KUKEN VAV/CAV

INTERNATIONAL BUSINESS DEPARTMENT

KUKEN KOGYO CO., LTD.

What is CAV (Constant Air Controller)?

- CAV is designed to project air in specific volume not withstanding the room temperature.
- CAV adjusts damper opening to secure the specified volume even when pressure inside the duct changes.
- Normally inside duct:
  - High static pressure = Air Volume Increases
  - Low static pressure = Air Volume Decreases

VAV

Send air-volume **ranging from 0% to 100%**

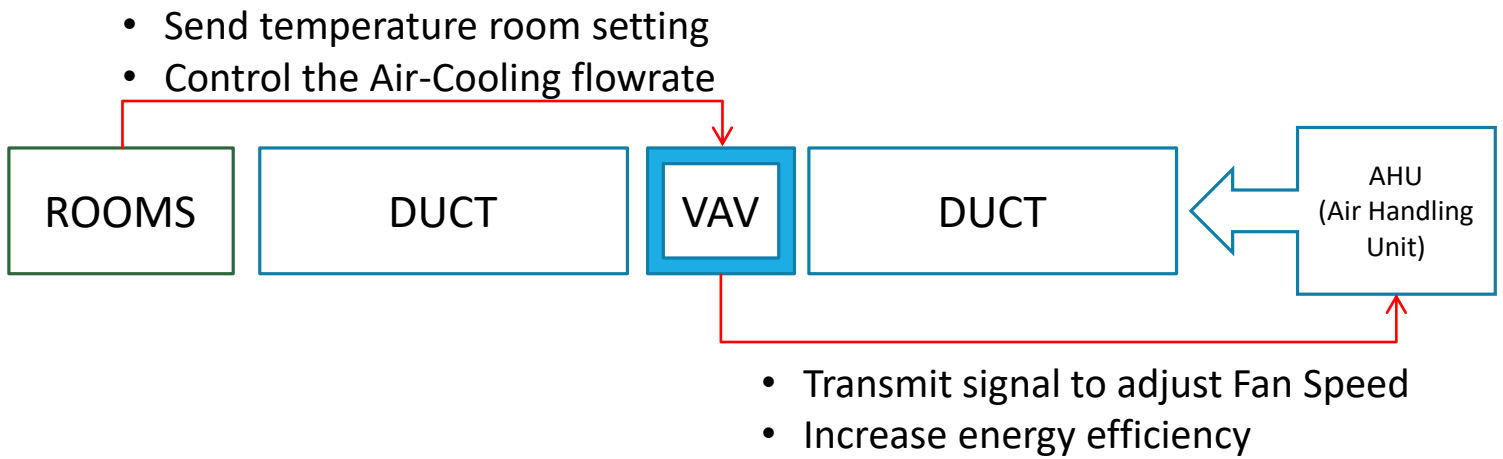
VS

CAV

Send air-volume at **fixed volume (0%, X%, 100%)**

What is VAV (Variable Air Controller)?

- VAV is a device to keep air-volume constant no matter how pressure inside the duct changes.
- VAV is designed to project required (nominal) amount of air by adjusting opening rate of damper blade even if the volume of air sent through duct increased/decreased.



VAV

Air volume responds to the outside signal

VS

MOTOR DAMPER

Blade angle responds to the outside signal

KUKEN VAV/CAV FEATURES

1. Accurate wind volume control function (equipped with high-accuracy digital wind velocity sensor and control circuit).
2. Copes with severe room pressure control by diminishing lead-time required for opening/closing (fluctuation of air volume caused by operation lead-time is diminished).
3. Digital wind-velocity sensor: small sized, shape does not allow dust to adhere.
4. Simple structure minimizing numbers of mechanically movable parts (trouble caused by friction is minimized).
5. Allows Max. 20 units in tandem operation.
6. Low pressure loss and low noise.

Round Type VAV

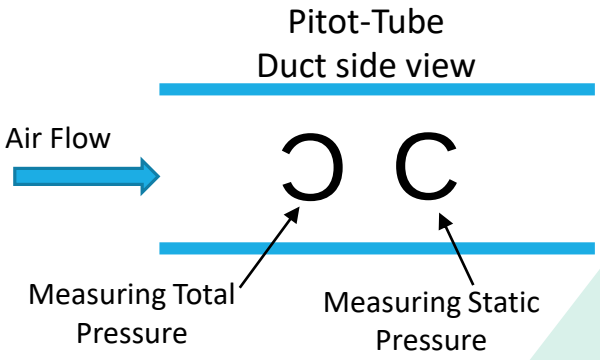
Square Type VAV

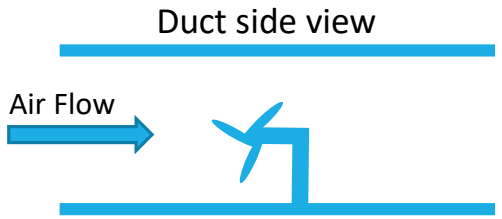
Low Noise Type VAV

Operation Lead Time

- Fully-Open/Close: 54 sec (50Hz)/ 45 sec (60Hz)
- Operation Lead-time: 0.1～0.5 sec
- Sensor Judging-time: 0.9～0.5 sec

