		420
	900	45							170		240		380
	750	38							145		200		320
22,4	1800	80							330		470		730
	1500	67							275		390		600
	1200	54							220		320		480
	1000	45							185		265		400
	900	40							165		240		360
	750	33							140		200		300

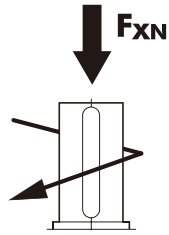
Hansen P4



Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2
Intermediate size	中间型号	(X)
Rated thrust load	额定附加轴向力	F_{xN} kN

i _N	min ⁻¹		Size - 规格										
	n ₁	n ₂	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
3,55	1800	510	8	13,5	27,5								
	1500	420	8,2	13,5	28								
	1200	340	8,6	14	28,5								
	1000	280	8,9	14,5	29,5								
	900	255	9	15	30								
	750	210	9,3	15,5	30								
4	1800	450	7,8	13	27,5								
	1500	380	8	13,5	28								
	1200	300	8,4	14	29								
	1000	250	8,7	14,5	29,5								
	900	225	8,9	14,5	30								
	750	190	9,2	15	31								
4,5	1800	400	7,4	12,5	28								
	1500	330	7,6	13	28,5								
	1200	265	8	13,5	29,5								
	1000	220	8,3	14	30								
	900	200	8,4	14	30								
	750	165	8,7	14,5	31								
5	1800	360	7,2	12	28								
	1500	300	7,4	12	29								
	1200	240	7,7	13	29,5								
	1000	200	8,1	13,5	30								
	900	180	8,2	13,5	31								
	750	150	8,5	14	31								
5,6	1800	320	6,9	11	28,5								
	1500	270	7,1	11	29								
	1200	215	7,2	11,5	30								
	1000	180	7,6	12	31								
	900	160	7,7	12,5	31								
	750	135	8	13	32								
6,3	1800	285	6,9	12	27	29,5	23,5	39		80		81	
	1500	240	7,1	12,5	27,5	30	24	39		82		83	
	1200	190	7,4	13	28,5	31	25	41		84		85	
	1000	160	7,7	13,5	29	32	26,5	42		86		86	
	900	145	8	14	29,5	32	26,5	43		88		88	
	750	120	8,2	14,5	30	33	27,5	44		90		89	
7,1	1800	255	7,1	12,5	26	29,5	23,5	35		80		79	
	1500	210	7,5	12,5	26,5	30	24,5	36		82		81	
	1200	170	7,9	13,5	27,5	31	25,5	38		84		83	
	1000	140	8,1	14	28	31	26,5	40		86		84	
	900	125	8,5	14	28,5	32	27	40		88		85	
	750	105	9	14,5	29,5	33	28,5	42		90		87	
8	1800	225	7,3	12	29,5	30	24,5	36	68	81	98	83	85
	1500	190	7,6	12,5	30	31	25	38	69	83	100	85	87
	1200	150	7,9	13	31	32	26,5	40	71	85	105	88	89
	1000	125	8,3	13,5	32	33	27,5	41	73	87	105	89	90
	900	115	8,5	14	32	33	28,5	42	75	89	105	90	92
	750	94	9,5	14	33	34	29,5	44	77	91	110	91	94
9	1800	200	7,3	10,5	30	30	25	37	66	82	98	81	82
	1500	165	7,6	10,5	31	31	26	38	68	84	100	83	84
	1200	135	8	11	32	31	27	40	70	86	105	84	86
	1000	110	8,4	11,5	32	32	28	41	72	88	105	86	88
	900	100	9,1	12	33	33	28,5	43	73	89	105	87	88
	750	83	9,9	12,5	33	34	29,5	44	76	92	110	88	90
10	1800	180	7,5	10	28	31	25,5	38	66	83	99	86	87
	1500	150	7,8	10,5	28,5	32	27	40	68	85	100	88	89
	1200	120	8,2	11	29,5	33	28	41	71	88	105	89	92
	1000	100	8,9	11,5	30	33	29	43	73	90	105	91	93
	900	90	9,6	12	31	34	29,5	44	74	91	110	92	94
	750	75	10,5	13,5	32	35	31	45	76	94	110	95	96
11,2	1800	160	8	13	27,5	31	25,5	38	68	84	99	83	84
	1500	135	8,3	13,5	28	32	27	40	70	86	100	85	86
	1200	105	9	14	29	32	28,5	41	73	89	105	87	88
	1000	89	10	15	29,5	33	29,5	43	75	91	110	88	89
	900	80	10,5	15,5	30	34	30	44	76	92	110	89	90
	750	67	12	17,5	32	35	31	46	78	95	115	94	94

