SERIES: RIC11 | DESCRIPTION: MECHANICAL INCREMENTAL ENCODER

FEATURES

- multiple shaft options
- different mounting options
- different resolution and detent options

RoHS

ELECTRICAL

parameter	conditions/description	min	typ	max	units
power supply			5		V
current consumption	each lead common lead	0.5 0.5	 1	10 10	mA mA
output	2-bit quadrature, channel A leads channel B by 90° with counter-clockwise rotation				
output phase difference	ΔT ≥6 ms @ 60 rpm (see output waveform)				
output resolution	15, 20 PPR				
detent step angle	20 detent models 30 detent models	16 10	18 12	20 14	° °
insulation resistance	at 250 Vdc, for 1 minute between terminals and bushing	100			MΩ
dielectric strength	for 1 minute between terminals and bushing		300		Vac

Notes: 1. All specifications measured at 15~35°C, humidity at 25~85%, under 86~106 kPa pressure, unless otherwise noted.

PUSH SWITCH SPECIFICATIONS

parameter	conditions/description	min	typ	max	units
rating	5 Vdc, 10 mA (1 mA min)				
contact resistance	voltage step-down test at 5 Vdc, 1 mA			100	mΩ
insulation resistance	at 250 Vdc, for 1 minute between terminals and bushing	100			MΩ
dielectric strength	between terminals and bushing for 1 minute (leakage current 1 mA) for 2 seconds (leakage current 1 mA)		 250 300		 Vac Vac
operating push force		3	5	7	N
travel		0.3	0.5	0.7	mm
bounce	shaft rotated at 1 cycles/s (OFF-ON-OFF)			10	ms
push switch life	at 1800~2000 cycles/hour without electrical load		20,000		cycles

MECHANICAL

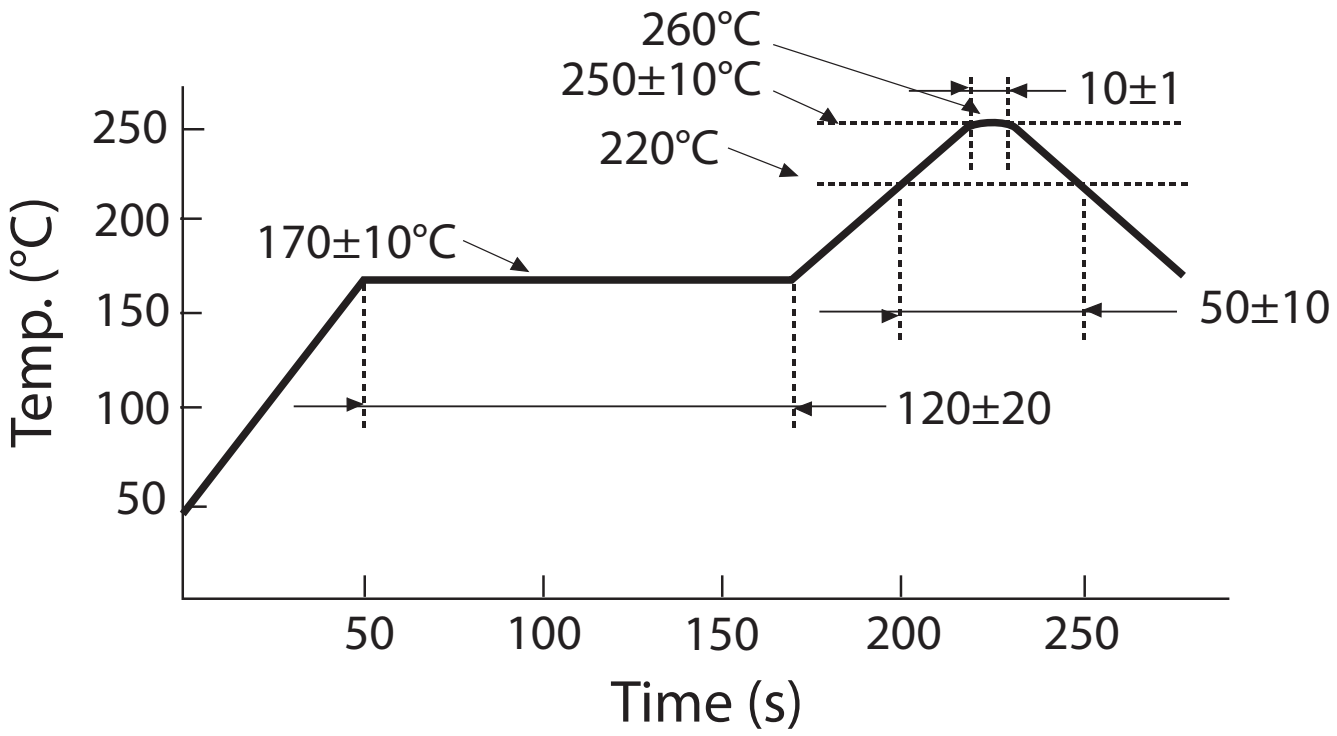
parameter	conditions/description	min	typ	max	units
shaft load	pull static load for 20 seconds push static load for 10 seconds		100 100		N N
rotational torque		10	15	20	mN•m
terminal strength	a static load of 3 N applied to tip of terminals for 10 s				
side thrust strength of shaft	a load of 80 N applied at the point 5 mm from the tip of the shaft perpendicular to the shaft axis for 10 s				
shaft play in rotational wobble	testing by angle board			2	°
shaft play in axial direction	pull/push load of 0.5 N applied on the shaft			0.2	mm
rotational life	at 600~800 cycles/hour without electrical load		100,000		cycles

