Split-type multi-turn absolute rotary encoder
SRMA46-M16S17Bit-SY□L-C-5V
SRMA46-M16S17Bit-SY□S-C-5V
SRMA46-M16S17Bit-SY□X-C-5V
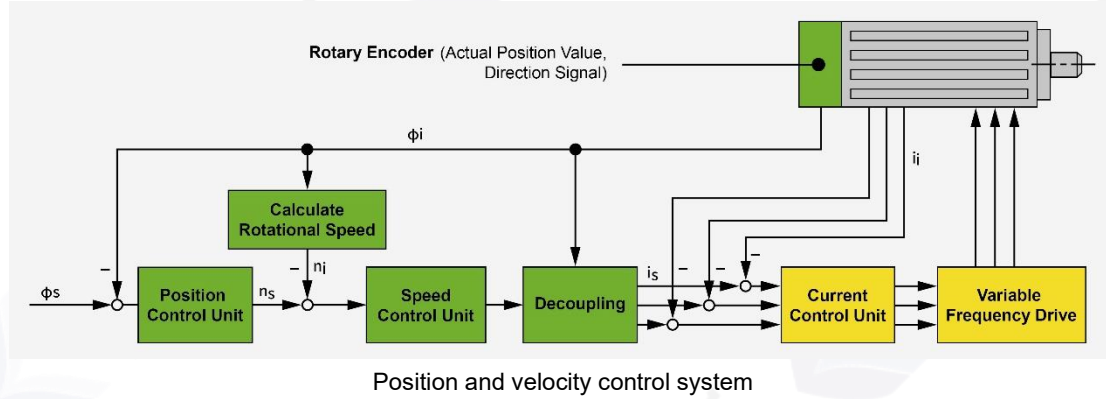# SPECIFICATION

目录

REAGLE

1．Summary Info

This manual primarily describes how to use the Split-type multi-turn absolute rotary series SRMA46 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
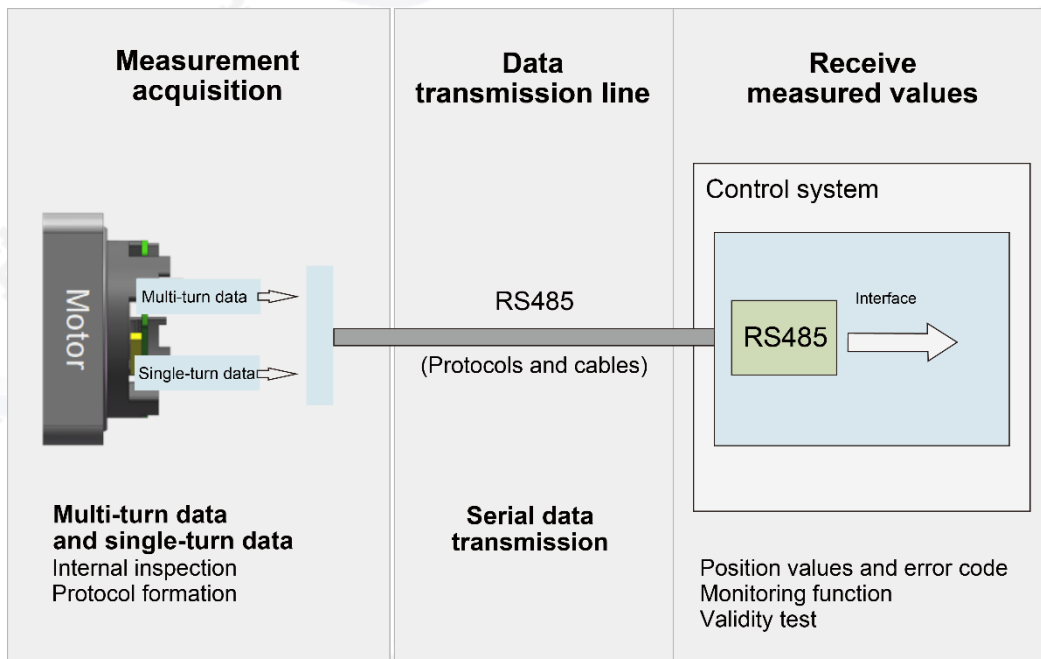
RS485 Communication Encoder

