锐鹰传感
REAGLE SENSING

Split-type single-turn absolute rotary encoder

SROA35-23Bit-SY-C-5V

SROA46-23Bit-SY-C-5V

SPECIFICATION

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ZHEJIANG REAGLE SENSING TECHNOLOGY INCORPORATED

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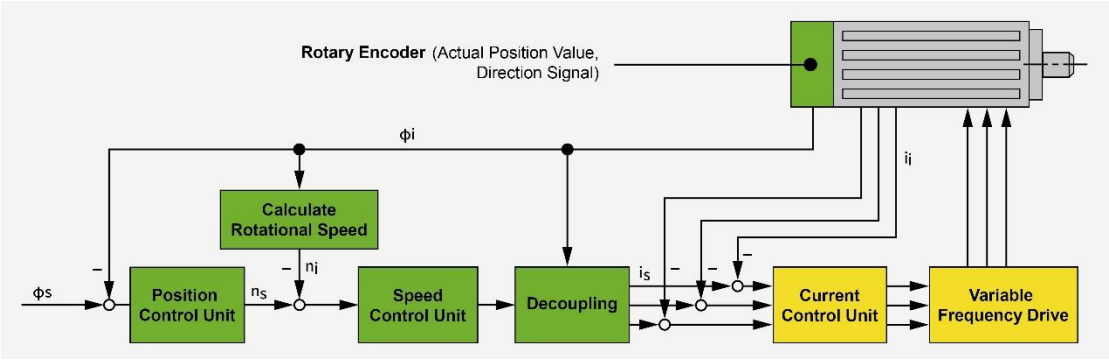
1. Summary Info

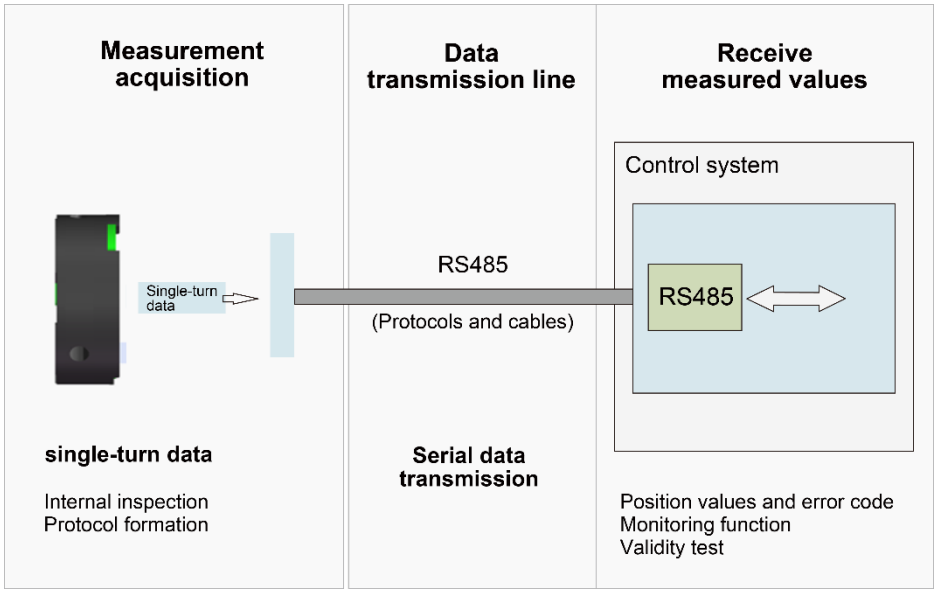
This manual primarily describes how to use the split-type Single-turn absolute rotary series SROA35 and SROA46 encoder from Reagle Sensing. This product is mainly used in servo-driven control systems, providing the feedback information required for accurate position and speed control units.



