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LKQ系列离心式空调风机技术手册 The LKQ Series Centrifugal Fan



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Qualification Certificate

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Based on Honesty, Innovation to Promote Development, Mutual Benefits Lead to Great Future

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Innovation is the source of vitality of LION KING. We advocate innovation, and actively create good atmosphere for innovation, such as respecting talents, respecting knowledge, respecting hardworking, respecting creation. And in practice, we continue to promote innovation of our system, mechanism, technology and products.

Mutual benefits are the way to lead us to a great future. With honest attitude, pragmatic work style and innovative thinking, we'll try our best to achieve multi-win situation for our company, employees, customers, partners and the society, which will help us for a long-time sustainable development.



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Zhejiang Lion King Ventilator Co Ltd certifies that the LKQ Centrifugal Fan series shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

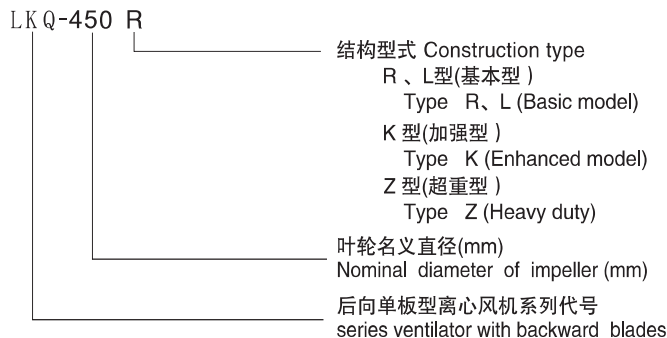


命名方式

Nomenclature

LKQ系列风机命名方式由风机系列代号、叶轮名义直径、结构型式组成：

The model designations signify the nominal impeller outside diameters:



产品形式

Product Features

1. 旋向

LKQ系列风机可分为左旋(LG)和右旋(RD)两种旋转方式，从风机皮带轮一端正视，叶轮顺时针旋转的称为右旋风机，逆时针旋转的称为左旋风机。皮带轮可左右调向，因此不受左右方向的限制。

LKQ Series ventilator can be divided into two direction of rotations, left-hand rotation (LG) and right-hand rotation (RD); Viewing from end of motor outlet line if the impeller rotates clockwise, it is called right hand ventilator. If the impeller rotates anti-clockwise, it is called left hand ventilator. The pulley can adjust its direction, left or right, therefore there is no limitation in directionality.

2. 出风口方向

LKQ系列风机可按图1所示制成0°、90°、180°、270°四种出风方向。

2. Direction of Air Outlet

According to Fig 1, LKQ Series ventilator can be made in four air-outlet directions: 0°, 90°, 180°, and 270°.

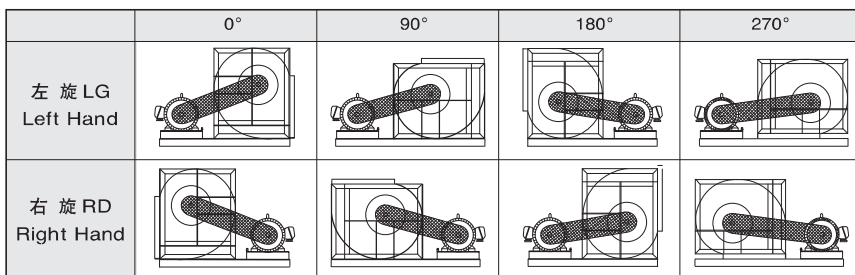


图1(Fig1)

3. 结构形式

LKQ系列风机分为R型、K型和Z型三种形式，R型为基本型，K型为用于大功率的加强型，Z型用于重载的超重型。

3. Type of structure

There are three types of LKQ ventilators, type R, type K and type Z. The type R represents the basic model, while the type K is designed for use at the higher power levels, and the type Z at the heavy duty levels.