Sensor: Tube vs Propeller



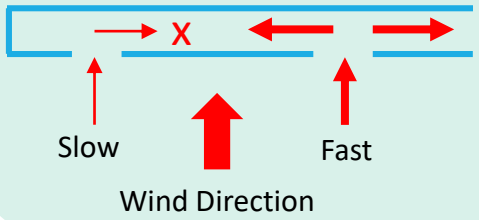


Advantages:

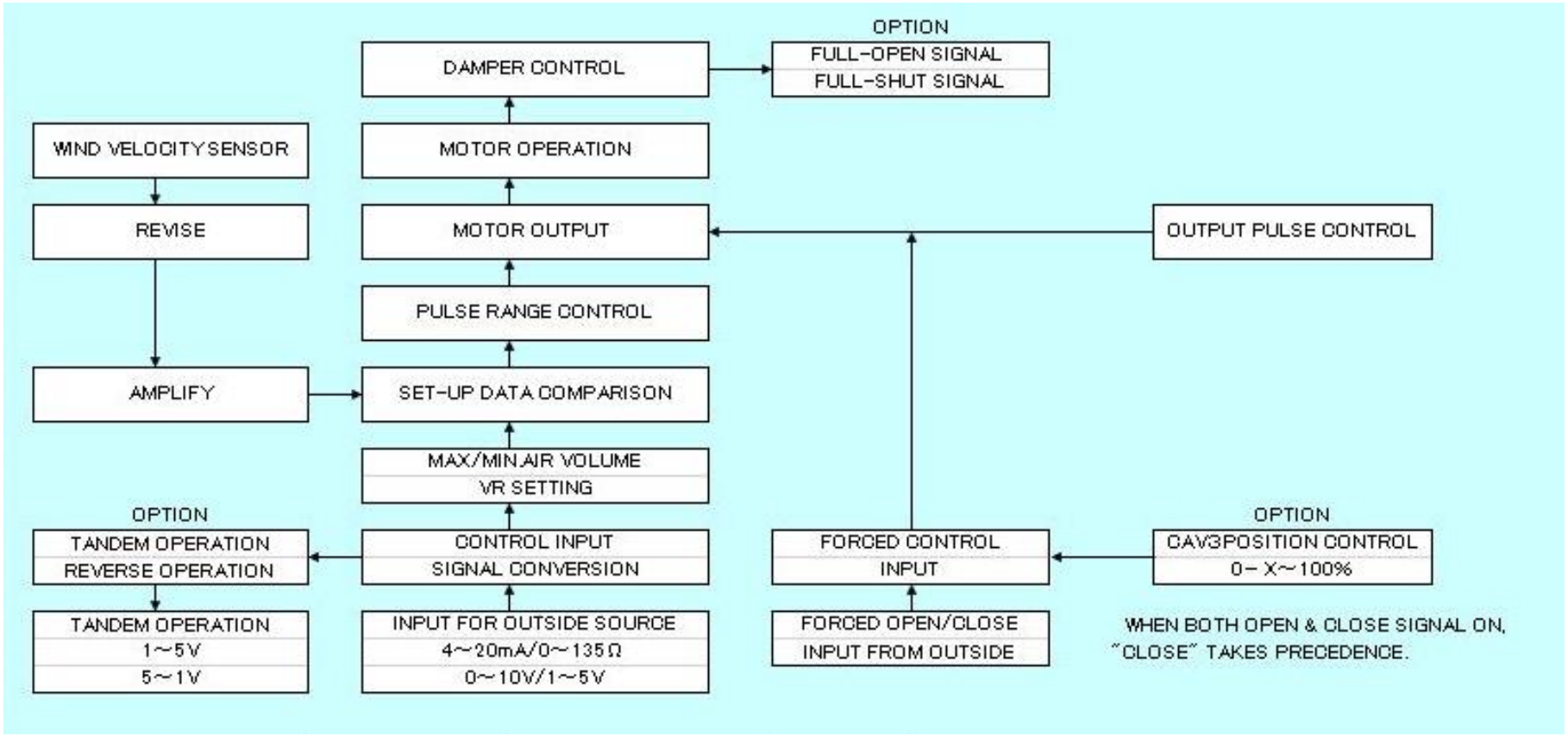
- Can accurately measure the air flow at the low velocities 0.25m/s (ASHRAE Handbook 2001).
- Reading accuracy is not affected by the partial flow.
- Able to operate up to 10 years without maintenance.

