VE3658/3668x
WIFI/Ethernet/USB 24-bit DAQ

Hardware Manual V1.0

VE3658N

VE3668N

Shenzhen VKinging Electronics Co.,Ltd

——Precision Accurate Fast Reliable

Appliance：

- Weak Signal Measurement Acquisition
- IEPE/ICP sensor measurements
- 0~20mA to 0~5V measurement
- Offline Data Acquisition Storage
- Audio/Vibration Signal Measurement
- Multi-card network data acquisition
- Wireless transmission signal acquisition

Contents

1 Product Introduction

1.1 Characteristics

VE3668/3658x is a high-speed data acquisition card with 8-channel true differential inputs, 24-bit resolution, maximum single-channel sampling rate of 102.4ksps and 8-channel synchronisation totalling 819.2ksps, precision preamplification and integrated IEPE/ICP hardware support. This product adopts a number of high-precision 24-bit ADC units and with the company's many years of accumulated development of the front differential amplification module, so that the product has a high speed, high resolution, high precision, ultra-low noise, high rejection ratio, a wide range of measurements, and low temperature drift, suitable for precision and high speed acquisition of a variety of occasions.

LAN communication adopts and original TCP/IP exchange communication protocol and built-in anti-packet loss algorithm, which can ensure the stable transmission and collection of data without loss for a long time.

All components of VE3668/3658x capture cards are industrial grade and fully metal shielded, which can be adapted to applications with strong industrial interference and has the advantages of moisture-proof, shock-proof and anti-interference.

1.2 List of characteristics

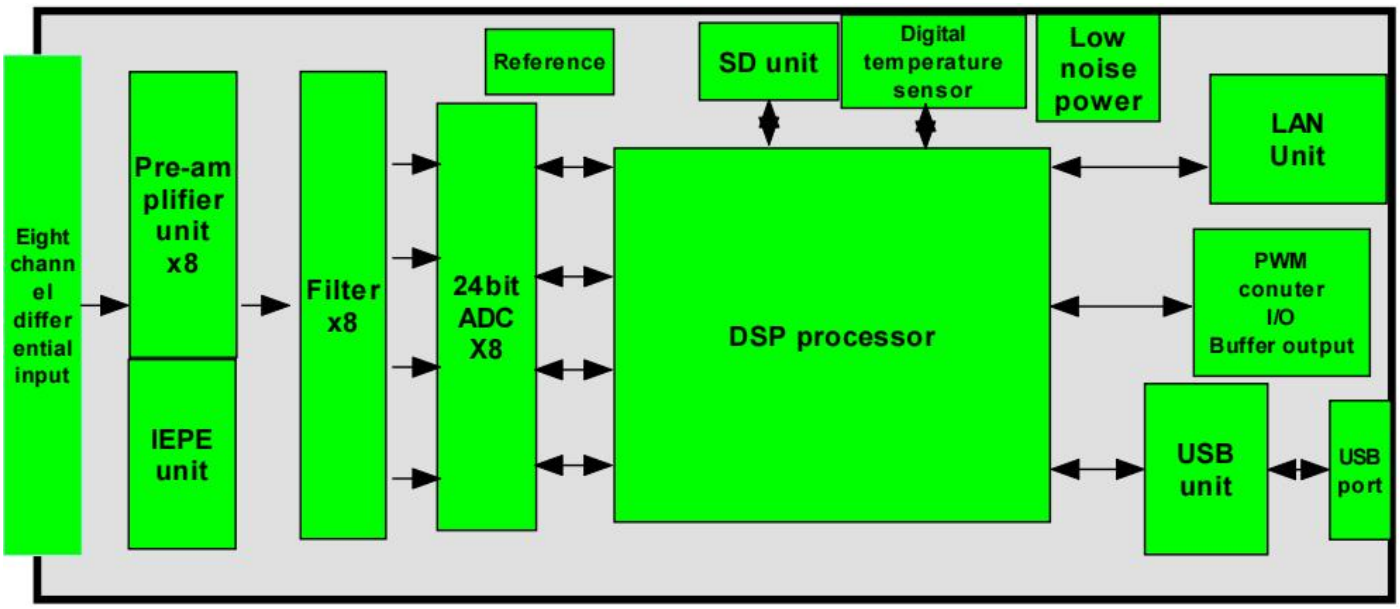
High precision and high resolution	24-Bit resolution
Multiple measurement modes	ADC / IEPE
Ultra-low noise preamplification	Measures signals down to uV level
High-speed synchronous acquisition	Up to 102.4ksps (102.4k dots per second) for a single channel, 800ksps for 8 channels
Input range	0 ~ ± 10V
Counting/frequency measurement	Counting or frequency measurement
Integrated 2-way PWM output	16-bit adjustable PWM
Support SD storage	Optional storage in txt / bin format

1.3 Ordering and Instructions

Below is the detailed product selection model

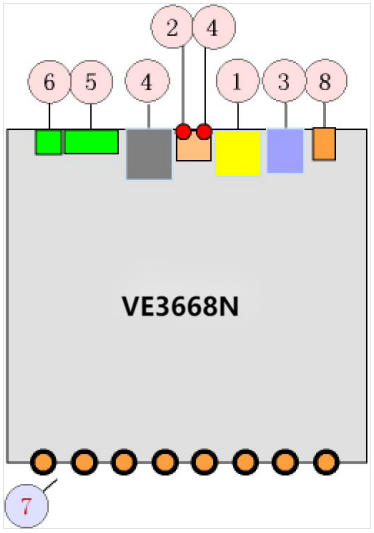
Mode	Instructions
VE3658U	USB connector，3.5mm Phoenix terminal plug and socket，Optional with mounting side plate
VE3668U	USB communication, BNC input, protective housing with mounting side plate
VE3658N	LAN/USB communication, 3.5mm Phoenix terminal plug and socket,Aluminium housing, optionally with mounting side plate
VE3668N	LAN/USB communication, BNC input, Protective enclosure with its own mounting side plate
VE3658W	WIFI//USB communication, 3.5mm Phoenix terminal plug and socket，Aluminium housing, optionally with mounting side plate
VE3668W	WIFI/USB communication, BNC input, Protective enclosure with its own mounting side plate

