VF-5200 series Air Velocity/Flow/Differential Manometer

Instruction Manual

VF-5204 (Low Pressure Type) : 0 ~ ±70mbar

VF-5205 (High Pressure Type) : 0 ~ ±1000mbar

VF-5204^{+}(Low Air Velocity/Flow/Differential Manometer) : Air Velocity 0 ~ 100m/s, Air flow is listed the below table

VF-5205^{+}(High Air Velocity/Flow/Differential Manometer) : Air Velocity 0 ~ 400m/s, Air flow is listed the below table

A. Specifications

Model No.	VF-5204 / VF-5204^{+}	VF-5205 / VF-5205^{+}
Measuring Range	Please refer the following table A.	
Resolution	Area : 00.01ft²/0.001m² Air Flow : 1CFM/1CMM Temperature : 0.1℃ (0.1℉) Air Velocity : 0.1m/s、1FPM、0.01Km/h、0.01Knots、0.01MPH Differential Pressure : 1Pa、±0.0001PSI、±0.01mbar、0.0001bar、0.01mmH2O、0.001inH2O、0.001mmHg、0.0001inHg	Area : 00.01ft²/0.001m² Air Flow : 1CFM/1CMM Temperature : 0.1℃ (0.1℉) Air Velocity : 0.1m/s、1FPM、0.1Km/h、0.1Knots、0.1MPH Differential Pressure : 10Pa、±0.001PSI、±0.1mbar、0.001bar、1mmH2O、0.1inH2O、0.1mmHg、0.001inHg
Accuracy (at 25°C)	±0.25% F.S、TEB<1% ※TEB : Total Error Band	
Area Setting	Max. 9.289m² / 99.99ft² (For Air Flow measurement)	
Measurement Unit	Area : ft²、m² Temperature : ˚C、˚F Air Flow : CFM、CMM (VF-5204^{+} / VF-5205^{+}) Air Velocity : m/s、FPM(ft/min)、Km/h、Knots、MPH (VF-5204^{+} / VF-5205^{+}) Differential Pressure : Pa、PSI、mbar、bar、mmH2O、inH2O、mmHg、inHg	
Media Compatibility	Dry air or non-corrosive gases and liquids	
Display	Digital LCD display : Differential Pressure、Air Velocity、Air Flow、Temp.、Measurement Unit	
Sampling Rate	Approx. 0.5 sec.	
Output Signal	Digital Output : RS-232 / Modbus RTU protocol (Differential Pressure、Air Flow、Air Velocity, Temp.、Max.、Min.、Avg. simultaneously)	
Temp. compensation	0 ~ +60°C (+32°F ~ +140°F)	
Main Functions	IP65 water and dust proof, Air Flow/Air Velocity/Wind Pressure measurements, Fine ZERO & SPAN adjustments, ZERO setting, Max./Min./Avg. values, Data hold, Switchable ℃/℉, USB/RS-232 output, LED back-light, Auto/Manual shutdown, Fine Area adjustment	
Baud Rate	57600	
Operating Environment	-10 ~ +60℃ (+14 ~ 140°F), 0~95%RH non-condensing	
Power Supply	One 9 V battery or AC Adaptor (option)	
Dimensions	150(L) × 75(W) × 28(D)mm (5.91 × 2.96 × 1.11 inches), Not including the pressure hose connector	
Weight	Approx. 250g (including the battery)	
Approvals	RoHS, CE, IP65	
Standard Accessories	Instrument (VF-5204 or VF-5205)、Paper box、Battery、Pouch case、Operation manual	
$^{+}$Plus Accessories	Instrument (VF-5204^{+} or VF-5205^{+})、Pitot tube (Φ8 x 300mm, specifications can be customized)、Silicon tube (1M, length can be specified)、Battery、Plastic carrying case、Operation manual	

※When you connect with the Pitot tube to measure the Air Velocity, The Min. Reading is:

