Ananda Drive Techniques (Shanghai) Co.,Ltd.

Technical Specifications

Product Name: torque sensor

Model: S15

Version No.: 08

Release Date: 2023-09-22

Prepared by: Zhu Huixiang

Reviewed by: _____

Confirmed by customer: _____

Approved by: _____

Document No.: AR-QP09- 14

Record S/N: 01040145-08

Preface

This document specifies the technical specifications for the product listed.

This document specifies the requirements on functions, conditions of use, reliability, materials and etc. of the product listed.

The Product is designed and produced for the markets in the EU, the U.S., and China.

If the Product is to be sold to a country or region other than that, additional approval might be required to ensure the compliance with local regulations and the limits of any intellectual property rights.

Applicable models include:

Torque sensor S15

Special notes:

Any change made to the Technical Specifications must be subject to the ANANDA procedure for document modification as well as re-confirmation by the signatories and approval of the customer.

The clarification and explanation for any clauses herein shall be subject to the instructions of the technical lead of the project.

Revision history:

Version	Doc. No./Content of revision	Revised by	Date
01	Adding of packaging information and revision of electrical definitions of interfaces	Zhu Huixiang	2022/09/08
02	Modification of the technical parameter list according to the meeting minutes	Zhu Huixiang	2022/09/22
03	Adding of tooth profile parameters of the matching crankset	Zhu Huixiang	2022/ 10/09
04	Update of technical parameters, optimization of left and right axle cups, and adding of installation instructions	Zhu Huixiang	2022/ 10/24
05	Modification of electrical definitions	Zhu Huixiang	2022/ 11/22
06	Adding of electrical definitions and revision of the parameter list	Zhu Huixiang	2023/02/28
07	Template modification	Zhu Huixiang	2023/08/10
08	Modify standard,Add Double signal parameter, Add Outline dimension ,Correct storage and use temperature	Zhu Huixiang	2023/09/22

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Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

1 General

1. 1 Scope

The Specification specifies the detailed requirements for functions and materials of the S1 5 torque sensor and provides some other information. All technical requirements specified herein are subject to verification in predefined procedures. The number of samples for testing shall be sufficient to verify the long- term compliance of the product with the Technical Specification.

1.2 Product functions and applications

This product is a power sensor for an electric bicycle, integrating torque and speed measurement. Scope of application: This sensor is used to measure the torque and speed of bicycles and electric vehicles.

1.3 Normative references

a. EN15194: *2017 Cycles - Electrically power assisted cycles - EPAC bicycle*

b. ISO 4210 2014 *Cycles – Safety requirements for bicycles*

c. GB 17761-2018 *Safety technical specification for* electric *bicycle(China)*

d. GB/T 2423.17-2008 Environmental testing for electric and electronic product(China)

2 Product definitions

2. 1 Product features

a. High precision and linearity;

b. No signal drift

c. Fast dynamic response;

d. Maintenance-free, high interchangeability;

e. Small size (standard bottom bracket);

f. Non-contact, long service life, insensitive to bending and axial motion;

g. Low power consumption, long-term stability;