Disadvantages:

- Not accurate for the velocities **lower than 7.5 m/s** (ASHRAE Handbook 2001 Ch.14.17).
- Risk of clogging in the holes is high, proper maintenance is required.
- Accuracy influenced by installation conditions.
- Standard type pitot-tube is not good at reading the partial flow:

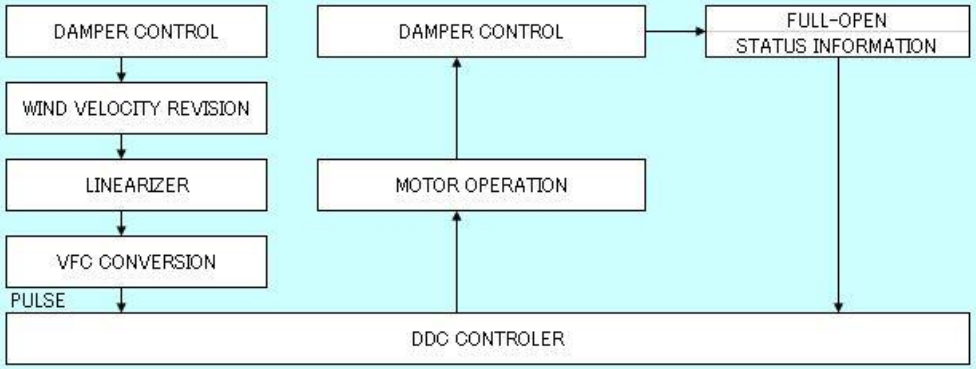


ANALOG TYPE CAV/VAV SYSTEM-FLOW DIAGRAM

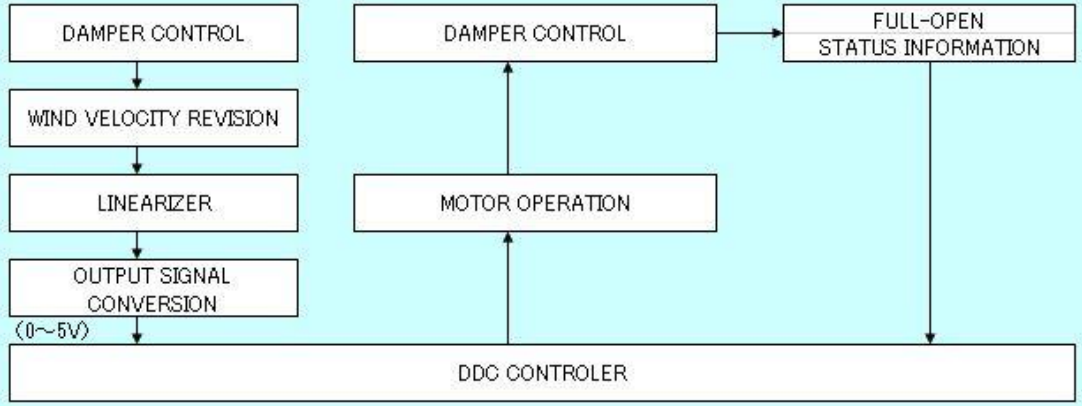


DIGITAL TYPE CAV/VAV SYSTEM-FLOW DIAGRAM

■ WIND VELOCITY PULSE SIGNAL



■ WIND VELOCITY VOLTAGE SIGNAL



SPECIFICATION

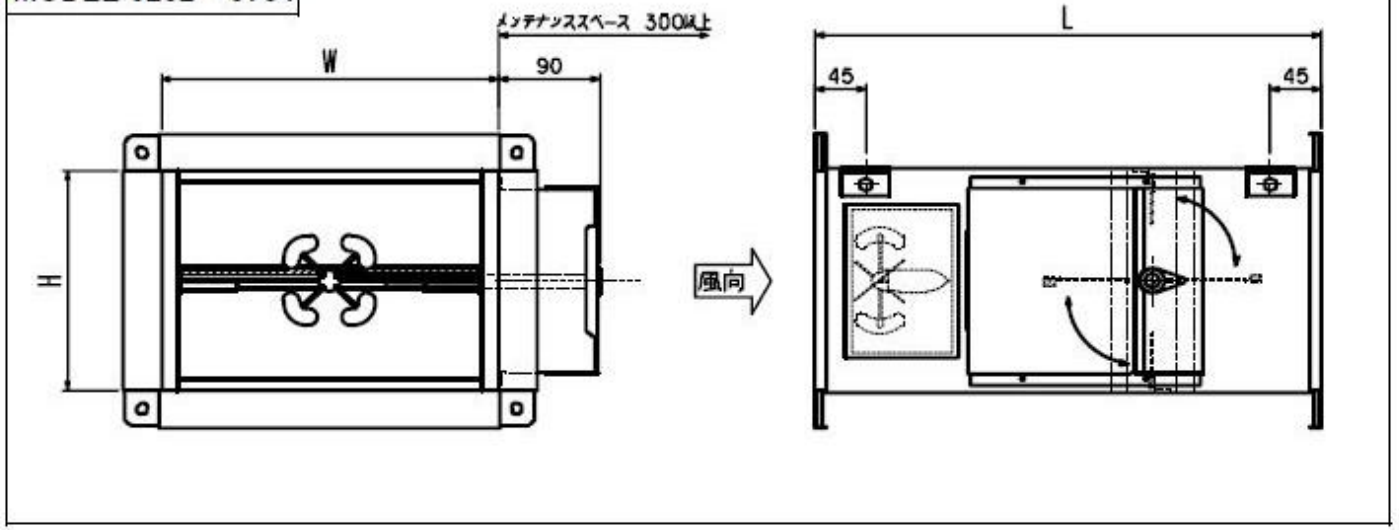
PRODUCT	CAV(ANALOG)	VAV(ANALOG)	CAV(DDC)	VAV(DDC)
POWER SOURCE	AC 24V(STANDARD) 、 AC 100V(OPTION) 50/60Hz			
ELECT. CONSUMPTION	4VA / 1 UNIT OF ACTUATOR(CONSUMTION OF DDC NOT CONSIDERED)			
