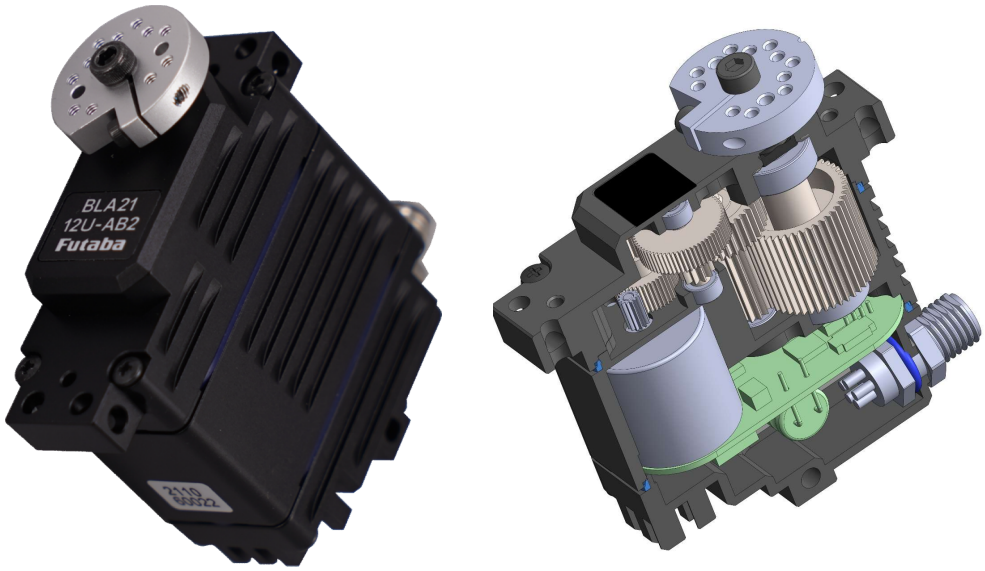
# BLA21-12U-A02 / AB2
# Technical Specification




BLA21-12U-A02 : Supports UAVCAN v0 signals.
Case shielded line and Battery line(-) are separated.
No PWM

BLA21-12U-AB2 : Supports UAVCAN v0 and PWM signals.
Case shielded line and Battery line(-) are common.
No Case shield

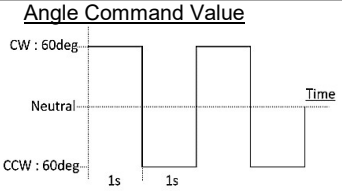
# BLA21-12U-A02 / AB2 Technical Specification

## Basic specifications (BLA21-12U-A02 and AB2)

| | Item | | Specification | | | | Remark |
|---|---|---|---|---|---|---|---|
| 1 | Rated Voltage | | 11.1 ～ 14.8V | | | | DC power supply. |
| 2 | Operating Voltage | | 9.0 ～ 16.8V | | | | DC power supply. |
| 3 | Standby Current | | ≤ 55mA | | | | at 12.0V |
| 4 | Starting Current * | Design value | ≤ 10A | | | | The maximum peak current may reach 10A for a short moment before the over current protection is activated. |
| | | Over current protection | 7A | | | | For the self-protection purpose the peak current can be limited in the range from 3.5A to 7A on the CANBUS line and on the program tool additionally provided by Futaba.<br>7A is the default setting and corresponds to the maximum torque at 12.0V (see No.6). |
| 5 | Consumption Current * | | LL | Me | UL | unit | at 12.0V , No-Load<br>LL : Low Limit Me : Medium Value UL : Upper Limit |
| | | | 34 | 120 | 206 | mA | |
| 6 | Max. Torque * | | 38.0 | 50.0 | 62.0 | kgf·cm | at 12.0V |
| | | | 3.73 | 4.90 | 6.08 | N·m | |
| | | | 528 | 694 | 861 | ozf·in | |
| | | | 48.0 | | | kgf·cm | at 11.1V |
| 7 | Rated Torque * | | 15.0 | | | kgf·cm | at 12.0V |
| | | | 1.47 | | | N·m | |
| | | | 208 | | | ozf·in | |
| | | | 13.9 | | | kgf·cm | at 11.1V |
| 8 | No Load Speed *<br>(Angle control mode) | | LL | Me | UL | unit | at 12.0V |
| | | | 0.06 | 0.09 | 0.12 | s/60° | |
| | | | 500 | 667 | 1000 | °/s | |
| | | | 83 | 111 | 167 | rpm | |
| | | | 0.10 | | | s/60° | at 11.1V |
| | No Load Speed *<br>(Speed control mode) | | LL | Me | UL | unit | at 12.0V |
| | | | 83 | 111 | 167 | rpm | |
| 9 | Travel Angle *<br>(Angle control)<br>+ : CW - : CCW | Range | +179.9° ～ -180.0° (Absolute) | | | | See also No.25 and No.27 for other operating modes in addition to the absolute angle control. |
| | | Accuracy | ±3.0° (Standard) | | | | at 12.0V, No-Load, positioned at ±60° |
| | | | ±1.5° (Measured) | | | | |
| 10 | BackLash * | | ≤ 0.5° | | | | — |
| 11 | Temperature Range | Operating | -40～+70℃ (-40～158°F) | | | | The operating noise level may increase at a low temperature range. |
| | | Storage | -40～+80℃ (-40～176°F) | | | | — |
| | | Over heat protection | +80℃ (176°F) | | | | The default temperature to activate the self-protection function “Torque OFF” in order to prevent overheat.<br>The temperature can be set from 20°C ton 80°C on the CANBUS line and on the program tool additionally provided by Futaba. |

