Magnetic Integrated Technology

15 BIT SINGLE TURN ABSOLUTE ENCODER SPECIFICATION

FILE NO	KEM15S V0.1
VER DATE	2021-11-30
ORG. RELEASE	2019-7-30

ITEM NO	MODEL	CUSTOMER P/N
	KEM15S-35-D	
	========	

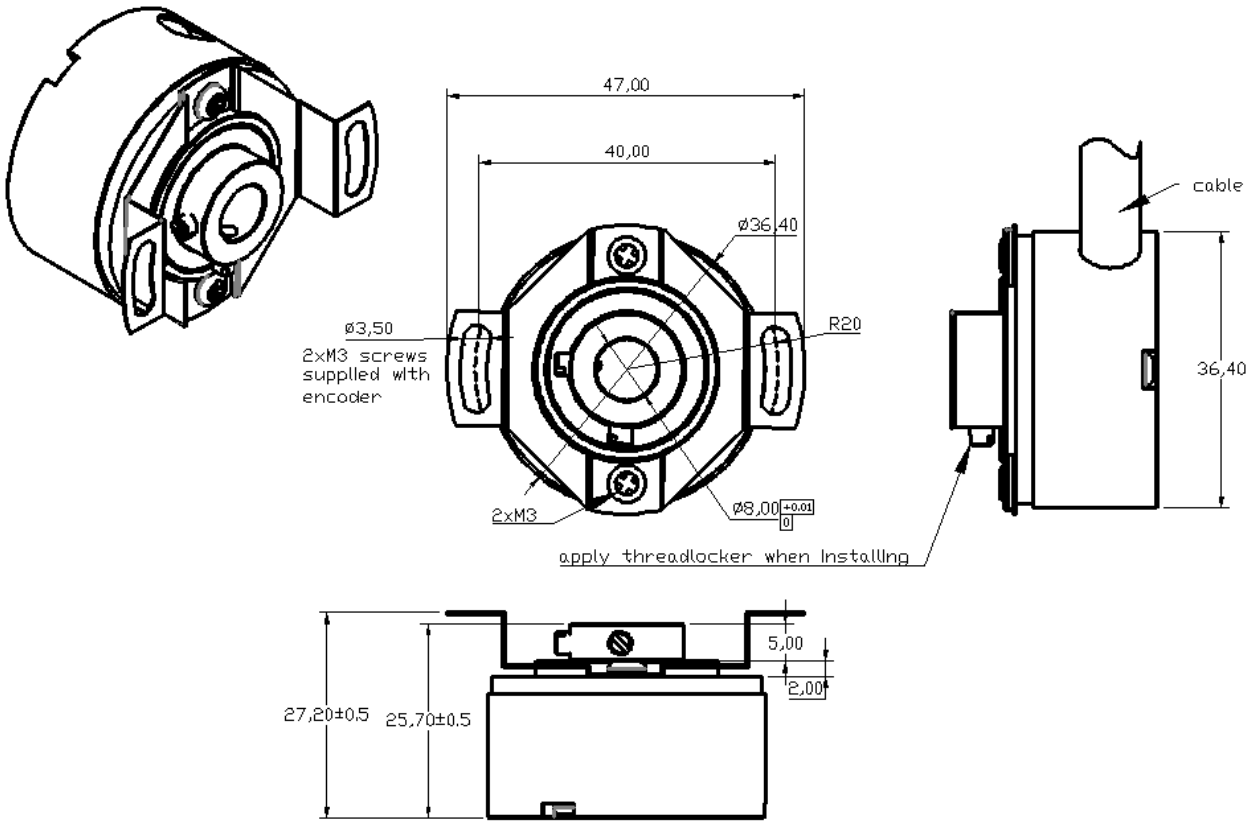
MANAGER	MARKETING	ENG	QA

CUSTOMER APPROVAL		

MODEL	PRODUCT DESCRIPTION	Encoder Assembly Incl. 500mm long, ø5.4mm cable with 4-AWG# wire & shielding screen.
KEM15S-35-D	15 BIT ABSOLUTE ENCODER, SINGLE-TURN	

