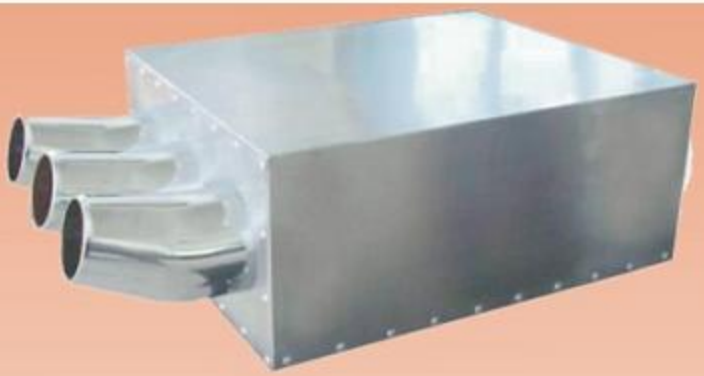
FAIRWAY

Jet Inducting System Fan



AUTO-JS喷流导引系统诱导风机

ISO14001

ISO9001

国家质量管理奖

喷流导引系统概述

地下汽车库若通风不良，容易积聚油蒸气而引起火灾或爆炸，还会使车辆发动机启动、运转时产生一氧化碳有毒废气，影响库内人员的健康。因此，从某种意义上讲，地下汽车库内有无良好的机械通风，是预防火灾发生和人员中毒的一个重要条件。（引自中华人民共和国国家标准《汽车库·修车库·停车场设计防火规范》GB50067-97条文说明第8.1.5条）。再如大型商场、会展中心、体育中心等大面积建筑物也均需良好的通风条件或空调降温，而自动喷流导引系统是最省基建和设备投资、最具高效率的通风形式。

Auto-JIS（自动喷流导引系统）是应建筑发展商为降低建筑层高、节省土建成本、改善通风及降温效果的综合需要所使用的，本公司通过引进国际先进技术和吸收、消化、创新，研制成功高效率的通风及降温方式。在东南亚地区和国内重大工程中得到普遍应用。近年来深受国内日益发展的建筑商和设计师的青睐。

Auto-JIS的实际应用在日本极为广泛，本公司引进的日本技术运用了先进的电脑软件CFD（computatioal Fluid Dynamics）流体动能计算系统模拟大面积的通风及降温情况，精确地计算出流体质点的运动状态与变化，如温度、压力、速度、时间等物理量，作出喷流导引系统的方案。每个喷流导引系统的具体布置各个建筑物的结构和功能而定，主要考虑的因素是成本和建筑物内空气质量的要求。

General of Jet Inducting System

In case of badness ventilation and accumulation of oil steam in the underground parking area,auto engine starts up automatically,even if fire or blast happend.Venomous exhaust gas such as carbon monoxide does harm to the human.Jet inducting system is better for under-guound parking area,shopping center,exhibition center,gymnasium center and all big building stace etc .

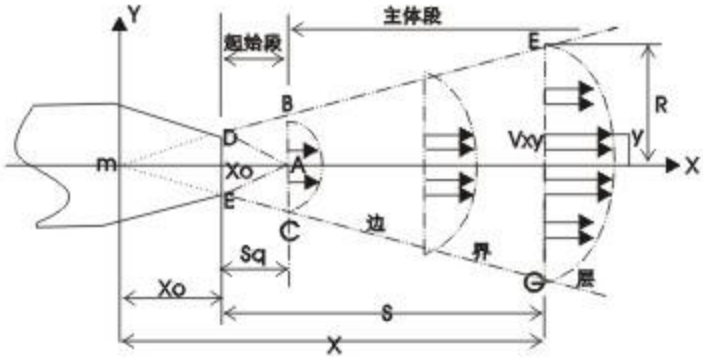
The JIS system is saving mounting cost and high efficiency ventilation .Auto-JIS can reduce the room height between two floors for saving excavating cost and guide fully flowing.

JIS Design can simulated by computer CFD(Computation Fluid Dynamics)software and calculating the status and movement of fluid particle such as temperature,pressure,speed and time ,and then make a decision.The arrangement for Jet inducting system should be made according to specific condition,the main reason as following,first is cost and second is the requirements for air quality in room.