# BLA21-12U-A02 / AB2 Technical Specification

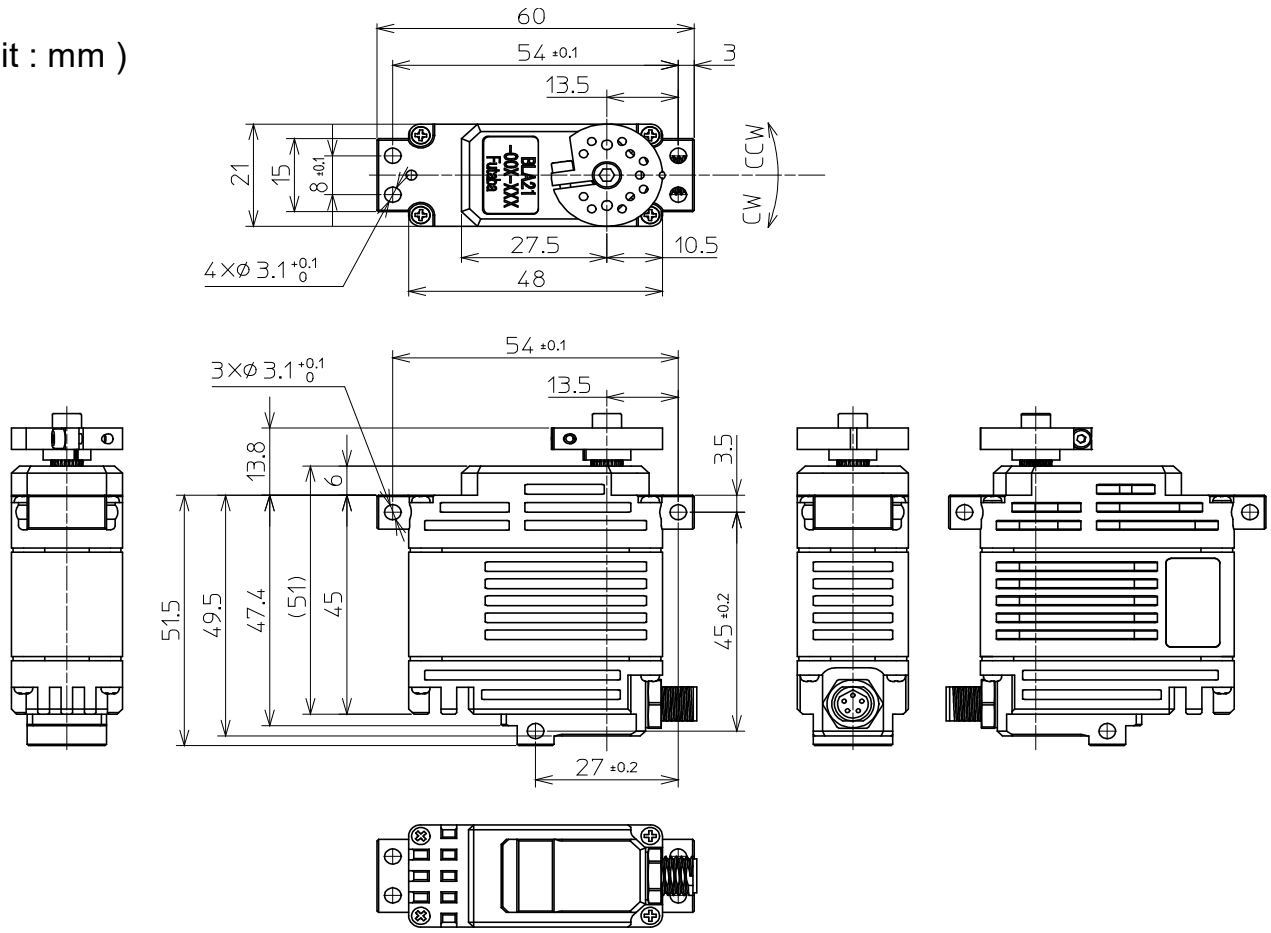
## Mechanical specifications (BLA21-12U-A02 and AB2)

