

**SERIES: M313X000X  
M313T000X**
**DESCRIPTION: M313 with AMT103 kit**

## AMT SPECIFICATIONS

output phase difference	90° ±45°
frequency response	0 ~ 250 kHz
output current	0 ~ 5 mA max.
output waveform	square wave
output signals	A, B, Z phase
current consumption	6 mA typ., 10 mA max.
supply voltage	3.6 ~ 5.5 V dc
output resolution (ppr) <sup>1</sup>	48, 96, 100, 125, 192, 200, 250, 256, 384, 400, 500, 512, 800, 1000, 1024, 2048
time constant	0.2 ms (at 48, 96, 100, 125, 200, 250, 256, 512 ppr) 0.4 ms (at 192, 384, 400, 500, 800, 1000, 1024, 2048 ppr)
accuracy	±15 arcmin (at 192, 384, 400, 500, 800, 1000, 1024, 2048 ppr) ±30 arcmin (at 96, 200, 250, 512 ppr) ±60 arcmin (at 48, 100, 125, 256 ppr)
max. rotational speed	7500 rpm (at 384, 800, 1000, 2048 ppr) 15000 rpm (at 192, 400, 500, 1024 ppr) 30000 rpm (at 48, 96, 100, 125, 200, 250, 256, 512 ppr)
operating temp.	-40° ~ 100°C
mounting hole options	A) 2 each M1.6 holes on 16 mm (0.63") bolt circle B) 2 each #4 holes on 19.05 mm (0.75") bolt circle C) 2 each M1.6 or M2 holes on 20 mm (0.787") bolt circle D) 3 each M1.6 or M2 holes on 20.9 mm (0.823") bolt circle E) 3 each M1.6 or M2 holes on 22 mm (0.866") bolt circle F) 4 each M1.6 or M2 holes on 25.4 mm (1") bolt circle

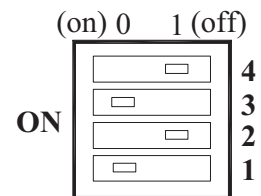
note: 1. All resolutions stated are before quadrature decoding (example: 1000 ppr x 4 = 4000 counts)  
2. Some stepper motors may leak a magnetic field causing the AMT index pulse to not function properly.

## DIP SWITCH SETTINGS

**0 = On, 1 = Off**

Resolution (PPR)	Maximum RPM	4	3	2	1
2048	7500	1	1	1	1
1000	7500	1	1	1	0
800	7500	1	1	0	1
384	7500	1	1	0	0
1024	15000	1	0	1	1
500	15000	1	0	1	0
400	15000	1	0	0	1
192	15000	1	0	0	0
512	30000	0	1	1	1
250	30000	0	1	1	0
200	30000	0	1	0	1
96	30000	0	1	0	0
256	30000	0	0	1	1
125	30000	0	0	1	0
100	30000	0	0	0	1
48	30000	0	0	0	0

**DIP switch:**  
Example setting: 500

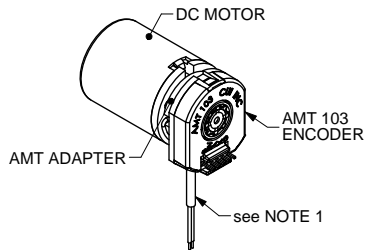
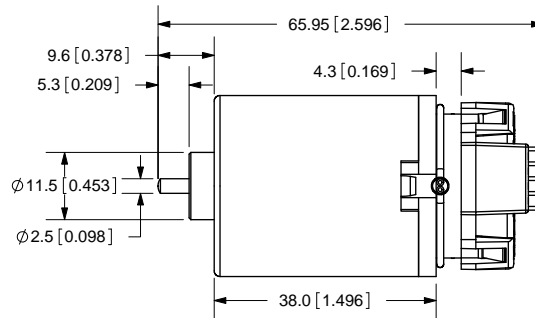
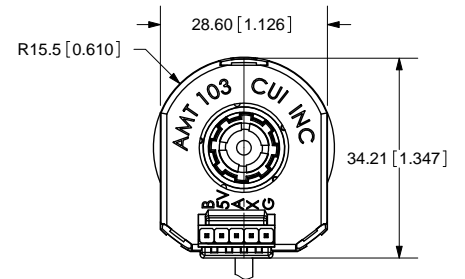
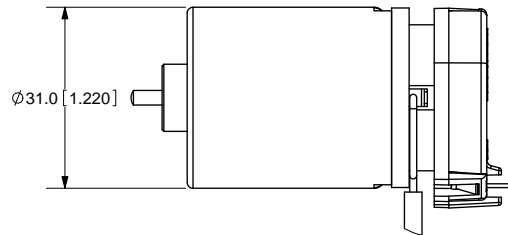
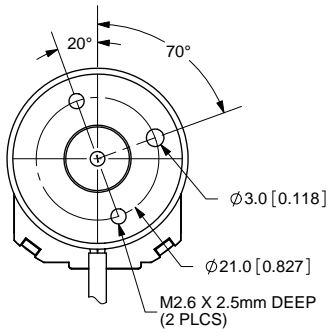


