16 BIT MULTI-TURN 17 BIT SINGLE TURN ABSOLUTE ENCODER SPECIFICATION

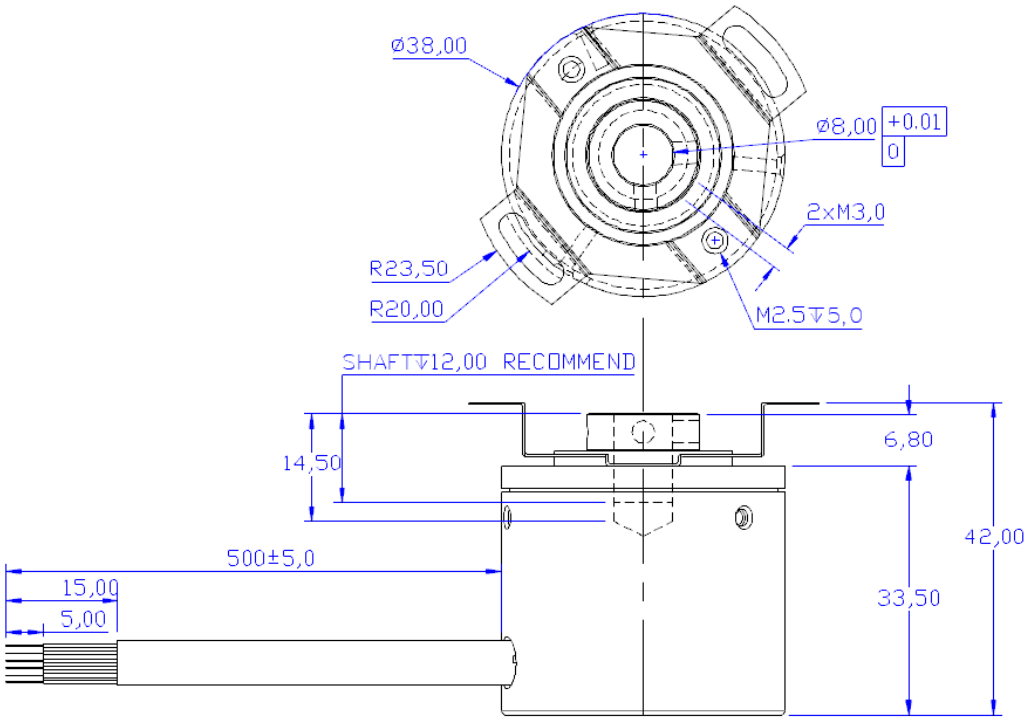
PART NO	KEM17M-38
VER DATE	2021-4-27
ORG. RELEASE	DRAFT VER0.1

訂購 ORDER INFORMATION	料號 PART NUMBER	備註 REMARK
	KEM17M-38	ø38 CASE OUTLINE

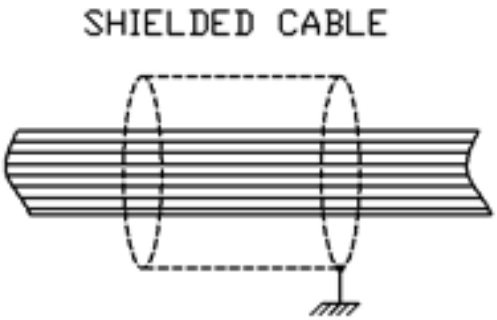
MODEL	PRODUCT DESCRIPTION	
KEM17M-38	16-BIT MULTI TURN 17-BIT SINGLE TURN TOTAL 33-BIT ABSOLUTE ENCODER	Encoder Assembly Incl. 500mm long, ø5.4mm cable with 6-AWG#26 wire & shielding.