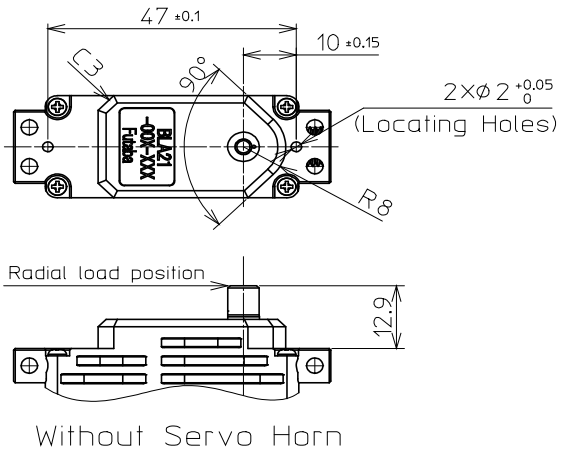
| | Item | Specification | Remark |
|---|---|---|---|
| 12 | Outer Dimension | 48.0x 21.0 x 51.0mm<br>(1.89 x 0.83 x 2.01 in) | See below Outer Dimension |
| 13 | Weight | 127g | with Horn and screws<br>without cables |
| 14 | International Protection Code | IP67 | Waterproof and dustproof |
| 15 | Case Material | Aluminum | Surface : Anodized<br>Salt Water Resistance, EMI Case Shielding |
| 16 | Gear Set Material | Steel | Surface : Hardening treatment |
| 17 | Gear bearing | 8 ball bearing | — |
| 18 | Output Shaft | Serration S6L | Size: φ6mm, 25 teeth, Long type |
| 19 | Radial load | 100N (for reference use only) | Load position : See below Outer Dimension |
| 20 | Position Sensor | Magnetic Encoder | — |
| 21 | Motor Type | Brushless DC Motor | |
| 22 | MTTF * | Operating time > 1,000h (TBC)<br>(Inquire for the test report) | Operating Condition<br>・at 12.0V<br>・±60°, 0.5Hz sweep<br>Test Condition<br>・Load : Rated Torque<br>(Powder Brake)<br>Angle Command Value<br>  |
| 23 | Vibration Resistance * | Operating time ≥ 1,000h (TBC)<br>(Inquire for the test report) | Operating Condition<br>・at 12.0V<br>・±60°, 0.5Hz sweep<br>・No-Load<br>Test Condition (sine wave)<br>・Frequency : 10 to 500Hz<br>・sweep 1oct/min<br>・amplitude limit 2mm<br>・Acceleration : 300m/s$^2$<br>・Vibration axis : X,Y,Z |

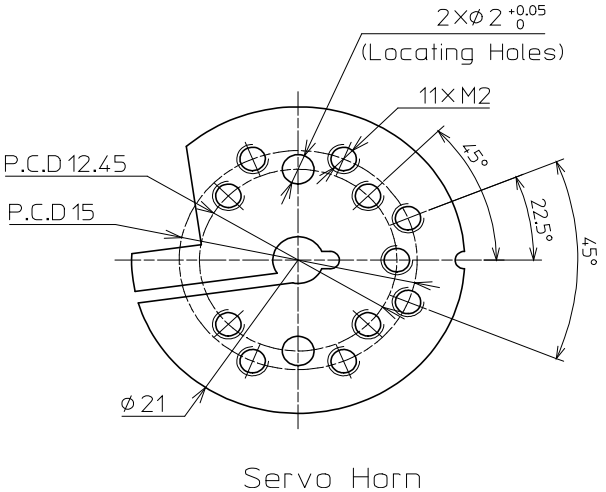
# BLA21-12U-A02 / AB2 Technical Specification