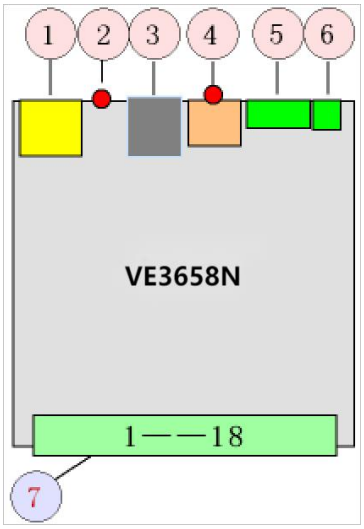
1.4 system block diagram



2 Hardware parameters and interface description

2.1 Product port function description





1) LAN port

2) USB connection indicator

3) USB/Power Port

4) SD card and SD indicator

5) digital IO port (DIP)

GND	**DIO1.4** **Input/Output**	**DIO1.3** **Input/Output**	**DIO1.2** **Outputs only supported**	**DIO1.1** **Outputs only supported**	**VCC**

6) 8~24V DC power supply port

7) Analogue input interface, menu as shown

BNC Mode:

AIN8	AIN7	AIN6	AIN5	AIN4	AIN3	AIN2	AIN1

3.5mm Phoenix terminal plug and socket:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
+ Ain8 -		**+ Ain7 -**		**AGND**	**+ Ain6 -**		**+ Ain5 -**		**+ Ain4 -**		**+ Ain3-**		**AGND**	**+ Ain2 -**		**+ Ain1 -**	

8) GPS antenna port (BNC type, GPS positioning module required)

2.2 Integrated electrical parameters

Sports Event	unit (of measure)	Typical values	Scope/Remarks
USB Supply Voltage	V	5	4.5~5.5
USB power supply current	mA	450@ADC mode	Note:WIFI version added 200mA
12-24V supply port voltage	V	12-24	6~40
12-24V supply port current (USB not powered)	mA	128mA@24V ADC mode	Note:WIFI version added 50mA
ADC analogue port input voltage	V	-10V ~ +10V	
ADC analogue signal input bandwidth	Hz	0~20Khz	20k(-3db)
ADC Anti-alias Filter Frequency Response		0.2 * fs @ -3db 0.5 * fs @ -10db	fs = Set sample rate
Anti-alias filter type		Sinc3	
IEPE Drive Voltage	V	24	22~26
IEPE Drive Current	mA	4	3.6~4.4
IEPE Mode AC Coupled Low Pass Frequency	Hz	0.4Hz@ -3db	Note 1
0~20mA Current Mode Load Resistor	Ω	250Ω ±0.1%	
0~20mA current mode maximum measurable current		25mA	
Digital port input VL low	V	0	-0.3~1
Digital port input VH high	V	3.3	2~4
Digital Port Output Voltage	V	3.3	3.2~3.4
Digital port output drive current (when output is high)	mA	10	
Digital port input absorption current (at 3.3V input voltage)	uA	170	
ADC Maximum Sample Rate	ksps	102.4	8-Channel Synchronisation
Minimum resolution voltage @ ±20mV steps	uV	0.1	
PWM frequency (DIO1.2, DIO1.3 ports)	Hz	1~1M	

PWM duty cycle (DIO1.2, DIO1.3 ports)	%	0~100	
Counter input maximum frequency (DIO1.4 port)	Hz	100K	
Counter input maximum count value		2^64th power	
operating temperature	℃	-40~ 85	
WIFI Model Acquisition Card Operating Temperature	℃	-20~ 60	
Storage temperature	℃	-40~ 105	
Physical dimensions (LWH)	mm	190*150*50(BNC mode) 120*108*26(3.5mm Phoenix terminal)	Without connector length

Note 1: The low pass frequency of 0.4Hz@ -3db in IEPE mode means that the turning point of the 0.7x amplitude-frequency characteristic is 0.4Hz, and that the low pass frequency of 0.4Hz@ -3db in IEPE mode is 0.7x amplitude-frequency characteristic.
In addition, the corresponding 0.95x is 3Hz@ -0.5db, but the -0.5db parameter is not normally a concern.

2.3 Safe use of the absolute maximum

sports event	**unit (of measure)**	**numerical value**	
USB supply voltage:	V	-1~+6	* Exceeding the absolute maximum value may damage the device and cause irreversible damage.
ADC Analogue Port	V	-15V~+24V	
Digital Ports	V	-1V~+5V	
DAC output port	V	-15V~+15V	
Electrostatic input (ESD) on all ports	V	2000	

2.4 ADC analogue conversion unit

2.4.1 ADC Input Detailed Electrical Parameters

sports event	unit (of measure)	typical case	Note
Common mode rejection ratio(CMRR)	dB	130	
Input Bias Current	nA	1	
Input bias voltage	uv	10	
Input Equivalent Voltage Noise	nVp-p	200	Maximum value is 400 when +-10V is selected for the input range.
Input equivalent current noise	pAp-p	1	Maximum value is 2
Equivalent Input Capacitance	pF	400	
input resistance	GΩ	1	
ADC Reference Accuracy		0.05%	
Overall maximum temperature drift of ADC amplification acquisition unit	ppm/℃	6	

2.4.2 Input Range vs Bottom Noise

Setting values (Program set)	Corresponding measuring range	background noise	Note
0	-10V~+10V	0.3mV	@1KS/s
1	-5V~+5V	0.1mV	
2	-2.5V~+2.5V	60uV	
3	-1V~+1V	25uV	
4	-500mV~+500mV	15uV	
5	-100mV~+100mV	6.5uV	
6	-20mV~+20mV	6uV	

2.4.3 Sample rate VS effective resolution

Sampling rate	Effective resolution (*attachment 1)	Note
1 ~ 4Ksps	21bit	Various noises in the ADC and peripheral internal devices increase at high sampling rates, thereby reducing the effective resolution (*Attachment 2).
4K~15Ksps	20bit	
15k~35Ksps	19bit	
35k~64Ksps	17bit	
64k~102.4ksps	16bit	

Attachment 1: Effective resolution is a characteristic of all ADCs: the last few bits of the ADC bounce back and forth, and the bits that don't bounce before them are the effective bits.

