NORTH FINDER
Product Manual

BS-NF600-M-D6EC

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 speace.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:
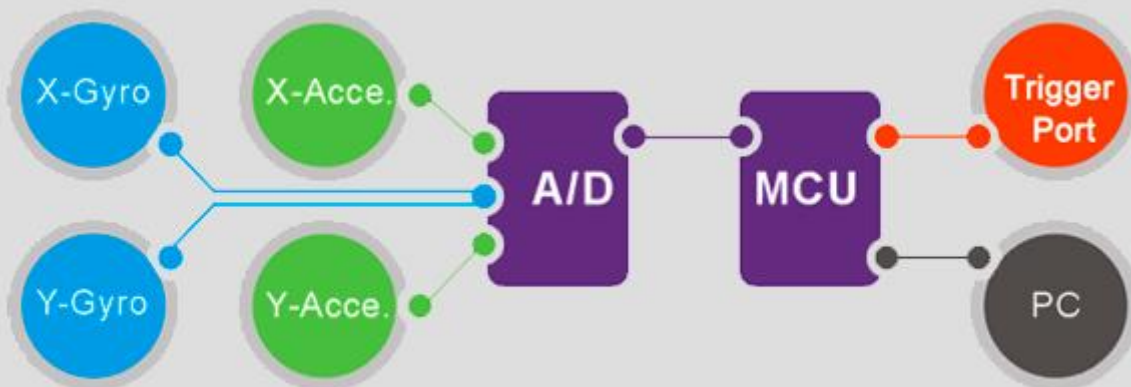

Chart 1: Product Principle Structure

1.3 PERFORMANCE PARAMETERS AND FEATURES

Power supply	＋18～＋36(Standard:28V)	V
Working current(rms)	＜1.5	A
Working mode	**Static**	
Tilt measuring range	±8	°
Accuracy of tilt measuring	<±0.06	°
Tilt resolution	0.01	°
Digital output type	RS232	bit
Azimuth measuring range	0～360	°
Accuracy of azimuth measuring	**<0.06**	°
Azimuth resolution	0.01	°
North seeking time	<3	min
Set-up time	<10	min
Net weight	<4	kg
Working temperature	-40～+60	℃
Store temperature	-55～+70	℃
Impact	3g，8～11	Ms
Dimensions	L170×W170×H160	mm

② INSTRUCTION

2.1 INSTALLATION

★ The flatness of the installation baselevel should be≤0.05mm，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 Y11S1210ZJ10，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 STRICLY PROHIBITED!!!</u>			

★The Communication Interface and Data Format

1 BS-NF600-M-D6EC

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

2.3 USE STEPS

*1.*Fix the item on the working board as instructed and connect them properly to the supply devices in accordance with the pin definition.

2. Adjust the power supply to its normal working voltage(Standard power DC +28V),check the power connection again and turn on the power after confirmation.The working current should be more than 500mA but smaller than 1A,otherwise turn off the power rapidly.

3. If the user trigging the control end or inputing the seeking north command， north finding data will be output 3 minutes later. it will find north automatically once on the two ends touched each time. to find north continuously, Please keep short circuit the control end. The north finder system will output the current angle information of the tilt and azimuth every 3minutes.

4.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 that 10ms.

◆ For the **BS-NF600-M-D6EC** 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.
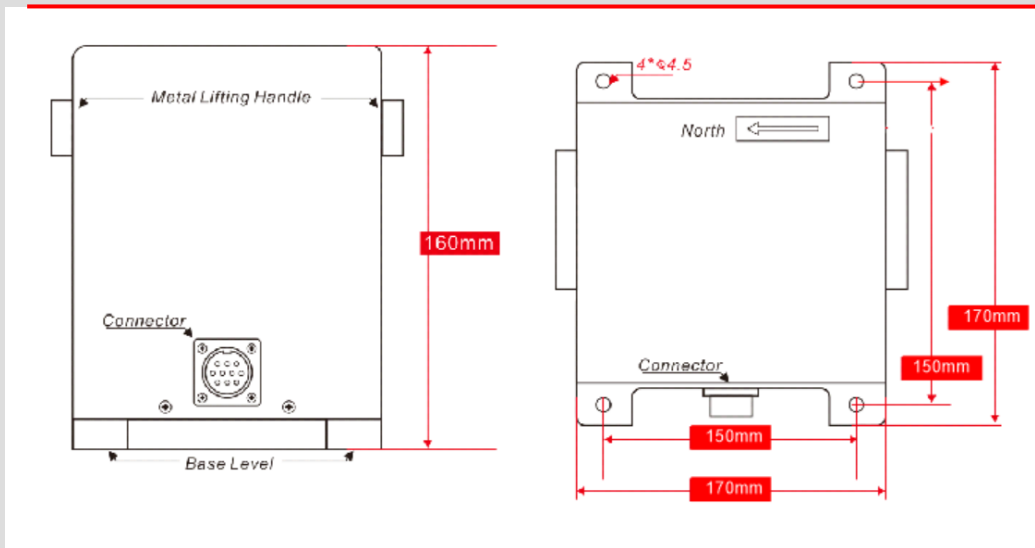
NOTES: The product current value will be variable between 500mA and 1.2A during working.Please be assured that this is normal.

2.4 Product Pictures

2.5 DIMENSION

Dimension: L170*W170*H160mm

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

3.1.1Acuracy Test of Azimuth

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

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

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

　　　　n—Testing times（n≥8），i =1，2……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.

3.1.4 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 0.03º,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 0º to ±8deg,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℃.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.

3.2.2Low temperature

Put the product in the high-low temperature chamber, making the temperature reach to－40℃.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.

3.3Materials 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 injuryed.

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.

◆**before the boot or after shutdown, the product MUST be placed and kept static on the horizontal plane for 1 minutes.**

◆ The largest eigenvalue：

1)SHOCK：3g 8～12ms

2)Operating temperature：-40℃～+60℃

3)Storage temperature: -55℃～+70℃

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.

⑤THE LIST OF SYSTEM

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

APPENDIXES

Electronic Connection

Color	Pin	Functions
Red	1	＋28V Input
Black	2	＋28V Input GND
Yellow	3	RS232 TX
Orange	4	RS232 RX
Brown	5	RS232 GND
Green	6	Factory test
Blue	7	Control Side
White	8	Control Side