Hansen P4




Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2
Intermediate size	中间型号	(X)
Rated thrust load	额定附加轴向力	F_{xN} kN

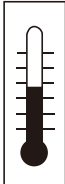
i_N	min ⁻¹		Size - 规格										
	n_1	n_2	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
12,5	1800	145	8	13	31	32	28	41	69	86	100	86	90
	1500	120	8,5	14	32	33	29,5	42	71	88	105	88	91
	1200	96	9,4	14,5	33	34	30	44	73	91	110	90	93
	1000	80	10,5	15,5	34	35	32	45	76	93	110	92	95
	900	72	11	16,5	35	35	32	46	77	95	110	95	98
	750	60	12	18	37	37	34	48	79	97	115	99	100
14	1800	130				32	27	40	70	87	105	85	86
	1500	105				33	28	41	73	89	105	86	88
	1200	86				34	29,5	44	75	92	110	88	90
	1000	71				35	30	45	77	94	110	92	93
	900	64				36	31	46	79	96	115	94	96
	750	54				38	34	48	81	98	115	98	100
16	1800	115				34	32	46	72	90	105	86	89
	1500	94				35	33	48	75	92	110	88	91
	1200	75				36	34	49	78	95	110	91	94
	1000	63				37	35	51	80	98	115	96	98
	900	56				39	37	52	81	99	115	98	100
	750	47				41	40	54	83	100	120	105	105
18	1800	100				33	29	43	73	90	105	86	88
	1500	83				34	30	44	75	92	110	88	90
	1200	67				35	32	46	78	95	115	92	94
	1000	56				38	33	47	80	98	115	96	98
	900	50				39	36	49	82	99	120	99	100
	750	42				42	39	54	86	105	120	105	105
20	1800	90							79		110		89
	1500	75							81		115		92
	1200	60							84		115		97
	1000	50							86		120		100
	900	45							88		120		105
	750	38							93		125		110
22,4	1800	80							76		110		90
	1500	67							78		115		93
	1200	54							81		115		98
	1000	45							84		120		105
	900	40							88		120		105
	750	33							94		130		110


Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2

Intermediate size 中间型号 **(X)**

Thermal power ratings 额定热功率 **P_t (kW)**

i _N	min ⁻¹ n ₁		Size - 规格										
			Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
3,55 ↓ 5,6	1800	- 1											
	1500	- 1											
	1200	- 1	Refer to us / 咨询汉森										
	1000	- 1											
	900	- 1											
	750	- 1											
6,3 ↓ 9	1800	- 1				89 210	120 310	140 390	165 480	180 580	165 630	670 780	780
	1500	- 1				96 210	130 310	160 400	185 440	210 570	210 590	180 650	270 800
	1200	- 1	Refer to us / 咨询汉森			98 190	135 280	165 370	195 400	210 520	230 530	250 610	320 730
	1000	- 1				98 170	135 250	170 330	195 360	230 470	240 480	270 570	340 680
	900	- 1				98 160	135 240	170 310	190 340	230 450	240 460	280 540	340 660
	750	- 1				95 145	130 210	170 280	185 310	220 400	235 410	280 500	350 590
10 ↓ 14	1800	- 1				78 170	100 250	130 330	165 420	170 480	190 560	125 560	185 670
	1500	- 1				81 165	105 240	140 320	170 380	180 470	205 510	180 530	250 690
	1200	- 1	Refer to us / 咨询汉森			82 150	105 220	145 280	170 330	190 420	210 450	200 480	270 620
	1000	- 1				79 135	105 190	140 260	165 300	190 370	210 410	220 450	290 570
	900	- 1				79 125	105 180	140 240	165 285	190 350	205 380	220 420	290 540
	750	- 1				75 110	100 160	135 220	160 255	180 320	200 340	220 390	290 500
16 ↓ 18	1800	- 1				64 130	80 190	110 260	130 320	140 380	160 430	120 470	160 510
	1500	- 1				65 130	84 190	110 250	130 285	150 370	165 390	150 420	190 510
	1200	- 1	Refer to us / 咨询汉森			64 115	85 170	115 220	130 250	155 330	165 340	160 380	210 460
	1000	- 1				61 100	81 145	110 200	125 225	150 300	160 310	180 350	220 420
	900	- 1				60 95	81 140	110 190	125 210	150 280	160 290	180 330	220 390
	750	- 1				57 84	76 120	105 170	120 190	140 250	155 260	180 300	220 360