1. DIMENSIONS

1-1. OUTLINE DIMENSION (UNIT : mm)



1.1 SHIELDING WIRE CONNECTION

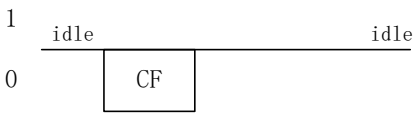
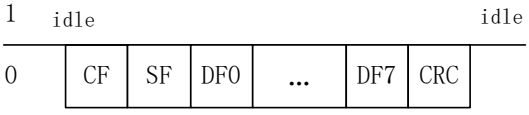


2. WIRING DESCRIPTION

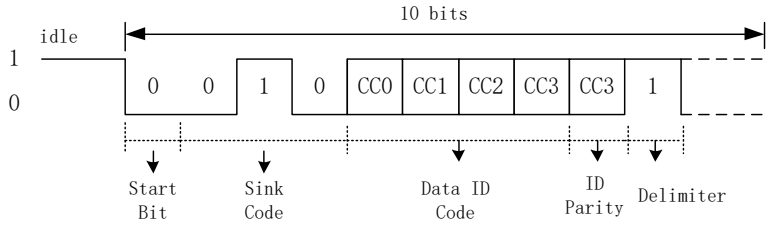
Cable Specification: 500mm length, ø5.4 shielded, RVVP AWG#26 * 6 wire.

Color	Specification	Function	Note
RED	AWG#26	DC5V	POWER SUPPLY
BLACK	AWG#26	GROUND	
GREEN	AWG#26	RS485 A	SERIAL DATA SIGNAL
YELLOW	AWG#26	RS485 B	
WHITE	AWG#26	POWER SUPPLY	BATTERY
BROWN	AWG#26	GROUND	BATTERY

3.	APPLICATION SCOPE	This encoder is suitable for servo motors for robot.	
4.	MODEL & DESCRIPTION	KEM17M-38 17-bit Absolute 16-bit total 33-bit Multi-Turn 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		Normal : -30℃ ~ +85°C Special Model : -60℃ ~+85°C
7.2	Storage Temp		-20℃ ~ +85°C
7.3	Operating Voltage		5.0 ± 0.5 VDC
8.	SPECIFICATION		
8.1	Operating Type		Motor Shaft Operating
8.2	Resolution	16-bit Multi-Turn, 17-bit single turn 131, 072 absolute positions	
8.3	Output Signals	Pure Binary	
8.4	Rated Power		0.1W @ Vdd=5V for normal model.
8.5	Power-up Time		3ms max.
8.6	Consumption Current	@Vdd=5.0V, $T_A \leqslant$-30℃	500mA max.
8.7	Rotation Speed	RPM	⩽6K Recommended
8.8	Output Delay		5 μs
8.9	Output Digital Voltage	Push-pull (Iout=2mA)	High: $V_{OH} \geqslant 4.9V$ Low: $V_{LO} \leqslant 0.1V$
8.10	Magnet	NdFeB, N40~N52, 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-hr each axis, total 18 hours
9.11	Vibration	5 ~ 40Hz , Amplitude 1.5 mm; 40 ~ 200Hz , 49m/s2 (5G)	2-hr each axis, total 6 hours
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		
11.1.2	Details		

CF (Control Field)



Start Bit: Fixed "0"

Sink Code: Fixed "010"

Data ID Code:

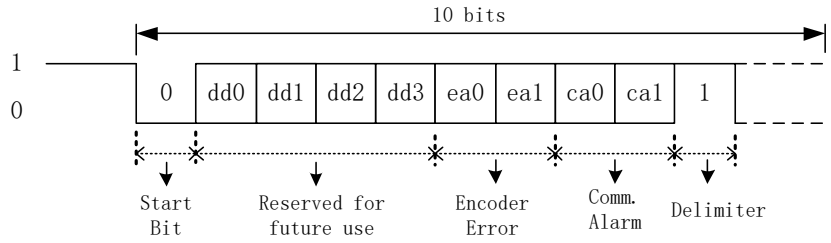
Server sending request in one of the DATA ID CODE that lists in Table 1, then the specific responding data shown in Table 2 will be transmitted from encoder.