APPLICABLE TEMP.	0 ～ 60℃ (UNDER NO CONDENSATION, NO FREEZING)			
RANGE OF STATIC PRESS.	STANDARD : 20 ～ 800Pa WITH SCILENCER BOX : 50 ～ 800Pa			
MATERIAL	STANDARG : H.D.GALVANIZED PLATE OPTION : SUS、GALVARIUM PLATE			
PAINTING(OPTION)	CLORIDE-VINYL RESIN、 EPOXY-RESIN PAINT			
FLOW SIGNAL OUT	DC4～20mA(OPTION)		PULSE(VOLTAGE BASED)、OR DC VOLTAGE(0～5V)	
REQ.FLOW SIGNAL	CONTACT SIGNAL FROM OUTSIDE	4～20mA(224Ω)、0～135Ω	COMAND FROM DDC	
		0～10V(18.2kΩ)		
SPECIAL OPTIONALCONTROL	BY-PASS TANDEM OPE.、PRIMARY-SECONDARY TANDEM OPE.			
FULL OPEN/CLOSE COMAND	CONTACT SIGNAL FROM OUTSIDE		COMAND FROM DDC	
FULL OPEN/CLOSE TIME	102(50Hz) / 85(60Hz) SEC. FROM FULLY CLOSED TO FULLY OPEN			
FULL OPEN SIGNAL	OPTION		STANDARD	
SUITABLE OPEN SIGNAL	OPTION		STANDARD	
CONTACT SIGNAL FOR OPE	OPTION			

