

Differential Pressure Transducer VFT-510 series

Instruction Manual



RIXEN
www.rixen.com.tw

Relative & Differential Pressure and Wind Velocity measurement

VFT-512 : Low Differential Pressure Transducer

VFT-513 : High Differential Pressure Transducer

G. Specifications

Model No.		VFT-512	VFT-513
Measuring Range	Differential Pressure	±7000Pa / ±700mmH ₂ O / ±70mbar	±99000Pa / 9900mmH ₂ O / 1000mbar
	Wind Speed	0~100m/s (via Pitot tube)	0~210m/s (via Pitot tube)
Resolution	Differential Pressure	1Pa / 0.1mmH ₂ O / 0.01mbar	10Pa / 1mmH ₂ O / 0.1mbar
	Wind Speed	0.1m/s	1m/s
Accuracy (at 25°C)	±0.25% F.S · TEB<1% ※TEB : Total Error Band		
Measurement Unit	Differential Pressure : Pa, mbar, mmH ₂ O switchable Wind Speed : m/s Temperature : °C, °F switchable		
Media Compatibility	Dry air or non-corrosive gases and liquids		
Display and Functions	LCD display (4-digital), The functions can be displayed : Relative pressure, Differential Pressure, Wind Speed, Temp., Max., Min., Averages, Measure Unit		
Sampling Rate	Approx. 0.5 sec.		
Output Signal	Analog Output : 4~20mA / 0~5V or 0~10Vdc ※The initial setting range is ±7000 Pa, 4-20mA and 0~5Vdc ※Output of wind speed is 0~100m/s, the minimum reading is 1.2m/s / Output of wind speed is 0~210m/s, the minimum reading is 4m/s ※0~10V of output needs 15VDC of power supply		
	Digital Output : RS-485 / Modbus RTU protocol (Wind Pressure, Temp. simultaneously)		
Auto temp. compensation	0~+60°C (+32°F ~ +140°F)		
Measurement range setting	The user can set the measuring range by setting button ※The Initial is ±7000 Pa for the VFT-512 / ±99000 Pa for the VFT-513 ※The wind speed can't set the measurement range		
Calibration	Zero & Span adjustments and Zero setting		
Baud Rate	9600		
Over Pressure	12.60PSI	21.75PSI	
Operating Environment	0~+55°C (+32~+131°F), 0~95%RH non-condensing		
Storage Environment	-20~+60°C (-4~+140°F), 0~95%RH non-condensing		
Power Supply	DC 12~32V, ≥150mA (Max. DC36V)		
Dimensions / Weight	110(L) × 80(W) × 48(D)mm (4.33 × 3.15 × 1.89 inches) Not including the pressure hose connector & cable gland ; Approx. 215g		
Approvals	RoHS, CE, IP65		

C. Key Function Description

Key Symbols	Operation	Function Description	Note
C	Press for three second	Select temperature(°C · °F) unit	Any mode
	Short press	Complete the current settings and save it	Any mode
P	Press for three second	Select pressure unit	Any mode
	Short press	N/A	Any mode
△	Press for three second	Magnification setting	Measure mode
	Short press	Increase value or change unit	Setting or adjustment mode
▽	Press for three second	fine-tune data mode	Measure mode
	Short press	Decrease value or change unit	Setting or adjustment mode
△ + ▽	Press in the same time	Measure range setting	Measure mode
		Value to zero(in fine-tune mode)	Fine-tune mode

D. Operating Instructions

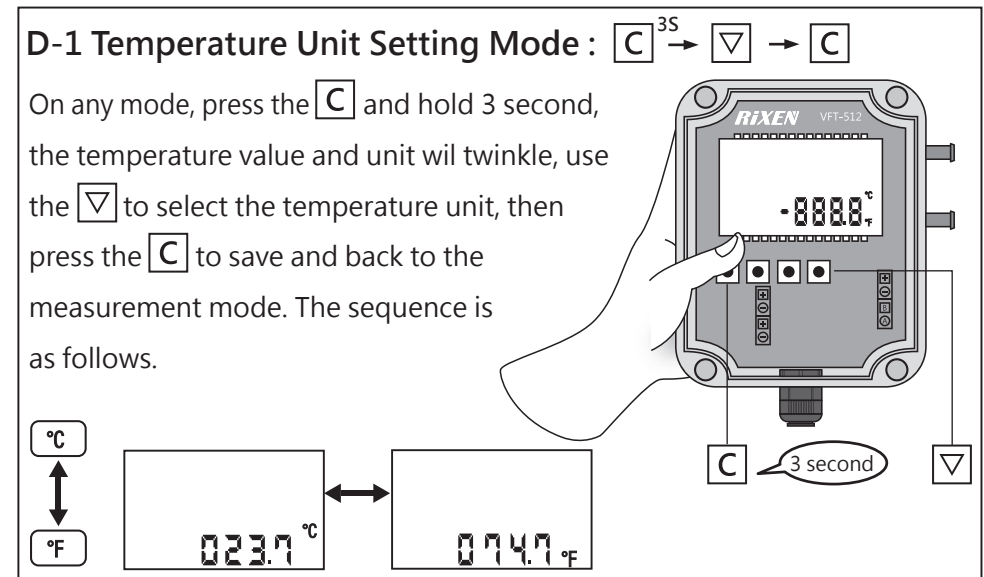
On the measurement mode, Press the **C** **P** **△** **▽** to enter the setting mode.