Position and velocity control system

The performance of the encoder has a decisive impact on the essential characteristics of the motor, such as:

- Positioning accuracy
- Speed stability
- Bandwidth, determining the response speed to drive command signals and resistance to interference
- Motor size
- Noise



RS485 Communication Encoder

2．Technical Specifications

Model	SROA35-23Bit-SY-C-5V SROA46-23Bit-SY-C-5V
Resolution	Supports up to 8388608（23bit），17bit Compatible
Absolute Positioning Accuracy	—（Dependent on the rotational accuracy of the motor shaft）
Repeatable positioning accuracy	＜±5″
Auxiliary Functions	Fault Warning * Electromagnetic Environment Warning
Communication Interface	RS485
Communication frequency	≤16kHz
Baud rate	2.5Mbps
Input shaft allowable deviation	Axial：——　　Axial play：＜0.1mm Radial：±0.1mm　　Radial play：＜0.01mm Tilt：＜0.1°
Main shaft speed	≤6000rpm
Moment of inertia	straight shaft Ø6mm
moment of inertia	0.21kg·mm^2
Starting Torque（20°C）	≤0.005N·m
Weight	≈0.021kg（excluding cables）
Rotor angular acceleration	≤80000rad/s^2
Vibration	Between 10 and 55Hz, maintain amplitude of 1.5mm. Between 55 and 2000Hz, acceleration is 98m/s². 2 hours per axis for XYZ, totaling 6 hours.
Mechanical shock	Shock acceleration of 980m/s², 11 milliseconds. 3 impacts per direction, totaling 18 impacts.
Operating Temperature	-20°C~105°C
Relative Humidity	≤90% (40°C/21 days, based on EN 60068-2-78); No condensation
Enclosure Protection Rating	—（Motor Rear Case Protection）

3. Electrical Parameters

Items		T=25℃		
		Min.	Typ.	Max.
Main power supply voltage		4.75 V	5V	5.25V
Main power supply Current (Typ)		--	90mA	--
Differential Level	High	3.5V	--	--
	Low	--	--	1.7V
Edge Change Time		--	--	100ns
Insulation resistance		50MΩ	--	--

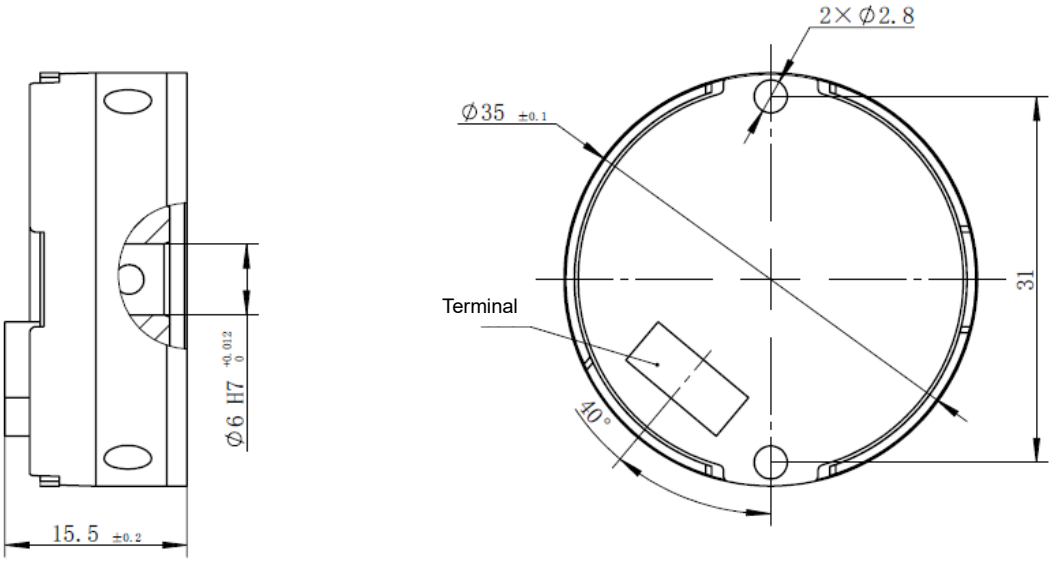
4. Cable Definition

Cable color	Definition
Red	5V
Black	GND
Blue	485+
Yellow	485-
Brown	NC（Not connected）
White	NC（Not connected）
Shielding mesh	PE