 Number of fans. / 风扇数量
Correction factors - see p. 31 / 修正系数见 31 页

Hansen P4

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ H
Two stages	二级	2

Intermediate size	中间型号	(X)
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Exact ratios i_{ex}	精确速比	i_{ex}
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Moments of inertia J related to the HSS	高速轴转动惯量	J (kgm ²)
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i_N	i_{ex}										
	Size - 规格										
	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
3,55	3,6184	3,6184	3,52								
4	3,913	3,913	3,8944								
4,5	4,3609	4,4361	4,415								
5	4,9428	5,0239	4,9286								
5,6	5,5639	5,6053	5,5786								
6,3	6,2327	6,2171	6,2857	6,2701	6,4572	6,1765		6,4323		6,4063	
7,1	7,1517	7,1517	7,0252	7,2059	7,2995	7,1061		6,9667		7,0498	
8	7,6974	8	7,7698	7,8824	8,1176	7,7647	7,7674	8,3097	8,0156	7,9484	8,0817
9	8,927	8,9933	8,875	9,0588	9,1765	8,9333	8,9091	9	8,6556	8,7468	8,905
10	10	9,975	10	9,737	10,266	9,7059	9,7647	10,263	10,355	10,359	10,027
11,2	11,475	11,4745	11,177	11,19	11,606	11,167	11,2	11,116	11,182	11,4	11,049
12,5	12,35	12,8356	12,3611	12,387	12,718	12,165	12,206	12,949	12,789	12,904	13,069
14				14,235	14,376	13,996	14	14,025	13,811	14,201	14,4
16				15,765	16,235	15,529	15,298	16,25	16,137	15,96	16,279
18				18,118	18,353	17,867	17,547	17,6	17,425	17,563	17,938
20								19,529		20,25	20,134
22,4								22,4		21,867	22,185

i_N	J										
	Size - 规格										
	Z2	A2	B2	C2	D2	E2	E2X	F2	F2X	G2	H2
3,55	0,00924	0,019	0,0387								
4	0,00883	0,0177	0,0365								
4,5	0,0084	0,0165	0,034								
5	0,00801	0,0156	0,0323								
5,6	0,00763	0,0148	0,0304								
6,3	0,00731	0,0145	0,0296	0,0593	0,124	0,228		0,438		1,07	
7,1	0,00695	0,0137	0,0283	0,0561	0,119	0,214		0,423		1,03	
8	0,00678	0,0128	0,0267	0,0507	0,104	0,197	0,264	0,357	0,508	0,87	1,2
9	0,00544	0,0104	0,0217	0,0487	0,1	0,189	0,243	0,348	0,485	0,847	1,12
10	0,00531	0,0103	0,0213	0,0416	0,081	0,154	0,22	0,284	0,399	0,674	0,958
11,2	0,00518	0,01	0,0208	0,0402	0,0788	0,148	0,207	0,278	0,385	0,661	0,904
12,5	0,00511	0,00967	0,0202	0,0317	0,0636	0,117	0,169	0,213	0,312	0,488	0,727
14				0,0309	0,0622	0,113	0,16	0,21	0,303	0,479	0,695
16				0,0243	0,0488	0,0871	0,126	0,162	0,231	0,398	0,522
18				0,0238	0,0479	0,0849	0,121	0,16	0,225	0,392	0,501
20								0,0929		0,173	0,42
22,4								0,0895		0,17	0,406

