

ENCODER switch

Serie EC006SM

Multifunction Snap-in &
Surface Mount Type

MODEL NO.

006SM Series



Features

Incremental type

A push on switch with a clear-click operational feel

An encoder with detents and excellent operating feeling

Applications

Menu selection and input for Audio Visual Equipment

Level controls for car audio & navigation system

Portable audio devices,
Personal digital assistant.

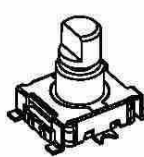
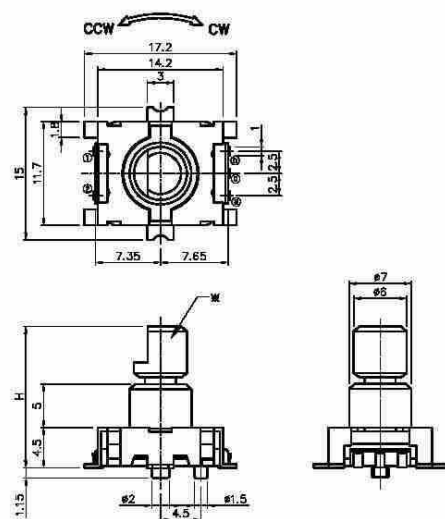
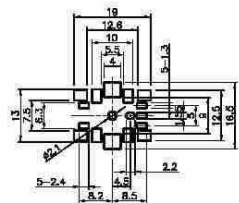
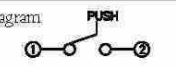
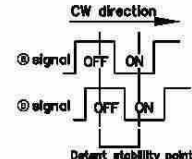
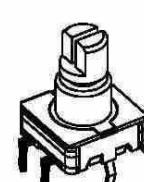
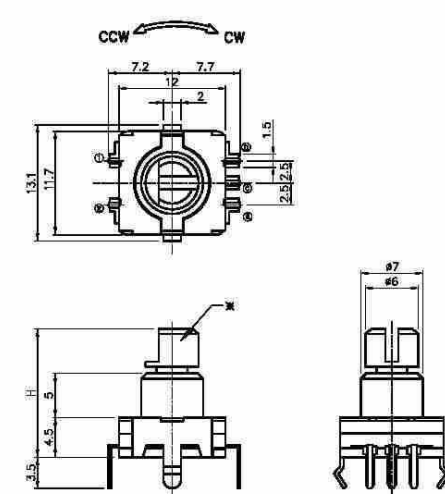
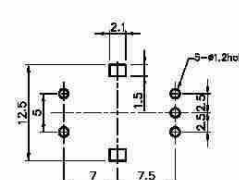
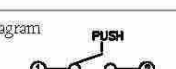
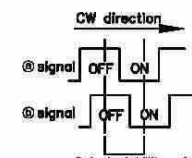
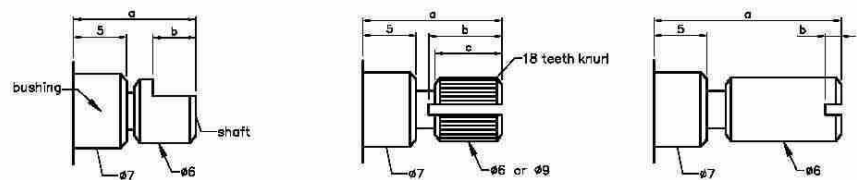


Main Specifications

	Encoder	Push on
Rating	10mA 5V DC	0.5mA 16V DC
Detent(pulse) /Travel	30 detent (15 pulses)	0.25mm
Contact Resistance	1 Ω max.	100m Ω max.
Operating Force	100gf	350gf (□□ : 35) without push on switch (□□ : 00)
Operating Life	15,000 Cycles	20,000 Cycles

Subsidiary Production Code

Code number	Terminal shape	Guide Boss	Drawing
006SM GJ□□	SMT	With	1
006SM BD□□	Snap-in	Without	2

No.	3D	Dimension Type	P.C.B pattern dimension
1		<p>Unit : mm</p> 	 <p>Circuit Diagram</p>  <p>CW direction</p>  <p>Detent stability point</p>
2		<p>Unit : mm</p> 	 <p>Circuit Diagram</p>  <p>CW direction</p>  <p>Detent stability point</p>
<p>Standard Dimensions Shaft</p>  <p>Custom applications are available for the shaft specifications.</p>			