产品结构

Construction of Product

LKQ系列风机主要由机壳、叶轮、框架、轴承、轴、出风口法兰(常规配置不带法兰)构成。

1) 机壳

机壳采用热镀锌钢板制造，侧板具有符合空气动力的外形，进风口整体拉伸成型，蜗板采用咬口或点焊的方式与侧板连接成一体。

2) 叶轮

叶轮采用优质冷轧钢板制成，按三元流理论设计的单板式叶片焊接在经数控机床加工的中盘和端圈上，整体喷塑。叶轮按高于国家标准的内控动平衡精度等级全检合格。

3) 框架

框架由角钢和扁钢焊接制成，表面喷塑，以保证足够的刚度和强度。

4) 轴承

轴承均采用优质滚珠或滚柱轴承，并根据噪声最低来选择，该轴承设有加润滑油的孔，已预先加润滑油并自动对中。L、R、K型风机采用向心球轴承，Z型风机采用重载的双列滚柱轴承的轴承箱结构。

5) 轴

风机轴采用特钢经粗加工、调质处理及磨削精加工制成，严格控制轴径尺寸公差及形位公差，每根轴均经过涂覆防锈处理。

6) 出风口法兰

法兰采用热镀锌钢板制造，法兰与壳体的连接采用TOX免焊工艺或螺栓连接，外观精美，并具有足够的刚度与强度。法兰口形式参照下页图2所示。

The major components of the LKQ Series ventilators include the scroll, impeller, frame, bearings, shaft, and outlet flange. (Outlet flange should be indicated when placing order)

1) Scroll

The scroll is made of hot galvanized steel sheet, and it is designed to provide an aerodynamically efficient flow path. The inlet is formed in one piece. The scroll is fixed to the side plates by "spot welding" or "seam locking".

2) Impeller

The LKQ impeller is made of high grade cold-rolled steel sheet. It is to provide a highly efficient and low noise and specially-designed blades, are welded on the center disc, and painted with polyester coatings. The impellers are dynamic balanced testing balanced before assembly in accordance with national standards.

3) Frame

The frames of LKQ made of angle flat steel to assure sufficient frame rigidity and intensity they are painted with polyester coatings.

4) Bearings

Out-spherical ball bearings are used LKQ Series ventilators. They are high quality with low noise ventilator. The bearing are supplied with lubrication fittings, they are pre-lubricated, sealed and self centering. For type L、R、K ventilators, self-aligning ball bearings are used, for type Z ventilators, heavy duty bearings housings are used.

5) Shaft

The shafts are made of 40 Cr or C45 carbon steel bars. The shafts are rough machined and then stress relieved before final machining. The shaft diameters are machined to very accurate tolerance levels and they are fully checked to assure precision fits. They are coated after assembly in order to provide corrosion resistance.

6) Outlet Flange

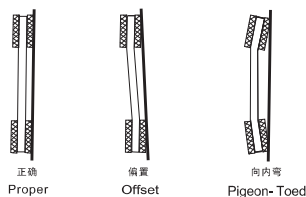
The outlet flange is made of galvanized steel sheet. The connections of the flange to the scroll is made using a TOX non-welding process. This maintains a good flange appearance while also providing sufficient strength and rigidity. The outlet flange dimensions are provided in Figure 2.





皮带传动安装

1. 拆除风机轴端的保护并检查有无缺口和毛刺；
2. 检查风机和电机轴之间的平行度；
3. 中心距应控制在 $0.7(d_1+d_2) < a < 2(d_1+d_2)$ ，前向风机皮带速度应控制在10~15m/s；后向风机皮带速度应控制在25~35m/s；
4. 将皮带轮套在轴上滑进去，不要敲击，以免损伤轴承；
5. 用一根直尺把风机和电机上的带轮对齐并紧固；
6. 把皮带套进皮带轮，不要撬、挤压，以免损伤皮带；
7. 调整张紧度直至皮带看起来松紧适度，风机运行几分钟后，再调整皮带至合适的张紧度；
8. 关掉风机，移动电机座以调整张紧度，当风机工作时，皮带紧的一边应是两个皮带轮连成的一直线，松的一边有轻微弧形。