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature		-40		85	°C
storage temperature		-40		85	°C
RoHS	yes				

SOLDERABILITY

parameter	conditions/description	min	typ	max	units
hand soldering	for maximum 3 seconds			350	°C
reflow soldering	only suitable for surface mount models		260		°C



PART NUMBER KEY

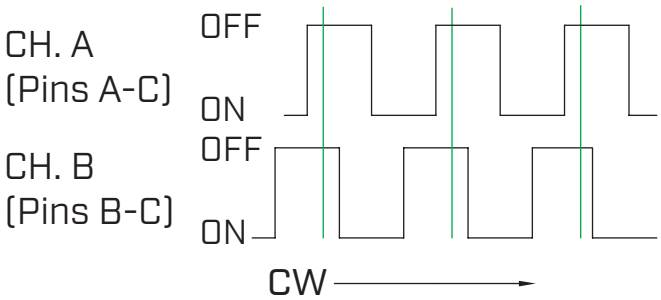
RIC11 - XX S XX X X - XX

- Base Number
- Resolution, Detent:
  22 = 20 PPR, 20 detents
  31 = 15 PPR, 30 detents
- Shaft Length:
  10 = 10 mm
  11 = 10.5 mm
  13 = 13 mm
  15 = 15 mm
  15.5 = 15.5 mm
  16 = 16 mm
  17 = 16.5 mm
  20 = 19.5 mm
- Shaft Style:
  D = D-Cut
  K = Knurled
- Bushing Length:
  2 = 2.2 mm (smooth)
  3 = 3.5 mm (smooth)
  5M = 5 mm (M7X0.75)
  5S = 5 mm (smooth)
  7 = 7 mm (smooth)
- Termination:
  TH = Through Hole
  USMT = Surface Mount (U-Pad)
  GSMT = Surface Mount (Gull Wing)

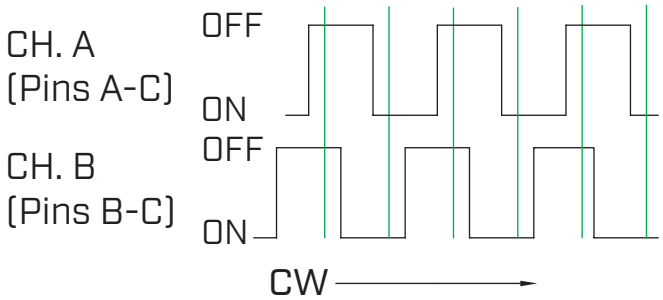
Note: 2. See Shaft Types and Mechanical Drawings for available configurations.

