

PRODUCT DESCRIPTION

2022

► 潔淨室

# 風機濾網機組

CLEAN ROOM FAN FILTER UNIT

## CR FFU SPECIFICATION

2X4	2.5X5	4X4	OTHER
超薄型	薄型	薄型	自動化 (AND)
薄型	標準型	標準型	製程設備專用
標準型	高效型	高效型	網路擴充模組
高效型	高風量型	高功率型	(SMFS)



TOPWELL

# TAIWAN-FFU

Topwell為累積30年的潔淨室工程經驗，結合台灣高科技電子產業技術，及傑出的軟體技術人才，並應用台灣企業優良的加工技術與品質，生產出優於國際品牌的新一代高效率風機濾網機組。讓我們從台灣開始，使全世界都看得到 TAIWAN-FFU。

Topwell, accumulated 30 years of service in cleanroom construction, developed the new generation of high efficiency Fan Filter Unit, in synergy of Taiwan hi-tech electronic technology and HMI software development, manufactured under the reliable quality in Taiwan.

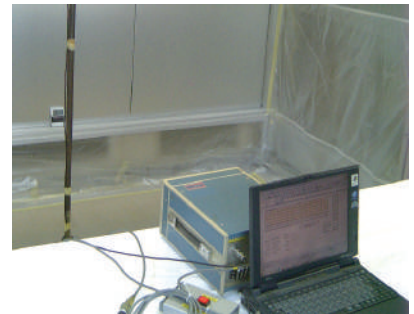
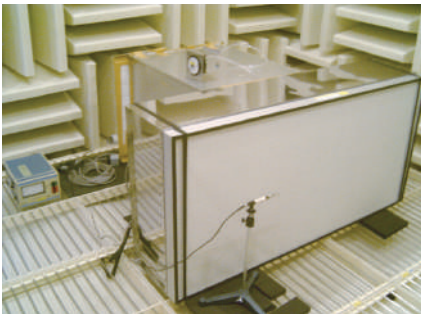
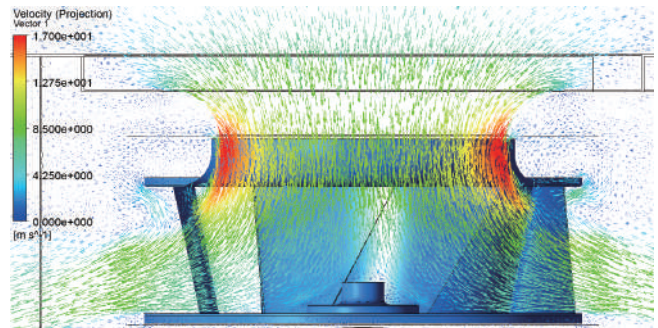


## 節能省電高效率 FFU 機組，整機效率高達65%

### 研發與測試 Research and Development

藉由3D氣流模擬軟體，研發最佳氣流場的箱體結構，可降低風道擾流，提升風機效率，促使風量分佈均勻。

FFU casing is designed, via air flow simulation software, to ensure the efficiency and flow distribution.

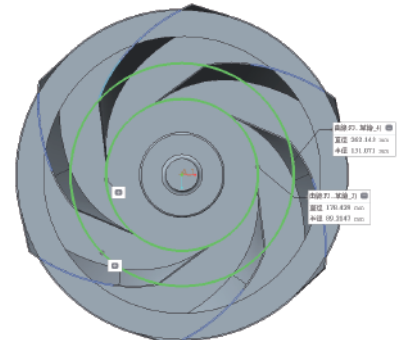
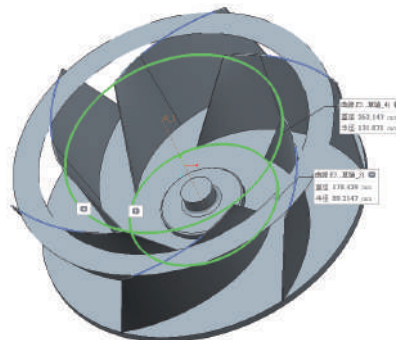


產品經專業研究機構的測試與驗證，確保研發數據的正確性，提升產品的效率及品質。  
FFU performance is tested and verified by third party labor research institute.

### 風扇特性分析 Fan Features

多種不同特性葉輪的組合應用，達成高效率低噪音的使用目標。

Aerofoil or centrifugal fan is selected to meet the application requirement.



**自製DC直流無刷馬達**  
**In-house BLDC Motor Production Line**

自製高效率直流無刷馬達，機電效率高達90%以上，軸心與軸承處具抗電蝕 (Current Burn)設計，為確保軸承使用壽命，選用高規材質，針對軸承鋼珠，其設計壽命 $L_{10}>5,000,000$  hrs，而軸承油脂設計壽命 $L_{50}>400,000$  hrs。

The DC brushless motor is designed to achieve over 90% of efficiency, and the shaft/bearing is prevented from electrical pitting to assure the designed bearing life. The design service life is calculated to be  $L_{10}>5,000,000$  hrs and  $L_{50}>400,000$  hrs for bearing ball and bearing grease, respectively.



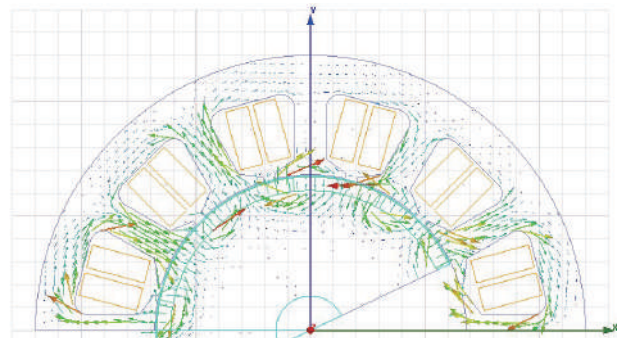
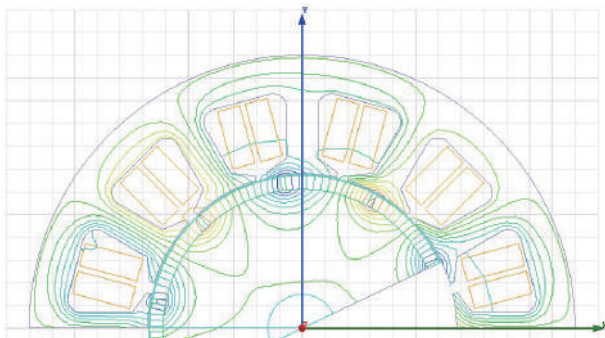
3C認證



CE認證

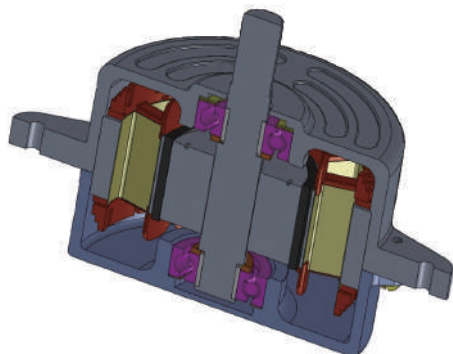
**矽鋼片磁路分析**  
**Coil Magnetic Analysis**

藉由有限元素分析法，分析、設計矽鋼片磁路。並以田口法優化矽鋼片形狀，縮短研發設計時程，有效利用材料，減少體積，最佳化馬達磁路。



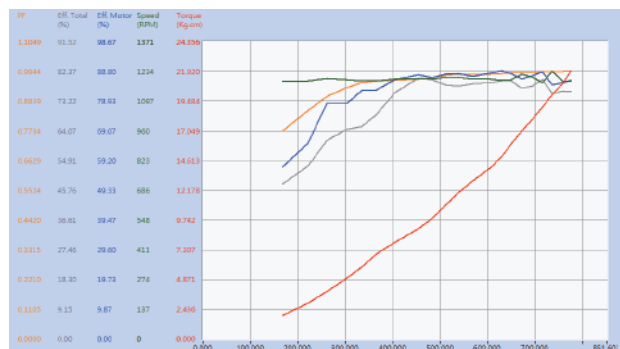
**馬達3D模組設計**  
**Motor Enclosure 3D Design**

以繪圖軟體繪製馬達各工件3D圖，各工件組裝確認尺寸後發包製作樣品。



**研發設計-電機動力分析**  
**Research & Development-Motor Dynamic Analysis**

全電腦控制馬達特性測試系統，採損失分離測法，量測分析出驅動器與馬達效率，同時搭配電力分析儀，同步量測驅動電壓、電流波形、功因及諧波，進而分別調整優化其效率。



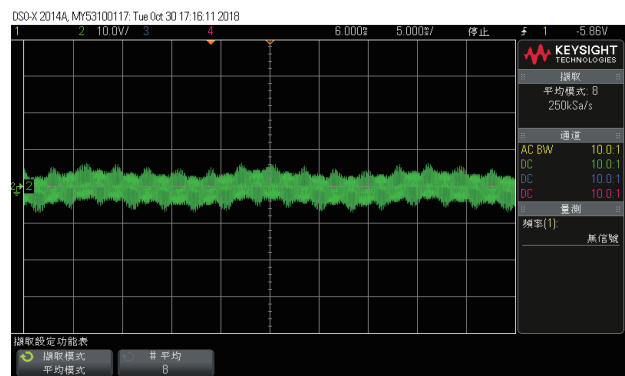
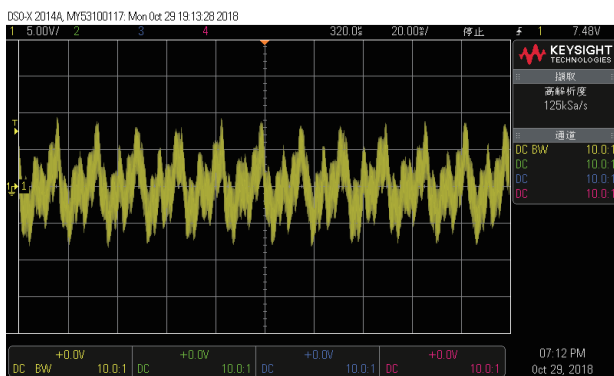
### 軸電壓可導致馬達軸承的損壞

## Electrical corrosion of motor bearing resulted from abnormal of shaft voltage

一般馬達轉動機械在軸與軸承間，及軸承本體內須有油膜的存在，以利軸的旋轉潤滑，而且此油膜對於小的軸電壓具有絕緣作用。當軸電壓大至超過油膜絕緣強度時，電流即從轉軸通過軸承路徑進入外殼導入地位，此時油膜將被破壞，而在軸承及軸的金屬接觸部形成電流通過造成電弧（arc）作用，電弧的高溫即引起金屬的熔融現象。While motor rotating, the shaft is rotated against the bearing, and the lubricant is presented in form of oil film in between to facilitate the rotation. In addition to the lubrication, this film shall also have the function of insulation against small shaft voltage. If the shaft voltage is too high (or the insulation is too small), high shaft current is generated across the shaft, via bearing, to motor shell and induced to grounding. The generation of high current will create the electrical arc. The high-temperature of arc may cause the melting of metal contact between shaft and bearing.

此熔融現象對於滾動軸承構造，會在軸襯合金處呈現麻點（pitting）狀之孔蝕，或在軸上呈現刮痕狀之損傷，同時電弧作用會導致碳的析出，使潤滑油變黑劣化，受損的金屬表面及碎屑將造成軸承的異常磨耗加劇，終導致整個軸承損壞或是發生高頻噪音。大部份馬達軸承的設計使用壽命為100,000小時，但發生此異常狀後，軸承有可能於1年內就完全損壞。

This melting phenomenon will be presented in form of pitting in the housing of bearing or scratches on the shaft. Due to the electrical corrosion, the lubricant will be blacken and deteriorated from carbon contamination. In combination with the metal injury, it will eventually lead to the generation of noise and bearing damage. Most of the service life of motor bearings is designed of 100,000 hours, but the service life could be drastically reduced to be less than a year due to the electrical corrosion.



### 特性驗證測試

## Motor Characteristics Testing

透過數位式多功能示波器分析馬達運轉中軸心與接地端電壓波形，可確保培林不會因軸電壓而發生電蝕情形，進而提升培林運轉壽命。

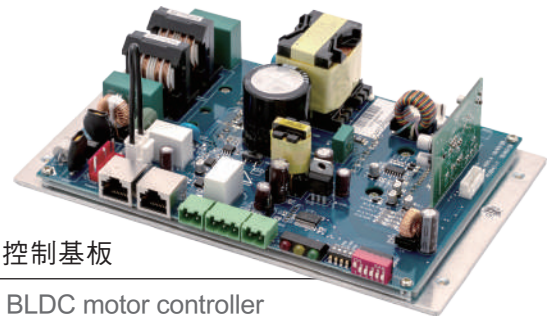
The shaft voltage is measured and analysed by oscilloscope, to prevent the bearing damage from electrical corrosion due to shaft voltage.