On any mode, press **C** to complete any setting, and return to the measurement mode.

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

D-1 Temperature Unit Setting Mode : C^{3S} → ▽ → C

On any mode, press the **C** and hold 3 second, the temperature value and unit wil twinkle, use the **▽** to select the temperature unit, then press the **C** to save and back to the measurement mode. The sequence is as follows.



The diagram illustrates the process of setting the temperature unit. A hand is shown pressing the 'C' button for 3 seconds on the RIXEN VFT-512 device. The display shows the current temperature in both Celsius (023.7 °C) and Fahrenheit (074.7 °F). A legend indicates that the 'C' button is used to toggle between °C and °F.

F. RS-485 transfer protocol

RS-485 transmission end is half-duplex transmission; it needs the shielded twisted pair to receive.

On the 9600bps, the maximum transmission distance standard is 1200M (it still depends on the environmental factor).

Baud rate: 9600

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	87H	59H

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	12H	34H

Data-Tem [15:8]	Data-Tem [7:0]	Data-Par [15:8]	Data-Par [7:0]	CRC Lo	CRC Hi
00H	FAH	00H	01H	8CH	F2H

Data-Pre 【15:0】 is pressure value $0 \times 1234 = 4660$

(the real value needs to refer the parameter)

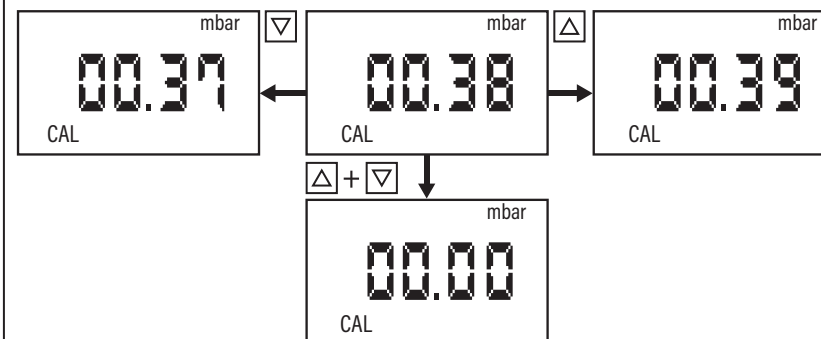
Data-Tem 【15:0】 is temperature value $0 \times 00FA = 250$

(the real value needs to refer the parameter)

Data-Tem 【15:0】 is parameter value $0 \times 0001 = 1$ (【15:3】 no value)

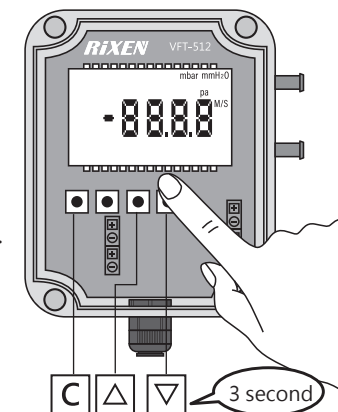
D-4 Fine Adjustment & Zero Mode :

On this mode, press the Δ or ∇ to adjust the pressure value or turn to zero for the pressure value. Then press the C to save and back to the measurement mode.