皮带松紧度

合适的皮带松紧度对使用寿命来说很重要太紧会给皮带和轴承带来额外的负载，降低它们的使用寿命，太松会出现皮带打滑现象而产生热能并降低使用寿命。皮带松紧度量具可用于判断皮带是否松紧合适。量具本身带有一个尺表，根据皮带轮中心距和皮带横截面确定皮带张紧力的大小，如图4和表3。

V-BELT DRIVE INSTALLATION

1. Remove the protective coating from the ends of the fan shaft and assure that the shaft ends are free of nicks and burrs.
2. Check fan and motor shafts for parallel and angular alignment.
3. The center distance must be controlled as $0.7(d_1+d_2) < 2(d_1+d_2)$; the belt speed of forward fan should be more than 10m/s, but less than 15m/s, (10<v<15m/s); the belt speed of backward fan should be more than 25m/s, but less than 35m/s, (25<v<35m/s);
4. Slide sheaves on to the shafts—do not drive the sheaves on to the shafts as this may result in bearing damage.
5. Align fan and motor sheaves with a straight-edge or string, and tighten.
6. Place belts over the sheaves with carefull, otherwise the belts will be damaged.
7. Adjust the belt tension until the belts appear snug. Run the unit for a few minutes and allow the belts to set properly.
8. Switch off the fan, adjust the belt tension by moving the motor base. When in operation, the tight side of the belts should be in a straight line from sheave to sheave and there should be a slight bow on the slack side.



如没有皮带张紧度量具，应调节皮带松紧至风机启动时皮带不发出尖叫声为止，如发出短促的叫声是允许的。
拉紧皮带后、开动风机之前，重新检查皮带轮的对齐情况，如有必要则重新调整对齐。新皮带在开始使用时可能有点拉伸，则应在运行几天后重新检查皮带张紧度。

与中心距有关的皮带张紧度指示
Belt tension indicator applied to mid centre distance.

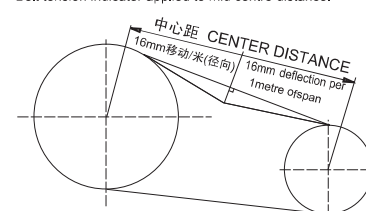


图4 (Fig4)



If a belt-tensioning gauge is not available, then the belt should be tightened just enough so that the belt does not squeal when the ventilator is started. A very short period of noise during the starting of a ventilator is allowable, but a squeal lasting several seconds or longer is not acceptable. After tensioning the belts and before starting the ventilator, check to make sure that the sheaves are properly aligned. Realign the sheaves if necessary. Note that new belts may stretch a little during initial use, so the belt tension level should be checked after a few day of operation.

皮带截面 Belt Section	使皮带向下移动16mm径向距离1米所需的力 Force required to deflect belt 16mm per metre of span		
	张紧力 (小皮带轮直径) Small Pulley Diameter (mm)	牛顿	千克力 Kilogram force (kgf)
SPZ	56-95	13-20	1.3-2.0
	100-140	20-25	2.0-2.5
SPA	80-132	25-35	2.5-3.6
	140-200	35-45	3.6-4.6
SPB	112-224	45-65	4.6-6.6
	236-315	65-85	6.6-8.7
SPC	224-335	85-115	8.7-11.7
	375-560	115-150	11.7-15.3
A	80-140	10-15	1.1-1.5
B	125-200	20-30	2.0-3.1

表3 (Table3)

轴承润滑

风机使用带座轴承，可通过加油嘴注入润滑油。润滑油有效期取决于油脂类型、轴承的转速和工作温度。判断是否加油的最好办法是当加新油时观察清除下来的旧油脂，如果清除下来的油脂看起来还象是新的，可延长换油脂的间隔，如果清除下来的油脂比新的黑得多表明油脂已氧化，应缩短换油脂的间隔。

Bearing Lubrication

The ventilator bearings are filled with lubricant when they come from the factory, so the bearings do not require any additional grease to be supplied before starting the ventilator. The ventilator that are equipped with pillow block bearings are provided with lubrication fittings, and these fittings allow for additional lubrication to be supplied to the bearings at regular intervals. The allowable period of time between lubrication of these bearings depends upon the operating speeds and temperatures of the bearing as well as on the type of grease used. The best way to determine the required frequency of lubrication is to inspect the condition of the grease that is discharged from the seals when new grease is added. If the discharged grease looks similar to the new grease, then a longer period of time between lubrications is possible. If the discharged grease is much darker than the new grease, then this indicates that the grease is being oxidized and more frequent lubrications of the bearings are required.