1. General

- 1.1 Application This specification is applied to ENCODER switches.
 Controls for image/sound devices, radio equipment.
- 1.2 Operating temperature range
 : -20 ~ 70 °C (normal humidity,normal air pressure)
- 1.3 Storage temperature range
 : -30 ~ 80 °C (normal humidity,normal air pressure)
- 1.4 Test conditions Unless otherwise specified, the atmospheric conditions for marking
 measurements and tests are as follows.
 Normal temperature : (Temperature 5 ~ 35°C)
 Normal humidity : (Relative humidity 25 ~ 85%)
 Normal air pressure : (Air pressure 86 ~ 106kPa)
 If any doubt arise from judgement, tests shall be conducted at the following conditions.
 Ambient temperature : 20 ±2°C
 Relative humidity : 60 ~ 70%
 Air pressure : 86 ~ 106kPa

2. Appearance,style and dimensions

- 2.1 Appearance There shall be no defects that affect the serviceability of the product.
- 2.2 Style & dimensions Refer to the assembly drawings.

3. Type of actuating Tactile feedback & Rotation

4. Number of Detent / 30 / 15
Resolution (Details of contact arrangement are given in the assembly drawings)

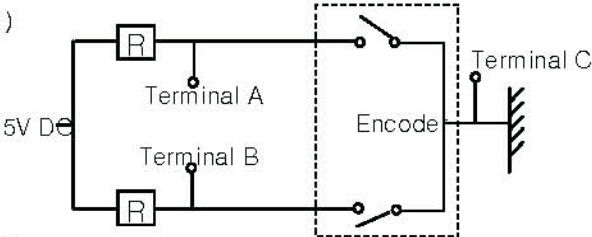
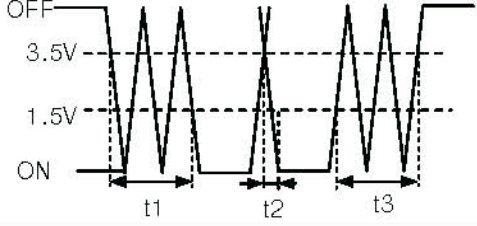
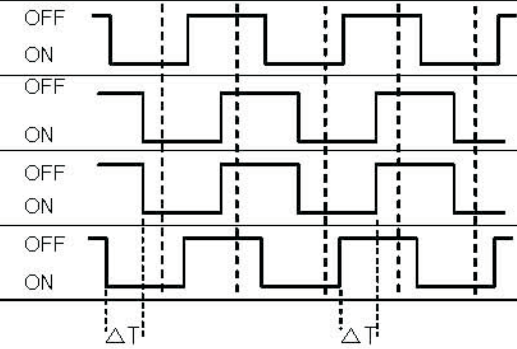
5. Rating

- 5.1 Tactile ratings 16 V DC 0.5 mA
- 5.2 Rotational ratings 5 V DC 10 µA

6. Electrical specification

	Items	Test conditions	Criteria
6.1	Contact resistance	Applying a blow static load to the center of the stem, measurements shall be made. (1) Depression : <u>5.096</u> N (2) Measuring method : 1kHz small-current contact resistance meter or voltage drop method at 5V DC 10mA.	<u>1</u> Ω Max.
6.2	Insulation resistance	Measurements shall be made following the test set forth below : (1)Test voltage : <u>100</u> V DC for 1 min (2)Applied position : Between all terminals.And if there is a metal frame,between terminals and ground(frame)	<u>100 MΩ</u> Min.
6.3	Voltage proof	Measurements shall be made following the test set forth below : (1)Test voltage : <u>100</u> V AC (50 ~ 60 Hz) (2)Duration : 1 min (3)Applied position : Between all terminals.And if there is a metal frame,between terminals and ground(frame)	There shall be no breakdown.

				Appr.ed HY.YOO	User	F.K.Industrievertretungen Loretostr.2/1 D-72351 Geislingen Tel. +49(0)7428-917310 E-Mail: info@fk-industrie.de
				Checked	Encoder switch	
PAGE	MARK	Revision	Signature	Desianed JM.KIM	Model No. EC006SM	