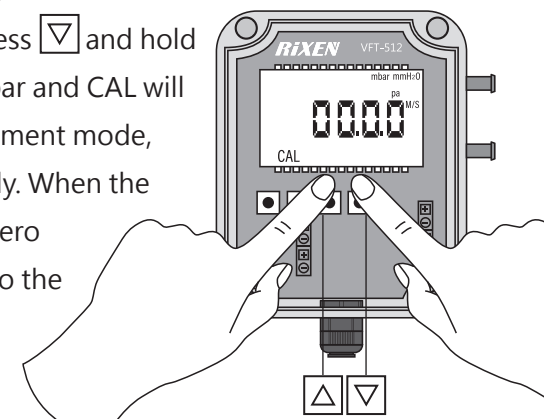
Fine Adjustment Mode : $\nabla^{3S} \rightarrow \Delta$ or $\nabla \rightarrow C$

On the measurement mode, press ∇ and hold 3 second. The display value, mbar and CAL will twinkle. Entering the fine adjustment mode, use Δ or ∇ to adjust the shift value, then press C to save and back to the measurement mode. (※The result of fine adjustment will not change the multiple setting.)



Zero Mode : $\nabla^{3S} \rightarrow \Delta + \nabla$

On the measurement mode, press ∇ and hold 3 second. The display value, mbar and CAL will twinkle. Entering the fine adjustment mode, press Δ and ∇ simultaneously. When the display value shows 0000, the Zero setting is completed and back to the measurement mode.



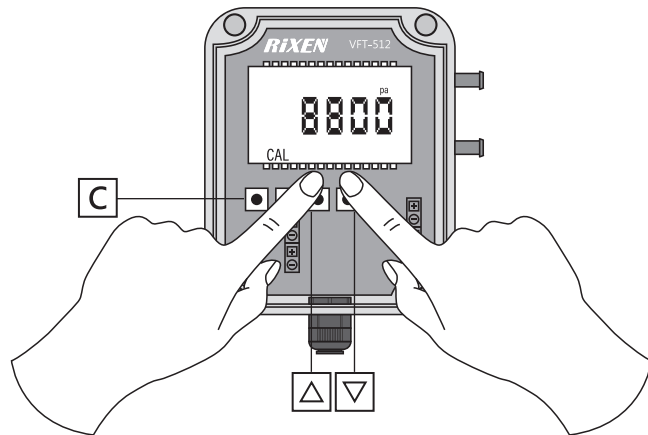
D-5 Measuring Range Setting : $\triangle + \nabla \rightarrow \triangle$ or $\nabla \rightarrow \square$

On measurement mode, press the \triangle and ∇ simultaneously. The display value, pa and CAL will twinkle, use \triangle or ∇ to set the measuring range. It will increase or decrease as 100 multiple. Then press the \square to save and back to the measurement mode.

※If it over the measuring range, the instrument will turn back to the initial setting automatically.

Example: The measuring range of VFT-512 over 7000, it will become 100.

The measuring range of VFT-512 lower than 100, it will become 7000.



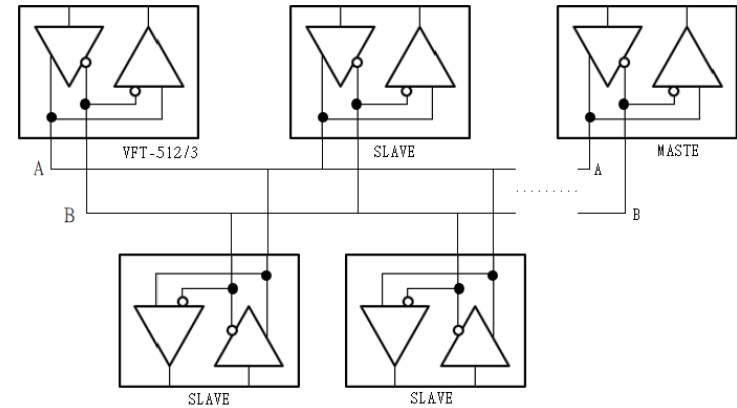
※Range setting of VFT-512 : Max. range is 7000pa/ Min. range is 10pa.

Range setting of VFT-513 : Max. range is 99,000pa/ Min. range is 1000pa.

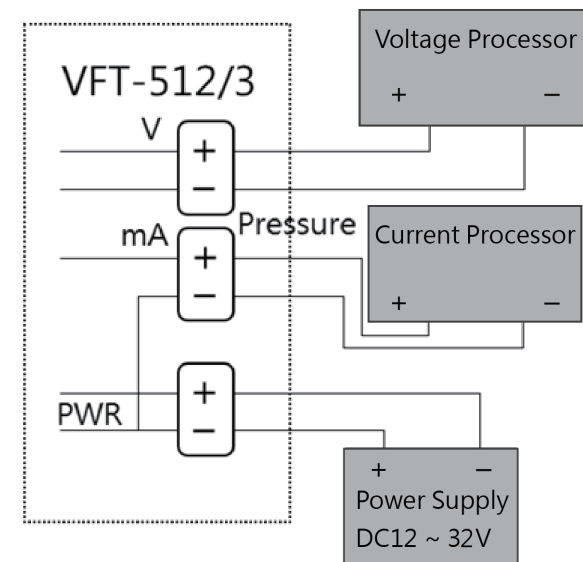
E. Connecting Diagram

※VFT512 and VFT-513 includes 1K resistance for noise immunity

E-1 RS-485 / Modbus RTU :