喷流导引系统机理研究

Auto-JIS运用动量守恒定律和空气高速喷流(Jet)的扰动(Turbulence)特性，以高速喷出的少量空气有效地诱导及搅拌周围静止的大量空气并带动到需要的目标方向。

地下车库Auto-JIS的空气喷流属于等温自由圆射流方式，其结构特性如下图所示。空气自喷口射流后，在惯性力的作用下，射流将始终保持流动方向向前运动。由于动量交换，射流出口速度从轴心开始向边界逐渐降低。射流轴心速度保持出口速度V0不变的一段，这为起始段；锥体部分ADE为射流核心；射流核心消失的断面BAC称过渡断面；过流断面之后称主体段。由于射流的紊动掺混和卷吸作用，使射流边界上的空气与周围空气产生动量交换，周围静止的空气不断被卷入射流，使射流的范围和流量不断地随着射程的增加而增加；射流速度等于零值的连线称射流边界线。射流边界线包围的空间形状如圆锥体。圆锥的顶点m称极点，圆锥的半顶角∠EmD的一半称极角。



射流极角可用下式计算：

tgα=a×φ

式中α-射流极角，为整个圆锥角的一半，圆形喷嘴α=14° 30′ （一般设定）。圆形喷嘴的紊流系数为0.071，起始段长度Sq=8.4R。

φ-喷嘴的形状系数，圆喷嘴的形状系数φ=3.4

a-喷嘴的紊流系数，经实测其数值取决于喷嘴的结构及空气经喷嘴时所爱扰动的大小；扰动越大，射流与周围空气发生卷吸的作用越强烈，α角就越大，a值也随之增大。

射流的静压分布：

室内空气射流中任一点的速度是个随机变量，而且速度分布服从对数正态分布。射流轴心速度始终大于边界层速度，在起始段的射流核心内，则二者相等。从射流断面图上的确良速度弧线可以看出由轴心向外，存在一个速度梯度和圆心圆周相等的射流速度，由于空气本身的粘性，因此射流内部和射流外部空气的静压并不相等。横断面的等压线地由轴心向外静压逐渐增大的同心圆，静压分布对称于轴心点，由于各方向的静压力相互抵消，外力之和等于零，因此射流仍处于平衡状态。从射流的纵断面分析，在射流的射程方向，由于速度随着射程的增加面减小，因此静压将随着射程的增大而增加，最后与环境静压相等。

射流时喷嘴的作用是使气流产生涡旋运动，向静止空气中扩散前进，从面产生很好发卷吸和导引作用。通过试验研究分析，对于喷嘴在水平长度为1.6倍于喷口直径，喷嘴斜面与轴线相夹6.5° 时的扰动特性比较理想，因此该喷嘴的应用比较成熟而广泛。

喷流导引系统中各个喷嘴的扩散角、喷流直径、引射距离、轴心速度、导引风量、断面平均风速等参数可由相应的计算公式得出，系统综合效果也可由CFD软件来模拟并计算。

The Theory of Jet Indcting System

The working principle of auto -JIS is using a little high speed air to turbulence the surrounding static air to a certain direction .The center speed of jet is taper ADE.Section BAC where jet center disappears is named astransition section .Body phase is next to transition section BAC.The jet turbulence can efficiently guide the sur-rounding static air,so air will move ,the jet width will increase gradually.The guided surrounding air quantity will increase too. Jet borderline is that jet speed is zero.The area within borderline is cone shape .The peak m of cone is named as apices .The half of semi-tip angle∠EmD of the cone is polar angle of jet which can be obtained from the following foumula:

α :polar angle of jet,equal to half of cone angle ,angle of spray nozzle α is 14° 30 Turbulence coefficient of spray nozzle is 0.071,The length of start phase is Sq=8.4R

Φ:shape coefficient of spray nozzle 3.4

a:Turbulence coefficient of spray nozzle is subjected to the structure of spray nozzle and turbulence area pass-ing spray nozzle.The more turbulence,the more polar angle of iet (α),turbulence coefficient of spray nozzle (a)increase followed