## MIT台灣設計製造的高品質高效率控制基板 High efficiency design of FFU controller

控制機板由國際大廠在台灣投資設立的專業製造廠商生產，產品符合EMC、SEMI相關規範或標準。控制基板內建諧波抑制器，有效降低用戶端的干擾。

FFU controller is designed by Taiwan professional company, which is invested by international well known company, and is manufactured in Taiwan. The controller is tested to meet the EMC and SEMI standards and the harmonic filter is built-in to minimize the interference of power source.



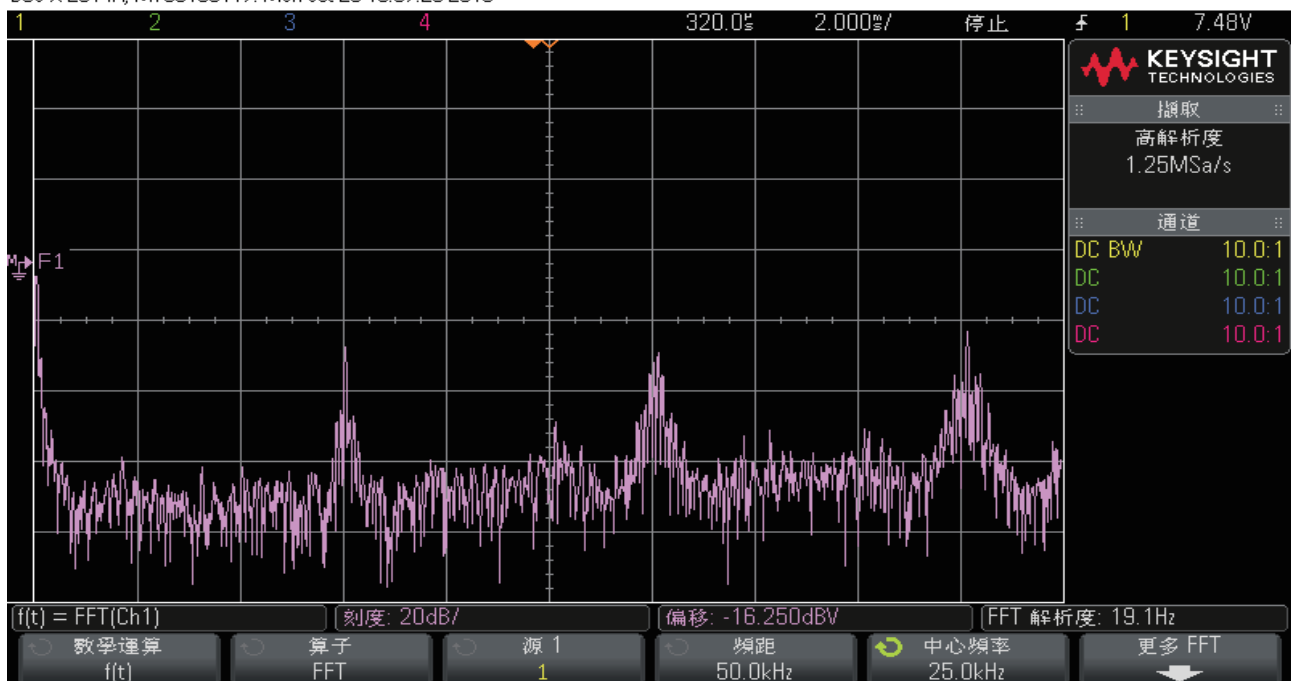
DC控制基板

DC BLDC motor controller

## 諧波分析 Harmonic Analysis

透過諧波分析儀測試馬達驅動電壓、電流諧波，修改驅動器端硬體軟體，使其降低馬達運轉中產生之震動及異音，提升馬達壽命。

DSO-X 2014A, MY53100117: Mon Oct 29 19:07:26 2018



目前Harmonic數據的要求，大多參照IEEE的規範，電壓380V以上的為15%以下，380V以下為18%以下，topwell全機種的Harmonic值均訂在8%以下的標準。

Refer to IEEE specifications, the harmonic is to be less than 15% and 18% for voltage > 380V and voltage < 380V, respectively. However, Topwell FFU controller is able to achieve the higher standard of harmonic less than 8%.

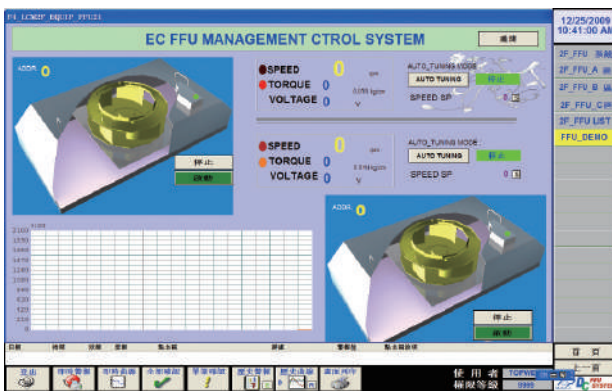
## 主要控制功能 Monitoring and control function

- ◆ 單機控制 Individual control
- ◆ 群組迴路控制 Group control
- ◆ 控制中心集體控制 Control Centre by Server
- ◆ 現場直接控制 Local Control by Local Clients
- ◆ 遠端連線控制 Remote Control by Internet
- ◆ 跨平台整合能力 OPC service
- ◆ 工控系統直接整合 HMI ex: Intouch, IFIX



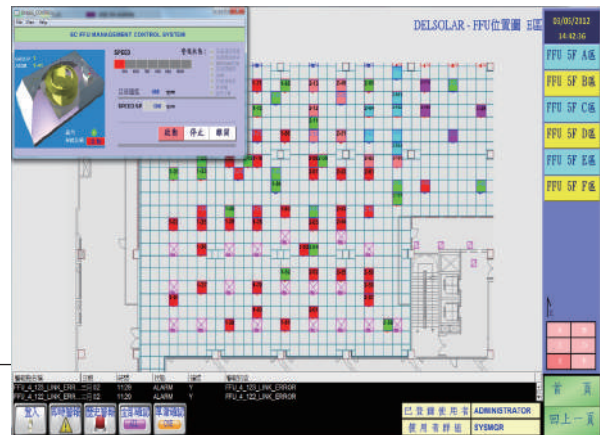
單機運轉資料顯示

Individual control mode



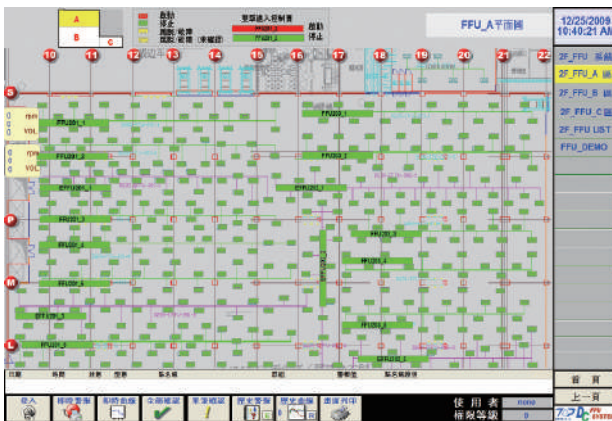
多機群控顯示，點擊圖示單元可顯示單機運轉資料

Group control mode



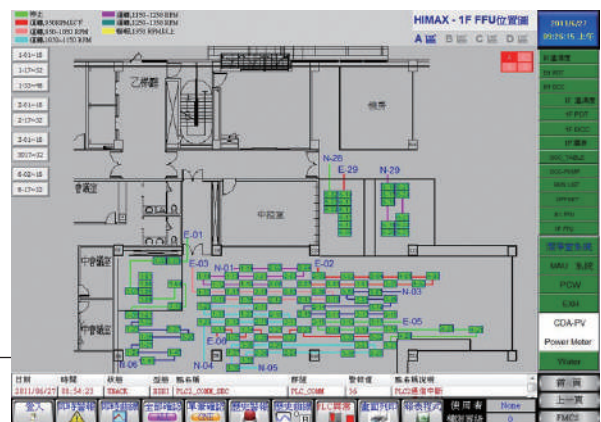
中文INTOUCH 圖控軟體，與廠務監控系統整合容易

INTOUCH software applicable for the monitoring and control system, enable the integration to FMS.



可將CAD圖面直接轉為圖控畫面

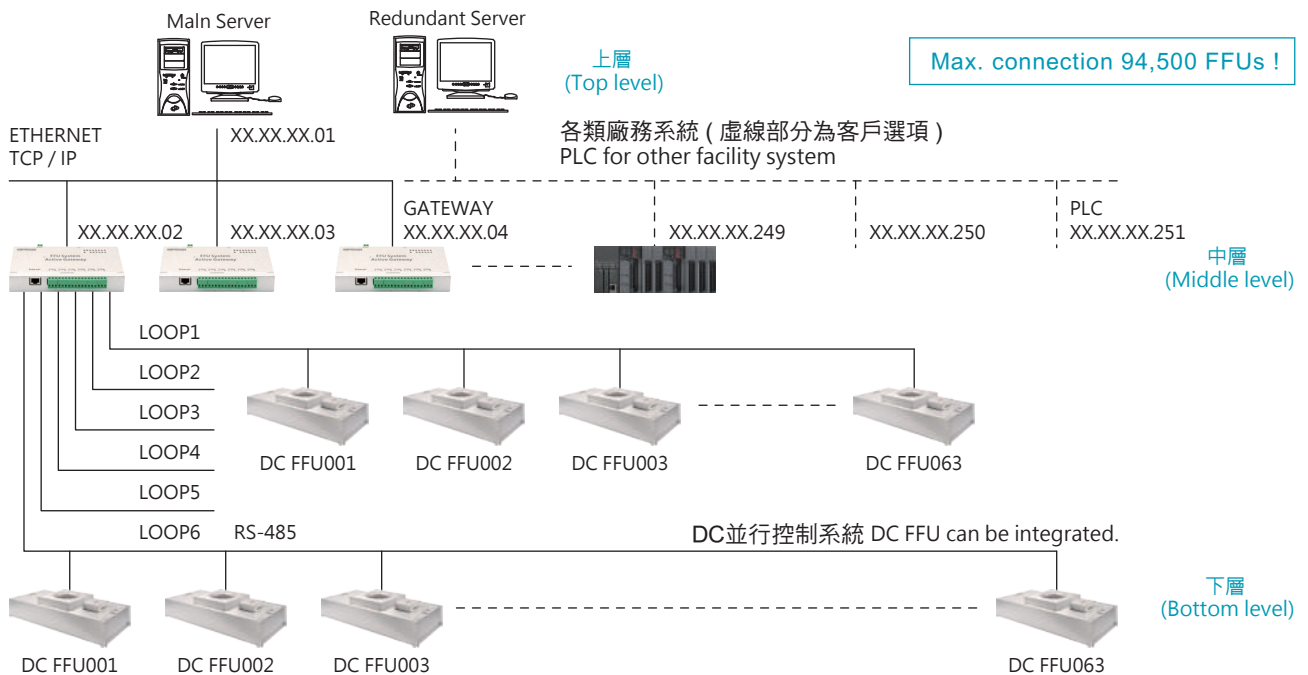
Display is easily converted from CAD drawing



圖控系統的軟體編輯及試機調整，Topwell 100% 完全自主處理，可於24小時內完成業主的變更需求。

Testing, commissioning and maintenance service fully local supported.

## FFU監控系統架構 FFU System



註：本系統之FFU控制器為監控通訊版，另有非監控版控制器提供單機手動調速及警報乾接點功能

Note: For AC FFU, the non-communication type, which is equipped only with manual control and alarm dry contact, is also available.

### 上層監控端 Top level: HMI

- ◆ 可透過ETHERNET網路使用套裝圖控軟體，例如：INTOUCH IFIX、CIMPLICITY等市面常用軟體，或自行開發之監控軟體，亦可以整合至既有的廠務系統內。  
Via ETHERNET, the HMI (INTOUCH, IFIX, CIMPLICITY or self-developed software) Monitors and controls FFUs through gateway.
- ◆ 可以透過 RS-232C 對 TOPWELL 之通訊轉換器讀出寫入。  
Direct communication with Topwell gateway by RS-232 is feasible.
- ◆ 可以直接對 FFU 控制器讀出寫入。  
Direct communication with Topwell FFU by RS-485 is feasible.

### 中層資料收集端 Middle level: Active gateway

- ◆ 資料收集器會主動將下層FFU控制器的資訊收集。  
Gathering data from FFU controller actively.

GATEWAY標準規格，FFU監控系統專用。

TOPWELL Active GATEWAY.



特殊規格，適用整合其他監控I/O用途。

Special request, applicable for other I/O integration.