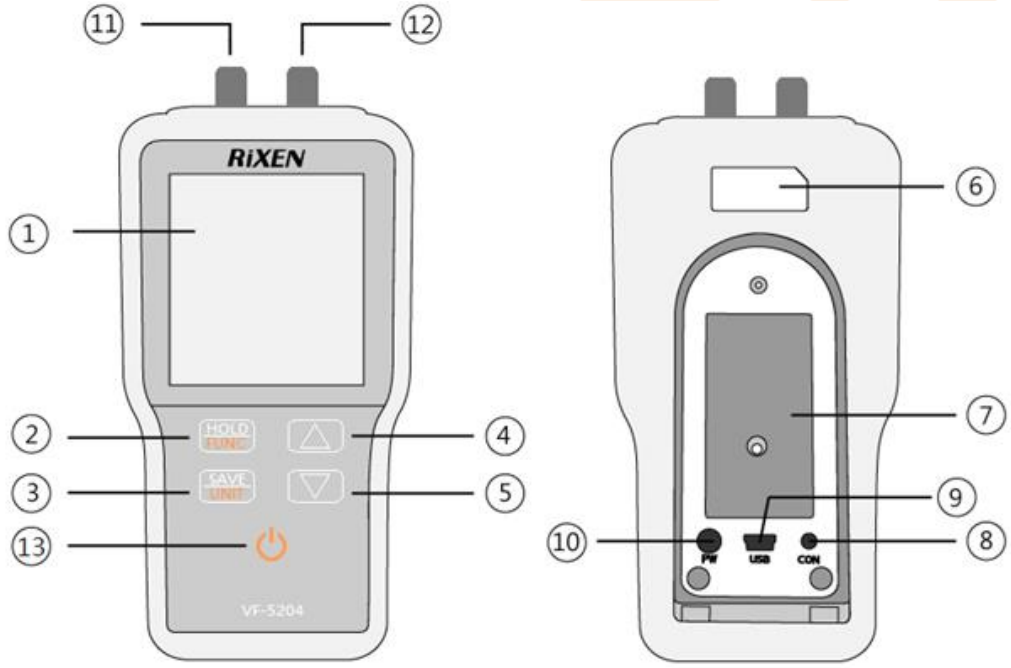
VF-5204 (Low Pressure) : 1.2m/s = 236FPM = 4.32Km/h = 2.33Knots = 2.68MPH

VF-5205 (High Pressure) : 4.0m/s = 780FPM = 14.4Km/h = 7.7Knots = 8.9MPH

Measurement Range (Table A)

Model No.	**Air Velocity (via Pitot tube)**					**Air Flow**		**Temperature**	
	m/s	FPM(ft/min)	Km/h	Knots	MPH	CFM	CMM	℃	℉
VF-5204^{+}	105	20,670	378	204.10	234.90	2,066,793	58,525	0~+60	+32~140
VF-5205^{+}	400	78,730	1,440	777.60	894.80	3,276,000	227,300		
Model No.	Pressure (Differential Pressure)								
	mbar	Pa	PSI	Bar	mmH2O	inH2O	mmHg	inHg	Max. Pressure
VF-5204	70	7,000	1.00	0.07	714	28.07	52.50	2.07	12.60PSI
VF-5205	1,000	100,000	14.50	1.00	10,200	401.50	750.00	29.53	21.75PSI

B. Instrument Description



① LCD display

② Data Hold and Function buttons

③ Save/confirm and Measurement Unit buttons

④ Adjustment button

⑤ Adjustment button

⑥ Model number and serial number

⑦ Battery cover

⑧ AC Adaptor input

⑨ USB output

⑩ RS-232 output

⑪ Pressure terminal (+) (⑫connect with atmosphere)

⑫ Pressure terminal (-) (⑪connect with atmosphere)

⑬ Power on/off

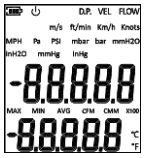
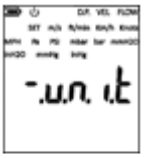
※To keep the instrument functions steadily, please avoid dropping, impacting or disassembling.

C. Display Description

※MMA is MAX、MIN、AVG.