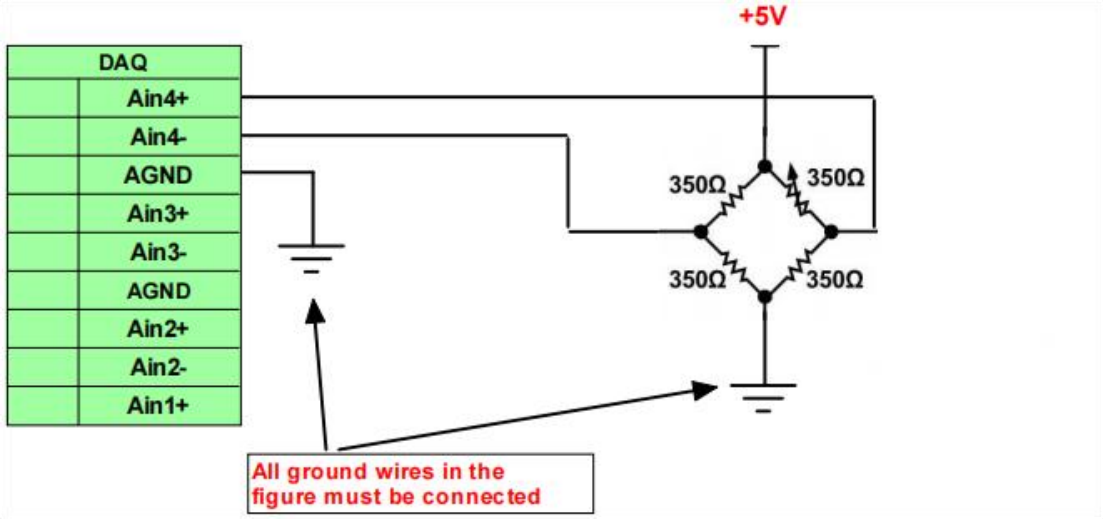
The bouncing bits are not random but normally distributed, so when using digital filtering can reflect the significance of the actual physical resolution of 24 bits.

Attachment 2: Signal acquisition should take into account both the ADC noise floor and the sampling rate corresponding to the effective resolution.

3 Port Usage and Description

3.1 Differential mode of ADC input

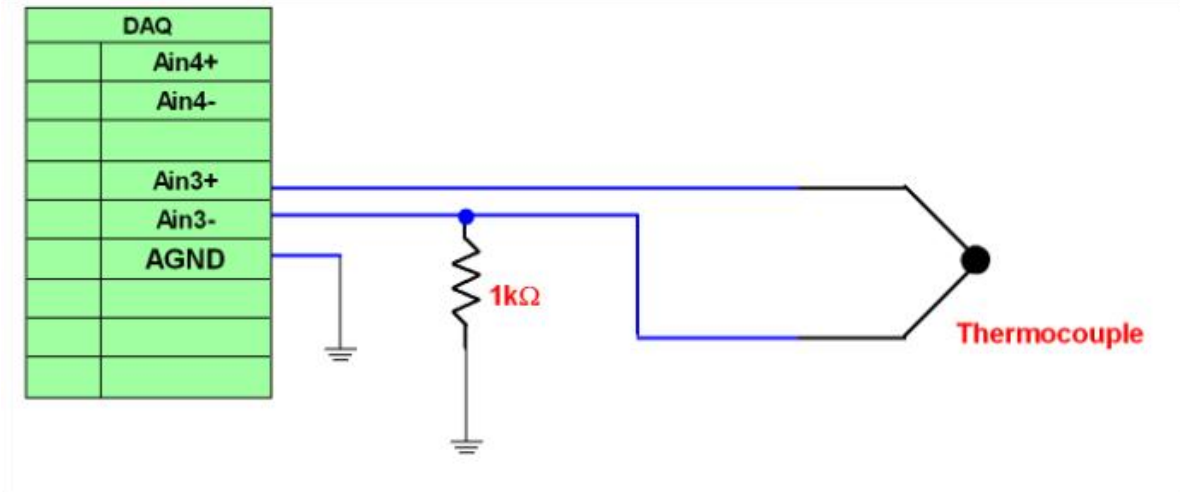
The differential method is the least noisy input method and effectively suppresses all kinds of common mode interference. However, care must be taken to provide the input with the correct input loop. Correct common ground is the first step in securing the input loop.



*BNC type does not support differential input

*3.5mm Phoenix terminal factory default setting is AIN- and AGND shorted (note4).

If the inputs do not share a common ground, you can refer to the following way to create an input return path.

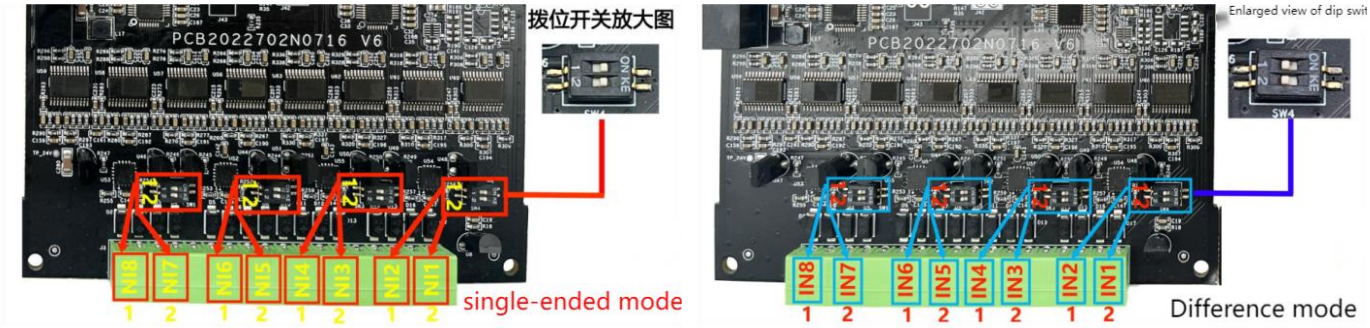


*Resistor can be connected directly to AGND without connecting to the negative terminal.

*VE3668 with direct BNC connection

*Note4: In order to make the SD type capture card more convenient for wiring, our default factory setting is AIN- and AGND shorted.

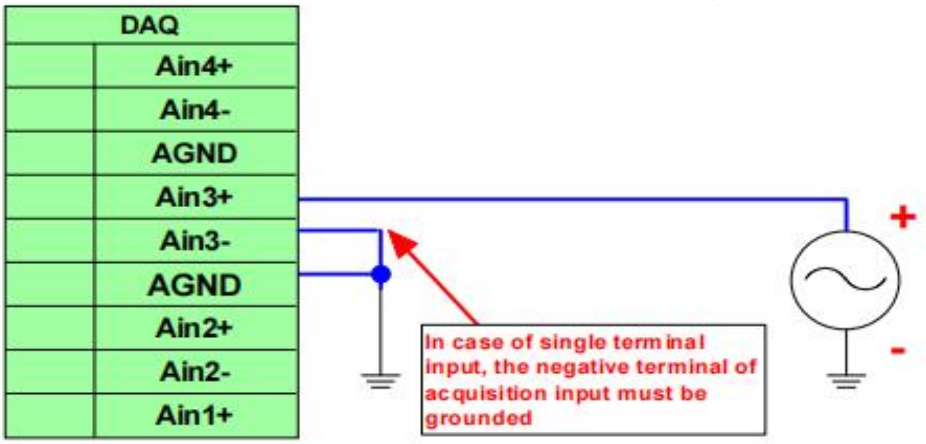
If you need to adjust to differential type input, you need to open the device case to make the following adjustments:



3.2 Application of Single-Ended Inputs for ADC Inputs

When the input is a single signal terminal input, the negative end of the differential input must be grounded.