### 下層FFU控制器 Bottom level: FFU controller

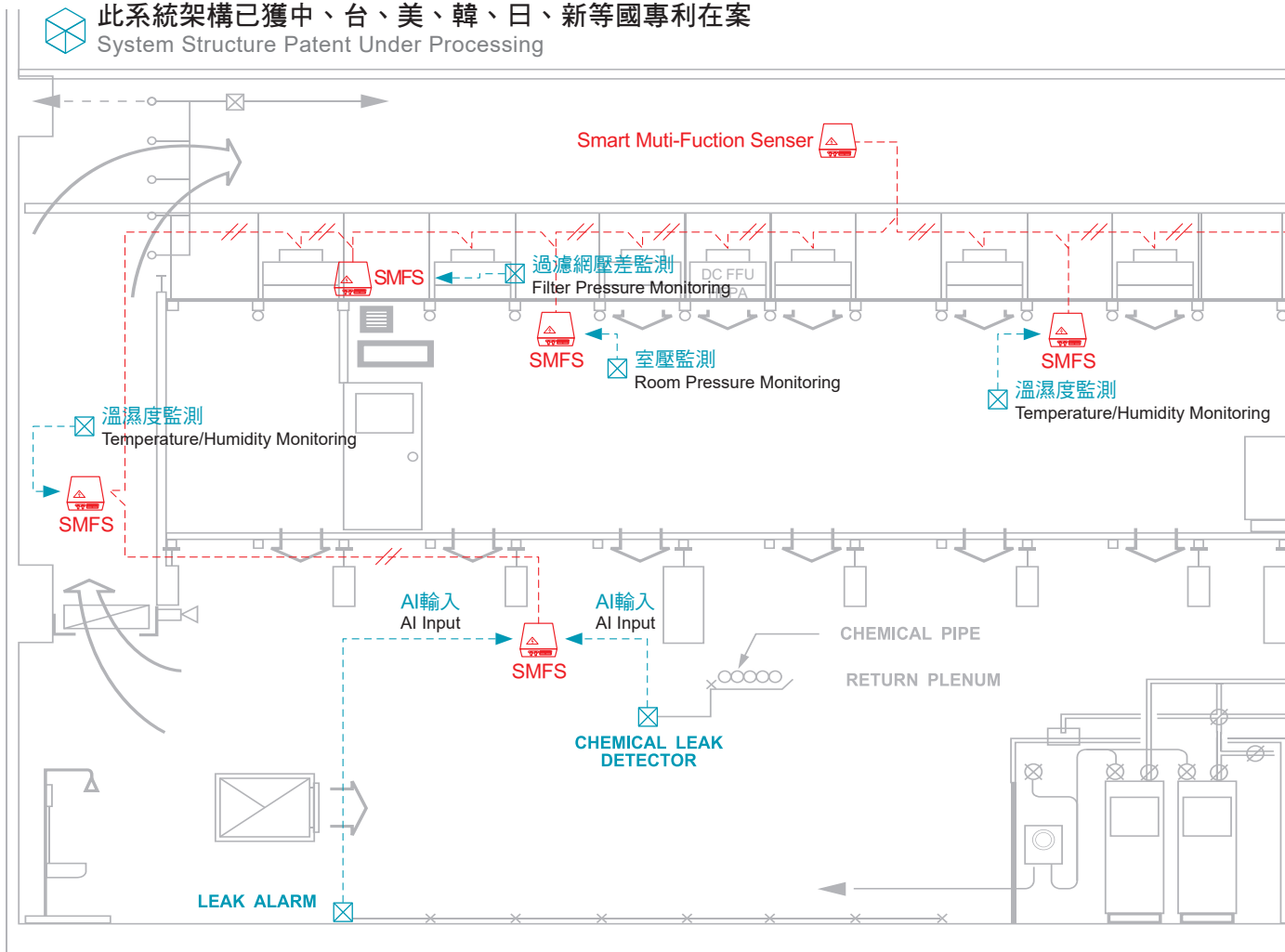
- LD01 DC FFU控制器-網路型  
DC FFU controller



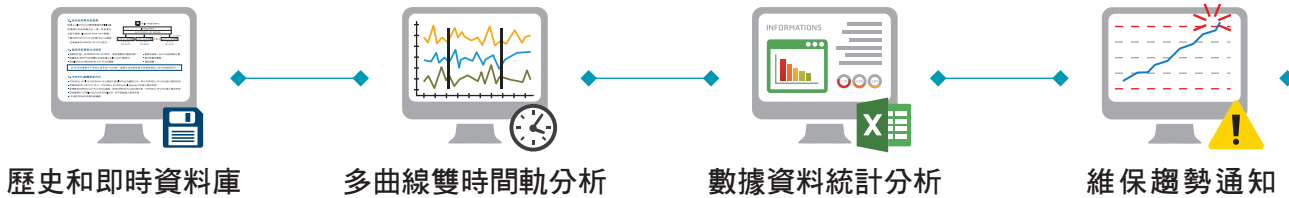
- WD01 手持式 DC FFU調速器  
Handheld DC FFU controller with display



# FFU網路及CR環境監測整合系統 ENVIRONMENTAL MONITORING INTEGRATION SYSTEM



## 智能網路監控系統功能 Intelligent network monitoring system function



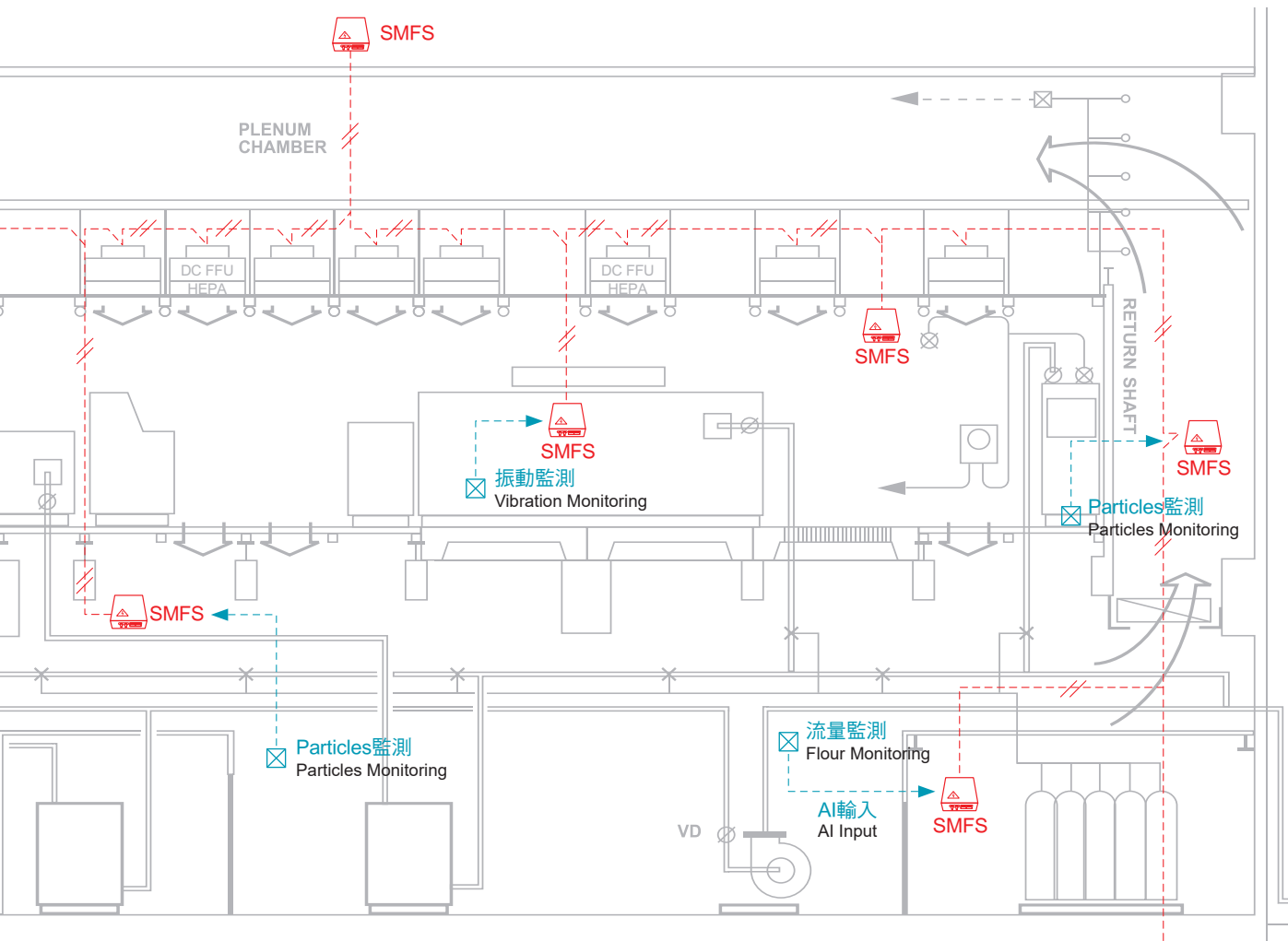
## SMFS 模組監控功能 SMFS Module monitoring function

- ◆ 壓差、壓力、溫濕度、表面溫度、風速、水溫、塵埃、VOC、流量、振動、電力等。  
Pressure Difference, Pressure, Temperature Humidity, Surface Temp, Velocity, Water Temp, Particle, VOC, Flow, Vibration, Power.
- ◆ SMFS感測器模組可外接AI輸入訊號。  
Available AI Signal Input.





CR 環境監測 / 製程條件監測 / 自動維保趨勢通知 / 大數據分析  
 CR Environment Monitoring / Process Condition Monitoring / Notification Of Maintenance / Data Analysis



**FFU 本體監控功能**  
**FFU Body monitoring function**

- ◆ 轉速、風量、濾網壓損、電力能耗、單控、群控、框選、單選、縮放...等。  
 Speed, Air Volume, Filter Pressure, Power Consumption, Individual Control, Group Control, Grouping Selection, Single Selection, Zooming.



系統說明請掃此  
 QR-Code

## 自動化及製程設備專用FFU FFU for Automation/Process Equipment

相較於一般潔淨室環境需求，自動化及製程設備其潔淨環境有其特別要求，首要考量的是自動化設備移動時會產生的大量發塵如何加以抑制及排除，再者就是如何防止其周圍較低潔淨等級環境的污染(室壓的建立)。除潔淨環境外，自動化及製程設備所安裝的FFU還特別要求安裝高度(薄型化)。尤其是倉儲自動化的FFU，會需求側面安裝並固定於棚架，故在安裝方式需特別考量強度及維修時拆裝方便性。

Comparing to general cleanroom environment, the requirements of clean environment for automation/process equipment is even more critical. In consideration of massive amount of particle generation from moving of automation equipment, the suppression and exhaustion of contaminant shall be implemented in the cleanroom FFU design. Additionally, the room pressure shall be built up to prevent the surrounding contaminant from entering.

Besides of clean environment for automation/process, the minimum space is also required for the FFU selection. Especially when applied for Stocker installation, the characteristics of durability and easy maintenance shall be incorporated into the FFU design,

### AMHS FFU Characteristics

#### Ball Room Circulation:

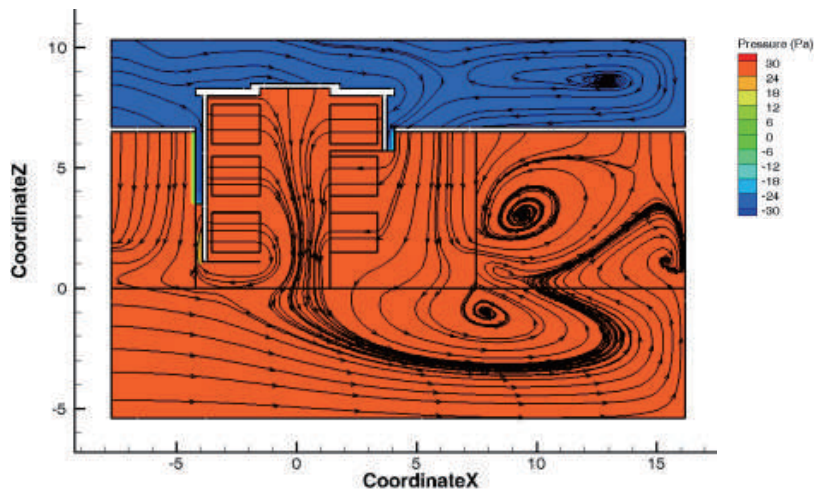
High Static Pressure  
(~180-240Pa/fiber glass, ~130-170Pa/PTFE)

- ◆ Ceiling Mounted Type  
Air Velocity(0.4m/s-0.6m/s)
- ◆ Side Mounted Type  
Air Velocity(~0.3m/s), Thin Type, Installation consideration