## Outer Dimension (BLA21-12U-A02 and AB2)

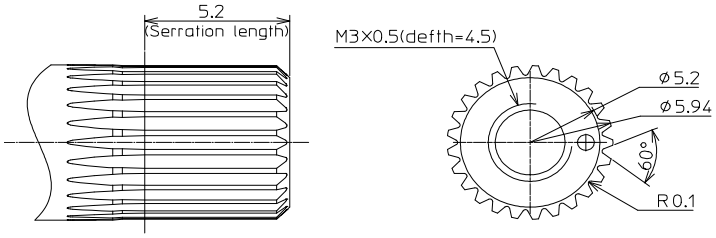
( unit : mm )




**OUTPUT SHAFT**




**Sarretion Size**

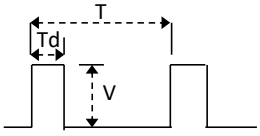
Standard Diameter : Φ6
Angle : 60°
Tooth : 25

# BLA21-12U-A02 / AB2 Technical Specification

## Specifications for CAN BUS signals (BLA21-12U-A02 and AB2)

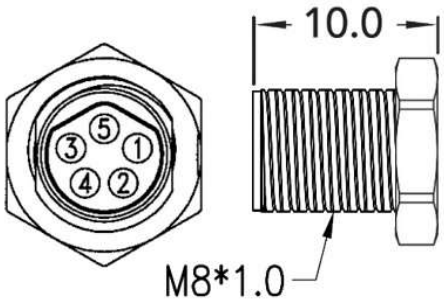
| | Item | | Specification | Remark | |
|---|---|---|---|---|---|
| 24 | Communication Interface | | CAN BUS | Protocol | UAVCAN V0 |
| | | | | Baud Rate | 1Mbps |
| | | | | Sample Point | 87.5% |
| | | | | Node ID | 1～127 |
| | | | | **(Please ask us for more information)** | |
| 25 | Operating morde (CANBUS)<br>+ : CW - : CCW (Turn direction reversible) | Angle control (Absolute) | TravelAngle: +179.9° ～ -180.0° | Absolute meaning the position in this range is absolute. The servo can acknowledge this range even after switching off and the position command within this range is identified uniquely. For the accuracy in this operating mode see No.9. | |
| | | Angle control (multi-turn) | TravelAngle: +36,000,000.0° ～ -36,000,000.0° | The servo can accept > 360° position commands within the range. (e.g. Command +3600° means to come back to the start position after rotating 10 times clockwise.) The servo will lose the multi turn information once switched off and the position will be identified within the absolute range of 360°. | |
| | | Speed control | Max Speed: +300rpm ～ -300rpm | This operating mode is used for applications where servo rotates continuously. The speed can range within ± 300 rpm and can be set on the CANBUS line and on the program tool additionally provided by Futaba. See also No.8 for the speed aberration. | |
| | | Torque control | Max Torque: +100% ～ -100% | This operating mode is used for applications where servo is supposed to output a constant torque. The torque can range within ± 100% and can be set on the CANBUS line and on the program tool additionally provided by Futaba. 100% means 7A and indicates the maximum torque at 12.0V (see No.6). | |