Distuibuting of static pressure of jet:

Wind speed on any point of the flowing air is variable and submits to normal school.Center speed of jet always is bigger than borderline speed.Center speed of jet always is equal to borderline speed with center of jet during start phase .There is an existing jet speed from centerline under the condition of the same speed grads and circle.Air static pressure inside the jet area is not equal to outside the udt ares.Status of static pressure is symmetric to the centerline.From the vertical section of jet,jet speed decrease following the increase of jet range at the direction of jet range.So static pressure increase following the increase of jet range till equal to surrounding static air to move.It is the best time to guide relaying when spray nozzle is arranged at the distance of 1.6diameter of spray nozzle,the corner of spray nozzle and centerline is 6.5degree.

Diffuse angle of spray nozzle,diameter of spray nozzle,guiding distance,center speed of jet,wind flowing capacity of spray nozzle,average wind speed of section can be calculated from the related formula.The results of JIS can be simulated and calculated by CFD software.

喷流导引系统应用特点

投资更省

1、土建成本：因设备吊装于梁窝内，不用通风管道，所以每层建筑可降低层高约400mm，节省大量土建费用。

2、设备投资：按1000m²面积的投资（含施工）计算，可比传统方式节省30%以上，面积越大，节省投资越大；并可视使用情况作分步投资、安装，灵活资金调度。

3、运转费用：因通风效率高，送、排风机运转时间短，节省大量运行电费。

效果更好

4、空气质量：因射流的高速扰动特性，室内空气整体快速流通，且无通风死角产生，所以通风效率更高，换气效果更佳，室内空气更清新。

5、外观：简洁美观，开阔室内空间，使物业更显现代气派。

6、设计弹性：系统规划简单，设计变动弹性大，出错机会少。

The advantages of Jet Inducting System

1.JIS can pass through wall and reduce the room height by 400mm between two floors for saving excavating cost.

2.JIS system can save mounting cost 30% than traditional sysem.

3.JIS had high efficiency of ventilation and short operating time for supply/exhaust fan for saving energy cost.

4.Guiding air fully flowing,reducing the exhaust gas density rate.And guide large quantity fresh air to ensure air quality.

5.JIS increase story space and appearance is nice and neat.

6.JIS is simple and flexible,so possible for making mistakes is small.

地下车库实况图：Underground Parking area

车库喷射通风效果侧视图：Jet ventilation effect in underground parking area

喷流导引系统设计说明

The Roughly Design of Jet Inducting System

一、需提供的设计基础资料：

1、室内平面结构比例图（例车位布置图）。

2、室内层高、梁高、梁下净高等立面参数。

3、室内排烟管、喷洒管、线槽等管线布置图。

4、室内送、排风口位置、方向。

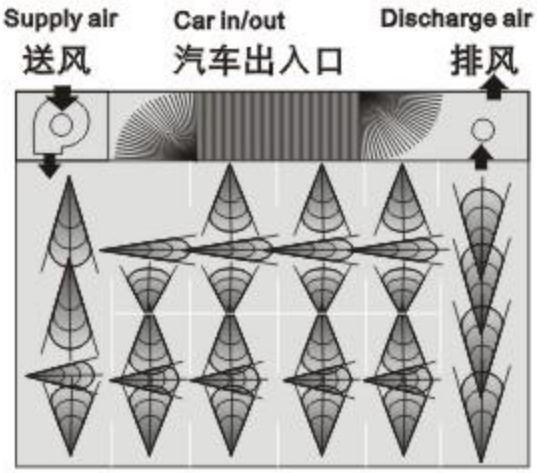
Required design documentation

1 Room plan structure proportion chart

2 The floor height,girder height and net height away girder

3 Ductwork for exhaust smoke duct,spray duct,line slot

4 Position and direction of inlet and outlet



二、设计说明：

1、喷流导引系统由送风机、喷流导引器、排风机、控制设备四部分组成。其中送风机是供新鲜空气用，喷流导引器是将室内空气搅拌均匀，并将新鲜空气沿着通风路径从送风口导引至排风口，同时把废气导至排风机处，再由排风机将废气排出室外；控制设备通过感测室内废气浓度自动开启或关闭设备，废气浓度感测器一般置于排风口附近。

