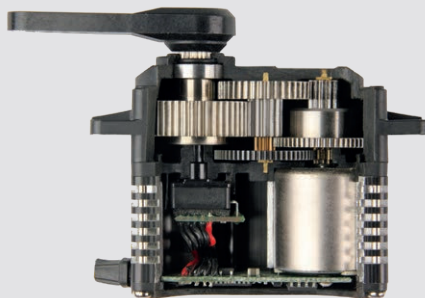
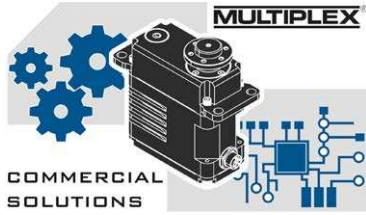


INNOVATIVE LÖSUNGEN FÜR  
INDUSTRIELLE ANWENDUNGEN

AKTUATOREN UND SERVOS





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Seit 2002 gehört die MULTIPLEX Modellsport GmbH & Co.KG mit Standort in Bretten, Deutschland zur südkoreanischen HITEC-Gruppe.

Die Produkte der Hitec RCD Korea, Inc. werden weltweit eingesetzt und eignen sich aufgrund ihrer Diversität für die unterschiedlichsten Einsatzgebiete. So finden sie beispielsweise Anwendung als Servo im UAV-Bereich, als Aktuator für Automatisierungs- und Handhabungsaufgaben in der Industrie, oder auch als Stellgeber für die aktive Aerodynamik eines Rennwagens.

**Detaillierte Spezifikationen, sowie zusätzliche Informationen lassen wir Ihnen gerne auf Anfrage zukommen.**

**Kontaktieren Sie uns unter:**

**Tel.: +49 (0) 7252 58093-20**

**Email: [salesteam@multiplex-cs.de](mailto:salesteam@multiplex-cs.de)**



**MULTIPLEX Modellsport  
GmbH & Co.KG**



**Hitec RCD Korea, Inc.**



**Hitec Group USA, Inc.**



**Hitec-MULTIPLEX Japan, Inc.**



**Hitec RCD Philippines, Inc.**

# PRODUKTÜBERSICHT

## Servos und Linear Aktuatoren

HLS-Serie Linear Aktuatoren

SG-Serie Servos

HSB/HSR-Serie Servos

D/DB/MD/MDB-Serie Servos

Sonstige Servos für industrienaher Anwendungen

## Servo Zubehör

- a. Programmiergeräte
- b. Servo Abtriebsarme



# ***ANALOG-AKTUATOREN***

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Analog-Aktuatoren sind in der Nieder- bis Mittelpreisregion angesiedelt und mit zumeist preiswerten Komponenten versehen. Der Antriebsmotor ist immer ein Gleichstrom-Bürstenmotor. Die Aktuatoren bieten keine Programmieroptionen seitens des Nutzers. Die Kommunikation erfolgt immer über ein PWM-Signal mit einer Frequenz von 50Hz. Die Motor-PWM ist analog zu Ansteuerfrequenz und beträgt somit ebenfalls 50Hz, somit ergibt sich lediglich alle 20ms die Möglichkeit für eine Kontrollaktivität (Motor-An oder Motor-Aus). Langsame Bewegungen oder kleine Korrekturen führen zu langen Motor-Aus-Perioden im Verhältnis zu Motor-An-Perioden. Die Motorspannung entspricht immer der Versorgungsspannung.

## **Vorteile:**

- Günstig
- Angenehme Geräuschentwicklung durch niedrige Motor-Ansteuerfrequenz
- Geringe Leistungsaufnahme

## **Nachteile:**

- Geringeres Haltemoment
- Langsames Ansprechverhalten
- Geringe Auflösung durch niedrige Ansteuerfrequenz
- Große Totzone (20ms)
- Langsame Bewegungen können unstetig werden

# ***DIGITAL-AKTUATOREN***

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Digital-Aktuatoren sind in der gehobenen Nieder- bis Hochpreisregion angesiedelt. Es können sehr hochwertige Komponenten wie beispielsweise Hall-Sensoren zur Positionserfassung, aber auch Bürstenlose-Gleichstrommotoren verwendet werden. Die Kommunikation erfolgt über ein PWM-Signal mit Frequenzen von bis zu 330Hz (je nach Aktuatortyp) oder andere Schnittstellen wie CAN, UAV/DroneCAN, RS-485 oder TTL. Die Motoransteuerfrequenz ist unabhängig von der Ansteuerfrequenz der Steuerung und beträgt zumeist 300-500Hz. Hieraus ergeben sich sehr kleine mögliche Totzonen von bis zu 1ms. Digitalaktuatoren bieten zudem vielseitige Programmier- und Schutzfunktionen und erlauben je nach Typ auch eine Zwei-Wege-Kommunikation (Feedback).

## **Vorteile:**

- Schnelles Ansprechverhalten
- Schnelle Korrekturaktivitäten
- Hohe Haltekraft
- Variabel Einstellbare Totzone
- Hohe Genauigkeit
- Zwei-Wege-Kommunikation
- Programmierbarkeit
- Sicherheitsfunktionen
- Hohe Auflösung

## **Nachteile:**

- Zumeist teurer
- Stellenweise unangenehme Geräuschentwicklung durch hohe Motor-Ansteuerfrequenz
- Höhere Leistungsaufnahme





# SCHNITTSTELLEN

## PWM-Kommunikation

Der klassische Weg der Ansteuerung von Hitec Aktuatoren mit vielen Vorteilen für einfache Aufgaben. Hitec PWM-Aktuatoren können mit einer Pulsweite von 900 bis 2100µs angesteuert werden. Die übliche Ansteuerfrequenz beträgt dabei 50Hz (20ms). Für spezielle Anwendungen sind je nach Aktuatortyp auch Frequenzen bis 330Hz möglich.

Aktuatoren mit PWM-Kommunikation lassen sich unkompliziert und preiswert ansteuern und sind für viele Anwendungen ohne benötigtes Feedback ausreichend.

Die Schnittstelle ist weit verbreitet und viele Steuerungen/Controller bieten passende Presets und Libraries.

### Pin-Layout von Hitec PWM-Aktuatoren\*



## RS485- und TTL-Kommunikation

Es finden sich etliche Anwendungen in unterschiedlichen Bereichen bei denen eine Rückmeldung zur tatsächlichen Position des Servos notwendig, oder zumindest wünschenswert ist. Verschiedene Hitec Aktuatoren sind auch mit RS485- und TTL-Schnittstellen erhältlich und bieten somit die Möglichkeit für eine Zweirichtungskommunikation (Feedback).

Hitec RS485- und TTL-Aktuatoren kommunizieren mit externen Geräten über das Halbduplex-Verfahren. TTL-Aktuatoren verfügen dabei neben der Spannungs- und Masseleitung über nur eine, RS485-Aktuatoren über zwei Signalleitungen.

### Pin-Layout von Hitec TTL-Aktuatoren\*



### Pin-Layout von Hitec RS485- Aktuatoren\*



## CAN- und UAV/DroneCAN-Kommunikation

Der Industrie- und UAV-Bereich gewinnt zunehmend an Bedeutung. Dieser zukunftssträchtige, schnelle und technisch hoch komplexe Markt verlangt nach Innovation und Zuverlässigkeit. Viele Anwendungen benötigen intelligente Lösungen und ein echtes Feedback von Position, Drehmoment und anderen Parametern zur Diagnose der Anwendung oder um Aussagen über den Zustand der Komponenten treffen zu können.

Folgende Protokolle sind verfügbar: CAN 2.0A, CAN 2.0B, UAV/DroneCAN

### Pin-Layout von Hitec CAN-Aktuatoren (SG-Serie abweichend)



\* Ausführung auf Kundenwunsch auch mit kundenspezifischen Steckverbindern möglich.

# FEATURE ÜBERSICHT

## Einstellung der Mittel- und Endlagen (EPA / Neutral Settings)

Erlaubt die Programmierung von Mittel- und Endpositionen des Servos.

## Einstellung der Drehrichtung

Clockwise (CW) = Aus der Draufsicht dreht das Servo bei Impulslängenvergrößerung im Uhrzeigersinn.

Counter-Clockwise (CCW) = Aus der Draufsicht dreht das Servo bei Impulslängenvergrößerung im Gegenuhrzeigersinn.

## Dead Band (DB-Width)

Je niedriger das Dead Band, desto eher finden Korrekturaktivitäten bei Winkeländerungen statt. Ein für die Applikation zu niedriges Dead Band führt zu erhöhtem Verschleiß. Eine Erhöhung des Dead Bands führt zu einem Präzisionsverlust.

## Travel Speed

Stellgeschwindigkeit des Servos: 100% entspricht der maximal möglichen Stellgeschwindigkeit.

## ID-Read / Node-ID

Zuweisung einer Aktuator-ID in TTL bzw. CAN-Netzwerken.

## Fail Safe

Bei einem Signalverlust fährt das Servo auf eine voreingestellte Position.

## Fail Safe Limp Modus

Das Servo geht in einen Schlafmodus, der Motor wird deaktiviert und die Position wird nicht gehalten. Das Servo lässt sich von Hand bewegen.

## Soft Start Einstellung

Bei Inbetriebnahme fährt das Servo verlangsamt auf die Sollposition um das Getriebe und die Peripherie zu schonen. Bei einer Einstellung von 100% fährt das Servo beim Einschalten mit maximaler Stellgeschwindigkeit auf die Sollposition.

## Overload Protection

Schutzmechanismus der das Servo vor Beschädigung bei Überlast/Blockieren schützt. Eine Einstellung von 20% entspricht einer Reduzierung des maximalen Drehmoments um 80%.

## Smart Sense

Ein intelligenter Regelkreis passt während des Betriebs Regelparameter an, um Schwingungen zu reduzieren. Diese werden durch variierende Trägheiten der unterschiedlichen Applikationen provoziert.

Eine manuelle Beeinflussung des Regelkreises ist ebenfalls möglich (Sensitivity Ratio Settings). Ein hoher Wert kann schnelle Schwingungen am Servo erzeugen. Ein niedriger Wert kann ein stark gedämpftes Ansprechverhalten erzeugen.



**HITEC**



# SERIENÜBERSICHT

## HLS-Serie (Linear Aktuatoren)

Elektrische Linearaktuatoren erzeugen geradlinige Hubbewegungen und können somit viele Anwendungen von Pneumatik- und Hydraulikzylindern ersetzen.

## SG-Serie (Industrie Servos)

Die premium Industriereservo Linie konsequent für Anforderungen der Bereiche Automatisierung, unbemannte Luftfahrt und Robotik entwickelt. Zur Grundausstattung gehört ein leistungsstarker BLDC-Motor, ein Hall-Sensor zur berührungslosen und verschleißfreien Positionserfassung, sowie eine wasserdichte Ausführung. Alle SG-Serie Servos verfügen zudem über eine Multi-Turn\* und Continuous-Rotation\*\* Funktion.

## HSB-Serie (Brushless Servos)

Servomotoren der Mittelpreisregion mit leistungsstarken BLDC Motoren.

## HSR-Serie (Servos mit Multi-Turn)

Servomotoren der Mittelpreisregion mit Multi-Turn\* und teilweise Continuous-Rotation\*\* Funktion. Zumeist ausgestattet mit einem BLDC-Motor.

## D-Serie (Digitale Servos)

Digitale Servomotoren der Mittelpreisregion mit Glockenanker- oder Bürstenmotor. Die Positionserfassung erfolgt mit Hilfe eines hochwertigen Potentiometers.

## MD-Serie (Digitale Servos mit Hall-Sensor)

Digitale Servomotoren der Mittelpreisregion mit Glockenanker- oder Bürstenmotor. Die Positionserfassung erfolgt mit Hilfe eines Hall-Sensors.

## DB-Serie (Brushless Servos)

Digitale Servomotoren der Mittelpreisregion mit leistungsstarken BLDC-Motoren. Die Positionserfassung erfolgt mit Hilfe eines hochwertigen Potentiometers.

## MDB-Serie (Brushless Servos mit Hall-Sensor)

Digitale Servomotoren der Mittelpreisregion mit leistungsstarken BLDC-Motoren. Die Positionserfassung erfolgt mit Hilfe eines Hall-Sensors.

## MDR-Serie (Digitale Servos mit Hall-Sensor und Multi-Turn)

Digitale Servomotoren der Mittelpreisregion mit Multi-Turn\* und teilweise Continuous-Rotation\*\* Funktion. Ausgestattet mit einem Glockenanker- oder Bürstenmotor. Die Positionserfassung erfolgt mit Hilfe eines Hall-Sensors.

## HS-Serie (Analoge Servos)

Analoge Servomotoren der Niederpreisregion, ausgestattet mit Bürstenmotoren und einem Potentiometer zur Positionserfassung.

## HS-1XXX, HS-5XXX, HS-7XXX Serie (Digitale Servos)

Digitale Servomotoren der Mittelpreisregion, ausgestattet mit Glockenanker- und Bürstenmotoren und einem Potentiometer zur Positionserfassung.

\* Als maximaler Drehwinkel sind mehrere Umdrehungen möglich.

\*\* Das Servo ist in der Lage endlos zu drehen. DroneCAN nicht!

# ZWEI-WEGE-KOMMUNIKATION (FEEDBACK)

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## Absolute Position

Eine Steuerung muss sich nicht länger darauf verlassen, dass ein Aktuator auch wirklich die gewünschte Position eingenommen hat, sie kann die aktuelle Position mit einer Auflösung von 4096 Schritten ablesen.

---

## Drehmoment

Das Drehmoment ist ein besonders wichtiges Feature. Hier können Aussagen über die tatsächlichen Belastungen im Betrieb sowie über den Zustand der Komponenten getroffen werden. Schwergängige Mechaniken können erfasst und somit rechtzeitig gewartet werden, bevor es zu einer Überlastung des Aktuators kommt. Das Drehmoment wird aus der Motor PWM abgeleitet und ist somit keine tatsächliche Messung, aber für die meisten Anwendungen hinreichend genau.

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## Geschwindigkeit

Wie schnell ist der verwendete Aktuator in der Anwendung wirklich? Die Antwort liefert der Aktuator und ermöglicht somit wichtige Rückschlüsse für so manche Steuerungsaufgabe.

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## Versorgungsspannung

Der Aktuator übermittelt stets die aktuelle Versorgungsspannung. Das Entwickler- oder das Wartungsteam sieht somit eventuelle Schwachpunkte im Kabelbaum und kann zum Beispiel hochohmige Verbinder rechtzeitig ersetzen.

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## Stromaufnahme

Der Strom ist das wichtigste Feedback bei der Schadensprophylaxe. Ein ansteigender Strom über eine bestimmte Laufzeit bei gleichbleibender Belastung deutet immer auf einen anstehenden Defekt hin. Dieser kann am Motor, dem Getriebe oder der zu bewegenden Mechanik zu finden sein. Die Erfassung der Stromaufnahme eröffnet neue Möglichkeiten in der Programmierung. Durch gezieltes Optimieren der internen Regelung (PID) sowie anderer Parameter wie Softstart (Ramp) oder Deadbands, lässt sich die Lebenszeit erhöhen. Weniger Stromspitzen = mehr Lebenszeit.

---

## Mikrocontroller-Temperatur

Die Temperatur des Mikrocontrollers ist mehr als nur eine nette Information. Thermisch stark wechselnde Umweltbedingungen können einem Aktuator viel abverlangen. Das Entwicklerteam lernt hier die thermischen Grenzen des Produkts kennen und kann entsprechende Maßnahmen einleiten, ehe es zum Versagen kommt.

---

## Motor-Temperatur

Verlange ich dem verwendeten Aktuator zu viel ab? Die Temperatur des Motors gibt zuverlässig Auskunft darüber, ob ein Aktuator am Limit betrieben wird. Gerade bei stark schwankenden thermischen Bedingungen ist dieses Feedback von größter Bedeutung.

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## Zyklenzähler

Wie viele Zyklen macht hat der verwendete Aktuator während eines Einsatzes? Wie viele Teile wurden positioniert? Wann muss der Aktuator getauscht werden, weil die maximale Zyklenzahl erreicht wurde. Einige unserer Aktuatoren liefern dieses Feedback bequem im Protokoll.

# MOTORTYPEN-ÜBERSICHT

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## Bürstenmotoren

Bürstenbehaftete Gleichstrommotoren (Bürstenmotoren) zeichnen sich primär durch den günstigen Preis, aber auch ihre hohe Überlastfähigkeit aus (gute Wärmeableitung). Diese Motoren werden vorwiegend in Analogservos verwendet. Sie sind für Applikationen mit eher geringen Leistungsanforderungen, bzw. einer verhältnismäßig niedrigen Anzahl von Zyklen (z. B. Schließmechanismen) eine gute Wahl. Die Nachteile sind, neben dem Verschleiß der Schleifer, ein erhöhtes Rastmoment und eine geringere Effizienz. Die Motorhochlaufzeit (Beschleunigung) liegt -je nach Typ- zwischen 22 und 40ms.

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## Glockenanker- / kernloser Motor (Coreless)

Diese äußerst effizienten Motoren (keine Ummagnetisierungsverluste) glänzen durch sehr schnelle Motorhochlaufzeiten (Beschleunigung) von nur 7 bis 11ms und eine gute Kraftentfaltung. Eisenkernlose Motoren haben bauartbedingt kein Rastmoment, was sich in einem besonders ruhigen Motorlauf widerspiegelt. Der Verschleiß ist gering und bezieht sich lediglich auf den Konduktor, der der Kommutierung dient, und die Lagerung. Ein Nachteil der kernlosen Bauform ist die geringe Überlastfähigkeit, bedingt durch die schlechte Wärmeableitung. Der Einsatz empfiehlt sich daher in anspruchsvolleren Applikationen, bei denen zwischen den Zyklen auch gelegentliche Ruhephasen vorhanden sind, um ein Abkühlen zu ermöglichen oder aber auch Steuerungs- und Regelungsaufgaben im niedrigen Lastbereich.

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## Bürstenloser Gleichstrommotor (Brushless)

Leistungsstarke BLDC-Motoren vereinen viele Vorteile moderner Antriebstechnik und gelten als nahezu verschleißfrei (keine Schleifer). Neben der hohen Effizienz und ruhigen Laufkultur bieten sensorgesteuerte bürstenlose Motoren ebenso eine schnelle Motorhochlaufzeit (Beschleunigung) von nur 11 bis 14ms und bereits aus dem Stand heraus ein hohes Drehmoment. Im Gegensatz zu Glockenanker-Motoren erfolgt eine gute Wärmeableitung über das Blechpaket, wodurch thermische Probleme im Dauerbetrieb minimiert werden können. Diese Motoren sind deswegen besonders empfehlenswert für anspruchsvolle Anwendungen mit häufigen Korrekturmaßnahmen. Die meisten Hochlast-Aktuatoren sind deshalb mit BLDC-Motoren ausgestattet.









# DMSZ

# Z E R T I F I K A T

Die  
**Deutsche Managementsystem Zertifizierungsgesellschaft mbH**

bescheinigt hiermit, dass das Unternehmen



**Multiplex Modellsport GmbH & Co. KG**

Westliche Gewerbestr.1  
75015 Bretten

für den Geltungsbereich

Produktion, Entwicklung und Handel von Flugmodellen, Fernsteuersystemen,  
Aktuatoren sowie Lade-, Antriebs- und Regeltechnologie im  
Modellsport und Industriebereich.

ein

**Qualitätsmanagementsystem**

eingeführt hat und anwendet.

Durch ein Audit, dokumentiert in einem Bericht, wurde der Nachweis erbracht,  
dass dieses Qualitätsmanagementsystem die Forderungen der folgenden Norm erfüllt:

**DIN EN ISO 9001:2015**

Ausgabe November 2015

Dieses Zertifikat ist gültig vom 05.12.2022 bis 04.12.2025

Zertifikat-Registrier-Nr.: QM 22118-Z02443

Griesheim, den 05.12.2022



*D. Kaiser*  
Dietmar Kaiser  
(Geschäftsführer)

*Hans-W. Lortz*  
Hans-Werner Lortz  
(Leiter Zertifizierungsstelle)







**HLS** LINEAR  
ACTUATORS



HLS12-30

HLS12-50

HLS12-100

## PROTOCOL & FEEDBACK LIST

| Series          | Item Name                      | Available Protocol |     |       |     |                     |
|-----------------|--------------------------------|--------------------|-----|-------|-----|---------------------|
|                 |                                | PWM                | TTL | RS485 | CAN | UAVCAN/<br>DroneCAN |
| HS Series       | HS-5125MG                      | ✓                  |     |       |     |                     |
| HS Series       | HS-53                          | ✓                  |     |       |     |                     |
| HS Series       | HS-81                          | ✓                  |     |       |     |                     |
| HS Series       | HS-85MG                        | ✓                  |     |       |     |                     |
| HS Series       | HS-311                         | ✓                  |     |       |     |                     |
| HS Series       | HS-322HD                       | ✓                  |     |       |     |                     |
| HS Series       | HS-325HB                       | ✓                  |     |       |     |                     |
| HS Series       | HS-645MG                       | ✓                  |     |       |     |                     |
| HS Series       | HS-646WP                       | ✓                  |     |       |     |                     |
| HS Series       | HS-1005SGT                     | ✓                  |     |       |     |                     |
| HS Series       | HS-1100WP                      | ✓                  |     |       |     |                     |
| D Series        | D485HW                         | ✓                  | ✓   |       |     |                     |
| D Series        | D646WP                         | ✓                  | ✓   |       |     |                     |
| D Series        | D951TW                         | ✓                  | ✓   |       |     |                     |
| D Series        | D954SW                         | ✓                  | ✓   |       |     |                     |
| D Series        | D980TW                         | ✓                  | ✓   |       |     |                     |
| DB Series       | DB778WP                        | ✓                  | ✓   |       |     |                     |
| DB Series       | DB961WP                        | ✓                  | ✓   |       |     |                     |
| HLS12 Series    | HLS12 Linear Servo             | ✓                  |     |       |     |                     |
| HSB Series      | HSB-9465SH                     | ✓                  |     |       |     |                     |
| HSB Series      | HSB-9485SH                     | ✓                  |     |       |     |                     |
| HSB Series      | HSB-9381TH                     | ✓                  |     |       |     |                     |
| HSB Series      | HSB-M9381TH                    | ✓                  |     |       |     |                     |
| HSR Series      | HSR-2645CRH                    | ✓                  |     |       |     |                     |
| MD Series       | MD1100WP                       | ✓                  | ✓   |       |     |                     |
| MD Series       | MD250MW                        | ✓                  | ✓   |       |     |                     |
| MD Series       | MD261SW                        | ✓                  | ✓   |       |     |                     |
| MD Series       | MD485HW                        | ✓                  | ✓   |       |     |                     |
| MD Series       | MD85MG                         | ✓                  | ✓   |       |     |                     |
| MDB Series      | MDB1200WP                      | ✓                  | ✓   |       |     |                     |
| MDB-CAN Series  | MDB961WP-CAN 28V               |                    |     |       | ✓   | ✓                   |
| MDB-CAN Series  | MDB778WP-CAN DroneCAN          |                    |     |       | ✓   | ✓                   |
| MDB-CAN Series  | MDB777WP-CAN DroneCAN          |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD145SW-CAN UAVCAN/DroneCAN    |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD245MW-CAN UAVCAN/DroneCAN    |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD250MW-CAN UAVCAN/DroneCAN    |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD65MG-CAN UAVCAN/DroneCAN     |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD70MH-CAN UAVCAN/DroneCAN     |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD85MG-CAN UAVCAN/DroneCAN     |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD89MW-CAN UAVCAN/DroneCAN     |                    |     |       | ✓   | ✓                   |
| MD-CAN Series   | MD950TW-CAN UAVCAN/DroneCAN    |                    |     |       | ✓   | ✓                   |
| MDR Series      | MDR845WP                       | ✓                  | ✓   |       |     |                     |
| MD-RS485 Series | MD245MW-RS485                  |                    |     | ✓     |     |                     |
| MD-RS485 Series | MD250MW-RS485                  |                    |     | ✓     |     |                     |
| MD-RS485 Series | MD950TW-RS485                  |                    |     | ✓     |     |                     |
| MD-RS485 Series | MD980TW-RS485                  |                    |     | ✓     |     |                     |
| SG Series       | SG33BL-T-12V (DSUB)            | ✓                  | ✓   | ✓     |     |                     |
| SG Series       | SG33BL-T-24V (DSUB)            | ✓                  | ✓   | ✓     |     |                     |
| SG Series       | SG33BL-T-24V (Gland Cable)     | ✓                  | ✓   | ✓     |     |                     |
| SG-CAN Series   | SG33BL-T-CAN-12V (Circular)    |                    |     |       | ✓   | ✓                   |
| SG-CAN Series   | SG33BL-T-CAN-24V (Circular)    |                    |     |       | ✓   | ✓                   |
| SG-CAN Series   | SG33BL-T-CAN-12V (Gland Cable) |                    |     |       | ✓   | ✓                   |
| SG-CAN Series   | SG33BL-T-CAN-24V (Gland Cable) |                    |     |       | ✓   | ✓                   |
| SG-CAN Series   | SG50BL-CAN 24V (Circular)      |                    |     |       | ✓   | ✓                   |

TORQUE\* No value is read for the torque, instead the load on the servo is read out.

✓ \*\* The number of revolutions is read out via the position feedback. There is no sparate counter.

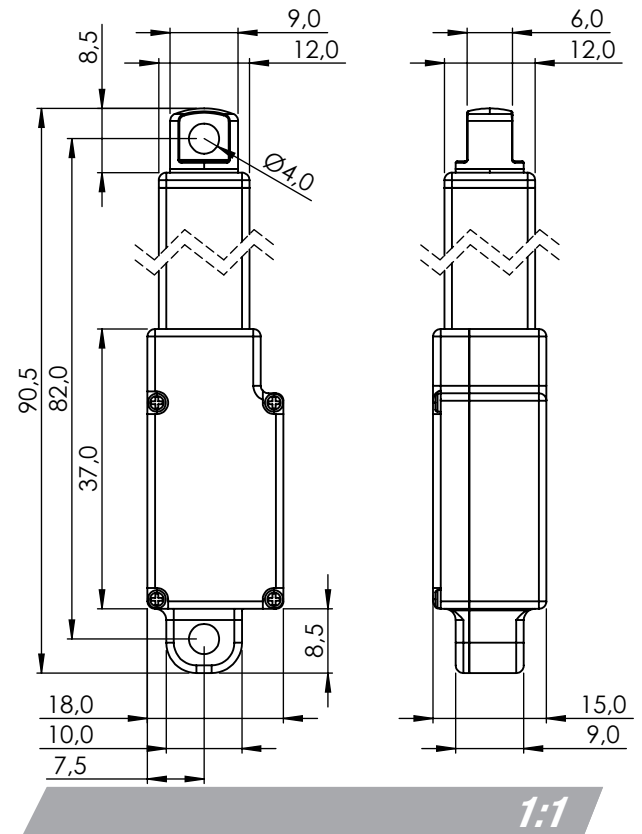
| Series          | Item Name                      | Available Feedback |       |         |         |         |            |            |              |
|-----------------|--------------------------------|--------------------|-------|---------|---------|---------|------------|------------|--------------|
|                 |                                | POSITION           | SPEED | TORQUE* | VOLTAGE | CURRENT | TURN COUNT | TEMP (MCU) | TEMP (MOTOR) |
| HS Series       | HS-5125MG                      |                    |       |         |         |         |            |            |              |
| HS Series       | HS-53                          |                    |       |         |         |         |            |            |              |
| HS Series       | HS-81                          |                    |       |         |         |         |            |            |              |
| HS Series       | HS-85MG                        |                    |       |         |         |         |            |            |              |
| HS Series       | HS-311                         |                    |       |         |         |         |            |            |              |
| HS Series       | HS-322HD                       |                    |       |         |         |         |            |            |              |
| HS Series       | HS-325HB                       |                    |       |         |         |         |            |            |              |
| HS Series       | HS-645MG                       |                    |       |         |         |         |            |            |              |
| HS Series       | HS-646WP                       |                    |       |         |         |         |            |            |              |
| HS Series       | HS-1005SGT                     |                    |       |         |         |         |            |            |              |
| HS Series       | HS-1100WP                      |                    |       |         |         |         |            |            |              |
| D Series        | D485HW                         | ✓                  |       |         |         |         |            |            |              |
| D Series        | D646WP                         | ✓                  |       |         |         |         |            |            |              |
| D Series        | D951TW                         | ✓                  |       |         |         |         |            |            |              |
| D Series        | D954SW                         | ✓                  |       |         |         |         |            |            |              |
| D Series        | D980TW                         | ✓                  |       |         |         |         |            |            |              |
| DB Series       | DB778WP                        | ✓                  |       |         |         |         |            |            |              |
| DB Series       | DB961WP                        | ✓                  |       |         |         |         |            |            |              |
| HLS12 Series    | HLS12 Linear Servo             | ✓                  |       |         |         |         |            |            |              |
| HSB Series      | HSB-9465SH                     |                    |       |         |         |         |            |            |              |
| HSB Series      | HSB-9485SH                     |                    |       |         |         |         |            |            |              |
| HSB Series      | HSB-9381TH                     |                    |       |         |         |         |            |            |              |
| HSB Series      | HSB-M9381TH                    |                    |       |         |         |         |            |            |              |
| HSR Series      | HSR-2645CRH                    |                    |       |         |         |         |            |            |              |
| MD Series       | MD1100WP                       | ✓                  |       |         |         |         |            |            |              |
| MD Series       | MD250MW                        | ✓                  |       |         |         |         |            |            |              |
| MD Series       | MD261SW                        | ✓                  |       |         |         |         |            |            |              |
| MD Series       | MD485HW                        | ✓                  |       |         |         |         |            |            |              |
| MD Series       | MD85MG                         | ✓                  |       |         |         |         |            |            |              |
| MDB Series      | MDB1200WP                      | ✓                  |       |         |         |         |            |            |              |
| MDB-CAN Series  | MDB961WP-CAN 28V               | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| MDB-CAN Series  | MDB778WP-CAN DroneCAN          | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| MDB-CAN Series  | MDB777WP-CAN DroneCAN          | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| MD-CAN Series   | MD145SW-CAN UAVCAN/DroneCAN    | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD245MW-CAN UAVCAN/DroneCAN    | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD250MW-CAN UAVCAN/DroneCAN    | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD65MG-CAN UAVCAN/DroneCAN     | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD70MH-CAN UAVCAN/DroneCAN     | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD85MG-CAN UAVCAN/DroneCAN     | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MD-CAN Series   | MD89MW-CAN UAVCAN/DroneCAN     | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| MD-CAN Series   | MD950TW-CAN UAVCAN/DroneCAN    | ✓                  | ✓     | ✓       | ✓       |         | ✓          | ✓          |              |
| MDR Series      | MDR845WP                       | ✓                  | ✓     | ✓       | ✓       |         | ✓ **       | ✓          |              |
| MD-RS485 Series | MD245MW-RS485                  | ✓                  |       |         |         |         |            |            |              |
| MD-RS485 Series | MD250MW-RS485                  | ✓                  |       |         |         |         |            |            |              |
| MD-RS485 Series | MD950TW-RS485                  | ✓                  |       |         |         |         |            |            |              |
| MD-RS485 Series | MD980TW-RS485                  | ✓                  |       |         |         |         |            |            |              |
| SG Series       | SG33BL-T-12V (DSUB)            | ✓                  | ✓     | ✓       | ✓       |         | ✓ **       | ✓          | ✓            |
| SG Series       | SG33BL-T-24V (DSUB)            | ✓                  | ✓     | ✓       | ✓       |         | ✓ **       | ✓          | ✓            |
| SG Series       | SG33BL-T-24V (Gland Cable)     | ✓                  | ✓     | ✓       | ✓       |         | ✓ **       | ✓          | ✓            |
| SG-CAN Series   | SG33BL-T-CAN-12V (Circular)    | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| SG-CAN Series   | SG33BL-T-CAN-24V (Circular)    | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| SG-CAN Series   | SG33BL-T-CAN-12V (Gland Cable) | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| SG-CAN Series   | SG33BL-T-CAN-24V (Gland Cable) | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |
| SG-CAN Series   | SG50BL-CAN 24V (Circular)      | ✓                  | ✓     | ✓       | ✓       | ✓       | ✓          | ✓          | ✓            |

TORQUE\* No value is read for the torque, instead the load on the servo is read out.

✓ \*\* The number of revolutions is read out via the position feedback. There is no sparate counter.