Hansen P4

97QU-VR2N40033 B

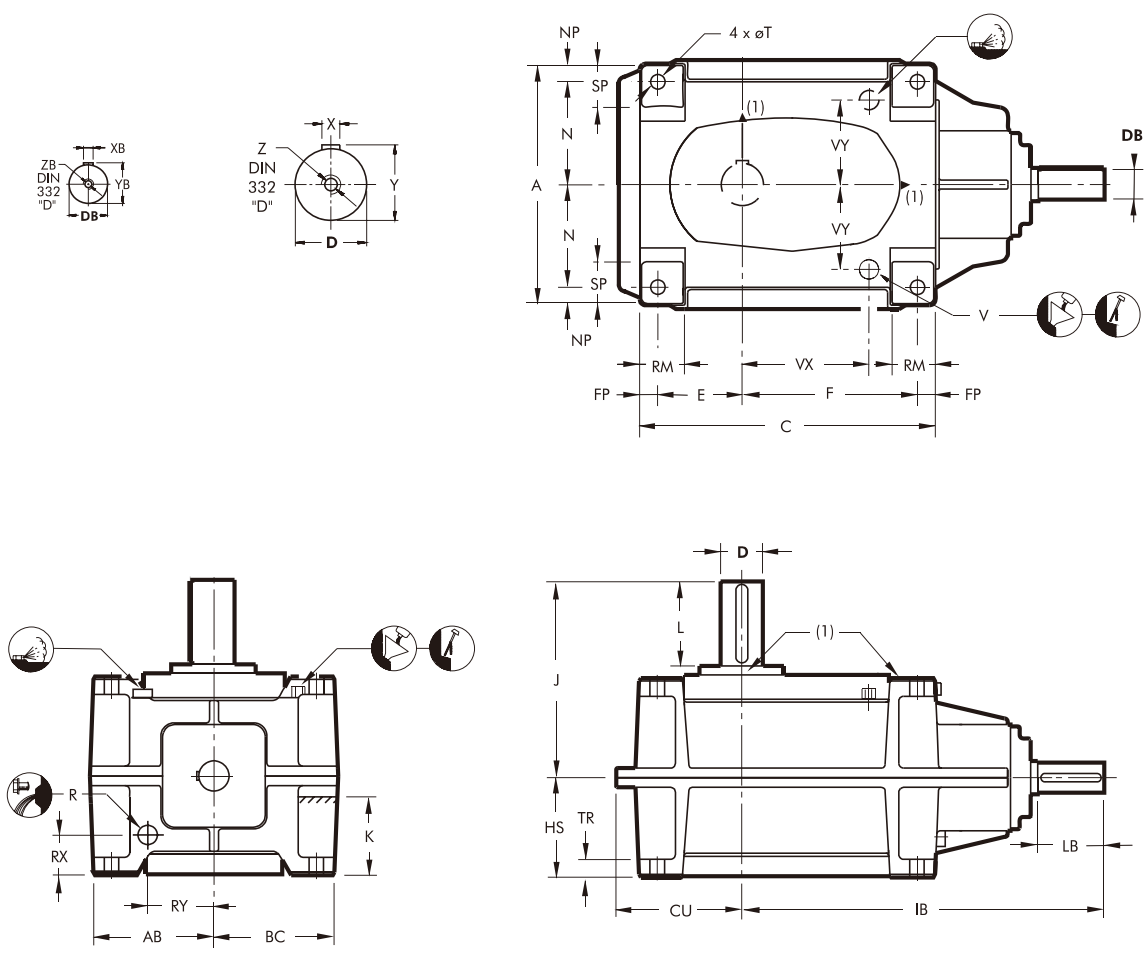
mm

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ B
Two stages	二级	2

For cooling tower fan drive 冷却塔风机驱动装置

The user is responsible for the provision of safety guards and correct installation of all equipment.
Certified dimensions upon request.

用户负责提供安全防护装置及所有设备的正确安装



External dimensions are not affected when mounting a backstop.
(1) Grease points
(2) Approximate values; only the markings on the gear unit dipstick are determinant for the oil level

安装逆止器不影响外形尺寸
(1) 加脂点
(2) 参考值。油位见箱体油尺。



Type	A	AB	BC	C	CU	E	F	FP	HS	IB	J	N	NP	RM	SP	T	TR
QVRZ2	320	165	165	375	165	105	220	25	150	457	310	135	25	60	60	19	25
QVRA2	355	182,5	182,5	425	185	125	250	25	150	550	340	152,5	25	60	60	19	25
QVRB2	400	206	206	490	208	140	290	30	165	602	355	170	30	72	72	24	30

