

# BLA21-12R3-C01 Technical Specification

Update Number  
250402-01

## BLA21-12R3-C01 Technical Specification



Model	Features
BLA21-12R3-C01	<ul style="list-style-type: none"><li>• Compact, Lightweight, High-Torque brushless servo motor.</li><li>• RS485 communication and daisy chain compatible.</li><li>• PWM input signal compatible.</li></ul>

### ■ Caution

- This product SHOULD NOT be used for the devices that is directly related to human life.
- Keep the servo away from an object which produces a strong magnetic field.  
There is a possibility of malfunction if the servo is affected by a strong magnetic field.
- Specifications and appearance of hardware/software and accessories are subject to change without notice for improvement.

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## Basic specifications

Item		Specification		Remark		
1	Rated Voltage	11.1 ~ 14.8V		DC power supply.		
2	Operating Voltage	9.0 ~ 14.8V		DC power supply.		
3	Standby Current	< 60mA		at 12.0V , No-Load		
4	Starting Current *1	Design value	≤ 10A		at 12.0V	
			4.3A		100% of torque control. See No.26.	
5	Consumption Current *1,*2	120	mA	at 12.0V , No-Load		
6	Max. Torque *1,*2	50.0	kgf·cm	at 12.0V		
		4.90	N·m			
		694	ozf·in			
		49.0	kgf·cm	at 11.1V		
		54.0		at 14.8V		
7	Rated Torque *1,*2	10.0	kgf·cm	at 12.0V		
		0.98	N·m			
		139	ozf·in			
		9.8	kgf·cm	at 11.1V		
		10.8		at 14.8V		
8	Rotation Time *1	0.17	s/60°	at 12.0V	This unit is commonly used as the speed unit for RC servos.	
		0.19		at 11.1V		
		0.14		at 14.8V		
9	No Load Speed *1,*2 (Angle control mode)	353	°/s	at 12.0V		
		58.8	rpm			
10	No Load Speed *1,*2 (Speed control mode)	58.8	rpm	at 12.0V		
11	Rotation Angle *1	Range	Mechanical	-180.0 ~ +179.9 °	Absolute	
			Software	-360,000,000.0 ~ +360,000,000.0 °	Pseudo absolute *Incremental above mechanical range.	
	Accuracy	3.0		Standard value	at 12.0V, No-Load, Position:±60°	
		0.2		Measured value		
12	Direction *1	PWM RS485	CW :Rotation Angle > 0 CCW :Rotation Angle < 0			

\*1 At 23±5°C (Initial Performance Data)

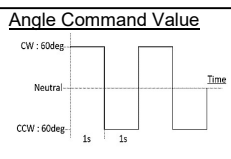
\*2 Each value is typical.

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## Basic specifications

	Item	Specification	Remark
13	BackLash *1	≤ 0.5°	
14	Temperature Range	Operating	0~+40°C (32~104°F)
		Storage	-20~+60°C (-4~140°F)

## Mechanical specifications

	Item	Specification	Remark
15	Outer Dimension	40.5 x 33.0 x 41.8mm (1.59 x 1.30 x 1.65 inch)	See below Outer Dimension
16	Weight	67.0g (2.36oz)	with Horn and screws without cables
17	IP Code	-	Not waterproof or dustproof
18	Case Material	Upper,Middle,Bottom : Resin Heatsink : Aluminum	Surface : Anodizing (Heatsink)
19	Gear Set Material	Steel	Surface : Hardening treatment
20	Gear bearing	2 ball bearing	Assembled to the final gear
21	Output Shaft	Serration S6	Size: φ6mm, 25 teeth
22	Position Sensor	Magnetic Encoder	
23	Motor Type	Brushless DC Motor	
24	MTTF *1	Operating time = 41h (73,800 cycle)  (Inquire for the test report)	<p><u>Operating Condition</u></p> <ul style="list-style-type: none"> <li>at 12.0V</li> <li>±60°, 0.5Hz sweep</li> </ul> <p><u>Test Condition</u></p> <ul style="list-style-type: none"> <li>Load : Rated Torque (Powder Brake)</li> </ul>  <p><u>Angle Command Value</u></p> <p>CW : 60deg Neutral CCW : 60deg 1s 1s Time</p>
25	Vibration Resistance *1	Operating time ≥ 300h  (Inquire for the test report)	<p><u>Operating Condition</u></p> <ul style="list-style-type: none"> <li>at 12.0V</li> <li>±60°, 0.5Hz sweep</li> <li>No-Load</li> </ul> <p><u>Test Condition (sine wave)</u></p> <ul style="list-style-type: none"> <li>Frequency : 10 to 500Hz (sweep 1oct/min, amplitude limit 2mm)</li> <li>Acceleration : 300m/s<sup>2</sup></li> <li>Vibration axis : X,Y,Z</li> </ul>