# HLS12-3050, HLS12-30210, HLS12-30380

#1-02453, #1-02454, #1-02455

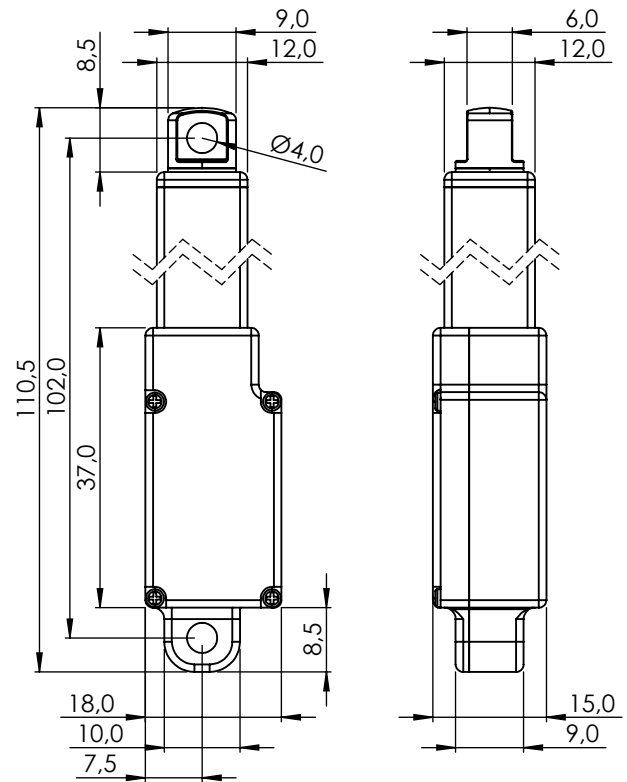


## GENERAL SPECIFICATION

| HLS12-30XXX                 |                                     |          |         |                  |          |         |                    |         |         |                    |         |         |
|-----------------------------|-------------------------------------|----------|---------|------------------|----------|---------|--------------------|---------|---------|--------------------|---------|---------|
| Control System              | PWM 1000usec ~ 2000usec             |          |         |                  |          |         |                    |         |         |                    |         |         |
| Position Sensor Type        | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Voltage Range     | 4.0 ~ 8.4V                          |          |         |                  |          |         |                    |         |         |                    |         |         |
| Motor Type                  | Cored Metal Brush                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Amplifier / MCU             | 32bits programmable Digital         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Lead Screw                  | Lead 5mm                            |          |         |                  |          |         |                    |         |         |                    |         |         |
| Stroke Option               | 30mm                                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Repeatability               | ±0.2mm                              |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Ratio                  | 50:1                                |          |         | 100:1            |          |         | 210:1              |         |         | 380:1              |         |         |
| Voltage                     | At 7.4V                             |          |         | At 7.4V          |          |         | At 7.4V            |         |         | At 7.4V            |         |         |
| Speed at no Load            | 30.9mm/s                            |          |         | 16.1mm/s         |          |         | 7.5mm/s            |         |         | 4.1mm/s            |         |         |
| Running Current at no Load  | 130mA                               |          |         | 130mA            |          |         | 130mA              |         |         | 130mA              |         |         |
| Load Spec                   | Load                                | Speed    | Current | Load             | Speed    | Current | Load               | Speed   | Current | Load               | Speed   | Current |
| Maximum Efficiency Point    | 1.2kg<br>(11.8N)                    | 23.5mm/s | 250mA   | 2.1kg<br>(20.6N) | 12.7mm/s | 250mA   | 4.4kg<br>(43.2N)   | 5.6mm/s | 250mA   | 8.0kg<br>(78.5N)   | 3.1mm/s | 250mA   |
| Peak Power Point            | 2.1kg<br>(20.6N)                    | 17.3mm/s | 370mA   | 3.8kg<br>(37.3N) | 8.6mm/s  | 370mA   | 7.7kg<br>(75.5N)   | 4.0mm/s | 370mA   | 12.4kg<br>(121.6N) | 2.3mm/s | 370mA   |
| Max Force (Lifted)          | 2.7kg<br>(26.5N)                    | 8.2mm/s  | 490mA   | 5.2kg<br>(51.0N) | 4.0mm/s  | 490mA   | 9.9kg<br>(97.1N)   | 2.8mm/s | 490mA   | 14.8kg<br>(145.2N) | 1.5mm/s | 490mA   |
| Stall Torque                | 3.1kg<br>(30.4N)                    |          |         | 6.2kg<br>(60.8N) |          |         | 12.4kg<br>(121.6N) |         |         | 22.2kg<br>(217.8N) |         |         |
| Stall Current               | 620mA                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Static Force            | 25.2kg (247N) (above)               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Side Load (Extended)    | 4.1kg (40N)                         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Temperature Range | -10°C ~ +50°C (14°F ~ +122°F)       |          |         |                  |          |         |                    |         |         |                    |         |         |
| Storage Temperature Range   | -30°C ~ +80°C (-31°F ~ +176°F)      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Vibrations at no Load       | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Lengt        | 160mm                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Gauge        | 24AWG                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Strand Count | 40/0.08                             |          |         |                  |          |         |                    |         |         |                    |         |         |
| External Dimensions         | 82.0 x 15.0 x 18.0mm                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Weight                      | 34.0g                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Ball Bearing                | Flange Bearing                      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Case Material               | Engineering Plastic & Aluminum Pipe |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Material               | 4 Metal Gears                       |          |         |                  |          |         |                    |         |         |                    |         |         |
| IP-Rating                   | IP4X                                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Revision                    | Rev. 1.1 / 02.01.2024               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Changelog                   | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |

# HLS12-5050, HLS12-50210, HLS12-50380

#1-02456, #1-02457, #1-02458



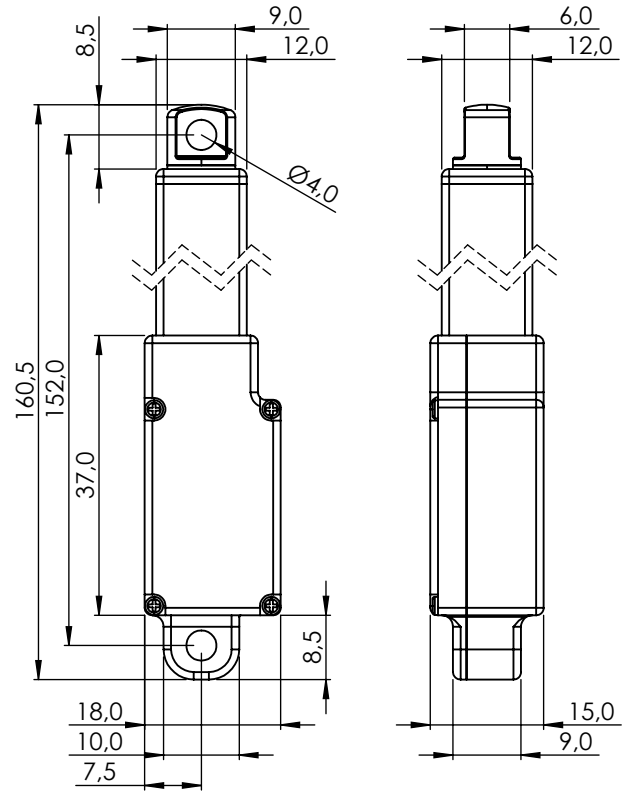


## GENERAL SPECIFICATION

| HLS12-50XXX                 |                                     |          |         |                  |          |         |                    |         |         |                    |         |         |
|-----------------------------|-------------------------------------|----------|---------|------------------|----------|---------|--------------------|---------|---------|--------------------|---------|---------|
| Control System              | PWM<br>1000usec ~ 2000usec          |          |         |                  |          |         |                    |         |         |                    |         |         |
| Position Sensor Type        | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Voltage Range     | 4.0 ~ 8.4V                          |          |         |                  |          |         |                    |         |         |                    |         |         |
| Motor Type                  | Cored Metal Brush                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Amplifier / MCU             | 32bits programmable Digital         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Lead Screw                  | Lead 5mm                            |          |         |                  |          |         |                    |         |         |                    |         |         |
| Stroke Option               | 50mm                                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Repeatability               | ±0.3mm                              |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Ratio                  | 50:1                                |          |         | 100:1            |          |         | 210:1              |         |         | 380:1              |         |         |
| Voltage                     | At 7.4V                             |          |         | At 7.4V          |          |         | At 7.4V            |         |         | At 7.4V            |         |         |
| Speed at no Load            | 30.9mm/s                            |          |         | 16.1mm/s         |          |         | 7.5mm/s            |         |         | 4.1mm/s            |         |         |
| Running Current at no Load  | 130mA                               |          |         | 130mA            |          |         | 130mA              |         |         | 130mA              |         |         |
| Load Spec                   | Load                                | Speed    | Current | Load             | Speed    | Current | Load               | Speed   | Current | Load               | Speed   | Current |
| Maximum Efficiency Point    | 1.2kg<br>(11.8N)                    | 23.5mm/s | 250mA   | 2.1kg<br>(20.6N) | 12.7mm/s | 250mA   | 4.4kg<br>(43.2N)   | 5.6mm/s | 250mA   | 8.0kg<br>(78.5N)   | 3.1mm/s | 250mA   |
| Peak Power Point            | 2.1kg<br>(20.6N)                    | 17.3mm/s | 370mA   | 3.8kg<br>(37.3N) | 8.6mm/s  | 370mA   | 7.7kg<br>(75.5N)   | 4.0mm/s | 370mA   | 12.4kg<br>(121.6N) | 2.3mm/s | 370mA   |
| Max Force (Lifted)          | 2.7kg<br>(26.5N)                    | 8.2mm/s  | 490mA   | 5.2kg<br>(51.0N) | 4.0mm/s  | 490mA   | 9.9kg<br>(97.1N)   | 2.8mm/s | 490mA   | 14.8kg<br>(145.2N) | 1.5mm/s | 490mA   |
| Stall Torque                | 3.1kg<br>(30.4N)                    |          |         | 6.2kg<br>(60.8N) |          |         | 12.4kg<br>(121.6N) |         |         | 22.2kg<br>(217.8N) |         |         |
| Stall Current               | 620mA                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Static Force            | 25.2kg (247N) (above)               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Side Load (Extended)    | 3.1kg (30N)                         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Temperature Range | -10°C ~ +50°C (14°F ~ +122°F)       |          |         |                  |          |         |                    |         |         |                    |         |         |
| Storage Temperature Range   | -30°C ~ +80°C (-31°F ~ +176°F)      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Vibrations at no Load       | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Length       | 160mm                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Gauge        | 24AWG                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Strand Count | 40/0.08                             |          |         |                  |          |         |                    |         |         |                    |         |         |
| External Dimensions         | 102.0 x 15.0 x 18.0mm               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Weight                      | 40.0g                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Ball Bearing                | Flange Bearing                      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Case Material               | Engineering Plastic & Aluminum Pipe |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Material               | 4 Metal Gears                       |          |         |                  |          |         |                    |         |         |                    |         |         |
| IP-Rating                   | IP4X                                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Revision                    | Rev. 1.1 / 02.01.2024               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Changelog                   | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |

# HLS-10050, HLS-100210, HLS-100380

#1-02496, #1-02460, #1-02461



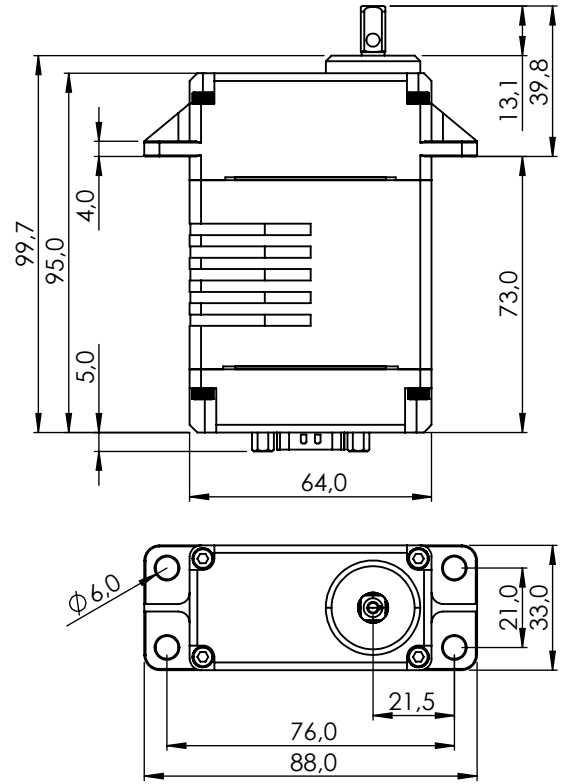
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## GENERAL SPECIFICATION

| <b>HLS12-100XX</b>          |                                     |          |         |                  |          |         |                    |         |         |                    |         |         |
|-----------------------------|-------------------------------------|----------|---------|------------------|----------|---------|--------------------|---------|---------|--------------------|---------|---------|
| Control System              | PWM<br>1000usec ~ 2000usec          |          |         |                  |          |         |                    |         |         |                    |         |         |
| Position Sensor Type        | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Voltage Range     | 4.0 ~ 8.4V                          |          |         |                  |          |         |                    |         |         |                    |         |         |
| Motor Type                  | Cored Metal Brush                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Amplifier / MCU             | 32bits programmable Digital         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Lead Screw                  | Lead 5mm                            |          |         |                  |          |         |                    |         |         |                    |         |         |
| Stroke Option               | 100mm                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Repeatability               | ±0.5mm                              |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Ratio                  | 50:1                                |          |         | 100:1            |          |         | 210:1              |         |         | 380:1              |         |         |
| Voltage                     | At 7.4V                             |          |         | At 7.4V          |          |         | At 7.4V            |         |         | At 7.4V            |         |         |
| Speed at no Load            | 30.9mm/s                            |          |         | 16.1mm/s         |          |         | 7.5mm/s            |         |         | 4.1mm/s            |         |         |
| Running Current at no Load  | 130mA                               |          |         | 130mA            |          |         | 130mA              |         |         | 130mA              |         |         |
| Load Spec                   | Load                                | Speed    | Current | Load             | Speed    | Current | Load               | Speed   | Current | Load               | Speed   | Current |
| Maximum Efficiency Point    | 1.2kg<br>(11.8N)                    | 23.5mm/s | 250mA   | 2.1kg<br>(20.6N) | 12.7mm/s | 250mA   | 4.4kg<br>(43.2N)   | 5.6mm/s | 250mA   | 8.0kg<br>(78.5N)   | 3.1mm/s | 250mA   |
| Peak Power Point            | 2.1kg<br>(20.6N)                    | 17.3mm/s | 370mA   | 3.8kg<br>(37.3N) | 8.6mm/s  | 370mA   | 7.7kg<br>(75.5N)   | 4.0mm/s | 370mA   | 12.4kg<br>(121.6N) | 2.3mm/s | 370mA   |
| Max Force (Lifted)          | 2.7kg<br>(26.5N)                    | 8.2mm/s  | 490mA   | 5.2kg<br>(51.0N) | 4.0mm/s  | 490mA   | 9.9kg<br>(97.1N)   | 2.8mm/s | 490mA   | 14.8kg<br>(145.2N) | 1.5mm/s | 490mA   |
| Stall Torque                | 3.1kg<br>(30.4N)                    |          |         | 6.2kg<br>(60.8N) |          |         | 12.4kg<br>(121.6N) |         |         | 22.2kg<br>(217.8N) |         |         |
| Stall Current               | 620mA                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Static Force            | 25.2kg (247N) (above)               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Max Side Load (Extended)    | 1.5kg (15N)                         |          |         |                  |          |         |                    |         |         |                    |         |         |
| Operating Temperature Range | -10°C ~ +50°C (14°F ~ +122°F)       |          |         |                  |          |         |                    |         |         |                    |         |         |
| Storage Temperature Range   | -30°C ~ +80°C (-31°F ~ +176°F)      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Vibrations at no Load       | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Length       | 160mm                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Gauge        | 24AWG                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Connector Wire Strand Count | 40/0.08                             |          |         |                  |          |         |                    |         |         |                    |         |         |
| External Dimensions         | 152.0 x 15.0 x 18.0mm               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Weight                      | 56.0g                               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Ball Bearing                | Flange Bearing                      |          |         |                  |          |         |                    |         |         |                    |         |         |
| Case Material               | Engineering Plastic & Aluminum Pipe |          |         |                  |          |         |                    |         |         |                    |         |         |
| Gear Material               | 4 Metal Gears                       |          |         |                  |          |         |                    |         |         |                    |         |         |
| IP-Rating                   | IP4X                                |          |         |                  |          |         |                    |         |         |                    |         |         |
| Revision                    | Rev. 1.1 / 02.01.2024               |          |         |                  |          |         |                    |         |         |                    |         |         |
| Changelog                   | -                                   |          |         |                  |          |         |                    |         |         |                    |         |         |

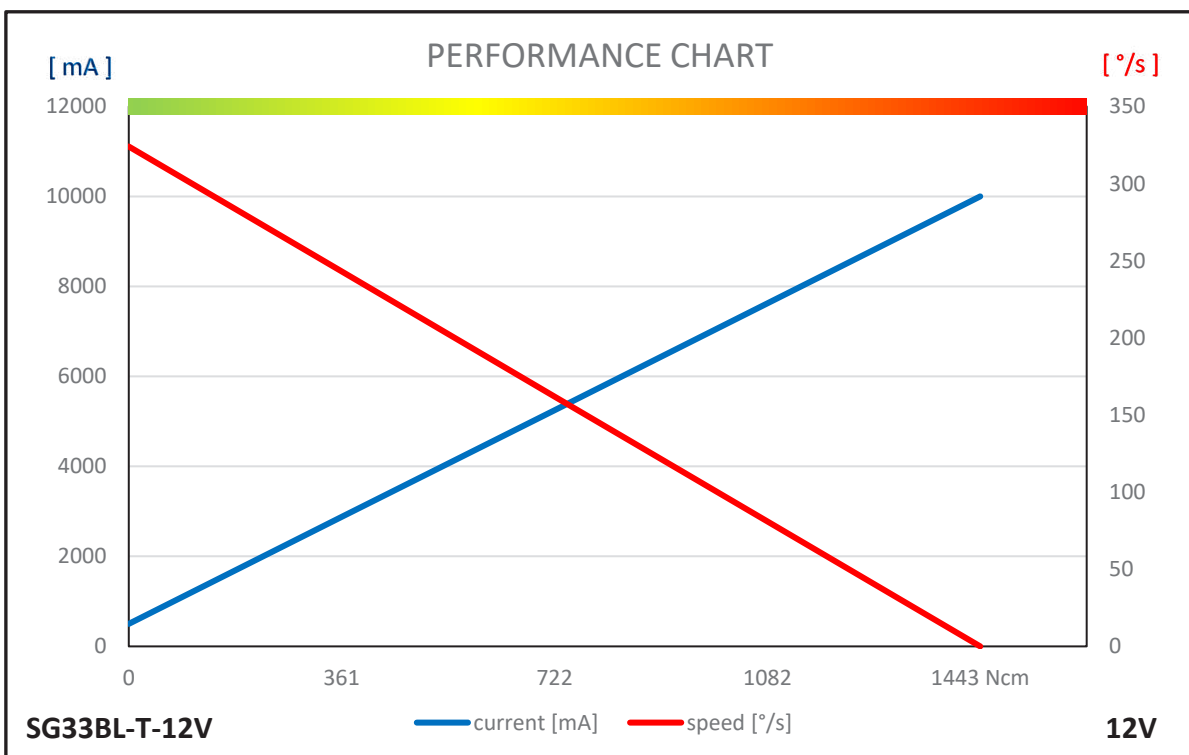
# SG33BL-T-12V (DSUB)

#1-00932



1:2

## PERFORMANCE CHART

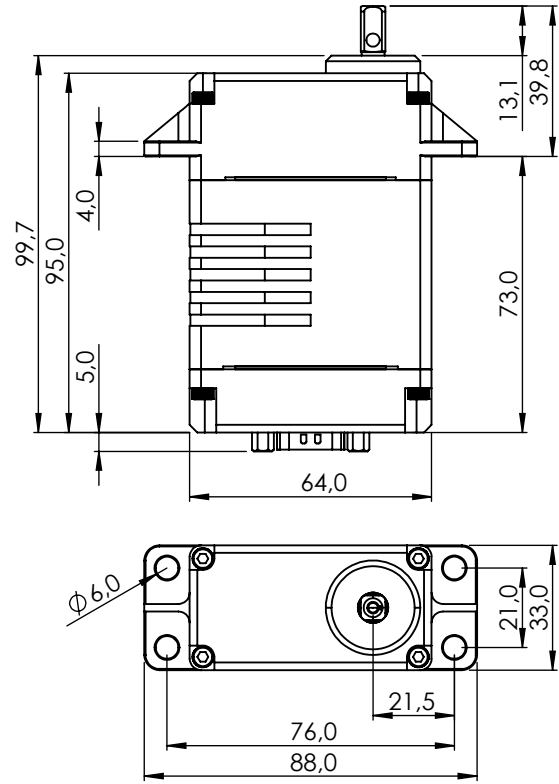


## GENERAL SPECIFICATION

| SG33BL-T-12V (DSUB)                          |   |                       |
|--|---|-----------------------|
| Control System                               | PWM / RS485 / TTL (Half Duplex)               |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs      |                       |
| Connector Type                               | D-Sub 9                                       |                       |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                       |
| Motor Type                                   | BLDC  |                       |
| Amplifier / MCU                              | 32bit programmable Digital                    |                       |
| Operating Voltage Range                      | 9.0V ~ 15.0V                                  |                       |
| Operating Voltage                            | At 12.0V                                      |                       |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                       |
| Stall Torque                                 | 147.0kgcm (1442.1Ncm)                         |                       |
| Rest Current                                 | 30mA  |                       |
| Running Current at no Load                   | 500mA   |                       |
| Stall Current                                | 10000mA                                       |                       |
| Deadband Width                               | 2µs   |                       |
| Operating Travel                             | Default                                       | ±60°                  |
|  | Programmable                                  | ±160°                 |
|  | Multi Turn                                    | ±2880° (Max ±8 Turns) |
|  | Continuous Rotation                           | n/a                   |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                       |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                       |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN60068-2-6         |                       |
| Connector Wire Length                        | -   |                       |
| Connector Wire Gauge                         | -   |                       |
| Connector Wire Strand Count                  | -   |                       |
| External Dimensions                          | 64.0 x 33.0 x 95.0mm                          |                       |
| Weight*                                      | 480.0g  |                       |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                       |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                       |
| Gear Material                                | 4 Hardened Steel Gears                        |                       |
| Gear Train Backlash                          | Max. 0.5°                                     |                       |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                       |
| IP-Rating                                    | IP68  |                       |
| MTTF   | >1000h  |                       |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                       |
| Changelog                                    | -   |                       |
| *of the servo only w/o horns and accessories |   |                       |

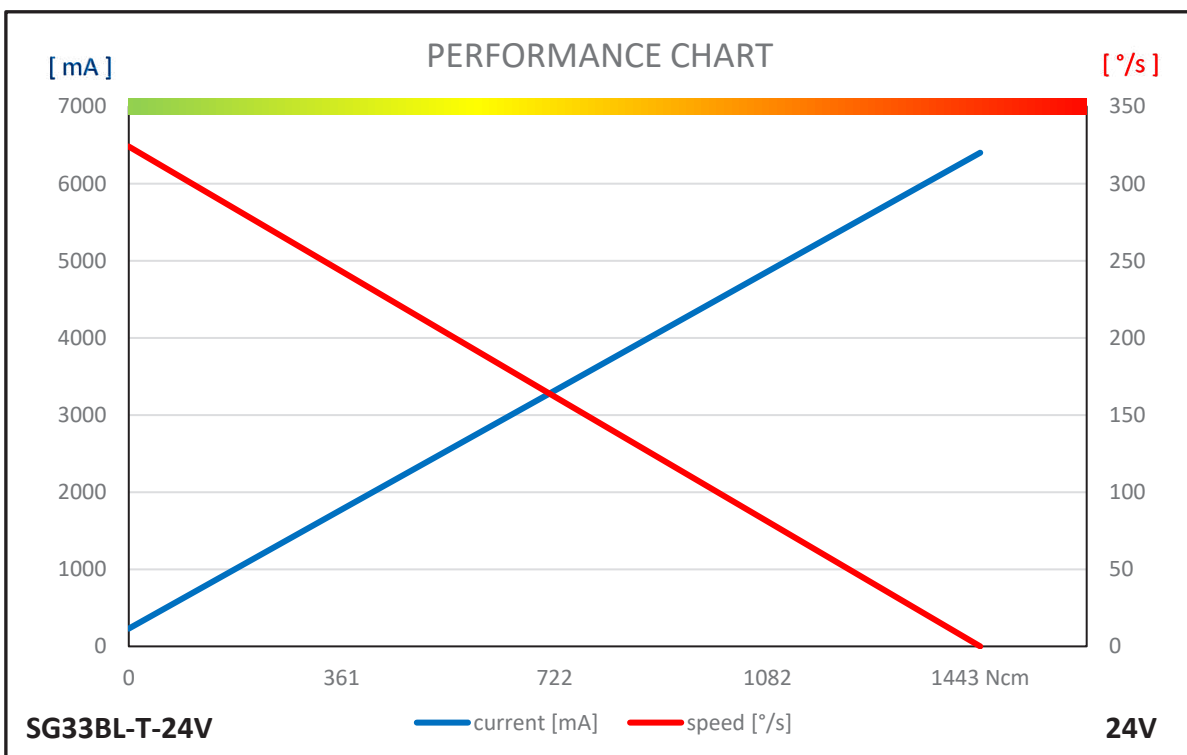
# SG33BL-T-24V (DSUB)

#1-02462



1:2

## PERFORMANCE CHART

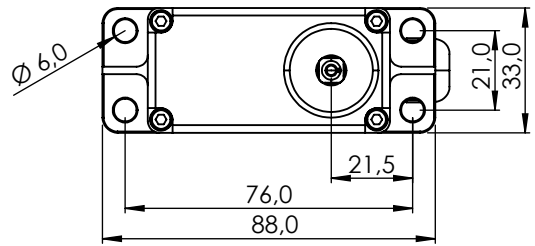
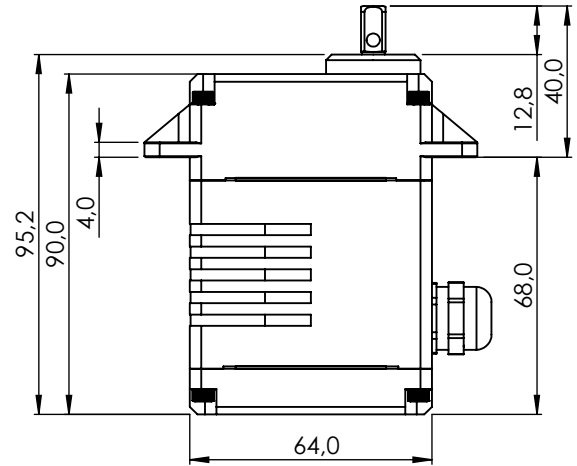


## GENERAL SPECIFICATION

| SG33BL-T-24V (DSUB)                          |   |                       |
|--|---|-----------------------|
| Control System                               | PWM / RS485 / TTL (Half Duplex)               |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs      |                       |
| Connector Type                               | D-Sub 9                                       |                       |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                       |
| Motor Type                                   | BLDC  |                       |
| Amplifier / MCU                              | 32bit programmable Digital                    |                       |
| Operating Voltage Range                      | 22.0V ~ 26.0V                                 |                       |
| Operating Voltage                            | At 24.0V                                      |                       |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                       |
| Stall Torque                                 | 147.00kgcm (1442.1Ncm)                        |                       |
| Idle Current                                 | 20mA  |                       |
| No Load Running Current                      | 230mA   |                       |
| Stall Current                                | 6400mA  |                       |
| Deadband Width                               | 2µs   |                       |
| Operating Travel                             | Default                                       | ±60°                  |
|  | Programmable                                  | ±160°                 |
|  | Multi Turn                                    | ±2880° (Max ±8 Turns) |
|  | Continuous Rotation                           | n/a                   |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                       |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                       |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN60068-2-6         |                       |
| Connector Wire Length                        | -   |                       |
| Connector Wire Gauge                         | -   |                       |
| Connector Wire Strand Count                  | -   |                       |
| External Dimensions                          | 64.0 x 33.0 x 95.0mm                          |                       |
| Weight*                                      | 480.0g  |                       |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                       |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                       |
| Gear Material                                | 4 Hardened Steel Gears                        |                       |
| Gear Train Backlash                          | Max. 0.5°                                     |                       |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                       |
| IP-Rating                                    | IP68  |                       |
| MTTF   | >1000h  |                       |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                       |
| Changelog                                    | -   |                       |
| *of the servo only w/o horns and accessories |   |                       |

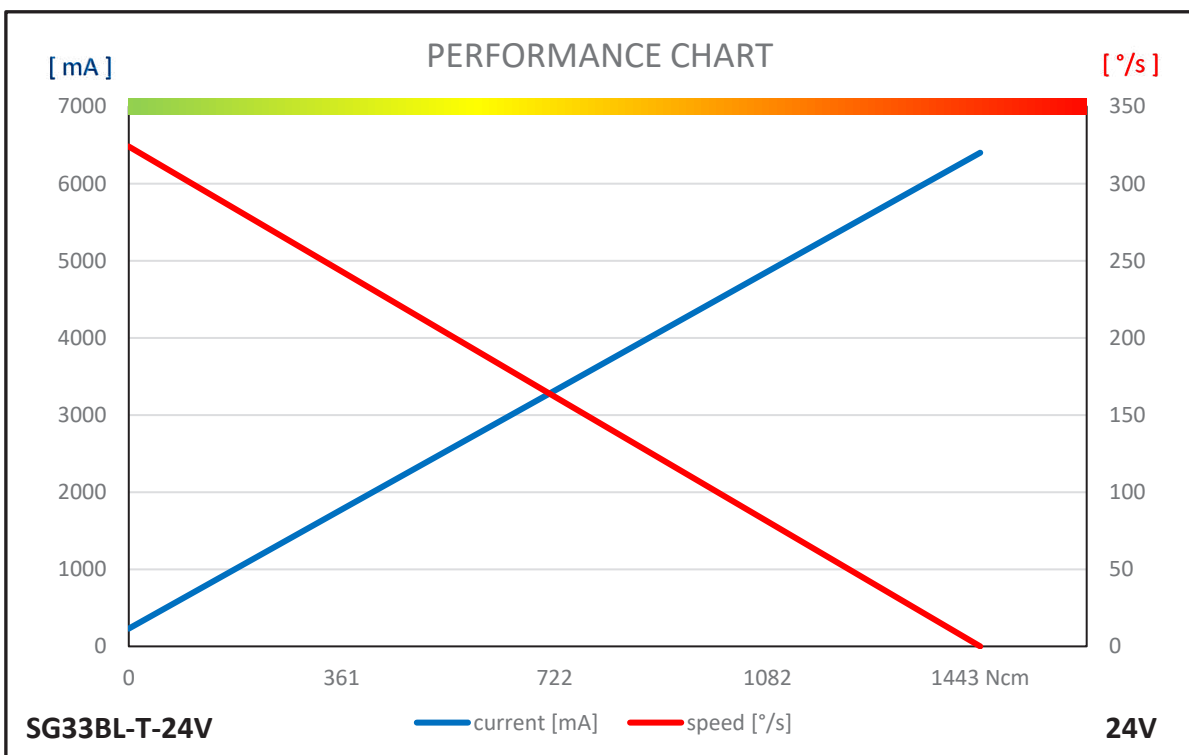
# SG33BL-T-24V (GLAND CABLE)

#1-02463



1:2

## PERFORMANCE CHART



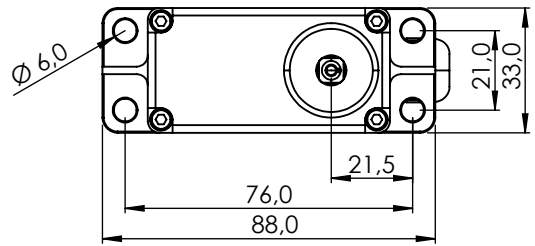
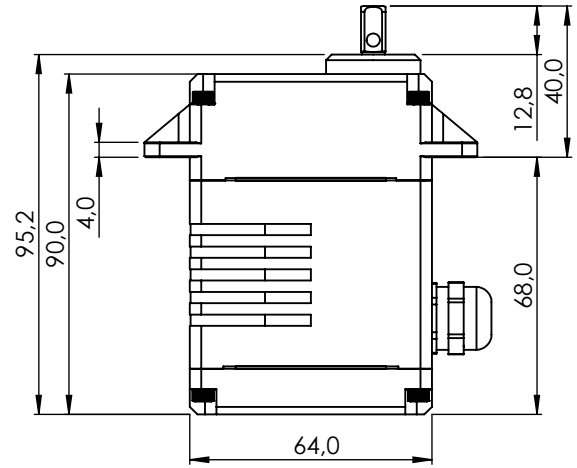


## GENERAL SPECIFICATION

| SG33BL-T-24V (Gland Cable)                   |   |                       |
|--|---|-----------------------|
| Control System                               | PWM / RS485 / TTL (Half Duplex)               |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs      |                       |
| Connector Type                               | -   |                       |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                       |
| Motor Type                                   | BLDC  |                       |
| Amplifier / MCU                              | 32bit programmable Digital                    |                       |
| Operating Voltage Range                      | 22.0V ~ 26.0V                                 |                       |
| Operating Voltage                            | At 24.0V                                      |                       |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                       |
| Stall Torque                                 | 147.00kgcm (1442.1Ncm)                        |                       |
| Rest Current                                 | 20mA  |                       |
| Running Current at no Load                   | 230mA   |                       |
| Stall Current                                | 6400mA  |                       |
| Deadband Width                               | 2µs   |                       |
| Operating Travel                             | Default                                       | ±60°                  |
|  | Programmable                                  | ±160°                 |
|  | Multi Turn                                    | ±2880° (Max ±8 Turns) |
|  | Continuous Rotation                           | n/a                   |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                       |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                       |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN 60068-2-6        |                       |
| Connector Wire Length                        | 400mm   |                       |
| Connector Wire Gauge                         | 20AWG   |                       |
| Connector Wire Strand Count                  | 80/0.08                                       |                       |
| External Dimensions                          | 64.0 x 33.0 x 90.0mm                          |                       |
| Weight*                                      | 500.0g  |                       |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                       |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                       |
| Gear Material                                | 4 Hardened Steel Gears                        |                       |
| Gear Train Backlash                          | Max. 0.5°                                     |                       |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                       |
| IP-Rating                                    | IP68  |                       |
| MTTF   | >1000h  |                       |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                       |
| Changelog                                    | -   |                       |
| *of the servo only w/o horns and accessories |   |                       |

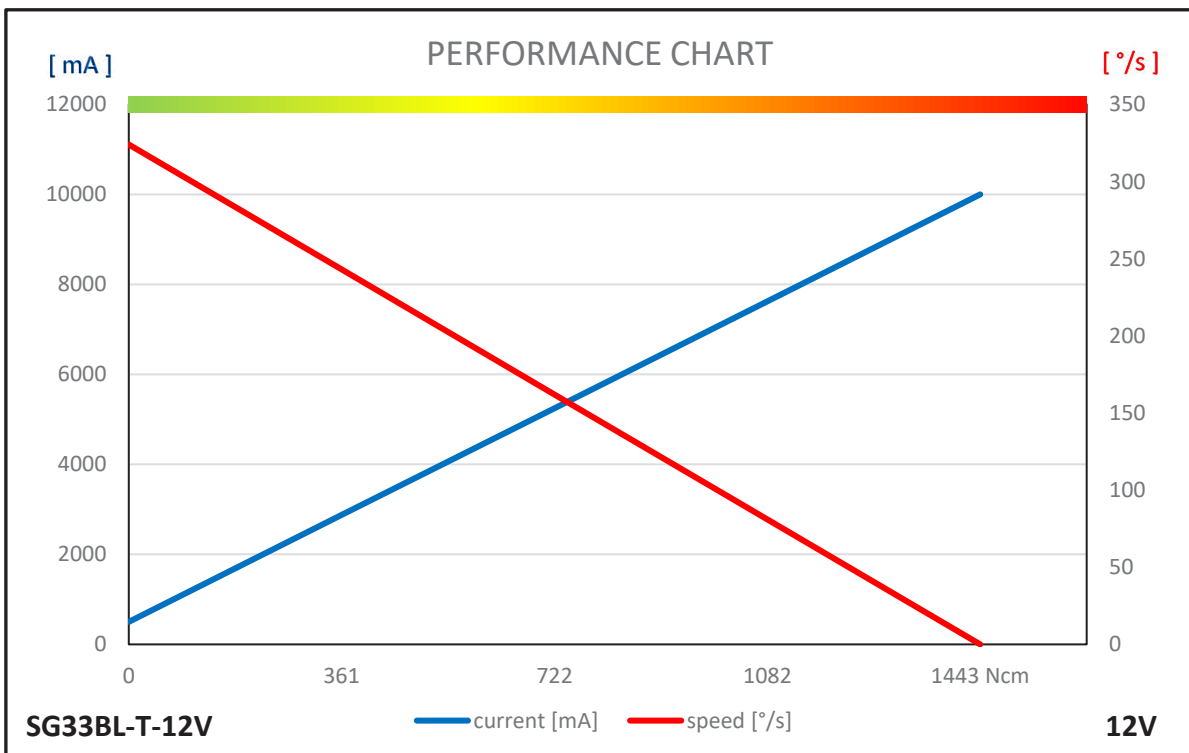
# SG33BL-T-CAN-12V (GLAND CABLE)

#1-02345



1:2

## PERFORMANCE CHART

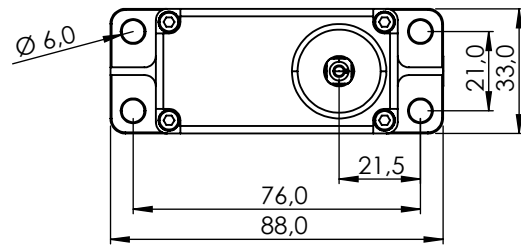
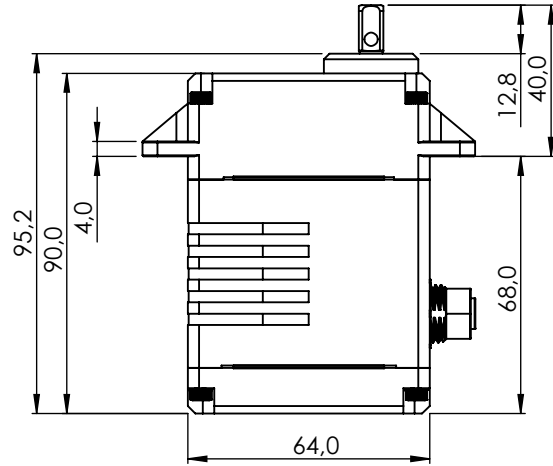