Display	Description
	Battery power indicator
	Manual shutdown indicator (on the manual shutdown mode)
HOLD	Data hold indicator
D.P.	Differential Pressure indicator (on the differential pressure measurement mode)
VEL	Air Velocity indicator (on the air velocity measurement mode)
FLOW	Air Flow indicator (on the air flow measurement mode)
CAL	Adjustment/Calibration indicator (on the adjustment/calibration mode)
SET	Setup mode indicator (on the any setting)
m/s	Units of measure for Air Velocity and Air Flow； Including m/s、ft/min、Km/h 、Knots、MPH、CFM、CMM。
Pa	Units of measure for Pressure；Including Pa、PSI、mbar、bar、mmH2O、inH2O、mmHg、inHg。
%	When the reading magnification has been set, the Magnification indicator is shows. (multiply setting's magnification by displayed value)
Region A	Measurement display：Measurement value、Magnification value Measurement display：unit (for setting the unit of measurement value)
Region B	Measurement display：Area value、Temperature value、MMA value Measurement display：unit (for setting the unit of temperature)
MAX	Maximum value indicator
MIN	Minimum value indicator
AVG	Average value indicator
X100	Magnification indicator, Measurement value and MMA value x 100 (V=v x 100)
m^2	Area unit indicator；Including m^2、ft^2
℃	Temperature unit indicator；Including℃、℉

D. Key Description ※When you turn off the instrument and start again, it will revolve to the initial setting.

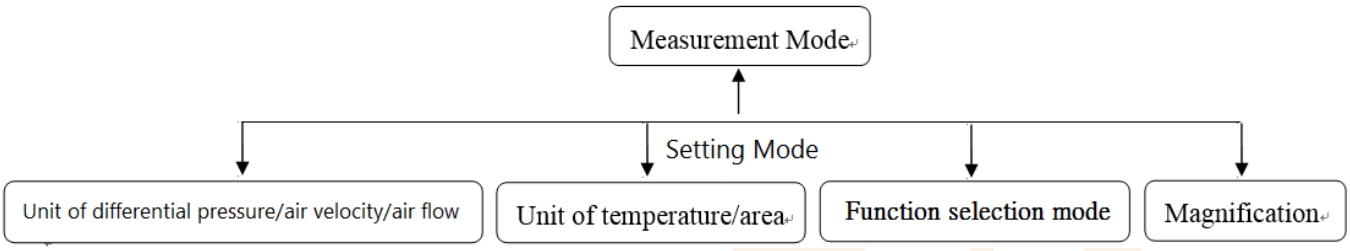
Key	Function	Description	LCD display
SAVE UNIT (3S)	Save (Confirm)	Press the SAVE UNIT button to complete the all of setting, and turn to measurement mode.	
	Unit Setting	1、On the measurement mode, press the SAVE UNIT and △ button and hold 3 second, release the SAVE UNIT and △ when "-unit" shows, enter the setting mode for differential pressure, air velocity and air flow. 2、On the measurement mode, press the SAVE UNIT and ▽ button and hold 3 second, release the SAVE UNIT and ▽ when "unit" shows, enter the setting mode for temperature and area. ※Entering the above setting mode, press the △ or ▽ to change the unit. ※Selected unit symbol will twinkle. ※Press the SAVE UNIT to save the selected unit, and turn back to measurement mode.	 
HOLD FUNC (3S)	Data Hold	On the measurement mode, press the HOLD FUNC button to enter the data hold mode. ※On the hold mode, press △ to gain measurement period's MAX./MIN./AVG. value. ※Press the HOLD FUNC to leave the hold mode, and turn back to measurement mode.	
	Measurement Function Selection	On the measurement mode, press the HOLD FUNC and △ button and hold 3 second, release the HOLD FUNC and △ when "-Func" shows, enter the measurement function selection mode. ※On this mode, press △ or ▽ to change the measurement function. ※Selected measurement function symbol(D.P、VEL、FLOW) will twinkle. ※Press SAVE UNIT to save selected measurement function, and turn back to measurement mode.	
	Magnification Setting	On the measurement mode, press the HOLD FUNC and ▽ button and hold 3 second, release the HOLD FUNC and ▽ when "100.00%" shows, enter the magnification setting mode. ※Press △ or ▽ to increase or decrease the data, press the △ and ▽ Simultaneously to change the number of digits. ※SET symbol will twinkle. ※Press SAVE UNIT to save selected magnification setting, and turn back to measurement mode.	
△ ▽	Back-light	On the measurement mode, press △ and ▽ simultaneously to start or shut back light. ※The back light will be shut down automatically after 30 second. ※Please note that the backlight cannot be operated in the mode of measurement function selection, unit selection, data hold, duct area setting and magnification setting.	----
	Adjustment (Selection)	On the mode of measuring function selection, unit selection, data hold, duct area setting and magnification setting, this button can adjust, select or change the setting or data.	----
△ ⏻	Power (Turn on/off)	1、 Turn on(automatic shutdown mode): On power off condition, press ⏻ to power on. ※The instrument will be shut down automatically if there is no operation for 8 minutes. 2、 Turn on(manual shutdown mode): On power off condition, press the △ and hold, then press the ⏻ , LCD will shows the ⏻ , unloose the △ and ⏻ to power on. ※The instrument will not be shut down automatically on this mode. 3、 Turn off: On any mode, Press the ⏻ and hold one second, LCD will shows "OFF", unloose the ⏻ , power off.	⏻