FILE No.		ENCODER SWITCH SPECIFICATION			PAGE	
EM006-35SD					2 / 4	
	Items	Test conditions			Criteria	
6.4	Switching Characteristics	Measurement shall be made under the condition as follows. 1) TEST Circuit Figure 1)  Figure 2) 			Code-OFF area : The area which the voltage is 3.5V or more. Code-ON area : The area which the voltage is 1.5V or more.	
6.5	Output signal format	(Applied for with-detent type) note : Output signal is 1 pulse per 2 detents. And terminal B-C is pulse ON or OFF at detent position. No specified output of terminal A-C at detent position.			2 phase-different signals (Signal A, B)	
		Rotational direction	Conditions	Figure 3)	Specification	
		C.W	A (Terminal A-C)	OFF		
			B (Terminal B-C)	ON		
		C.C.W	A (Terminal A-C)	OFF		
			B (Terminal B-C)	ON		
6.6	Chattering	Specified by the signal's passage time from 3.5V to 1.5V or from 1.5V to 3.5V of each switching position (code OFF↔ON)			Figure 2) $t_1, t_3 \leq 3\text{ms}$	
6.7	Phase difference	Measurement shall be made under the condition which the shaft is rotated in $360^\circ \bullet s^{-1}$ (constant speed)			Figure 3) $\Delta T \geq 6\text{ms}$	
7. Mechanical specification						
	Items	Test conditions			Criteria	
7.1	Operating force	Placing the switch such that the direction of switch operation is vertical and then gradually increasing the load applied to the center of the stem, the maximum load required for the switch to come to a stop shall be measured.			tact : $350 \pm 100\text{ gf}$ $(3.43 \pm 1.0\text{ N})$	
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FILE No.		ENCODER SWITCH SPECIFICATION			PAGE	
EM006-35SD					3 / 4	
Items		Test conditions			Criteria	
7.2	Travel	Placing the switch such that the direction of switch operation is vertical and then applying static load to the center of the stem, the travel distance for the switch to come to a make "ON" shall be measured.			tact : 0.25 ± 0.1 mm rotate step angle : $12^\circ \pm 3^\circ$	
7.3	Return force	The sample switch is installed such that the direction of switch operation is vertical and, upon depression of the stem in its center the travel distance, the force of the stem to return to its free position shall be measured.			30 gf Min. (0.29 N Min.)	
7.4	Stop strength	Placing the switch such that the direction of switch operation is vertical and then a below static load shall be applied in the direction of stem operation. (1) Depression : 3 Kgf (29.4 N) (2) Duration : 3 s			There shall be no sign of damage mechanically and electrically.	
7.5	Shaft wobble	Bending moment of 50mNm to be applied to the shaft at 30mm from the mounting surface. If the shaft length is less than 30mm, the value shall be calculated as right formula.			bushing wobble length(mm) $5\text{mm} \rightarrow 0.8 \times L/30\text{mm}$	
7.6	Shaft play in axial direction				0.4 mm P-P Max.	
7.7	Rotation play at the click position	(Applied for with detent type) Measure with jig for rotational angle			4° Max.	
8. Environmental specification						
Items		Test conditions			Criteria	
8.1	Resistance to low temperatures	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hour before measurements are made: (1) Temperature : -30 ± 2 °C (2) Time : 96 h (3) Waterdrops shall be removed.			Item 6. Item 7.1 Item 7.2	
8.2	Heat resistance	Following the test set forth below the sample shall be left in normal temperature and humidity conditions for 1 hour before measurements are made: (1) Temperature : 80 ± 2 °C (2) Time : 96 h			Item 6. Item 7.1 Item 7.2	
8.3	Moisture resistance	Following the test set forth below the sample shall be left in normal temperature and humidity condition for 1 hour before measurements are made: (1) Temperature : 60 ± 2 °C (2) Time : 96 h (3) Relative humidity : 90 ~ 95 % (4) Waterdrops shall be removed.			Contact resistance (Item 6.1) : 200 mΩ Max. Insulation resistance (Item 6.2) : 10 MΩ Min. Bounce (Item 6.4) : ON bounce 20 ms Max. : OFF bounce 20 ms Max. Item 6.3, 7.2, 7.1	
			Appr.ed	HY.YOO	User	F.K.Industrievertretungen Loretostr. 2/1 D-72351 Geislingen
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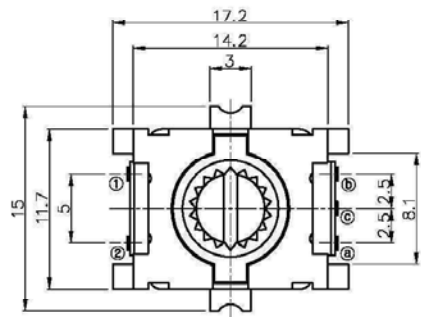
8.4	Change of temperature	<p>After the test by following conditions, the switch shall be allowed to stand under normal room temperature and humidity conditions for 1 hour, and measurement shall be made. Water drops shall be removed.</p> <p>(1) Times of cycles : <u>5</u> times</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; padding-left: 20px;"> <p>A = <u>60</u> °C</p> <p>B = <u>-10</u></p> <p>C = <u>2</u> h</p> <p>D = <u>1</u> h</p> <p>E = <u>2</u> h</p> <p>F = <u>1</u> h</p> </div> </div>	Item 6. Item 7.1 Item 7.2
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9. Endurance specification			
	Items	Test conditions	Criteria
9.1	Operating life	<p>Measurements shall be made following the test set forth below :</p> <p>(1) <u>5</u> V DC <u>5</u> mA resistive load</p> <p>(2) Rate of operation : <u>2</u> to <u>3</u> operations per sec.</p> <p>(3) Depression : The maximum load of a specification of the operating force.</p> <p>(4) Cycles of operation: Tach - <u>20,000</u> cycles : Rotate - <u>15,000</u> cycles</p>	<p>Contact resistance (Item 6.1) : <u>200</u> mΩ Max.</p> <p>Insulation resistance (Item 6.2) : <u>10</u> MΩ Min.</p> <p>Bounce (Item 6.4) : ON bounce <u>20</u> ms Max. : OFF bounce <u>20</u> ms Max.</p> <p>Operating force (Item 7.1) : <u>±30</u> % of initial force Item 6.3, 7.2</p>