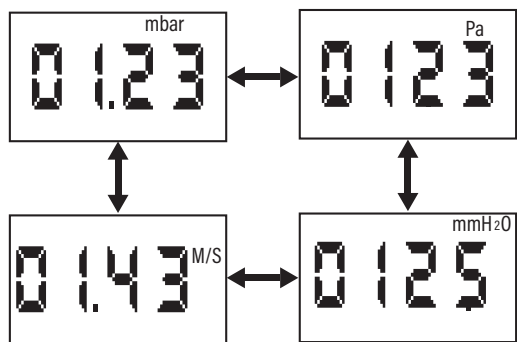
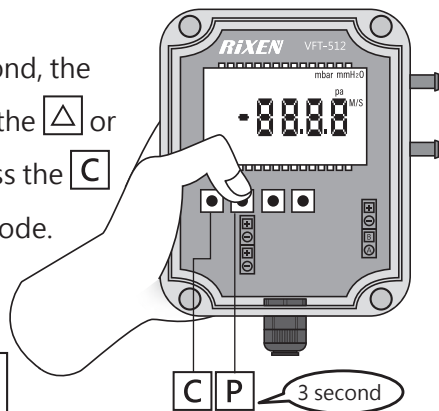


E-2 Voltage output, current output and power supply input :



D-2 Pressure Unit Setting Mode : $P^{3S} \rightarrow \Delta$ or $\nabla \rightarrow C$

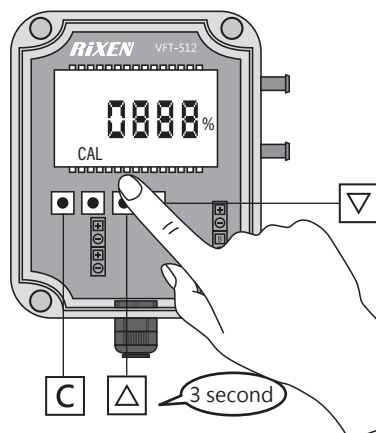
On any mode, press P and hold 3 second, the pressure value and unit will twinkle, use the Δ or ∇ to select the pressure unit, then press the C to save and back to the measurement mode. The sequence is as follows.



D-3 Multiple Setting : $\Delta^{3S} \rightarrow \Delta$ or $\nabla \rightarrow C$

On measurement mode, press Δ and hold 3 second. The display value, CAL and unit will twinkle. Use the Δ or ∇ to set the multiple (Max. 200%), then press the C to save and back to the measurement mode. The sequence is as follows.

※If the multiple over 200 or lower than 0, it will comes 100.



【1:0】 is considered as pressure and wind pressure

- >>>> 00 is mbar (the real value is 46.60)
- >>>> 01 is pa (the real value is 4660)
- >>>> 10 is mmH₂O (the real value is 466.0)
- >>>> 11 is m/s (the real value is 466.0)

【2】 is considered as temperature unit

- >>>> 0 is °C (the real value is 25)
- >>>> 1 is °F (the real value is 25)

The reading is 4660pa 25°C (the above is the positive value.)

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	07H	F6H	23H

Data-Pre 【15:0】 is pressure value 0 x FF81 = -127

(the real value needs to refer the parameter)

Data-Tem 【15:0】 is temperature value 0 x 02C4 = 708

(the real value needs to refer the parameter)

Data-Tem 【15:3】 is parameter value 0 x 0007 = 7 (【15:3】 no value)

The reading is -12.7m/s 70.8 °F (the above is the negative value.)