2．Technical Specifications

Model	SRMA46-M16S17Bit-SY□L-C-5V SRMA46-M16S17Bit-SY□S-C-5V SRMA46-M16S17Bit-SY□X-C-5V
Resolution	131072（17bit）
Number of turns	65536（16bit）
Auxiliary Functions	Fault Warning *Electromagnetic Environment Warning *Battery Voltage Warning
Communication Interface	RS485
Communication frequency	≤16kHz
Baud rate	2.5Mbps
Input shaft allowable deviation	Axial：±0.3mm Axial play：＜0.2mm Radial：±0.1mm Radial play：＜0.02mm Tilt：＜0.2°
Main shaft speed	≤6000rpm
Moment of inertia	straight shaft Ø6/Ø8mm
moment of inertia	$0.23kg \cdot mm^2$
Weight	≈0.008 kg（excluding cables）
Rotor angular acceleration	powered by the power supply≤$80000rad/s^2$， powered by the battery≤$80000rad/s^2$
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℃~105℃
Relative Humidity	≤90%（40℃/21d，based on EN 60068-2-78）；No condensation
Enclosure Protection Rating	-（Motor Rear Case Protection）
Electromagnetic Compatibility	Compliant with IEC 61800-3 standards

3．Electrical Parameters

Items		T=25℃		
		Min.	Typ.	Max.
Power supply voltage		4.75 V	5V	5.25V
Main power supply Current (Typ)		--	72mA	--
Battery voltage		--	3.6V DC	--
Battery power supply current consumption (motor at rest)		--	7uA	--
Battery warning voltage		--	3.1V	--
Mode Conversion voltage	Main power supply switches to low power mode		4.2V	
	Low power mode switches to main power supply mode		4.3V	
Differential Level	High	3.5V	--	--
	Low	--	--	1.7V
Edge Change Time		--	--	100ns
Insulation resistance		50MΩ	--	--

4．Cable Definition

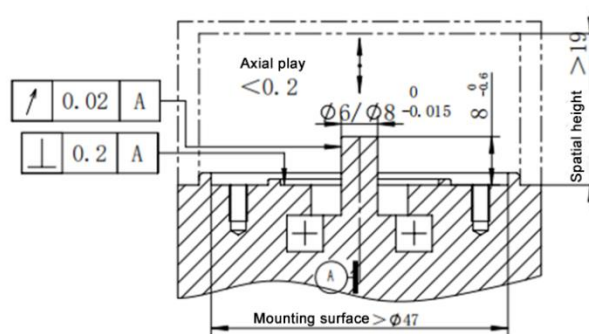| Cable color	Definition
Red	5V
Black	GND
Blue	485+
Yellow	485-
Brown	Battery +
White	Battery GND
Shielding mesh	PE

5．Mechanical Specifications

5.1 SRMA46-M16S17Bit-SY_L-C-5V（High-profile）

◇ Product Structure Dimension Diagram
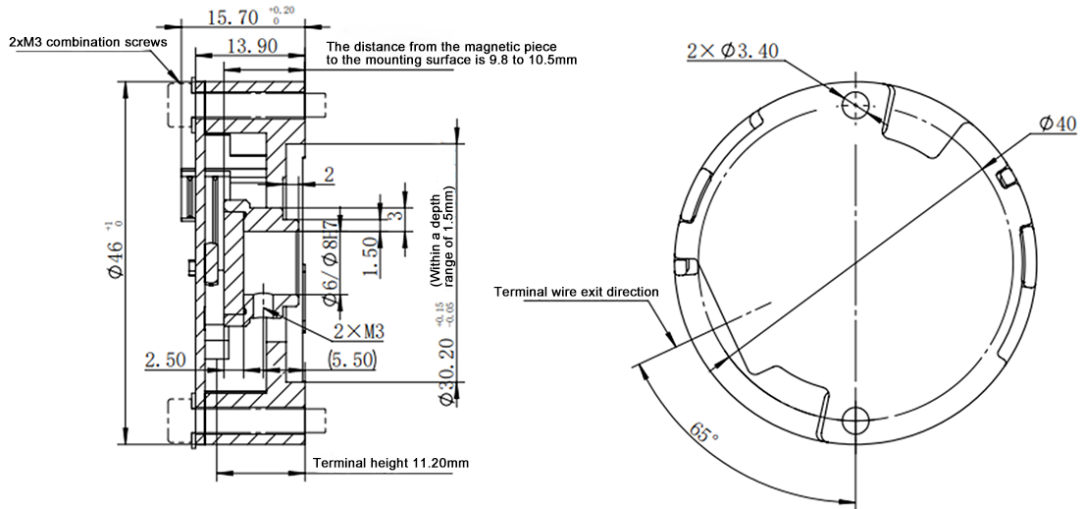
◇ Recommended Motor End Design Dimensions