2、送、排风机的位置宜设于防火分区的两端。

3、室内有直接通向室外的防火分区，可不设送风机。

4、室内面积不超过2000m²可不设置机械排烟系统。

5、排烟风管由于不再兼作排风用，故管内风速可升至12-20m/s，每个排烟口的覆盖距离可达30m，最终使得排烟风管的尺寸和密度较常规做法有大幅减少（一般可减少50%），且由于风管间距加大往往可把排烟风管布置在室内四周沿墙或其它可以不占用室内层高的位置。

6、电气及控制：在每台喷流导引器边预留单相电源接线；控制方式有CO感测自控，时间编程自控、手动开关控制三种，可视室内情况选用，但任何一种控制方式最好与送、排风机连锁运转（电气配线方式见“安装说明”接线图）。

7、安装位置：喷流导引器回风口与其障碍物的间距不少于500mm，喷嘴出风口向下15°前方无 阻挡物，设备吊装高度以允许之最低高度为宜，一般取设备底部与梁底或管线底相平。

8、设备间距与接力风速：布置喷流导引系统时，设备纵向间距的大小取决于诱导接力风速的选择，设备横向间距的大小取决于每台诱导风机的喷嘴数量和角度。在理想条件下，虽然喷流的宽度会一直增至无限大，诱导风量也会增至无限大，但各点的风速会减至无限小而且在实际环境里，实验证明，在喷流中心速度大约1m/s时，实行诱导接力较适合。当然整个喷流导引系统的安排，须视各个建筑物的特殊情况而定，主要的考虑因素是空气质量的要求和成本控制，这些安排可以按设计说明精确选择决定。

Design description

1、JIS is composed of supply fan,spray nozzle,discharge fan and control components.Supply fan is to supply fresh air.Spray nozzle turbulence the surrornding air and guide fresh air from inlet to outlet and guide exhaust gas to outside room by discharge fan.Control components automatically turn on or off equipment through inducing the density of exhaust gas in room.Sensor for exhaust gas shall be mounted neaby the outlet.

2、Supply and discharge fan shall be arranged on both sides of fire area.

3、It is not necessary to mount supply fan in room that has fire directly to outside.

4、It is not necessary to mount machinery smoke discharhe system in room with the area of less than 2000 square meters.

5、Smoke discharge pipe is not for discharge air.Air speed in the duct can reach up 12-20m/s.The range of each smoke outlet can obtain 30m.So JIS can reduce the density and quantity of smoke pipe then traditional system.Smoke pipe can be arranged around the wall in room or others because of the large space between two pipes.

6、Electric control

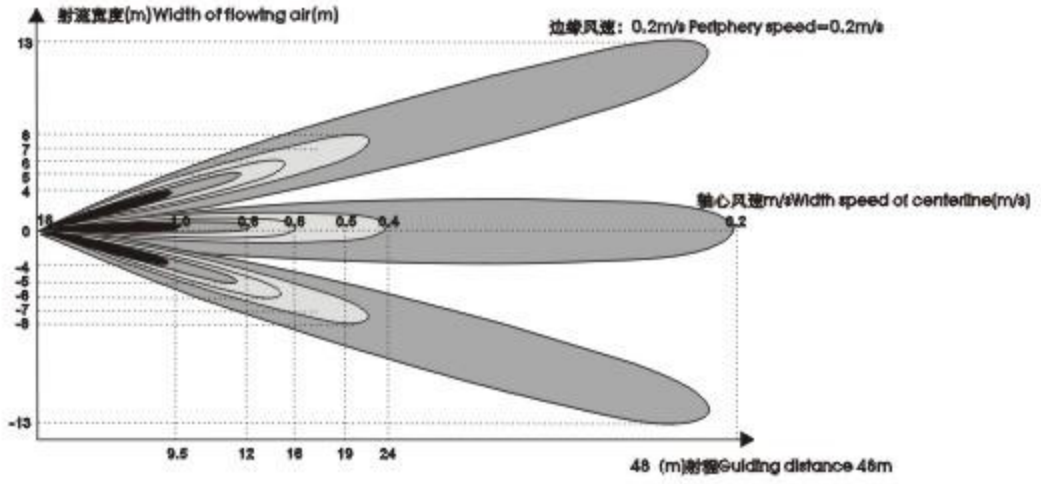
JIS reserve single phasa electric wiring and has three control ways,auto control of CO sensor,time control and switch control.But each control way shall be combined with supply fan or discharge fan.