## GENERAL SPECIFICATION

| SG33BL-T-CAN-12V (Gland Cable)               |   |                |               |          |
|--|---|----------------|---------------|----------|
| Control System                               | CAN 2.0A,B / DroneCAN (UAVCAN v0)             |                |               |          |
|  | Protocol (Mode)                               | Standard 2.0A  | Extended 2.0B | DroneCAN |
|  | Baud-Rate                                     | 10kbps ~ 1Mbps |               |          |
|  | Sample-Point                                  | 50% or 87.5%   |               |          |
|  | Available SERVO ID                            | 1 ~ 254        |               | 1 ~ 127  |
|  | Available Node ID                             | 1 ~ 2047       | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range                            | 0 ~ 5V         |               |          |
| Connector Type                               | -   |                |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                |               |          |
| Motor Type                                   | BLDC  |                |               |          |
| Amplifier / MCU                              | 32bit programmable Digital                    |                |               |          |
| Operating Voltage Range                      | 9.0 ~ 15.0V                                   |                |               |          |
| Operating Voltage                            | At 12.0V                                      |                |               |          |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                |               |          |
| Stall Torque                                 | 147.0kgcm (1442.1Ncm)                         |                |               |          |
| Rest Current                                 | 30mA  |                |               |          |
| Running Current at no Load                   | 500mA   |                |               |          |
| Stall Current                                | 10000mA                                       |                |               |          |
| Deadband Width                               | -   |                |               |          |
| Travel                                       | Travel / Command                              | 90° / 4096     |               |          |
|  | Servo mode                                    | Left           | Center        | Right    |
|  | Pos Command                                   | +1366          | +8192         | +15018   |
|  | Pos [°]                                       | -150           | 0             | +150     |
|  | Turn Mode                                     | Left           | Power On      | Right    |
|  | Pos Command                                   | -16383         | 0             | +16383   |
|  | Pos [°]                                       | -359           | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                    |                |               |          |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                |               |          |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                |               |          |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN 60068-2-6        |                |               |          |
| Connector Wire Length                        | 400mm   |                |               |          |
| Connector Wire Gauge                         | 20AWG   |                |               |          |
| Connector Wire Strand Count                  | 80/0.08                                       |                |               |          |
| External Dimensions                          | 64.0 x 33.0 x 90.0mm                          |                |               |          |
| Weight*                                      | 500.0g  |                |               |          |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                |               |          |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                |               |          |
| Gear Material                                | 4 Hardened Steel Gears                        |                |               |          |
| Gear Train Backlash                          | Max. 0.5°                                     |                |               |          |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                |               |          |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                |               |          |
| IP-Rating                                    | IP68  |                |               |          |
| MTTF   | >1000h  |                |               |          |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                |               |          |
| Changelog                                    | -   |                |               |          |
| *of the servo only w/o horns and accessories |   |                |               |          |

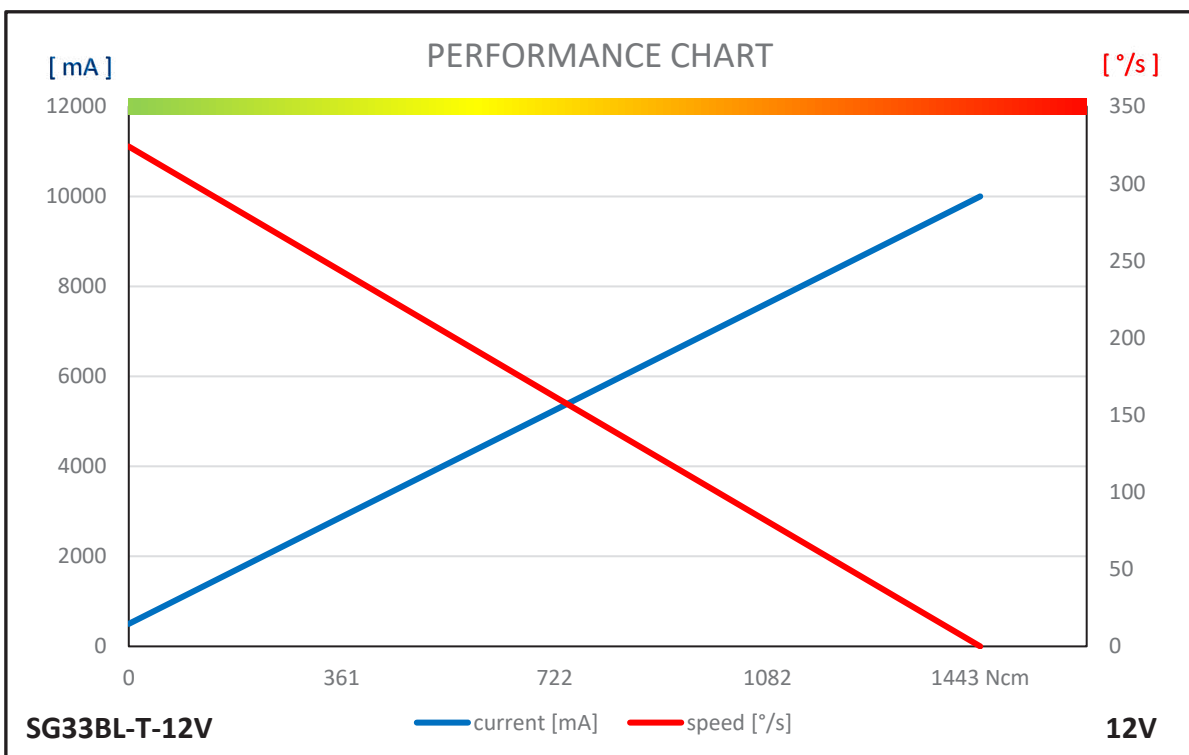
# SG33BL-T-CAN-12V (CIRCULAR)

#1-02346



1:2

## PERFORMANCE CHART

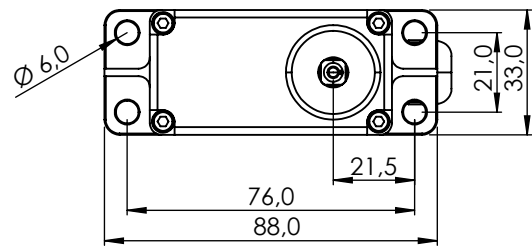
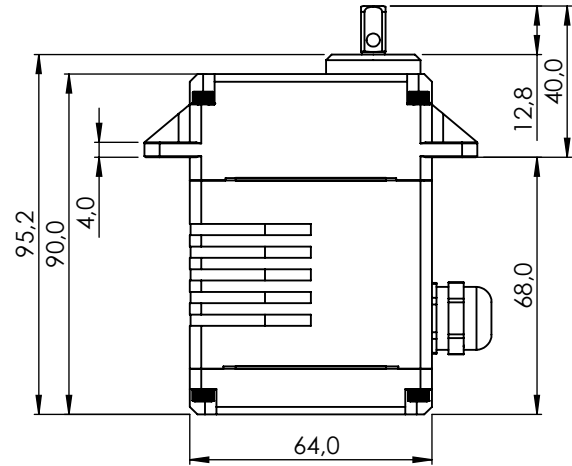


## GENERAL SPECIFICATION

| SG33BL-T-CAN-12V (Circular)                  |   |                |               |          |
|--|---|----------------|---------------|----------|
| Control System                               | CAN 2.0A,B / DroneCAN (UAVCAN v0)             |                |               |          |
|  | Protocol (Mode)                               | Standard 2.0A  | Extended 2.0B | DroneCan |
|  | Baud-Rate                                     | 10kbps ~ 1Mbps |               |          |
|  | Sample-Point                                  | 50% or 87.5%   |               |          |
|  | Available SERVO ID                            | 1 ~ 254        |               | 1 ~ 127  |
|  | Available Node ID                             | 1 ~ 2047       | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range                            | 0 ~ 5V         |               |          |
| Connector Type                               | Circular                                      |                |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                |               |          |
| Motor Type                                   | BLDC  |                |               |          |
| Amplifier / MCU                              | 32bit programmable Digital                    |                |               |          |
| Operating Voltage Range                      | 9.0 ~ 15.0V                                   |                |               |          |
| Operating Voltage                            | At 12.0V                                      |                |               |          |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                |               |          |
| Stall Torque                                 | 147.0kgcm (1442.1Ncm)                         |                |               |          |
| Rest Current                                 | 30mA  |                |               |          |
| Running Current at no Load                   | 500mA   |                |               |          |
| Stall Current                                | 10000mA                                       |                |               |          |
| Deadband Width                               | -   |                |               |          |
| Travel                                       | Travel / Command                              | 90° / 4096     |               |          |
|  | Servo mode                                    | Left           | Center        | Right    |
|  | Pos Command                                   | +1366          | +8192         | +15018   |
|  | Pos [°]                                       | -150           | 0             | +150     |
|  | Turn Mode                                     | Left           | Power On      | Right    |
|  | Pos Command                                   | -16383         | 0             | +16383   |
|  | Pos [°]                                       | -359           | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                    |                |               |          |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                |               |          |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                |               |          |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN 60068-2-6        |                |               |          |
| Connector Wire Length                        | -   |                |               |          |
| Connector Wire Gauge                         | -   |                |               |          |
| Connector Wire Strand Count                  | -   |                |               |          |
| External Dimensions                          | 64.0 x 33.0 x 90.0mm                          |                |               |          |
| Weight*                                      | 480.0g  |                |               |          |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                |               |          |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                |               |          |
| Gear Material                                | 4 Hardened Steel Gears                        |                |               |          |
| Gear Train Backlash                          | Max. 0.5°                                     |                |               |          |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                |               |          |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                |               |          |
| IP-Rating                                    | IP68  |                |               |          |
| MTTF   | >1000h  |                |               |          |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                |               |          |
| Changelog                                    | -   |                |               |          |
| *of the servo only w/o horns and accessories |   |                |               |          |

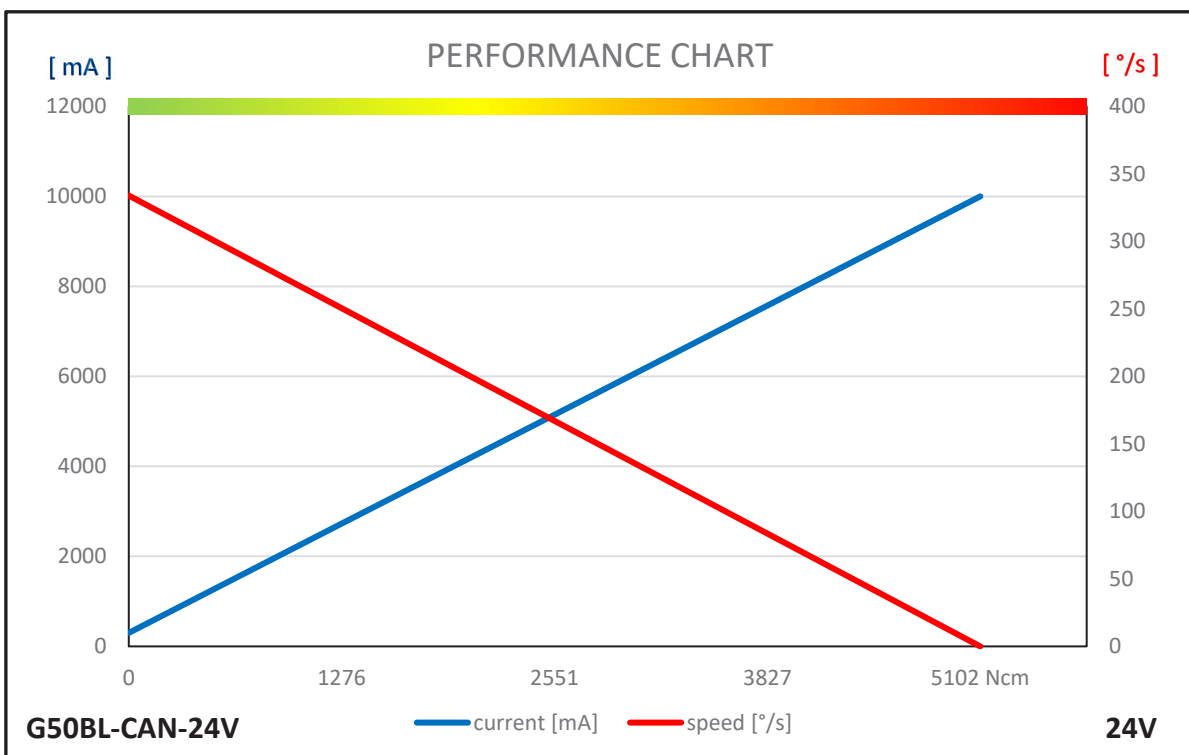
# SG33BL-T-CAN-24V (GLAND CABLE)

#1-02464



1:2

## PERFORMANCE CHART

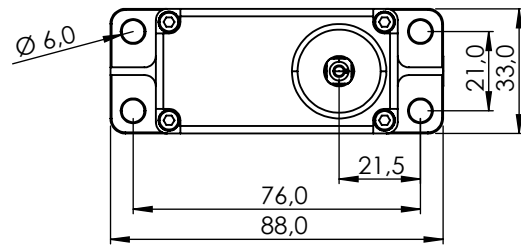
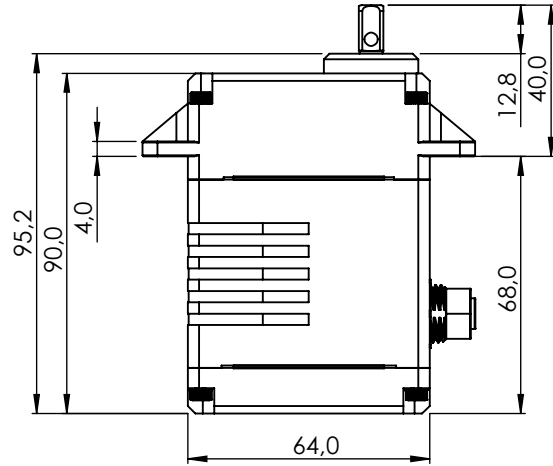


## GENERAL SPECIFICATION

| SG33BL-T-CAN-24V (Gland Cable)               |   |                |               |          |
|--|---|----------------|---------------|----------|
| Control System                               | CAN2.0A,B / DroneCAN (UAVCAN v0)              |                |               |          |
|  | Protocol (Mode)                               | Standard 2.0A  | Extended 2.0B | DroneCAN |
|  | Baud-Rate                                     | 10kbps ~ 1Mbps |               |          |
|  | Sample-Point                                  | 50% or 87.5%   |               |          |
|  | Available SERVO ID                            | 1 ~ 254        |               | 1 ~ 127  |
|  | Available Node ID                             | 1 ~ 2047       | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range                            | 0 ~ 5V         |               |          |
| Connector Type                               | -   |                |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                |               |          |
| Motor Type                                   | BLDC  |                |               |          |
| Amplifier / MCU                              | 32Bit programmable Digital                    |                |               |          |
| Operating Voltage Range                      | 18.0 ~ 32.0V                                  |                |               |          |
| Operating Voltage                            | At 24.0V                                      |                |               |          |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                |               |          |
| Stall Torque                                 | 147.0kgcm (1442.1Ncm)                         |                |               |          |
| Rest Current                                 | 20mA  |                |               |          |
| Running Current at no Load                   | 230mA   |                |               |          |
| Stall Current                                | 6400mA  |                |               |          |
| Deadband Width                               | -   |                |               |          |
| Travel                                       | Travel / Command                              | 90° / 4096     |               |          |
|  | Servo mode                                    | Left           | Center        | Right    |
|  | Pos Command                                   | +1366          | +8192         | +15018   |
|  | Pos [°]                                       | -150           | 0             | +150     |
|  | Turn Mode                                     | Left           | Power On      | Right    |
|  | Pos Command                                   | -16383         | 0             | +16383   |
|  | Pos [°]                                       | -359           | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                    |                |               |          |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                |               |          |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                |               |          |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN 60068-2-6        |                |               |          |
| Connector Wire Length                        | 400mm   |                |               |          |
| Connector Wire Gauge                         | 20AWG   |                |               |          |
| Connector Wire Strand Count                  | 80/0.08                                       |                |               |          |
| External Dimensions                          | 64.0 x 33.0 x 90.0mm                          |                |               |          |
| Weight*                                      | 500.0g  |                |               |          |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                |               |          |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                |               |          |
| Gear Material                                | 4 Hardened Steel Gears                        |                |               |          |
| Gear Train Backlash                          | Max. 0.5°                                     |                |               |          |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                |               |          |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                |               |          |
| IP-Rating                                    | IP68  |                |               |          |
| MTTF   | >1000h  |                |               |          |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                |               |          |
| Changelog                                    | -   |                |               |          |
| *of the servo only w/o horns and accessories |   |                |               |          |

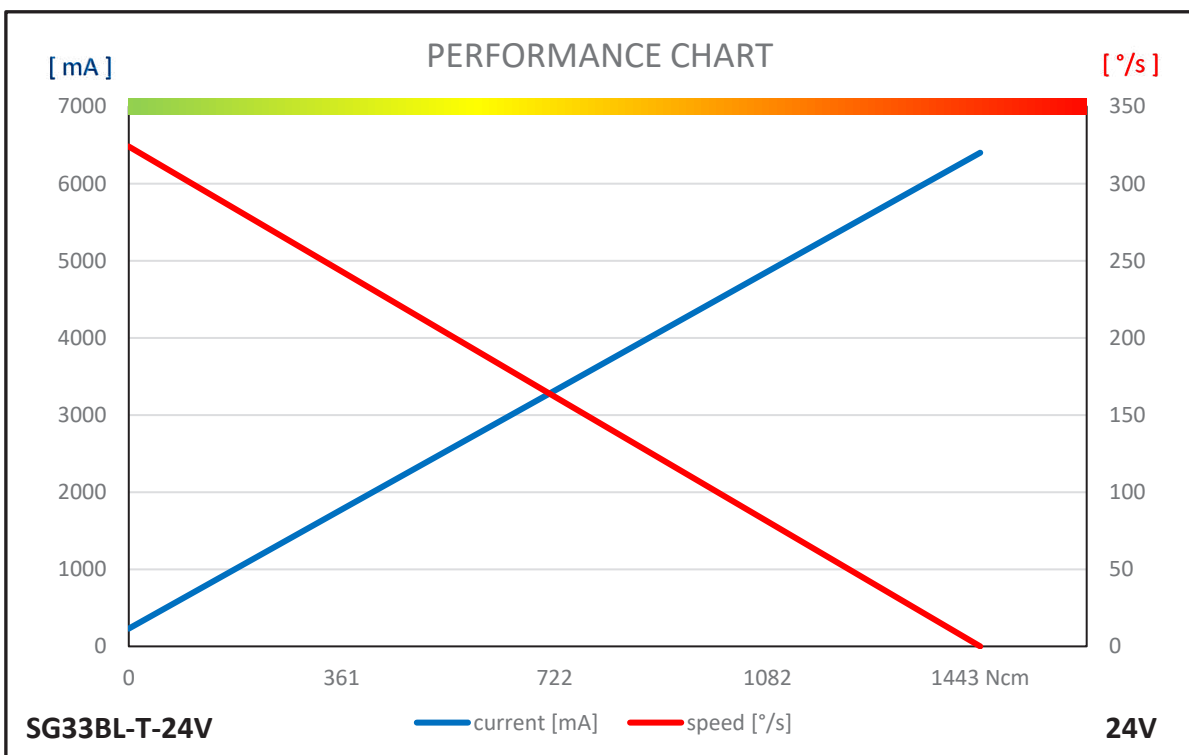
# SG33BL-T-CAN-24V (CIRCULAR)

#1-02465



1:2

## PERFORMANCE CHART



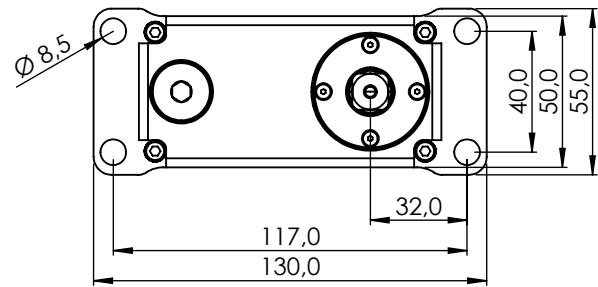
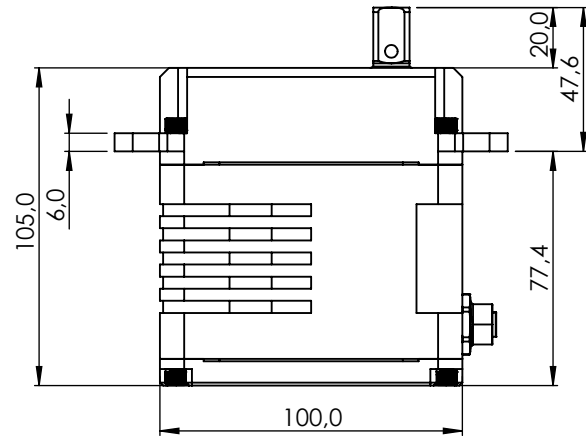


## GENERAL SPECIFICATION

| SG33BL-T-CAN-24V (Circular)                  |   |                |               |          |
|--|---|----------------|---------------|----------|
| Control System                               | CAN 2.0A,B / DroneCAN (UAVCAN v0)             |                |               |          |
|  | Protocol (Mode)                               | Standard 2.0A  | Extended 2.0B | DroneCAN |
|  | Baud-Rate                                     | 10kbps ~ 1Mbps |               |          |
|  | Sample-Point                                  | 50% or 87.5%   |               |          |
|  | Available SERVO ID                            | 1 ~ 254        |               | 1 ~ 127  |
|  | Available Node ID                             | 1 ~ 2047       | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range                            | 0 ~ 5V         |               |          |
| Connector Type                               | Circular                                      |                |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                |               |          |
| Motor Type                                   | BLDC  |                |               |          |
| Amplifier / MCU                              | 32bit programmable Digital                    |                |               |          |
| Operating Voltage Range                      | 18.0 ~ 32.0V                                  |                |               |          |
| Operating Voltage                            | At 24.0V                                      |                |               |          |
| Operating Speed at no Load                   | 324°/s (54RPM)                                |                |               |          |
| Stall Torque                                 | 147.0kgcm (1442.1Ncm)                         |                |               |          |
| Rest Current                                 | 20mA  |                |               |          |
| Running Current at no Load                   | 230mA   |                |               |          |
| Stall Current                                | 6400mA  |                |               |          |
| Deadband Width                               | -   |                |               |          |
| Travel                                       | Travel / Command                              | 90° / 4096     |               |          |
|  | Servo mode                                    | Left           | Center        | Right    |
|  | Pos Command                                   | +1366          | +8192         | +15018   |
|  | Pos [°]                                       | -150           | 0             | +150     |
|  | Turn Mode                                     | Left           | Power On      | Right    |
|  | Pos Command                                   | -16383         | 0             | +16383   |
|  | Pos [°]                                       | -359           | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                    |                |               |          |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                |               |          |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                |               |          |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII / EN 60068-2-6        |                |               |          |
| Connector Wire Length                        | -   |                |               |          |
| Connector Wire Gauge                         | -   |                |               |          |
| Connector Wire Strand Count                  | -   |                |               |          |
| External Dimensions                          | 64.0 x 33.0 x 90.0mm                          |                |               |          |
| Weight*                                      | 480.0g  |                |               |          |
| Ball Bearing                                 | 6 Ball Bearings & 2 Needle Bearings           |                |               |          |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                |               |          |
| Gear Material                                | 4 Hardened Steel Gears                        |                |               |          |
| Gear Train Backlash                          | Max. 0.5°                                     |                |               |          |
| Horn Gear Spline                             | Square 6.5 x 6.5                              |                |               |          |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS)         |                |               |          |
| IP-Rating                                    | IP68  |                |               |          |
| MTTF   | >1000h  |                |               |          |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                |               |          |
| Changelog                                    | -   |                |               |          |
| *of the servo only w/o horns and accessories |   |                |               |          |

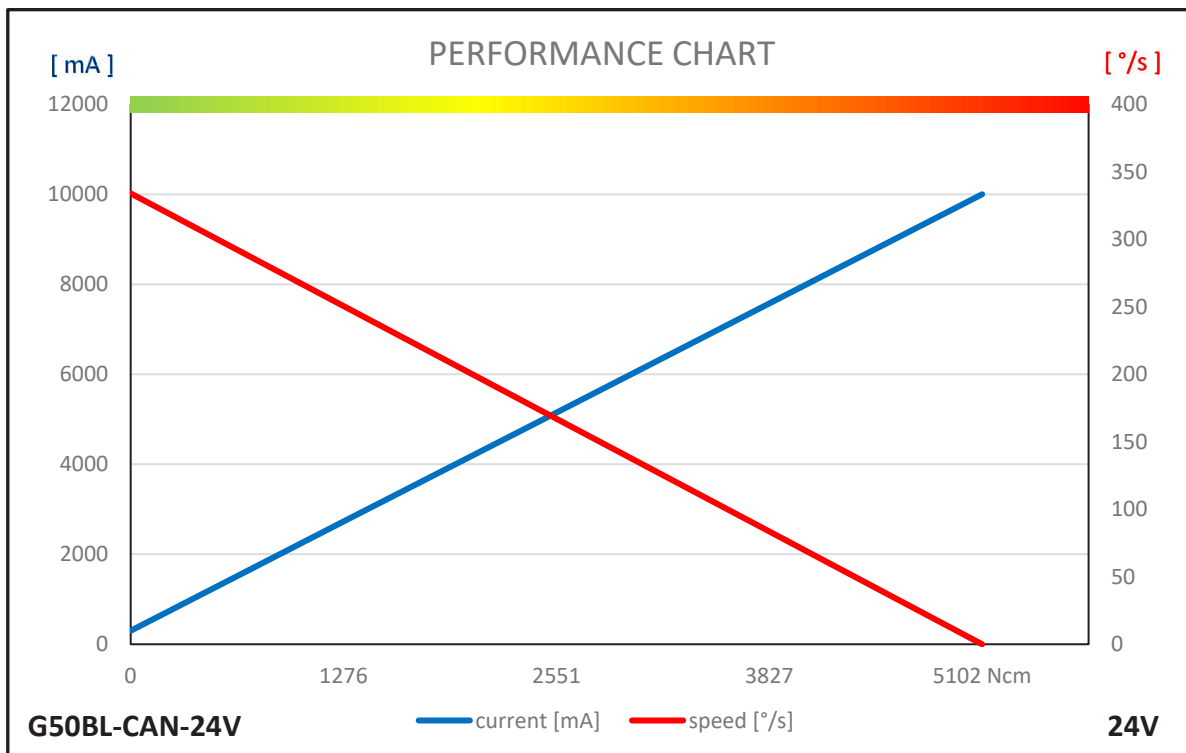
# SG50BL-CAN-24V (CIRCULAR)

#1-02412



1:2,5

## PERFORMANCE CHART



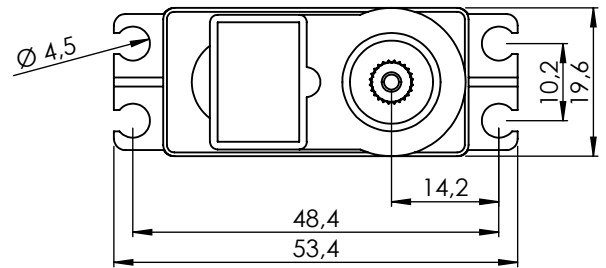
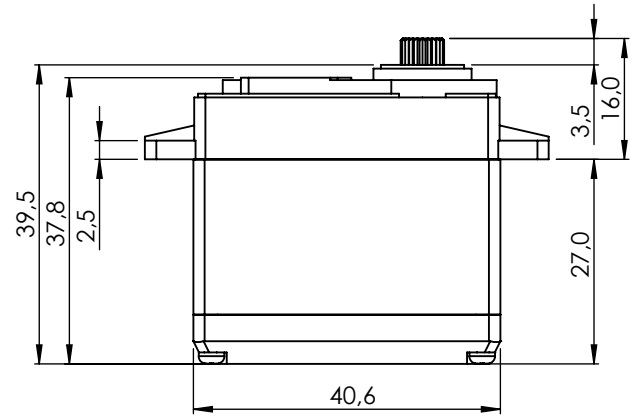
## GENERAL SPECIFICATION

| SG50BL-CAN-24V (Circular)                    |   |                |               |          |
|--|---|----------------|---------------|----------|
| Control System                               | CAN 2.0A,B / DroneCAN (UAVCAN v0)             |                |               |          |
|  | Protocol (Mode)                               | Standard 2.0A  | Extended 2.0B | DroneCAN |
|  | Baud-Rate                                     | 10kbps ~ 1Mbps |               |          |
|  | Sample-Point                                  | 50% or 87.5%   |               |          |
|  | Available SERVO ID                            | 1 ~ 254        |               | 1 ~ 127  |
|  | Available Node ID                             | 1 ~ 2047       | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range                            | 0 ~ 5V         |               |          |
| Connector Type                               | Circular                                      |                |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                  |                |               |          |
| Motor Type                                   | BLDC  |                |               |          |
| Amplifier / MCU                              | 32bit programmable Digital                    |                |               |          |
| Operating Voltage Range                      | 18.0 ~ 32.0V                                  |                |               |          |
| Operating Voltage                            | At 24.0V                                      |                |               |          |
| Operating Speed at no Load                   | 120°/s (20RPM)                                |                |               |          |
| Stall Torque                                 | 520.0kgcm (5101.2Ncm)                         |                |               |          |
| Rest Current                                 | 45mA  |                |               |          |
| Running Current at no Load                   | 300mA   |                |               |          |
| Stall Current                                | 10000mA                                       |                |               |          |
| Deadband Width                               | -   |                |               |          |
| Travel                                       | Travel / Command                              | 90° / 4096     |               |          |
|  | Servo mode                                    | Left           | Center        | Right    |
|  | Pos Command                                   | +1366          | +8192         | +15018   |
|  | Pos [°]                                       | -150           | 0             | +150     |
|  | Turn Mode                                     | Left           | Power On      | Right    |
|  | Pos Command                                   | -16383         | 0             | +16383   |
|  | Pos [°]                                       | -359           | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                    |                |               |          |
| Operating Temperature Range                  | -30°C ~ +70°C (-22°F ~ +158°F)                |                |               |          |
| Storage Temperature Range                    | -40°C ~ +80°C (-40°F ~ +176°F)                |                |               |          |
| Vibrations at no Load                        | MIL-STD 810G 514.6C VII / EN 60068-2-6        |                |               |          |
| Connector Wire Length                        | -   |                |               |          |
| Connector Wire Gauge                         | -   |                |               |          |
| Connector Wire Strand Count                  | -   |                |               |          |
| External Dimensions                          | 100.0 x 50.0 x 105.0mm                        |                |               |          |
| Weight*                                      | 1450g   |                |               |          |
| Ball Bearing                                 | 4 Angular Ball Bearings & 9 Needle Bearings   |                |               |          |
| Case Material                                | Rugged Aluminum Alloy With Hardcoat Anodizing |                |               |          |
| Gear Material                                | 5 Hardened Steel Gears                        |                |               |          |
| Gear Train Backlash                          | Max. 0.5°                                     |                |               |          |
| Horn Gear Spline                             | Square 12.0 x 12.0                            |                |               |          |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MOS12)       |                |               |          |
| IP-Rating                                    | IP68  |                |               |          |
| MTTF   | >1000h  |                |               |          |
| Revision & Stand                             | Rev. 1.2 / 01.02.2024                         |                |               |          |
| Changelog                                    | -   |                |               |          |
| *of the servo only w/o horns and accessories |   |                |               |          |

