


NF601 North finder

Hamburg 
Engineering

Hamburg Engineering

info@hamburg-engineering.de

①About The North finder

1.1 INTRODUCTION

North Finder (Hereinafter referred to “the product”) is mainly used to fast determine their own true north, composed of double free revolving DTG(Dynamically Tuned Gyroscope), bi-axial accelerometer sensor, mechanical rotation device and the circuit of output signal processing.

1.2 DESCRIPTION

The product is mainly composed of a high-accurate DTG and two accelerometers. With the two basic traits of double free gyro: precession and gyroscopic inertia, gyro rotation axes relative to the inertia space remains unchanged, but the earth's rotation around the polar axes with its own angular velocity is revolving turning to the inertia space. You can find its rotation axis of the gyro relative to the earth is revolving if the earth is as the reference. That's why that gyroscope is able to track and measure the earth's axis rotation angular velocity. By gyro sensitive to the different components of angular velocity of the Earth axis rotation on X axis and Y axis, we can get the orientation information of the product reference axis and then get the tilt data of axes via the two axes accelerometer sensor. The platform of product is adjustable. The Principle structure is as follows:

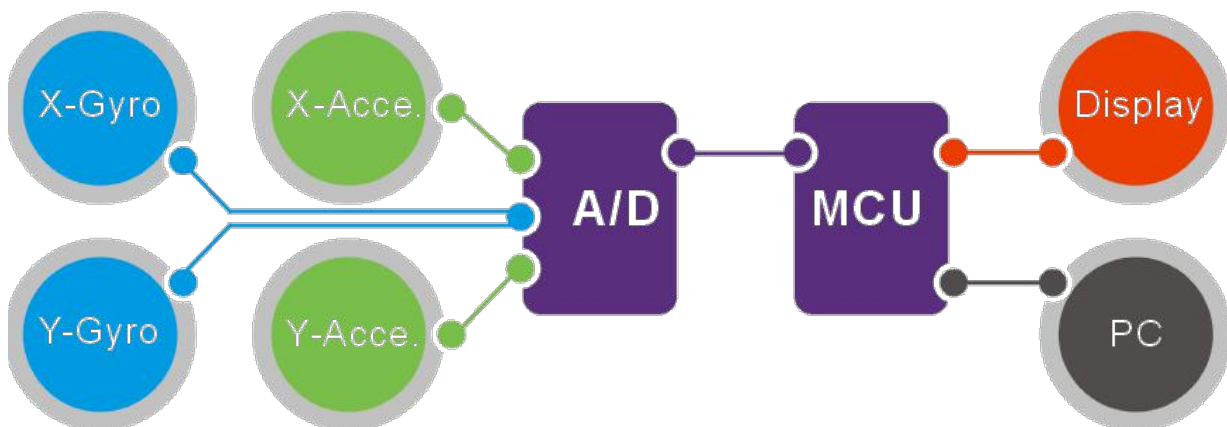


Chart 1: Product Principle Structure

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1.3 PERFORMANCE PARAMETERS AND FEATURES

Power supply	+24~+36 (customised)	V
Working current(rms)	<1.5	mA
Working mode	Static	
Tilt measuring range	±8	°
Accuracy of tilt measuring	±0.06	°
Tilt resolution	0.01	°
Digital output type	RS232	bit
Tilt angle digital display	4	bit
Bearing digital display	5	bit
Azimuth measuring range	0~360	°
Accuracy of azimuth measuring	<0.1	°
Azimuth resolution	0.01	°
North seeking time	<3.5	min
Set-up time	10	min
Net weight	<8	kg
Working temperature	-40~+60	°C
Impact	3g, 8~11	ms
Dimension	For details, see Appendix (customised)	mm

② INSTRUCTION

2.1 INSTALLATION

- ★ The flatness of the installation base level should be $\leq 0.05\text{mm}$, fix the product with screws and make sure they're in rigid connection.
- ★ Make sure and conform the product axis to that testing axis of system.

2.2 ELECTRICAL INTERFACE

- ★ Plugged-in Y11—1210, the Pins are defined as follows

1	2	3	4
Power Supply	Power Ground	RS232 TX	RS232 RX
5	6	7	8
RS232 Ground	NC	Control Side	Control Side
<u>OTHER PINS EMPTY IS STRICTLY PROHIBITED!!!</u>			

- ★ The Communication Interface and Data Format

1 NF601(TZ)

Digital output	RS232			
Baudrate	9600			
The data format	1 start bit, 8 DB, 1 stop bit, no parity bit.			
Data Frame Format:				
AA	YL YH	XL XH	HL HH	SUM
Frame Prefix	Y-Tilt	X-Tilt	Azimuth Angle	Check Sum
Frame data is total 8 bytes.				
Frame Prefix	Hex data AA			
Y-Tilt	Double-bytes, low byte first, 16-bit complement, 1bit			

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	=0.01°
X-Tilt	Double-bytes, low byte first, 16-bit complement data, 1bit=0.01° °
Azimuth Angle	Double-bytes, low byte first, 16-bit original code data, 1bit=0.01°
Check Sum	Single-byte, It is the result of the low 8-bit after the 2~7th byte adding together.