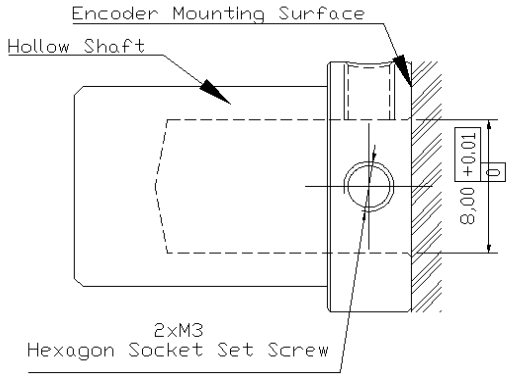
1. DIMENSIONS

1-1. OUTLINE DIMENSION

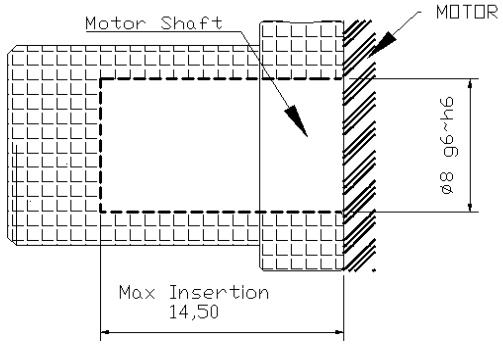


Magnetic Integrated Technology 承康科技	DRAWING NUMBER 1-KEM15S-35-D	DATE 202111.30

1-2. ENCODER HOLLOW SHAFT & MOTOR SHAFT INSTALLATION

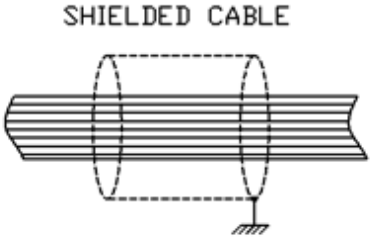


HOLLOW SHAFT DIMENSION



RECOMMENDED MOTOR SHAFT DIMENSION

1-3. SHIELDING WIRE CONNECTION



2. WIRING DESCRIPTION

Cable Specification: ø5.8 shielded, 500mm length, 4-AWG#26 wire.

Color	Function	Note
RED	DC5V	POWER SUPPLY
BLACK	GROUND	
YELLOW	RS485 A	SERIAL DATA SIGNAL
GREEN	RS485 B	

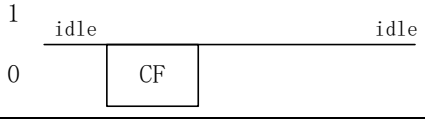
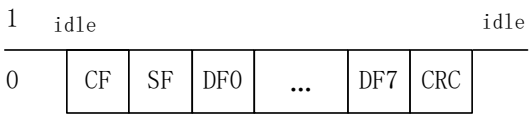
3. APPLICATION SCOPE	This encoder is suitable for servo motors for robot.
4. MODEL & DESCRIPTION	KEM15S-35 15-bit Single-Turn Absolute Encoder
5. APPEARANCE	There shall be no remarkable damage in visual inspection. Products shall be judged by boundary samples if there are any doubts.
6. DIMENSIONS	REFER TO CLAUSE 1 OUTLINE DIMENSIONS

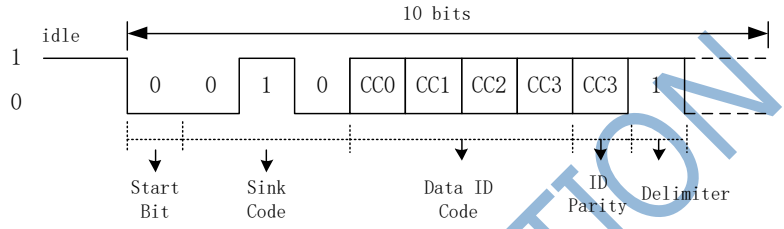
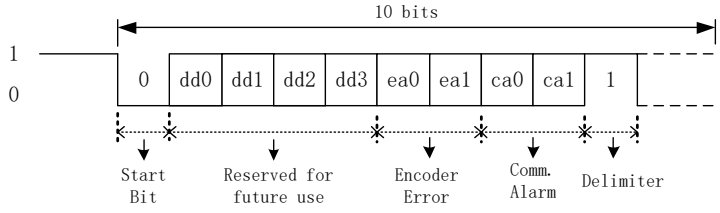
7. RATINGS

NO.	ITEM	CONDITION	SPECIFICATION
7.1	Operating Temp		-40 ~ +85°C
7.2	Storage Temp		-40 ~ +105°C
7.3	Operating Voltage		5.0 ± 0.5 VDC

8. SPECIFICATION

8.1	Operating Type		Motor Shaft Operating
8.2	Resolution	Single Turn, 15-bit, 32768 absolute positions	
8.3	Output Signals	Pure Binary	
8.4	Rated Power		0.1W @ Vdd=5V
8.5	Power-up Time		3ms max.
8.6	Consumption Current	@Vdd=5.0V	100mA typ.
8.7	Rotation Speed	RPM	≤6K Recommended
8.8	Output Delay		5 μs
8.9	Output Digital Voltage	Push-pull (Iout=2mA)	HIGH: V_{OH}≥4.9V LOW: V_{LO}≤0.1V
8.10	Magnet	NdFeB, N35~N40, supplied w/ encoder	Dimension Ø5x2 or Ø6x2; Radial magnetized.
8.11	DATA MEMORY	EEPROM	762 bytes
8.12	Serial Communication	RS485	Communication rate 2.5Mbps