# HSR-2645CRH

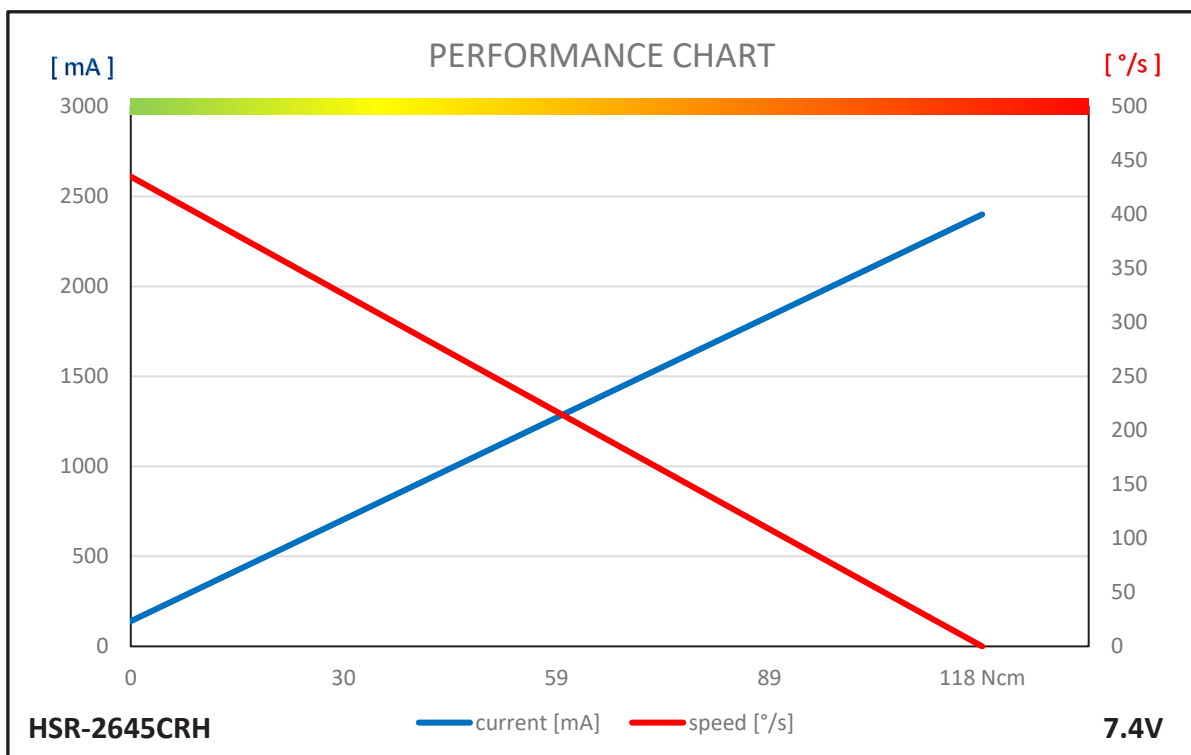
#138645

#1-02360 GP 24 Stück



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## PERFORMANCE CHART



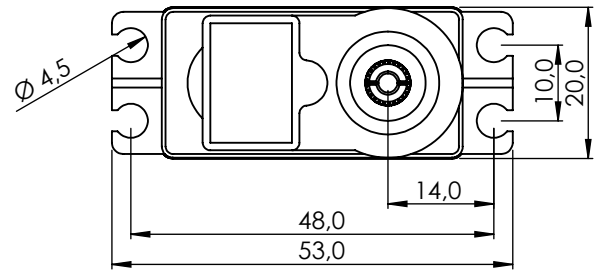
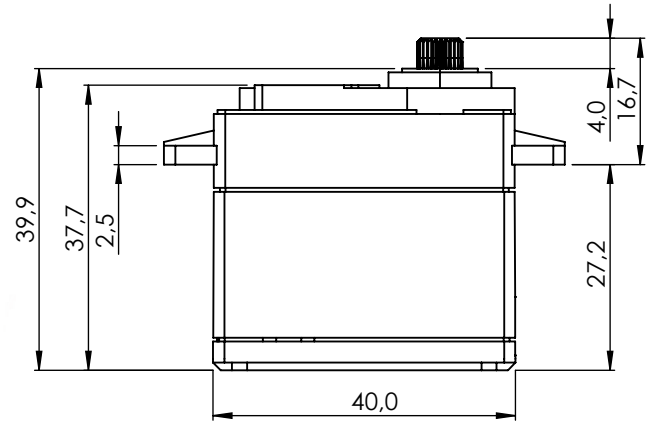
## GENERAL SPECIFICATION

| HSR-2645CRH                                   |   |                     |
|---|---|---------------------|
| Control System                                | PWM   |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs              |                     |
| Connector Type                                | Hitec 3P (JR 3P compatible)                           |                     |
| Position Sensor Type                          | -   |                     |
| Motor Type                                    | Cored Carbon Brush                                    |                     |
| Amplifier / MCU                               | 8bit programmable Digital Amplifier with Mosfet Drive |                     |
| Operating Voltage Range                       | 3.5V ~ 8.4V   |                     |
| Operating Voltage                             | At 6.0V   | At 7.4V             |
| Operating Speed at no Load                    | 347°/s (58RPM)  | 435°/s (72RPM)      |
| Stall Torque                                  | 10.0kgcm (98.1Ncm)                                    | 12.0kgcm (117.7Ncm) |
| Peak Efficiency Torque                        | 2.0kgcm (19.6Ncm)                                     | 2.4kgcm (23.5Ncm)   |
| Rest Current                                  | 3mA   | 3mA                 |
| Running Current at no Load                    | 120mA   | 140mA               |
| Stall Current                                 | 2000mA  | 2400mA              |
| Deadband Width                                | -   | -                   |
| Operating Travel                              | Default   | Continuous Rotation |
|   | Programmable  | Yes                 |
|   | Multi Turn/Continuous Rotation                        | Yes / Yes           |
| Operating Temperature Range                   | -20°C ~ +60°C (-4°F ~ +140°F)                         |                     |
| Storage Temperature Range                     | -30°C ~ +80°C (-22°F ~ +176°F)                        |                     |
| Connector Wire Length                         | 300mm   |                     |
| Connector Wire Gauge                          | 22AWG   |                     |
| Connector Wire Strand Count                   | 60/0.08   |                     |
| External Dimensions                           | 40.6 x 19.6 x 37.8mm                                  |                     |
| Weight*                                       | 53.0g   |                     |
| Ball Bearing                                  | Dual Ball Bearing                                     |                     |
| Case Material                                 | Engineering Plastic                                   |                     |
| Gear Material                                 | 1 Metal-Plastic & 3 Metal Gears                       |                     |
| Gear Train Backlash                           | Max 0.5°  |                     |
| Horn Gear Spline                              | H24T Ø6.0   |                     |
| Accessories                                   | Mounting Hardware, Servo Horn (R-0)                   |                     |
| IP-Rating                                     | IP4X  |                     |
| Revision                                      | Rev. 1.0 / 02.01.2024                                 |                     |
| Changelog                                     | -   |                     |
| * of the servo only w/o horns and accessories |   |                     |

# HSB-9465SH

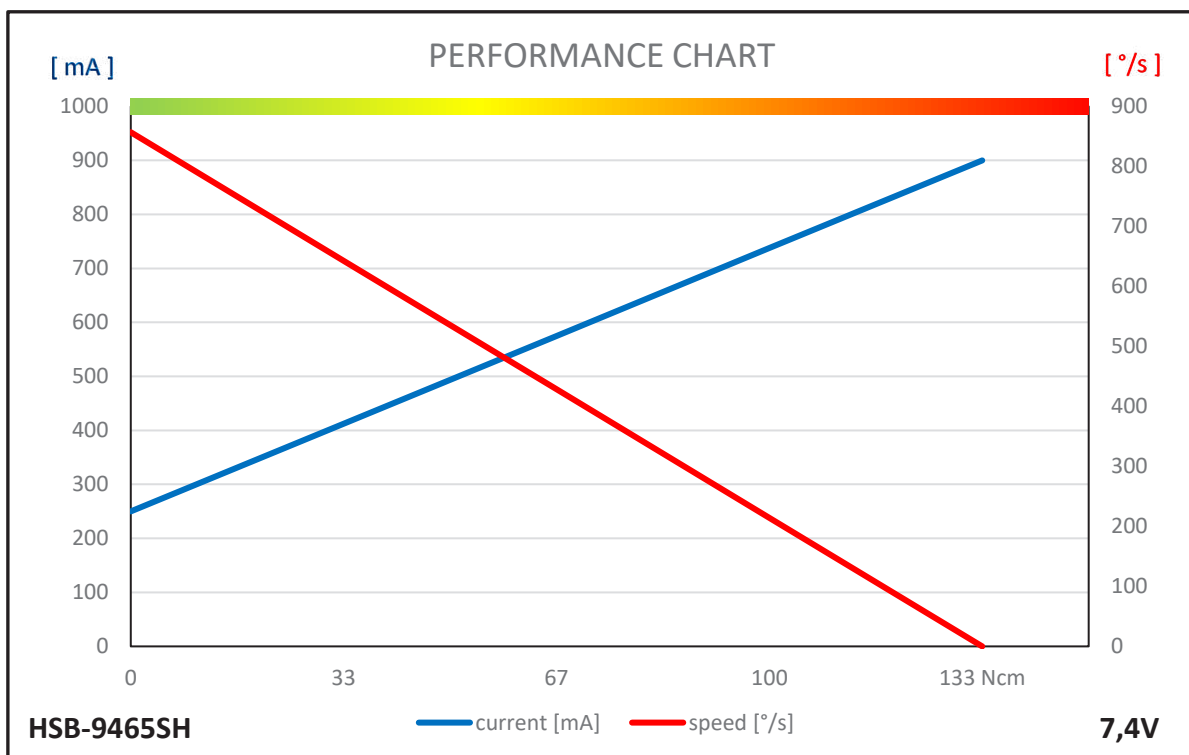
#116465

#1-02355 GP 24 STÜCK



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## PERFORMANCE CHART



## GENERAL SPECIFICATION

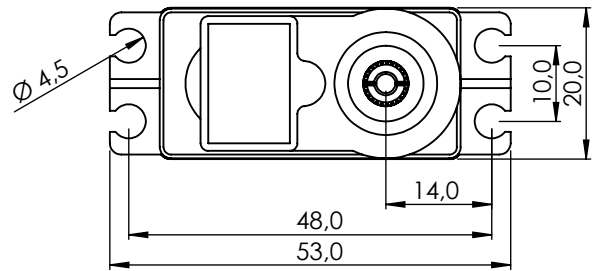
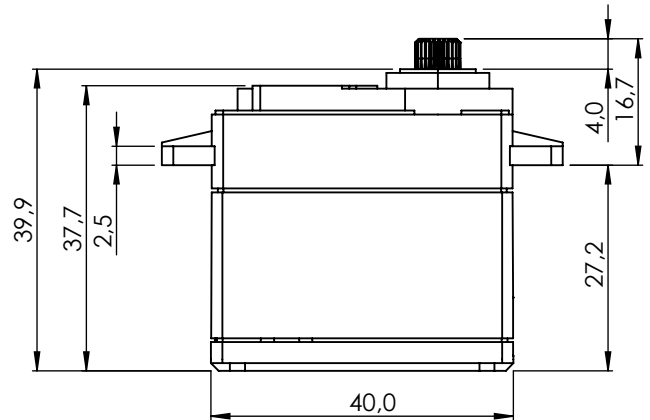
| HSB-9465SH                              |  |                     |
|---|--|---------------------|
| Control System                          | PWM  |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs                               |                     |
| Connector Type                          | Hitec 3P (JR 3P compatible)  |                     |
| Position Sensor Type                    | Indirect Drive / 4 Slider / 1M Cycle Long Life                         |                     |
| Motor Type                              | BLDC   |                     |
| Amplifier / MCU                         | 16bit programmable Digital Amplifier with Mosfet Drive                 |                     |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |
| Operating Voltage                       | At 6.0V  | At 7.4V             |
| Operating Speed at no Load              | 667°/s (111RPM)  | 857°/s (143RPM)     |
| Stall Torque                            | 13.5kgcm (132.4Ncm)  | 13.5kgcm (132.4Ncm) |
| Peak Efficiency Torque                  | 2.7kgcm (26.5Ncm)  | 2.7kgcm (26.5Ncm)   |
| Rest Current                            | 30mA   | 30mA                |
| Running Current at no Load              | 250mA  | 250mA               |
| Stall Current                           | 1100mA   | 900mA               |
| Deadband Width                          | 1µs  | 1µs                 |
| Operating Travel                        | Default  | ±60°                |
|   | Programmable   | Max. 160°           |
|   | Multi Turn/Continuous Rotation   | n/a / n/a           |
| Operating Temperature Range             | -20°C ~ +60°C (-4°F ~ +140°F)  |                     |
| Storage Temperature Range               | -30°C ~ +80°C (-22°F ~ +176°F)   |                     |
| Connector Wire Length                   | 300mm  |                     |
| Connector Wire Gauge                    | 20AWG  |                     |
| Connector Wire Strand Count             | 80/0.08  |                     |
| External Dimensions                     | 40.0 x 20.0 x 37.7mm   |                     |
| Weight*                                 | 62.0g  |                     |
| Ball Bearing                            | Dual Ball Bearing  |                     |
| Case Material                           | Engineering Plastic  |                     |
| Gear Material                           | 1 Metal-Plastic & 3 Steel Gears  |                     |
| Gear Train Backlash                     | Max. 0.5°  |                     |
| Horn Gear Spline                        | H25T Ø6.0  |                     |
| Accessories                             | Mounting Hardware, HD-IM25, HD-LS25, HD-OS25, HD-X25, HD-IL25, HD-LL25 |                     |
| IP-Rating                               | IP54   |                     |
| Revision                                | Rev. 1.1 / 03.01.2024  |                     |
| Changelog                               | -  |                     |
| *of the servo w/o horns and accessories |  |                     |



# HSB-9485SH

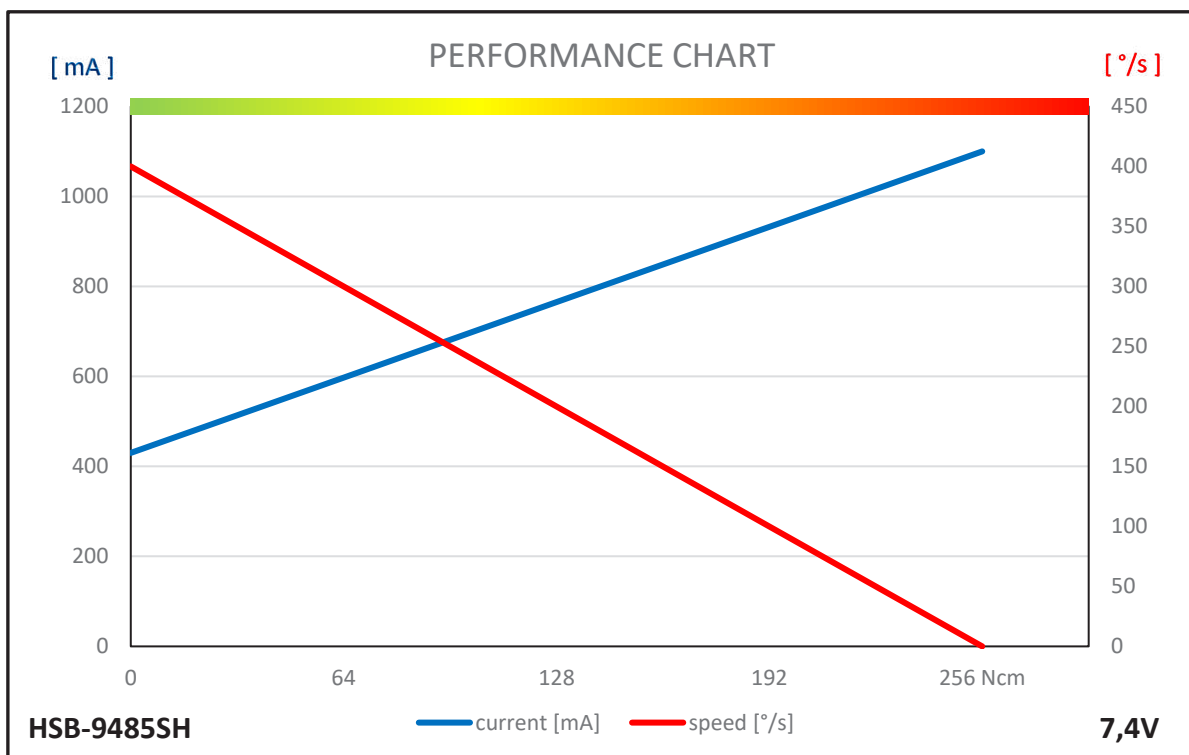
#116485

#1-02356 GP 24 STÜCK



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## PERFORMANCE CHART



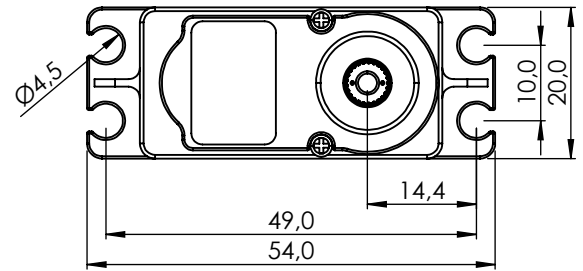
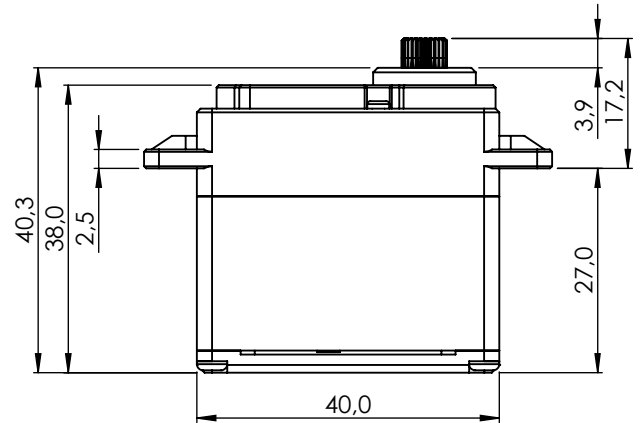
## GENERAL SPECIFICATION

| HSB-9485SH                              |  |                     |
|---|--|---------------------|
| Control System                          | PWM  |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs   |                     |
| Connector Type                          | Hitec 3P (JR 3P compatible)  |                     |
| Position Sensor Type                    | Indirect Drive / 4 Slider / 1M Cycle Long Life                                       |                     |
| Motor Type                              | BLDC   |                     |
| Amplifier / MCU                         | 16bit programmable Digital Amplifier with Mosfet Drive                               |                     |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |
| Operating Voltage                       | At 6.0V  | At 7.4V             |
| Operating Speed at no Load              | 333°/s (56RPM)   | 400°/s (67RPM)      |
| Stall Torque                            | 26.0kgcm (255.1Ncm)  | 26.0kgcm (255.1Ncm) |
| Peak Efficiency Torque                  | 5.2kgcm (51.0Ncm)  | 5.2kgcm (51.0Ncm)   |
| Rest Current                            | 30mA   | 30mA                |
| Running Current at no Load              | 360mA  | 430mA               |
| Stall Current                           | 1300mA   | 1100mA              |
| Deadband Width                          | 1µs  | 1µs                 |
| Operating Travel                        | Default  | ±60°                |
|   | Programmable   | Max. 160° **        |
|   | Multi Turn/Continuous Rotation   | n/a / n/a           |
| Operating Temperature Range             | -20°C ~ +60°C (-4°F ~ +140°F)  |                     |
| Storage Temperature Range               | -30°C ~ +80°C (-22°F ~ +176°F)   |                     |
| Connector Wire Length                   | 300mm  |                     |
| Connector Wire Gauge                    | 20AWG  |                     |
| Connector Wire Strand Count             | 80/0.08  |                     |
| External Dimensions                     | 40.0 x 20.0 x 37.7mm   |                     |
| Weight*                                 | 62.0g  |                     |
| Ball Bearing                            | Dual Ball Bearing  |                     |
| Case Material                           | Engineering Plastic  |                     |
| Gear Material                           | 1 Metal-Plastic & 3 Steel Gears  |                     |
| Gear Train Backlash                     | Max. 0.5°  |                     |
| Horn Gear Spline                        | H25T Ø6.0  |                     |
| Accessories                             | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25, HD-IL25, HD-LL25) |                     |
| IP-Rating                               | IP54   |                     |
| Revision                                | Rev. 1.1 / 03.01.2024  |                     |
| Changelog                               | -  |                     |
| *of the servo w/o horns and accessories |  |                     |
| ** also available with 270°             |  |                     |

# HSB-9381TH

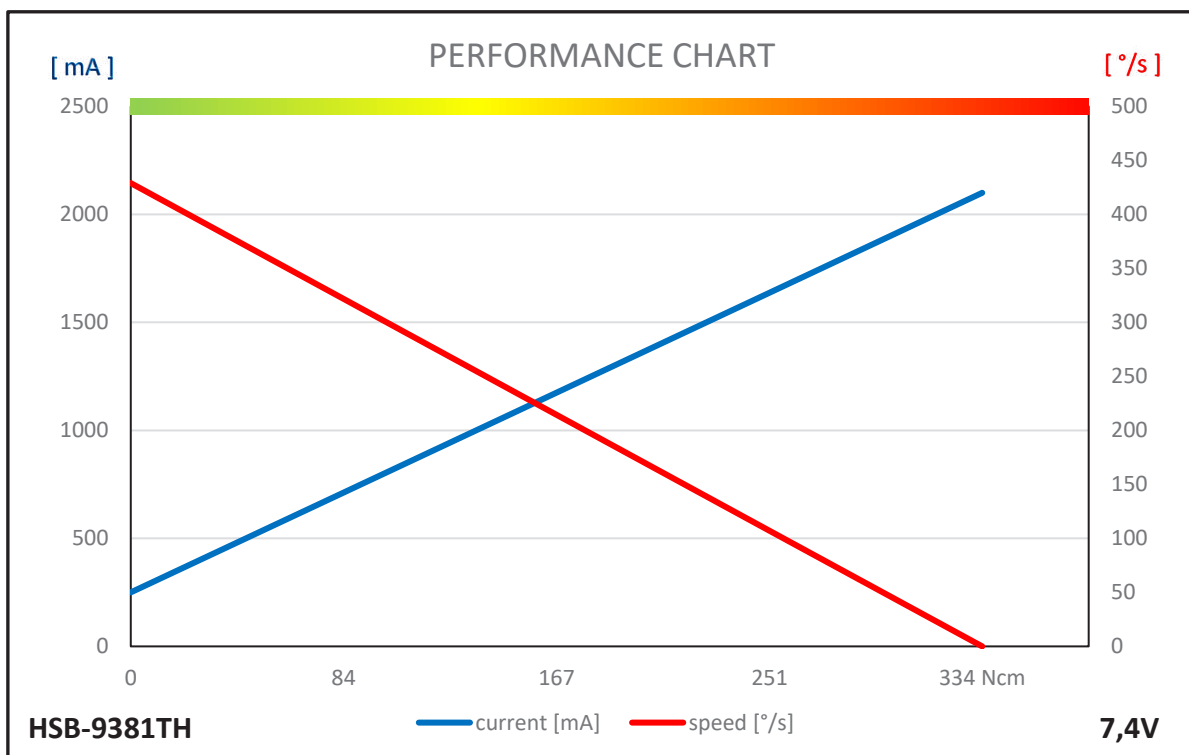
#1-00074

#1-02357 GP 24 Stück



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## PERFORMANCE CHART



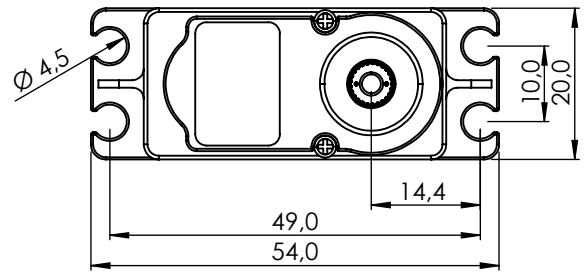
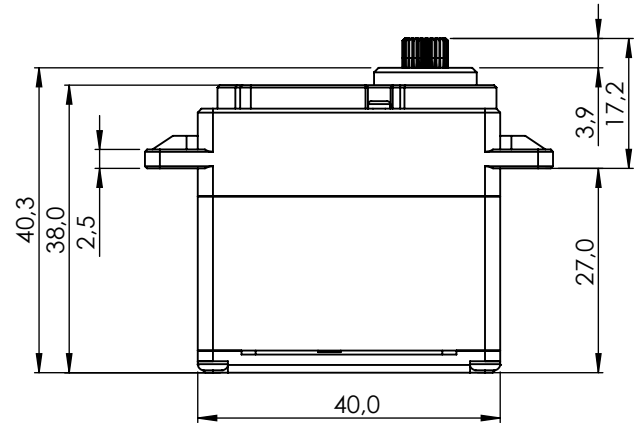
## GENERAL SPECIFICATION

| HSB-9381TH                              |  |                     |
|---|--|---------------------|
| Control System                          | PWM  |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs                           |                     |
| Connector Type                          | Hitec 3P (JR 3P compatible)  |                     |
| Position Sensor Type                    | Indirect Drive / 4 Slider / 1M Cycle Long Life                     |                     |
| Motor Type                              | BLDC   |                     |
| Amplifier / MCU                         | 16bit programmable Digital   |                     |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |
| Operating Voltage                       | At 6.0V  | At 7.4V             |
| Operating Speed at no Load              | 353°/s (59RPM)   | 429°/s (71RPM)      |
| Stall Torque                            | 34.0kgcm (333.5Ncm)  | 34.0kgcm (333.5Ncm) |
| Peak Efficiency Torque                  | 6.8kgcm (66.7Ncm)  | 6.8kgcm (66.7Ncm)   |
| Rest Current                            | 27mA   | 27mA                |
| Running Current at no Load              | 250mA  | 250mA               |
| Stall Current                           | 2700mA   | 2100mA              |
| Deadband Width                          | 1µs  | 1µs                 |
| Operating Travel                        | Default  | ±60°                |
|   | Programmable   | Max. 160°           |
|   | Multi Turn/Continuous Rotation                                     | n/a / n/a           |
| Operating Temperature Range             | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |
| Storage Temperature Range               | -30°C ~ +80°C (-31°F ~ +176°F)                                     |                     |
| Connector Wire Length                   | 300mm  |                     |
| Connector Wire Gauge                    | 20AWG  |                     |
| Connector Wire Strand Count             | 80/0.08  |                     |
| External Dimensions                     | 40.0 x 20.0 x 38.0mm   |                     |
| Weight*                                 | 79.0g  |                     |
| Ball Bearing                            | Dual Ball Bearing  |                     |
| Case Material                           | Aluminum Alloy   |                     |
| Gear Material                           | 1 Metal-Plastic & 3 Titanium Alloy Gears                           |                     |
| Gear Train Backlash                     | Max 0.5°   |                     |
| Horn Gear Spline                        | H25T Ø6.0  |                     |
| Accessories                             | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |
| IP-Rating                               | IP54   |                     |
| Revision                                | Rev. 1.1 / 03.01.2024  |                     |
| Changelog                               | -  |                     |
|   |  |                     |
|   |  |                     |
| *of the servo w/o horns and accessories |  |                     |

# HSB-M9381TH

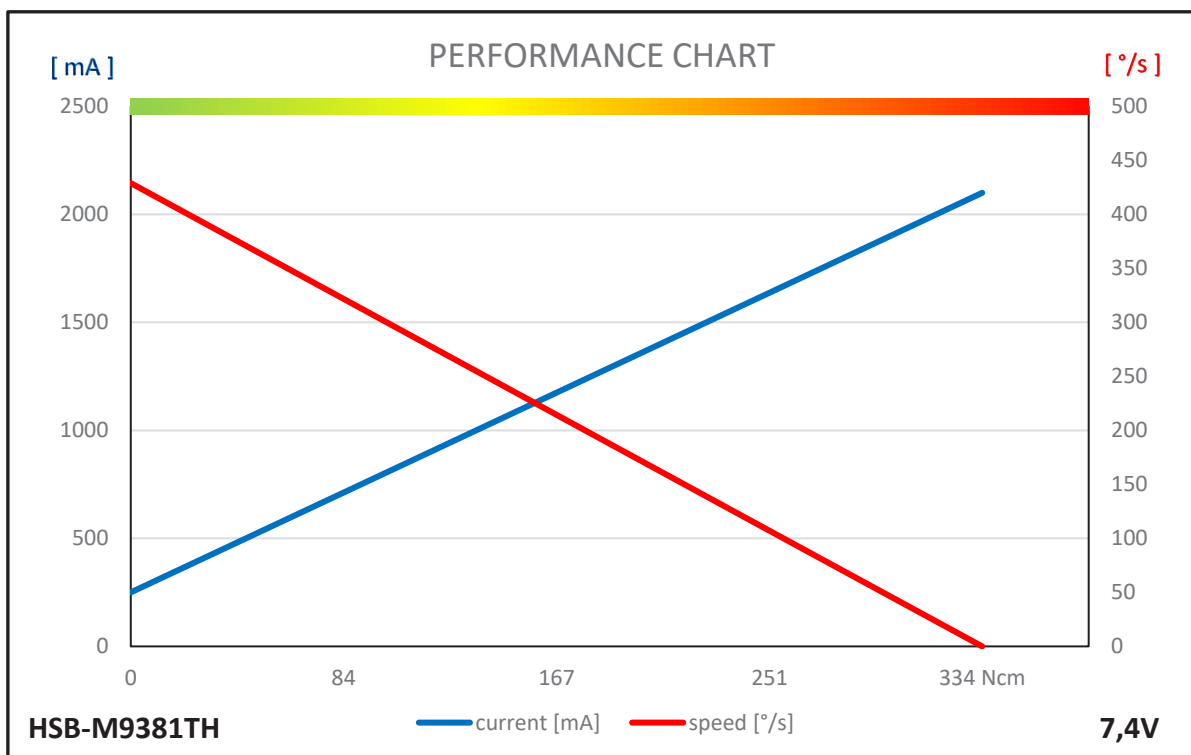
#1-01191

#1-02353 GP 24 Stück



1:1

## PERFORMANCE CHART

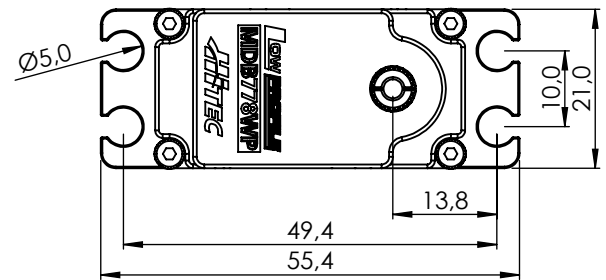
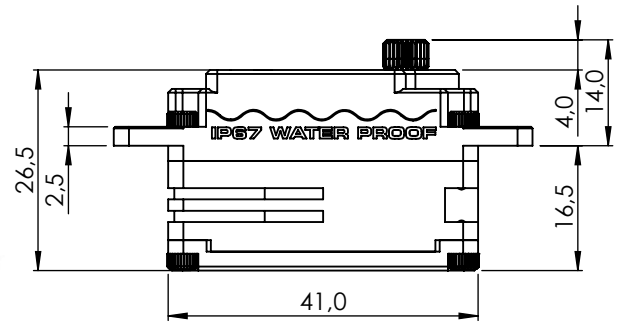


## GENERAL SPECIFICATION

| HSB-M9381TH                             |  |                     |
|---|--|---------------------|
| Control System                          | PWM  |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs                           |                     |
| Connector Type                          | Hitec 3P (JR 3P compatible)  |                     |
| Position Sensor Type                    | Contactless Magnetic Encoder                                       |                     |
| Motor Type                              | BLDC   |                     |
| Amplifier / MCU                         | 16bit programmable Digital Amplifier with Mosfet Drive             |                     |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |
| Operating Voltage                       | At 6.0V  | At 7.4V             |
| Operating Speed at no Load              | 353°/s (59RPM)   | 429°/s (71RPM)      |
| Stall Torque                            | 34.0kgcm (333.5Ncm)  | 34.0kgcm (333.5Ncm) |
| Peak Efficiency Torque                  | 6.8kgcm (66.7Ncm)  | 6.8kgcm (66.7Ncm)   |
| Rest Current                            | 27mA   | 27mA                |
| Running Current at no Load              | 250mA  | 250mA               |
| Stall Current                           | 2700mA   | 2100mA              |
| Deadband Width                          | 1µs  | 1µs                 |
| Operating Travel                        | Default  | ±60°                |
|   | Programmable   | Max. 300°           |
|   | Multi Turn/Continuous Rotation                                     | n/a / n/a           |
| Operating Temperature Range             | -20°C ~ +70°C (-4°F ~ +158°F)                                      |                     |
| Storage Temperature Range               | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                     |
| Connector Wire Length                   | 300mm  |                     |
| Connector Wire Gauge                    | 20AWG  |                     |
| Connector Wire Strand Count             | 80/0.08  |                     |
| External Dimensions                     | 40.0 x 20.0 x 38.0mm   |                     |
| Weight*                                 | 78.0g  |                     |
| Ball Bearing                            | Dual Ball Bearing  |                     |
| Case Material                           | Aluminum Alloy   |                     |
| Gear Material                           | 1 Metal-Plastic & 3 Titanium Alloy Gears                           |                     |
| Gear Train Backlash                     | Max 0.5°   |                     |
| Horn Gear Spline                        | H25T Ø6.0  |                     |
| Accessories                             | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |
| IP-Rating                               | IP54   |                     |
| Revision                                | Rev. 1.1 / 03.01.2024  |                     |
| Changelog                               | -  |                     |
| *of the servo w/o horns and accessories |  |                     |

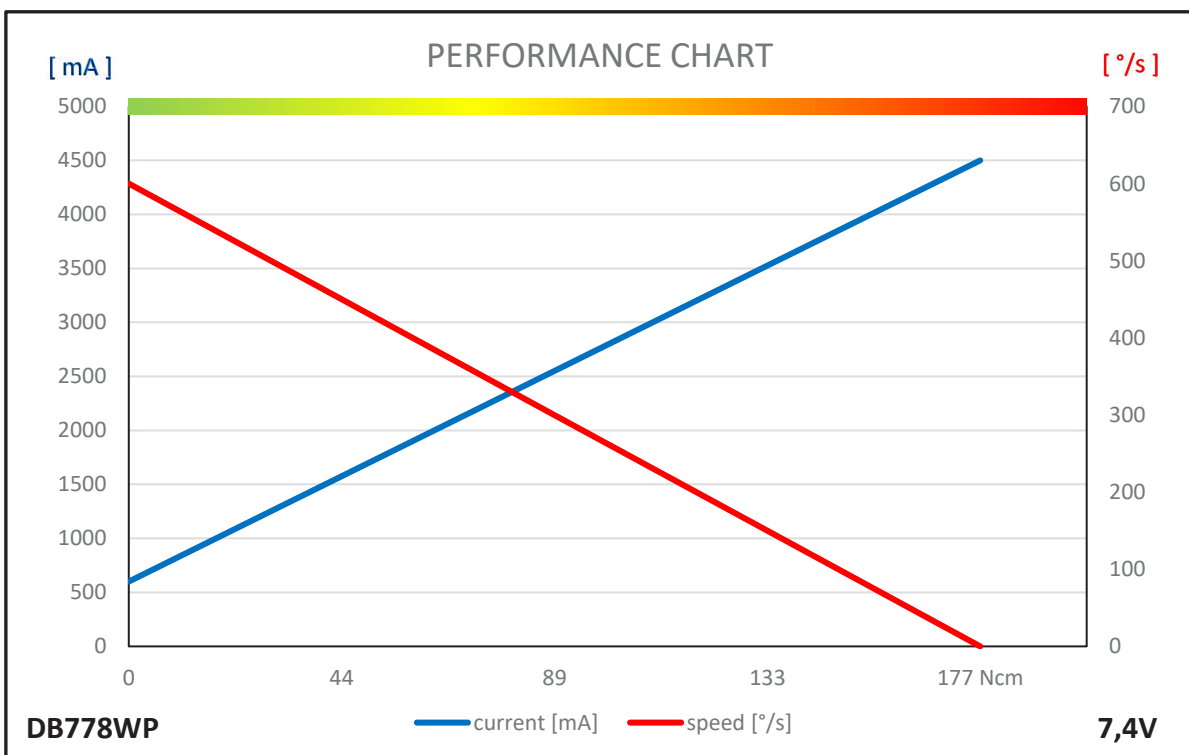
# DB778WP

#1-02853



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## PERFORMANCE CHART



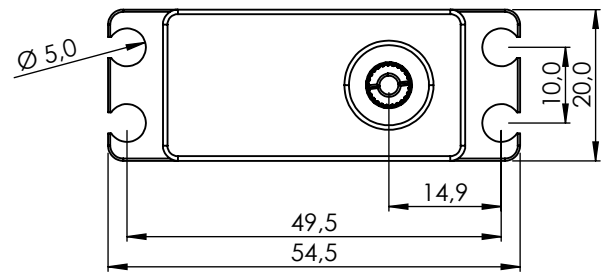
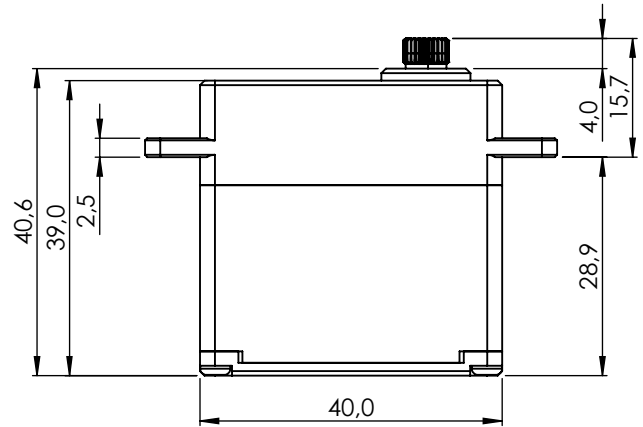


