Single-turn Absolute Rotational Encoder
SROA42-23Bit-SC-C-5V
SROA42-17Bit-SC-C-5V
SPECIFICATION
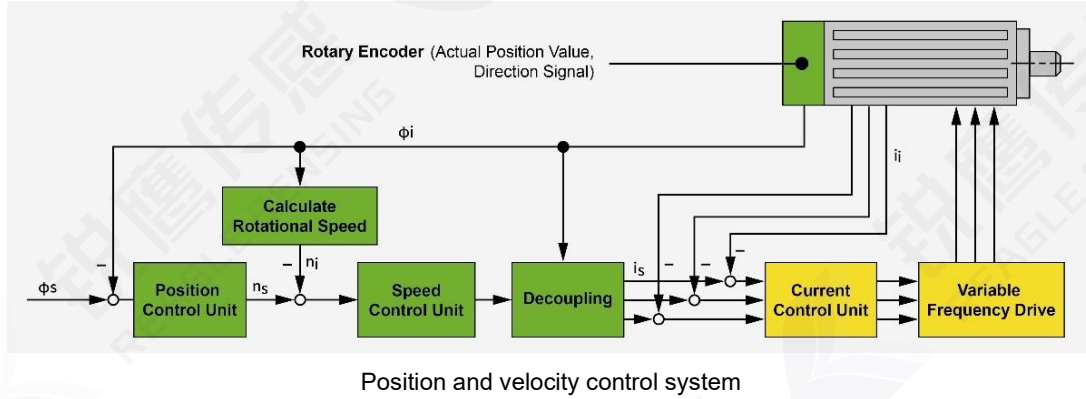
Contents

1．Summary Info

This manual primarily describes how to use the SROA42 conical shaft series single-turn encoders from Reagle Sensing. This product mainly serves servo-driven control systems, providing the feedback information necessary 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
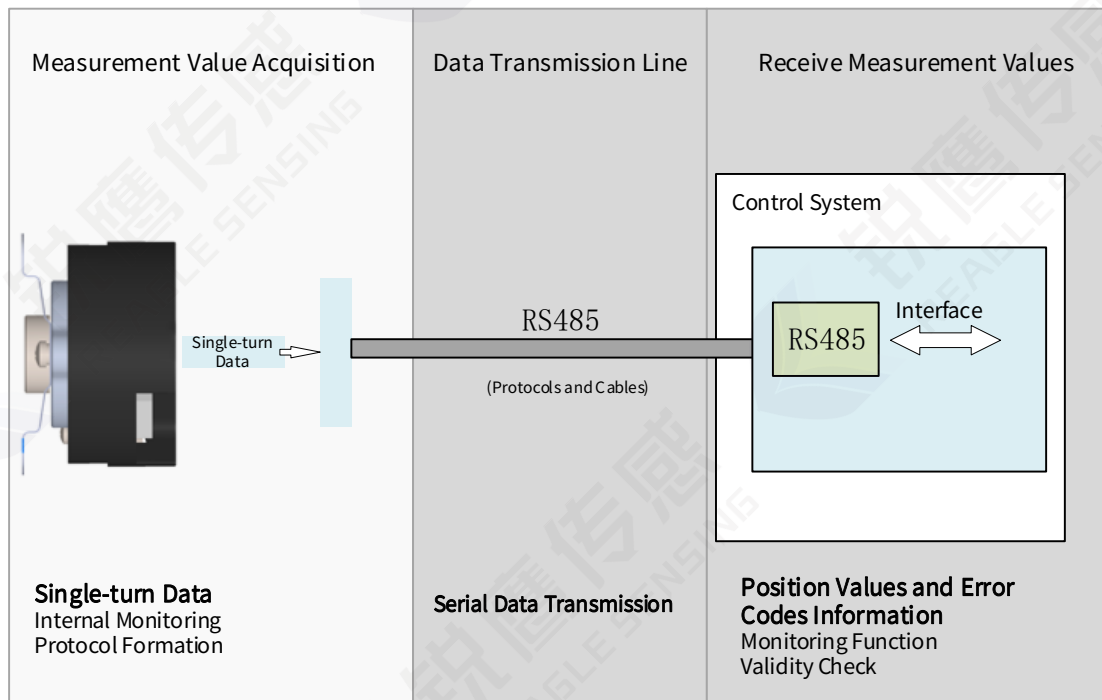
Equipped with RS485 communication encoder