✻ The lower end of the encoder shaft will be seated into the motor end cover.
When the shaft is Φ6, ΦD should be greater than Φ12.5;
When the shaft is Φ8, ΦD should be greater than Φ14.5

✻ The main body of this product can be positioned using either screw positioning
or positioning with the inner circle of Φ30.15 on the bottom of the main body.
Choose one of the two methods
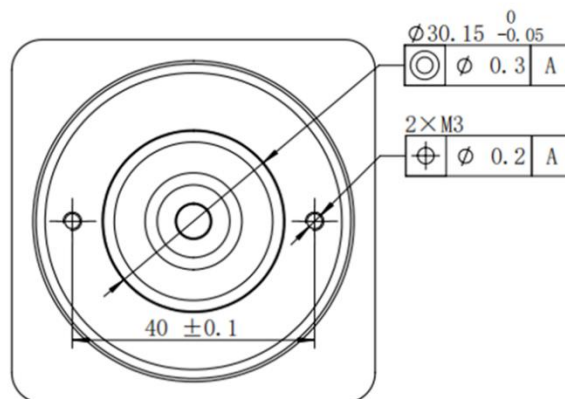
5.2 SRMA46-M16S17Bit-SY_S-C-5V（Low-profile）

✧ Product Structure Dimension Diagram

✧ Recommended Motor End Design Dimensions
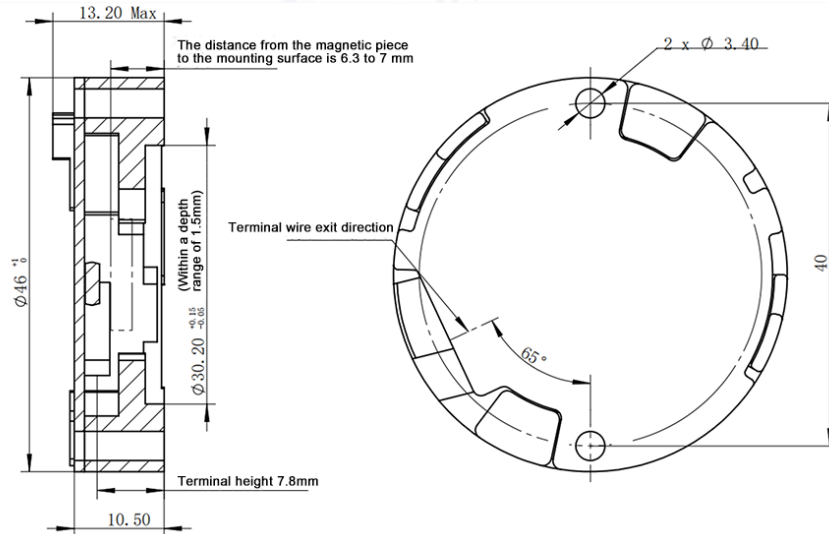