## GENERAL SPECIFICATION

| DB778WP                                      |  |                     |
|--|--|---------------------|
| Control System                               | PWM / TTL (Half Duplex)                                    |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                   |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)                                |                     |
| Position Sensor Type                         | Contact Analog Potentiometer                               |                     |
| Motor Type                                   | BLDC   |                     |
| Amplifier / MCU                              | 32bit programmable Digital                                 |                     |
| Operating Voltage Range                      | 4.0V ~ 8.4V  |                     |
| Operating Voltage                            | At 6.0V  | At 7.4V             |
| Operating Speed at no Load                   | 500°/s (83RPM)   | 600°/s (100RPM)     |
| Stall Torque                                 | 15.0kgcm (147.2Ncm)  | 18.0kgcm (175.6Ncm) |
| Peak Efficiency Torque                       | 3.0kgcm (29.4Ncm)  | 3.6kgcm (35.3Ncm)   |
| Rest Current                                 | 28mA   | 28mA                |
| Running Current at no Load                   | 500mA  | 600mA               |
| Stall Current                                | 3500mA   | 4500mA              |
| Deadband Width                               | 1µs  | 1µs                 |
| Operating Travel                             | Default  | ±60°                |
|  | Programmable   | Max. 175°           |
|  | Multi Turn/Continuous Rotation                             | n/a / n/a           |
| Operating Temperature Range                  | -20°C ~ +70°C (-4°F ~ +158°F)                              |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                             |                     |
| Vibrations at no Load                        | -  |                     |
| Connector Wire Length                        | 200mm  |                     |
| Connector Wire Gauge                         | 20AWG  |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |
| External Dimensions                          | 41.0 x 21.0 x 26.5mm                                       |                     |
| Weight*                                      | 66.0g  |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                     |
| Case Material                                | Rugged Aluminum Alloy                                      |                     |
| Gear Material                                | 5 Hardened Steel Gears                                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |
| Accessories                                  | Hex Screw, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |
| IP-Rating                                    | IP67   |                     |
| Revision                                     | Rev. 1.0 / 09.01.2024                                      |                     |
| Changelog                                    | -  |                     |
| *of the servo only w/o horns and accessories |  |                     |

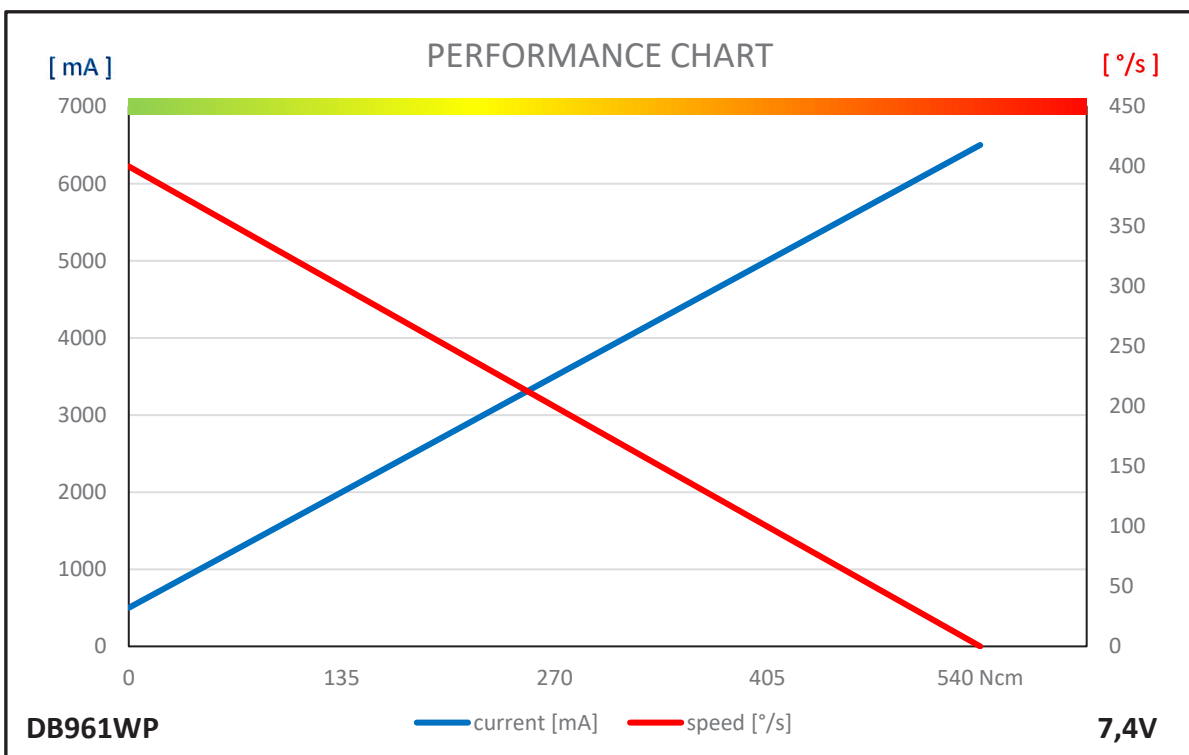
# DB961WP

#1-02571



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## PERFORMANCE CHART

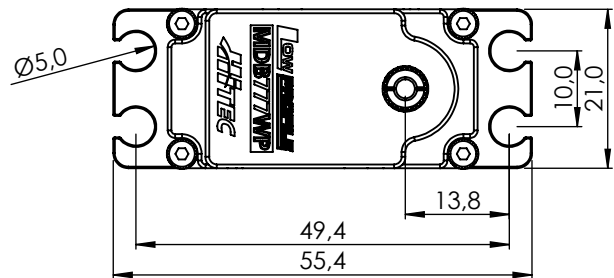
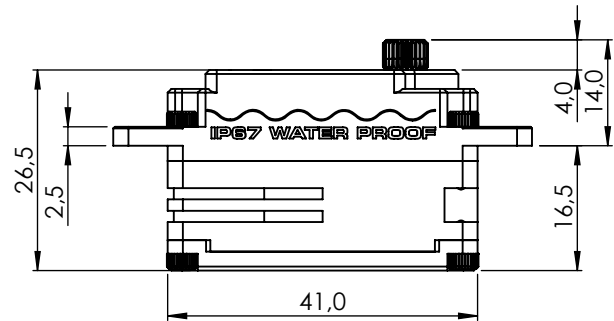


## GENERAL SPECIFICATION

| DB961WP                                      |  |                     |
|--|--|---------------------|
| Control System                               | PWM / TTL (Half Duplex)                              |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs             |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)                          |                     |
| Position Sensor Type                         | Contact Analog Potentiometer                         |                     |
| Motor Type                                   | BLDC   |                     |
| Amplifier / MCU                              | 16bit programmable Digital                           |                     |
| Operating Voltage Range                      | 4.0 ~ 8.4V   |                     |
| Operating Voltage                            | At 6.0V  | At 7.4V             |
| Operating Speed at no Load                   | 333°/s (56RPM)                                       | 400°/s (67RPM)      |
| Stall Torque                                 | 55.0kgcm (539.6Ncm)                                  | 55.0kgcm (539.6Ncm) |
| Peak Efficiency Torque                       | 11.0kgcm (107.9Ncm)                                  | 11.0kgcm (107.9Ncm) |
| Rest Current                                 | 35mA   | 35mA                |
| Running Current at no Load                   | 500mA  | 500mA               |
| Stall Current                                | 8000mA   | 6500mA              |
| Deadband Width                               | 1µs  | 1µs                 |
| Operating Travel                             | Default  | ±60°                |
|  | Programmable   | Max. 260°           |
|  | Multi Turn/Continuous Rotation                       | n/a / n/a           |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                        |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                       |                     |
| Vibrations at no Load                        | ML-STD-810G 514.6C-VII                               |                     |
| Connector Wire Length                        | 300mm  |                     |
| Connector Wire Gauge                         | 20AWG  |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |
| External Dimensions                          | 40.0 x 20.0 x 39.0mm                                 |                     |
| Weight*                                      | 90.0g  |                     |
| Ball Bearing                                 | Dual Ball Bearing                                    |                     |
| Case Material                                | Aluminum Alloy                                       |                     |
| Gear Material                                | 5 Hardened Steel Gears                               |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |
| Accessories                                  | Mounting Hardware, HD-IM25, HD-LS25, HD-OS25, HD-X25 |                     |
| IP-Rating                                    | IP67   |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024                                |                     |
| Changelog                                    | -  |                     |
| *of the servo only w/o horns and accessories |  |                     |

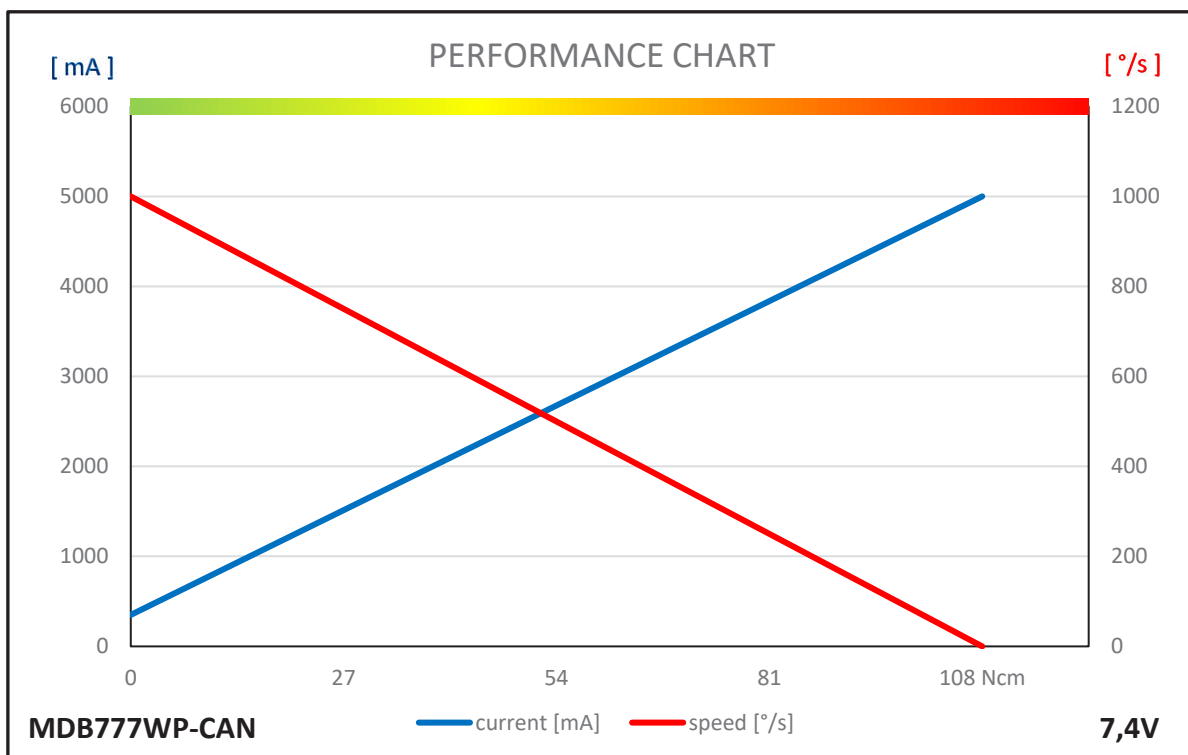
# MDB-777WP-CAN/DroneCAN

#1-03030 #1-03031



1:1

## PERFORMANCE CHART

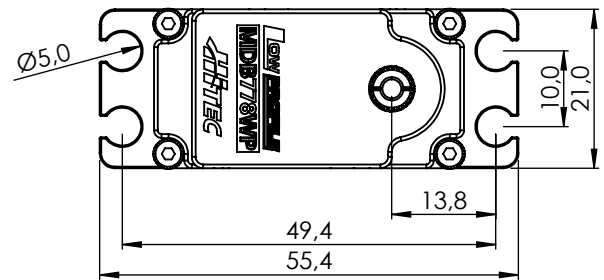
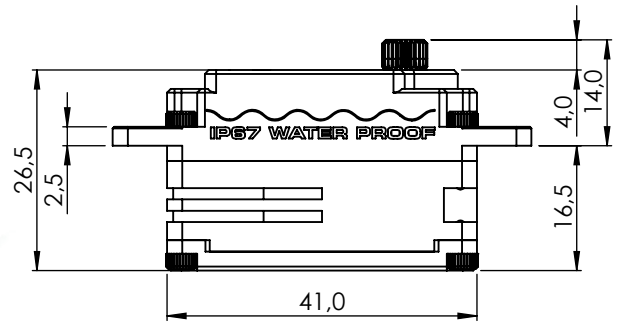


## GENERAL SPECIFICATION

| MDB777WP-CAN/DroneCAN                        |  |                     |               |          |
|--|--|---------------------|---------------|----------|
| Control System                               | CAN BUS  |                     |               |          |
|  | Protocol (Mode)  | Standard 2.0A       | Extended 2.0B | DroneCAN |
|  | Baud-Rate  | 10kbps ~ 1Mbps      |               |          |
|  | Sample-Point   | 50% or 87.5%        |               |          |
|  | Available SERVO ID   | 1 ~ 254             |               | 1 ~ 127  |
|  | Available Node ID  | 1 ~ 2047            | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range   | 0 ~ 5V              |               |          |
| Connector Type                               | Hitec 4P   |                     |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                                       |                     |               |          |
| Motor Type                                   | BLDC   |                     |               |          |
| Amplifier / MCU                              | 32bit programmable Digital   |                     |               |          |
| Operating Voltage Range                      | 4.0V ~ 8.4V  |                     |               |          |
| Operating Voltage                            | At 6.0V  | At 7.4V             |               |          |
| Operating Speed at no Load                   | 750°/s (125RPM)  | 1000°/s (167RPM)    |               |          |
| Stall Torque                                 | 8.0kgcm (78.5Ncm)  | 11.0kgcm (107.9Ncm) |               |          |
| Peak Efficiency Torque                       | 1.6kgcm (15.7Ncm)  | 2.2kgcm (21.6Ncm)   |               |          |
| Rest Current                                 | 26mA   | 26mA                |               |          |
| Running Current at no Load                   | 320mA  | 350mA               |               |          |
| Stall Current                                | 4000mA   | 5000mA              |               |          |
| Deadband Width                               | n/a  | n/a                 |               |          |
| Travel                                       | Travel / Command   | 90° / 4096          |               |          |
|  | Servo mode   | Left                | Center        | Right    |
|  | Pos Command  | +1366               | +8192         | +15018   |
|  | Pos [°]  | -150                | 0             | +150     |
|  | Turn Mode  | Left                | Power On      | Right    |
|  | Pos Command  | -16383              | 0             | +16383   |
|  | Pos [°]  | -359                | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)   |                     |               |          |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |               |          |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                                     |                     |               |          |
| Vibrations at no Load                        | -  |                     |               |          |
| Connector Wire Length                        | 300mm  |                     |               |          |
| Connector Wire Gauge                         | 20AWG  |                     |               |          |
| Connector Wire Strand Count                  | 80/0.08  |                     |               |          |
| External Dimensions                          | 41.0 x 21.0 x 26.5mm   |                     |               |          |
| Weight*                                      | 70.0g  |                     |               |          |
| Ball Bearing                                 | Dual Ball Bearing  |                     |               |          |
| Case Material                                | Aluminum Alloy   |                     |               |          |
| Gear Material                                | 5 Hardened Steel Gears   |                     |               |          |
| Gear Train Backlash                          | Max. 0.5°  |                     |               |          |
| Horn Gear Spline                             | H25T Ø6.0  |                     |               |          |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |               |          |
| IP-Rating                                    | IP67   |                     |               |          |
| Revision                                     | Rev. 1.0 / 09.01.2024  |                     |               |          |
| Changelog                                    | -  |                     |               |          |
| *of the servo only w/o horns and accessories |  |                     |               |          |

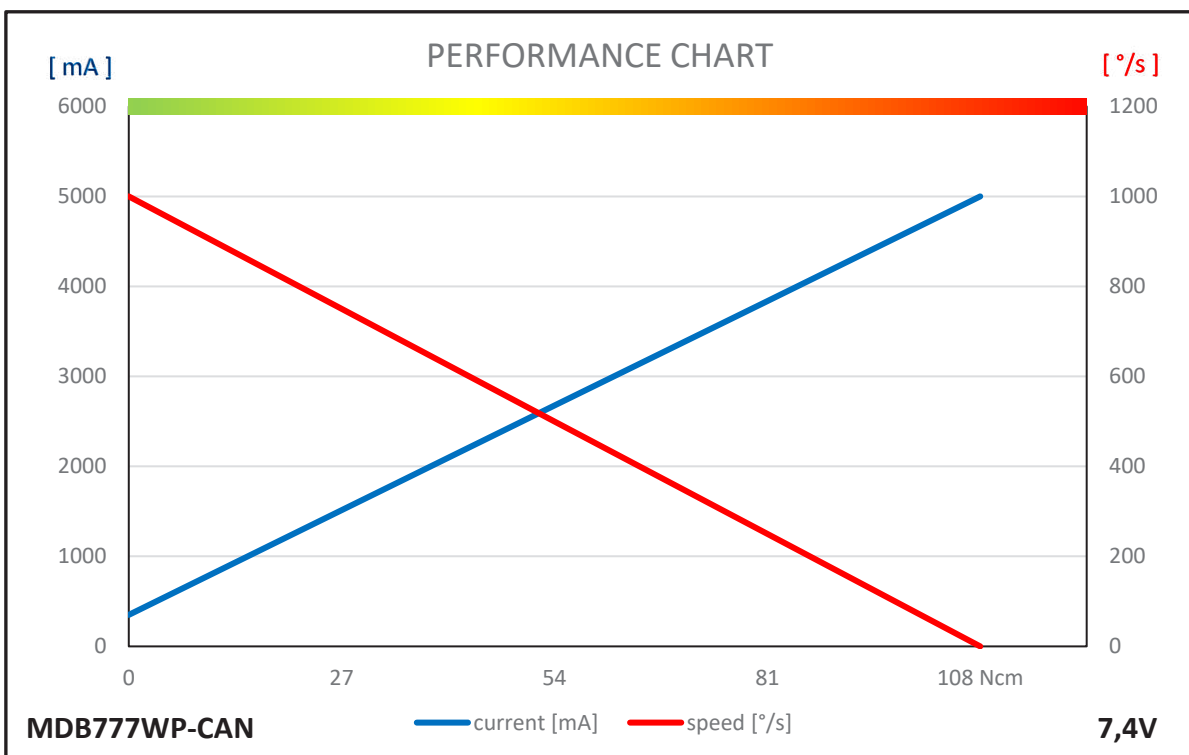
# MDB778WP-CAN/DroneCAN

#1-03032 #1-03033



1:2

## PERFORMANCE CHART



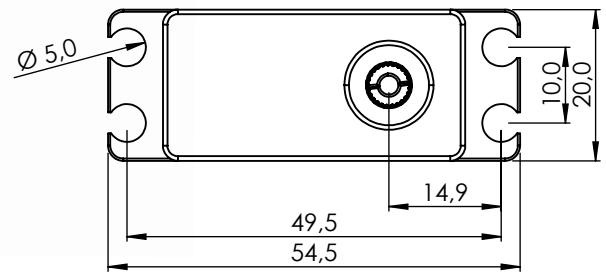
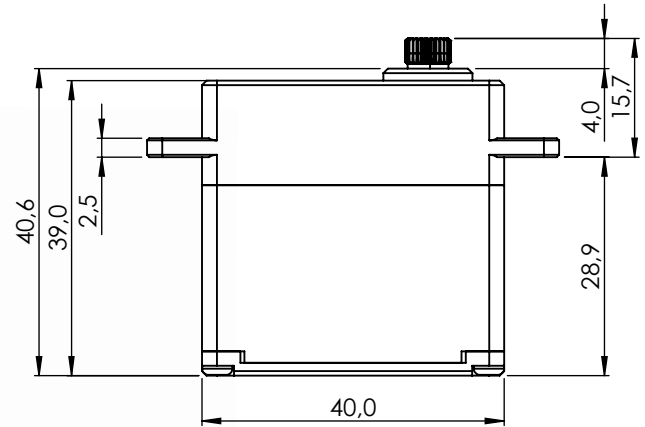
## GENERAL SPECIFICATION

| MDB778WP-CAN/DroneCAN                        |  |                     |               |          |
|--|--|---------------------|---------------|----------|
| Control System                               | CAN BUS  |                     |               |          |
|  | Protocol (Mode)  | Standard 2.0A       | Extended 2.0B | DroneCAN |
|  | Baud-Rate  | 10kbps ~ 1Mbps      |               |          |
|  | Sample-Point   | 50% or 87.5%        |               |          |
|  | Available SERVO ID   | 1 ~ 254             |               | 1 ~ 127  |
|  | Available Node ID  | 1 ~ 2047            | 1 ~ 536870911 | 1 ~ 127  |
|  | Input Signal Range   | 0 ~ 5V              |               |          |
| Connector Type                               | Hitec 4P   |                     |               |          |
| Position Sensor Type                         | Contactless Magnetic Encoder                                       |                     |               |          |
| Motor Type                                   | BLDC   |                     |               |          |
| Amplifier / MCU                              | 32bit programmable Digital   |                     |               |          |
| Operating Voltage Range                      | 4.0V ~ 8.4V  |                     |               |          |
| Operating Voltage                            | At 6.0V  | At 7.4V             |               |          |
| Operating Speed at no Load                   | 462°/s (77RPM)   | 600°/s (100RPM)     |               |          |
| Stall Torque                                 | 14.0kgcm (137.3Ncm)  | 16.0kgcm (157.0Ncm) |               |          |
| Peak Efficiency Torque                       | 2.8kgcm (27.5Ncm)  | 3.3kgcm (32.4Ncm)   |               |          |
| Rest Current                                 | 50mA   | 50mA                |               |          |
| Running Current at no Load                   | 400mA  | 500mA               |               |          |
| Stall Current                                | 4000mA   | 5000mA              |               |          |
| Deadband Width                               | n/a  | n/a                 |               |          |
| Travel                                       | Travel / Command   | 90° / 4096          |               |          |
|  | Servo mode   | Left                | Center        | Right    |
|  | Pos Command  | +1366               | +8192         | +15018   |
|  | Pos [°]  | -150                | 0             | +150     |
|  | Turn Mode  | Left                | Power On      | Right    |
|  | Pos Command  | -16383              | 0             | +16383   |
|  | Pos [°]  | -359                | 0             | +359     |
| Turn Range                                   | -32760 ~ +32760 (CAN only)   |                     |               |          |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |               |          |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                                     |                     |               |          |
| Vibrations at no Load                        | -  |                     |               |          |
| Connector Wire Length                        | 300mm  |                     |               |          |
| Connector Wire Gauge                         | 20AWG  |                     |               |          |
| Connector Wire Strand Count                  | 80/0.08  |                     |               |          |
| External Dimensions                          | 41.0 x 21.0 x 26.5mm   |                     |               |          |
| Weight*                                      | 70.0g  |                     |               |          |
| Ball Bearing                                 | Dual Ball Bearing  |                     |               |          |
| Case Material                                | Aluminum Alloy   |                     |               |          |
| Gear Material                                | 5 Hardened Steel Gears   |                     |               |          |
| Gear Train Backlash                          | Max. 0.5°  |                     |               |          |
| Horn Gear Spline                             | H25T Ø6.0  |                     |               |          |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |               |          |
| IP-Rating                                    | IP67   |                     |               |          |
| Revision                                     | Rev. 1.0 / 09.01.2024  |                     |               |          |
| Changelog                                    | -  |                     |               |          |
| *of the servo only w/o horns and accessories |  |                     |               |          |



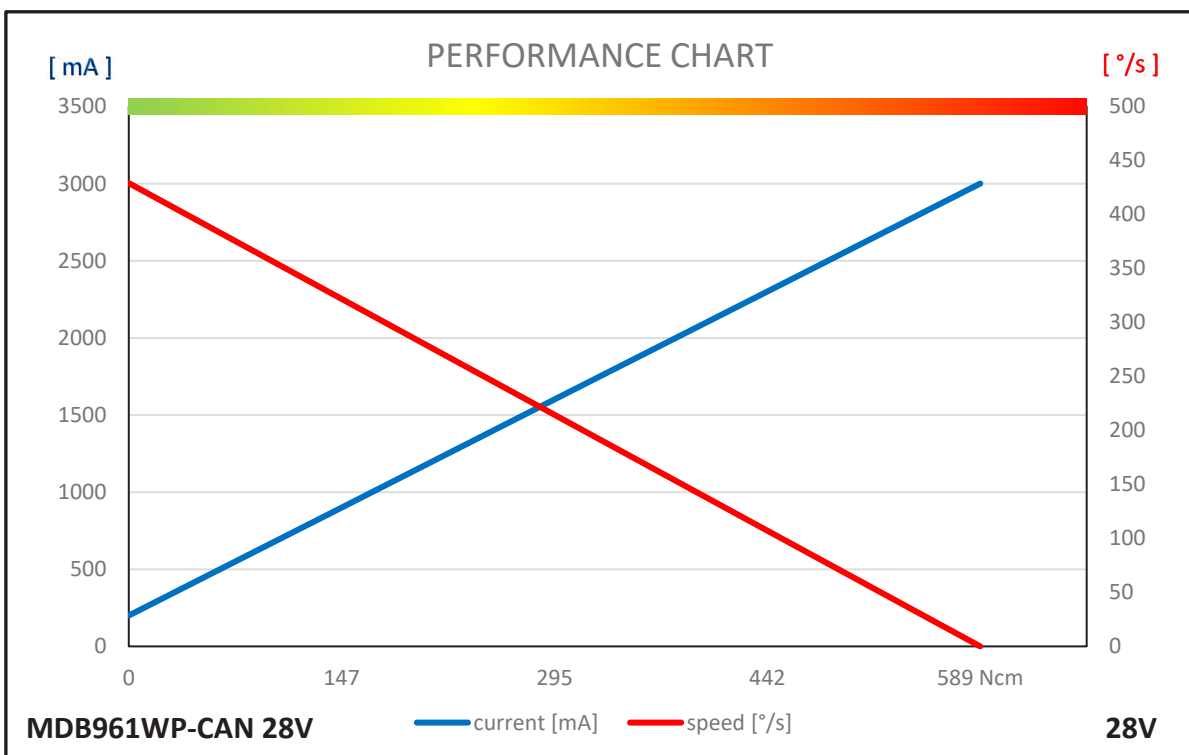
# MDB961WP-CAN 28V

#1-03003



1:2

## PERFORMANCE CHART

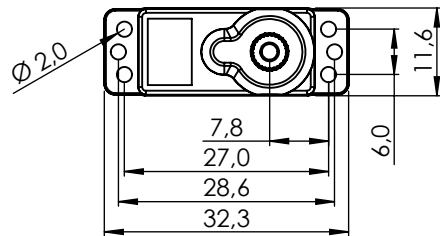
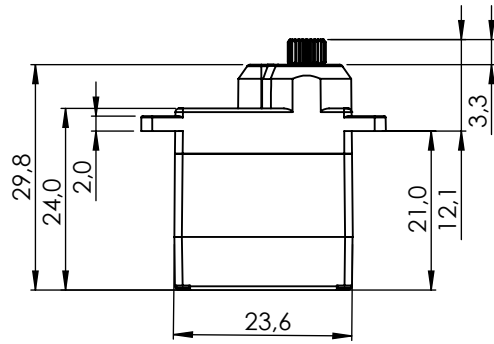


## GENERAL SPECIFICATION

| MDB961WP-CAN 28V                             |   |                     |                     |               |
|--|---|---------------------|---------------------|---------------|
| Control System                               | CAN BUS   |                     |                     |               |
|  | Protocol (Mode)   | Standard 2.0A       |                     | Extended 2.0B |
|  | Baud-Rate   | 10kbps ~ 1Mbps      |                     |               |
|  | Sample-Point  | 50% or 87.5%        |                     |               |
|  | Available SERVO ID  | 1 ~ 254             |                     | 1 ~ 127       |
|  | Available Node ID   | 1 ~ 2047            | 1 ~ 536870911       | 1 ~ 127       |
|  | Input Signal Range  | 0 ~ 5V              |                     |               |
| Connector Type                               | Hitec 4P  |                     |                     |               |
| Position Sensor Type                         | Contactless Magnetic Encoder                              |                     |                     |               |
| Motor Type                                   | BLDC  |                     |                     |               |
| Amplifier / MCU                              | 32bit programmable Digital                                |                     |                     |               |
| Operating Voltage Range                      | 8.0V ~ 32.0V  |                     |                     |               |
| Operating Voltage                            | At 12.0V  | At 24.0V            | At 28.0V            |               |
| Operating Speed at no Load                   | 429°/s (71RPM)  | 429°/s (71RPM)      | 429°/s (71RPM)      |               |
| Stall Torque                                 | 60.0kgcm (588.6Ncm)                                       | 60.0kgcm (588.6Ncm) | 60.0kgcm (588.6Ncm) |               |
| Peak Efficiency Torque                       | 12.0kgcm (117.7Ncm)                                       | 12.0kgcm (117.7Ncm) | 12.0kgcm (117.7Ncm) |               |
| Rest Current                                 | 18mA  | 10mA                | 9mA                 |               |
| Running Current at no Load                   | 500mA   | 300mA               | 200mA               |               |
| Stall Current                                | 6700mA  | 3400mA              | 3000mA              |               |
| Deadband Width                               | n/a   | n/a                 | n/a                 |               |
| Travel                                       | Travel / Command  | 90° / 4096          |                     |               |
|  | Servo mode  | Left                | Center              | Right         |
|  | Pos Command   | +1366               | +8192               | +15018        |
|  | Pos [°]   | -150                | 0                   | +150          |
|  | Turn Mode   | Left                | Power On            | Right         |
|  | Pos Command   | -16383              | 0                   | +16383        |
|  | Pos [°]   | -359                | 0                   | +359          |
| Turn Range                                   | -32760 ~ +32760   |                     |                     |               |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                             |                     |                     |               |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                            |                     |                     |               |
| Vibrations at no Load                        | -   |                     |                     |               |
| Connector Wire Length                        | 300mm   |                     |                     |               |
| Connector Wire Gauge                         | 20AWG   |                     |                     |               |
| Connector Wire Strand Count                  | 80/0.08   |                     |                     |               |
| External Dimensions                          | 40.0 x 20.0 x 39.0mm                                      |                     |                     |               |
| Weight*                                      | 90.0g   |                     |                     |               |
| Ball Bearing                                 | Dual Ball Bearing   |                     |                     |               |
| Case Material                                | Aluminum Alloy  |                     |                     |               |
| Gear Material                                | 5 Hardened Steel Gears                                    |                     |                     |               |
| Gear Train Backlash                          | Max. 0.5°   |                     |                     |               |
| Horn Gear Spline                             | H25T Ø6.0   |                     |                     |               |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-OS25, HD-X25) |                     |                     |               |
| IP-Rating                                    | IP67  |                     |                     |               |
| Revision                                     | Rev. 1.0 / 09.01.2024                                     |                     |                     |               |
| Changelog                                    | -   |                     |                     |               |
| *of the servo only w/o horns and accessories |   |                     |                     |               |

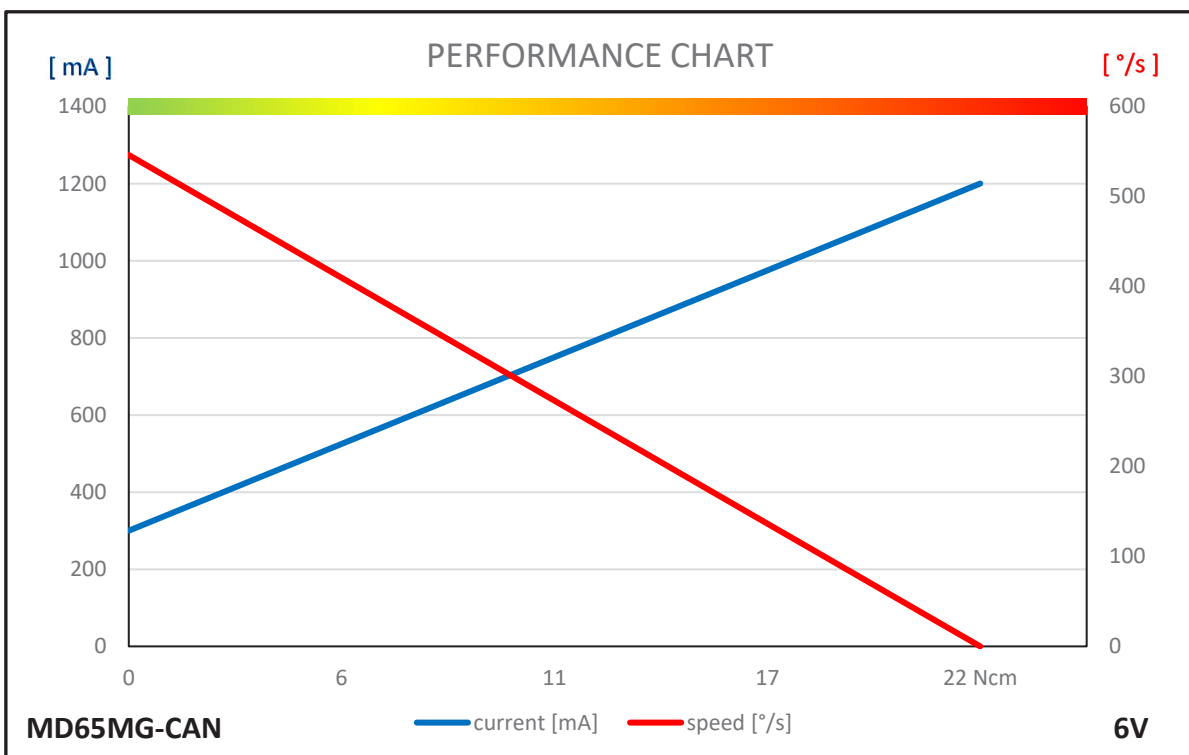
# MD65MG-CAN/UAV/DroneCAN

#1-01707, #1-01643



1:1

## PERFORMANCE CHART

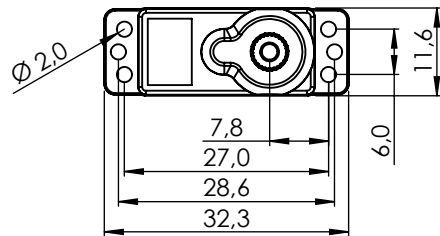
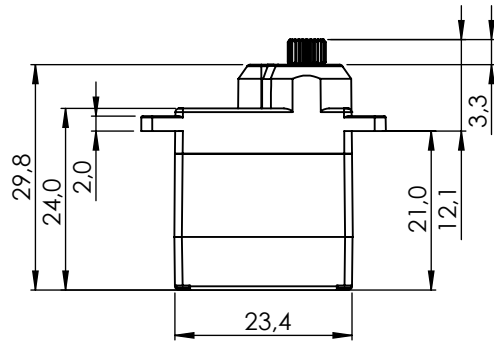