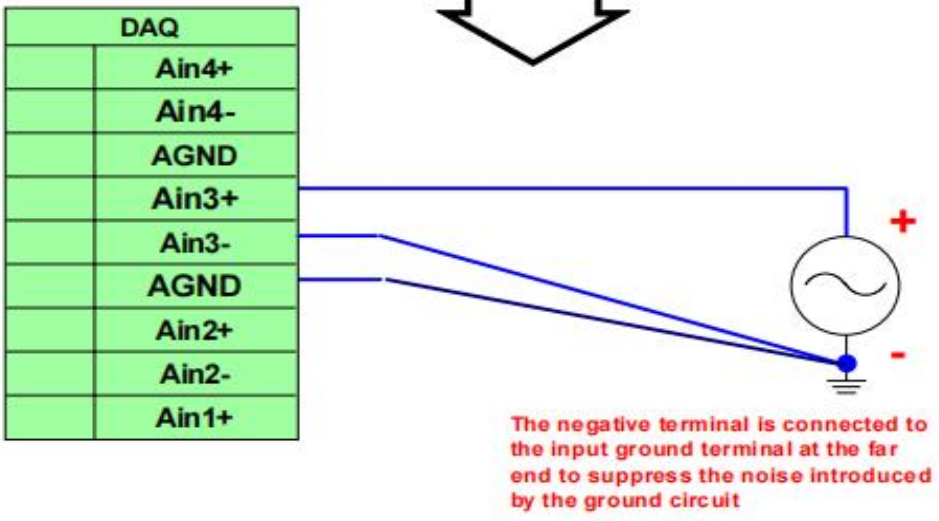
When this capture card is used to capture non-differential signals, it can also perform well with a high rejection ratio, and can eliminate the noise introduced by the ground line very well



*Only for type VE3658N.

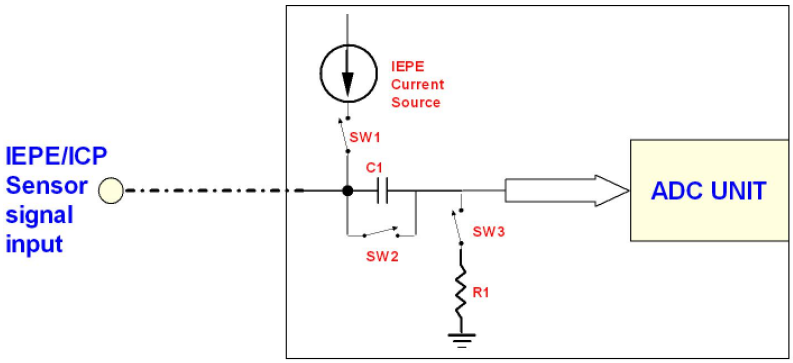
*BNC type direct connection

Better



3.3 IEPE/ICP Sensor Access Modes

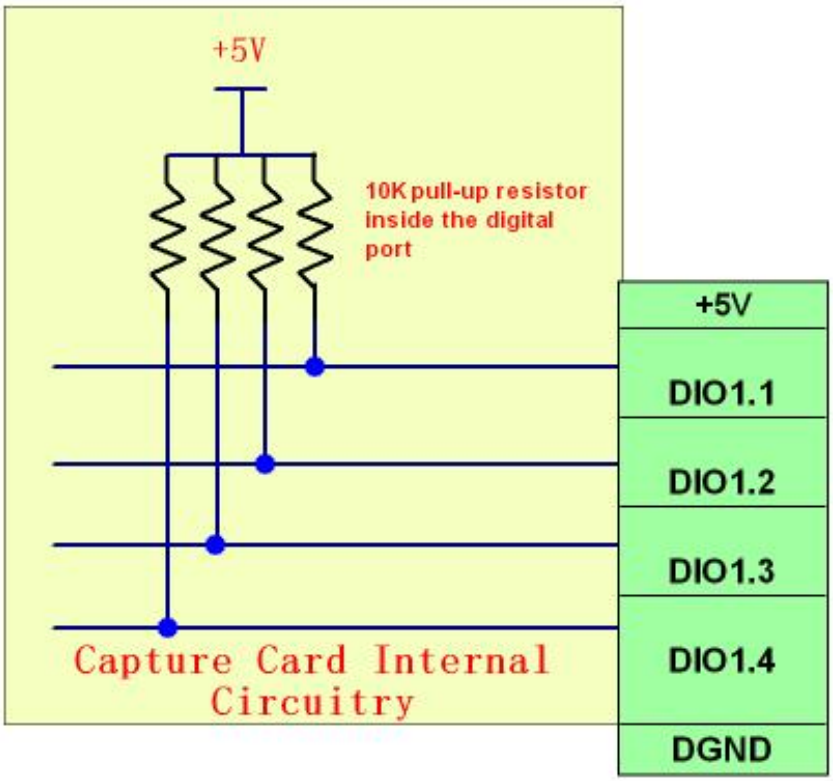
Schematic diagram of the internal IEPE/ICP drive unit



- This acquisition card integrates IEPE/ICP hardware function support.
- The acquisition card integrates 24V power supply unit, constant current driver and receiver unit, and each channel can be switched to ADC/IEPE mode through software setting separately.
- In IEPE mode, the output is 24V 4mA constant current (2mA compatible), and the ADC input is automatically switched to AC-coupled input.
- The 8 channels can be independently switched and controlled.