✳ The lower end of the encoder shaft will be seated into the motor end cover.
When the shaft is Φ6, ΦD should be greater than Φ12.5;
When the shaft is Φ8, ΦD should be greater than Φ14.5
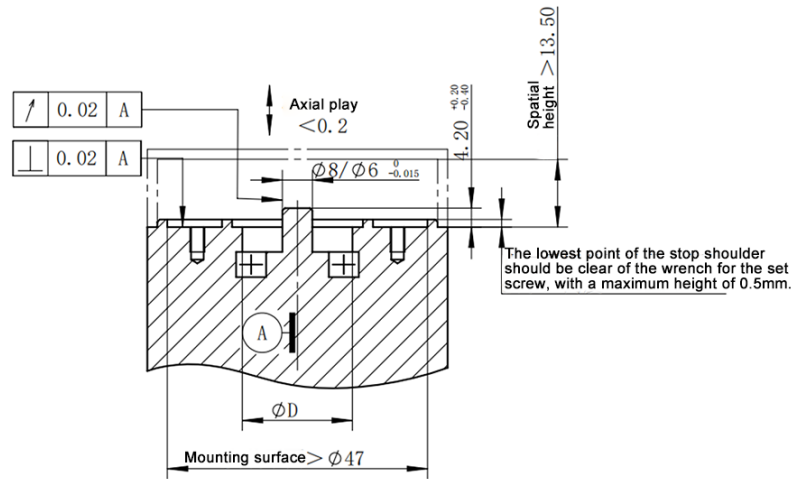

✳ The main body of this product can be positioned using either screw positioning or positioning with the inner circle of Φ30.15 on the bottom of the main body. Choose one of the two methods

5.3 SRMA46-M16S17Bit-SY_X-C-5V（Ultra-low-profile）

✧ Product Structure Dimension Diagram

13.20 Max

The distance from the magnetic piece to the mounting surface is 6.3 to 7 mm

2 x Φ 3.40

(Within a depth range of 1.5mm)

Terminal wire exit direction

Φ46 $^{+1}_{0}$

Φ30.20 $^{+0.15}_{-0.05}$

40

65°

Terminal height 7.8mm

10.50

✧ Recommended Motor End Design Dimensions

0.02 | A

0.02 | A

Axial play <0.2

Spatial height >13.50

4.20 $^{+0.30}_{-0.40}$

Φ8/Φ6 $^{0}_{-0.015}$

The lowest point of the stop shoulder should be clear of the wrench for the set screw, with a maximum height of 0.5mm.

A

ΦD

Mounting surface＞Φ47

* The lower end of the encoder shaft will be seated into the motor end cover.
When the shaft is Φ6, ΦD should be greater than Φ14;
When the shaft is Φ8, ΦD should be greater than Φ15

Φ30.15 $^{0}_{-0.05}$

2×M3

0.02 | A

40 ±0.10

* The main body of this product can be positioned using either screw positioning or positioning with the inner circle of Φ30.15 on the bottom of the main body.
Choose one of the two methods
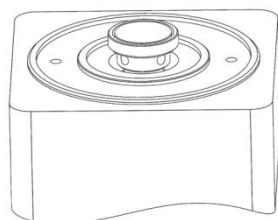
KREAGLE
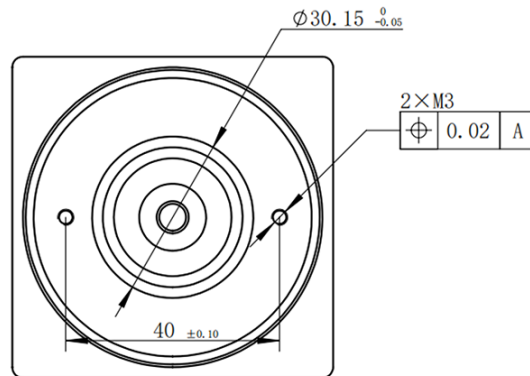
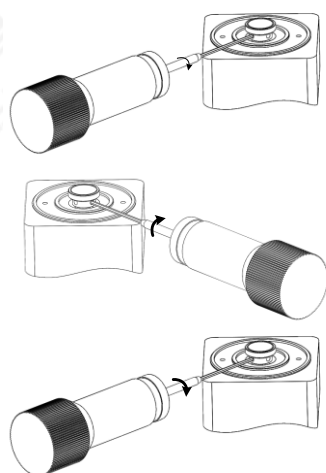# 6．Mounting Procedure