## GENERAL SPECIFICATION

| MD65MG-CAN/UAVCAN/DroneCAN                   |   |                   |               |                 |
|--|---|-------------------|---------------|-----------------|
| Control System                               | CAN BUS   |                   |               |                 |
|  | Protocol (Mode)                                     | Standard 2.0A     | Extended 2.0B | UAVCAN/DroneCAN |
|  | Baud-Rate   | 10kbps ~ 1Mbps    |               |                 |
|  | Sample-Point  | 50% or 87.5%      |               |                 |
|  | Available SERVO ID                                  | 1 ~ 254           |               | 1 ~ 127         |
|  | Available Node ID                                   | 1 ~ 2047          | 1 ~ 536870911 | 1 ~ 127         |
|  | Input Signal Range                                  | 0 ~ 5V            |               |                 |
| Connector Type                               | Hitec 4P  |                   |               |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder                        |                   |               |                 |
| Motor Type                                   | Cored Metal Brush                                   |                   |               |                 |
| Amplifier / MCU                              | 32bit programmable Digital                          |                   |               |                 |
| Operating Voltage Range                      | 4.0V ~ 8.4V   |                   |               |                 |
| Operating Voltage                            | At 4.8V   | At 6.0V           |               |                 |
| Operating Speed at no Load                   | 429°/s (71RPM)                                      | 546°/s (91RPM)    |               |                 |
| Stall Torque                                 | 1.8kgcm (17.7Ncm)                                   | 2.2kgcm (21.6Ncm) |               |                 |
| Peak Efficiency Torque                       | 0.4kgcm (3.9Ncm)                                    | 0.4kgcm (3.9Ncm)  |               |                 |
| Rest Current                                 | 30mA  | 30mA              |               |                 |
| Running Current at no Load                   | 180mA   | 220mA             |               |                 |
| Stall Current                                | 960mA   | 1200mA            |               |                 |
| Deadband Width                               | 4Step   | 4Step             |               |                 |
| Travel                                       | Travel / Command                                    | 90° / 4096        |               |                 |
|  | Servo mode  | Left              | Center        | Right           |
|  | Pos Command   | +1366             | +8192         | +15018          |
|  | Pos [°]   | -150              | 0             | +150            |
|  | Turn Mode   | Left              | Power On      | Right           |
|  | Pos Command   | -16383            | 0             | +16383          |
|  | Pos [°]   | -359              | 0             | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                          |                   |               |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                       |                   |               |                 |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                      |                   |               |                 |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII                             |                   |               |                 |
| Connector Wire Length                        | 300mm   |                   |               |                 |
| Connector Wire Gauge                         | 28AWG   |                   |               |                 |
| Connector Wire Strand Count                  | 20/0.08   |                   |               |                 |
| External Dimensions                          | 23.6 x 11.6 x 24.0mm                                |                   |               |                 |
| Weight*                                      | 12.8g   |                   |               |                 |
| Ball Bearing                                 | Single Ball Bearing                                 |                   |               |                 |
| Case Material                                | Engineering Plastic                                 |                   |               |                 |
| Gear Material                                | 1 Heavy Duty Resin & 4 Metal Gears                  |                   |               |                 |
| Gear Train Backlash                          | Max. 0.5°   |                   |               |                 |
| Horn Gear Spline                             | 25T Ø5.0  |                   |               |                 |
| Accessories                                  | Tapping Screw, Servo Horns (MS-I25, MS-L25, MS-X25) |                   |               |                 |
| IP-Rating                                    | IP4X  |                   |               |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                               |                   |               |                 |
| Changelog                                    | -   |                   |               |                 |
| *of the servo only w/o horns and accessories |   |                   |               |                 |

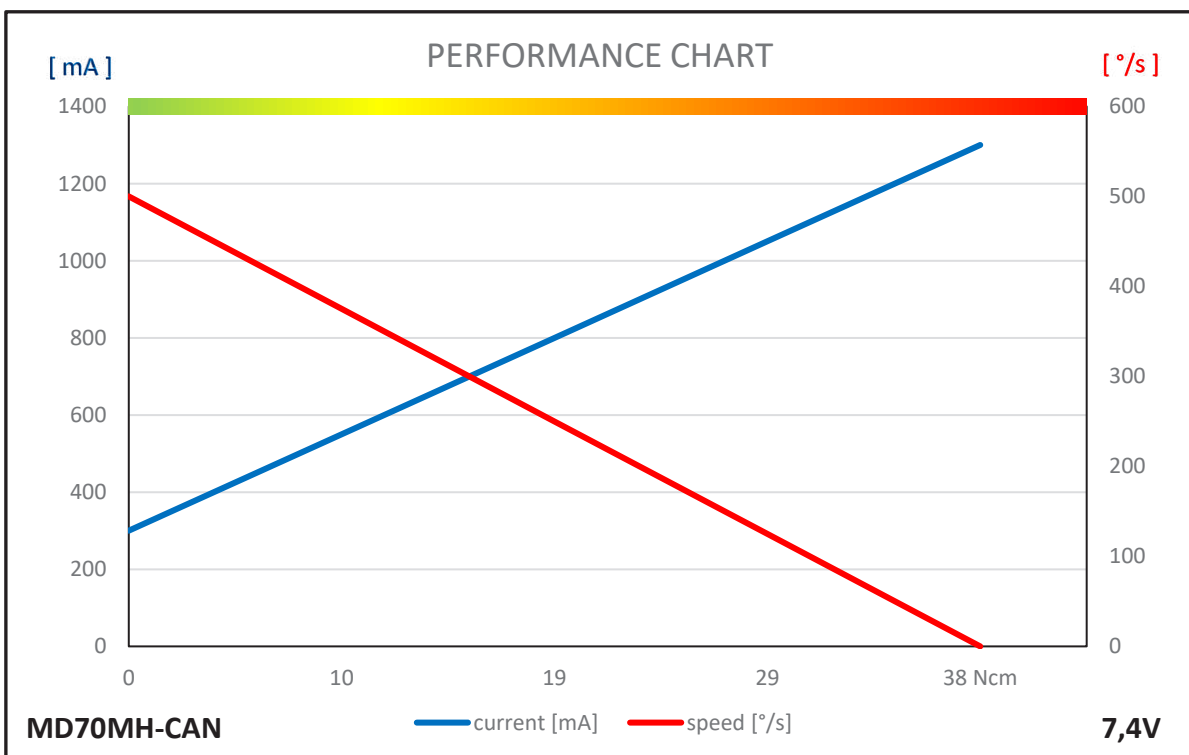
# MD70MH-CAN/UAVCAN/DroneCAN

#1-01201, #1-01644



1:1

## PERFORMANCE CHART

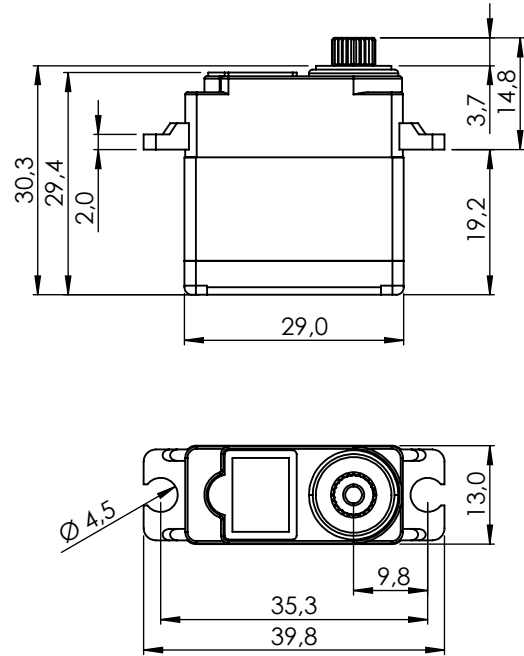


## GENERAL SPECIFICATION

| MD70MH-CAN/UAVCAN/DroneCAN                   |   |                   |               |                 |
|--|---|-------------------|---------------|-----------------|
| Control System                               | CAN BUS   |                   |               |                 |
|  | Protocol (Mode)                                     | Standard 2.0A     | Extended 2.0B | UAVCAN/DroneCAN |
|  | Baud-Rate   | 10kbps ~ 1Mbps    |               |                 |
|  | Sample-Point  | 50% or 87.5%      |               |                 |
|  | Available SERVO ID                                  | 1 ~ 254           |               | 1 ~ 127         |
|  | Available Node ID                                   | 1 ~ 2047          | 1 ~ 536870911 | 1 ~ 127         |
|  | Input Signal Range                                  | 0 ~ 5V            |               |                 |
| Connector Type                               | Hitec 4P  |                   |               |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder                        |                   |               |                 |
| Motor Type                                   | Cored Metal Brush                                   |                   |               |                 |
| Amplifier / MCU                              | 32bit programmable Digital                          |                   |               |                 |
| Operating Voltage Range                      | 4.0V ~ 8.4V   |                   |               |                 |
| Operating Voltage                            | At 6.0V   | At 7.4V           |               |                 |
| Operating Speed at no Load                   | 400°/s (67RPM)                                      | 500°/s (83RPM)    |               |                 |
| Stall Torque                                 | 3.1kgcm (30.4Ncm)                                   | 3.8kgcm (37.3Ncm) |               |                 |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)                                    | 0.8kgcm (7.9Ncm)  |               |                 |
| Rest Current                                 | 30mA  | 30mA              |               |                 |
| Running Current at no Load                   | 200mA   | 240mA             |               |                 |
| Stall Current                                | 1000mA  | 1300mA            |               |                 |
| Deadband Width                               | n/a   | n/a               |               |                 |
| Travel                                       | Travel / Command                                    | 90° / 4096        |               |                 |
|  | Servo mode  | Left              | Center        | Right           |
|  | Pos Command   | +1366             | +8192         | +15018          |
|  | Pos [°]   | -150              | 0             | +150            |
|  | Turn Mode   | Left              | Power On      | Right           |
|  | Pos Command   | -16383            | 0             | +16383          |
|  | Pos [°]   | -359              | 0             | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                          |                   |               |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                       |                   |               |                 |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                      |                   |               |                 |
| Vibrations at no Load                        | -   |                   |               |                 |
| Connector Wire Length                        | 300mm   |                   |               |                 |
| Connector Wire Gauge                         | 28AWG   |                   |               |                 |
| Connector Wire Strand Count                  | 20/0.08   |                   |               |                 |
| External Dimensions                          | 23.4 x 11.4 x 24.0mm                                |                   |               |                 |
| Weight*                                      | 14.1g   |                   |               |                 |
| Ball Bearing                                 | Single Ball Bearing                                 |                   |               |                 |
| Case Material                                | Engineering Plastic                                 |                   |               |                 |
| Gear Material                                | 1 Heavy Duty Resin & 4 Metal Gears                  |                   |               |                 |
| Gear Train Backlash                          | Max. 0.5°   |                   |               |                 |
| Horn Gear Spline                             | 25T Ø5.0  |                   |               |                 |
| Accessories                                  | Tapping Screw, Servo Horns (MS-I25, MS-L25, MS-X25) |                   |               |                 |
| Dust & Water Protection class                | IP4X  |                   |               |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                               |                   |               |                 |
| Changelog                                    | -   |                   |               |                 |
| *of the servo only w/o horns and accessories |   |                   |               |                 |

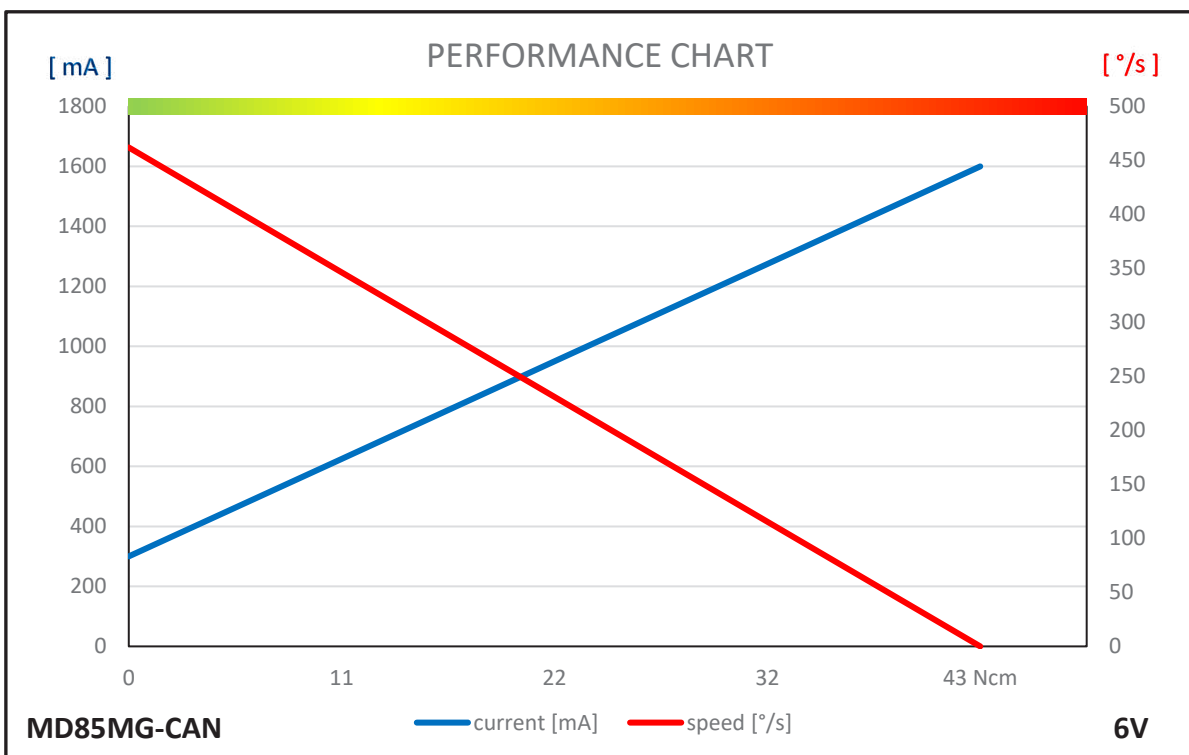
# MD85MG-CAN/UAVCAN/DroneCAN

#1-01573, #1-01645



1:1

## PERFORMANCE CHART



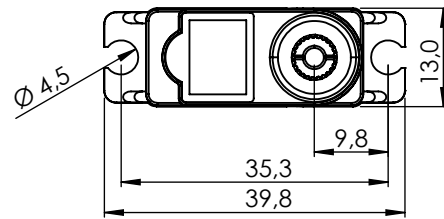
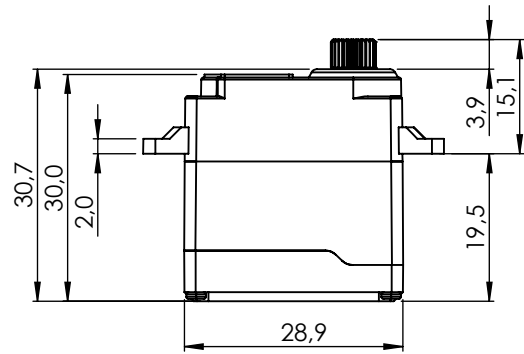


## GENERAL SPECIFICATION

| MD85MG-CAN/UAVCAN/DroneCAN                   |  |                   |               |                 |
|--|--|-------------------|---------------|-----------------|
| Control System                               | CAN BUS  |                   |               |                 |
|  | Protocol (Mode)                                | Standard 2.0A     | Extended 2.0B | UAVCAN/DroneCAN |
|  | Baud-Rate                                      | 10kbps ~ 1Mbps    |               |                 |
|  | Sample-Point                                   | 50% or 87.5%      |               |                 |
|  | Available SERVO ID                             | 1 ~ 254           |               | 1 ~ 127         |
|  | Available Node ID                              | 1 ~ 2047          | 1 ~ 536870911 | 1 ~ 127         |
|  | Input Signal Range                             | 0 ~ 5V            |               |                 |
| Connector Type                               | Hitec 4P                                       |                   |               |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder                   |                   |               |                 |
| Motor Type                                   | Cored Carbon Brush                             |                   |               |                 |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive   |                   |               |                 |
| Operating Voltage Range                      | 4.0V ~ 8.4V                                    |                   |               |                 |
| Operating Voltage                            | At 4.8V  | At 6.0V           |               |                 |
| Operating Speed at no Load                   | 353°/s (59RPM)                                 | 462°/s (77RPM)    |               |                 |
| Stall Torque                                 | 3.6kgcm (35.3Ncm)                              | 4.3kgcm (42.2Ncm) |               |                 |
| Peak Efficiency Torque                       | 0.7kgcm (6.9Ncm)                               | 0.9kgcm (8.8Ncm)  |               |                 |
| Rest Current                                 | 30mA   | 30mA              |               |                 |
| Running Current at no Load                   | 260mA  | 300mA             |               |                 |
| Stall Current                                | 1300mA   | 1600mA            |               |                 |
| Deadband Width                               | 4Step  | 4Step             |               |                 |
| Travel                                       | Travel / Command                               | 90° / 4096        |               |                 |
|  | Servo mode                                     | Left              | Center        | Right           |
|  | Pos Command                                    | +1366             | +8192         | +15018          |
|  | Pos [°]  | -150              | 0             | +150            |
|  | Turn Mode                                      | Left              | Power On      | Right           |
|  | Pos Command                                    | -16383            | 0             | +16383          |
|  | Pos [°]  | -359              | 0             | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                     |                   |               |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                  |                   |               |                 |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                 |                   |               |                 |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII                        |                   |               |                 |
| Connector Wire Length                        | 300mm  |                   |               |                 |
| Connector Wire Gauge                         | 28AWG  |                   |               |                 |
| Connector Wire Strand Count                  | 20/0.08  |                   |               |                 |
| External Dimensions                          | 29.0 x 13.0 x 29.4mm                           |                   |               |                 |
| Weight*                                      | 22.7g  |                   |               |                 |
| Ball Bearing                                 | Single Ball Bearing                            |                   |               |                 |
| Case Material                                | Engineering Plastic                            |                   |               |                 |
| Gear Material                                | 5 Metal Gears                                  |                   |               |                 |
| Gear Train Backlash                          | Max. 0.5°                                      |                   |               |                 |
| Horn Gear Spline                             | 24T Ø6.0                                       |                   |               |                 |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I, M-X, M-O) |                   |               |                 |
| IP-Rating                                    | IP4X   |                   |               |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                          |                   |               |                 |
| Changelog                                    | -  |                   |               |                 |
| *of the servo only w/o horns and accessories |  |                   |               |                 |

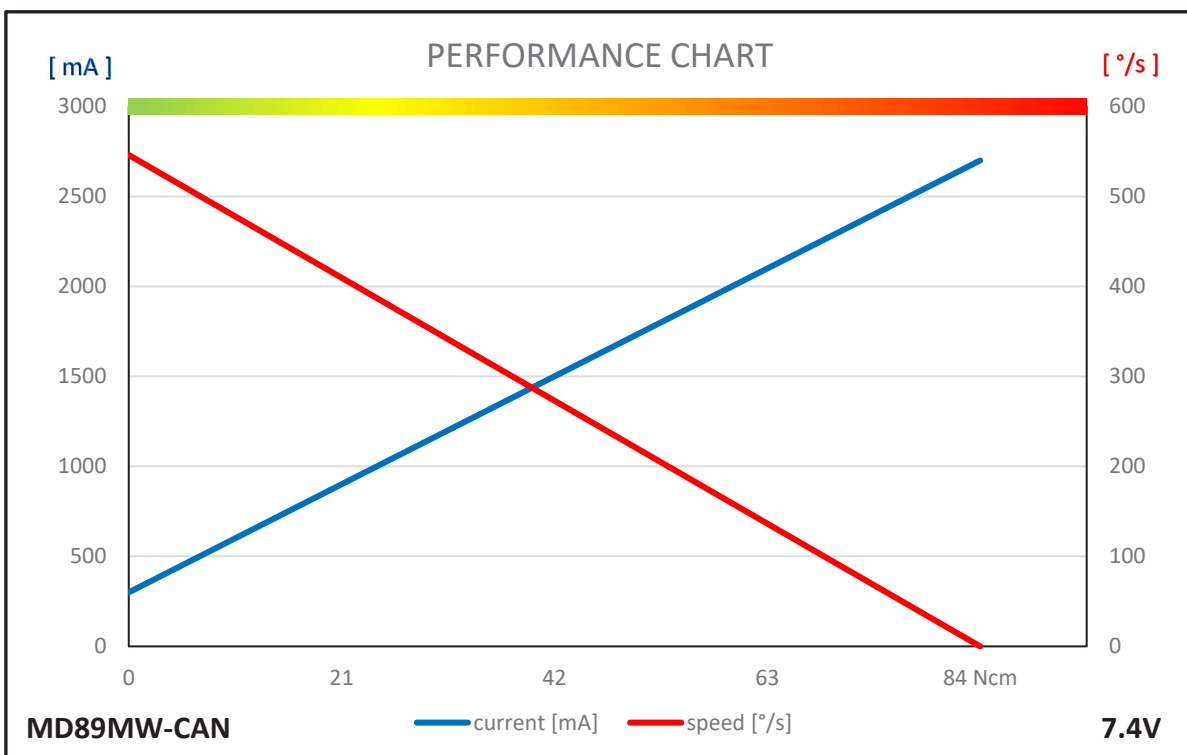
# MD89MW-CAN/UAVCAN/DroneCAN

#1-01972, #1-01973



1:1

## PERFORMANCE CHART

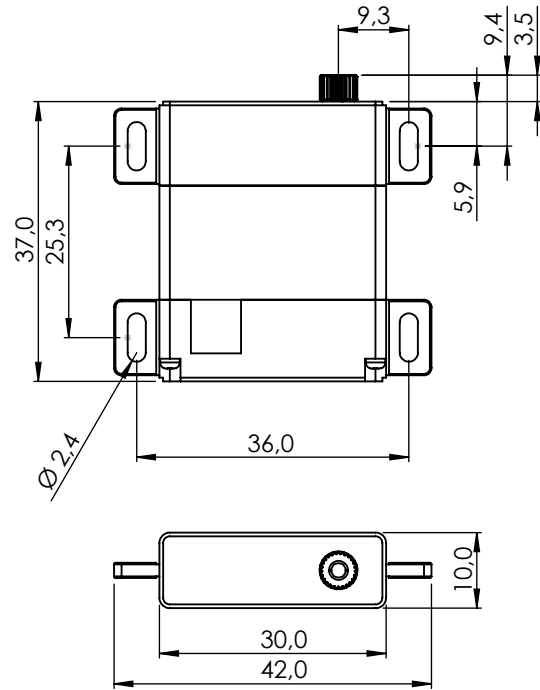


## GENERAL SPECIFICATION

| MD89MW-CAN/UAVCANDroneCAN                    |  |                   |                   |                 |
|--|--|-------------------|-------------------|-----------------|
| Control System                               | CAN BUS  |                   |                   |                 |
|  | Protocol (Mode)                                | Standard 2.0A     | Extended 2.0B     | UAVCAN/DroneCAN |
|  | Baud-Rate                                      | 10kbps ~ 1Mbps    |                   |                 |
|  | Sample-Point                                   | 50% or 87.5%      |                   |                 |
|  | Available SERVO ID                             | 1 ~ 254           |                   | 1 ~ 127         |
|  | Available Node ID                              | 1 ~ 2047          | 1 ~ 536870911     | 1 ~ 127         |
|  | Input Signal Range                             | 0 ~ 5V            |                   |                 |
| Connector Type                               | Hitec 4P                                       |                   |                   |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder                   |                   |                   |                 |
| Motor Type                                   | Coreless                                       |                   |                   |                 |
| Amplifier / MCU                              | 32bit programmable Digital                     |                   |                   |                 |
| Operating Voltage Range                      | 4.0 ~ 8.4V                                     |                   |                   |                 |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V           |                 |
| Operating Speed at no Load                   | 353°/s (59RPM)                                 | 462°/s (77RPM)    | 546°/s (91RPM)    |                 |
| Stall Torque                                 | 5.3kgcm (52.0Ncm)                              | 6.4kgcm (62.8Ncm) | 8.5kgcm (83.4Ncm) |                 |
| Peak Efficiency Torque                       | 1.1kgcm (10.8Ncm)                              | 1.3kgcm (12.8Ncm) | 1.7kgcm (16.7Ncm) |                 |
| Rest Current                                 | 30mA   | 30mA              | 30mA              |                 |
| Running Current at no Load                   | 200mA  | 250mA             | 300mA             |                 |
| Stall Current                                | 1800mA   | 2200mA            | 2700mA            |                 |
| Deadband Width                               | n/a  | n/a               | n/a               |                 |
| Travel                                       | Travel / Command                               | 90° / 4096        |                   |                 |
|  | Servo mode                                     | Left              | Center            | Right           |
|  | Pos Command                                    | +1366             | +8192             | +15018          |
|  | Pos [°]  | -150              | 0                 | +150            |
|  | Turn Mode                                      | Left              | Power On          | Right           |
|  | Pos Command                                    | -16383            | 0                 | +16383          |
|  | Pos [°]  | -359              | 0                 | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                     |                   |                   |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                  |                   |                   |                 |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                 |                   |                   |                 |
| Vibrations at no Load                        | -  |                   |                   |                 |
| Connector Wire Length                        | 300mm  |                   |                   |                 |
| Connector Wire Gauge                         | 22AWG  |                   |                   |                 |
| Connector Wire Strand Count                  | 60/0.08  |                   |                   |                 |
| External Dimensions                          | 28.9 x 13.0 x 30.0mm                           |                   |                   |                 |
| Weight*                                      | 28.0g  |                   |                   |                 |
| Ball Bearing                                 | Dual Ball Bearing                              |                   |                   |                 |
| Case Material                                | Engineering Plastic                            |                   |                   |                 |
| Gear Material                                | 5 Metal Gears                                  |                   |                   |                 |
| Gear Train Backlash                          | Max. 0.5°                                      |                   |                   |                 |
| Horn Gear Spline                             | 25T Ø6.0                                       |                   |                   |                 |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I, M-X, M-O) |                   |                   |                 |
| IP-Rating                                    | IP4X   |                   |                   |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                          |                   |                   |                 |
| Changelog                                    | -  |                   |                   |                 |
| *of the servo only w/o horns and accessories |  |                   |                   |                 |

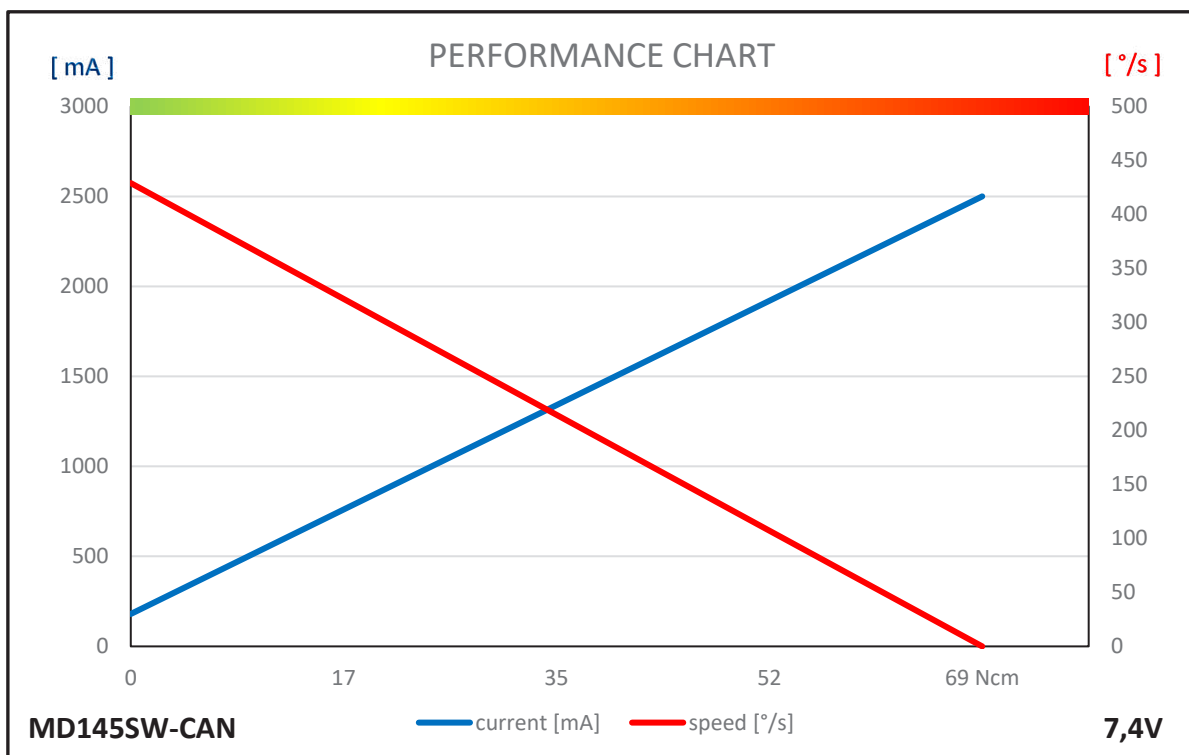
# MD145SW-CAN/UAVCAN/DroneCAN

#1-01787, #1-01641



1:1

## PERFORMANCE CHART

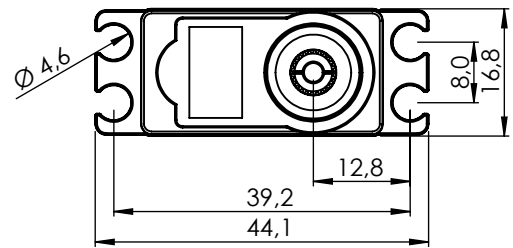
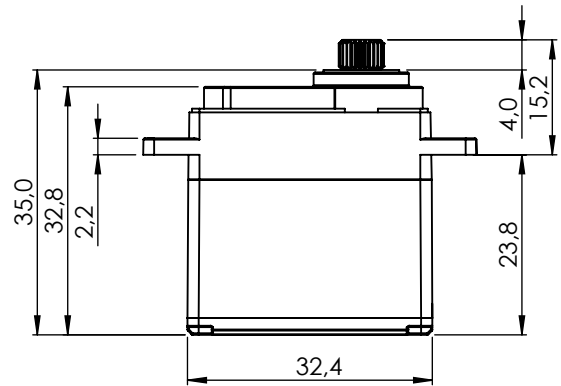


## GENERAL SPECIFICATION

| MD145SW-CAN/UAVCAN/DroneCAN                  |  |                   |                   |               |
|--|--|-------------------|-------------------|---------------|
| Control System                               | CAN BUS  |                   |                   |               |
|  | Protocol (Mode)                                  | Standard 2.0A     |                   | Extended 2.0B |
|  | Baud-Rate  | 10kbps ~ 1Mbps    |                   |               |
|  | Sample-Point                                     | 50% or 87.5%      |                   |               |
|  | Available SERVO ID                               | 1 ~ 254           |                   | 1 ~ 127       |
|  | Available Node ID                                | 1 ~ 2047          | 1 ~ 536870911     | 1 ~ 127       |
|  | Input Signal Range                               | 0 ~ 5V            |                   |               |
| Connector Type                               | Hitec 4P   |                   |                   |               |
| Position Sensor Type                         | Contactless Magnetic Encoder                     |                   |                   |               |
| Motor Type                                   | Cored Carbon Brush                               |                   |                   |               |
| Amplifier / MCU                              | 32bit programmable Digital                       |                   |                   |               |
| Operating Voltage Range                      | 4.0V ~ 8.4V                                      |                   |                   |               |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V           |               |
| Operating Speed at no Load                   | 286°/s (48RPM)                                   | 353°/s (59RPM)    | 429°/s (71RPM)    |               |
| Stall Torque                                 | 4.9kgcm (16.7Ncm)                                | 5.9kgcm (57.9Ncm) | 7.0kgcm (68.7Ncm) |               |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)                                 | 1.2kgcm (11.8Ncm) | 1.4kgcm (13.7Ncm) |               |
| Rest Current                                 | 30mA   | 30mA              | 30mA              |               |
| Running Current at no Load                   | 120mA  | 180mA             | 180mA             |               |
| Stall Current                                | 1,600mA  | 2,500mA           | 2,500mA           |               |
| Deadband Width                               | 4Step  | 4Step             | 4Step             |               |
| Travel                                       | Travel / Command                                 | 90° / 4096        |                   |               |
|  | Servo mode                                       | Left              | Center            | Right         |
|  | Pos Command                                      | +1366             | +8192             | +15018        |
|  | Pos [°]  | -150              | 0                 | +150          |
|  | Turn Mode  | Left              | Power On          | Right         |
|  | Pos Command                                      | -16383            | 0                 | +16383        |
|  | Pos [°]  | -359              | 0                 | +359          |
| Turn Range                                   | -32760 ~ +32760 (CAN only)                       |                   |                   |               |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                    |                   |                   |               |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                   |                   |                   |               |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII                          |                   |                   |               |
| Connector Wire Length                        | 300mm  |                   |                   |               |
| Connector Wire Gauge                         | 24AWG  |                   |                   |               |
| Connector Wire Strand Count                  | 40/0.08  |                   |                   |               |
| External Dimensions                          | 30.0 x 10.0 x 37.0mm                             |                   |                   |               |
| Weight*                                      | 27.6g  |                   |                   |               |
| Ball Bearing                                 | Dual Ball Bearing                                |                   |                   |               |
| Case Material                                | Engineering Plastic                              |                   |                   |               |
| Gear Material                                | 1 Metal-Plastic & 4 Steel Gears                  |                   |                   |               |
| Gear Train Backlash                          | Max. 0.5°  |                   |                   |               |
| Horn Gear Spline                             | 25T Ø5.0   |                   |                   |               |
| Accessories                                  | Mounting Hardware, Servo Horns (MS-L25, MS-ML25) |                   |                   |               |
| IP-Rating                                    | IP4X   |                   |                   |               |
| Revision                                     | Rev. 1.1 / 03.01.2024                            |                   |                   |               |
| Changelog                                    | -  |                   |                   |               |
| *of the servo only w/o horns and accessories |  |                   |                   |               |

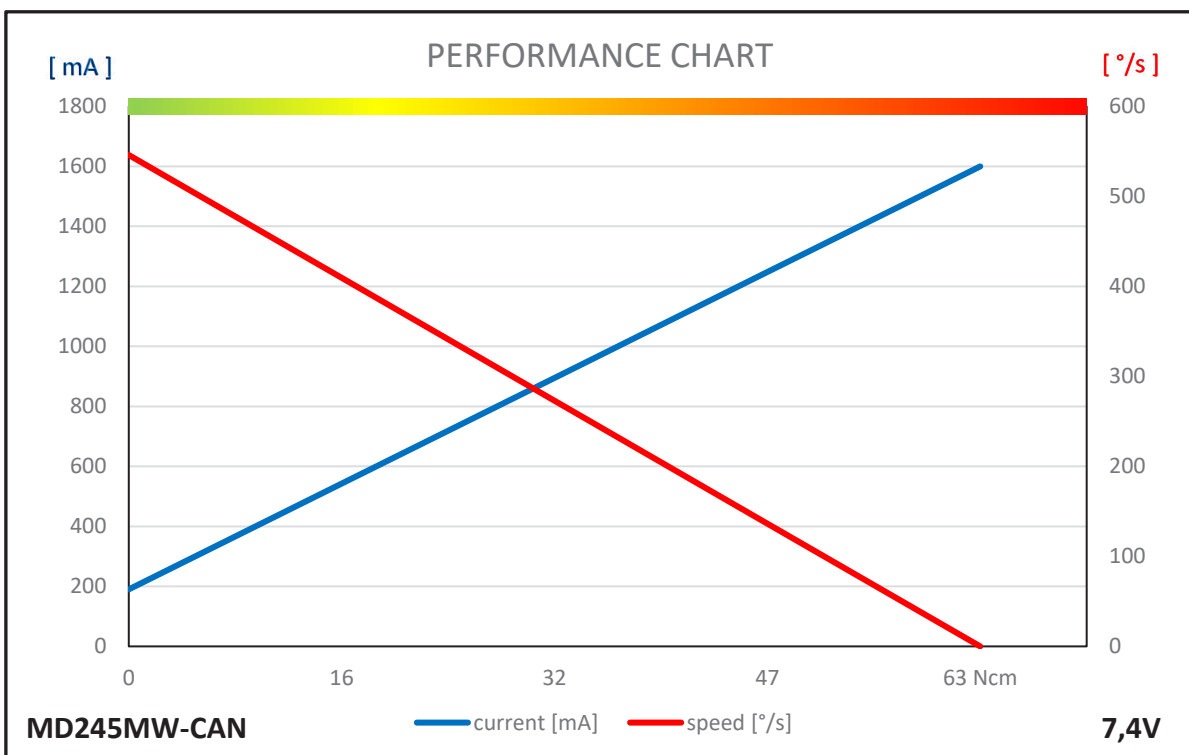
# MD245MW-CAN/UAVCAN/DroneCAN

#1-01574, #1-01642



1:1

## PERFORMANCE CHART

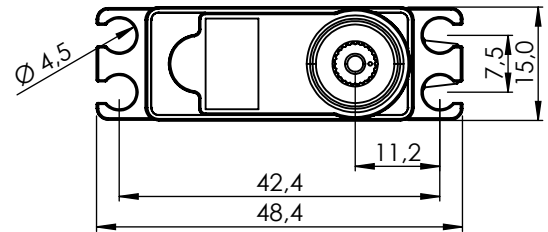
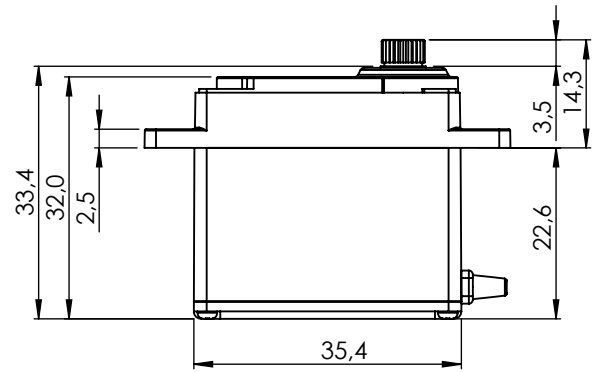