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2．Technical Specifications

Model	SROA42-23Bit-SC-C-5V SROA42-17Bit-SC-C-5V
Resolution	Supports up to 8,388,608 (23bit), compatible with 17bit.
Absolute positioning accuracy	＜±50 Arc seconds
Repeat positioning accuracy	＜±3 Arc seconds
Auxiliary functions	Fault Warning * Electromagnetic Environment Warning
Communication interface	RS485
Communication frequency	≤16kHz
Baud rate	2.5Mbps
Input shaft allowable deviation	Axial：±0.5mm　　Axial play：＜0.1mm Radial：±0.1mm　　Radial play：＜0.01mm Tilt：0.1°
Main shaft speed	≤6000rpm
Shaft diameter	Cone axis Ø9 ; Conical angle: 1:10
Moment of inertia	0.68kg·mm^2
Starting torque (20°C)	≤0.005N·m
Weight	≈0.06kg (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
Protection Rating	IP 40

3．Electrical Parameters
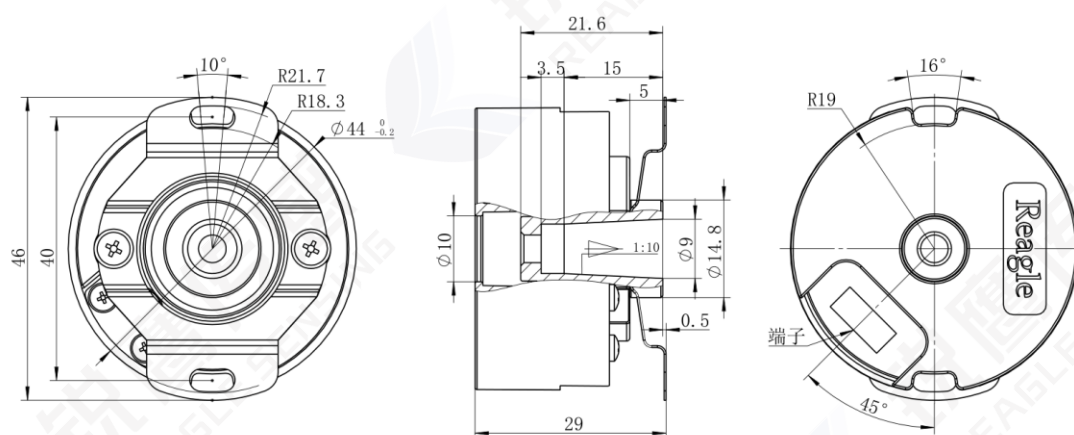
Items		T=25°C		
		Min.	Typ.	Max.
Main power supply voltage		4.75 V	5V	5.25V
Main power supply current (Typ)		--	90mA	--
Differential Level	High	3.5V	--	--
	Low	--	--	1.7V
Edge change time		--	--	100ns
Insulation resistance		50MΩ	--	--