▽ ⏻	Fine- Adjustment / Zeroing	On the power off condition, press the ▽ and hold, then press the ⏻ , the CAL will twinkle, unloose the ▽ and ⏻ to enter the adjustment/zeroing mode. ※On this mode, press △ or ▽ to increase or decrease the data. ※Press SAVE UNIT to save selected unit, and turn back to measurement mode. ※Please be note that the adjusted data or changed data will not be reset for turn off.	CAL

E. Operating Instructions ※Refer the "D. Key Description"

※When you turn off the instrument and start again, it will revolve to the initial setting except of adjusted and changed data.

The functions can be operated in measurement mode as follows :



E-1 Turn on / Turn off : Please refer the "D. Key Description – Power (Turn on / off)".

E-2 Measurement function setting : Please refer the "D. Key Description – Measurement Function Selection".

This instrument has the measuring function of the air velocity (VEL), air flow (FLOW) and differential pressure (D.P).

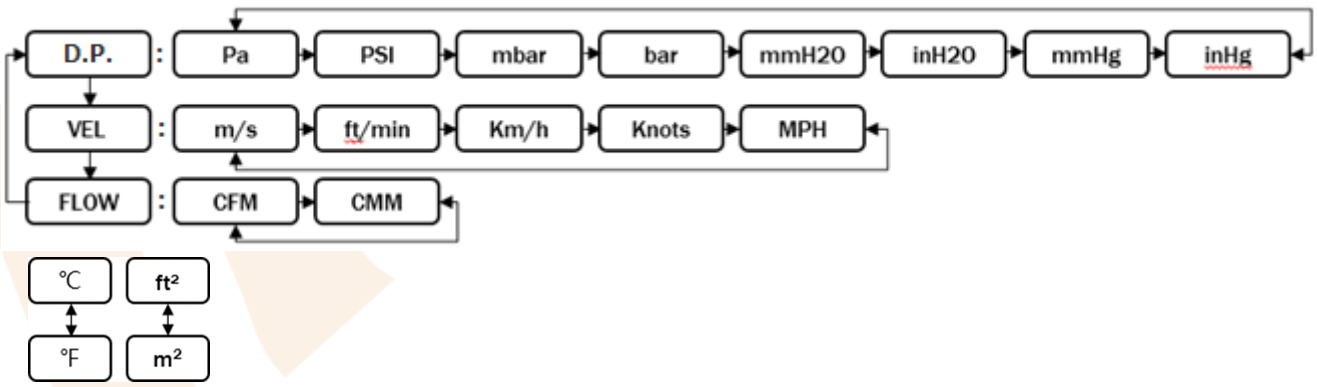
This three measuring function can be switched by button.

E-3 Unit setting mode : Please refer the "D. Key Description – Unit Setting".

The selected unit will twinkle.

E-3-1 Unit setting of differential pressure, air velocity and air flow :

The units can be set as follows :



E-4 Air flow measurement mode (area setting) :

E-4-1 Air flow measurement mode setting :

On the measurement mode, press the HOLD FUNC △ and hold 3 second, release the HOLD FUNC and △ when "-Func" shows, enter the measurement function selection mode.

On this mode, press the △ or ▽ to choose the FLOW measurement mode, the FLOW symbol will twinkle, press the HOLD FUNC to save the setting, enter the flow measurement mode.