## GENERAL SPECIFICATION

| MD245MW-CAN/UAVCAN/DroneCAN                  |                                       |                   |                   |                 |
|--|---------------------------------------|-------------------|-------------------|-----------------|
| Control System                               | CAN BUS                               |                   |                   |                 |
|  | Protocol (Mode)                       | Standard 2.0A     | Extended 2.0B     | UAVCAN/DroneCAN |
|  | Baud-Rate                             | 10kbps ~ 1Mbps    |                   |                 |
|  | Sample-Point                          | 50% or 87.5%      |                   |                 |
|  | Available SERVO ID                    | 1 ~ 254           |                   | 1 ~ 127         |
|  | Available Node ID                     | 1 ~ 2047          | 1 ~ 536870911     | 1 ~ 127         |
|  | Input Signal Range                    | 0 ~ 5V            |                   |                 |
| Connector Type                               | Hitec 4P                              |                   |                   |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder          |                   |                   |                 |
| Motor Type                                   | Coreless Metal Brush                  |                   |                   |                 |
| Amplifier / MCU                              | 32bit programmable Digital            |                   |                   |                 |
| Operating Voltage Range                      | 4.0V ~ 8.4V                           |                   |                   |                 |
| Operating Voltage                            | At 4.8V                               | At 6.0V           | At 7.4V           |                 |
| Operating Speed at no Load                   | 353°/s (59RPM)                        | 462°/s (77RPM)    | 546°/s (91RPM)    |                 |
| Stall Torque                                 | 4.2kgcm (41.2Ncm)                     | 5.2kgcm (51.0Ncm) | 6.4kgcm (62.8Ncm) |                 |
| Peak Efficiency Torque                       | 0.8kgcm (7.9Ncm)                      | 1.0kgcm (9.8Ncm)  | 1.3kgcm (12.8Ncm) |                 |
| Rest Current                                 | 30mA                                  | 30mA              | 30mA              |                 |
| Running Current at no Load                   | 110mA                                 | 150mA             | 190mA             |                 |
| Stall Current                                | 1000mA                                | 1300mA            | 1600mA            |                 |
| Deadband Width                               | n/a                                   | n/a               | n/a               |                 |
| Travel                                       | Travel / Command                      | 90° / 4096        |                   |                 |
|  | Servo mode                            | Left              | Center            | Right           |
|  | Pos Command                           | +1366             | +8192             | +15018          |
|  | Pos [°]                               | -150              | 0                 | +150            |
|  | Turn Mode                             | Left              | Power On          | Right           |
|  | Pos Command                           | -16383            | 0                 | +16383          |
|  | Pos [°]                               | -359              | 0                 | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)            |                   |                   |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)         |                   |                   |                 |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)        |                   |                   |                 |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII               |                   |                   |                 |
| Connector Wire Length                        | 300mm                                 |                   |                   |                 |
| Connector Wire Gauge                         | 22AWG                                 |                   |                   |                 |
| Connector Wire Strand Count                  | 60/0.08                               |                   |                   |                 |
| External Dimensions                          | 32.4 x 16.8 x 32.8mm                  |                   |                   |                 |
| Weight*                                      | 35.5g                                 |                   |                   |                 |
| Ball Bearing                                 | Dual Ball Bearing                     |                   |                   |                 |
| Case Material                                | Engineering Plastic                   |                   |                   |                 |
| Gear Material                                | 1 Metal-Plastic & 3 Metal Gears       |                   |                   |                 |
| Gear Train Backlash                          | Max. 0.5°                             |                   |                   |                 |
| Horn Gear Spline                             | H25T Ø6.0                             |                   |                   |                 |
| Accessories                                  | Mounting Hardware, Servo Horn (M-025) |                   |                   |                 |
| IP-Rating                                    | IP4X                                  |                   |                   |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                 |                   |                   |                 |
| Changelog                                    | -                                     |                   |                   |                 |
| *of the servo only w/o horns and accessories |                                       |                   |                   |                 |

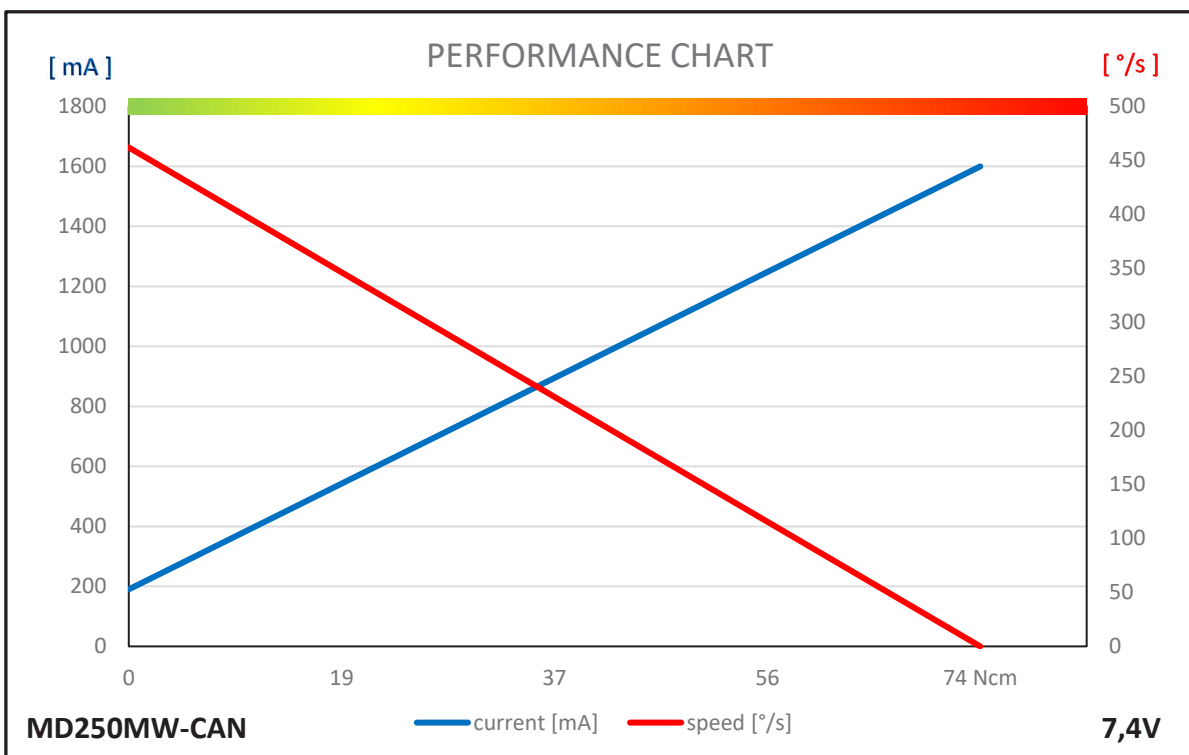
# MD250MW-CAN/UAVCAN/DroneCAN

#1-01666, #1-01572



1:1

## PERFORMANCE CHART



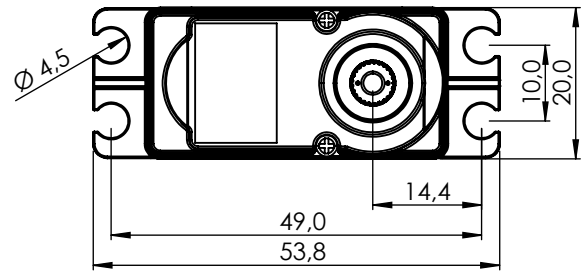
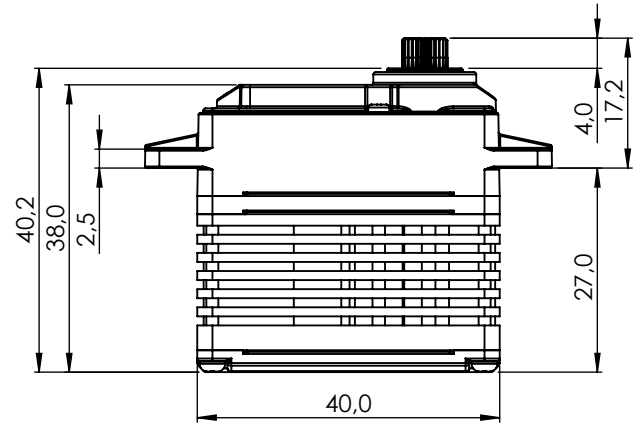


## GENERAL SPECIFICATION

| MD250MW-CAN/UAVCAN/DroneCAN                  |                                       |                   |                   |                 |
|--|---------------------------------------|-------------------|-------------------|-----------------|
| Control System                               | CAN BUS                               |                   |                   |                 |
|  | Protocol (Mode)                       | Standard 2.0A     | Extended 2.0B     | UAVCAN/DroneCAN |
|  | Baud-Rate                             | 10kbps ~ 1Mbps    |                   |                 |
|  | Sample-Point                          | 50% or 87.5%      |                   |                 |
|  | Available SERVO ID                    | 1 ~ 254           |                   | 1 ~ 127         |
|  | Available Node ID                     | 1 ~ 2047          | 1 ~ 536870911     | 1 ~ 127         |
|  | Input Signal Range                    | 0 ~ 5V            |                   |                 |
| Connector Type                               | Hitec 4P                              |                   |                   |                 |
| Position Sensor Type                         | Contactless Magnetic Encoder          |                   |                   |                 |
| Motor Type                                   | Cored Carbon Brush                    |                   |                   |                 |
| Amplifier / MCU                              | 32bit programmable Digital            |                   |                   |                 |
| Operating Voltage Range                      | 4.0V ~ 8.4V                           |                   |                   |                 |
| Operating Voltage                            | At 4.8V                               | At 6.0V           | At 7.4V           |                 |
| Operating Speed at no Load                   | 300°/s (50RPM)                        | 375°/s (63RPM)    | 462°/s (77RPM)    |                 |
| Stall Torque                                 | 4.9kgcm (48.1Ncm)                     | 6.1kgcm (59.8Ncm) | 7.5kgcm (73.6Ncm) |                 |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)                      | 1.2kgcm (11.8Ncm) | 1.5kgcm (14.7Ncm) |                 |
| Rest Current                                 | 40mA                                  | 40mA              | 40mA              |                 |
| Running Current at no Load                   | 110mA                                 | 150mA             | 190mA             |                 |
| Stall Current                                | 1000mA                                | 1300mA            | 1600mA            |                 |
| Travel                                       | Travel / Command                      | 90° / 4096        |                   |                 |
|  | Servo mode                            | Left              | Center            | Right           |
|  | Pos Command                           | +1366             | +8192             | +15018          |
|  | Pos [°]                               | -150              | 0                 | +150            |
|  | Turn Mode                             | Left              | Power On          | Right           |
|  | Pos Command                           | -16383            | 0                 | +16383          |
|  | Pos [°]                               | -359              | 0                 | +359            |
| Turn Range                                   | -32760 ~ +32760 (CAN only)            |                   |                   |                 |
| Operating Temperature Range                  | -20°C ~ +60°C (-22°F ~ +140°F)        |                   |                   |                 |
| Storage Temperature Range                    | -30°C ~ +60°C (-80°F ~ +176°F)        |                   |                   |                 |
| Vibrations at no Load                        | MIL-STD-810G 514.6C-VII               |                   |                   |                 |
| Connector Wire Length                        | 300mm                                 |                   |                   |                 |
| Connector Wire Gauge                         | 22AWG                                 |                   |                   |                 |
| Connector Wire Strand Count                  | 60/0.08                               |                   |                   |                 |
| External Dimensions                          | 35.4 x 15.0 x 32.0mm                  |                   |                   |                 |
| Weight*                                      | 38.8g                                 |                   |                   |                 |
| Ball Bearing                                 | Dual Ball Bearing                     |                   |                   |                 |
| Case Material                                | Engineering Plastic                   |                   |                   |                 |
| Gear Material                                | 1 Metal-Plastic & 4 Steel Gears       |                   |                   |                 |
| Gear Train Backlash                          | Max. 0.5°                             |                   |                   |                 |
| Horn Gear Spline                             | H25T Ø6.0                             |                   |                   |                 |
| Accessories                                  | Mounting Hardware, Servo Horn (M-I25) |                   |                   |                 |
| IP-Rating                                    | IP4X                                  |                   |                   |                 |
| Revision                                     | Rev. 1.1 / 03.01.2024                 |                   |                   |                 |
| Changelog                                    | -                                     |                   |                   |                 |
| *of the servo only w/o horns and accessories |                                       |                   |                   |                 |

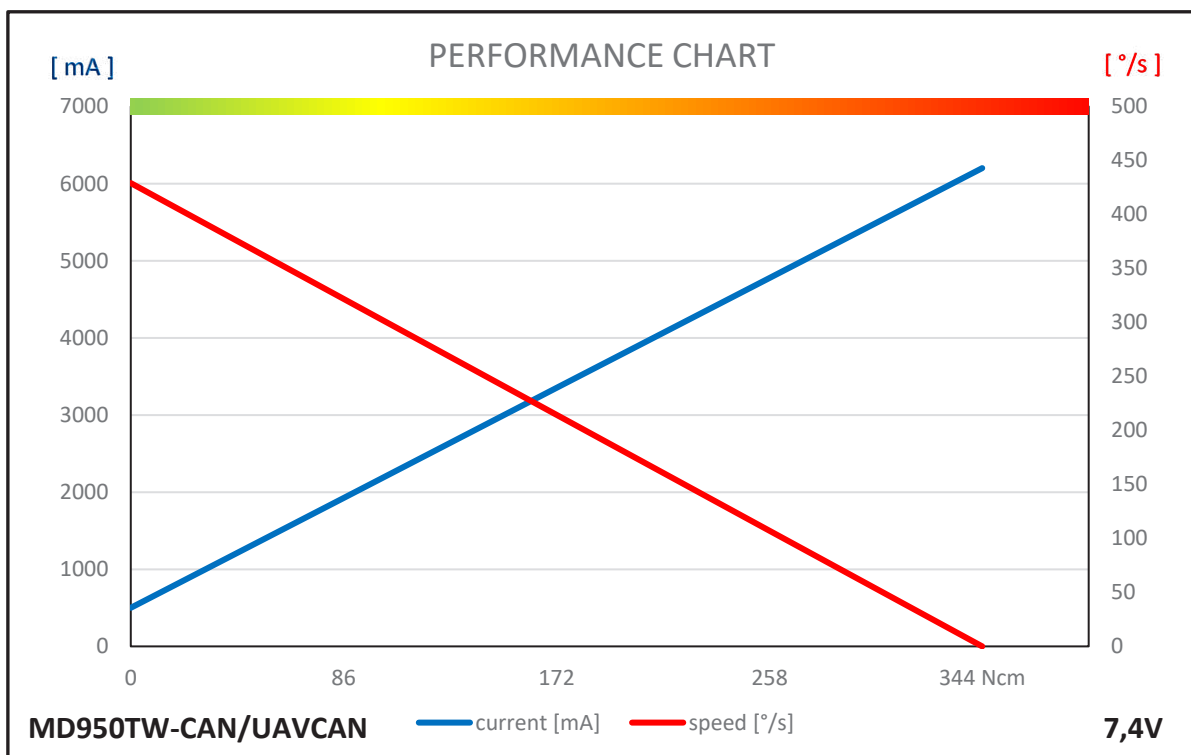
# MD950TW-CAN/UAVCAN/DroneCAN

#1-01646, #1-01647



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## PERFORMANCE CHART

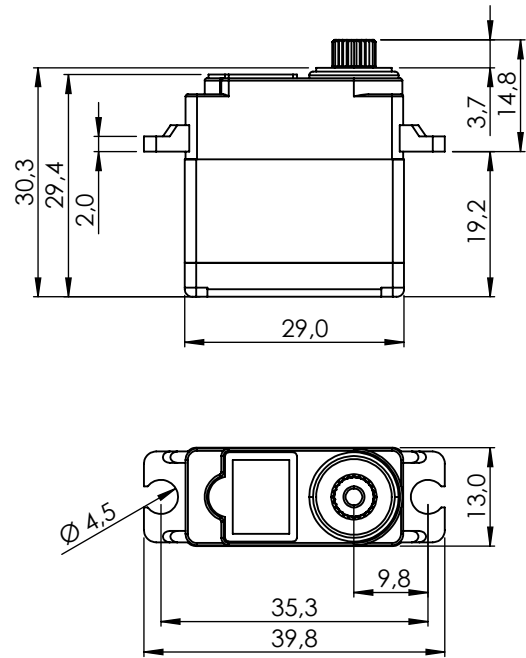


## GENERAL SPECIFICATION

| MD950TW-CAN/UAVCAN                      |  |                     |                     |                 |
|---|--|---------------------|---------------------|-----------------|
| Control System                          | CAN BUS  |                     |                     |                 |
|   | Protocol (Mode)  | Standard 2.0A       | Extended 2.0B       | UAVCAN/DroneCAN |
|   | Baud-Rate  | 10kbps ~ 1Mbps      |                     |                 |
|   | Sample-Point   | 50% or 87.5%        |                     |                 |
|   | Available SERVO ID   | 1 ~ 254             |                     | 1 ~ 127         |
|   | Available Node ID  | 1 ~ 2047            | 1 ~ 536870911       | 1 ~ 127         |
|   | Input Signal Range   | 0 ~ 5V              |                     |                 |
| Connector Type                          | Hitec 4P   |                     |                     |                 |
| Position Sensor Type                    | Contactless Magnetic Encoder                                       |                     |                     |                 |
| Motor Type                              | Coreless   |                     |                     |                 |
| Amplifier / MCU                         | 32bit programmable Digital   |                     |                     |                 |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |                     |                 |
| Operating Voltage                       | At 4.8V  | At 6.0V             | At 7.4V             |                 |
| Operating Speed at no Load              | 261°/s (44RPM)   | 353°/s (59RPM)      | 429°/s (72RPM)      |                 |
| Stall Torque                            | 21.0kgcm (206.0Ncm)  | 29.0kgcm (284.5Ncm) | 35.0kgcm (343.4Ncm) |                 |
| Peak Efficiency Torque                  | 4.2kgcm (41.2Ncm)  | 5.8kgcm (56.9Ncm)   | 7.0kgcm (68.7Ncm)   |                 |
| Rest Current                            | 30mA   | 30mA                | 30mA                |                 |
| Running Current at no Load              | 300mA  | 390mA               | 500mA               |                 |
| Stall Current                           | 3700mA   | 4800mA              | 6200mA              |                 |
| Deadband Width                          | 4Step  | 4Step               | 4Step               |                 |
| Travel                                  | Travel / Command   | 90° / 4096          |                     |                 |
|   | Servo mode   | Left                | Center              | Right           |
|   | Pos Command  | +1366               | +8192               | +15018          |
|   | Pos [°]  | -150                | 0                   | +150            |
|   | Turn Mode  | Left                | Power On            | Right           |
|   | Pos Command  | -16383              | 0                   | +16383          |
|   | Pos [°]  | -359                | 0                   | +359            |
| Turn Range                              | -32760 ~ +32760 (CAN only)   |                     |                     |                 |
| Operating Temperature Range             | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |                     |                 |
| Storage Temperature Range               | -30°C ~ +80°C (-31°F ~ +176°F)                                     |                     |                     |                 |
| Vibrations at no Load                   | MIL-STD-810G 514.6C-VII  |                     |                     |                 |
| Connector Wire Length                   | 300mm  |                     |                     |                 |
| Connector Wire Gauge                    | 20AWG  |                     |                     |                 |
| Connector Wire Strand Count             | 80/0.08  |                     |                     |                 |
| Extrenal Dimensions                     | 40.0 x 20.0 x 38.0mm   |                     |                     |                 |
| Weight*                                 | 66.4g  |                     |                     |                 |
| Ball Bearing                            | Dual Ball Bearing  |                     |                     |                 |
| Case Material                           | Engineering Plastic & Aluminum Heatsink                            |                     |                     |                 |
| Gear Material                           | 1 Metal-Plastic & 3 Titanium Alloy Gears                           |                     |                     |                 |
| Gear Train Backlash                     | Max. 0.5°  |                     |                     |                 |
| Horn Gear Spline                        | H25T Ø6.0  |                     |                     |                 |
| Accessories                             | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |                     |                 |
| IP-Rating                               | IP54   |                     |                     |                 |
| Revision                                | Rev. 1.1 / 03.01.2024  |                     |                     |                 |
| Changelog                               | -  |                     |                     |                 |
| *of the servo w/o horns and accessories |  |                     |                     |                 |

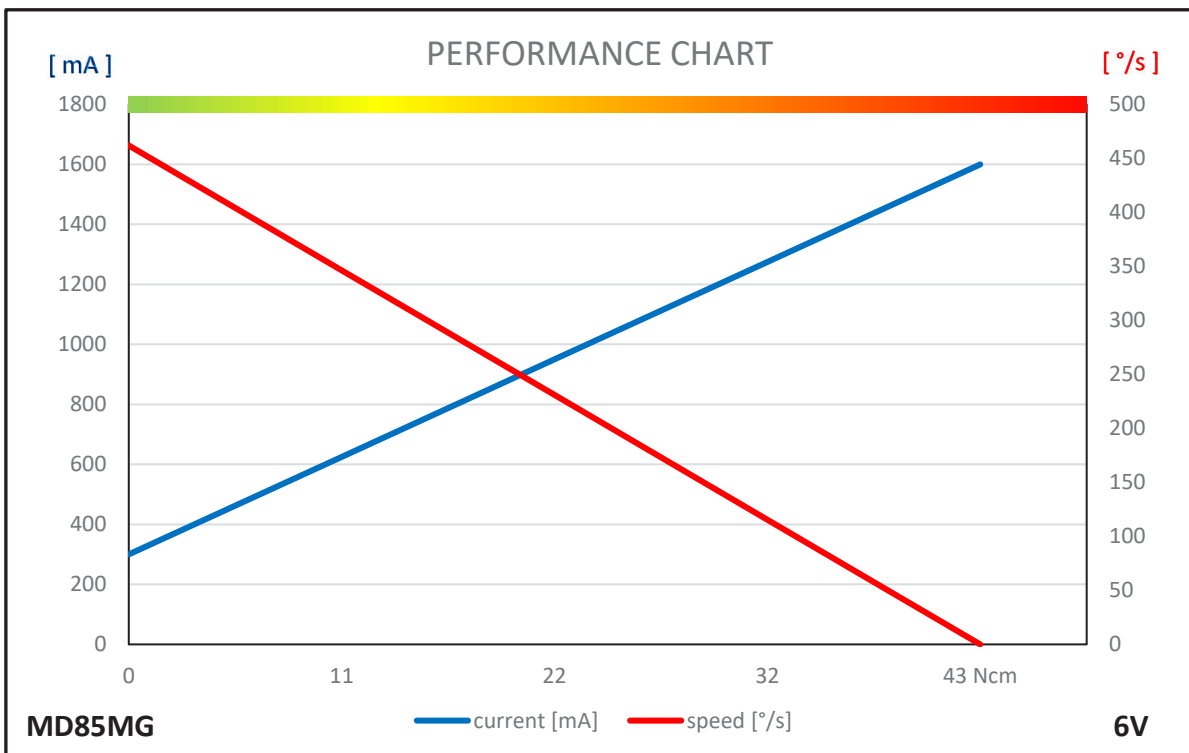
# MD85MG

#1-01656



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## PERFORMANCE CHART

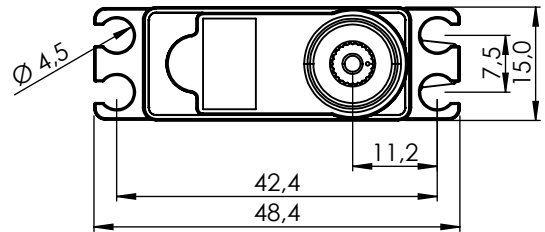
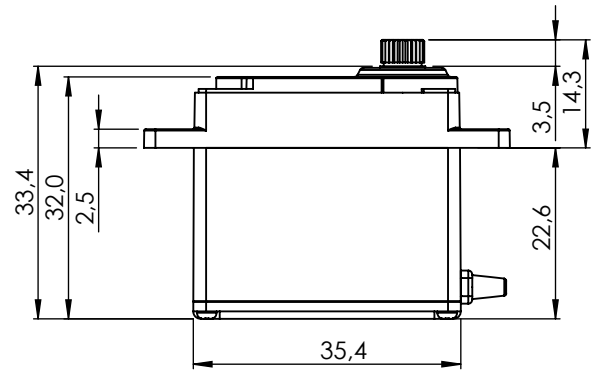


## GENERAL SPECIFICATION

| MD85MG                                       |  |                   |
|--|--|-------------------|
| Control System                               | PWM / TTL (Half Duplex)                                |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs               |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                            |                   |
| Position Sensor Type                         | Contactless Magnetic Encoder                           |                   |
| Motor Type                                   | Cored Carbon Brush                                     |                   |
| Amplifier / MCU                              | 32bit programmable Digital Amplifier with Mosfet Drive |                   |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 353°/s (59RPM)   | 462°/s (77RPM)    |
| Stall Torque                                 | 3.6kgcm (35.3Ncm)                                      | 4.3kgcm (42.2Ncm) |
| Peak Efficiency Torque                       | 0.7kgcm (6.9Ncm)                                       | 0.9kgcm (8.8Ncm)  |
| Rest Current                                 | 30mA   | 30mA              |
| Running Current at no Load                   | 260mA  | 300mA             |
| Stall Current                                | 1300mA   | 1600mA            |
| Deadband Width                               | 2µs  | 2µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable   | Max. 320°         |
|  | Multi Turn/Continuous Rotation                         | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                          |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                         |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 250mm  |                   |
| Connector Wire Gauge                         | 28AWG  |                   |
| Connector Wire Strand Count                  | 20/0.08  |                   |
| External Dimensions                          | 29.0 x 13.0 x 29.4mm                                   |                   |
| Weight*                                      | 21.5g  |                   |
| Ball Bearing                                 | Single Ball Bearing                                    |                   |
| Case Material                                | Engineering Plastic                                    |                   |
| Gear Material                                | 5 Metal Gears  |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |
| Horn Gear Spline                             | 24T Ø6.0   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I, M-X, M-O)         |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 03.01.2024                                  |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

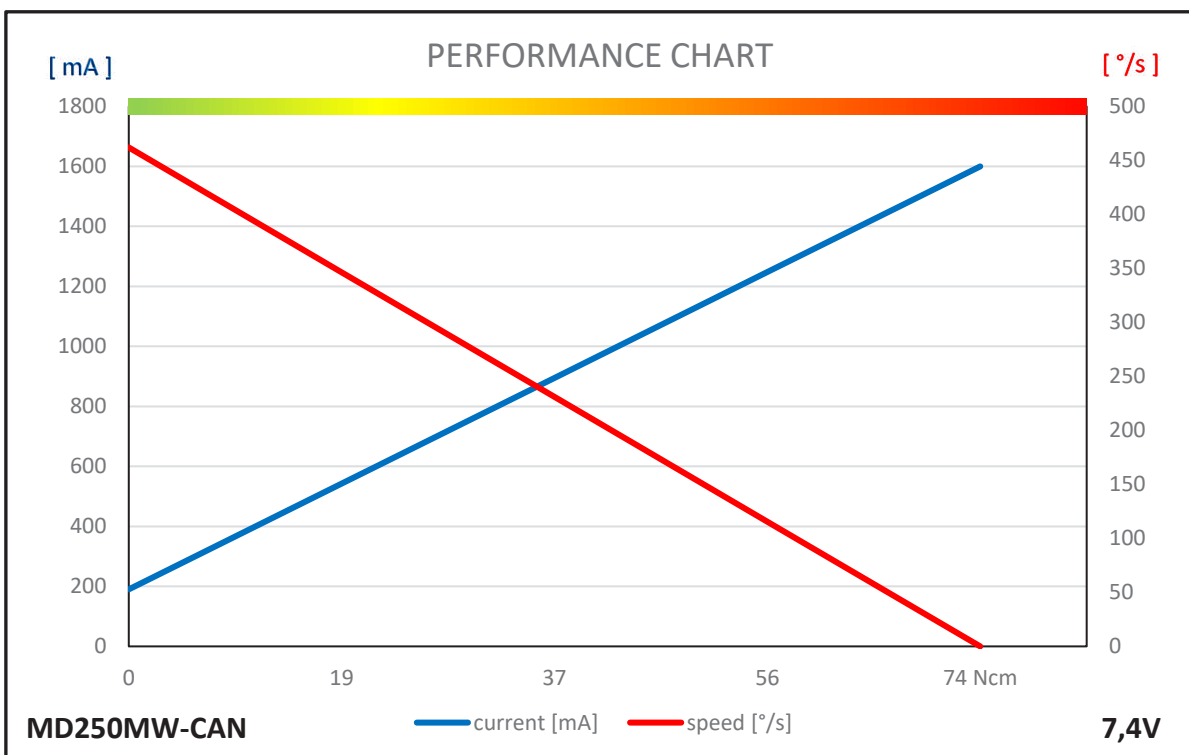
# MD250MW

#1-00707



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## PERFORMANCE CHART

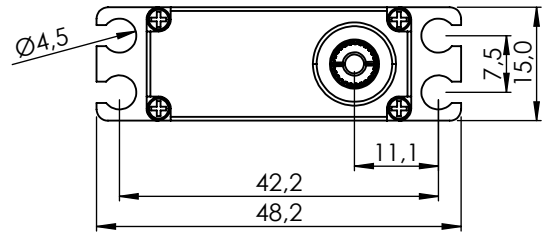
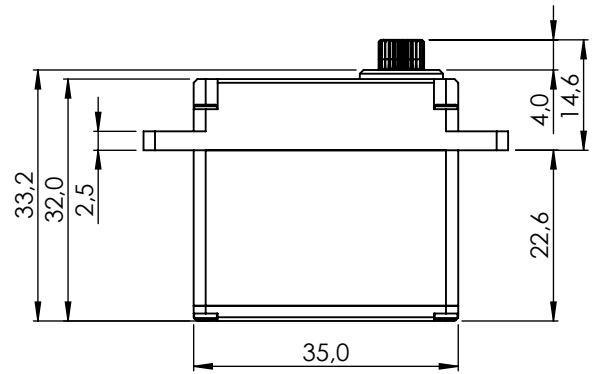


## GENERAL SPECIFICATION

| MD250MW                                      |  |                   |                   |
|--|--|-------------------|-------------------|
| Control System                               | PWM / TTL (Half Duplex)                        |                   |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs       |                   |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                    |                   |                   |
| Position Sensor Type                         | Contactless Magnetic Encoder                   |                   |                   |
| Motor Type                                   | Cored Carbon Brush                             |                   |                   |
| Amplifier / MCU                              | 32Bit programmable Digital with Mosfet Drive   |                   |                   |
| Operating Voltage Range                      | 3.5V ~ 8.4V                                    |                   |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V           |
| Operating Speed at no Load                   | 300°/s (50RPM)                                 | 375°/s (63RPM)    | 462°/s (77RPM)    |
| Stall Torque                                 | 4.9kgcm (48.1Ncm)                              | 6.1kgcm (59.8Ncm) | 7.5kgcm (73.6Ncm) |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)                               | 1.2kgcm (11.8Ncm) | 1.5kgcm (14.7Ncm) |
| Rest Current                                 | 40mA   | 40mA              | 40mA              |
| Running Current at no Load                   | 110mA  | 150mA             | 190mA             |
| Stall Current                                | 1000mA   | 1300mA            | 1600mA            |
| Deadband Width                               | 2µs  | 2µs               | 2µs               |
| Operating Travel                             | Default  | ±60°              |                   |
|  | Programmable                                   | Max. 320°         |                   |
|  | Multi Turn/Continuous Rotation                 | n/a / n/a         |                   |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                  |                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                 |                   |                   |
| Vibrations at no Load                        | -  |                   |                   |
| Connector Wire Length                        | 300mm  |                   |                   |
| Connector Wire Gauge                         | 22AWG  |                   |                   |
| Connector Wire Strand Count                  | 60/0.08  |                   |                   |
| External Dimensions                          | 35.4 x 15.0 x 32.0mm                           |                   |                   |
| Weight*                                      | 38.3g  |                   |                   |
| Ball Bearing                                 | Dual Ball Bearing                              |                   |                   |
| Case Material                                | Engineering Plastic                            |                   |                   |
| Gear Material                                | 1 Metal-Plastic & 4 Steel Gears                |                   |                   |
| Gear Train Backlash                          | Max. 0.5°                                      |                   |                   |
| Horn Gear Spline                             | H25T Ø6.0                                      |                   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I25, R-ML25) |                   |                   |
| IP-Rating                                    | IP4X   |                   |                   |
| Revision                                     | Rev. 1.1 / 03.01.2024                          |                   |                   |
| Changelog                                    | -  |                   |                   |
| *of the servo only w/o horns and accessories |  |                   |                   |