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

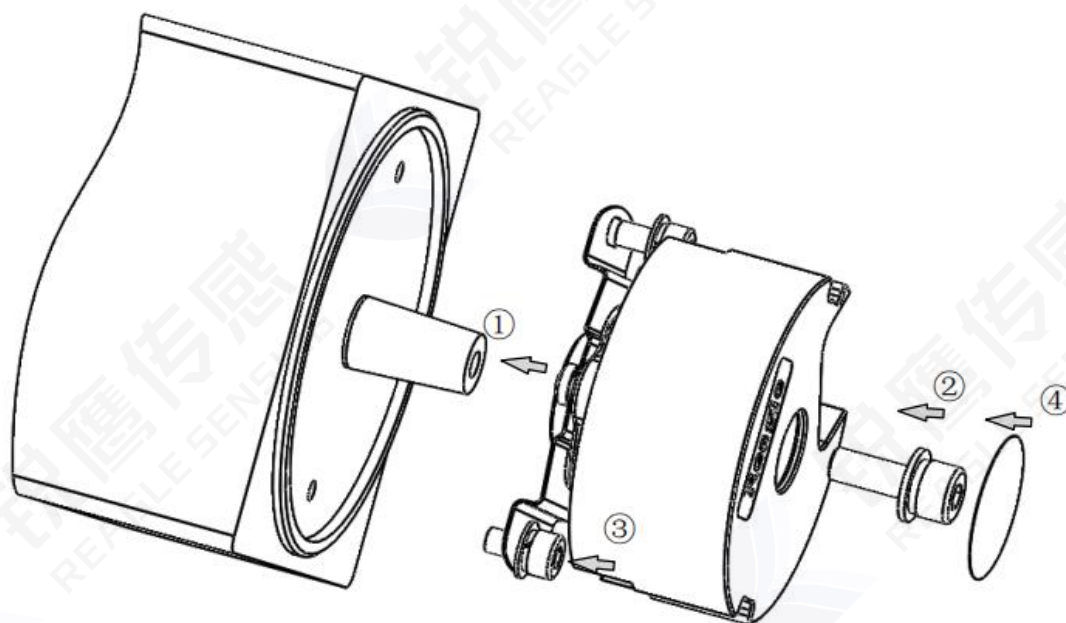## 5．Mechanical Specifications

[Note]: The above are the default connection pins.

6．Mounting Procedure

6.1 Installation Diagram

6.2 Installation Accessories

• Metric 2.5mm Hex Torque Wrench
• Metric 3.0mm Hex Torque Wrench

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6.3 Installation Sequence

One. Place the encoder onto the motor shaft. When properly aligned, the encoder shaft should fit snugly with the motor shaft without any misalignment or looseness. If there is any issue, check the motor dimensions for deformation or foreign objects. Do not forcefully press down the encoder or strike it during installation.
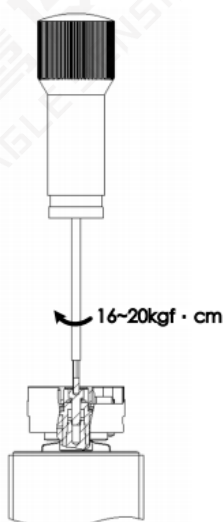
16~20kgf · cm

Two. Insert an M4 hex socket head screw through the top of the encoder shaft and tighten it using the appropriate hex torque wrench. Recommended torque is 16~20 kgf·cm.
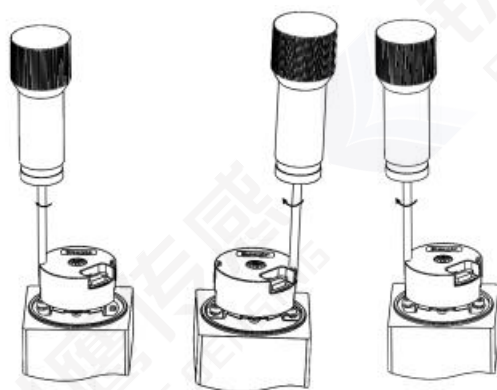
Three. Lightly tighten one side M3 screw with the corresponding hex torque wrench, then lightly tighten the other side M3 screw. Next, sequentially tighten both side screws to 8~10 kgf·cm torque.
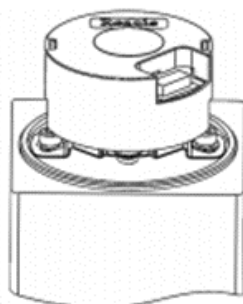
Four. Apply a new dust-proof sticker over the hole on the rear cover.