6.1 Installation Diagram
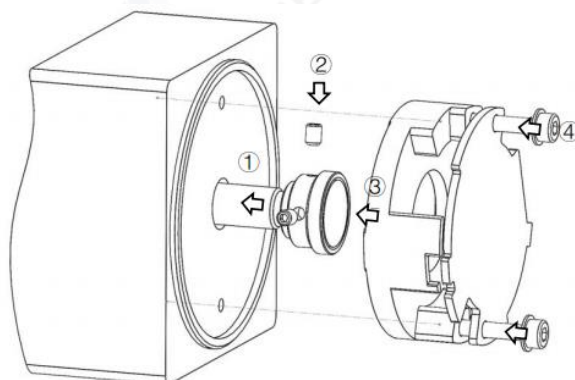
6.2 Installation Accessories

· Metric 1.5mm across flats hex torque wrench
· Metric 2.5mm across flats hex torque wrench

6.3 Installation Sequence

① Insert the encoder shaft assembly into the motor shaft so that the assembly is flush with the end face of the shaft.

② Dip the head of the M3 set screw in thread-locking adhesive, and use the corresponding hex torque wrench to screw in the first set screw into the encoder shaft and lightly tighten it so that it contacts the motor shaft; Dip the head of the second set screw in thread-locking adhesive, screw it into the encoder shaft, and tighten it with a torque of 7kgf·cm; Then, tighten the first screw with a torque of 7kgf·cm.
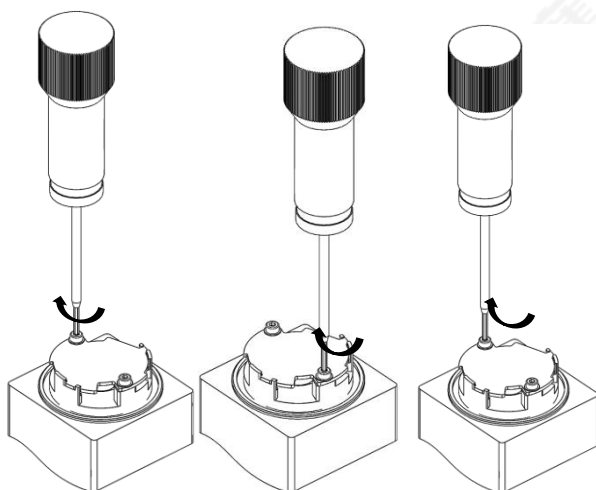
③ Dip the thread holes of the end cover in thread-locking adhesive and insert the M3 combination screws into the corresponding mounting holes. Use a hex torque wrench to lightly tighten one side of the M3 combination screw, then tighten the other side M3 combination screw with a torque of 8kgf·cm. Then, tighten the first screw with a torque of 8kgf·cm.

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	17bit
	Multi-turn position information	16bit
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* 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:

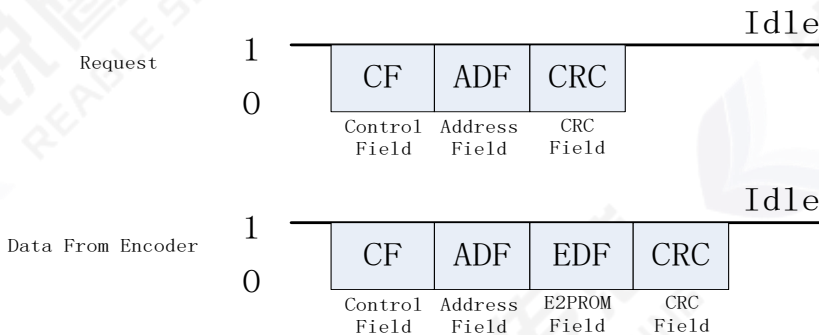| Items	Description	Remarks
CF	Control Field	Identifies different command types.
SF	Status Field	Provides information on the encoder's status
DF	Data Field	Encoder Position Data
ADF	Address Field	Accessible Encoder Address
EDF	E2PROM Field	The content at the specified address
CRC	Cyclic Redundancy Check	Polynomial: x8+1 (XOR all data except CRC)