5. Mechanical Specifications

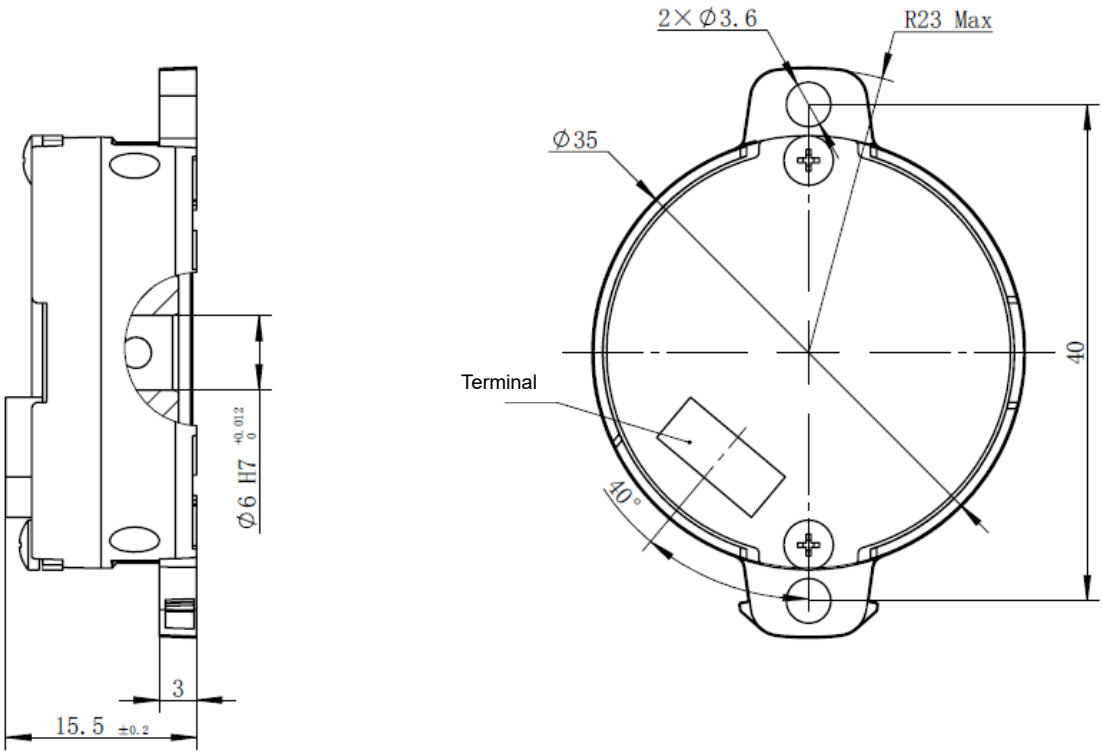
5.1 SROA35 series

✧ Product Structure Dimension Diagram

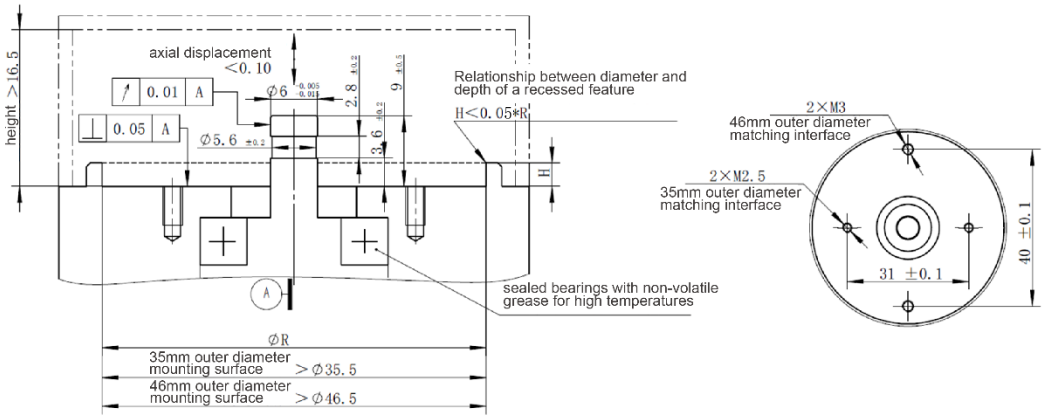


5.2 SROA46 series

✧ Product Structure Dimension Diagram



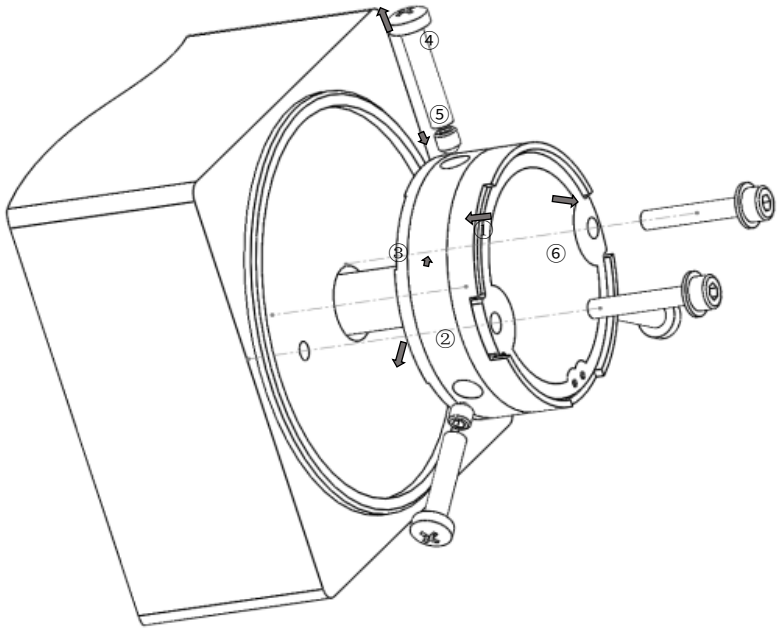
✧ Recommended Motor End Design Dimensions



6. Mounting Procedure

6.1 SROA35 series

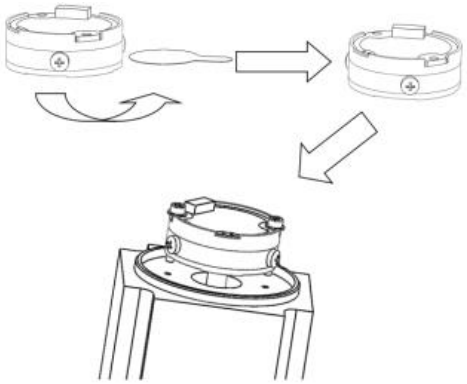
6.1.1 Installation Diagram



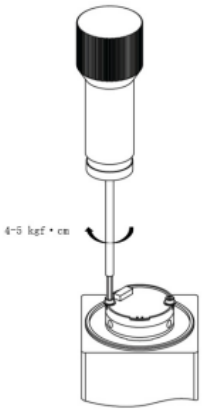
6.1.2 Installation Accessories

- 1.5mm metric hex key torque wrench
- 2.0mm metric hex key torque wrench