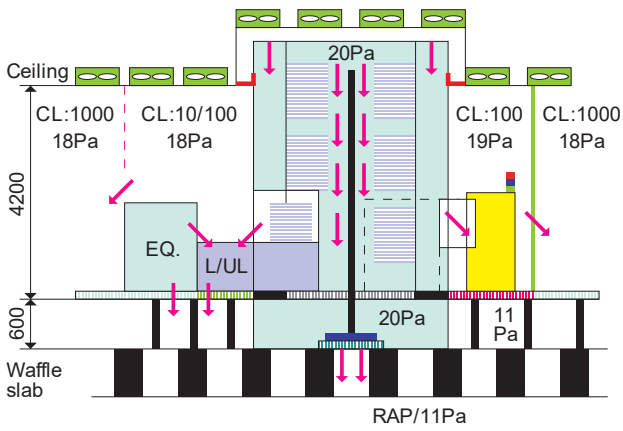
#### Local Circulation:

Low Static Pressure  
(~120Pa/fiber glass, 70Pa/PTFE)

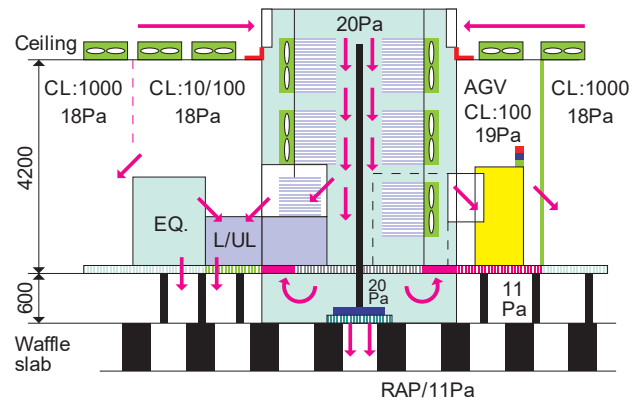
- ◆ Side Mounted Type  
Air Velocity(~0.3m/s), Thin Type, Installation consideration



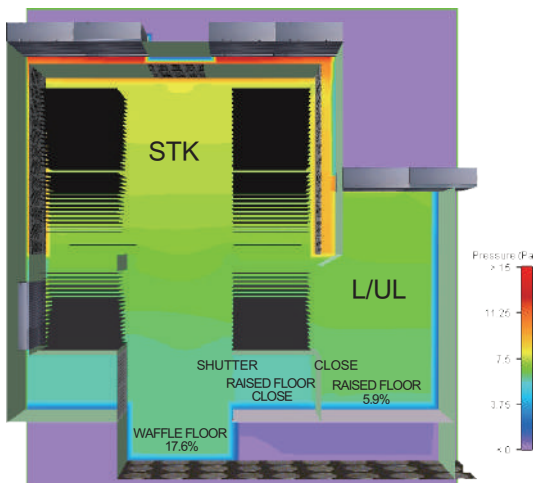
Stocker System-A



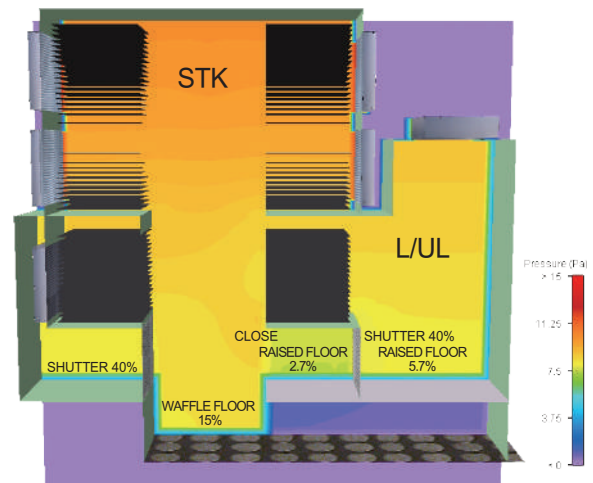
Stocker System-B



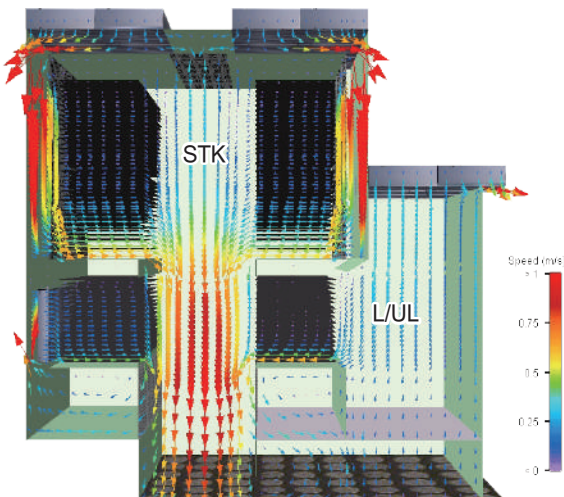
◆ STK壓力分佈圖-A



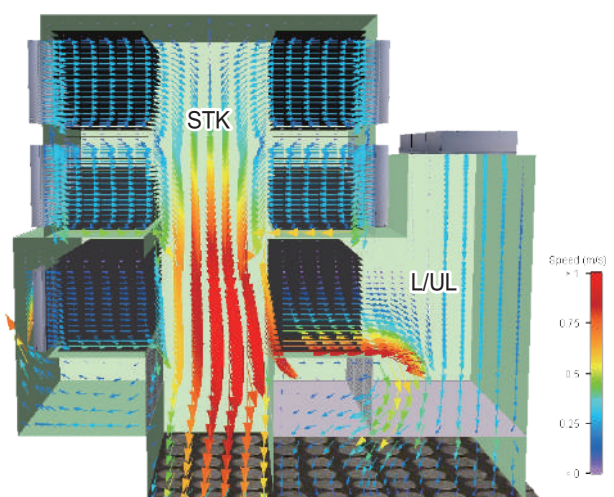
◆ STK壓力分佈圖-B



◆ STK氣流分佈圖-A

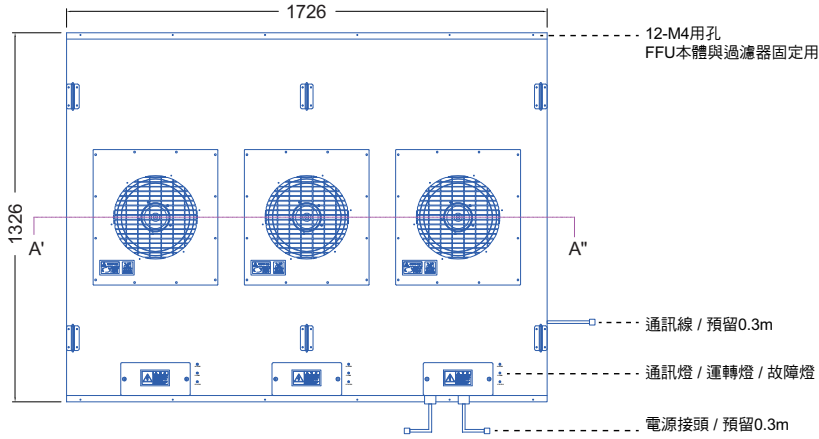


◆ STK氣流分佈圖-B

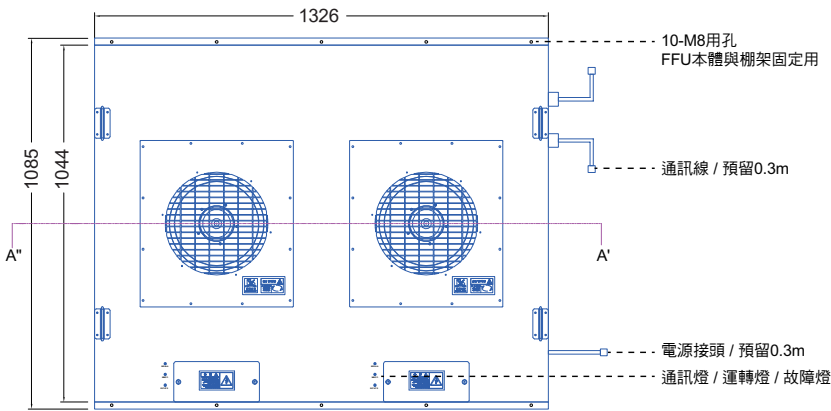


自動化及製程設備專用FFU  
FFU for automation and process equipment

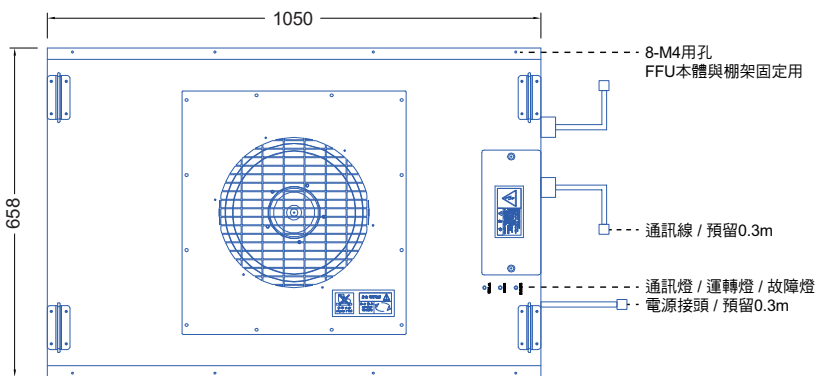
外型尺寸及規格 Dimensions and specifications



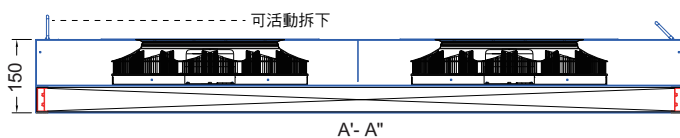
Specification	
Size	1726 x 1326 x 150 H
Working No	*****
Model	RR-1D2X2L1-04
Air Vol	35 CMM
Efficiency	0.3 $\mu$ m $\geq$ 99.97%
Power	1 $\phi$ 200-220V $\pm$ 10%
Freq	50/60 HZ
Consump	250 W
S/N	*****
Date	2016/**



Specification	
Size	1044 x 1326 x 150 H
Working No	*****
Model	RR-1D2X2L1-02
Air Vol	21 CMM
Efficiency	0.3 $\mu$ m $\geq$ 99.97%
Power	1 $\phi$ 200-220V $\pm$ 10%
Freq	50/60 HZ
Consump	140 W
S/N	*****
Date	2016/**



Specification	
Size	1050 x 658 x 150 H
Working No	*****
Model	RR-1D2X2L1-05
Air Vol	12 CMM
Efficiency	0.3 $\mu$ m $\geq$ 99.97%
Power	1 $\phi$ 200-220V $\pm$ 10%
Freq	50/60 HZ
Consump	76 W
S/N	*****
Date	2016/**

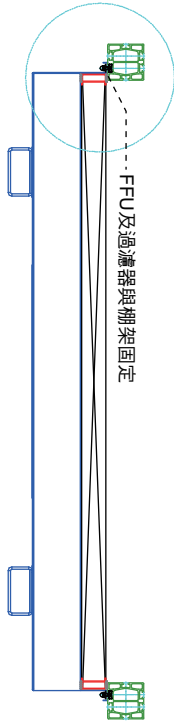


規格	高度 H	Max.OP(TSP=200Pa)	Power Input
	mm	Q. CMM	VA
薄型	200	10 ~ 39	160 ~ 330
超薄型	100	10 ~ 19	160

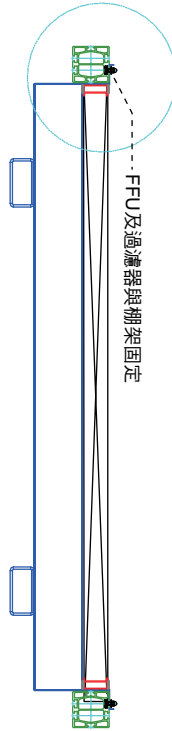
自動化及製程設備專用FFU  
FFU for automation and process equipment

