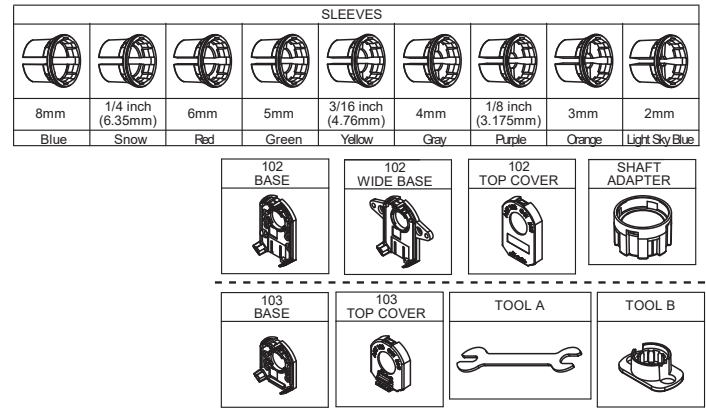


# MODULAR INCREMENTAL ENCODER

## Features

- low power consumption
- CMOS outputs
- 16 DIP switch selectable resolutions
- index pulse
- modular package design
- straight (radial) and right-angle (axial) versions
- 9 mounting hole options for radial version
- 8 mounting hole options for axial version
- -40~100°C operating temperature



## Electrical specifications

parameter	conditions/description	min	typ	max	units
power supply	VDD	3.6	5	5.5	V
current consumption	with unloaded output		6		mA
output high level		VDD-0.8			V
output low level				0.4	V
output current	CMOS sink/source per channel			2	mA
rise/fall time			30		ns

## Incremental encoder specifications

parameter	conditions/description	min	typ	max	units
channels	quadrature A, B, and X index				
waveform	CMOS voltage square wave				
phase difference	A leads B for CCW rotation (viewed from front)		90		degrees
quadrature resolutions <sup>1</sup>	48, 96, 100, 125, 192, 200, 250, 256, 385, 400, 500, 512, 800, 1000, 1024, 2048				PPR
index <sup>2</sup>	one pulse per 360 degree rotation				
accuracy			0.25		degrees
quadrature duty cycle (at each resolution)	256, 512, 1024, 2048	49	50	51	%
	48, 96, 100, 125, 192, 200, 250, 384, 400, 500	47	50	53	%
	800, 1000	43	50	56	%

- Notes: 1. Resolution selected via adjustable DIP switch  
2. Some stepper motors may leak a magnetic field causing the index pulse to not function properly

## Mechanical specifications

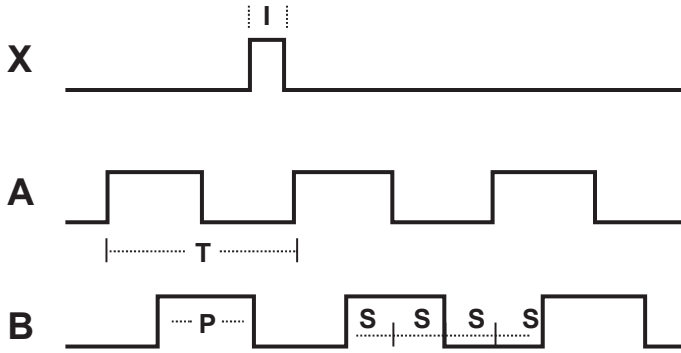
parameter	conditions/description	min	typ	max	units
motor shaft length		9			mm
weight	AMT102		20.5		g
axial play				±0.3	mm
rotational speed (at each resolution)	192, 384, 400, 500, 800, 1000, 1024, 2048			7500	RPM
	48, 96, 100, 125, 200, 250, 256, 512			15000	RPM

## Environmental conditions

parameter	conditions/description	min	typ	max	units
operating temperature		-40		100	°C
humidity	non-condensing			95	%
vibration	20~500 Hz, 1 hour on each XYZ			10	G
shock	11 ms, ±XYZ direction			50	G
RoHS	2011/65/EU				

# Signal waveforms

Quadrature signals with index showing counter-clockwise rotation



Parameter	Description	Expression	Units
T	period	$360/R$	mechanical degrees
P	pulse width	$T/2$	mechanical degrees
I	index width	$P/2$	mechanical degrees
S	A/B state width	$P/2$	mechanical degrees

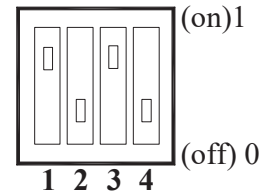
# Resolution setup

1 = On, 0 = Off

Resolution (PPR)	Maximum RPM	1	2	3	4
2048	7500	0	0	0	0
1024	7500	0	0	1	0
1000	7500	1	0	0	0
800	7500	0	1	0	0
512	15000	0	0	0	1
500	7500	1	0	1	0
400	7500	0	1	1	0
384	7500	1	1	0	0
256	15000	0	0	1	1
250	15000	1	0	0	1
200	15000	0	1	0	1
192	7500	1	1	1	0
125	15000	1	0	1	1
100	15000	0	1	1	1
96	15000	1	1	0	1
48	15000	1	1	1	1