7.3.1 Position Data Reading
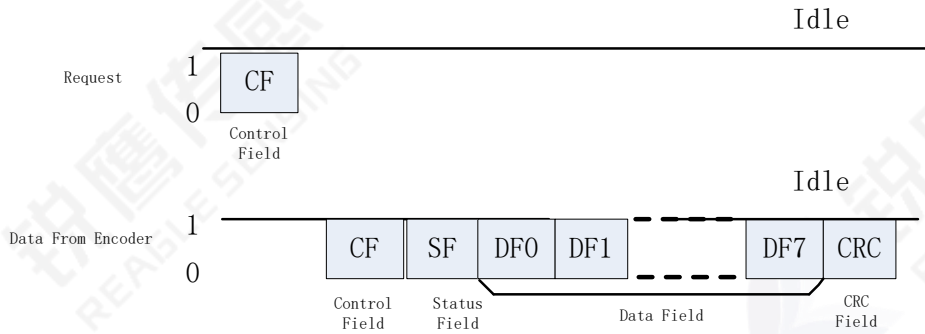
【Note】: The number of DF data depends on different CF.

7.3.2 Write E^{2}PROM
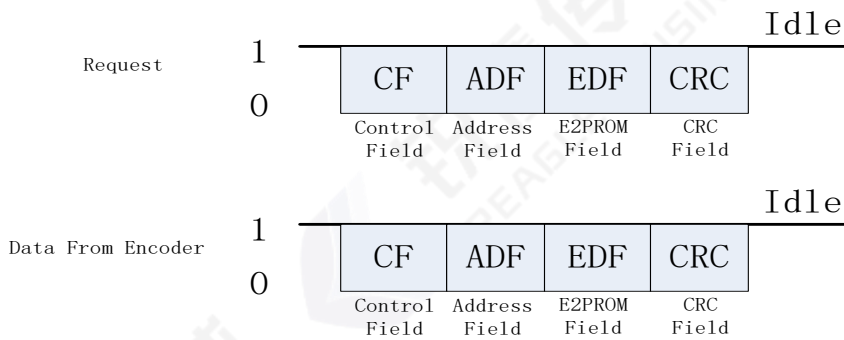
*The request frame and response frame have the same content

7.3.3 Read E^{2}PROM

*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)	Single-turn position information reading（CF+SF+ABS+CRC）
	ID1(0x8A)	Multi-turn position information reading（CF+SF+ABM+CRC）
	ID2(0x92)	Encoder ID information reading（CF+SF+ENID+CRC）
	ID3(0x1A)	Reading all information（CF+SF+ABS+ENID+ABM+ALMC+CRC）
Write E²PROM	ID6(0x32)	The 8-bit "user data" can be written to the corresponding data of the specified address. After sending the instruction format, please do not communicate with the encoder within 20µs, as the encoder will reply with the data.
Read E²PROM	IDD(0xEA)	The 8-bit "user data" can be read from the specified address. After sending the instruction format, please do not communicate with the encoder within 20µs, as the encoder will reply with the data.
Reset	ID7(0xBA)	This reset command requires sending the instruction continuously 10 times at an interval of not less than 62.5us to reset all fault flag bits.
	ID8(0xC2)	This reset command requires sending the instruction continuously 10 times at an interval of not less than 62.5us to reset the current single-turn position to zero. Even if power is re-applied, the position will remain at the reset position data.
	IDC(0x62)	This reset command requires sending the instruction continuously 10 times at an interval of not less than 62.5us to reset the multi-turn data to zero (without affecting the single-turn data). At the same time, all fault flag bits will be 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	Same as ALMC.Bit2
Bit5	Xor Multi Error	Equals the logical OR of ALMC.Bit5, Bit6, and Bit7
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					
ID1 (0x8A)	ABM0	ABM1	ABM2					
ID2 (0x92)	ENID							
ID3 (0x1A)	ABS0	ABS1	ABS2	ENID	ABM0	ABM1	ABM2	ALMC
ID7 (0xBA)	ABS0	ABS1	ABS2					
ID8 (0xC2)	ABS0	ABS1	ABS2					
IDC (0x62)	ABS0	ABS1	ABS2					