FFU及過濾器與棚架固定安裝方式 FFU and filter and scaffolding fixed installation

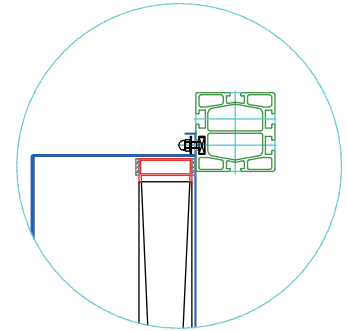
◆ 固定工法-A



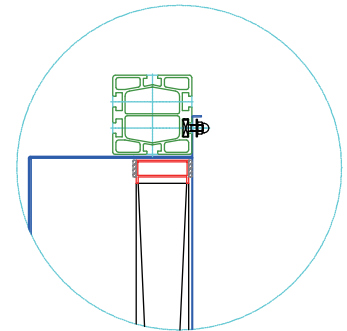
◆ 固定工法-B



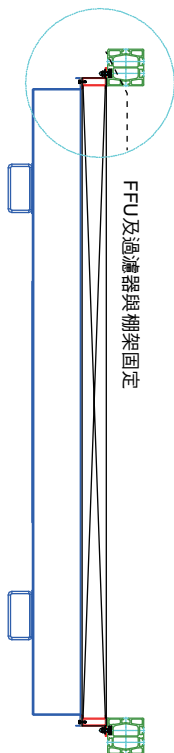
◆ 固定工法-A / 棚架固定



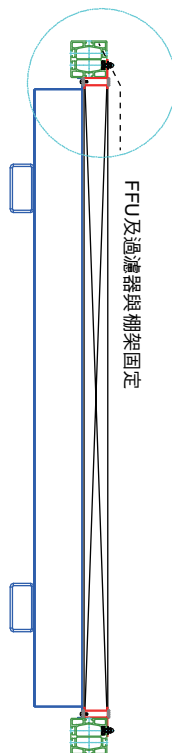
◆ 固定工法-B / 棚架固定



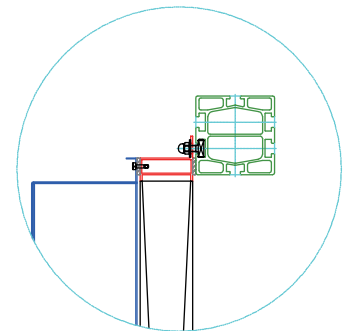
◆ 固定工法-C



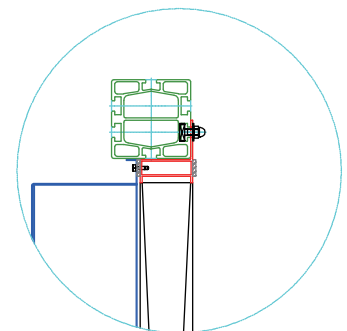
◆ 固定工法-D



◆ 固定工法-C / 棚架固定



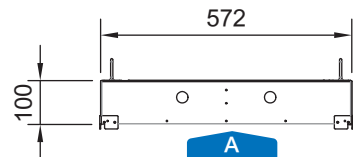
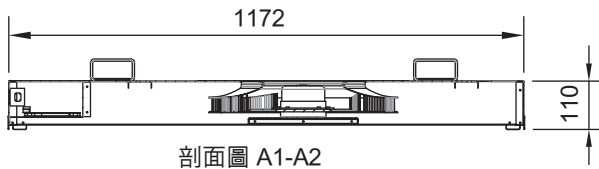
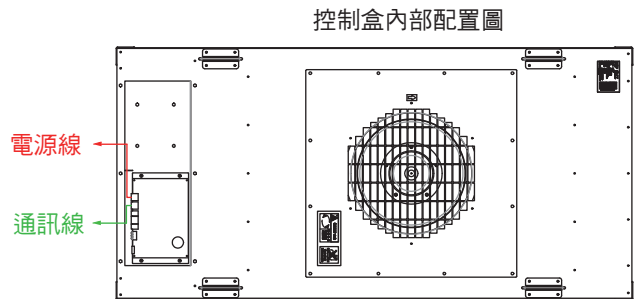
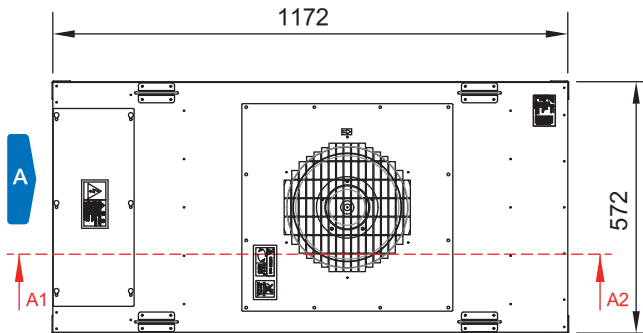
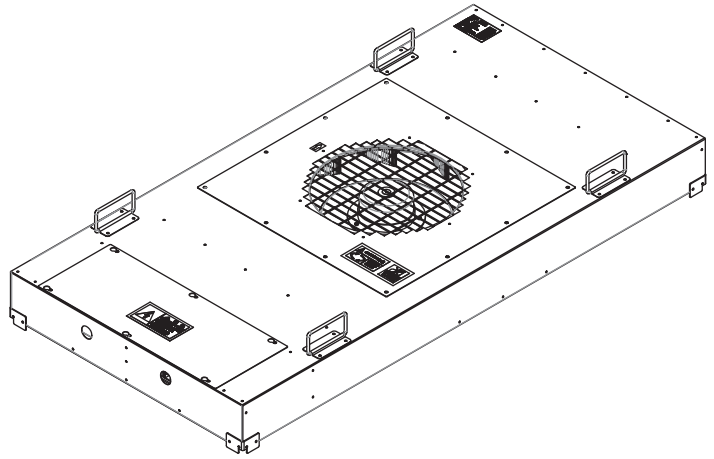
◆ 固定工法-D / 棚架固定



外型尺寸及規格 Dimensions and specifications

2x4  
超薄型

Specification	
外觀尺寸(mm)	1172x572x100
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	15CMM@150~250Pa
常時運轉耗電	90~150W
額定運轉能力(功率)	200W
最高效率	40%
常時運轉範圍諧波 (THDi)	<6%
功 因(PF)	>97%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	16.34KG

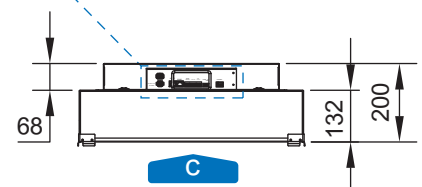
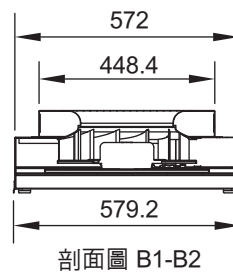
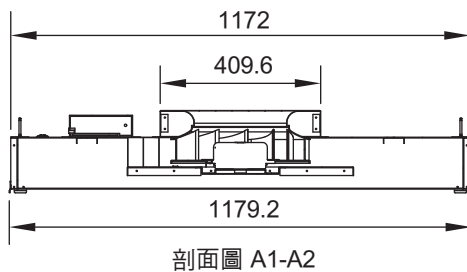
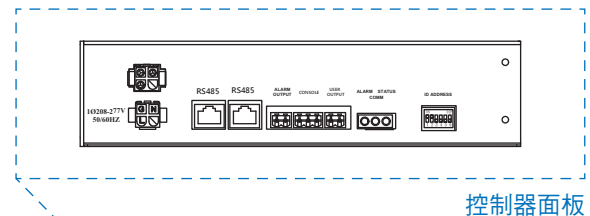
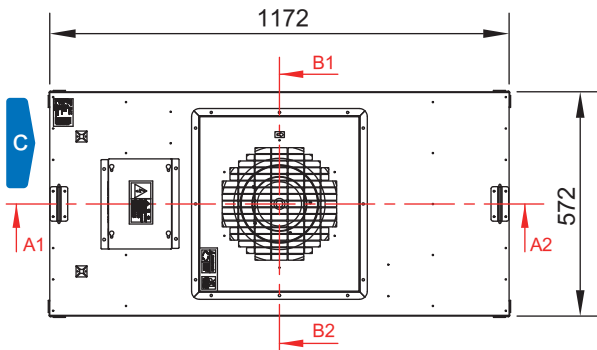
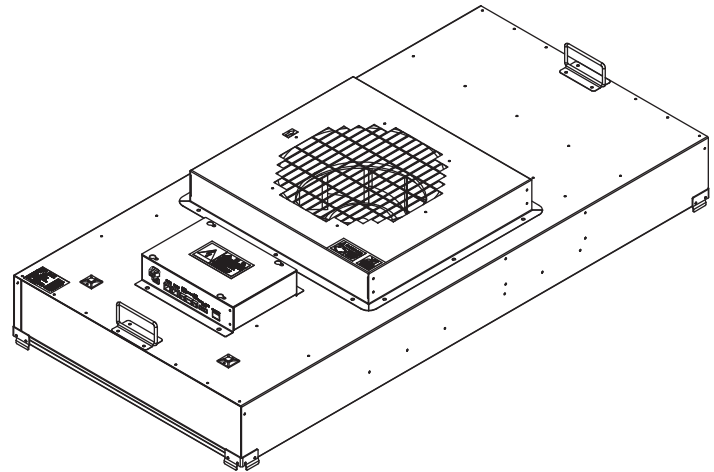


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

外型尺寸及規格 Dimensions and specifications



Specification	
外觀尺寸(mm)	1172x572x200
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	19CMM@150~250Pa
常時運轉耗電	90~150W
額定運轉能力(功率)	250W
最高效率	52%
常時運轉範圍諧波 (THDi)	<10%
功 因(PF)	>97%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	22.58KG

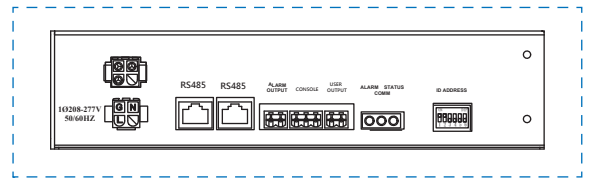
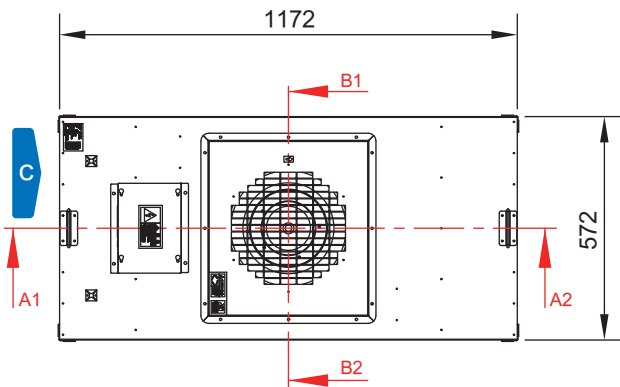
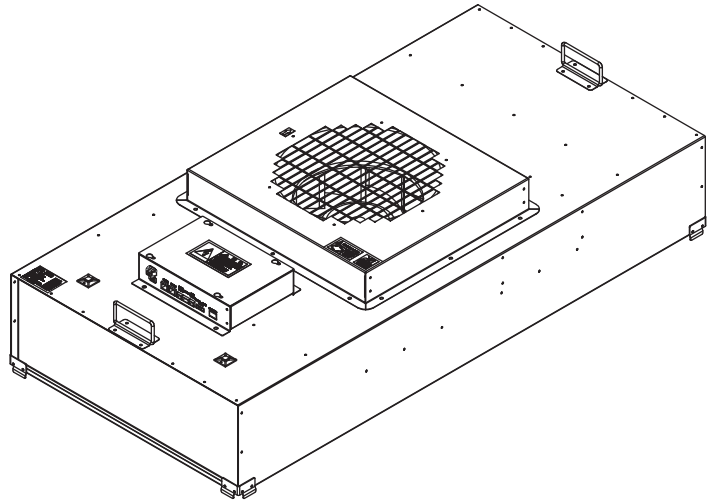


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

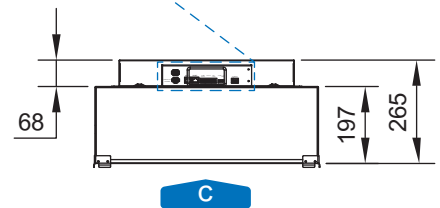
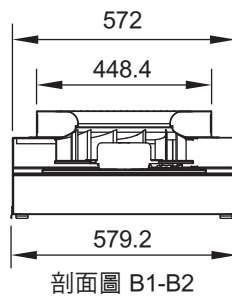
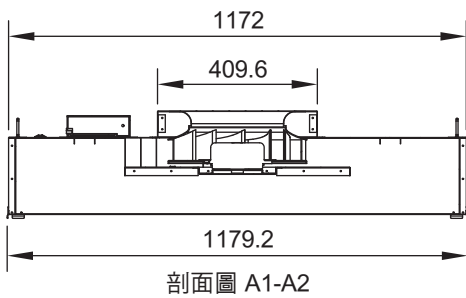
外型尺寸及規格 Dimensions and specifications

2X4  
標準型

Specification	
外觀尺寸(mm)	1172x572x265
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	19CMM@150~250Pa
常時運轉耗電	90~150W
額定運轉能力(功率)	250W
最高效率	50%
常時運轉範圍諧波 (THDi)	<10%
功 因(PF)	>97%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	24.13KG