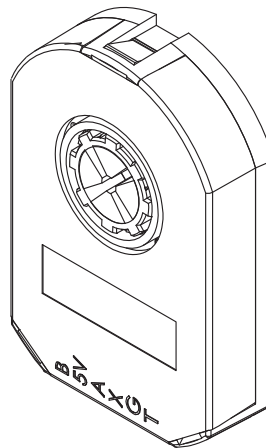
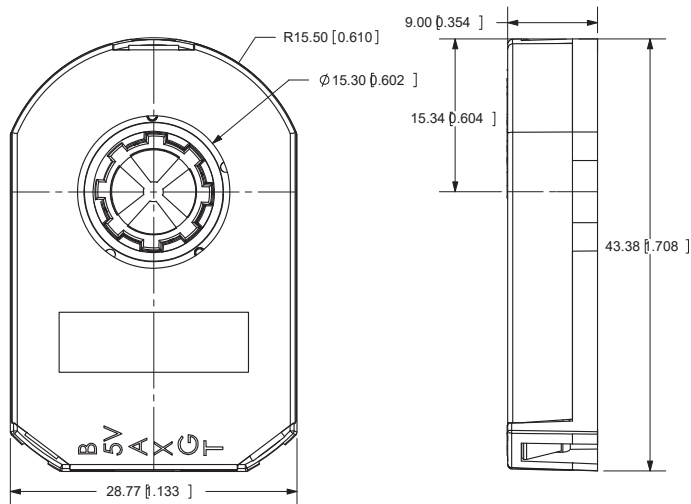
## DIP switch:

Example setting: 500 PPR



# ENCODER – mechanical and pinout

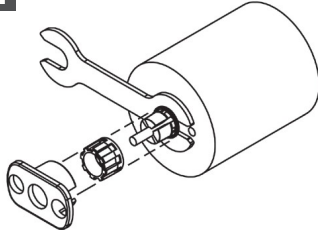
units: mm[inch]  
tolerance:  $\pm 0.1\text{mm}$



Function	
B	B CHANNEL
5V	+5 V
A	A CHANNEL
X	INDEX CHANNEL
G	GND
T	UNUSED

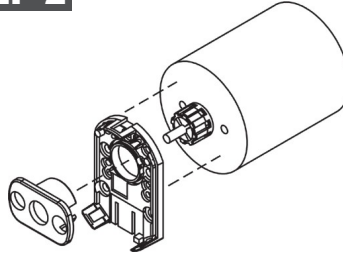
# Assembly procedure

## STEP 1



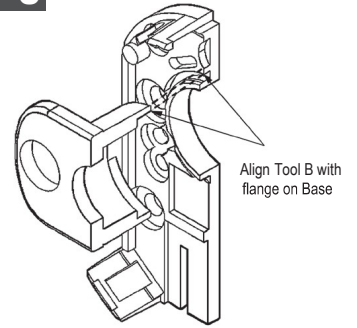
1. Insert Tool A as a spacer that defines the distance to the mounting surface.
2. Slide appropriate sized Sleeve over shaft all the way down to Tool A.
3. Slide Shaft Adaptor over Sleeve.
4. Use Tool B to press Shaft Adaptor over Sleeve until flush with Tool A.

## STEP 2



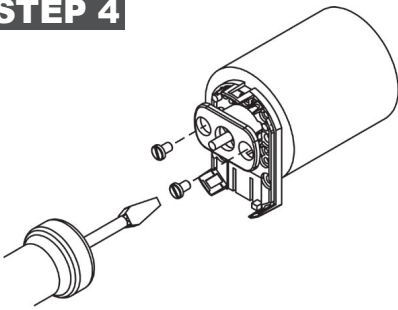
1. Remove Tools A and B.
2. Place Base on motor, with Tool B used as a centering tool.

## STEP 3



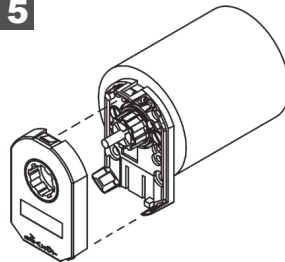
1. Align Tool B with flange on Base.
2. Slide Base and Tool B onto motor, centering onto the Shaft Adapter.

## STEP 4



1. Fasten the Base on the motor.
2. Remove Tool B.

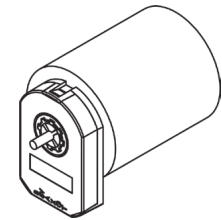
## STEP 5



1. Slide the Top Cover onto the Base, carefully observing that the teeth of the Shaft Adaptor align with the grooves in the hub.\*

\* We recommend no more than three cycles of mounting and removal of the AMT top cover base. Multiple cycles of mounting and removing the top cover can cause base fatigue over time and affect encoder performance.

## STEP 6



1. Make sure the snaps are fully engaged and the Top Cover is flush with the Base.
2. When assembly is finished, the Shaft Adaptor should be about flush with the front of the Encoder and the Motor Shaft should rotate freely.

## Mounting hole pattern

units: mm[inch]  
tolerance:  $\pm 0.1\text{mm}$