【Note】:

1. ABS0~ABS2 correspond to the low, middle, and high positions of the encoder's single-turn position, respectively, with the high 7 bits of ABS2 being 0, and the rest forming a 17-bit single-turn position information.
2. ABM0~ABM2 correspond to the low, middle, and high positions of the encoder's multi-turn position, respectively, with ABM2 being 0, and the rest forming a 16-bit multi-turn position information.
3. ENID is the encoder ID information, which defaults to 0x11.
4. ALMC is the encoder fault flag bit, for details see 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"	Multi-turn Error	Battery Error	Battery Alarm

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
Multi-turn Error	Multi-turn data loss, multi-turn count fault	Fault reset
Battery Alarm	The battery voltage is below 3.1V, set the bit	After replacing with a battery of normal voltage, the fault disappears automatically

8．Timing Description

8.1 Timing Diagram
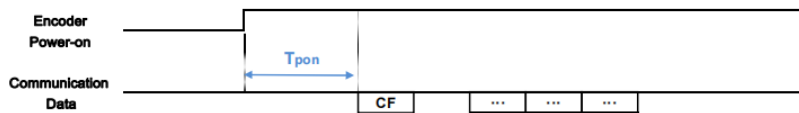
Reagle Power-on Timing Chart
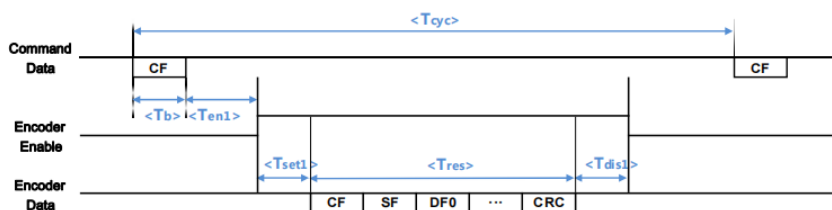
Reagle CF Communication Timing Chart
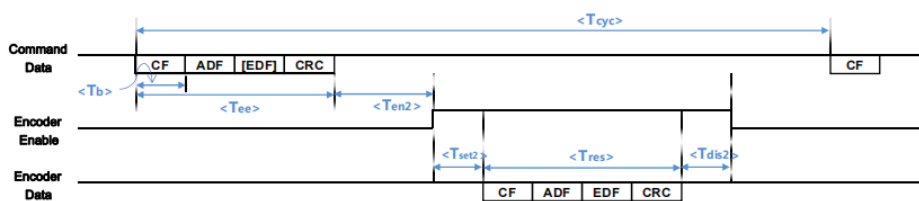
Reagle EEPROM Communication Timing Chart

8.2 Detailed Specifications

Characteristic	Symbol	Minimum	Default	Maximum	Unit	Note
Power-On time	Tpon		350	500	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		7.5		µs	
Encoder EEPROM Command time	Tee		12		µs	Read: 3 bytes 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		1.8		µs	
Encoder disable delay time	Tdis1	1.2		2	µs	
	Tdis2		2		µs	

SRMA Timing Characteristics

9．Configuration Description

For the ordering code and specifications of the terminal cable, please refer to the " REAGLE SENSING Magnetoelectric Encoder Ordering Instructions"

Optional Configurations	Description
Straight shaft type	Hole diameterΦ6 /Φ8

Revision History

Date	Version Number	Modification Details or Changes	
		Location	Content
20210125	V1.0	E^{2}PROM communication specifications	Communication specifications change/revision record addition
20220302	V2.0	Communication protocol Timing sequence	Refine the communication protocol explanation Add a timing sequence section
20220518	V2.1	Structural dimensions	Add ultra-low-profile magnetic encoder

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