控制器面板



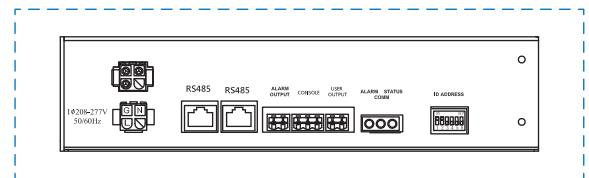
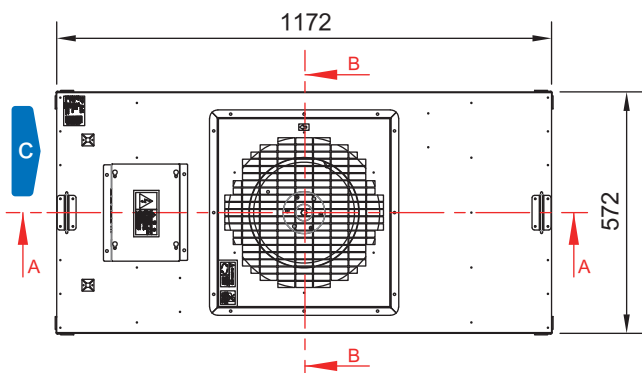
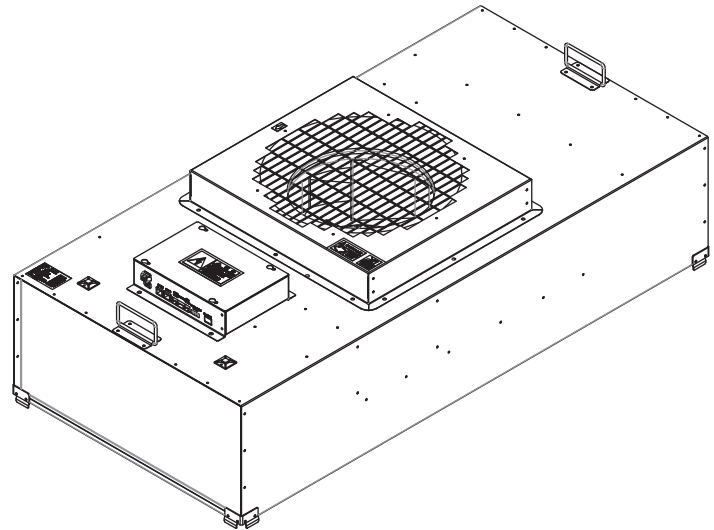
註:金屬沖壓件之一般公差依JIS B 0408之B級規定



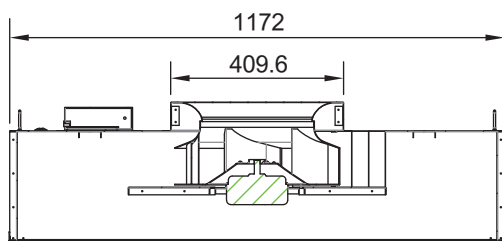
外型尺寸及規格 Dimensions and specifications

2x4  
高效型

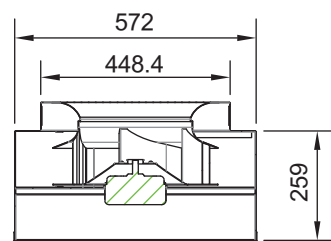
Specification	
外觀尺寸(mm)	1172x572x327
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	23CMM@165~275Pa
常時運轉耗電	125~187W
額定運轉能力(功率)	250W
最高效率	56%
常時運轉範圍諧波 (THDi)	<10%
功 因(PF)	>97%
馬達絕緣等級	E
馬達防塵防水等級	IP30
箱體材質	鍍鋁鋅鈹
重 量	24.59KG



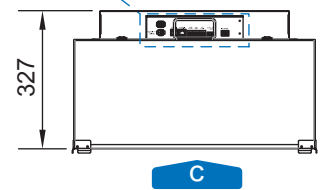
控制器面板(4:1)



剖面圖 A-A



剖面圖 B-B

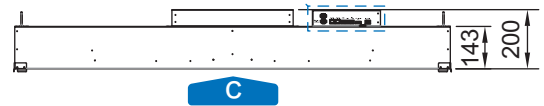
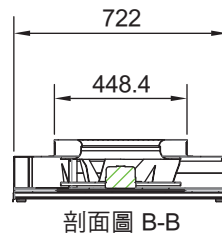
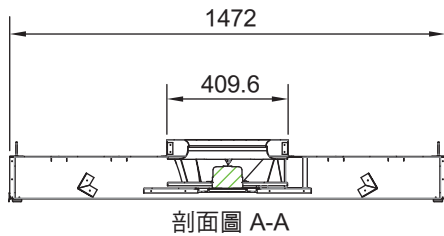
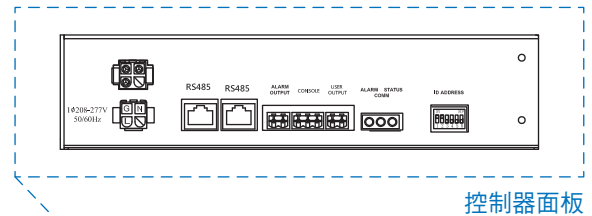
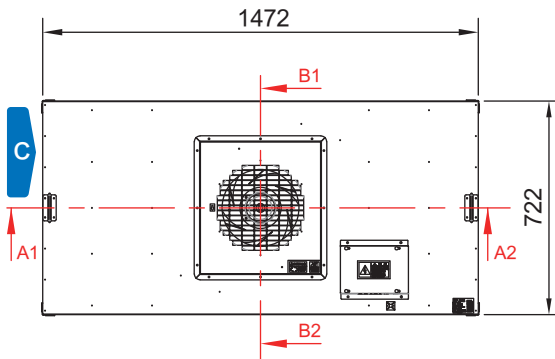
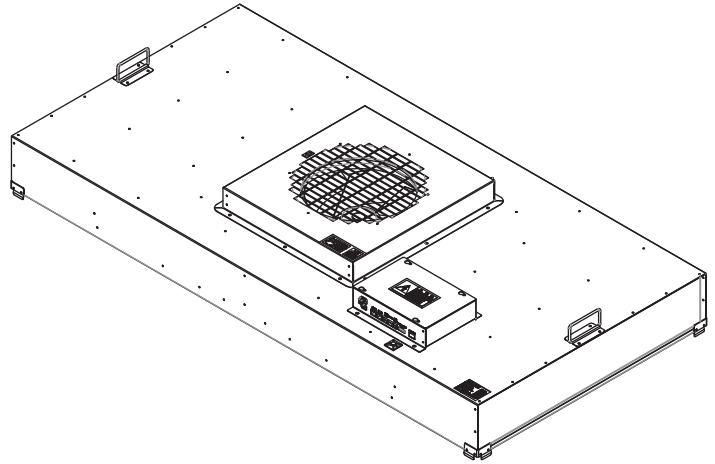


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

2.5X5  
薄型

外型尺寸及規格 Dimensions and specifications

Specification	
外觀尺寸(mm)	1472x722x200
電源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	25CMM@150~280Pa
常時運轉耗電	130~230W
額定運轉能力(功率)	300W
最高效率	51%
常時運轉範圍諧波 (THDi)	<5%
功因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重量	28.06KG

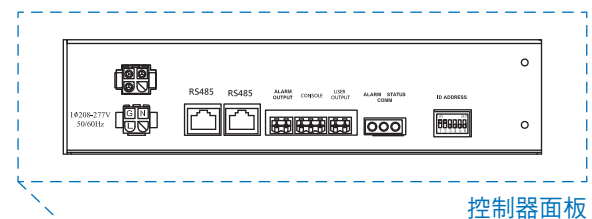
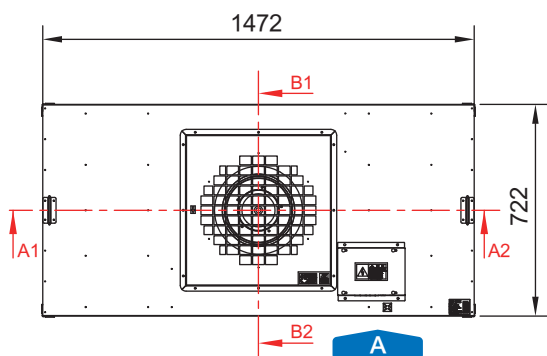
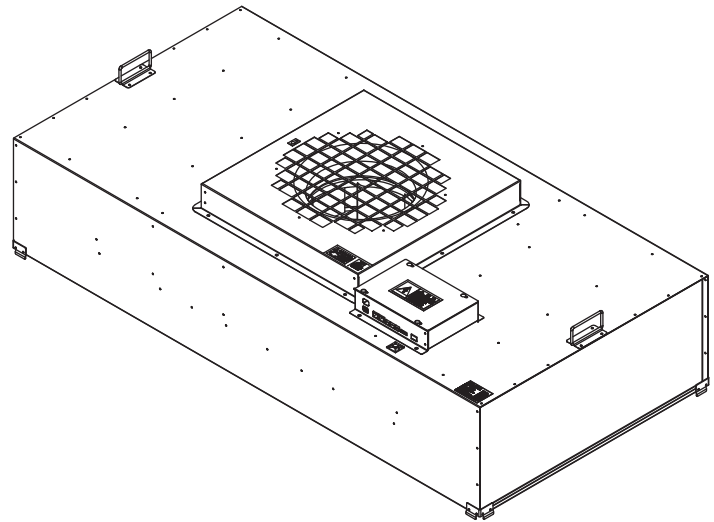


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

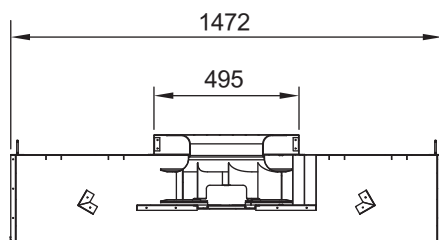
2.5X5  
標準型

外型尺寸及規格 Dimensions and specifications

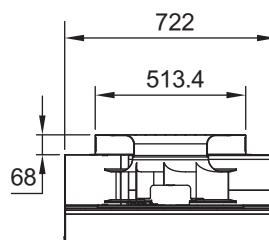
Specification	
外觀尺寸(mm)	1472x722x368
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	25CMM@150~280Pa
常時運轉耗電	120~220W
額定運轉能力(功率)	300W
最高效率	56%
常時運轉範圍諧波 (THDi)	<7%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	36.94KG



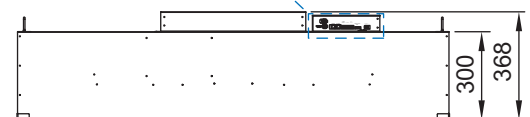
控制器面板



剖面圖 A1-A2



剖面圖 B1-B2

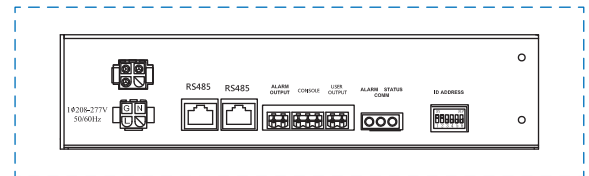
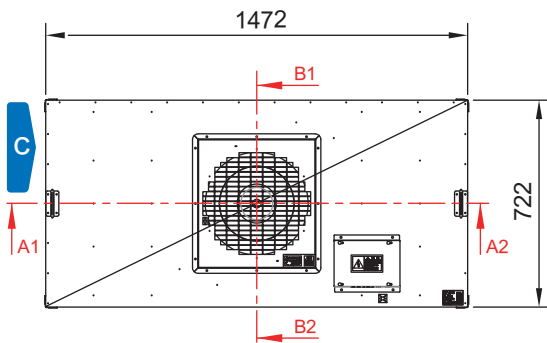
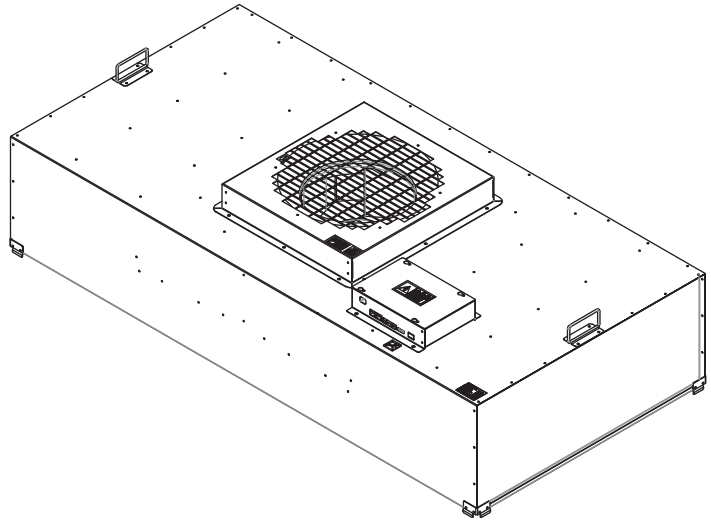


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

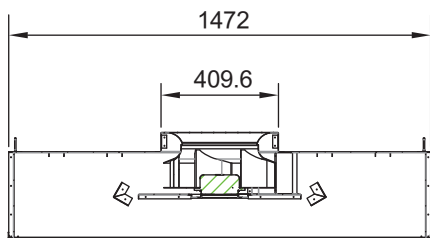
外型尺寸及規格 Dimensions and specifications

2.5X5  
高效型

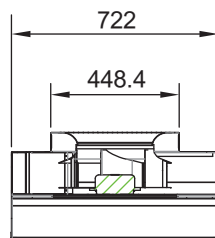
Specification	
外觀尺寸(mm)	1472x722x368
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	25CMM@150~280Pa
常時運轉耗電	117~200W
額定運轉能力(功率)	300W
最高效率	58%
常時運轉範圍諧波 (THDi)	<5%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	34.02KG