Type 型号	Shafts / 轴 Key / 键 ISO/R773-1969										Draining / 排油			Ventilation / 透气			kg	Litres	Oil level / 油位 K (2)
	D	L	X	Y	Z	DB	LB	XB	YB	ZB	R	RX	RY	V	VX	VY			
QVRZ2	60m7	140	18	64	M20	35k6	80	10	38	M12	R 3/4"	65	82	R 3/4"	150	108	120	4	120
QVRA2	80m7	170	22	85	M20	40k6	110	12	43	M16	R 3/4"	65	100	R 3/4"	180	120	170	5	115
QVRB2	90m7	170	25	95	M24	50k6	110	14	53,5	M16	R 3/4"	67	110	R 3/4"	210	140	230	7	130

Hansen P4

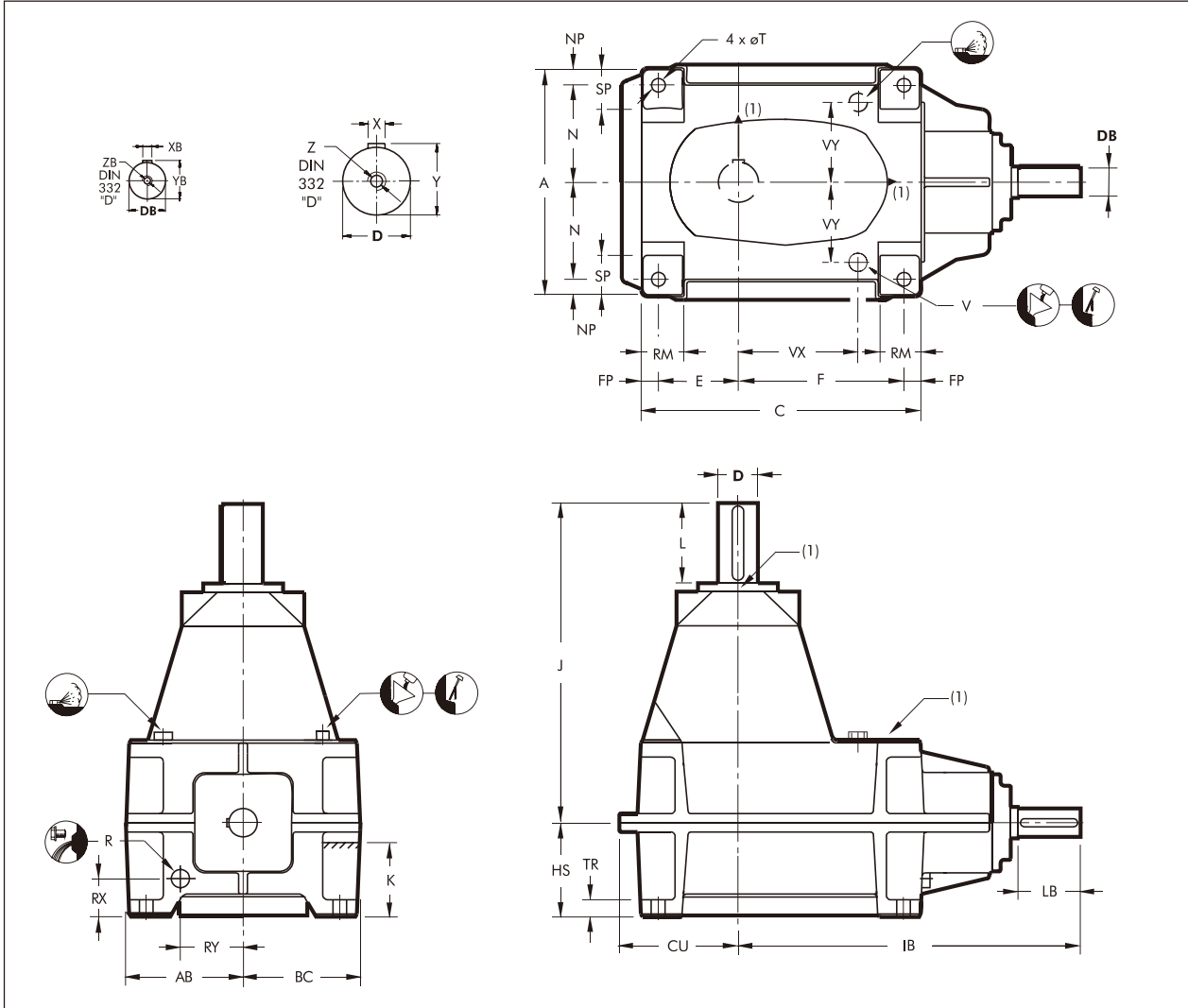
97QU-VR2N40133 B

mm

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	Z ▶ B
Two stages	二级	2
Extended bearing housing	加大轴承跨距箱体	L
For cooling tower fan drive	冷却塔风机驱动装置	