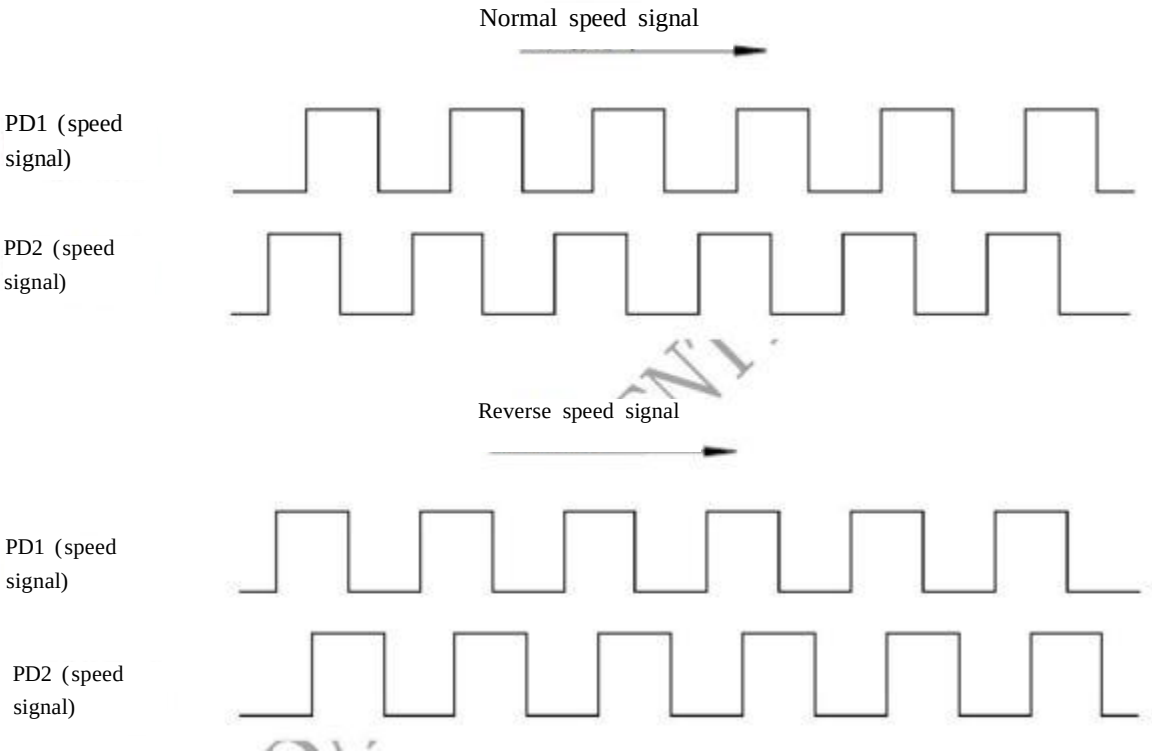
h. Adjustable assembly size and input/output signal.

2.2 Technical parameter requirements

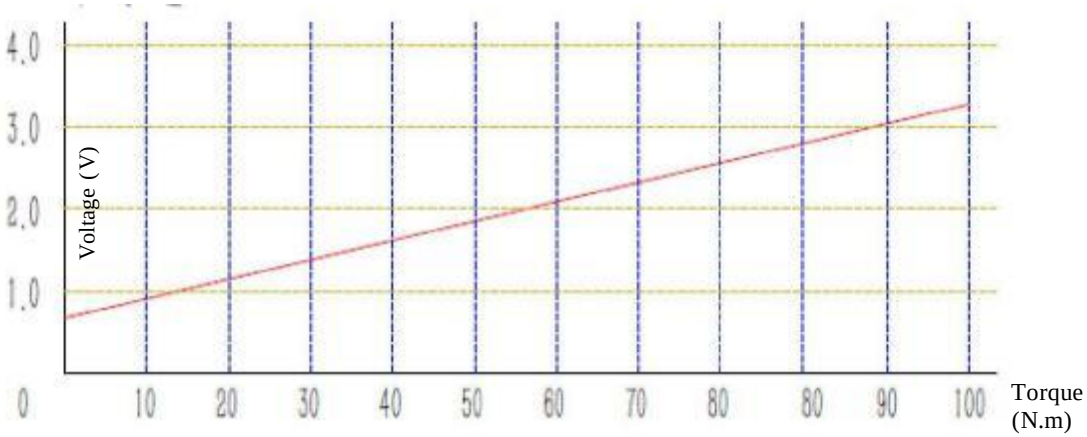
Product Specification / Item	BBTS 1.1 Central Axle Torque Sensor
Input voltage	4.5~5. 1V
Power input	<0.22W
Torque output analog voltage	0.75~3.34V
Number of speed signal pulses	24r
Duty cycle of speed signal	50%
Slope of sensor signal	25mV/N ·m
Measurement range	0~ 100N.m
Design standard	EN14764
Headset thread gauge	BS(C) 1.375X24
Measurement type	Static and dynamic
Crankset specification	General bicycle standard
Protection class	IP66
Salt spray tset	96H
Operating temperature	-20~55℃
Storage temperature	-20~ 60℃

2.3 Speed signal

Power on the central axle torque sensor properly, connect its speed signal wire to the probe of an oscilloscope, and turn the central axle torque sensor by one revolution. The oscilloscope can detect 24 sets of square pulse waves in the signal output of the central axle torque sensor.