- Phillips screwdriver

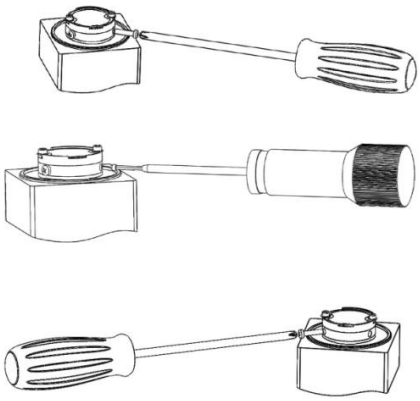
6.1.3 Installation Sequence



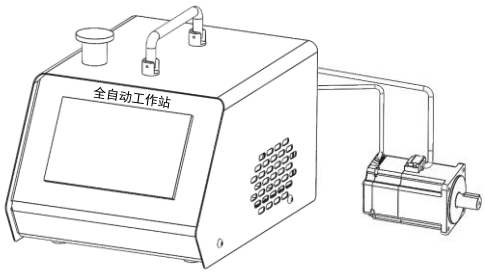
① Remove the dust cover from the bottom of the encoder.
Insert the encoder shaft into the motor shaft until the bottom of the encoder is flush with the rear cover of the motor. Adjust the angle so that the screw holes on the encoder align with the threaded holes on the motor rear cover.
Secure the encoder in place by inserting M2.5 combination screws into the screw holes on both sides of the encoder.