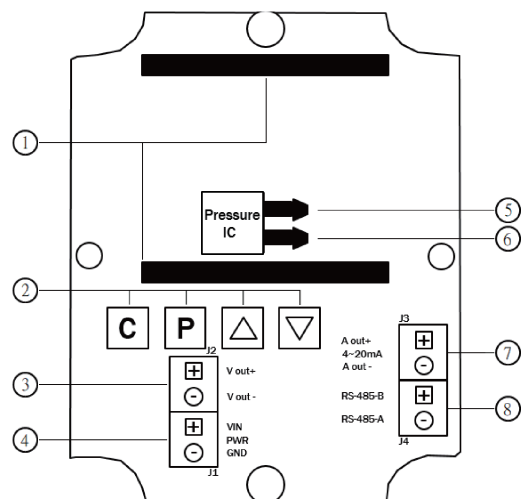
Conversions and Formulas : 1pa = 0.01mbar = 0.102mmH₂O ·
m/s = (mmH₂O^{1/2}) X 4.04

A. Pay attention before use

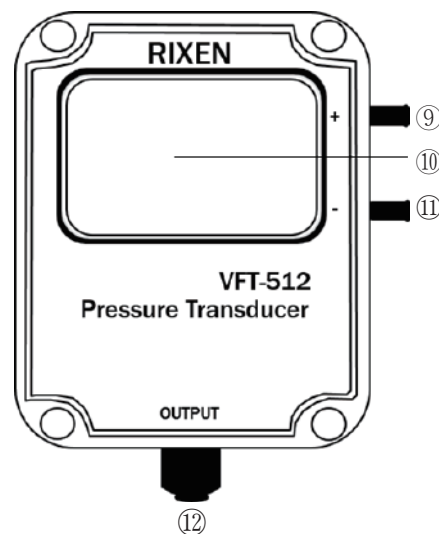
- ① Please read these operating instructions carefully before using this product.
- ② Please use the device properly based on the full understanding of the content.

B. Instrument Description

Wiring Diagram



External Diagram



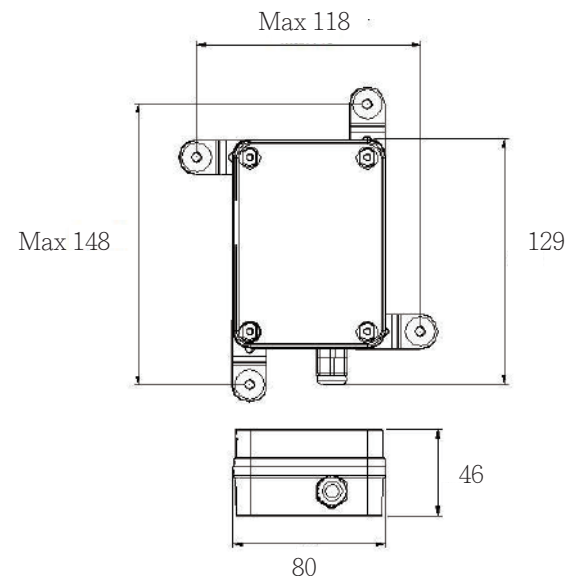
- | | |
|--|------------------------------------|
| ① Pin display | ⑦ DC Current Output : 4 ~ 20mA |
| ② Setting buttons | ⑧ Digital Output : RS-485 / Modbus |
| ③ DC Voltage Output : 0 ~ 5V 、 0 ~ 10V
(Selectable) | ⑨ Pressure terminal (+) |
| ④ Power Supply : 12 ~ 30VDC (≥ 150mA) | ⑩ LCD display |
| ⑤ Pressure sensor connect with ⑨ | ⑪ Pressure terminal (-) |
| ⑥ Pressure sensor connect with ⑪ | ⑫ Waterproof terminal block |

※Please make sure the pressure terminal (⑨ 、 ⑪) be tight connected with signal connections.

※Please fasten the outer casing and terminal block (⑫) to make sure the functions of waterproof and dustproof.

	Pa	Kpa	mbar	mmH ₂ O	mmHg	inH ₂ O	PSI
Pa	1	0.001	0.01	0.10197	0.007501	0.004016	0.000145
Kpa	1000	1	10	101.9716	7.501	4.016	0.145
mbar	100	0.1	1	10.1972	0.7501	0.4016	0.0145
mmH ₂ O	9.807	0.009807	0.09807	1	0.0734	0.0394	0.001422
mmHg	133.3	0.1333	1.333	13.62	1	0.5362	0.0193
inH ₂ O	249.1	0.2491	2.491	25.4	1.865	1	0.0361
PSI	6895	6.895	68.948	704.3	51.71	27.73	1

G-1 Dimensions of VFT-510 series



H. 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 When the LCD displays the pressure, it is pressure output. The same situation as the wind speed.
- ④ 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.
- ⑤ Use the original pitot tube is suggested for the more accurate measuring value.
- ⑥ 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.
- ⑦ If there are any operation questions or malfunction, please contact your local distributor or our service department.