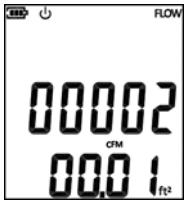
E-4-2 Duct area setting and flow calculation :

Area setting : On the flow measurement mode, the flow unit (CMM or CFM) will be hinted, the B area's value on the display will be changed from temperature value to area value. Press the △ or ▽ to increase or decrease the data, press the SAVE UNIT to change the number of digits. The selected digit number will twinkle, it will be stopped after 5 second. Press the △ , ▽ or SAVE UNIT will twinkle again.

Flow calculation : On the air flow measurement mode, you can set up the pipe cross section previously or set up it during measuring. The measured air flow value will be displayed automatically on the A area's.

※Initial area is 00.01 ft^2 , Maximum is 99.99 ft^2 , Minimum is 00.01 ft^2 【Remark】1m^2 = 0.0929ft^2

[Example]



E-5 Hold mode :

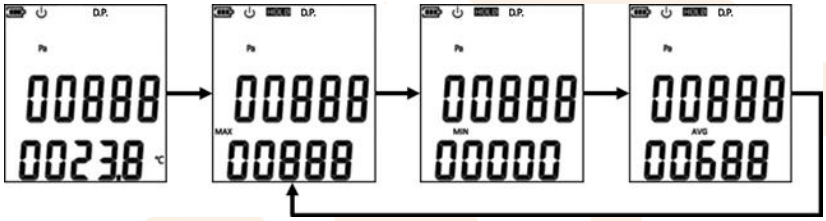
On the measurement mode, press the HOLD FUNC to hold measurement value, HOLD will be displayed on the screen.

On this mode, press the △ or ▽ to gain measurement period's MAX./MIN./AVG. value. (in the B area.)

E-5-1 Leave the hold mode :

Press the SAVE UNIT to leave the hold mode, and turn back to measurement mode.

[Example]



E-6 Magnification mode : Please refer the "D. Key Description – Magnification Setting".

When the measurement value is exceeded, the magnification must be set to get the correct value.

On the magnification mode, press the △ or ▽ to adjust the data, press the △ and ▽ simultaneously to set the number of digits, press the SAVE UNIT to turn back to measurement mode.

【Remark】Initial magnification value is 100.00% , Maximum is 200.00% , Minimum is 0.01%.

Selected digit number will twinkle.

E-7 Fine-Adjustment / Zeroing : Please refer the "D. Key Description – Fine-Adjustment / Zeroing".

Please be note that the adjusted data or changed data will not be reset for turn off.

【Remark】On the fine-adjustment and zeroing operating , please use the calibrator or contact your local distributor to avoid instruments deviation or damage.

F. RS-232 transfer protocol

RS-232 the transmission end is one way transfer via the three wires (touch ground) to input and output.
Using the original transmission line or cable under 10m is recommended.
Baud rate: 57600
Transfer status: / 8 / N / 1
Transfer content: (8BIT)
Read Holding Registers by Function 03H

F-1 Request Data Frame

Read the pressure, temperature and parameter.

Slave address	Function	Starting address Hi	Starting address Lo	No. of Byte Hi	No. of Byte Lo	CRC Lo	CRC Hi
11H	03H	00H	00H	00H	06H	C7H	58H

F-2 Response Data Frame

Response value = 11-Byte (includes the position command CRC)

Slave address	Function	Byte count	Data-Pre【15:8】	Data-Pre 【7:0】
11H	03H	06H	01H	2CH

Data-Tem【15:8】	Data-Tem【7:0】	Data-Par【15:8】	Data-Par【7:0】	CRC Lo	CRC Hi
00H	FAH	00H	00H(10H)	5CH	93H

Data-Pre【15:0】is A value 0 x 012C = 300 (the real value needs to refer the parameter)

Data-Tem【15:0】is B value 0 x 00FA = 250 (the real value needs to refer the parameter)(no any function in “FLOW” unit)