(located on back of encoder)

**SERIES: M313X000X  
M313T000X**
**DESCRIPTION: M313 with AMT103 kit**
**M313X DC MOTOR SPECIFICATIONS**


parameter	conditions/description	min	nom	max	units
gear reduction	M313X0001 M313T0003 M313T0004		none 1:100 1:264		
voltage			12		V dc
winding resistance		2.25	2.5	2.75	$\Omega$
output power				12.98	W
efficiency				60	%
no load speed		7,020	7,800	8,580	rpm
no load current	shaft $\varnothing$ 2.5 mm	0.097	0.243	0.389	A
stall torque			66.95		mNm
friction torque			3.39		mNm
speed constant			685		rpm/V
back-EMF constant			1.46		mV/rpm
torque constant			13.95		mNm/A
current constant			0.072		A/mNm
rotor inductance			2,200		$\mu$ H
mechanical time constant			26		ms
rotor inertia			20		gcm <sup>2</sup>
angular acceleration				33	10 <sup>3</sup> rad/s <sup>2</sup>
thermal resistance			25/9.5		k/W
thermal time constant			793		s
operating temp.		-10		50	$^{\circ}$ C
shaft bearing	sintered bronze sleeves				
shaft load	shaft $\varnothing$ 2.5 mm: radial at 3,000 rpm (3 mm from bearing) axial at 3,000 rpm axial at standstill (shaft supported)			5.88 2 490	N N N
shaft play	radial (4 mm from motor face) $\leq$ axial $\leq$			0.03 0.5	mm mm
direction of rotation	clockwise, viewed from the front face				
speed up to				15,000	rpm
torque up to				9,597	mNm
current up to	thermal limits			0.856	A

REV.	DESCRIPTION	DATE
A	NEW DRAWING	8/3/2009



TOLERANCE:  
 $\pm 0.3\text{mm}$  UNLESS OTHERWISE SPECIFIED



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TITLE: M313 WITH AMT103 KIT		REV: A
PART NO. M313X0001	UNITS: MM [INCHES]	
DRAWN BY: ZRJ	APPROVED BY:	SCALE: 1:1

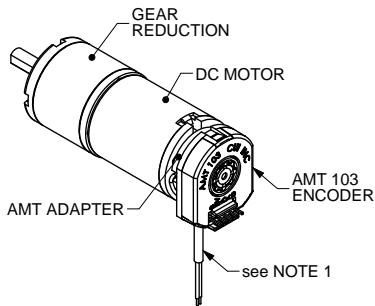
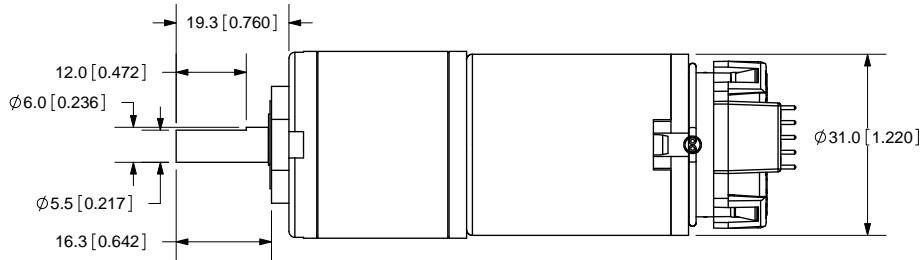
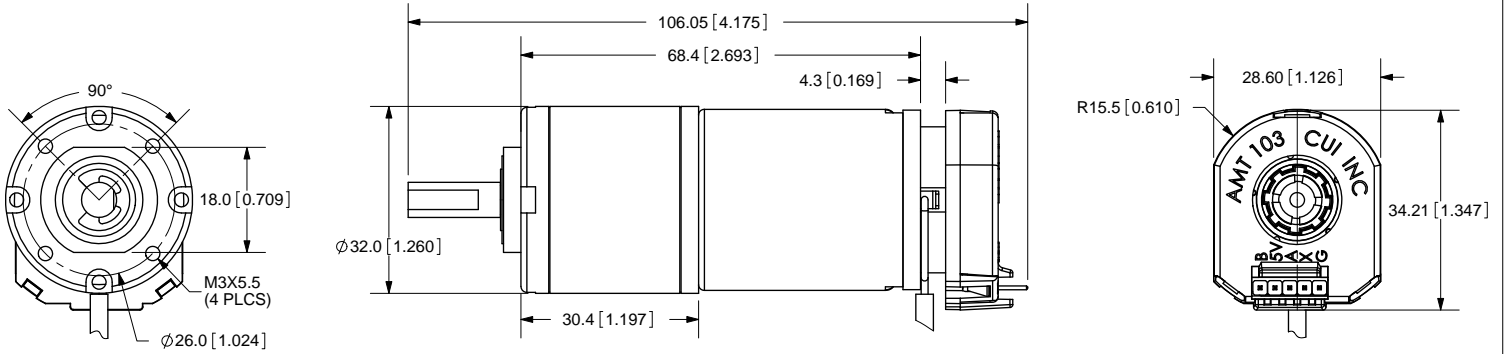
**SPECIFICATIONS:**

NOTE 1: 4mm opening for 22AWG power leads to be covered with heat shrink, power leads to be tied into 50mm diameter bundle.