OUTPUT WAVEFORM

20 PPR, 20 Detent Models



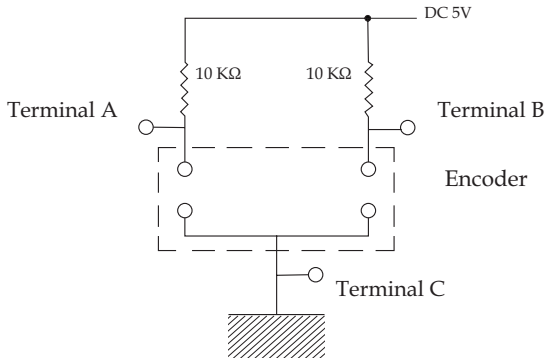
15 PPR, 30 Detent Models

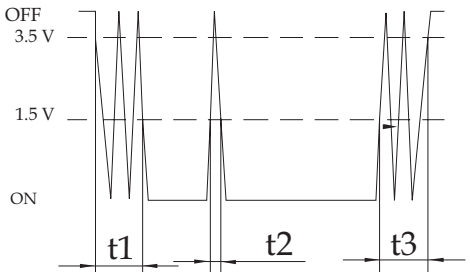


SWITCHING CHARACTERISTICS

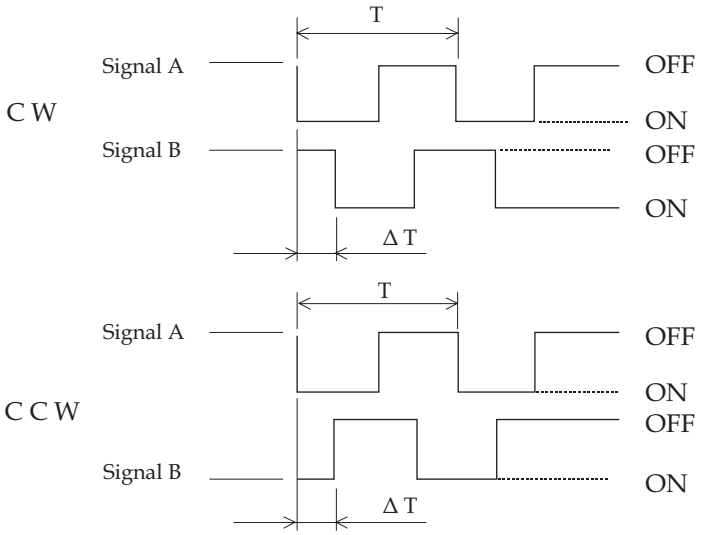
parameter	conditions/description	value
chattering	signal's passage of time from 1.5 V to 3.5 V of each switching position (OFF to ON or ON to OFF)	t1, t3≤ 3 ms
sliding noise (bounce)	time of voltage change exceeds 1.5 V in code ON area. When the bounce has code ON time less than 1 ms between chattering (t1 or t3), the voltage change shall be regarded as a part of chattering. When the code ON time between 2 bounces is less than 1 ms, they are regarded as 1 linked bounce.	t2≤ 2 ms
sliding noise	voltage change in code OFF area	3.5 V min

Notes: 3. Testing at 60 RPM.
4. Code OFF: The area which the voltage is 3.5 V or more. Code ON: The area which the voltage is 1.5 V or less.





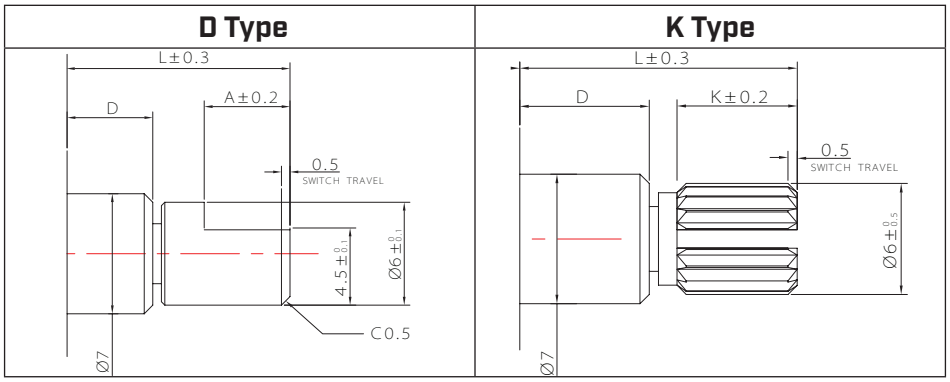
PHASE DIFFERENCE



At 60 RPM constant speed: ΔT ≥6 ms

SHAFT TYPES

units: mm
tolerance:
X≤10.00: ±0.30 mm
10.00<X≤100.00: ±0.50 mm
unless otherwise noted