【3:0】is considered as low pressure and wind pressure

>>>> 0000 is pa (the real value is 300)
>>>> 0001 is PSI (the real value is 0.0300)
>>>> 0010 is mbar (the real value is 3.00)
>>>> 0011 is bar (the real value is 0.0300)
>>>> 1000 is m/s (the real value is 30.0)
>>>> 1001 is ft/min (the real value is 300)
>>>> 1010 is km/h (the real value is 30.0)
>>>> 1011 is knots (the real value is 3.00)
>>>> 0100 is mmH_2O (the real value is 30.0)
>>>> 0101 is inH_2O (the real value is 0.300)
>>>> 0110 is mmHg (the real value is 3.00)
>>>> 0111 is inHg (the real value is 0.0300)
>>>> 1100 is MPH (the real value is 3.00)
>>>> 1101 is CMM (the real value is 300)
>>>> 1110 is CFM (the real value is 300)

【3:0】is considered as high pressure and wind pressure

>>>> 0000 is pa (the real value is 30.0)
>>>> 0001 is PSI (the real value is 0.300)
>>>> 0010 is mbar (the real value is 30.0)
>>>> 0011 is bar (the real value is 0.300)
>>>> 1000 is m/s (the real value is 30.0)
>>>> 1001 is ft/min (the real value is 30.0)
>>>> 1010 is km/h (the real value is 30.0)
>>>> 1011 is knots (the real value is 30.00)
>>>> 0100 is mmH_2O (the real value is 300)
>>>> 0101 is inH_2O (the real value is 30.0)
>>>> 0110 is mmHg (the real value is 30.0)
>>>> 0111 is inHg (the real value is 0.300)
>>>> 1100 is MPH (the real value is 30.0)
>>>> 1101 is CMM (the real value is 300)
>>>> 1110 is CFM (the real value is 300)

【4】is considered as digit*100

>>>> 1 is *100
>>>> 0 is 0*100

【7:5】is considered as B value

>>>> 000 is ℃ (the real value is 25.0)
>>>> 001 is ˚F (the real value is 25.0)

The reading is 300pa 25℃ (the above is the low pressure.) / The reading is 3000pa 25℃ (the above is the high pressure.)

F-3 Response Data Frame

Response value = 11-Byte (includes the position command CRC)

Slave address	Function	Byte count	Data-Pre【15:8】	Data-Pre【7:0】
11H	03H	06H	FFH	81H

Data-Tem【15:8】	Data-Tem【7:0】	Data-Par【15:8】	Data-Par【7:0】	CRC Lo	CRC Hi
02H	C4H	00H	28H	84H	FFH

Data-Pre【15:0】is A value 0 x 1A79 = 6777 (the real value needs to refer the parameter)

Data-Tem【15:0】is B value 0 x 1A79 = 6777 (the real value needs to refer the parameter)

Data-Par【15:0】is parameter value 0 x 009E = 1001 1110 ---【15:8】no value
The reading is -12.7m/s 70.8 ˚F

F-4 Response Data Frame

Response value = 11-Byte (includes the position command CRC)

Slave address	Function	Byte count	Data-Pre【15:8】	Data-Pre【7:0】
11H	03H	06H	1AH	79H

Data-Tem【15:8】	Data-Tem【7:0】	Data-Par【15:8】	Data-Par【7:0】	CRC Lo	CRC Hi
XXH	XXH	00H	9EH	84H	FFH

Data-Pre【15:0】is A value 0 x 1A79 = 6777 (the real value needs to refer the parameter)

Data-Tem【15:0】is random number without reference value.

Data-Par【15:0】is parameter value 003E = 0011 1110 ---【15:8】no value
The reading is 6777*100CFM.

F-5 Conversions and Formulas

1pa=0.000145psi=0.01mbar=0.00001bar=0.1019716mmH_2O=0.00401inH_2O=

0.0075mmHg=0.0002953inHg

1m/s=196.85ft/min=3.6km/hr=1.944knots=2.237MPH

CMM=m3/min CFM=ft3/min 1ft=0.3048m

G. Precautions

1. This instrument must only be operated within its specifications, or it will be damaged.
2. This instrument has waterproof and dustproof function; please do not use it in a high temperature environment or with corrosive materials to avoid leakage or damage.
3. On the measuring wind pressure, wind speed and temperature, because the unstable temperature environment or tube pressure, please multiple sampling or extend the capturing for the signal interval.
4. Use the original pitot tube is suggested for the more accurate measuring value.
5. When the instrument is not use for a long time, please keep it and the all accessories in a dry environment, also please avoid direct sunlight.
6. If there are any operation questions or malfunction, please contact your local distributor or our service department.