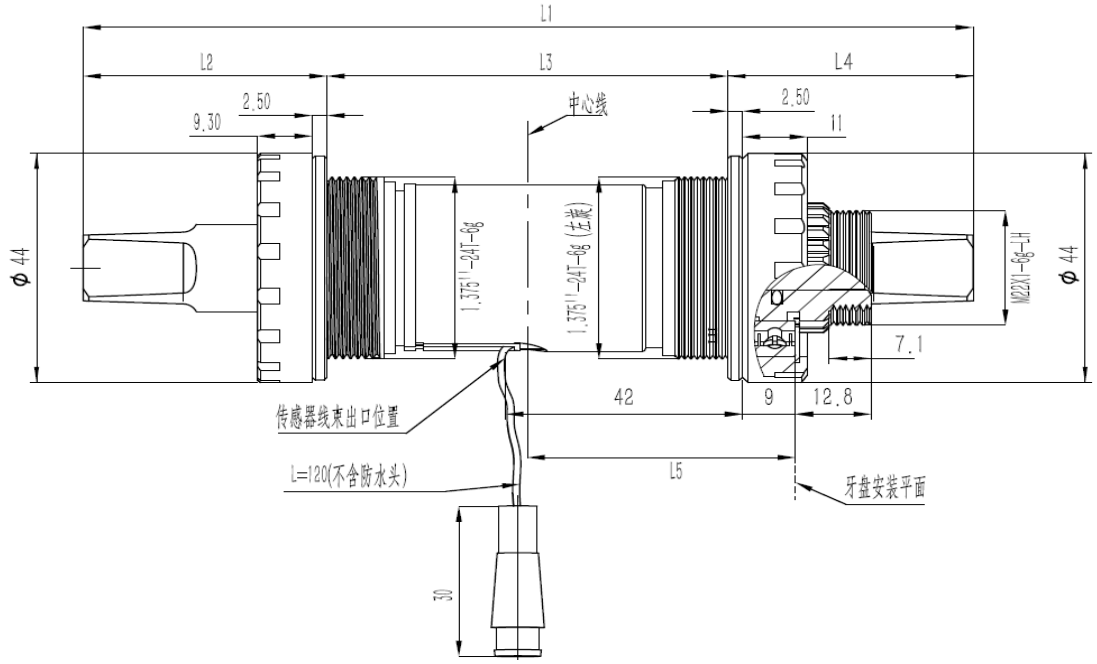
2.4 Torque signal



2.5 Product appearance and size

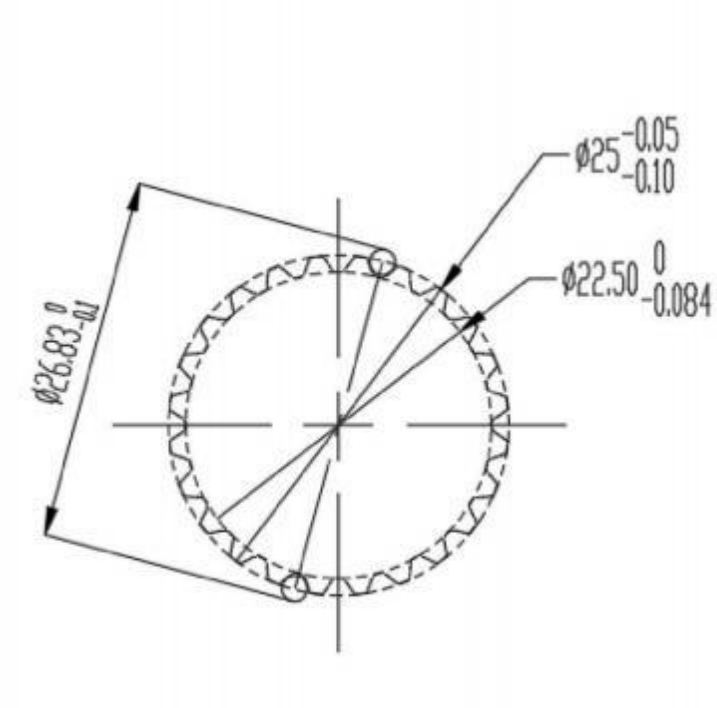
a. Outline drawing

b. Outline dimension drawing

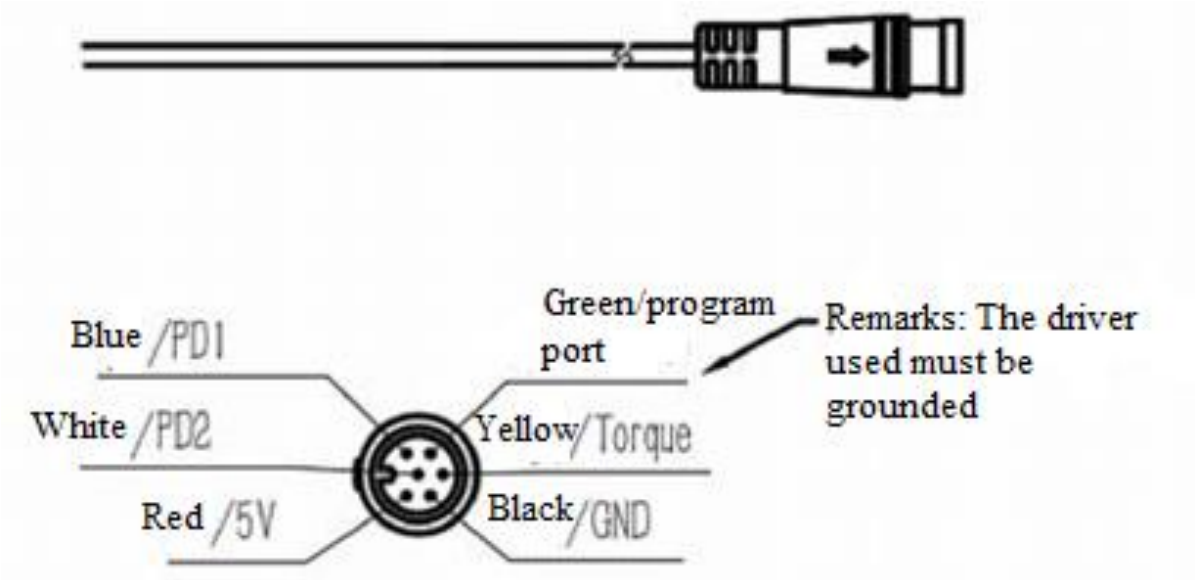


Specification	L2	L3	L4	L5
L1= 151mm	41.5mm	68mm	41.5mm	45.5mm
L1= 151mm	39mm	73mm	39mm	45.5mm
L1= 165mm	40.5mm	84mm	40.5mm	53.5mm
L1= 181mm	40.5mm	100mm	40.5mm	61.5mm

2.6. Threads and parameters of crankset installation



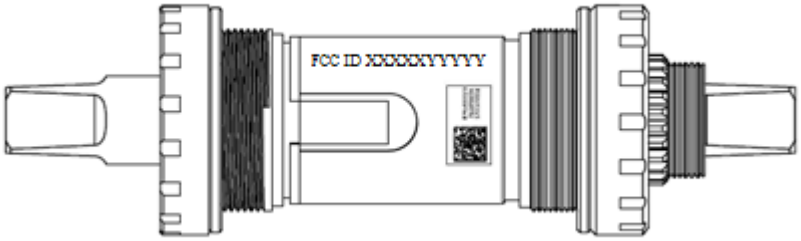
External spline	
Item	Value
Number of threads	24
Modulus	1
Pressure angle	30°
Diameter of pitch circle	24
Diameter of base circle	20.78
Outer diameter and deviation	φ25 (-0.05, -0.1)
Inner diameter and deviation	φ22.5 (0, -0.084)
Tolerance class and fit class	6f
Minimum radius of root arc	0.2
Maximum thread thickness	1.518
Minimum thread thickness	1.465
Diameter of the starting circle of involute	22.866
Thread profile tolerance Ff	0.03
Threading tolerance Fβ	0.011
Measuring bar diameter Dm	1.9
Cross-bar spacing Mre	φ26.83 (0, -0.1)