DIMENSION

■ SQUARE

MODEL	DUCT SIZE		DIM. L
	W	H	
0202	200	200	450
0302	300	200	450
0403	400	300	450
0404	400	400	450
0504	500	400	450
0704	700	400	450
1004	1000	400	450
1006	1000	600	500
1008	1000	800	500
1208	1200	800	500
1210	1200	1000	500
1212	1200	1200	500
1414	1400	1400	500
1614	1600	1400	500
1616	1600	1600	500

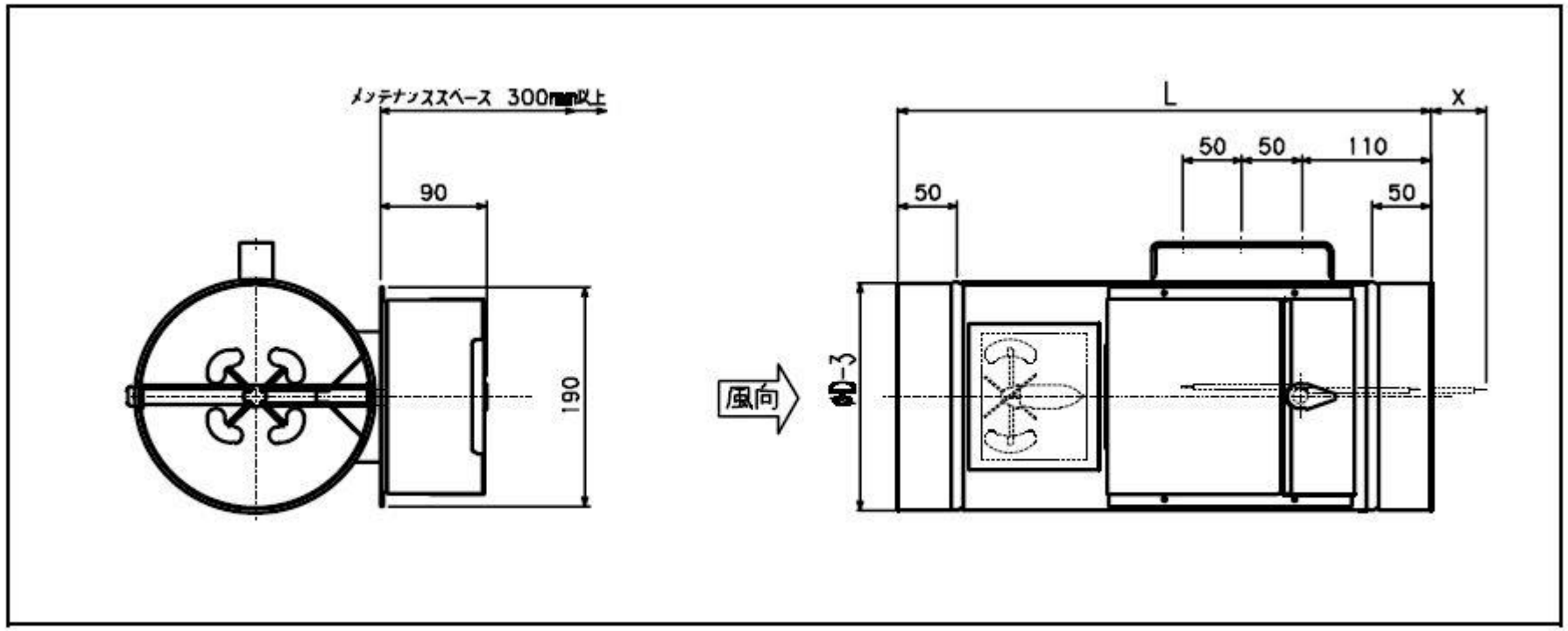
MODEL 0202～0704



DIMENSION

■ ROUND

MODEL	DIM. D (DUCT SIZE)	DIM. L	DIM. X
150	150	450	0
200	200	450	0
250	250	450	0
300	300	500	21
350	350	500	46



INSTALLATION

■ BEFORE CONNECTING VAV/CAV

① Design duct system that minimizes the chance of generating uneven, partial flow.

② Avoid applying the unit outdoor or in the location expected to have ambient air temp. 50°C or above.

③ Prepare inspection hole(on ceiling for easy access to actuator) and maintenance space(300㎜ or more).

④ Keep the unit away from air-intake port to avoid the chance of rain water coming into the unit.
It negatively affect performance of wind-velocity sensor.

⑤ Do not give physical shock to the unit.

⑥ Do not step, sit, nor stand on the unit(body and actuator).

⑦ Connect the unit to duct in the way wind-velocity sensor faces up-stream.

⑧ Electronic type can be facing any direction(up, down, horizontal..) as long as shaft is situated horizontally against ground. Mechanical type can only be situated horizontally against ground(facing horizontally).

⑨ Do not drill or make additional hole on actuator and unit body.

⑩ Take countermeasure for input signal wire to prevent noise from coming in.

⑪ Prepare cable wire or 600V vynyl insulation wire or equivalent for power cable.

⑫ Applicable wind pressure against the unit(both in-coming and out-going) should be 800Pa or below.

⑬ Do not apply corrosive gas(air containing acid or alkaline vapor).

⑭ Air sent to the unit should be free from dust(prepare filter for dusty room).

⑮ Do not apply flexible duct as a rectifier pipe(see ③ INSTALLATION OF VAV/CAV below).

⑯ The unit is designed for air-cond. application only.

■ INSTALLATION OF VAV/CAV

① Secure inspection hole on ceiling (□450 or □600) with ample maintenance space(fig.1).

② Unit contains electronic parts. Keep the unit away from water and excessively high ambient temp.(applicable range : 0～60℃).

③ If elbow exists upstream of the unit, wind tends to flow unevenly into the unit. It negativly affects reading of wind-velocity. Prepare a straight rectifier duct like the way shown(fig.2 and fig.3).
※ If wind is already coming unevenly upstream of the elbow, longer rectifier is required.