说明

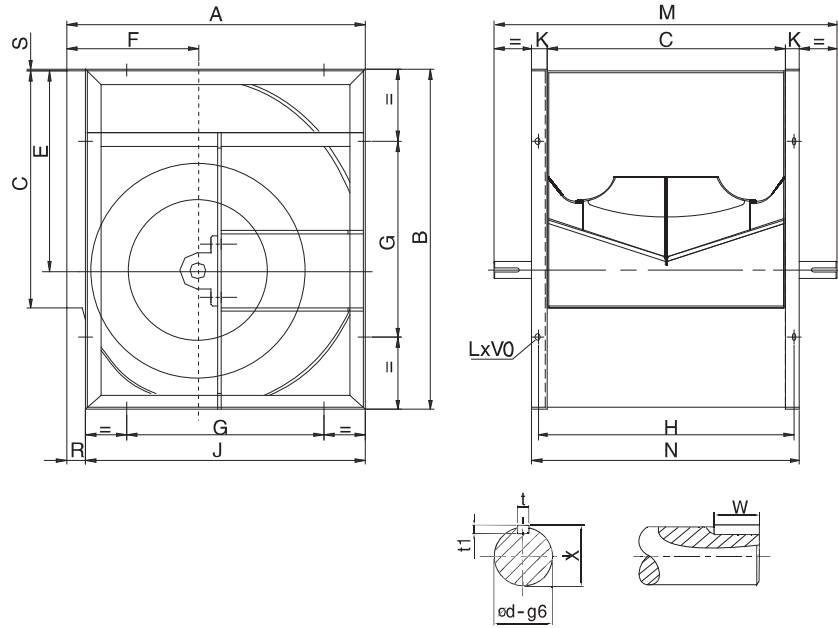
1) . 订货时须注明风机型号、转速、风量、风压、出风口方向和旋转方向。若需配套皮带、皮带轮、电机、安装底座等配件及它特殊要求可在订货时提出。

Instructions

1) . During ordering it is necessary to state the type of ventilator, speed, air volume, air pressure, direction of air outlet, rotating direction, type of electric motor and its specifications.



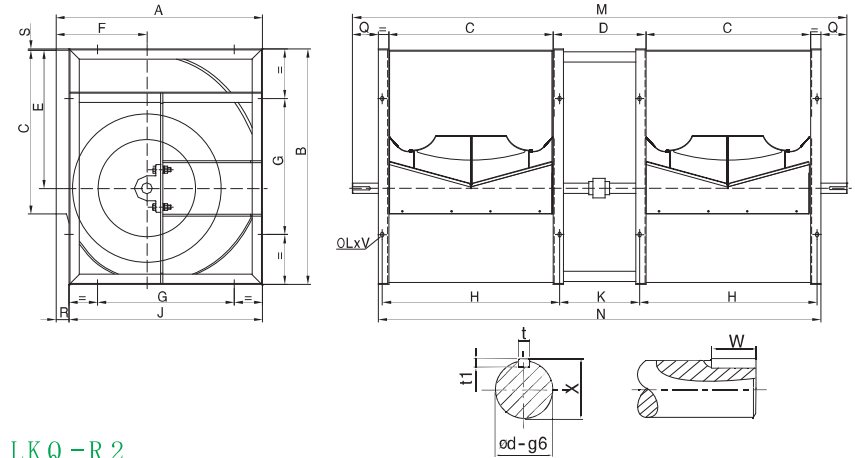
LKQ-K (Z)