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 bits (up to 23 bits supported)
Communication Rate	2.5 Mbps	--

7.2 E^{2}PROM Communication Specifications

| Items	Address	Description	Remarks
Readable and Writable User Parameter Address Range	0~0x7E* page 8	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 order		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:

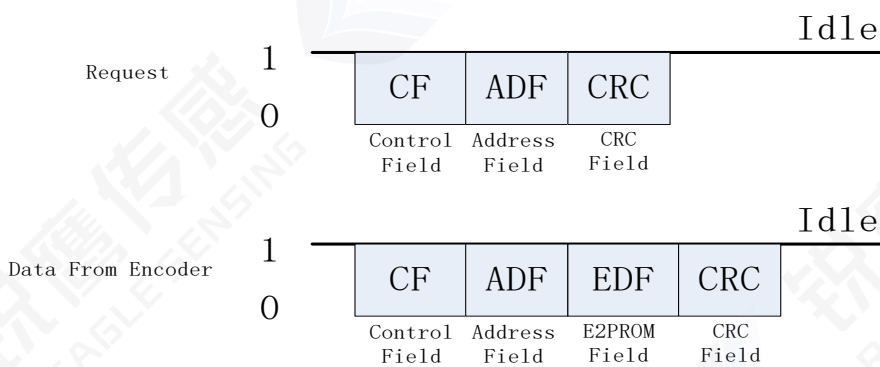| Items	Description	Remarks
CF	Control Field	Identifies different command types.
SF	Status Field	Provides information on the encoder's status
DF	Data Field	Encoder Position Data
ADF	Address Field	Accessible Encoder Address
EDF	E^{2}PROM Field	The content at the specified address
CRC	CRC Verification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

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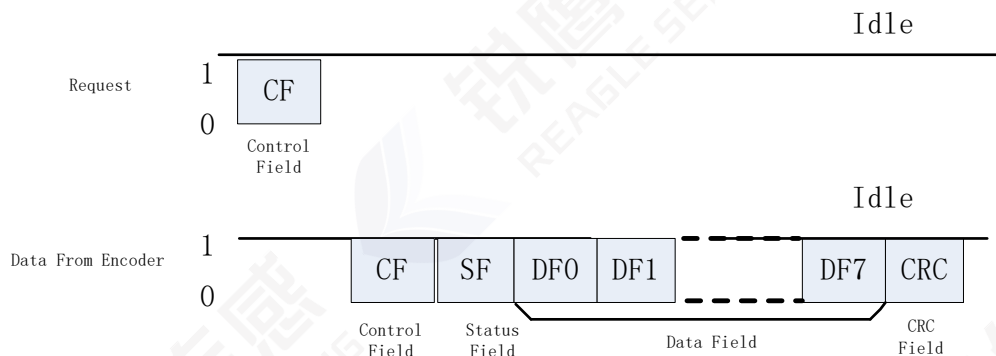
[Note]: The number of DF (Data Frames) varies depending on the CF (Configuration File).

7.3.2 Write E^2PROM
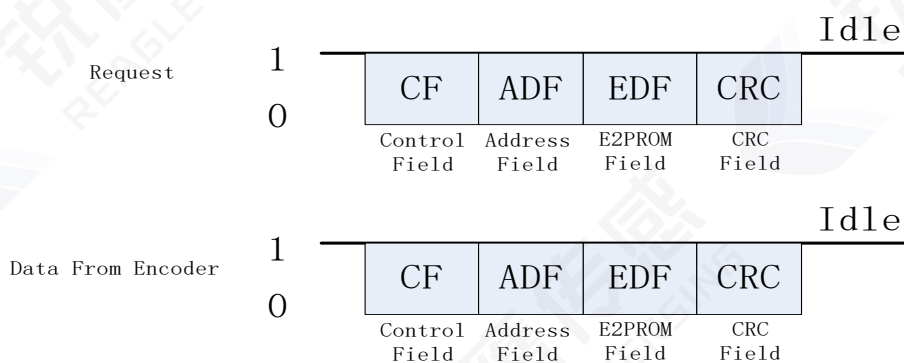
＊ 请求帧与返回帧内容相同

7.3.3 Read E^2PROM

＊ 返回帧中增加了所访问地址内容

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 Information Reading (CF+SF+ABS+CRC)
	ID2(0x92)	Encoder ID Information Reading (CF+SF+ID+CRC)
	ID3(0x1A)	Reading All Data (CF+SF+ABS+ID+ABM+ALMC+CRC)
Write E²PROM	ID6(0x32)	8-bit "User Data" can be written into the specified address data. After sending the command format, the encoder sends back data within 20μs; do not communicate with the encoder during this process.
Read E²PROM	IDD(0xEA)	8-bit "User Data" can be read from the specified address. After sending the command format, the encoder sends back data within 20μs; do not communicate with the encoder during this process.
Reset	ID7(0xBA)	The reset command requires that the command be sent continuously 10 times with a minimum interval of 62.5us to reset all fault flags.
	ID8(0xC2)	The reset command requires that the command be sent continuously 10 times with a minimum interval of 62.5us to reset and zero any single-turn position. Even after re-powering, the position retains the data from after the reset.