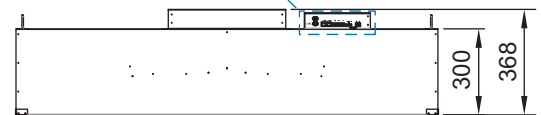
控制器面板



剖面圖 A-A



剖面圖 B-B



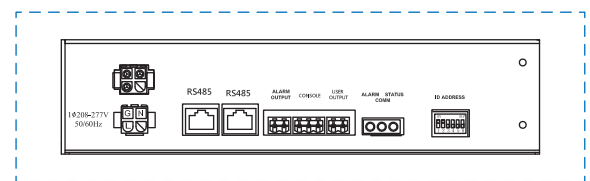
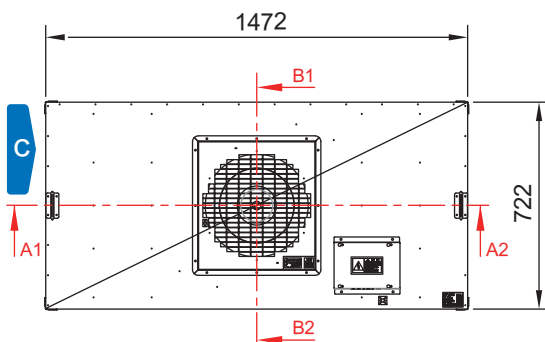
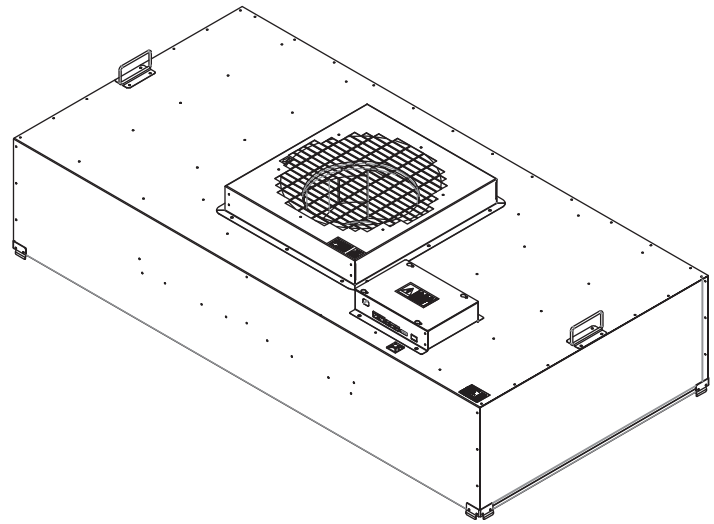
C

註:金屬沖壓件之一般公差依JIS B 0408之B級規定

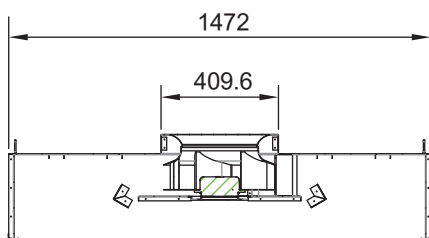
2.5X5  
高風量型

外型尺寸及規格 Dimensions and specifications

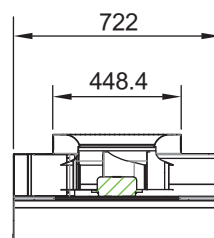
Specification	
外觀尺寸(mm)	1472x722x368
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	33CMM@150~300Pa
常時運轉耗電	160~290W
額定運轉能力(功率)	300W
最高效率	57%
常時運轉範圍諧波 (THDi)	<7%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	36.94KG



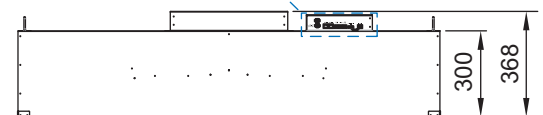
控制器面板



剖面圖 A-A



剖面圖 B-B

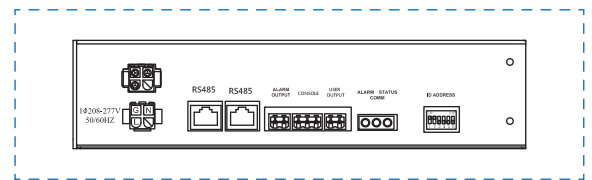
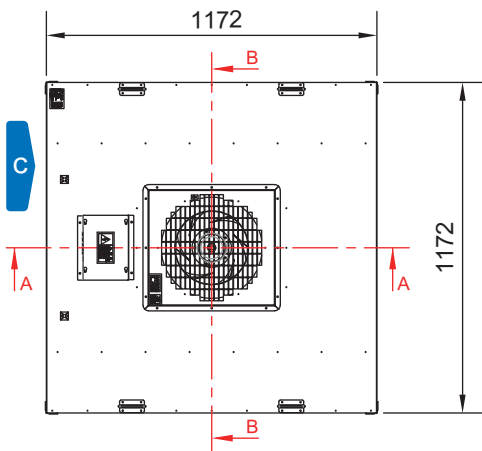
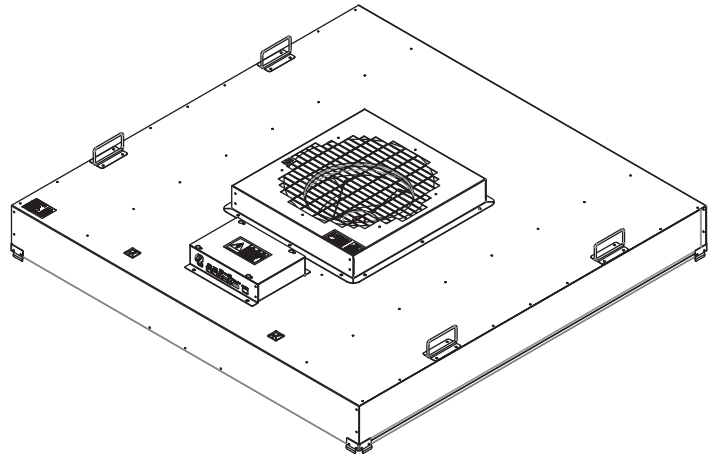


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

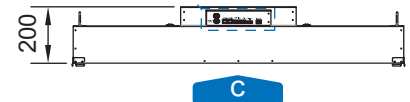
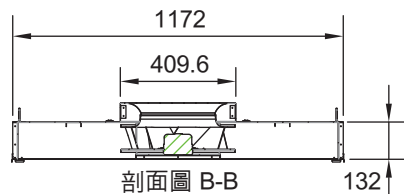
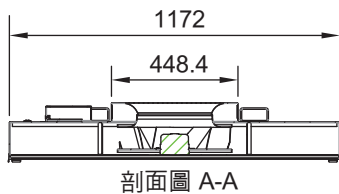
外型尺寸及規格 Dimensions and specifications



Specification	
外觀尺寸(mm)	1172x1172x200
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	31CMM@180~270Pa
常時運轉耗電	195~300W
額定運轉能力(功率)	350W
最高效率	49%
常時運轉範圍諧波 (THDi)	<7%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	48KG



控制器面板

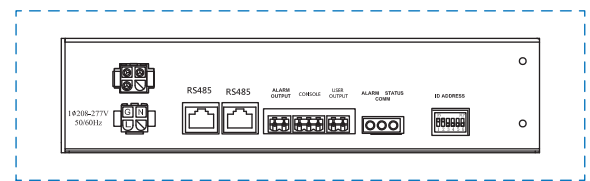
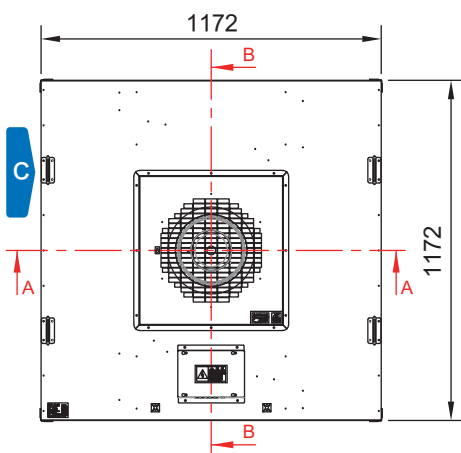
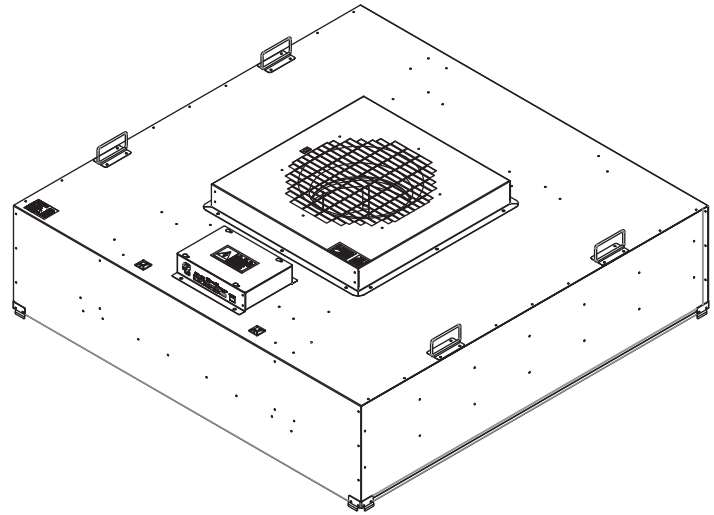


註:金屬沖壓件之一般公差依JIS B 0408之B級規定

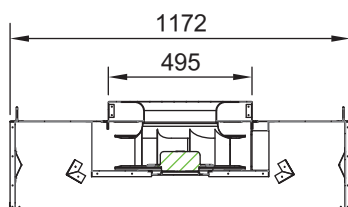


外型尺寸及規格 Dimensions and specifications

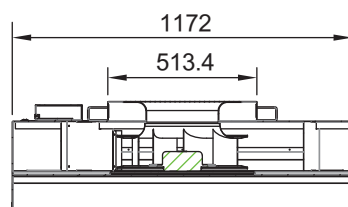
Specification	
外觀尺寸(mm)	1172x1172x368
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	37CMM@180~270Pa
常時運轉耗電	195~300W
額定運轉能力(功率)	350W
最高效率	58%
常時運轉範圍諧波 (THDi)	<6%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	52KG