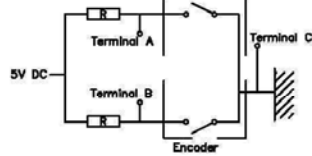
10. Soldering conditions			
	Items	Recommended conditions	
10.1	Hand soldering	<p>Please practice according to below conditions.</p> <p>(1) Soldering temperature : <u>350</u> °C Max.</p> <p>(2) Continuous soldering time : <u>3</u> seconds Max.</p> <p>(3) Excessive pressure shall not be applied to the terminal.</p>	
10.2	Reflow soldering	<p>Please practice according to below conditions.</p> <p>(1) Preheat : Temperature on the copper foil surface should reach 180°C, <u>2 ± 0.3</u> minutes after the PCB entered into the soldering equipment</p> <p>(2) Soldering heat: Temperature on the copper foil surface should reach the peak temperature of <u>255</u> °C within <u>30</u> seconds after the PCB entered into soldering heat zone.</p> <div style="text-align: center;"> </div>	

				Appr.ed HY.YOO	User Encoder switch	F.K.Industrievertretungen Loretostr. 2/1 D-72351 Geislingen
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Standard Position



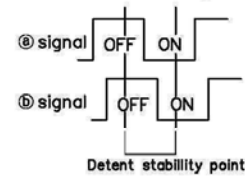
Measurement condition
: Rotation speed 360°/s



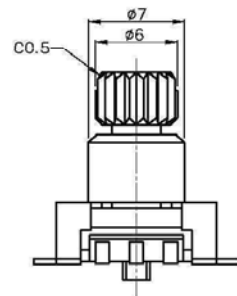
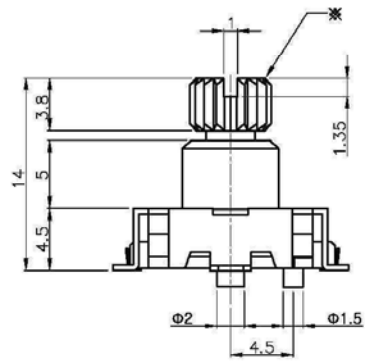
Circuit Diagram



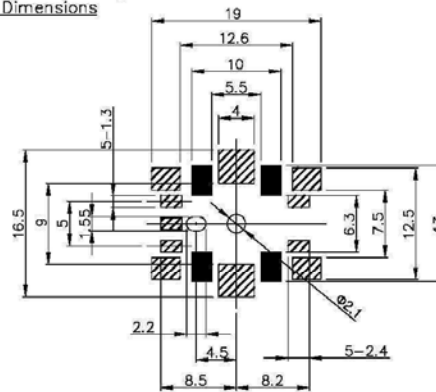
CW direction



REFERENCE



P.C. Board Mounting Hole Dimensions



* Custom applications are available for the shaft specifications.

Basic Dimensions	Tolerances										
Up To 10	±0.3										
Above 10 To 100	±0.5										
Above 100	±0.8										
Angular Dimensions	±3'	변경부호/ Rev.Mark	변경 사항 / Revision note	담당/Design	검토/Check	승인/Appro.	도면번호 / Document No.	부품명 / Part Name	09.08.12	단 위 / Unit mm	F.K.Industrievertretungen Loretstr.2/1 D-72351 Geislingen Tel. 49(0)7428-917310 E-Mail: info@fk-industrie.de