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	Equal to 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 type	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 to ABS2 represent the low, middle, and high positions of the encoder's single-turn position, respectively, where the top 7 bits of ABS2 are 0, and the other data constitute 17-bit single-turn position information (for a 23-bit encoder, the top 1 bit of ABS2 is 0, and the rest are valid bits).
2. ABM0 to ABM2 represent the low, middle, and high positions of the encoder's multi-turn position, respectively, where ABM2 is 0, and the other data constitute 16-bit multi-turn position information.
3. ENID is the encoder ID information, valued at 0x11 (17Bit) or 0x17 (23Bit).
4. ALMC is the encoder fault flag, for further details refer to section 7.4.4.

7.4.4 Fault description

ALMC faults are detailed in the table below:

Bit	0	1	2	3	4	5	6	7
Description	Over-speed	"0"	Counting Error	"0"	"0"	"0"	"0"	"0"

Descriptions of fault flag bits are as follows:
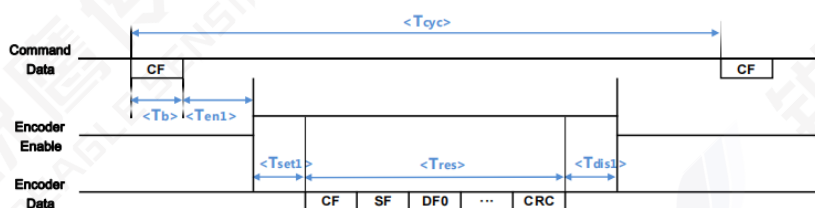
Name	Function	Action
Over-speed	For 5V power mode, when speed exceeds 7200 RPM	Reset Power
Counting Error	Single-turn information calculation fault	Reset Power

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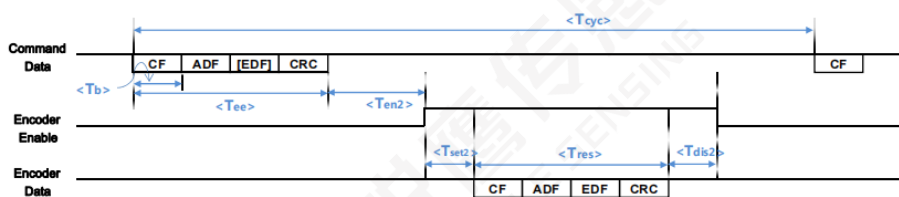Dedicated to sensing technology
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8．Timing Description

8.1 Timing Diagram
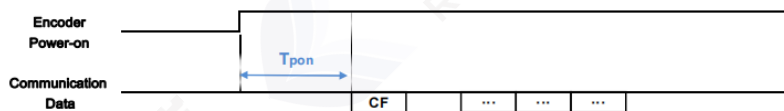
Reagle Power-on Timing Chart

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 Instructions

Order codes can be found in the "Reagle Sensing Absolute Encoder Ordering Instructions. "

Specifications for terminal cables are detailed in the "Reagle Sensing Absolute Encoder Terminal Cable Drawings. "

Optional Configuration	Description
Resolution	17Bit/23Bit
Connector type	Type A (default type) / Type C / Type D

Revision History

No.	Version Number	Modification Details or Changes	
		Location	Content
3378F	V1.0	/	New
35C8E	V2.0	Communication Specifications Timing Description	Detailed communication protocol description Add timing section
35D5B	V2.1	Mechanical Specifications	Change in structural dimensions
38345	V2.2	Operating Temperature	Update temperature range
385A1	V2.3	Mechanical Specifications	Change in structural dimensions

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