D=5			
	100	130	160
L	10	13	16
A	4	5	10

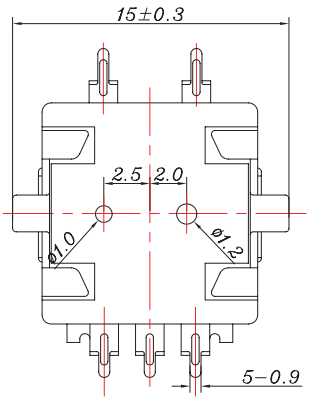
	10K	10K	11K	15K
D	2.2	3.5	5	7
L	10	10	10.5	15
A	5	5	3.5	6.5

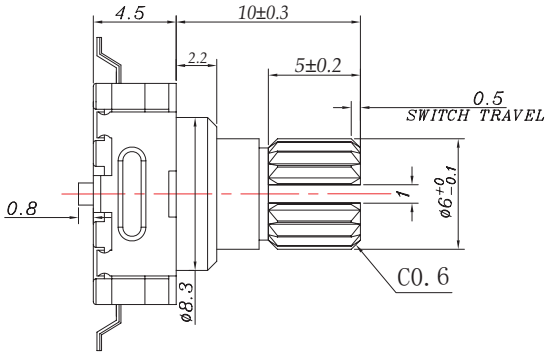
D=7				
	150	15.50	170	200
L	15	15.5	16.5	19.5
A	7	6	8	11

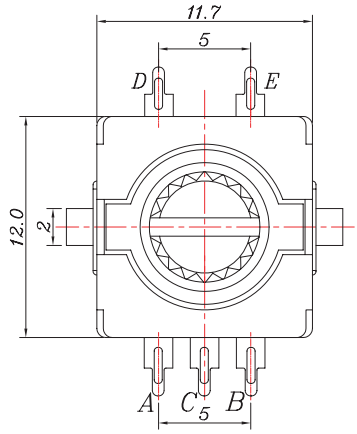
MECHANICAL DRAWING (RIC11-31S10K2-GSMT)

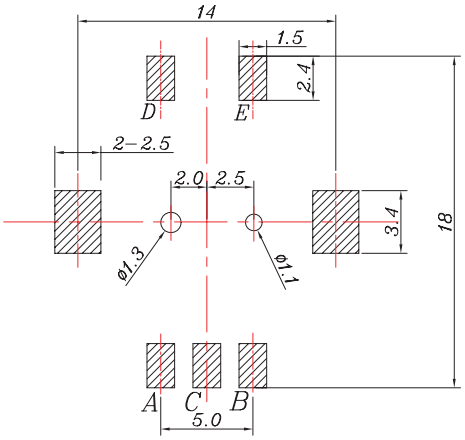
units: mm
tolerance:
X≤10.00: ±0.30 mm
10.00<X≤100.00: ±0.50 mm
unless otherwise noted

DESCRIPTION	MATERIAL	PLATING/COLOR
housing	LCP	
bracket	SPCC	
bushing	zinc alloy	
shaft	aluminum	
terminals	phosphor copper	