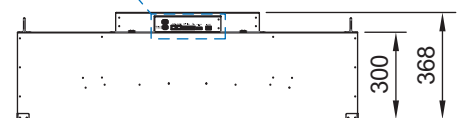
控制器面板



剖面圖 A-A



剖面圖 B-B

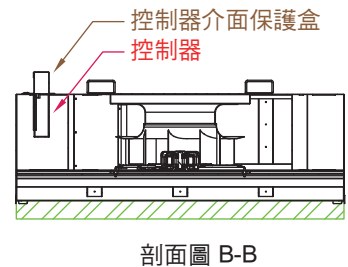
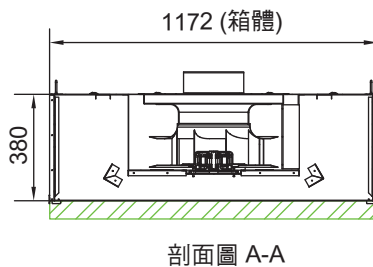
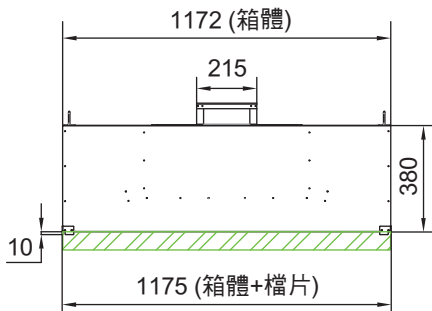
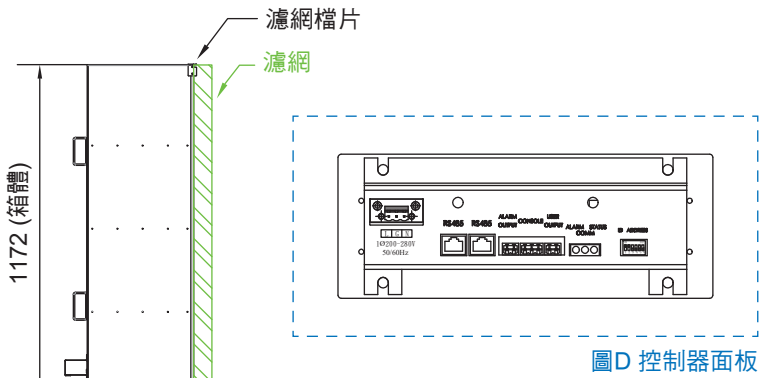
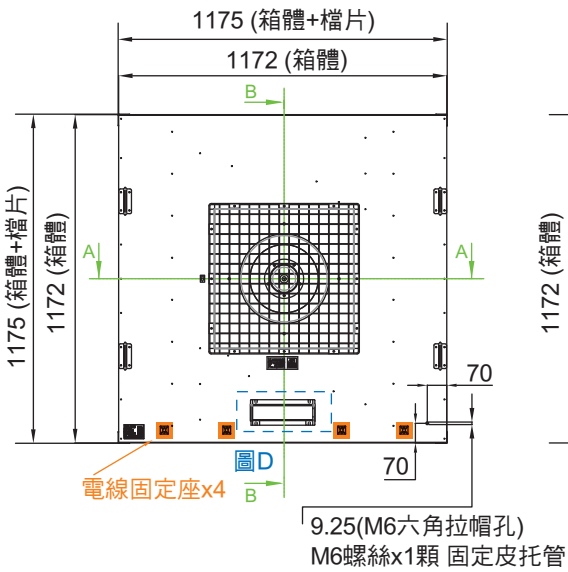
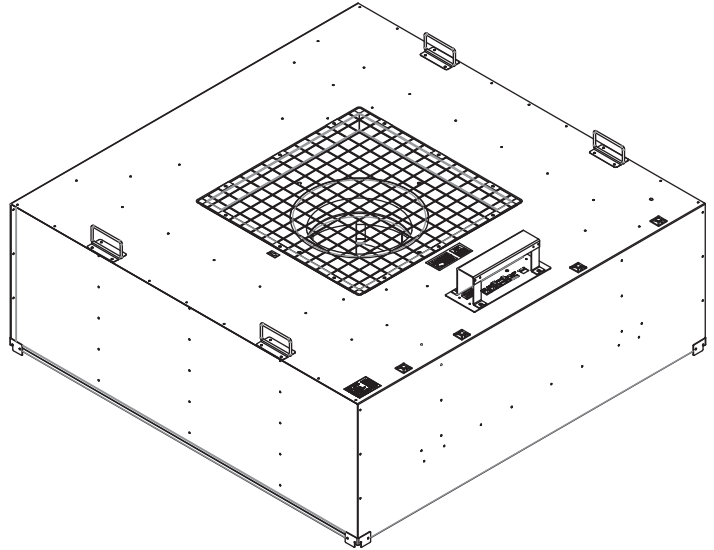


C

註:金屬沖壓件之一般公差依JIS B 0408之B級規定

外型尺寸及規格 Dimensions and specifications

Specification	
外觀尺寸(mm)	1175x1175x380
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	39CMM@180~270Pa
常時運轉耗電	195~300W
額定運轉能力(功率)	350W
最高效率	61.5%
常時運轉範圍諧波 (THDi)	<6%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	52KG

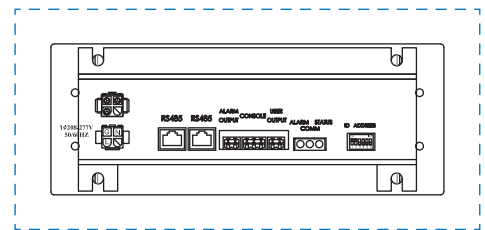
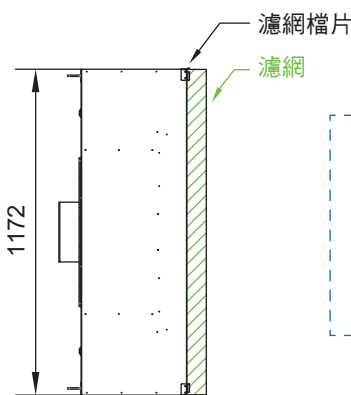
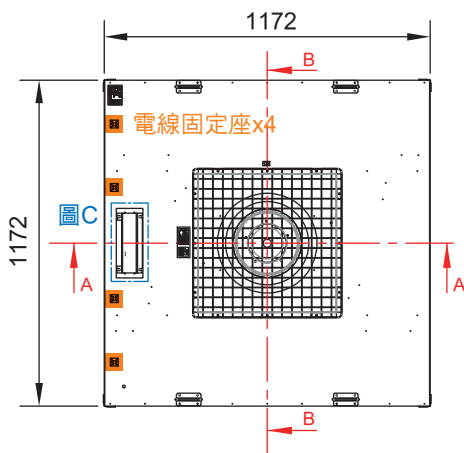
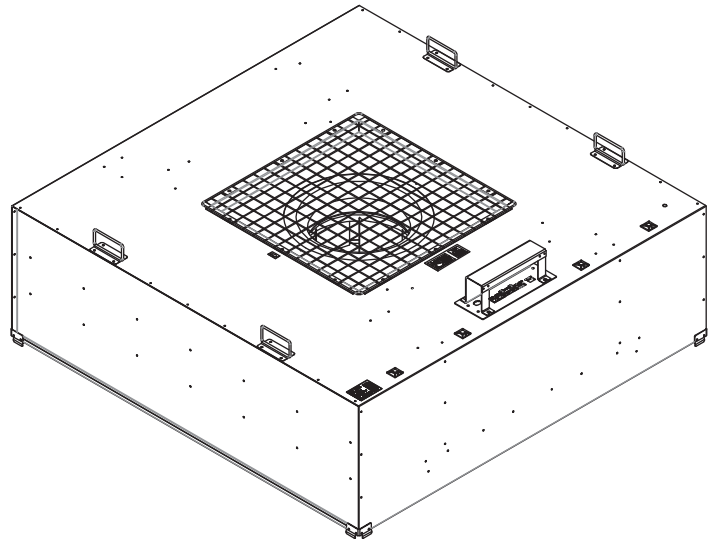




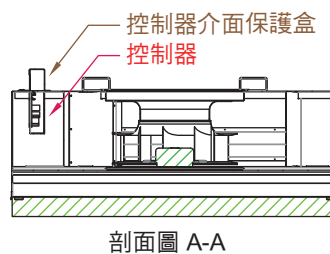
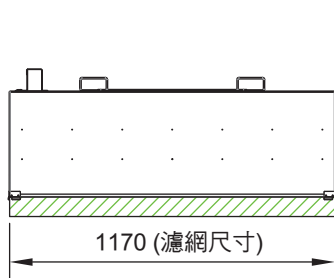


外型尺寸及規格 Dimensions and specifications

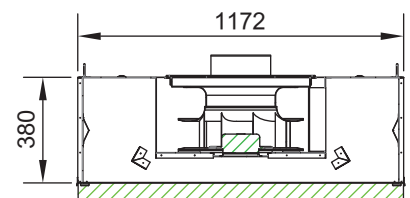
Specification	
外觀尺寸(mm)	1172x1172x380
電 源	1Ø-220/277V-50/60Hz
常時運轉範圍 (風量/全靜壓)	43CMM@180~300Pa
常時運轉耗電	220~380W
額定運轉能力(功率)	500W
最高效率	60%
常時運轉範圍諧波 (THDi)	<6%
功 因(PF)	>98%
馬達絕緣等級	E
馬達防塵防水等級	IP54
箱體材質	鍍鋁鋅鈹
重 量	52KG



圖C 控制器面板



剖面圖 A-A



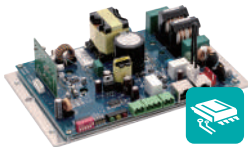
剖面圖 B-B

註:金屬沖壓件之一般公差依JIS B 0408之B級規定

FFU 馬達、基板及圖控系統，新舊更替、整合轉換工程

FFU motor, substrate, graphic control system, replacement of old and new, integrated conversion engineering.

### 🔄 單元更新 Unit update



控制基板更新  
CONTROL BOARD

▶ AC改裝DC / DC舊基板改裝新基板

🔄 Control Board Update



馬達更新  
M O T O R

▶ AC改裝DC / DC舊馬達改裝新馬達

🔄 Motor Update

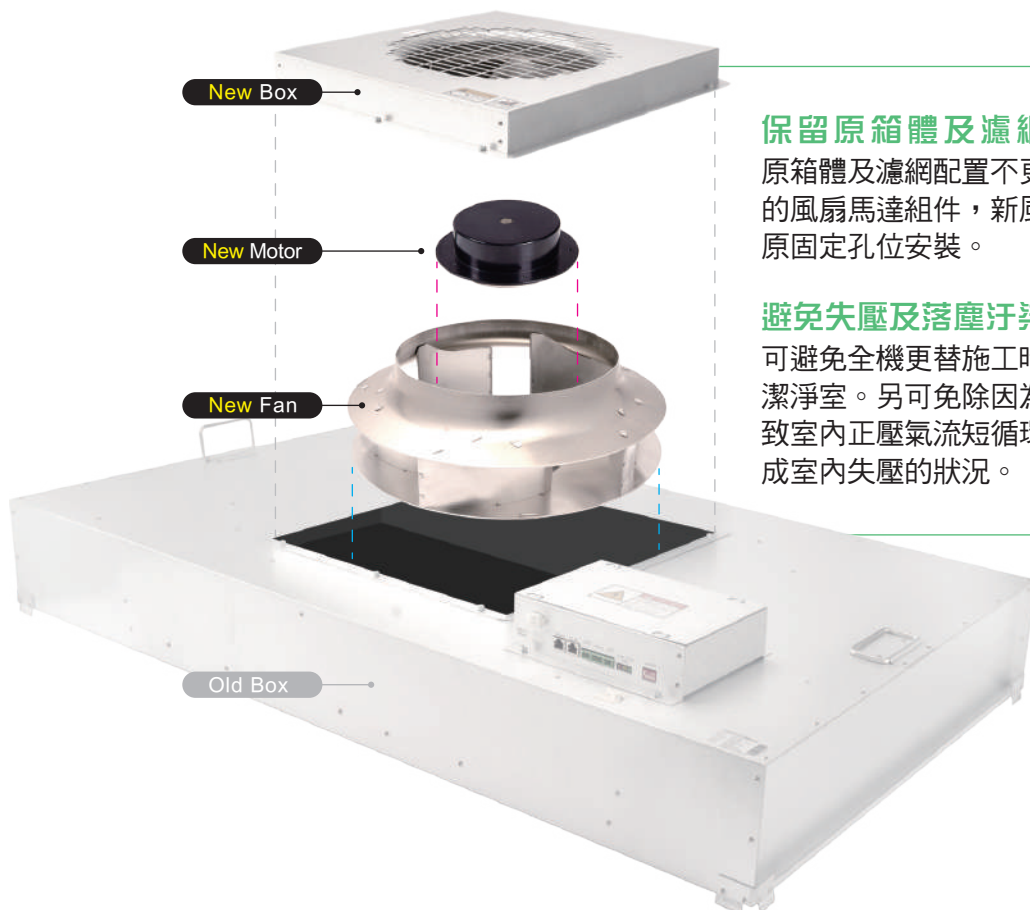


圖控系統更新  
CONTROL SYSTEM

▶ 各別廠商的封閉式圖控系統改為 Intouch、IFIX等開放式圖控系統。

🔄 Graphic Control System Update

### 🔄 組件更新 Component update



#### 保留原箱體及濾網 ▼

原箱體及濾網配置不更動，僅汰除舊有的風扇馬達組件，新風扇馬達組件依據原固定孔位安裝。

#### 避免失壓及落塵汙染 ▼

可避免全機更替施工時掉落的塵埃汙染潔淨室。另可免除因為天花板開孔，導致室內正壓氣流短循環至天花板內，造成室內失壓的狀況。

FFU 專用選配件  
FFU dedicated selection accessories



ONLINE PARTICLE SENSOR 粒子傳感器

SPECIFICATION  
 工作電源：DC 24V  
 通訊：Modbus RTU · RJ45X1  
 量測範圍：0.3~0.5um · 0~1000000個 / cf3



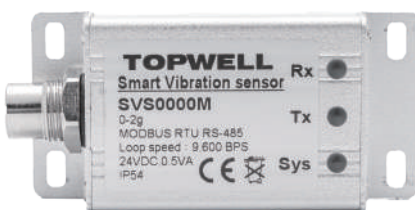
通訊型壓差傳感器 ±25Pa

SPECIFICATION  
 工作電源：AC208~277V (可直接使用現場既有電力)  
 通訊：Modbus RTU · RJ45X2  
 量測範圍：±25Pa(±3%) 適用量測室內環境



通訊型壓差傳感器 500Pa

SPECIFICATION  
 工作電源：AC208~277V (可直接使用現場既有電力)  
 通訊：Modbus RTU · RJ45X2  
 量測範圍：500Pa(±3%) 適用量測FFU整機靜壓



震動傳感器

SPECIFICATION  
 工作電源：AC208~277V (可直接使用現場既有電力)  
 通訊：Modbus RTU · RJ45X2  
 量測範圍：0~9999um / 1Khz

總公司-台灣

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Qianjin West Road, Kunshan City, Jiangsu Province 215300  
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