PC FILE NAME:  
 M313X0001

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REV.	DESCRIPTION	DATE
A	NEW DRAWING	8/3/2009



TOLERANCE:  
±0.3mm UNLESS OTHERWISE  
SPECIFIED



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TITLE: M313 WITH AMT103 KIT		REV: A
PART NO. M313T0003	UNITS: MM [INCHES]	
DRAWN BY: ZRJ	APPROVED BY:	SCALE: 1:1

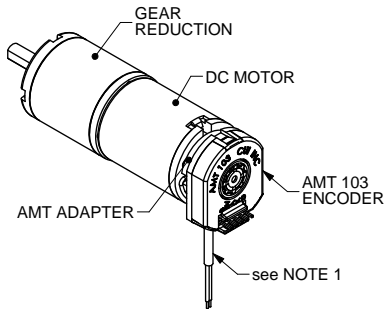
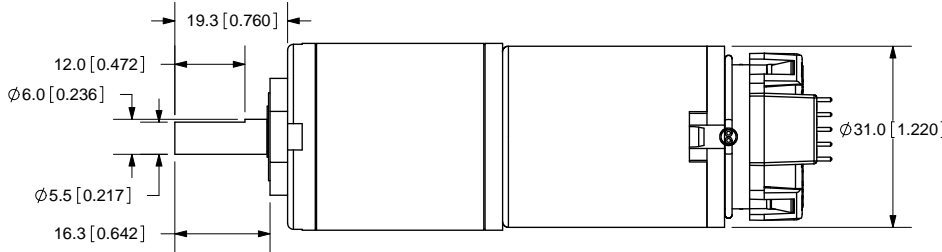
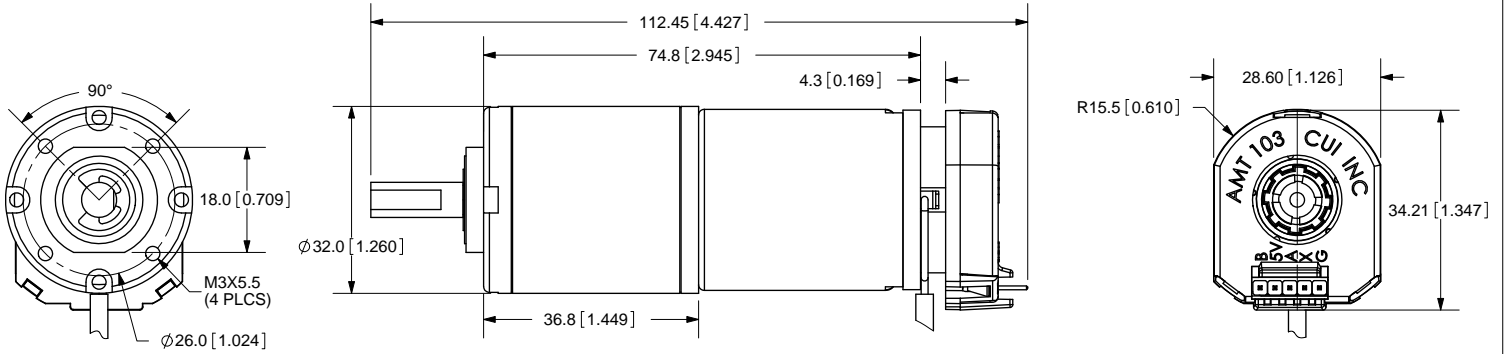
**SPECIFICATIONS:**

NOTE 1: 4mm opening for 22AWG power leads to be covered with heat shrink, power leads to be tied into 50mm diameter bundle.

PC FILE NAME:  
M313T0003

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REV.	DESCRIPTION	DATE
A	NEW DRAWING	8/3/2009



TOLERANCE:  
±0.3mm UNLESS OTHERWISE  
SPECIFIED



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TITLE: M313 WITH AMT103 KIT		REV: A
PART NO. M313T0004	UNITS: MM [INCHES]	
DRAWN BY: ZRJ	APPROVED BY:	SCALE: 1:1

**SPECIFICATIONS:**

NOTE 1: 4mm opening for 22AWG power leads to be covered with heat shrink, power leads to be tied into 50mm diameter bundle.

PC FILE NAME:  
M313T0004

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