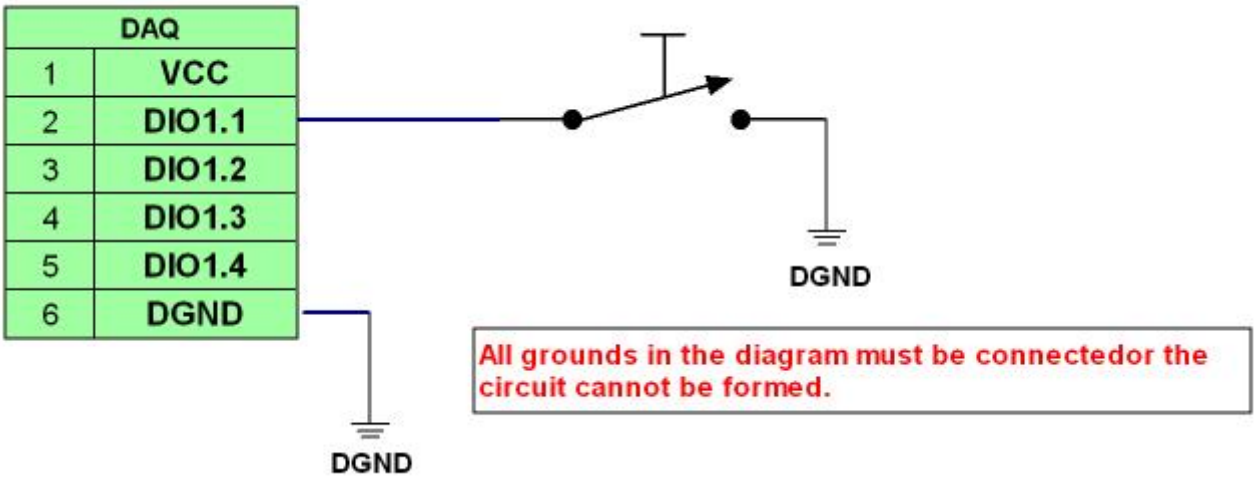
3.4 Application of digital ports as inputs

When the capture card is used as an input, its internal pull-up resistor can be used more conveniently.



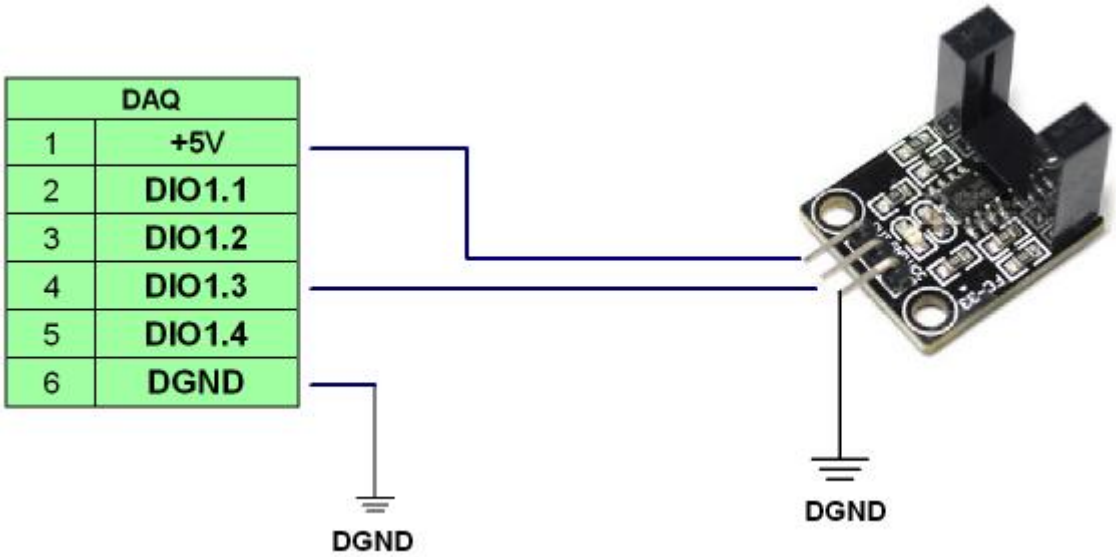
3.5 Key Input Use

When the capture card is used as an input, its internal pull-up resistor can be used more conveniently.



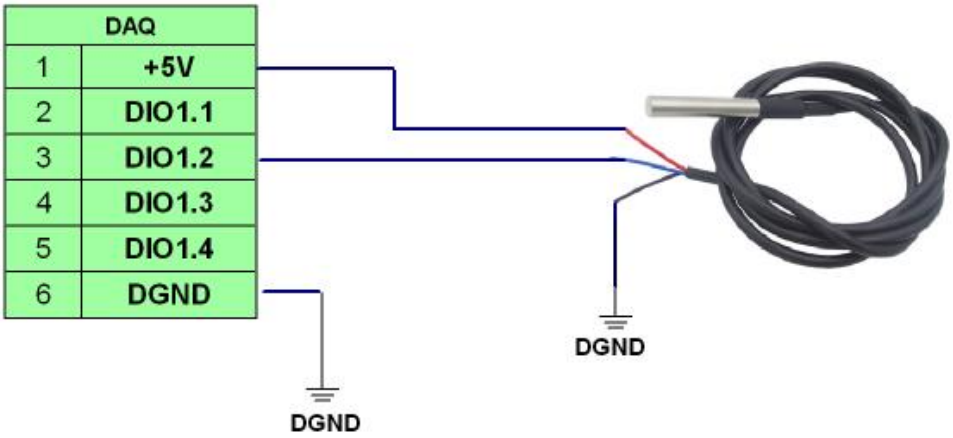
3.6 Powering the Sensor Inputs Using the Internal 5V Supply

When the capture card is used as an input, its internal pull-up resistor can be used more conveniently.



3.7 Any digital port can be connected to a digital temperature sensor.

Any digital port of the acquisition card can be equipped with an 18B20 digital temperature sensor to read out the temperature value directly, and the cable length of the digital temperature sensor can be up to 5 metres.



4 SSample-Trigger-Clock

4.1 ADC Clock Source

The sampling beat of this capture card can be selected from two sources: 1. software clock, 2. hardware clock.

The software clock can be used to achieve 1~102.4ksps continuous sampling rate arbitrary settings, which in the time domain of the application is no problem at all. However, if used in the frequency domain analysis, you must use the hardware clock mode, the following table hardware clock sampling frequency point:

Software clock frequency points: 1sps-102.4ksps，Hardware clock frequency point: the following table

Fixed frequency point			
160	1024	4096	20480
200	1280	5120	25600
320	1600	6400	51200
400	2048	8192	102400
640	2560	10240	
800	3200	12800	

When the frequency points in the above table are set on the acquisition card, the hardware will automatically enter the hardware clock mode, so as to realise the frequency domain time acquisition of the accurate frequency, and in applications such as FFT/DFT, all of which are occasions where the hardware clock mode must be used.

4.2 IO Trigger Acquisition Mode

IO1.1-IO1.4 can all be set as trigger sources.