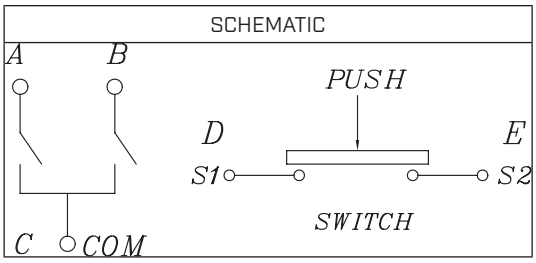








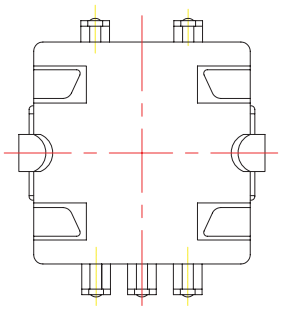
Recommended PCB Layout
Top View

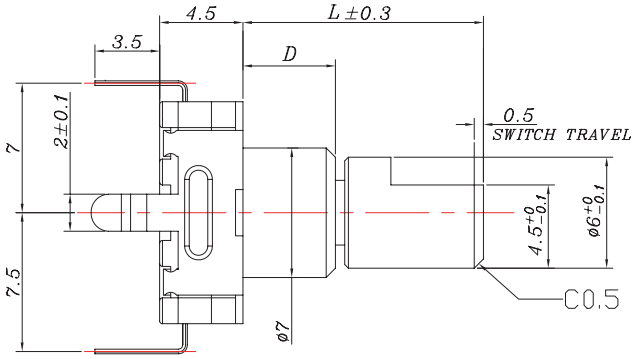


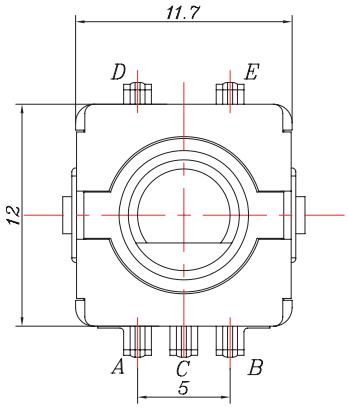
MECHANICAL DRAWING (THROUGH HOLE MODELS)

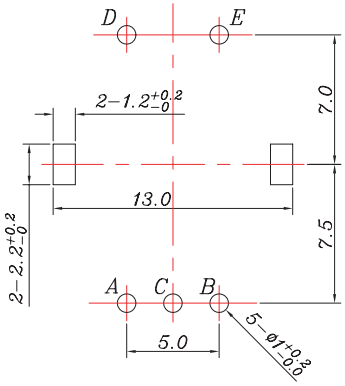
units: mm
tolerance:
X≤10.00: ±0.30 mm
10.00<X≤100.00: ±0.50 mm
unless otherwise noted

DESCRIPTION	MATERIAL	PLATING/COLOR
housing	PBT	
bracket	SPCC	
bushing	zinc alloy	
shaft	aluminum/zinc alloy	
terminals	phosphor copper	









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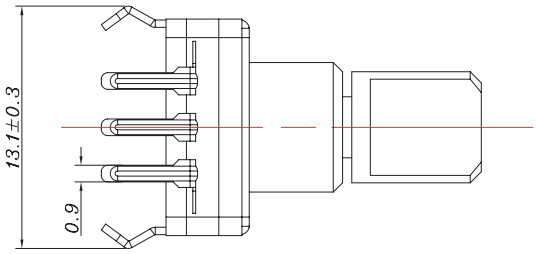
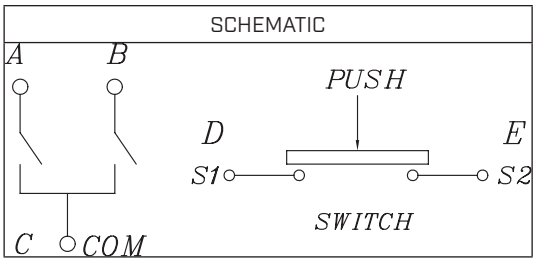
Top View