9. RELIABILITY			
9.1	Cycle Life		Infinitive
9.2	Weight		100g±10g
9.3	High Temp	16 hours@80±2°C	Output variation <0.2%;
9.4	Low Temp	16 hours@-20±2°C	Output variation <0.2%;
9.5	Humid	2 hours@60±2°C, 90~95% RH	Output variation <0.1%;
9.6	Insulation Resistance	100ns by DC 500V Megohm meter, between Case & Ground	50MΩ
9.7	Dielectric Strength	1 minute, between Case & Ground	AC500V
9.8	PMS		
9.9	DIPi		
9.10	Shock	490 m/s2 (50G), 11 ms	2 hrs each axis, total 18 hrs
9.11	Vibration	5 ~ 40Hz , Amplitude 1.5 mm; 40 ~ 200Hz , 49m/s2 (5G)	2 hrs each axis, total 6 hrs
10. ENVIRONMENTAL		ROHS	Compliant
10.1	ESD; HUMAN	MIL-STD-883G Method 3015.7	(±)1000V ~ 4000V, Step：(±)500V
10.2	ESD; MACHINE	JEDEC EIA/JESD22-A115	(±)100V ~ 300V, Step：(±)50V
11. COMMUNICATION PROTOCOL			
11.1	Frame Format		
11.1.1	Data Readout from EM35ARS017		
	Request to encoder		
	Respond Data out from encoder		
	#Abbreviation	CF: Control Field; SF: Status Field; DF: Data Field	

11.1.2	Details	
	CF (Control Field)	 Start Bit: Fixed "0" Sink Code: Fixed "010" Data ID Code: Server sending request in one of the DATA ID CODE that lists in Table 1, then the specific responding data shown in Table 2 will be transmitted from encoder. **Table 1** **Request** / **DATA ID** / **CODE** (cc0 cc1 cc2 cc3) / **Parity** (cc4) Readout Data: 0 (0 0 0 0 0); 2 (0 1 0 0 1); 3 (1 1 0 0 0) Reset: 8 (0 0 0 1 1) Error Correction: 9 (1 0 0 1 0) Delimiter: Fixed "1"
	SF (Status Field)	 Start Bit: Fixed "0" dd0:dd3: "0000", Reserved for future use ea0 : "1",when error occurs. i.e., encoder counting error. (Mostly due to magnetic reasons) ea1: "1", Reserved ca0:ca1: "00", Reserved

Note:*

When Communication alarm is occurred, the received data should be invalid, and transmit the same Request signal again. Check the Encoder and repower if necessary.

Delimiter: Fixed "1"

DF (Data Field)

Table 2

DATA ID CODE	DF0	DF1	DF2	DF3	DF4	DF5	DF6	DF7
0	ABSA0	ABSA1	ABSA2					
2	ENID							
3	ABSA0	ABSA1	ABSA2	ENID	ABSA0	ABSA1	ABSA2	ALMC
8	ABSA0	ABSA1	ABSA2					
9	ABSA0	ABSA1	ABSA2	ALMC				

Note: Blank in above table means no data to be transmitted.

ABSA0~ABSA2: Absolute data within single-turn revolution.

ABSA0：Always 0

ENID: Encoder ID, Fixed "06H"

ALMC: Encoder Error Alarm

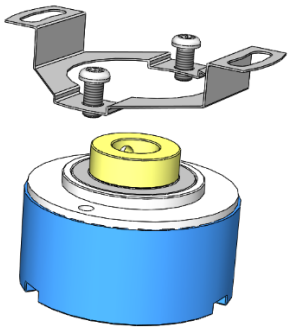
BIT	DF_70	DF_71	DF_72	DF_73	DF_74	DF_75	DF_76	DF_77
Error occurred	1	0	1	0	0	0	0	0

DF_70: when the rotation speed exceeding the upper limitation, this bit is set to high (1).

DF_72: Counting Error (CE), mostly caused by magnetic error.

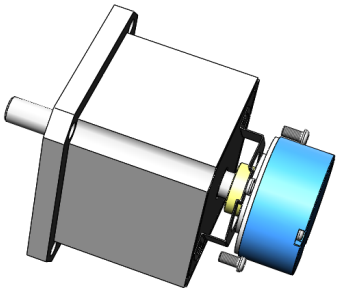
DF_70~DF_77: LSB first.

11. Appendix: The Installation

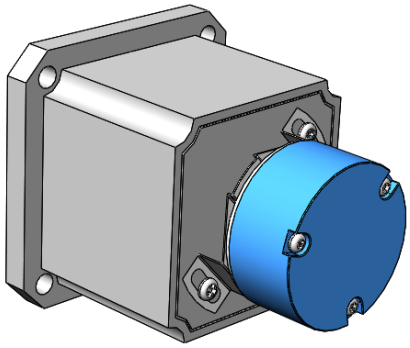


KEM encoder is usually using hollow shaft to allow motor shaft directly inserting into the hollow, it shall be mounted by a flexible mounting plate as shown in figure above. Make sure to fix the shaft in that the mounting plate will not cause burden the ball bearing to the encoder and will not cause damage to the mounting plate.

Encoders are usually installed at the rear end of motor, shown as below pictures. The 8mm dia. motor shaft is standard and 6mm is optional. Insert the motor rear shaft into encoder's hollow shaft for about 12mm depth, tighten the encoder's flexible mounting bracket firmly onto motor rear end by two M3 screws.



Couple the encoder hollow shaft with the rigid motor shaft and always fasten attached screws securely. Be sure to firmly tighten two hex-screws that located at encoder's hollow shaft, apply threads-lock glue and tightly screwed in for long-term use.



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