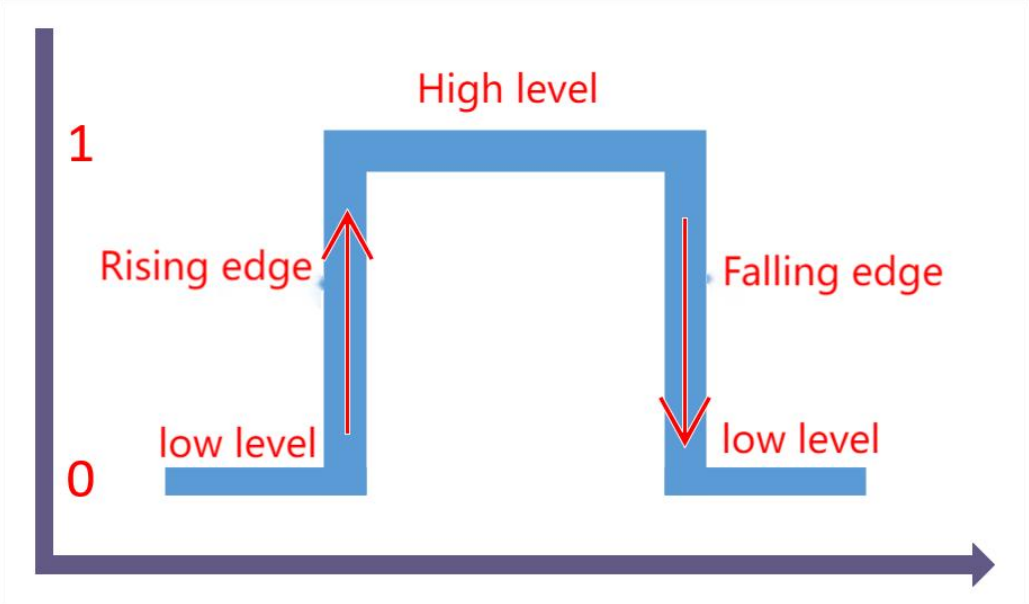
Trigger acquisition - mode 1.

--- High level trigger continuous sampling ---, --- High level trigger N sampling --- (N acquisition = finite number of acquisitions)

--- Low level trigger continuous sampling ---, --- Low level trigger N sampling --- (N acquisition = limited number of acquisitions)

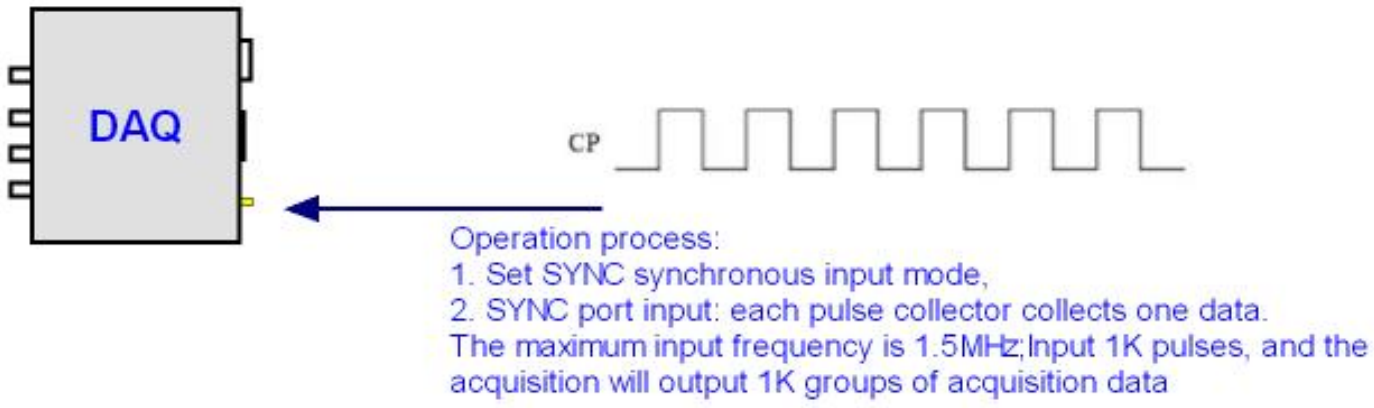
--- Falling edge triggers continuous sampling ---, --- Falling edge triggers N sampling --- (N acquisition = finite number of acquisitions)

--- Rising edge triggers continuous sampling ---, --- Rising edge triggers N sampling --- (N acquisition = finite number of acquisitions)



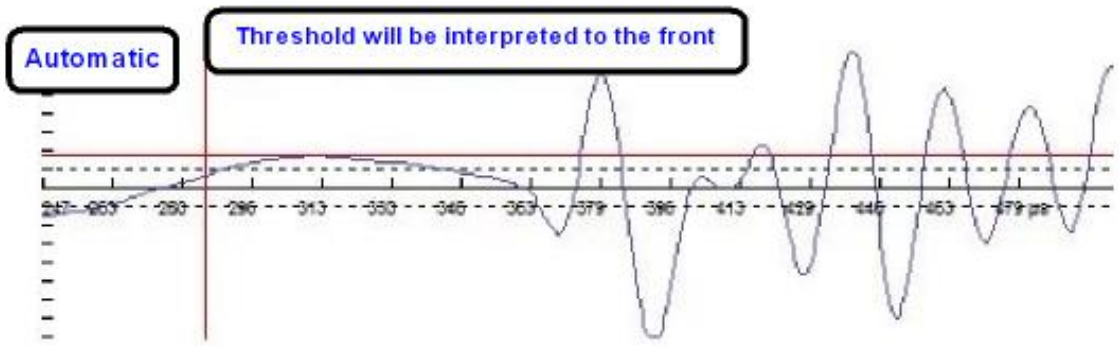
4.3 External Clock Trigger Mode

Trigger Acquisition - Mode 2: SYNC is used as the acquisition clock input port for acquisition, one data point is acquired for each pulse (falling edge) (1 high and 1 low level for 1 pulse).