② Use the appropriate hexagon socket wrench to sequentially tighten the M2.5 combination screws on both sides until they are flush with the PCB (Printed Circuit Board).Finally, tighten both screws to 4-5 kgf·cm of torque to secure them in place.



③ Use a Phillips screwdriver to remove one screw from the side wall. Insert an M3*3 hex socket set screw and preliminarily tighten it. Remove another screw from the side wall. Insert another M3*3 hex socket set screw and tighten it to 7 kgf·cm. Tighten the first set screw to 7 kgf·cm. Finally, remove the remaining screw from the side wall to complete the encoder installation.

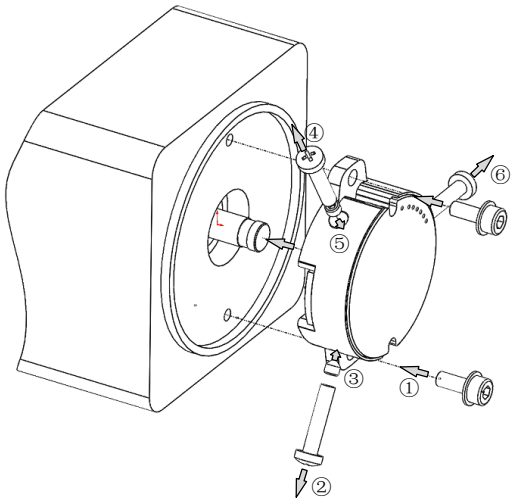


④ After the motor rear cover assembly is complete, connect the motor cables and encoder cables to the workstation. If the test is successful, it indicates that the encoder installation is entirely correct and the installation process is complete.

【Note】: The encoder must be tested and confirmed by the workstation to ensure that the installation is stable and reliable.

6.2 SROA46 series

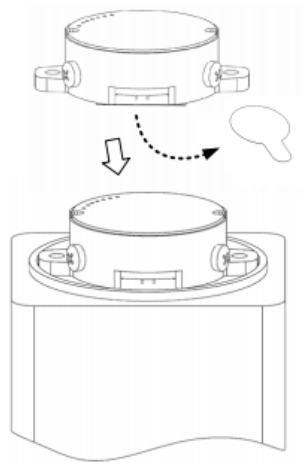
6.2.1 Installation Diagram



6.2.2 Installation Accessories

- 1.5mm metric hex key torque wrench
- 2.0mm metric hex key torque wrench
- Phillips screwdriver

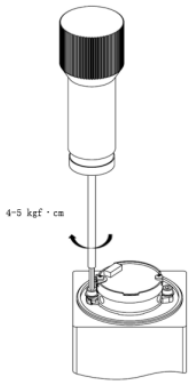
6.2.3 Installation Sequence



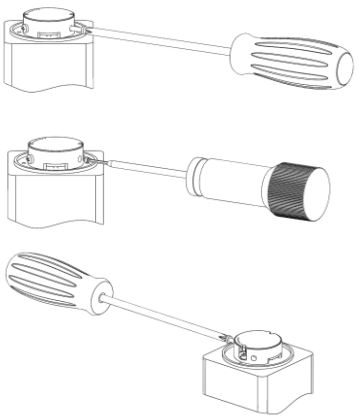
① Remove the Encoder Lower Dust Cover:

Remove the dust cover from the lower part of the encoder.