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## Outer Dimension

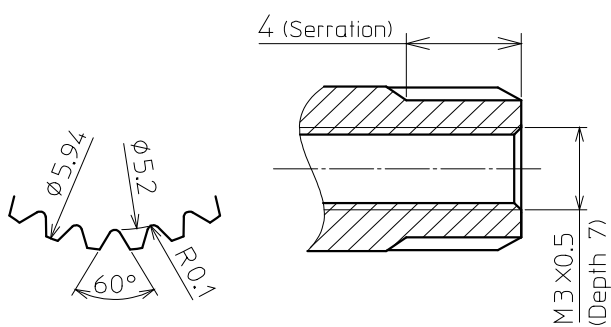
( unit : mm )

### Serration Size

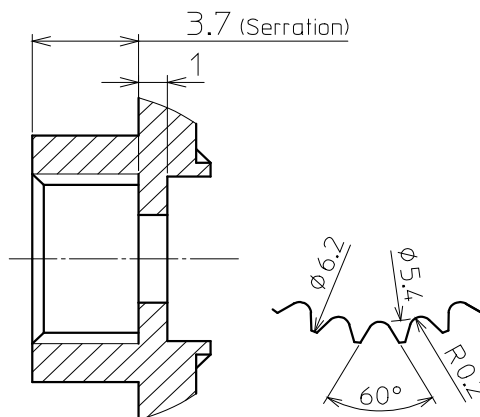
Standard Diameter :  $\Phi 6$

Angle :  $60^\circ$

Tooth : 25



Servo Output Shaft Serration



Servo Horn Serration

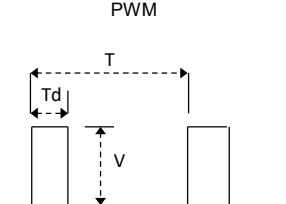
## OUTPUT SHAFT

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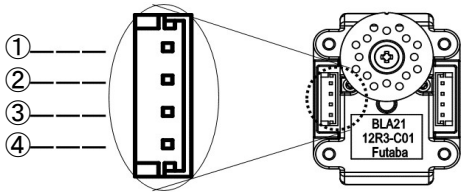
## Specifications for RS485 signals

Item		Specification		Remark	
26	Communication Interface	RS485		Protocol	CM.BUS
				Baud Rate	9.6k ~ 1.0Mbps
				Max. connections	6 units
				8bit, Stop bit 1, None Parity, Asynchronous	
Operating mode (RS485)	Angle control	-360,000,000.0 ~ +360,000,000.0°	0.1°	See No.11.	
	Speed control	-100 ~ +100	rpm	Commandable speed. See No.10 for actual speed.	
	Torque control	-10,000 ~ +10,000	0.01%	Max. torque at supply voltage of 12.0V is 100%. See No.6. The actual torque that can be output depends on the power supply, load, etc., so use the command value as a guide.	

## Specifications for PWM signals

Item		Specification		Remark	
27	Communication Interface			Signal Voltage:V	HIGH : min. 2.0V max. 5.0V
					LOW : min. 0.0V max. 1.0V
			Frame Rate:T	14.25ms	
			CW / Center / CCW:Td	560 / 1520 / 2480μs	
<p>•If the high level voltage exceeds 5V, the servo may be damaged. If you use an RC device as a signal source, please pay attention to the voltage level of the PWM signal.</p> <p>•Please refer to the User's Manual (1M36Q145**) for information on how to use the PWM signal.</p>					
Operating Mode (PWM)	Angle control	Rotation Angle	+144.0° (560μs) Neutral 0° (1520μs) -144.0° (2480μs)		

## Connector specifications

Item		Specification			Remark	
28	Cable	Non-Shielded Cable (Detachable)			Cable Length : 150mm(5.91 inch)	
29	Connector	Manufacture	J.S.T. Mfg. Co.,Ltd.			
		Type	B4B-EH			
		Matching	EHR-4 etc.			
30	Pin Assignment	Pin No.	Assignment	Cable Color		
		①	RS485 B (D-)	Gray		
		②	RS485 A (D+)	Gray		
		③	Battery(+)	Red		
		④	Battery(-)	Black		

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## Model name system