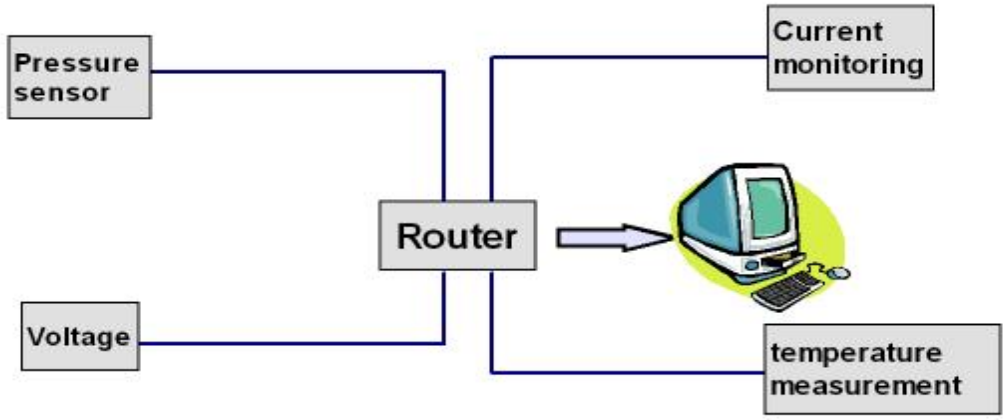
4.4 Analogue level-triggered acquisition mode

Trigger acquisition - Mode 3: Input analogue input channels (channels acquired by reference attributes), input one of the channels as a trigger signal, and trigger the acquisition to start when the voltage value of the trigger channel meets the set voltage threshold condition.



4.5 Multiple front-end acquisition at the same time

This acquisition system supports one acquisition terminal to collect multiple acquisition front-ends for time-sharing, which can easily build a multi-point measurement and monitoring system, and one transceiver supports a maximum of 255 acquisition front-ends.



5 LED status and indication

LED status		
Red and Blue Dual Colour Lamp(VE3668)		
	Red and blue lights	Note
The power supply is normal.		After power-on, no Ethernet or USB connection was made
Communication is normal	Blue light always on	Communication is normal
Waiting for the trigger	Blue light - flashes slowly once per second	Trigger acquisition pending
Acquisition in progress	Blue light - Flashes rapidly three times per second	Acquisition in progress
SD mode-no SD card	Prolonged extinguishing of lights	SD mode without SD card
SD mode-SD card normal	Red light - flashes slowly once per second	SD mode, SD normal, SD standby, waiting for offline trigger
Saving offline	Red light - flashes rapidly three times per second	Data is being saved in SD mode
DAQ abnormal	Red light - always on	DAQ abnormal

6 Quick installation and easy testing

For information packages, please go to our official website to download directly www.vkinging.com

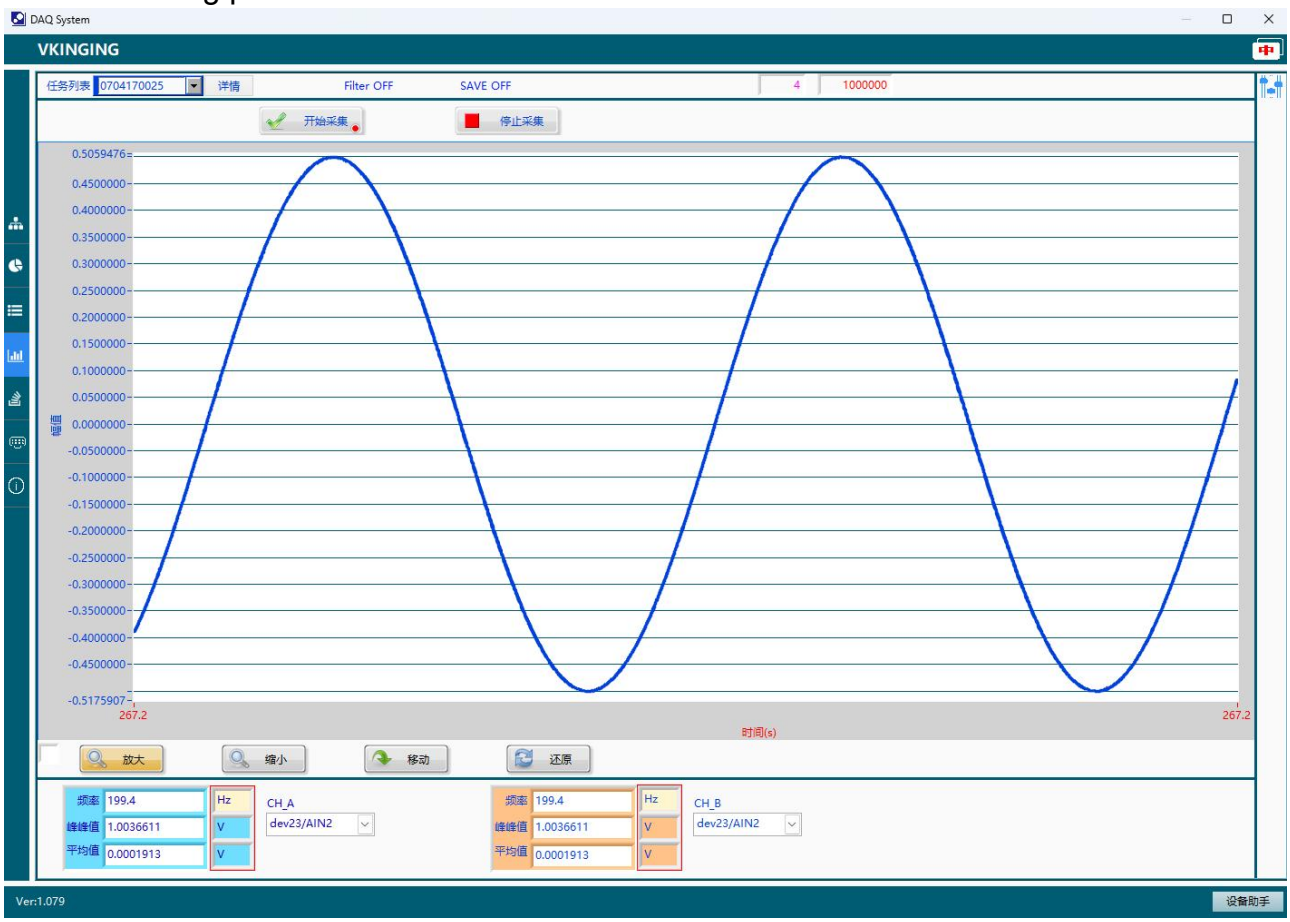
6.1 Installation of drivers and test software

The Ethernet function of this collector can be used directly without installing a driver.
If you need to use USB to modify IP address parameters or transfer data via USB, you need to install the USB driver.
The USB driver is included in our package with detailed installation instructions.