Model	A	B	C	E	F	G	H	J	K	M	N	R	S	t	t1	W	X	φd	LxV
280	466	518	361	302	215	280	391	432	30	600	421	34	5	8	7	60	33	30	13x18
315	518	578	404	340	236	280	434	480	30	665	464	38	3	8	7	70	33	30	13x18
355	578	655	453	383	261	355	493	548	40	725	533	30	6	10	8	70	38	35	13x18
400	651	736	507	431.5	290	355	547	613	40	790	587	38	4.5	10	8	70	38	35	13x18
450	726	827	569	486	322	530	609	681	40	890	649	45	4.5	12	8	90	43	40	13x18
500	800	918	638	538	352	530	678	750	40	960	718	50	5	12	8	90	43	40	13x18
560	893	1030	715	603	390	530	765	845	50	1070	815	48	8	14	9	90	53.5	50	13x18
630	999	1157	801	678.5	434	530	851	946	50	1155	901	53	7	14	9	90	53.5	50	13x18
710	1121	1303	898	765	485	630	948	1058	50	1290	998	63	7	18	11	90	64	60	17x22
800	1250	1468	1007	862	535	710	1057	1181	50	1450	1107	69	7	18	11	90	64	60	17x22
900	1408	1648	1130	971	604	800	1180	1319	60	1570	1250	89	7	18	11	100	69	65	17x22
1000	1541	1810	1267	1066	657	900	1317	1462	60	1700	1387	79	9	18	11	100	69	65	17x22



LKQ-R (K) 2



LKQ-R 2

Model	A	B	C	D	E	F	G	H	J	K	M	N	Q	R	S	t	t1	W	X	φd	LxV
280	466	518	361	280	302	214	280	391	432	250	1216	1060	77	34	5	8	7	50	28	25	13x18
315	518	578	404	315	340	236	280	434	480	285	1359	1183	88	38	3	8	7	60	28	25	13x18
355	578	654	453	355	383	260	355	493	548	315	1508	1339	83.5	30	6	8	7	60	33	30	13x18
400	650	736	507	400	432	290	355	547	612	360	1667	1492	86.5	38	4.5	8	7	60	33	30	13x18
450	726	827	569	450	486	322	530	609	681	410	1864	1666	98	45	5	10	8	70	38	35	13x18
500	800	918	638	500	538	352	530	678	750	460	2053	1856	98.5	50	5	10	8	70	38	35	13x18
560	893	1030	715	560	602	390	530	765	845	510	2275	2090	92.5	48	8	12	8	70	43	40	13x18
630	999	1157	801	630	678.5	434	530	851	946	580	2521	2332	94.5	53	7	14	9	70	48.5	45	13x18
710	1121	1303	898	710	765	485	630	948	1058	660	2863	2606	128.5	63	7	14	9	90	53.5	50	17x22

LKQ-K 2

Model	A	B	C	D	E	F	G	H	J	K	M	N	Q	R	S	t	t1	W	X	φd	LxV
355	578	654	453	355	383	260	355	493	548	315	1533	1339	96	30	6	10	8	70	38	35	13x18
400	650	736	507	400	432	290	355	547	612	360	1697	1492	99	38	4.5	10	8	70	38	35	13x18
450	726	827	569	450	486	322	530	609	681	410	1909	1666	120.5	45	5	12	8	90	43	40	13x18
500	800	918	638	500	538	352	530	678	750	460	2098	1856	121	50	5	12	8	90	43	40	13x18
560	893	1030	715	560	602	390	530	765	845	510	2345	2090	127.5	48	8	14	9	90	53.5	50	13x18
630	999	1157	801	630	678.5	434	530	851	946	580	2586	2332	127	53	7	14	9	90	53.5	50	13x18
710	1121	1303	898	710	765	485	630	948	1058	660	2898	2606	146	63	7	18	11	90	64	60	17x22
800	1250	1468	1007	800	862	535	710	1057	1181	750	3257	2914	171.5	69	7	18	11	90	64	60	17x22
900	1408	1648	1130	900	971	604	800	1180	1319	850	3600	3280	160	89	7	18	11	100	69	65	17x22
1000	1541	1810	1267	1000	1066	657	900	1317	1462	950	3967	3654	156.5	79	7	18	11	100	69	65	17x22