7、The distance between return grill and its obstacle shall be no less than 500mm.There is on obstacle at the 15 degree down the outlet of spray nozzle.The mounting height of equipment shall be better for allowable minimum benefit,normally the bottom of the equipment shall be level to the bottom of girder or piping.

8、The vertical mounting space of JIS fans is subject to thd selection of guiding wind speed.The horizontal mounting space of JIS fans is subject to the quantity and position of spuay nozzle for each JIS fan.Jet width and guided wind flowing capacity can become infinitely great in ideal condition in theory,but the wind speed will become infinitely small and there are not ideal condition in fact,for example,there are obstacle and all direction wind in building.So when jet speed drop to a certain value,it needs another jet for relaying.When the jet speed reach 1m/s,it is better for guiding relaying.Certainly,the arrangement for jet inducting system should be made according to specific condition,the main reason as following,first is cost and second is the requirements for air temperature quality in room.All this work can be simulated by computer and then make a decision.

三、喷嘴夹角15° 时气流速度分布俯视图

Wind speed of flowing air at the 15 degree of spray nozzle



四、诱导系统性能参数表：Performance Data of JIS

轴心风速 Womd speed of center	(m/s)	1	0.8	0.6	0.5	0.4	0.2
诱导距离 Guiding distance	s(m)	9.5	12	16	19	24	48
喷流宽度 Width of flowing air	(m)	8	10	12	14	16	26
诱导风机 Guiding wind flowing capacity	Q(m^3/s)	36234	45606	60601	71848	90592	/