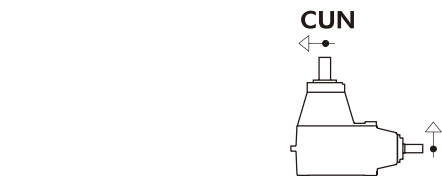
The user is responsible for the provision of safety guards and correct installation of all equipment.
Certified dimensions upon request.

用户负责提供安全防护装置及所有设备的正确安装



External dimensions are not affected when mounting a back-stop.
(1) Grease points
(2) Approximate values; only the markings on the gear unit dipstick are determinant for the oil level

安装逆止器不影响外形尺寸
(1). 加脂点
(2). 参考值。油位见箱体油尺。



Shaft arrangements 出轴方式
(front view) (主视图)

Type	A	AB	BC	C	CU	E	F	FP	HS	IB	J	N	NP	RM	SP	T	TR
QVRZ2L	320	165	165	375	165	105	220	25	150	457	440	135	25	60	60	19	25
QVRA2L	355	182,5	182,5	425	185	125	250	25	150	550	520	152,5	25	60	60	19	25
QVRB2L	400	206	206	490	208	140	290	30	165	602	590	170	30	72	72	24	30

Type 型号	Shafts / 轴 Key / 键 ISO/R773-1969										Draining / 排油			Ventilation / 透气			kg	Litres	Oil level / 油位
	D	L	X	Y	Z	DB	LB	XB	YB	ZB	R	RX	RY	V	VX	VY			K (2)
QVRZ2L	60m7	140	18	64	M20	35k6	80	10	38	M12	R 3/4"	65	82	R 3/4"	150	103	150	4	120
QVRA2L	80m7	170	22	85	M20	40k6	110	12	43	M16	R 3/4"	65	100	R 3/4"	180	120	200	5	115
QVRB2L	90m7	170	25	95	M24	50k6	110	14	53,5	M16	R 3/4"	67	110	R 3/4"	190	140	260	7	130