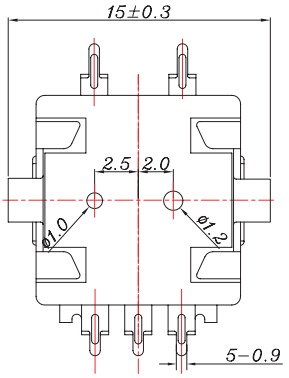


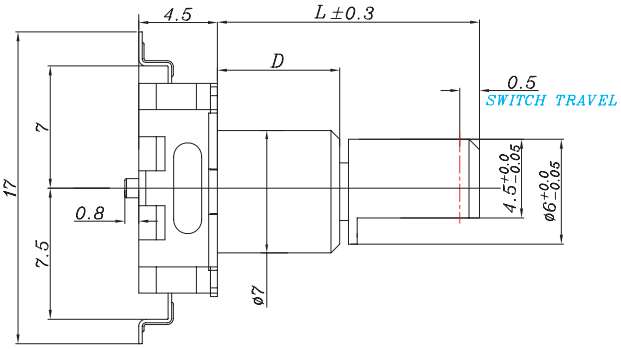


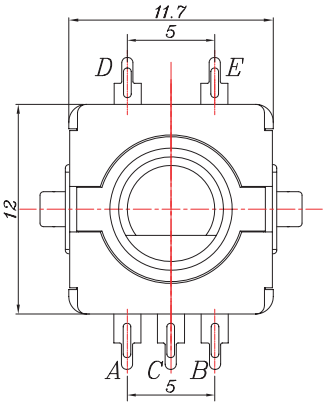
MECHANICAL DRAWING (GULL WING SMT MODELS)

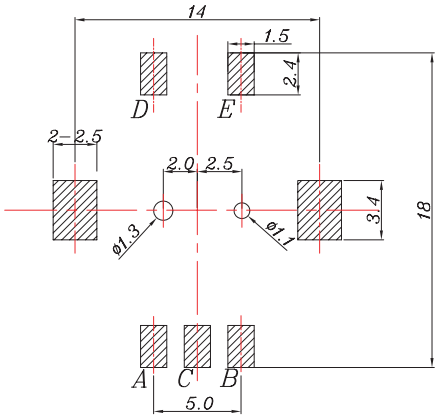
units: mm
tolerance:
X≤10.00: ±0.30 mm
10.00<X≤100.00: ±0.50 mm
unless otherwise noted

DESCRIPTION	MATERIAL	PLATING/COLOR
housing	LCP	
bracket	SPCC	
bushing	zinc alloy	
shaft	aluminum/zinc alloy	
terminals	phosphor copper	









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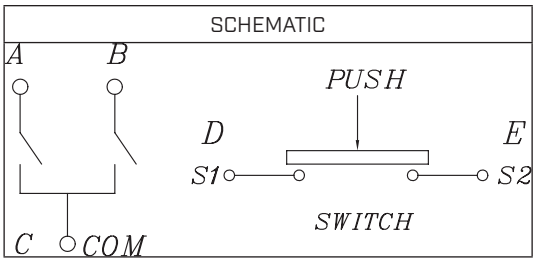
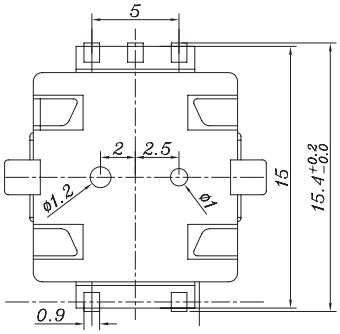
Top View

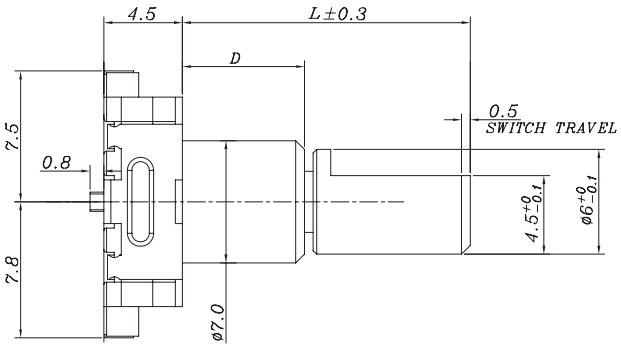


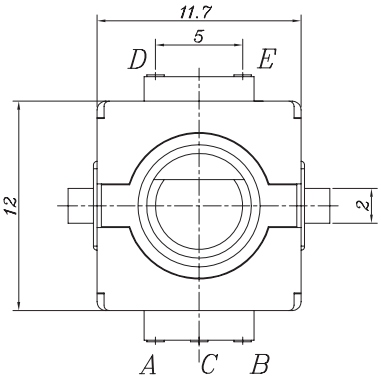
MECHANICAL DRAWING (U SHAPE SMT MODELS)