Table 1

Request	DATA ID	CODE				Parity
		cc0	cc1	cc2	cc3	cc4
Readout Data	**0**	0	0	0	0	0
	1	1	0	0	0	1
	2	0	1	0	0	1
	3	1	1	0	0	0
Reset	**7**	1	1	1	0	1
Error Correction	**9**	1	0	0	1	0
Reset multi-turn	**C**	0	0	1	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", Logic 1-OR of Multi-turn error, Battery error and Battery alarm is transmitted.

ca0:ca1: "00", Reserved

Note*:

When an error occurs in the bit of ea1, request "Data ID 3" to confirm the contents of ALMC in the data frame. Because Full absolute status, Over-speed and Counter overflow are not included in ea1, confirm them in ALMC.

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					
1	ABM0	ABM1	AMB2					
2	ENID							
3	ABSA0	ABSA1	ABSA2	ENID	ABSA0	ABSA1	ABSA2	ALMC
7	ABSA0	ABSA1	ABSA2					
9	ABSA0	ABSA1	ABSA2	ALMC				
C	ABSA0	ABSA1	ABSA2					

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

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

ENID: Encoder ID, Fixed "17H"

ABM0~ ABM2: Multi-turn data:

ABM0 is located to lower bite and ABM2 is located to higher bite in the frame of total 24 bits. ABM2 is always logic "0", and then the valid data

consists of total 16 bits.

ALMC: Encoder Error Alarm

BIT	$DF7_0$	$DF7_1$	$DF7_2$	$DF7_3$	$DF7_4$	$DF7_5$	$DF7_6$	$DF7_7$
Error occurred	1	0	1	0	0	1	1	1
Name & its symbol	**Over_speed**	---	**Counting error**	**Counter overflow**	---	**Multi-turn error**	**Battery error**	**Battery alarm**

Table 3 ALMC

$DF7_0$: when the rotation speed exceeding the upper limitation, this bit is set to high (1).

$DF7_2$: Counting Error (CE), mostly caused by magnetic error.

$DF7_3$: Counting overflow, mostly caused by logic "1" is transmitted when the multi-turn counter is over flow. The multi-turn counter continues to operate as a cyclic counter of 0~ 65,535.

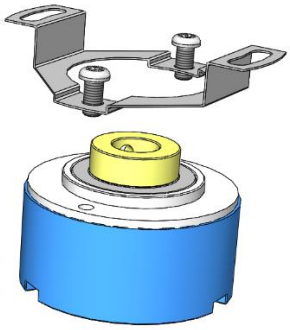
$DF7_5$: Multi-turn error, Logic "1" is transmitted, when reversals and counting errors occur.

$DF7_6$: Battery error, Logic "1" is generated when the external battery voltage is 3.31±0.25V or less during main power-off.

$DF7_7$: Battery error: Logic "1" is transmitted, when the external battery voltage is 3.47 ±0.1 V or less during main power-on.

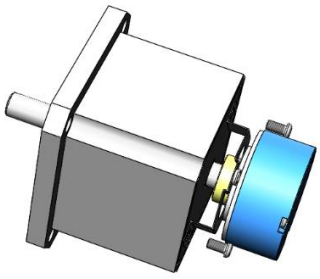
$DF7_0$~$DF7_7$: LSB first.

12 Appendix: The Installation

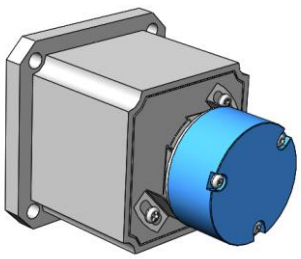


KEM encoder is usually using hollow shaft to allow motor shaft directly inserting into the hollow, it shall be mounted by a flexible mounting plate as shown in figure above. Make sure to fix the shaft in that the mounting plate will not cause burden the ball bearing to the encoder and will not cause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