Hansen P4

97QU-VR2N40223 A

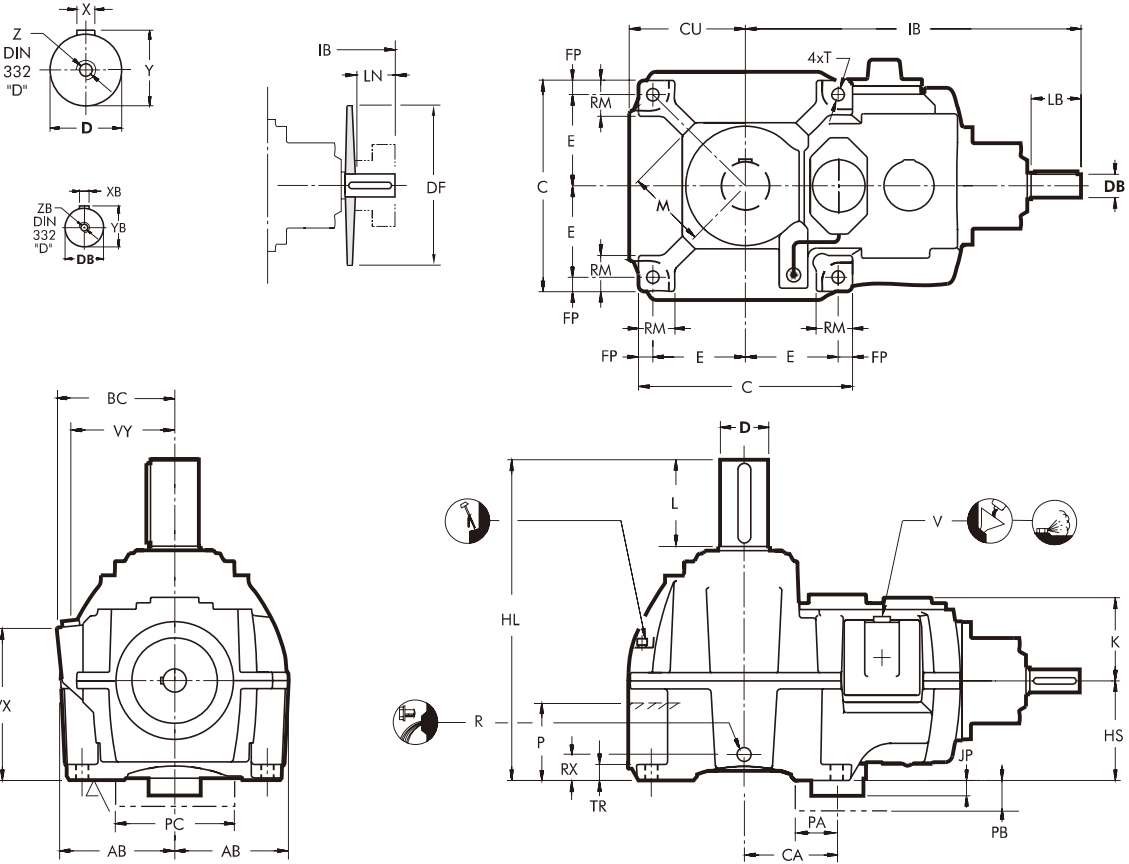
mm

Gear unit	减速机	Q
Vertical low speed shaft	垂直低速轴	V
Right-angle shafts	直交轴	R
Size	规格	C ▶ F
Two stages	二级	2

For cooling tower fan drive 冷却塔风机驱动装置

The user is responsible for the provision of safety guards and correct installation of all equipment.
Certified dimensions upon request.

用户负责提供安全防护装置及所有设备的正确安装

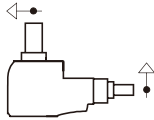


External dimensions are not affected when mounting a back-stop

- (1) Space for pump removal
- (2) LN1 for coupling hub diam. ≤ 150 mm, LN2: for coupling hub diam. > 150 mm
- (3) Approximate values; only the markings on the gear unit dipstick are determinant for the oil level

安装逆止器不影响外形尺寸
(1) 油泵拆卸空间
(2) LN1: 用于法兰孔径小于150mm, LN2: 用于法兰孔径大于150mm。
(3) 参考值。油位见箱体油尺。

CUN



Shaft arrangements 出轴方式
(front view) (主视图)

Type	AB	BC	C	CU	E	FP	HL	HS	IB	K	M	RM	T	TR	kg	Litres
QVRC2	255	280	470	260	200	35	709	215	812	183	165	95	28	38	380	22
QVRD2	285	290	530	290	225	40	782	245	916	210	195	95	35	40	560	29
QVRE2	320	335	600	326	260	40	900	280	1012	228	225	105	35	45	840	50
QVRF2	365	372	690	370	295	50	945	320	1119	262	265	135	42	52	1290	75

Type 型号	Shafts / 轴 Key / 键 ISO/R773-1969										Pump / 油泵				
	D-m7	L	X	Y	Z	DB	LB	XB	YB	ZB	CA	JP	PA (1)	PB (1)	PC (1)
QVRC2	105	210	28	111	M24	50k6	180	14	53,5	M16	197	48	110	100	200
QVRD2	115	210	32	122	M24	60m6	210	18	64	M20	226	41	110	95	200
QVRE2	135	250	36	143	M30	65m6	210	18	69	M20	262	43	130	70	330
QVRF2	155	250	40	164	M30	75m6	210	20	79,5	M20	299	38	130	65	330

Type 型号	Fan / 风扇			Draining / 排油		Ventilation / 透气			Oil level / 油位
	DF	LN		R	RX	V	VX	VY	P (3)
		LN1 (2)	LN2 (2)						
QVRC2	380	157	131	R 1"	50	R 1"	325	250	172
QVRD2	440	187	161	R 1"	53	R 1"	355	260	197
QVRE2	475	182	156	R 1"	64	R 1"	440	292	227
QVRF2	560	182	156	R 1"	73	R 1"	460	330	262