Our test software is designed for evaluation purposes and provides various development routines in the package.
The test software can be run directly after installation

6.2 Easy to use test software for testing

We have test software, you can test the hardware directly.
The following picture shows the interface of the software:

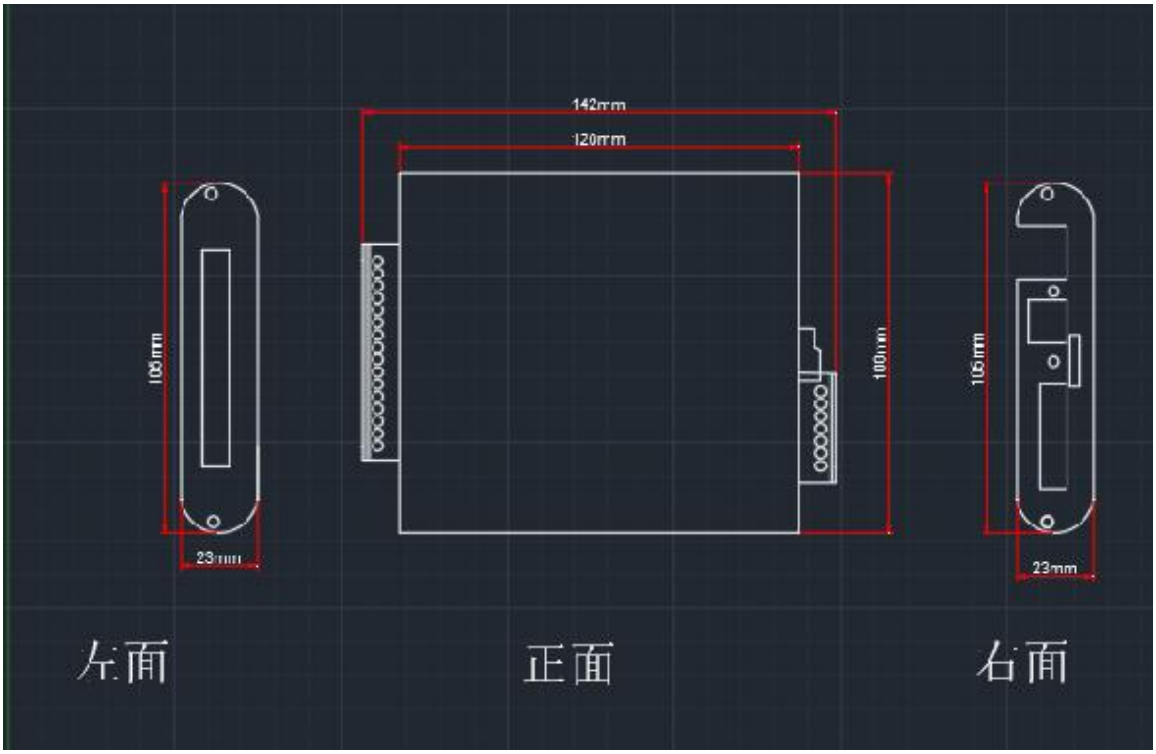


For more specific instructions on how to use the test software, please refer to the Test Software User's Guide included in our packages.

7 External dimensions and installation

VE3668N Mode:

VE3658N Mode:



8 Common Problems and Troubleshooting

Description of the problem	Methods of elimination	Other notes
USB driver installation	Firstly, connect the computer with USB, make sure the indicator light is on. Then operate the computer, right-click on my computer -> click on Management -> Device Manager -> Port, to see if you can see the VKxx capture card word driver, if not need to install the driver, detailed steps, please refer to the package "USB driver installation instructions"	
USB connection has serial port but cannot communicate	After plugging in the new serial port will appear, confirm whether there is a new serial port appears. If there is a new serial port, make sure If there is a new serial port, make sure the serial port number and baud rate are correct.	The default virtual serial port baud rate is 9600
USB plugged in can not display the serial port	1， part of the WIN7 system is optimised for the lack of relevant files. 2， individual computer system files are missing, please replace a computer or other operating systems and then test to confirm 3， Rule out poor contact with the USB cable or USB cable quality problems, replace a cable test.	
USB power up and no response	1， If using USB power supply, ensure the quality of the USB lead. If the voltage drop of the cable is too low, the USB power supply and communication may be abnormal. At this time, please replace the USB cable test to confirm. 2, can use green power supply special seat 8~24V power supply.。	Elimination: Use a multimeter to measure whether the 5V output of the IO terminal is 5V output to
USB easily disconnected	If there is strong interference in the neighbourhood, the USB may disconnect, which is determined by the transmission characteristics of the USB. It is recommended to replace the LAN Ethernet communication method	In industrial application scenarios, it is recommended to use LAN
LAN cannot communicate	1, please confirm the IP address and port, check the IP of the local computer to make sure it is in the same network segment. 2, Make sure the light on the Ethernet cradle is blinking normally. If the light is not on, check the quality of the cable 3、Check the connection by other communication methods.	Network cable length support up to 100m
Multiple LAN cards communicate abnormally	1, the IP address between different cards can not be the same, otherwise it will be conflict 2, whether there are other computers or devices within the network occupy the same IP 3， Check whether there is a possibility of duplicated MAC address	
SD offline mode does not work	1, confirm whether the SD mode is set successfully 2, Make sure the SD card format is correct 3， Check if SD card is formatted properly Please refer to our related information for use.	Please refer to our related materials to use

Large temperature drift	1， confirm whether the power supply is normal and stable 2， exclude whether it still exists after resetting the hardware 3， exclude the possibility of sensor causes 4， Replace the sensor channel, compare and confirm the exclusion	
Indicator light is off.	1, to confirm the power-up is correct, available USB power or switch to the dedicated port power 2, to confirm whether all the indicators do not light up If still can not be solved, please contact our after-sales personnel	Usually caused by incorrect power supply
VE3668 upper computer software related issues		Please refer to the VE3668 Software User's Guide included in the packet.

9 After-sales and warranty

—. Warranty:

The company with the attached warranty documents or directly affixed to the back of the equipment on the warranty sticker, to provide a one-year full warranty service, product warranty 10 years.

1 by our technical staff to confirm the initial product quality problems for the company, the customer will return to the product, within 3 days we confirm the maintenance and send back

2. If it is confirmed that the user is caused by improper use, we communicate with both sides to confirm that we will charge a certain amount of related costs.

二．maintenance:

All of our products are provided with 10 years of free maintenance services, the first year of free warranty thereafter, such as the need to replace components in the maintenance process, then only the cost of components charged.

三．exchange:

For new product failures the company provides three months of free replacement service, customers should first send back the faulty product in the form of logistics or express delivery, the company receives another new product back to the customer. Our company bears the freight cost of returning the product to the customer.

10 Version and revision history

Releases	Clarification	Time
V1.00	First version	2025.02.01

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