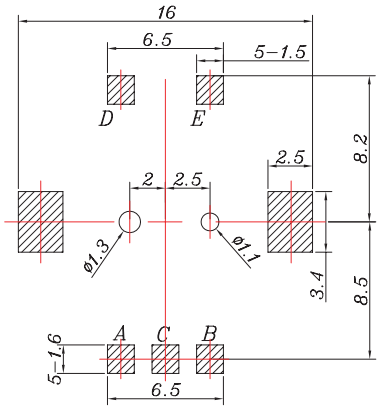
units: mm
tolerance:
X≤10.00: ±0.30 mm
10.00<X≤100.00: ±0.50 mm
unless otherwise noted

DESCRIPTION	MATERIAL	PLATING/COLOR
housing	LCP	
bracket	SPCC	
bushing	zinc alloy	
shaft	aluminum/zinc alloy	
terminals	phosphor copper	









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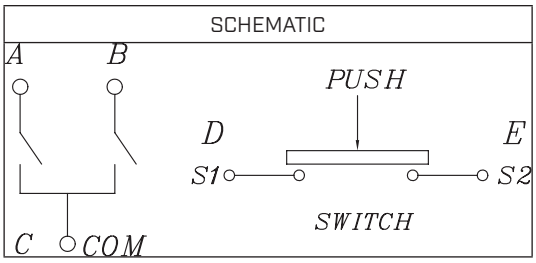
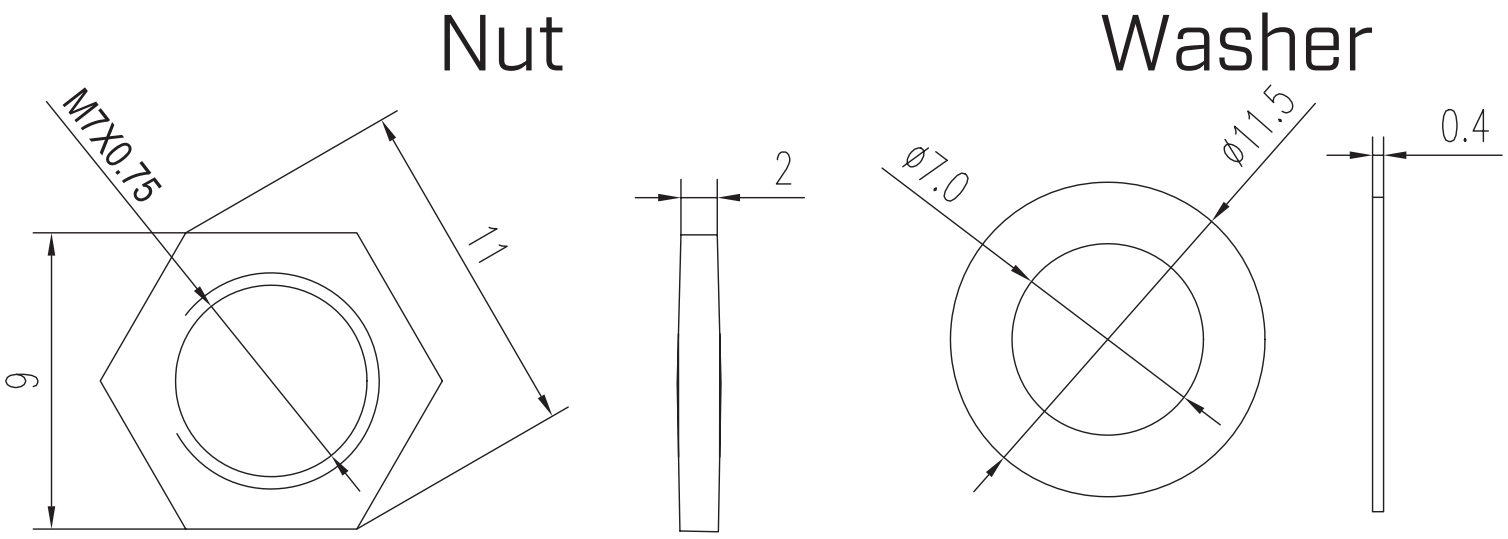


MOUNTING HARDWARE

units: mm



REVISION HISTORY

rev.	description	date
1.0	initial release	09/20/2023

The revision history provided is for informational purposes only and is believed to be accurate.