2.7 Remark：

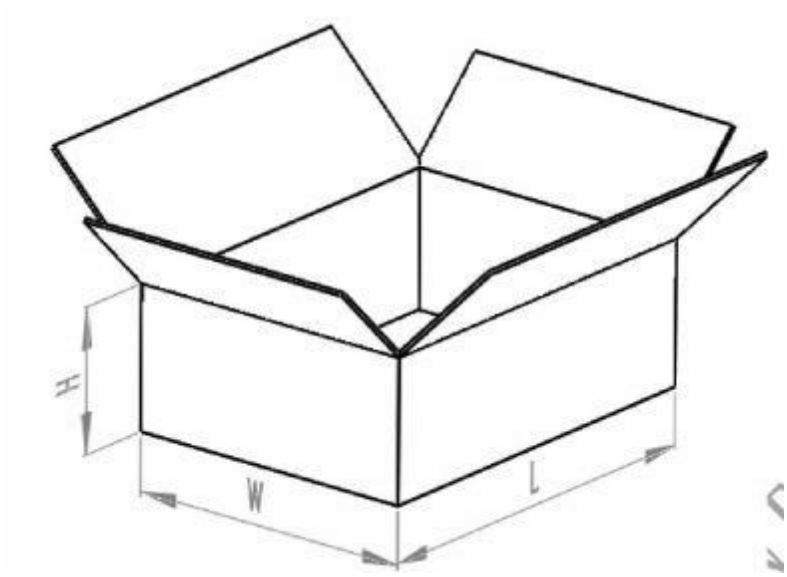
EP64000xx-------- Material code of customer;
1220100008-------Material code of Ananda;
S15YYWWXXXX---S15： Type

YY：Year
WW：Week
XXXX：SN



2.8 Packaging requirements

a. Size of packaging box



L =508mm

W=380mm

H= 182mm

b. Quantity:

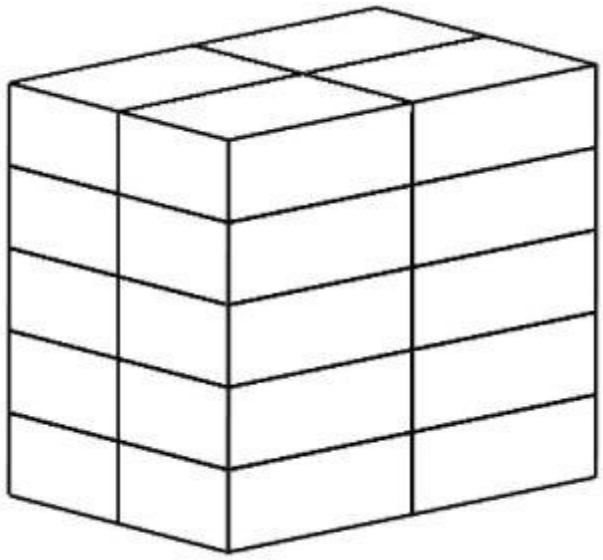
Specification: S15 L1= 151 per box 42pcs

Specification: S15 L1= 165 per box 42pcs

Specification: S15 L1= 181 per box 30pcs

Note: Components and parts can be packaged separately.

c. Each carton should be marked with info on: logistics, product, quantity and model; Products are shipped with pallets. The stacking height and number of products on each pallet shall meet the order requirements. The length, width and height of each pallet are limited to 1,200mm × 800mm × 1, 100mm.



d. Packaging materials shall be green, energy-efficient and recyclable.

3 Instructions for Use

3. 1 External conditions:

Excessive mechanical stress (e. g. longitudinal force/load exceeding the specified limit, and intense vibration) may cause damage to the sensor and result in poor signal output.

3.2 Safety measures

a. Do not remove the sensor housing under any circumstances.

b. Note the maximum electrical and mechanical load requirements in sensor specifications.

c. Protect the sensor from exposure to any electromagnetic field that does not conform to electromagnetic compatibility requirements.

4 Installation Diagrams

Step 1: Tighten the left headset as shown in the figure. (Tightening torque: 35NM)

Step 2: Insert the torque sensor assembly through the left side of the bottom bracket, and pull its wire out of the lower hole of the bottom bracket.

Step 3: Tighten the right headset as shown in the figure. (Tightening torque: 35NM)

Step 4: Install the crankset until its spline is fitted with that of the torque sensor.

Step 5: Tighten the locking nut as shown in the figure.

Step 6: Install the crank. Thus, the torque sensor installation is completed.

Warning: The 2.5mm washers at both ends of the torque sensor must be installed to avoid axial over-tightness and uneven crank rotation.