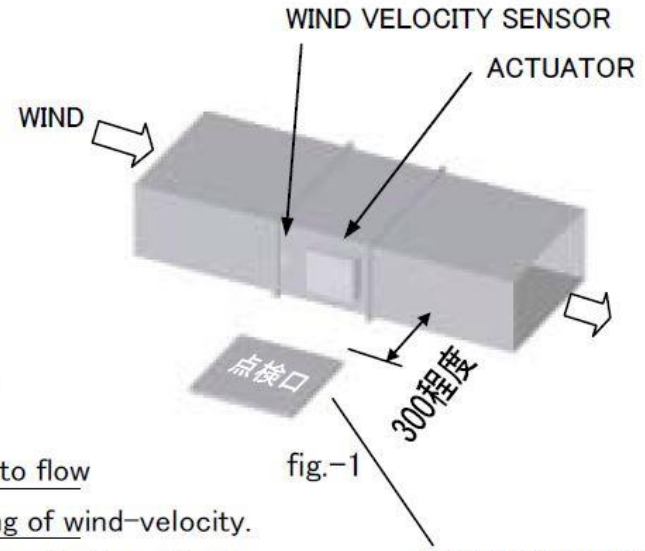


fig.-1

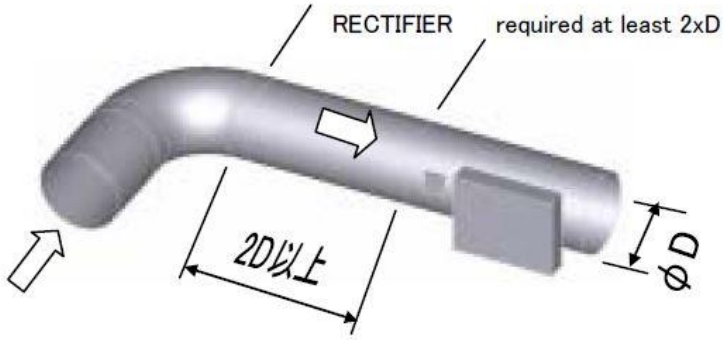


fig.2

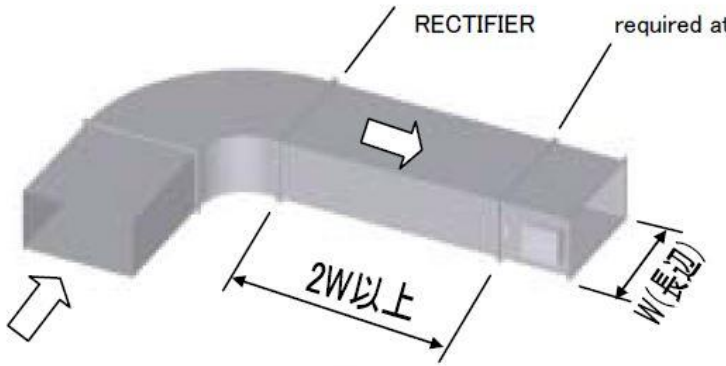


fig.3

* Recommendable length of rectifier pipe

④ If straight pipe(rectifier) can not be applicable when elbow exists upstream, apply elbow with guide-vane equipped internally(fig.4). ※The unit cannot be connected to elbow duct directly.

⑤ If hopper comes upstream of the unit, apply straight duct as shown in fig.5.

※ If wind is already coming unevenly upstream of the elbow, longer straight duct is required.

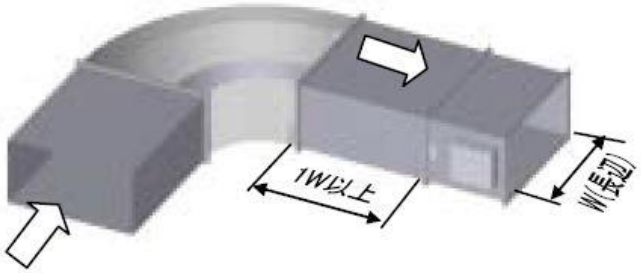


fig.4

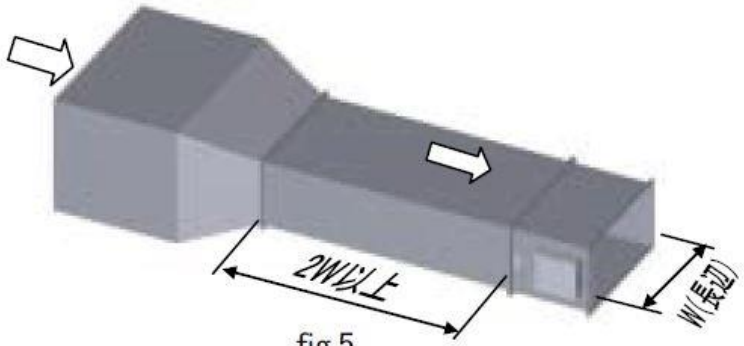


fig.5

⑥ If duct ends(both on upstream & downstream) are smaller than the unit size, wind mostly tends to go through extension area of duct internal when length of straight duct is enough. Follow fig.6.

※ If wind is already coming unevenly upstream of hopper, longer straight duct is required.

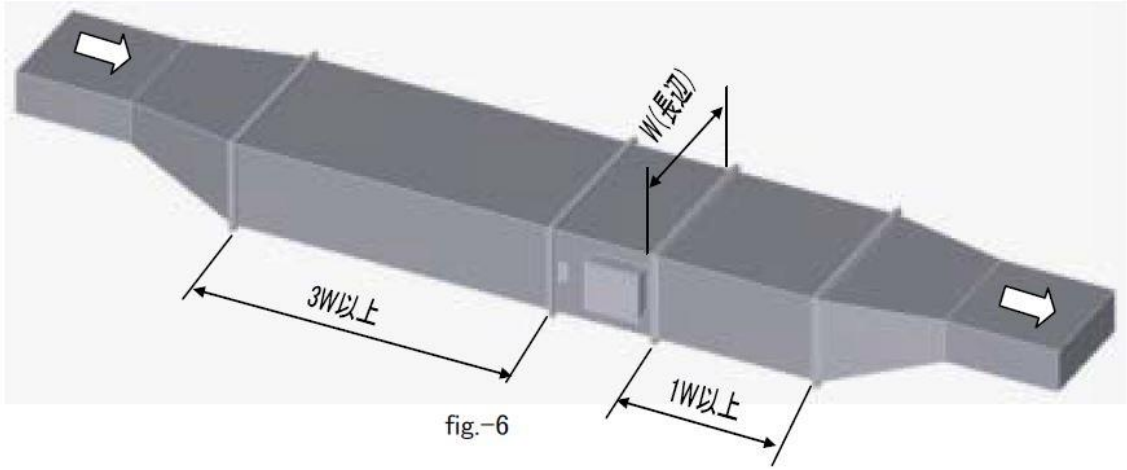


fig.-6

⑦ If unit is applied on branch ducts, straight duct like the way shown on fig.7.