2 NF601(TZ)

Digital output	RS232	
Baudrate	9600	
The data format	1 start bit, 8 DB, 1 stop bit, no parity bit.	
Data Frame Format		
AA	HL HH	SUM
Frame Prefix	Azimuth Angle	Check Sum
Frame data is total 4 bytes.		
Frame Prefix	Hex data AA	
Azimuth Angle	Double-bytes, low byte first, 16-bit original code data, 1bit=0.01°	
Check Sum	Single-byte, it is the result of the low 8-bit after the 2~3th byte adding together.	

2.3 USE STEPS

- ◆ Fix the item on the working board as instructed and connect them properly to the supply devices in accordance with the pin definition.
- ◆ Adjust the power supply to its normal working voltage, check the power connection again and turn on the power after confirmation. The

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working current should be more than 500mA but smaller than 1A, otherwise turn off the power rapidly.

◎ After power on, there is a sign “” rolling displayed on screen.

◎ After 95s set-up time, the tilt angle data of X Y axis will be displayed on the LED display screen of the front.

◎ The above data is continuous on and waiting for customers' next command on the control end.

◆ After clients triggering the control end or inputting the seeking north command, the tilt angle data and azimuth information of X Y axis will be output and displayed only after 3min. Then its system will enter into next standby mode.

◎ The first line data on screen is for X axis, the second for Y axis and the third the current azimuth data.

◆ The Use of The Control End: After the product power on 95s, the current tilt angle will be displayed. And then its system will start to determine the state of trigger end: for example, when the 7 and 8 pins shorted and continued for more than one second, product system would consider that's an effective trigger signal and begin to seek the north within 3mins, which will be displayed as the countdown on screen. After time's over, the relevant data will be output. When the two pins are continuous open and shorted less than one second, system will be in wait state. It will be working only when the effective trigger signal is received every time. When the two pins are continuously in shorted state, the product system will output the current angle information of the tilt and azimuth every 3minutes.

◆ Seeking North Command

Serial port input, standard RS-232, 8-bit data, 1-bit start bit, 1-bit stop bit, no parity bit, baud rate 9600.

Command Format: ASCII string “\$NF*” , time interval between bytes more than 10ms.

◆ For the **NF601(TZ)** serie of products with tilt output, when starting the seeking, customers should firstly and repeatedly adjust the work surface level to make sure the stable tilt output less than 0.5°, that is

X Y axis data shown on screen. Otherwise, the output accuracy of azimuth angle will be affected.



NOTES: The product current value will be variable between 500mA and 1.2A during working. Please be assured that this is normal.

③ SYSTEM TESTING

This chapter described is made for the products upon rigorous testing procedures in the factory. If you have any question or requests, please don't hesitate to get in touch with us.

3. 1 PARAMETERS TESTING

3. 1. 1 Accuracy Test of Azimuth

Fix the calibrated product on the stable work platform and do testing usually no less than 8 times, continuously or interruptedly, with the specified power supply. By the following formula, the results should be consistent with the product performance requirements.

$$S = \sqrt{\sum_{i=1}^n \frac{(\alpha_i - \bar{\alpha})^2}{n-1}}$$

In Formula: S—Refer to the accuracy of seeking north (1σ);

n—Testing times ($n \geq 8$), $i = 1, 2, \dots, n$;

α_i —The "i" th testing value;

$\bar{\alpha}$ —the mean value after “n”times of testing;

3. 1. 2 Time Test of North Seeking

As the above 3.1.1 stipulated , before testing the accuracy of north seeking,successively measure with a timer from that point of starting display of seeking to the point of finish seeking north. The test results should be consistent with the product performance requirements.

3. 1. 3 Insulated Resistance Test

As stipulated in GJB998, 6.1 and 6.2, when the product is in non-working mode,test the insulated resistance between these separate circuits ,and that between the circuits and the casing, by megohmmeter. The testing results should conform to : the insulation resistance $\geq 20\text{M}\Omega$ under standard atmosphere and $\geq 2\text{M}\Omega$ under hygrothermal conditions stipulated.。

3. 1. 4 Tests of Accuracy And Tilt Measuring Range

According to the instalation instruction, Install the product on the tilt-rotating working platform and adjust its level degree no more than 0.03° ,so that to make the system working properly.Rotate the platform according to the direction of X and Y axis in the measring range from 0° to $\pm 8\text{deg}$,write down the tilt angle output by the system every 2degrees. After deducting the installation error, the inclination angle accuracy shall meet the performance requirements.

3.2 ADAPTABILITY TO ENVIROMENT

3.2.1 Working Under High-Temperature

Put the product in the high-low temperature chamber, making the temperature rise to $+60^\circ\text{C}$.After keeping warm for two hours, switch on the product power to check if it can work normally and also meet the demands as follows:

Parts shall not damage;

- a) No components is damaged.

-
- b) The device works properly.
 - c) Data communication is normal.

3.2.2 Low temperature

Put the product in the high-low temperature chamber, making the temperature reach to -40°C . After keeping warm for two hours, switch on the product power to check if it can work normally and also meet the demands as follows:

- a) No components is damaged.
- b) The device works properly.
- c) Data communication is normal.