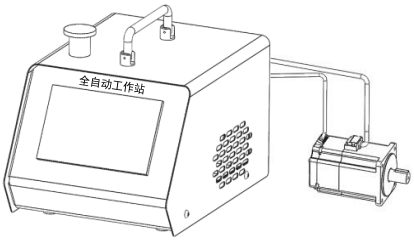
Insert the Encoder Shaft into the Motor Shaft: Insert the encoder shaft into the motor shaft until the bottom of the encoder aligns with the rear end cover of the motor. During normal fitting, inserting the encoder should not require force. If there is resistance, check the dimensions of the motor and inspect for any signs of compression damage or foreign objects. Do not apply force to push the encoder down during.



② Use the appropriate internal hexagon torque wrench to lightly tighten the M3 combination screws on one side. Then, lightly tighten the M3 combination screws on the other side. Next, sequentially tighten both sides of the screws with a torque of 4~5 kgf·cm.



③ Use a Phillips screwdriver to remove one screw from the side wall. Insert an M33 internal hexagon socket set screw and pre-lock it. Then, remove the other screw from the side wall and insert another M33 internal hexagon socket set screw. Tighten it to 7 kgf·cm. Next, tighten the first set screw to 7 kgf·cm. Finally, remove the remaining screw from the side wall to complete the installation.



④ fter assembling the motor rear cover, connect the motor wires and encoder wires to the workstation. If the test is successful, it indicates that the encoder is installed correctly. The installation process is now complete.

【Note】: The encoder must be tested and confirmed by the workstation to ensure that the installation is stable and reliable.

7. Communication Specifications

7.1 Overview

Items	Description	Remarks
Communication Code System	Binary	--
Communication Circuit	Differential Drive	RS485
Data Transmission Content	Single-Turn Position Information	17 bit（maximum support 23bit）
Communication Rate	2.5 Mbps	--

7.2 E^2PROM Communication Specifications

Items	Address	Description	Remarks
Readable and Writable User Parameter Address Range	0~0x7E* page8	User Parameter Domain	This address domain can be used to store user parameters. The partial area on page 8 is reserved and not recommended for customer use.
Page Address	0x7F	0~7	Within this range
Maximum Number of Erase Cycles	100000 times		Executable Operation Count

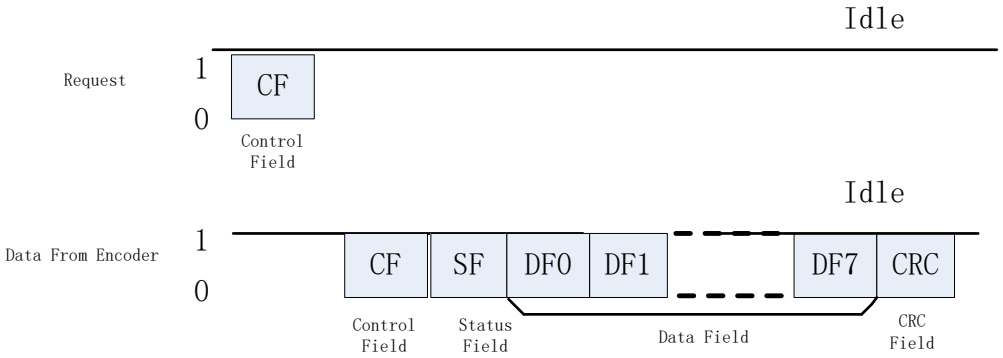
7.3 Frame Format

Each data frame is divided into several data words. Each data word is transmitted and received with 1 start bit, 8 data bits, and 1 stop bit, with the least significant bit first and the most significant bit last.

In the data frame transmission, the following terms are used:

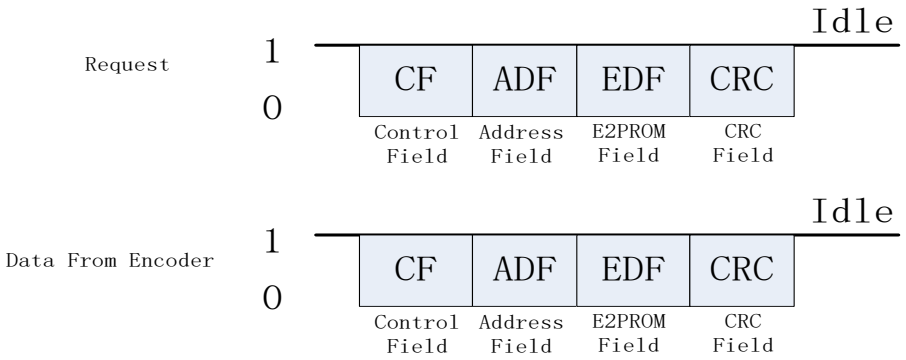
Items	Description	Remarks
CF	Control Field	Identifies different command types.
SF	Status Field	Provides information on the encoder's status
DF	Data Field	Encoder Position Data
ADF	Address Field	Accessible Encoder Address
EDF	E^2PROM Field	The content at the specified address
CRC	Cyclic Redundancy Check	Polynomial: x8+1 (XOR all data except CRC)

7.3.1 Position Data Reading



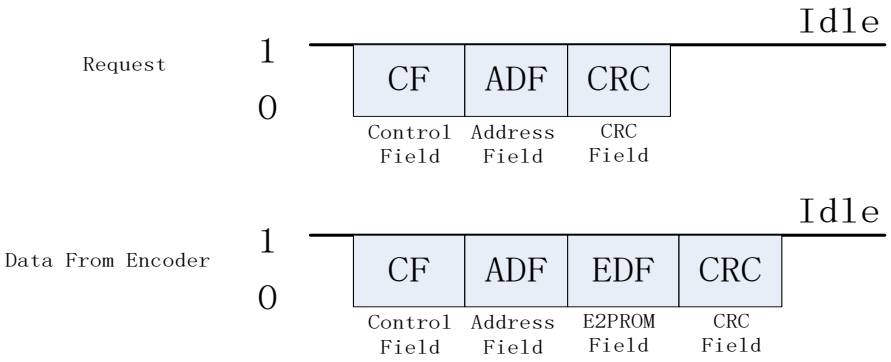
[Note]: The number of DF (Data Frames) varies depending on the CF (Configuration File).

7.3.2 Write E^2PROM



***The request frame and response frame have the same content**

7.3.3 Read E^2PROM



***The request frame and response frame have the same content**

7.4 Detailed Description

7.4.1 Control Field（CF）

CF consists of one data word, with categories and contents as shown in the table below:

Items	CF type	Remarks

Read data	ID0(0x02)	Absolute Position Reading（CF+SF+ABS+CRC）
	ID2(0x92)	Encoder ID Information Read（CF+SF+ID+CRC）
	ID3(0x1A)	Read All Data（CF+SF+ABS+ID+ABM+ALMC+CRC）
Write E^2PROM	ID6(0x32)	8-bit 'user data' can be written to the specified address. After the instruction format is sent, the encoder will return data within 20 μs. During this process, please avoid communicating with the encoder.
Read E^2PROM	IDD(0xEA)	8-bit 'user data' can be read from the specified address. After the instruction format is sent, the encoder will return data within 20 μs. During this period, please do not communicate with the encoder.
Reset	ID7(0xBA)	The reset command requires sending 10 consecutive instructions with a time interval of no less than 62.5 μs between each, to reset all fault status flags.
	ID8(0xC2)	The reset command requires sending 10 consecutive instructions with a time interval of no less than 62.5 μs between each, to reset and zero the current single-turn position. The position data will remain at the reset value even after power is cycled.

7.4.2 Status Field（SF）

SF is composed of one byte, with each bit defined as shown in the table below:

Bit number	Description	Remarks
Bit0	Rsvd	“0”
Bit1	Rsvd	“0”
Bit2	Rsvd	“0”
Bit3	Rsvd	“0”
Bit4	Counting Error	Same as ALMC.Bit2
Bit5	Rsvd	“0”
Bit6	Rsvd	“0”
Bit7	Rsvd	“0”

7.4.3 Data Field (DF0~DF7)

Depending on the CF type, the DF contains a different number of bytes, as detailed in the table below:

CF 类型	DF0	DF1	DF2	DF3	DF4	DF5	DF6	DF7
ID0 (0x02)	ABS0	ABS1	ABS2					
ID2 (0x92)	ENID							
ID3 (0x1A)	ABS0	ABS1	ABS2	ENID	ABM0	ABM1	ABM2	ALMC
ID7 (0xBA)	ABS0	ABS1	ABS2					
ID8 (0xC2)	ABS0	ABS1	ABS2					

【Note】：

1. ABS0~ABS2 represent the low, middle, and high bits of the encoder's single-turn position, where the high 7 bits of ABS2 are zero, and the remaining data forms a 17-bit position information.
2. ABM is always "0".
3. ENID is the encoder ID information, with a default value of 0x11.
4. ALMC is the encoder fault status flag, detailed in Section 7.4.4.

7.4.4 Error Description

ALMC faults are detailed in the table below:

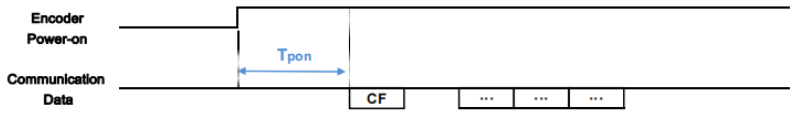
Bit	0	1	2	3	4	5	6	7
Name	Over-speed	“0”	Counting Error	“0”	“0”	“0”	“0”	“0”

Descriptions of fault flag bits are as follows:

Name	Function	Action
Over-speed	For 5V power mode, when speed exceeds 7200 RPM	Reset Power
Counting Error	Single-turn information calculation fault	Reset Power

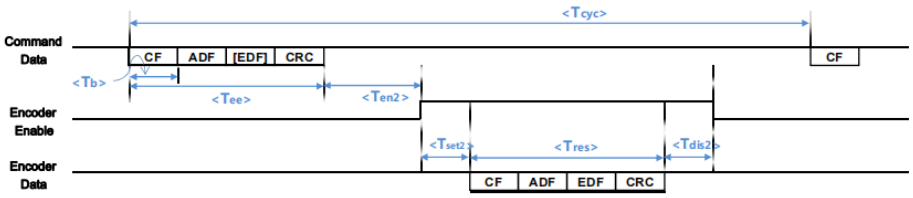
8. Timing Description

8.1 Timing Diagram



Reagle Power-on Timing Chart

Reagle CF Communication Timing Chart



Reagle EEPROM Communication Timing Chart

8.2 Detailed Specifications

Characteristic	Symbol	Minimum	Default	Maximum	Unit	Note
Power-On time	Tpon		450	550	ms	
Command cycle period	Tcyc	62.5			μs	
Data byte time	Tb		4		μs	
Encoder enable delay time	Ten1	1.5		3.5	μs	
	Ten2		4.5		μs	
Encoder EEPROM Command time	Tee		12		μs	Read: 3bytes data
			16		μs	Write: 4 bytes data
Encoder response time	Tres		4*N		μs	N bytes data
Encoder data set-up delay time	Tset1	0.8		2	μs	
	Tset2	1		1.5	μs	
Encoder disable delay time	Tdis1	0.6		1.2	μs	
	Tdis2		1.3		μs	

9. Configuration Description

Order codes can be found in the 'REAGLE SENSING Absolute Value Encoder Ordering Instructions'.
Specifications for terminal cables are detailed in the ' REAGLE SENSING Absolute Value Encoder Terminal Cable Drawing'.

Optional Configurations	Description
Resolution	17Bit/23Bit

Revision History

Date	Version Number	Modification Details or Changes	
		Location	Content
20210831	V1.0	/	New Version
20220302	V2.0	Communication Protocol Timing	Detailed Communication Protocol Description Detailed Communication Protocol Description
20220505	V2.1	Installation Methods	Dust plug changed to dust sticker
20220620	V3.0	Main Body	Replace with a new type of main body
20230213	V3.1	Operating Temperature	Update the temperature range
20230728	V3.2	Structural Dimensions Recommended Motor End Design Dimensions	Remove the PE Connector Plate Adjust the Groove Height

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