If branches split at the edge of main duct, prepare straight duct like the way shown on fig.8.

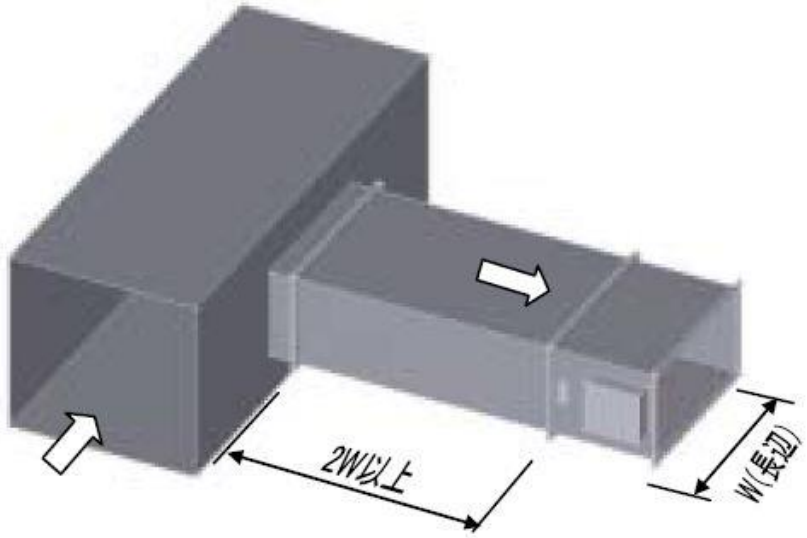


fig.7

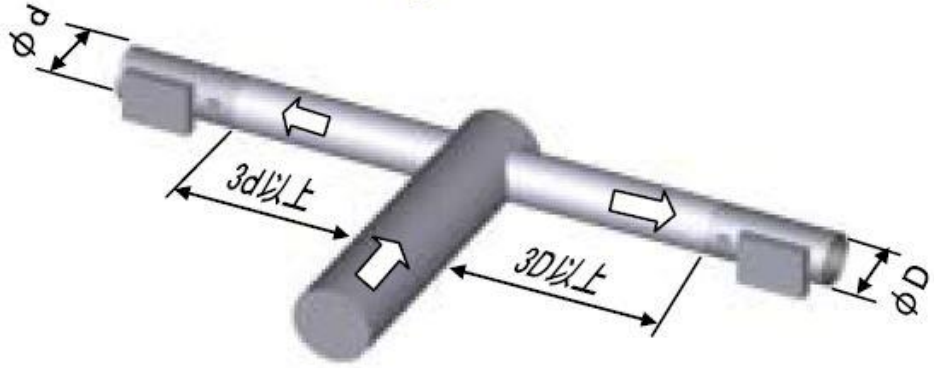
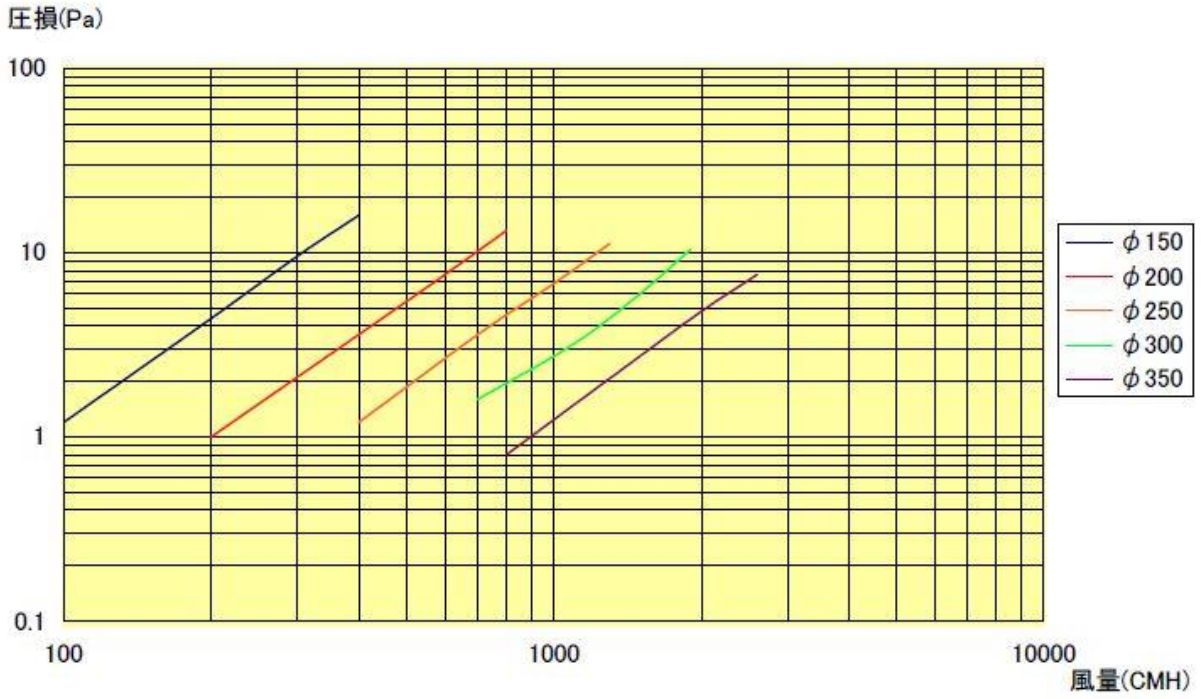