注：$Q=4.4\times\left(\frac{a\times s}{d_o}+0.147\right)\times Q_o$

其中；Q-诱导风量m3/h　　s-诱导距离m

Q_o-喷嘴出口风量m3/h　　d_o-喷嘴直径0.08m

a-圆喷嘴紊流系数0.071　　4.4-为常数

0.147-为常数

Formula: $Q=4.4\times\left(\frac{a\times s}{d_o}+0.147\right)\times Q_o$

Q:guiding wind flowing capacity in m3/h

Q_o:wind flowing capacity of spray nozzle in m3/h

s:guiding distance in meter

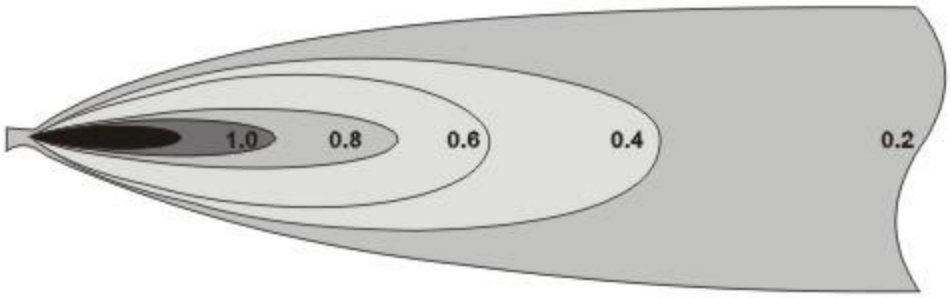
d_o:diameter of spray nozzle 0.08m

a:turbulence coefficient of spray nozzle 0.071

0.147 and 4.4 are constant

五、喷嘴平行叠加时气流速度分布俯视图

Wind speed of flowing air for the superposition of spray nozzles in parallel



喷流导引系统风机使用规范

Technical Specification of JIS

一、AUTO-JIS系列低噪音诱导风机型号说明

AUTO-JIS系列诱导风机根据用户不同的需要可分为A、B两种形式，其型号规格的意义如下：

AUTO-JIS – X – No.X

- No.X：表示机号（风机叶轮直径的分米数）
- X：风机型式：A：表示管道式诱导风机；B：表示多风机式诱导风机
- AUTO-JIS：表示低噪声诱导风机代号

A型诱导风机由高压风机、螺旋风管和喷嘴组成。
B型多风机式诱导由超薄型风机和翘角喷嘴组成。

二、技术参数 Technical data

出口风速 outlet velocity	14-18m/s 14-18m/s	噪 声 Noise level	≤54dB(A)
喷 嘴 Spray nozzle	Φ80mm×3 支/台 Φ80mm × 3 pcs per JIS fan	箱体尺寸 Dimension of JIS fan	L600×W500×H250mm
输入功率 Power supply	190W/220V/三速电机 190W/220V/3-phase	重 量 Weight of JIS fan	≤20kg
控制（选配） Electric control	时间编程控制 CO 感测自控 CO sensor by time control		

AUTO-JIS-A型管道式诱导风机的性能参数

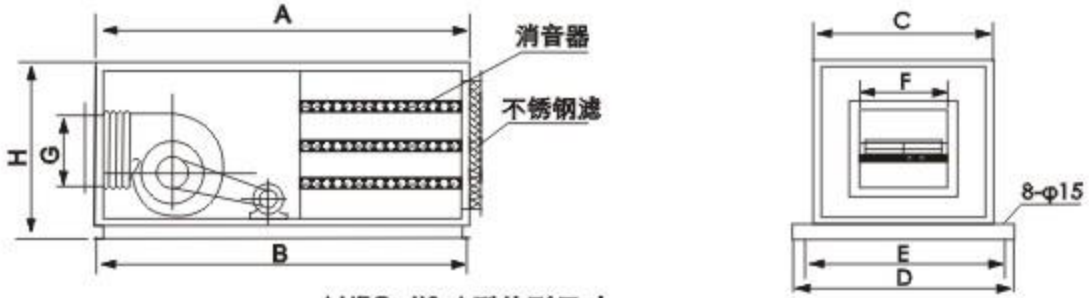
规格	风量 (m^3/h)	最高全压 (Pa)	转速 (r/min)	功率 (kw)	噪声 dB(A)
AUTO-JIS-A-1.8#	2400	1600	3688	2.2	84
AUTO-JIS-A-2.5#	3600	1730	3320	4	85
AUTO-JIS-A-2.8#	6000	1760	2610	5.5	87

AUTO-JIS-B型管道式诱导风机的性能参数

规格	风量 (m^3/h)	喷嘴形式 (直径×个数)	射程 (m)	功率 (kw)	电源 (V/Hz)	噪声 dB(A)	重量 (kg)
AUTO-JIS-B-2.5#	630~850	φ100×2	12	120	220/50	54	28
		φ80×3	10				
AUTO-JIS-B-3#	985~1350	φ100×2	18	300	220/50	58	35
		φ80×3	15				