## Specifications for PWM signals (Only BLA21-12U-AB2)

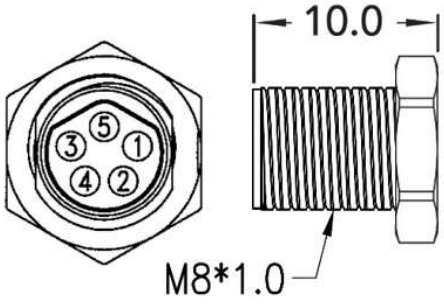
| | Item | | Specification | Remark | |
|---|---|---|---|---|---|
| 26 | Communication Interface | | PWM<br>  <br> | Signal Voltage:V | HIGH : min. 2.0V max. 5.0V |
| | | | | | LOW : min. 0.0V max. 0.45V |
| | | | | Frame Rate:T | 14.25ms |
| | | | | CW / Center / CCW:Td | Default 2120 / 1520 / 920µs |
| 27 | Operating Mode (PWM)<br>+ : CW - : CCW (Turn direction reversible) | Angle control (Absolute) | Default / Max.<br>TravelAngle: +60.0° (2120µs) / +180.0°<br>Neutral 0° (1520µs) / Neutral 0°<br>-60.0° (920µs) / -180.0° | The travel-ends are ±60° (default) lead by the pulse 1520±600µs where the input-width is 600µs centering the neutral of 1520µs. The travel-ends can be set from ±60° to ±180° on the CANBUS line and on the program tool additionally provided by Futaba. Also both the neutral 1520µs and input-width 600µs can be set within the range of 100 to 10,000µs and 10 to 10,000µs respectively. | |
| | | Angle control (Extended) | Default / Max.<br>TravelAngle: +360.0° (2120µs) / +360.0°<br>Neutral 0° (1520µs) / Neutral 0°<br>-360.0° (920µs) / -360.0° | The travel-ends can be extended to ±360° exceeding the absolute range of ±180°. Once the servo is switched off, the position in the extended range (±360°> position > ±180°) will be identified within the absolute range. (e.g. the end position CW 270° will be regarded as CCW90°) | |
| | | Speed control | Max Speed: +600rpm (2120µs)<br>0rpm (1520µs)<br>-600rpm (920µs) | This operating mode is used for applications where servo rotates continuously. The speed can range within ± 600 rpm and can be set on the CANBUS line and on the program tool additionally provided by Futaba. See also No.8 for the speed aberration. | |
| | | Torque control | - | Not available for PWM signals. | |

# BLA21-12U-A02 / AB2 Technical Specification

## Connector specifications (Only BLA21-12U-A02)

| | Item | | Specification | | | Remark |
|---|---|---|---|---|---|---|
| 28 | Cable | | Shielded Cable (Detachable) | | | Cable Length : 15.75 inch (400mm) |
| 29 | Connector | Manufacture | ODS Electronics Co., Ltd. | | |   |
| | | Type | MMEPM05MCC-SHS7001 | | | |
| | | Mating | MAEAF05FCC-SRC7000 etc. | | | |
| 30 | Pin Assignment | | Pin No. | Assignment | Cable Color | |
| | | | ① | Battery (+) | Brown | |
| | | | ② | Battery (-) | White | |
| | | | ③ | CAN-H | Blue | |
| | | | ④ | CAN-L | Black | |
| | | | ⑤ | Case Shield Line | Drain | |

## Connector specifications (Only BLA21-12U-AB2)

| | Item | | Specification | | | Remark |
|---|---|---|---|---|---|---|
| 31 | Cable | | Shielded Cable (Detachable) | | | Cable Length : 15.75 inch (400mm) |
| 32 | Connector | Manufacture | ODS Electronics Co., Ltd. | | |   |
| | | Type | MMEPM05MCC-SHS7001 | | | |
| | | Mating | MAEAF05FCC-SRC7000 etc. | | | |
| 33 | Pin Assignment | | Pin No. | Assignment | Cable Color | |
| | | | ① | Battery (+) | Brown | |
| | | | ② | PWM | White | |
| | | | ③ | CAN-H | Blue | |
| | | | ④ | CAN-L | Black | |
| | | | ⑤ | Battery (-) and Case Shield Line | Drain | |

* At 23±5℃ (Initial Performance Data)

**All Specifications are subject to change without prior notice.**

# BLA21-12U-A02 / AB2 Technical Specification

## Model name system

BLA 21 - 12 U - A B 2

**Motor type**
Brushless
DC Motor

**Servo width**
21: 21mm

**Power-supply voltage**
(Rated Voltage)
06: 6.0 - 7.4V
12: 11.1 - 14.8V
28: 24.0 - 28.0V

**Main signal type**
U: UAVCAN v0

**Development code**

**Optional function 1**
0: Case shielded line and Battery(-) are separated.
B: Supports PWM signals (Rotation direction: CW *)
* Operation of PWM signal 1520 → 2120 µs.

**Optional function 2**
1: Straight connector type.
2: Side connector type.

■Caution
・This product SHOULD NOT been 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.