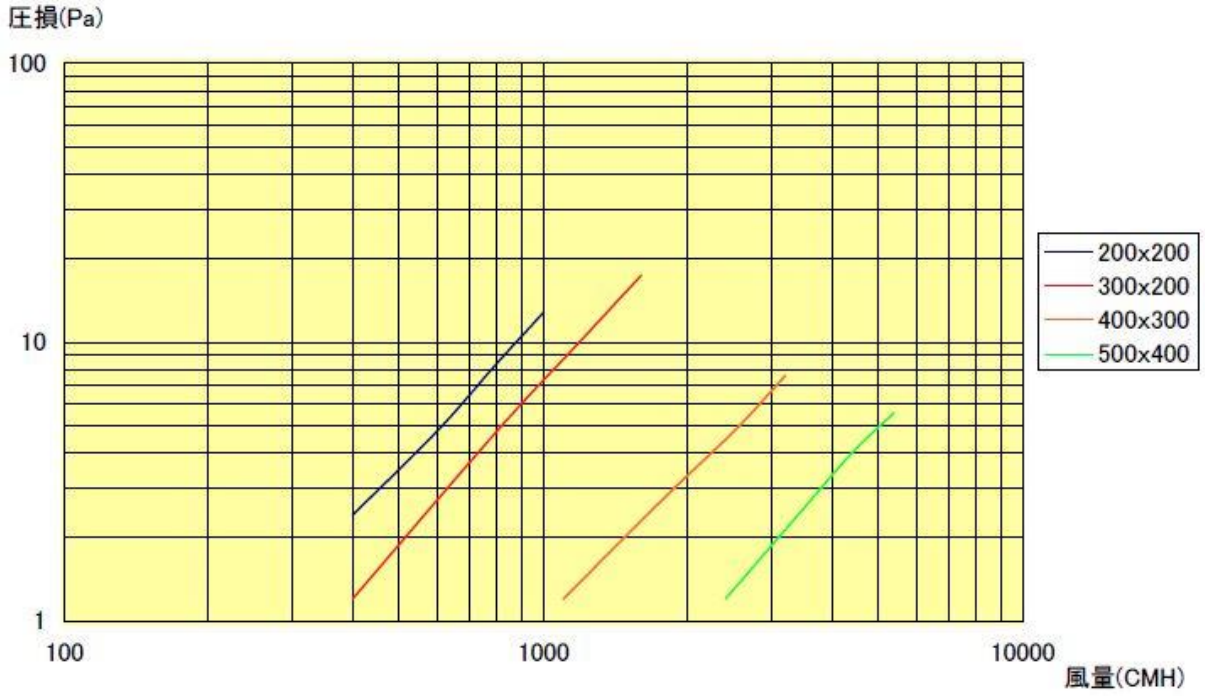
fig.−8

Predicted performance curve: Pressure Drop

Round Type



Square Type



To Place Order

1 YOU NEED **VAV** OR **CAV**?

2 **ANALOG** OR **DIGITAL**?

3 POWER SOURCE(**VOLTAGE**)? (CHOOSE FROM BELOW NO.3)

4 SPECIFY **CONTROL SIGNAL**. (CHOOSE FROM BELOW NO.4)

5 SPECIFY **MAX. AND MIN. FLOWRATE** (***0% AND 100%***)

6 SPECIFY **FLOWRATE "X"%** IF CUSTOMER SPEC. CALLS FOR.

1

CAV
VAV

2

ANALOG
DIGITAL

3

AC24V
AC100V

4

2	2 POSITION CAV (0-100%)	CAV
3	3 POSITION CAV (0-X-100%)	
I	AIR VOLUME SIGNAL : 4~20mA(0-0~100%), (0-X~100%)	VAV-ANALOG
R	AIR VOLUME SIGNAL : 0~135Ω(0-0~100%), (0-X~100%)	
V	AIR VOLUME SIGNAL : 0~10V(0-0~100%), (0-X~100%)	
C	AIR VOLUME SIGNAL : 1~5V, CHILD UNIT FOR VAV	VAV-SPECIAL
Y	AIR VOLUME SIGNAL : PULSE SIGNAL(DDC MAKER : YAMATAKE)	VAV-DIGITAL
J	AIR VOLUME SIGNAL : 0~5V SIGNAL (DDC MAKER : JOHNSON)	
T	AIR VOLUME SIGNAL : 0~5V SIGNAL (DDC MAKER : TOKO ELECT.)	
G	AIR VOLUME SIGNAL : 0~5V SIGNAL (DDC MAKER : YOKOGAWA. ELECT.)	