AUTO–JIS系列低噪声诱导风机外型尺寸

1、AUTO-JIS-A型管道式诱导风机外型尺寸



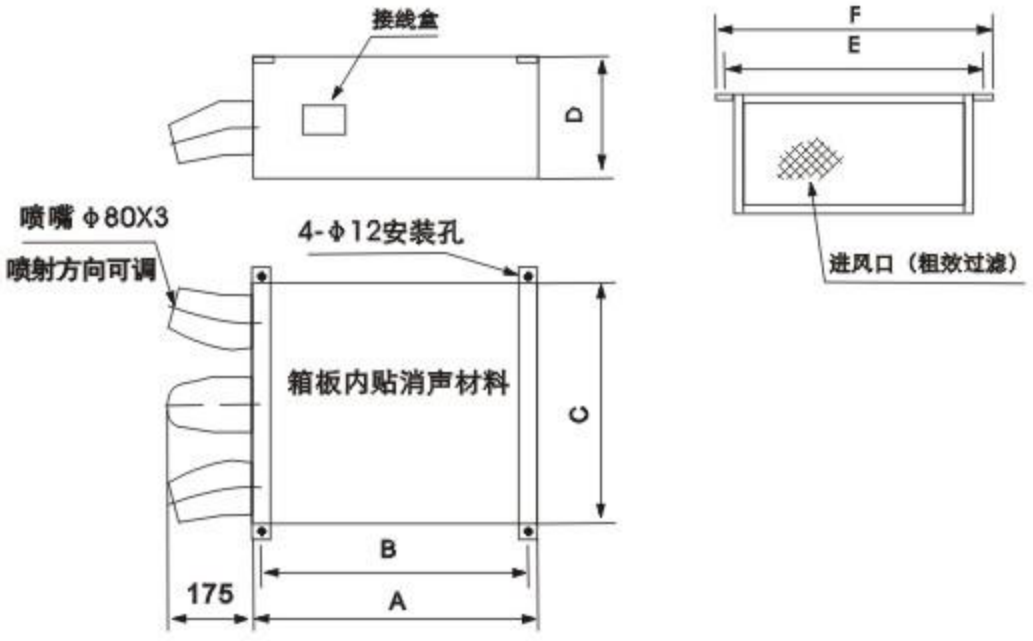
AUTO-JIS-A型外形尺寸

AUTO–JIS–A型风机的喷嘴外形图

规　　格	A	B	C	D	E	F	G	H
AUTO-JIS-A-1.8	1450	1410	580	740	660	260	260	380
AUTO-JIS-A-2.5	1680	1640	660	820	740	320	320	715
AUTO-JIS-A-2.8	1800	1760	720	880	800	360	360	750

2、AUTO-JIS-B型管道式诱导风机外型尺寸

规　　格	A	B	C	D	E	F
AUTO-JIS-B-2.5	600	560	500	250	540	580
AUTO-JIS-B-3.0	800	760	600	300	640	640



AUTO-JIS-B型外形尺寸

二、组件说明
Equipment composition

组织名称 Name of components	组件说明 Description & Specification
风　轮 JIF fan imponents	日本“美之亚”品牌的超薄低噪音金属离心风轮，冲压成型，并经严格动、静平衡校测 Japanese MITSUYA metal centrifugal impeller which is static and dy-namic balanced comply with ISO2.5
马　达 Motor	日本NSK轴承的三速电机，使用寿命达三万小时；三速调节，利于气流平衡和车流低谷时的省电运行 Three speed motor and NSK bearing with life time of 30000 houra, 3 speed adjustment is for the balance of flowing air and low energy operation on the peak of power.
导风嘴 Guiding mouth	平滑圆锥型 Taper type
箱　体 Housing	吸音箱体，外形美观 Sound absorbed housing and nice aspect
滤　网 Fiter net	铝合金滤网，拆卸清洗方便 Aluminum net is easy to clean
分流器 Diffuser	均衡分配高速气流 Distribution of high speed flowing air
喷　嘴 Spray nozzle	每台三支喷嘴，角度可按需配置，利于扩展喷流范围；喷嘴长度可自由延伸 Mounting 3 pieces spray nozzle per on set JIS fan.Mounting angle of spray noozzle can be selected for extend the spray range. The length of spray nozzle can be extended.

三、安装说明

1、吊装：用10mm圆钢通过膨胀螺栓吊装于楼板下，螺栓与楼板之间须牢固地栓紧固定螺栓。

2、位置：诱导风机回风口与其障碍物的间距不少于500mm，喷嘴出风口向下15°前方无阻挡物。机器吊装高度以允许之最低高度为宜，一般取设备底部与梁底或管线底部相平。

3、接线：诱导风机有高（H）、中（M）、低（L）三速接线端，三速接线的方式见下图。

4、喷嘴：诱导风机箱体吊装完成后，再配置喷嘴角度，并将喷嘴与箱体连接。

Installation of JIS fan

1、Ceiling mounted to 10mm round steel by expansion bolt.

2、The distance between return grill and its obstacle shall be no less than 500mm.There is on obstacle at the 15 degree down the outlet of spray nozzle.The mounting shall be level to the bottom of girder or piping.

3、JIS fan has three wiring connections,high speed(H),middle speed(M),low speed(L),referring to the following wiring connection.

4、Select the angle of spray nozzle and fix the spray nozzle to the housing after ceiling mounting of JIF fan housing.

四、诱导风机三速接线图

Three-speed wiring siagram of JIS fan