3.3 Materials and components

The raw material adopted is carried out in strict accordance with the the product design stipulated and comply with the following requirements:

- a) The electronic components need be with stable quality, reliable performance and from stable supply manufactures.
- b) All e-components was sifted according to the relevant standards.

3.4 DIMENSION AND TOLERANCE/PUBLIC ERRAND

Re.the shape and installation position ,please refer to the appendix.

The product dimension and tolerance must conform to the requirements of the design pattern.

3.5 SURFACE AND APPEARANCE CONDITIONS

The conditions are as follows:

- a) The surface color is consistent with the drawings for all of its parts, color uniform
- b) The surface coating should be with no defects,such as obvious scratches, loss, peeling, blistering, cracking and corrosion, etc.
- c) The colors of the characters carving, symbols and signs should be uniform, clear and solid.
- d) The outside surface should be clean, no grease, sealants and other residues. The exposed fasteners or connectors slots, holes and edges should not be fluffed and injured.

④PRODUCT MAINTANCE

~~Before the analysis in this chapter ,DO MUST pay attention to the following points:~~

- ◆ The product is the precision equipment. It requests to handle with care, otherwise the compact will exceed its limit and bring about the permanent damage.
- ◆The product is required to operate strictly in accordance with the manual,otherwise the permanent damage will be caused.
- ◆ With its own peculiarities in the use of the product, the operator must learn more about the product instruction firstly and foremostly.
- ◆**before the boot or after shutdown, the product MUST be placed and kept static on the horizontal plane for two minutes.**
- ◆ The largest eigenvalue:
 - 1)SHOCK: 10g 8~12ms
 - 2)Operating temperature: -40℃~+60℃
 - 3)Storage temperature: -45℃~+65℃

Permanent damage may occur if exceed the largest eigenvalue!!!

To summarize solution through practice for user to consult as the below
Power current abnorm (Current >1.2A or <500mA)

1. Check the voltage of power supply meet the requirments or not,The wrong power-line connections will damage the motor.

2.No signal output

Check the serial connection and serial port settings, the data received is correctly formatted or not.

3.Other questions

Please send it back to our factory for repair.



The product has own defect within one-year warranty , If the product is broken, all charge will be paid by your site. If the product faulty or damaged, Don't repair it by youself, Please send it back to us for repair.

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⑤ THE LIST OF SYSTEM

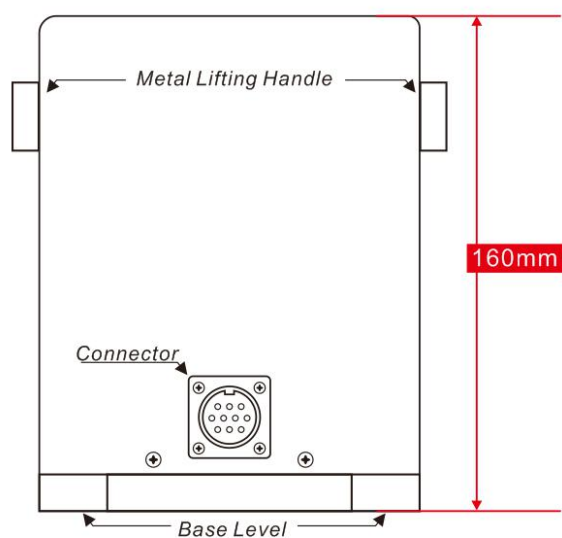
Name	Qty
North Finder	1
Connector	2
RS232 To USB Converter	1
Software of Disk	1
Instruction	1

APPENDIXES

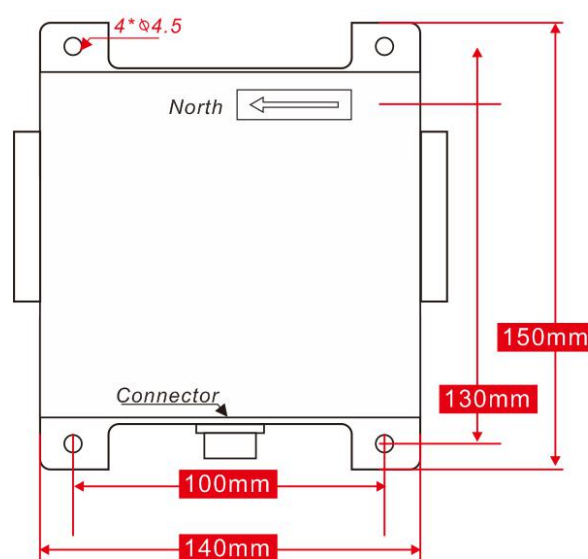
A Dimension



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Dimensions: L150*W140*H160mm



B Electronic Connection

Color	Functions
Red、 Green	+24V Input
Black、 Brown	+24V Input GND
Yellow	RS232 TX
Orange	RS232 RX
Gray	RS232 GND
Blue	Control Side
White	Control Side

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※ More products information, please refer to the company's Website :
www.hamburg-engineering.de