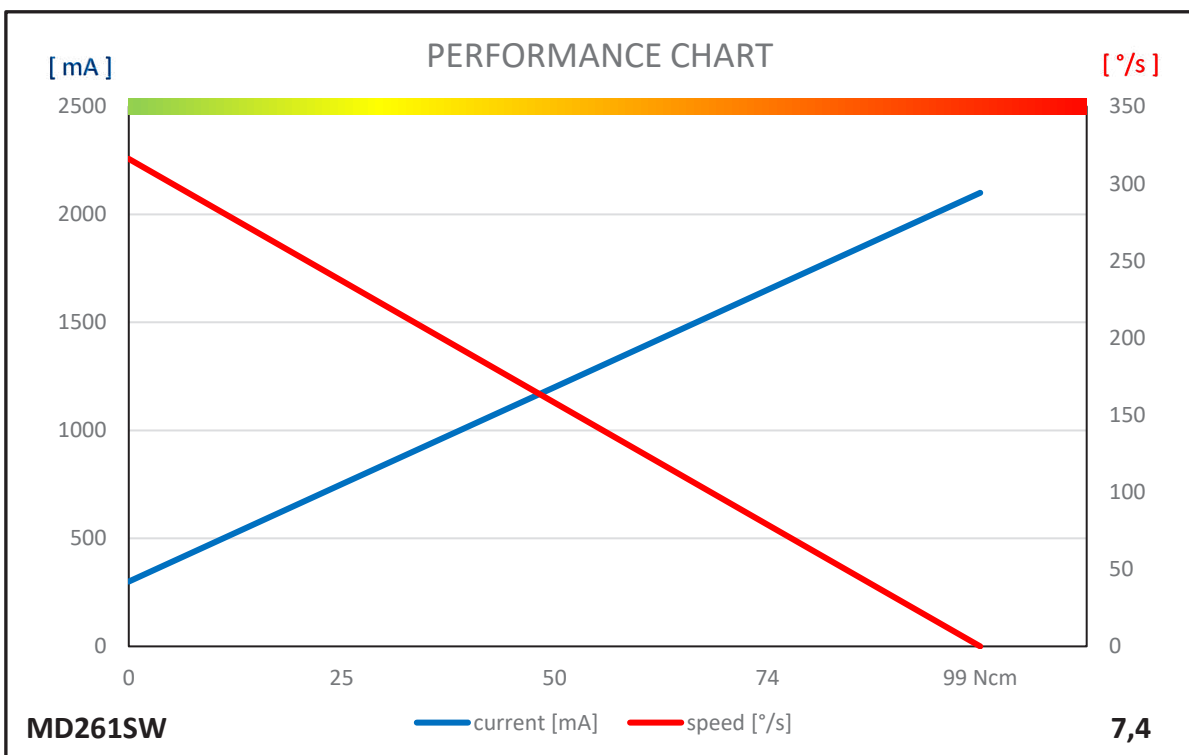
# MD261SW

#1-03052



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## PERFORMANCE CHART





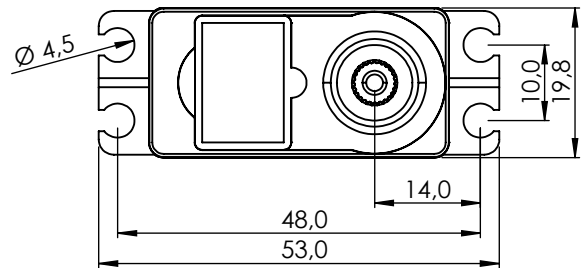
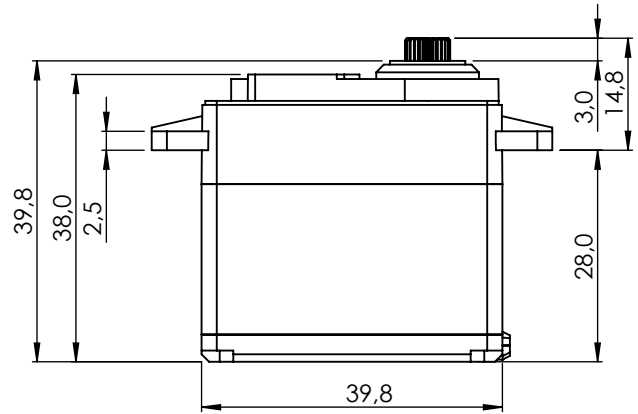
## GENERAL SPECIFICATION

| MD261SW                                      |  |                   |                    |
|--|--|-------------------|--------------------|
| Control System                               | PWM / TTL (Half Duplex)                  |                   |                    |
|  | Pulse Width 900µs 1500µs (Center) 2100µs |                   |                    |
| Connector Type                               | Hitec 3P (JR 3P compatible)              |                   |                    |
| Position Sensor Type                         | Contactless Magnetic Encoder             |                   |                    |
| Motor Type                                   | Cored Carbon Brush                       |                   |                    |
| Amplifier / MCU                              | 32bit programmable Digital               |                   |                    |
| Operating Voltage Range                      | 3.5V ~ 8.4V                              |                   |                    |
| Operating Voltage                            | At 4.8V                                  | At 6.0V           | At 7.4V            |
| Operating Speed at no Load                   | 200°/s (33RPM)                           | 261°/s (44RPM)    | 316°/s (53RPM)     |
| Stall Torque                                 | 6.5kgcm (63.7Ncm)                        | 8.1kgcm (79.5Ncm) | 10.0kgcm (98.1Ncm) |
| Peak Efficiency Torque                       | 1.3kgcm (12.8Ncm)                        | 1.6kgcm (15.7Ncm) | 2.0kgcm (19.6Ncm)  |
| Rest Current                                 | 30mA                                     | 30mA              | 30mA               |
| Running Current at no Load                   | 220mA                                    | 260mA             | 300mA              |
| Stall Current                                | 1400mA                                   | 1700mA            | 2100mA             |
| Deadband Width                               | 2µs                                      | 2µs               | 2µs                |
| Operating Travel                             | Default                                  | ±60°              |                    |
|  | Programmable                             | Max. 320°         |                    |
|  | Multi Turn/Continuous Rotation           | n/a / n/a         |                    |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)            |                   |                    |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)           |                   |                    |
| Vibrations at no Load                        | -  |                   |                    |
| Connector Wire Length                        | 300mm                                    |                   |                    |
| Connector Wire Gauge                         | 22AWG                                    |                   |                    |
| Connector Wire Strand Count                  | 60/0.08                                  |                   |                    |
| External Dimensions                          | 35.0 x 15.0 x 32.0mm                     |                   |                    |
| Weight*                                      | 50.6g                                    |                   |                    |
| Ball Bearing                                 | Dual Ball Bearing                        |                   |                    |
| Case Material                                | Aluminum Alloy                           |                   |                    |
| Gear Material                                | 5 Steel Gears                            |                   |                    |
| Gear Train Backlash                          | Max. 0.5°                                |                   |                    |
| Horn Gear Spline                             | H25T Ø6.0                                |                   |                    |
| Accessories                                  | Mounting Hardware, Servo Horn (M-I25)    |                   |                    |
| IP-Rating                                    | IP4X                                     |                   |                    |
| Revision                                     | Rev. 1.0 / 05.01.2024                    |                   |                    |
| Changelog                                    | -  |                   |                    |
| *of the servo only w/o horns and accessories |  |                   |                    |

# MD485HW

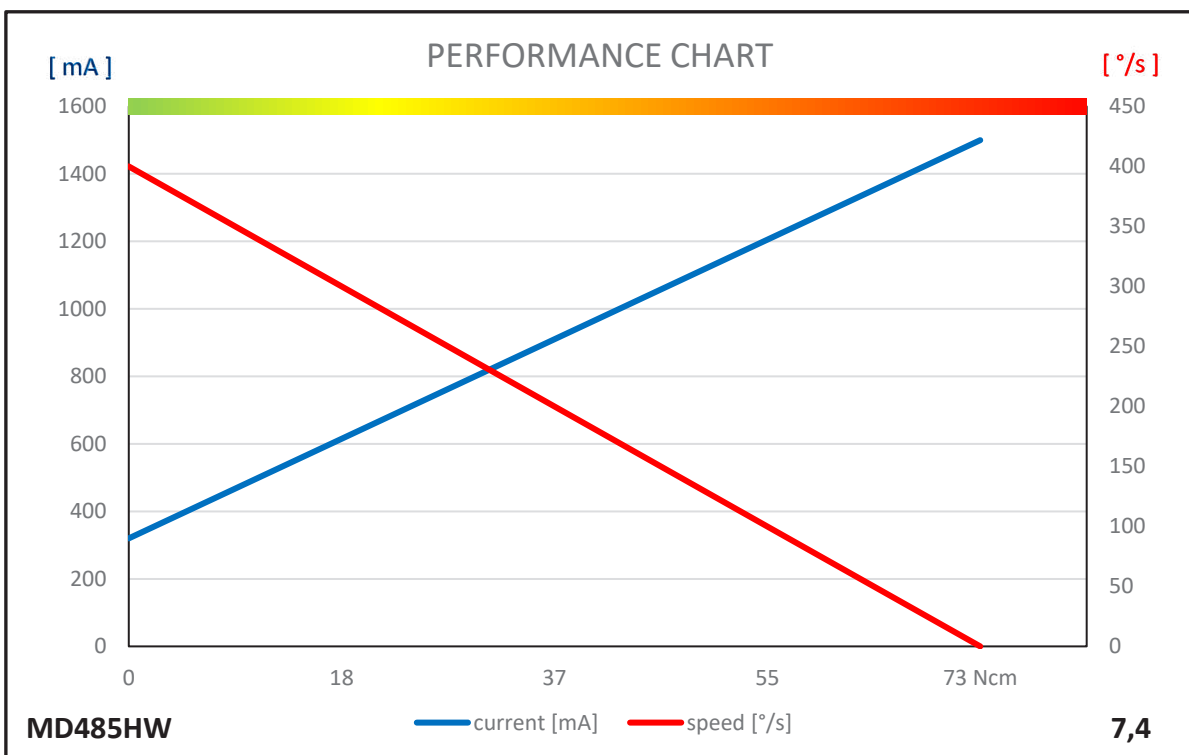
#1-01924

#1-02363 GP 30 Stück



1:1

## PERFORMANCE CHART

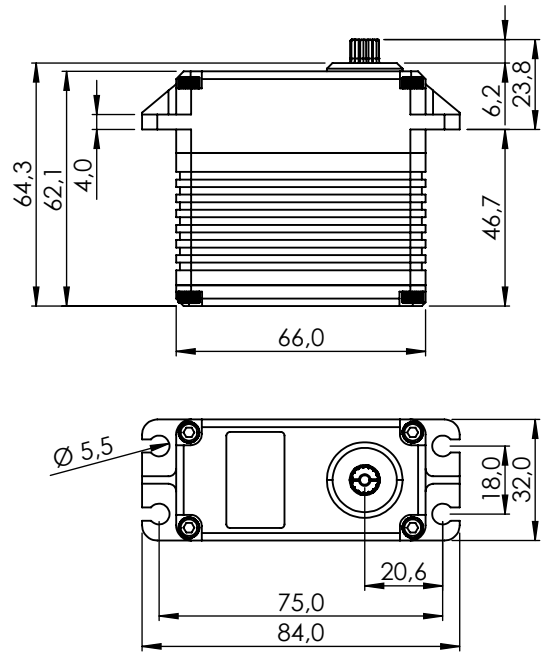


## GENERAL SPECIFICATION

| MD485HW                                      |  |                   |                   |
|--|--|-------------------|-------------------|
| Control System                               | PWM / TTL (Half Duplex)  |                   |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                           |                   |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)  |                   |                   |
| Position Sensor Type                         | Contactless Magnetic Encoder                                       |                   |                   |
| Motor Type                                   | Cored Carbon Brush   |                   |                   |
| Amplifier / MCU                              | 32bit Programmable Digital Mosfet Drive                            |                   |                   |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                   |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V           |
| Operating Speed at no Load                   | 300°/s (50RPM)   | 353°/s (59RPM)    | 400°/s (67RPM)    |
| Stall Torque                                 | 4.8kgcm (47.1Ncm)  | 6.0kgcm (58.8Ncm) | 7.4kgcm (72.6Ncm) |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)   | 1.2kgcm (11.8Ncm) | 1.5kgcm (14.7Ncm) |
| Rest Current                                 | 30mA   | 30mA              | 30mA              |
| Running Current at no Load                   | 250mA  | 280mA             | 320mA             |
| Stall Current                                | 1000mA   | 1200mA            | 1500mA            |
| Deadband Width                               | 2µs  | 2µs               | 2µs               |
| Operating Travel                             | Default  | ±60°              |                   |
|  | Programmable   | Max. 320°         |                   |
|  | Multi Turn/Continuous Rotation                                     | n/a / n/a         |                   |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                   |                   |
| Vibrations at no Load                        | -  |                   |                   |
| Connector Wire Length                        | 300mm  |                   |                   |
| Connector Wire Gauge                         | 24AWG  |                   |                   |
| Connector Wire Strand Count                  | 40/0.08  |                   |                   |
| External Dimensions                          | 39.8 x 19.8 x 38.0mm   |                   |                   |
| Weight*                                      | 43.3g  |                   |                   |
| Ball Bearing                                 | Dual Ball Bearing  |                   |                   |
| Case Material                                | Engineering Plastic  |                   |                   |
| Gear Material                                | 4 Heavy Duty Resin Gears   |                   |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |                   |
| Horn Gear Spline                             | H25T Ø6.0  |                   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                   |                   |
| IP-Rating                                    | IP4X   |                   |                   |
| Revision                                     | Rev. 1.1 / 03.01.2024  |                   |                   |
| Changelog                                    | -  |                   |                   |
| *of the servo only w/o horns and accessories |  |                   |                   |

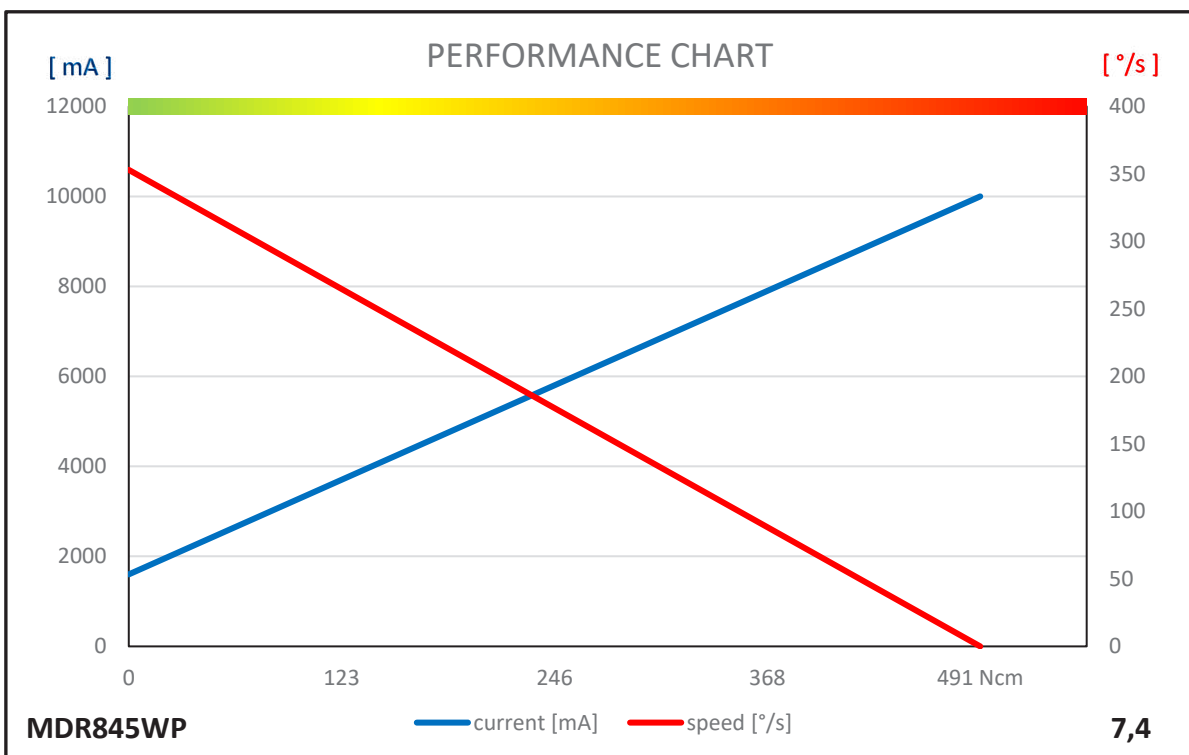
# MDR845WP

#1-01329



1:1

## PERFORMANCE CHART

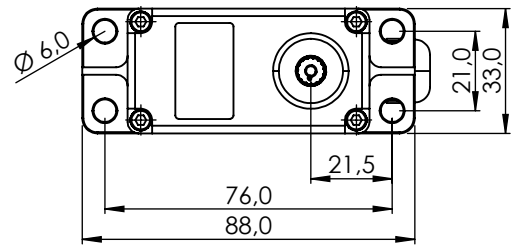
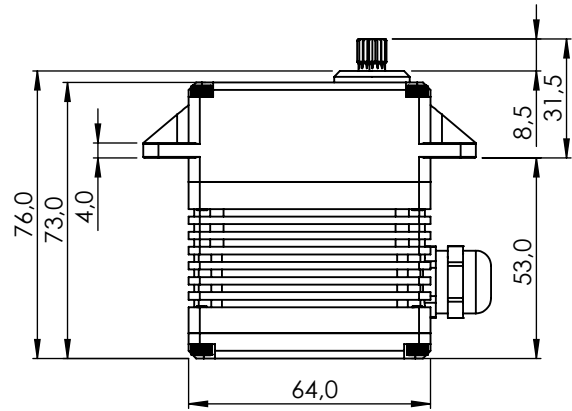


## GENERAL SPECIFICATION

| MDR845WP                                     |   |                     |                     |
|--|---|---------------------|---------------------|
| Control System                               | PWM / TTL (Half Duplex)                             |                     |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs            |                     |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)                         |                     |                     |
| Position Sensor Type                         | Contactless Magnetic Encoder                        |                     |                     |
| Motor Type                                   | Cored Carbon Brush                                  |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital                          |                     |                     |
| Operating Voltage Range                      | 4.0V ~ 8.4V   |                     |                     |
| Operating Voltage                            | At 4.8V   | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 231°/s (38RPM)                                      | 286°/s (48RPM)      | 353°/s (59RPM)      |
| Stall Torque                                 | 32.5kgcm (318.8Ncm)                                 | 40.5kgcm (397.3Ncm) | 50.0kgcm (490.5Ncm) |
| Peak Efficiency Torque                       | 6.5kgcm (63.8Ncm)                                   | 8.1kgcm (79.5Ncm)   | 10.0kgcm (98.1Ncm)  |
| Rest Current                                 | 30mA  | 30mA                | 30mA                |
| Running Current at no Load                   | 1100mA  | 1250mA              | 1600mA              |
| Stall Current                                | 6000mA  | 7000mA              | 10000mA             |
| Deadband Width                               | 2µs   | 2µs                 | 2µs                 |
| Operating Travel                             | Default   | ±1800°              |                     |
|  | Programmable  | Max. ±8 Turns       |                     |
|  | Multi Turn/Continuous Rotation                      | Yes / Yes           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                       |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                      |                     |                     |
| Vibrations at no Load                        | -   |                     |                     |
| Connector Wire Length                        | 300mm   |                     |                     |
| Connector Wire Gauge                         | 20AWG   |                     |                     |
| Connector Wire Strand Count                  | 80/0.08   |                     |                     |
| External Dimensions                          | 66.0 x 32.0 x 62.1mm                                |                     |                     |
| Weight*                                      | 229.4g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing                                   |                     |                     |
| Case Material                                | Engineering Plastic & Aluminum Heatsink             |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 4 Steel Gears                     |                     |                     |
| Gear Train Backlash                          | Max. 0.5°   |                     |                     |
| Horn Gear Spline                             | 15T Ø8.0  |                     |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (Q-MIA, Q-XA, Q-MIA) |                     |                     |
| IP-Rating                                    | IP67  |                     |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024                               |                     |                     |
| Changelog                                    | -   |                     |                     |
| *of the servo only w/o horns and accessories |   |                     |                     |

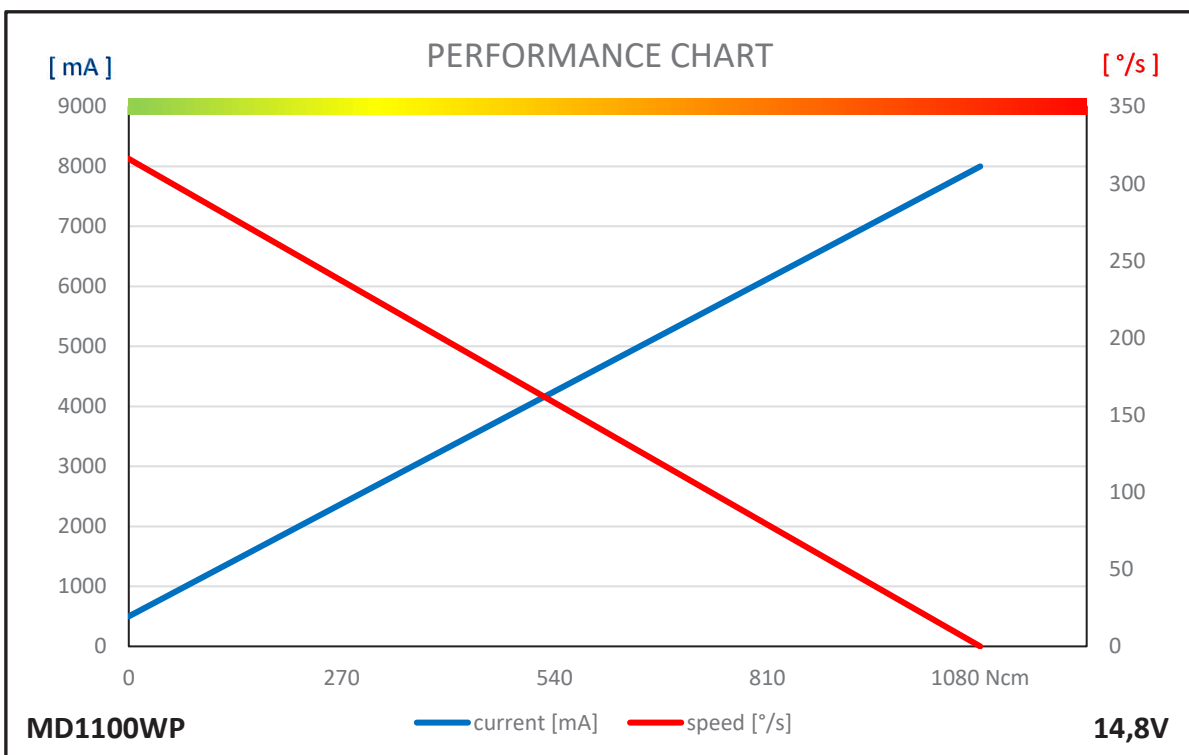
# MD1100WP

#1-01638



1:2

## PERFORMANCE CHART

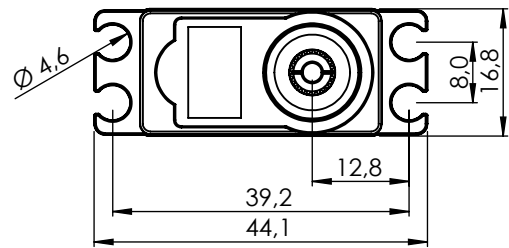
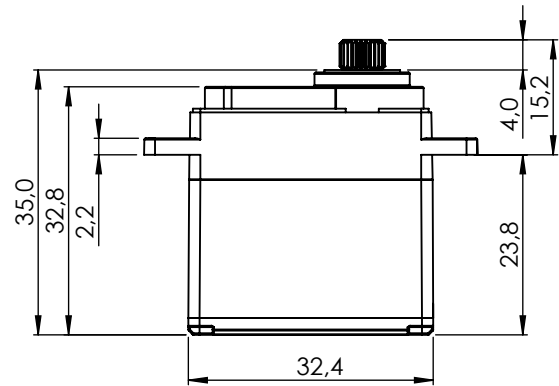


## GENERAL SPECIFICATION

| MD1100WP                                     |  |                       |
|--|--|-----------------------|
| Control System                               | PWM / TTL (Half Duplex)                      |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs     |                       |
| Connector Type                               | Hitec 3P (JR 3P compatible)                  |                       |
| Position Sensor Type                         | Contactless Magnetic Encoder                 |                       |
| Motor Type                                   | 5 Poles DC Cored Carbon Brush                |                       |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive |                       |
| Operating Voltage Range                      | 9.0V ~ 16.8V                                 |                       |
| Operating Voltage                            | At 11.1V                                     | At 14.8V              |
| Operating Speed at no Load                   | 231°/s (38RPM)                               | 316°/s (53RPM)        |
| Stall Torque                                 | 84.0kgcm (824.0Ncm)                          | 110.0kgcm (1079.1Ncm) |
| Peak Efficiency Torque                       | 16.8kgcm (164.8Ncm)                          | 22.0kgcm (215.8Ncm)   |
| Rest Current                                 | 90mA   | 90mA                  |
| Running Current at no Load                   | 550mA  | 500mA                 |
| Stall Current                                | 6500mA                                       | 8000mA                |
| Deadband Width                               | 2µs  | 2µs                   |
| Operating Travel                             | Default                                      | ±60°                  |
|  | Programmable                                 | Max. 320°             |
|  | Multi Turn/Continuous Rotation               | n/a / n/a             |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                |                       |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)               |                       |
| Vibrations at no Load                        | IEC-60068-2-64                               |                       |
| Connector Wire Length                        | 270mm  |                       |
| Connector Wire Gauge                         | 18AWG (Signal: 20AWG)                        |                       |
| Connector Wire Strand Count                  | 120/0.08 (80/0.08)                           |                       |
| External Dimensions                          | 64.0 x 33.0 x 73.0mm                         |                       |
| Weight*                                      | 324.3g                                       |                       |
| Ball Bearing                                 | Dual Ball Bearing & Dual Needle Bearing      |                       |
| Case Material                                | Rugged Aluminum Alloy                        |                       |
| Gear Material                                | 1 Metal-Plastic & 3 Hardened Steel Gears     |                       |
| Gear Train Backlash                          | Max. 0.5°                                    |                       |
| Horn Gear Spline                             | 15T Ø8.0                                     |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MO)         |                       |
| IP-Rating                                    | IP67   |                       |
| Revision                                     | Rev. 1.1 / 03.01.2024                        |                       |
| Changelog                                    | -  |                       |
| *of the servo w/o only horns and accessories |  |                       |

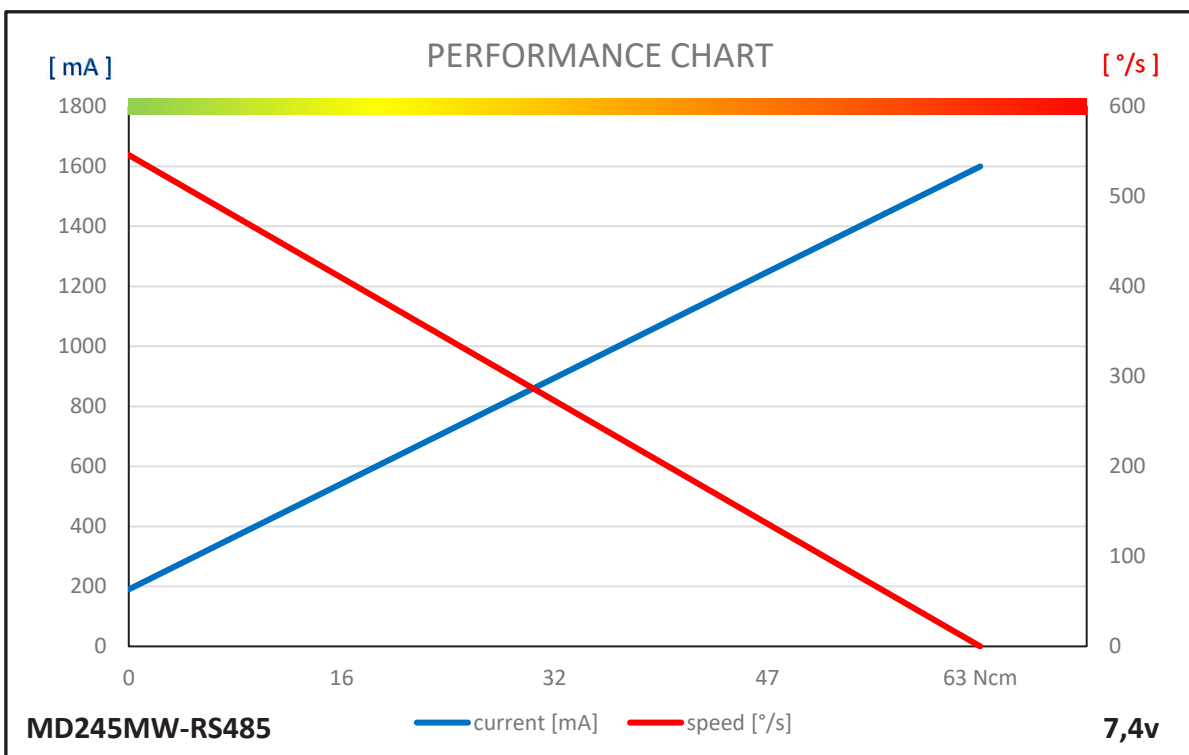
# MD245MW-RS485

#1-01677



1:1

## PERFORMANCE CHART



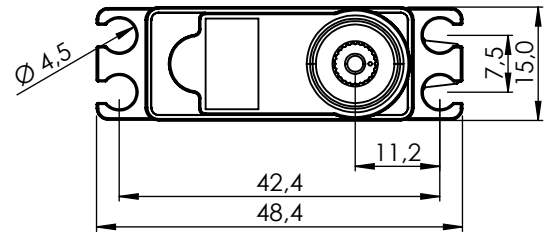
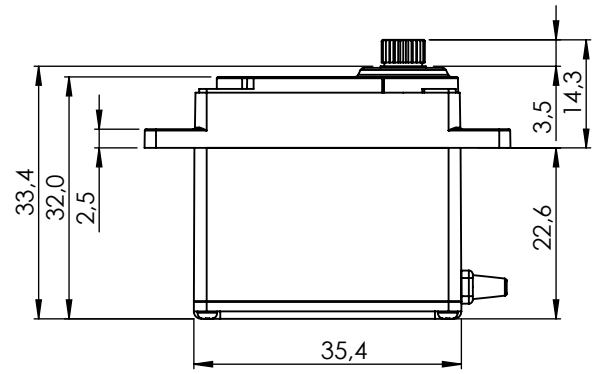


## GENERAL SPECIFICATION

| MD245MW-RS485                                |                                       |                   |                   |
|--|---------------------------------------|-------------------|-------------------|
| Control System                               | RS485                                 |                   |                   |
|  | Pulse Width -                         |                   |                   |
| Connector Type                               | Hitec 4P                              |                   |                   |
| Position Sensor Type                         | Contactless Magnetic Encoder          |                   |                   |
| Motor Type                                   | Coreless                              |                   |                   |
| Amplifier / MCU                              | 32bit programmable Digital            |                   |                   |
| Operating Voltage Range                      | 4.0V ~ 8.4V                           |                   |                   |
| Operating Voltage                            | At 4.8V                               | At 6.0V           | At 7.4V           |
| Operating Speed at no Load                   | 353°/s (59RPM)                        | 462°/s (77RPM)    | 546°/s (91RPM)    |
| Stall Torque                                 | 4.2kgcm (41.2Ncm)                     | 5.2kgcm (51.0Ncm) | 6.4kgcm (62.8Ncm) |
| Peak Efficiency Torque                       | 0.9kgcm (8.8Ncm)                      | 1.0kgcm (9.8Ncm)  | 1.3kgcm (12.8Ncm) |
| Rest Current                                 | 30mA                                  | 30mA              | 30mA              |
| Running Current at no Load                   | 110mA                                 | 150mA             | 190mA             |
| Stall Current                                | 1000mA                                | 1300mA            | 1600mA            |
| Deadband Width                               | n/a                                   | n/a               | n/a               |
| Operating Travel                             | Default                               | ±60°              |                   |
|  | Programmable                          | Max. 320°         |                   |
|  | Multi Turn/Continuous Rotation        | n/a / n/a         |                   |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)         |                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)        |                   |                   |
| Vibrations at no Load                        | -                                     |                   |                   |
| Connector Wire Length                        | 300mm                                 |                   |                   |
| Connector Wire Gauge                         | 22AWG                                 |                   |                   |
| Connector Wire Strand Count                  | 60/0.08                               |                   |                   |
| External Dimensions                          | 32.4 x 16.8 x 32.8mm                  |                   |                   |
| Weight*                                      | 35.2g                                 |                   |                   |
| Ball Bearing                                 | Dual Ball Bearing                     |                   |                   |
| Case Material                                | Engineering Plastic                   |                   |                   |
| Gear Material                                | 1 Metal-Plastic & 3 Metal Gears       |                   |                   |
| Gear Train Backlash                          | Max. 0.5°                             |                   |                   |
| Horn Gear Spline                             | H25T Ø6.0                             |                   |                   |
| Accessories                                  | Mounting Hardware, Servo Horn (M-025) |                   |                   |
| IP-Rating                                    | IP4X                                  |                   |                   |
| Revision                                     | Rev. 1.0 / 05.01.2024                 |                   |                   |
| Changelog                                    | -                                     |                   |                   |
| *of the servo only w/o horns and accessories |                                       |                   |                   |

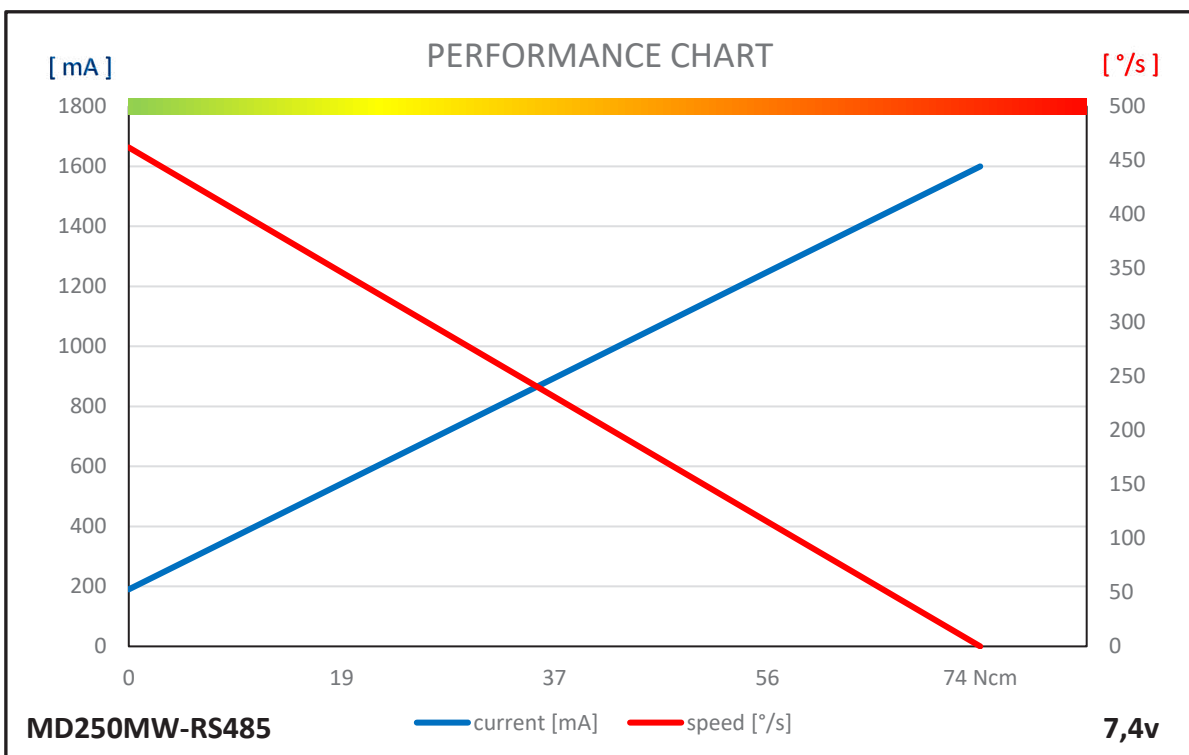
# MD250MW-RS485

#1-01676



1:1

## PERFORMANCE CHART

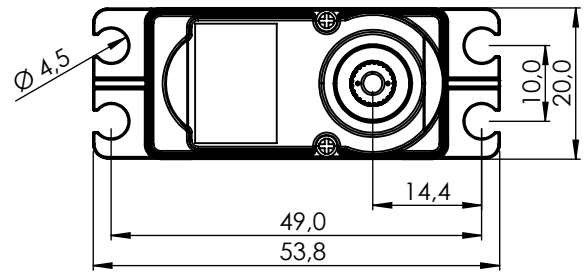
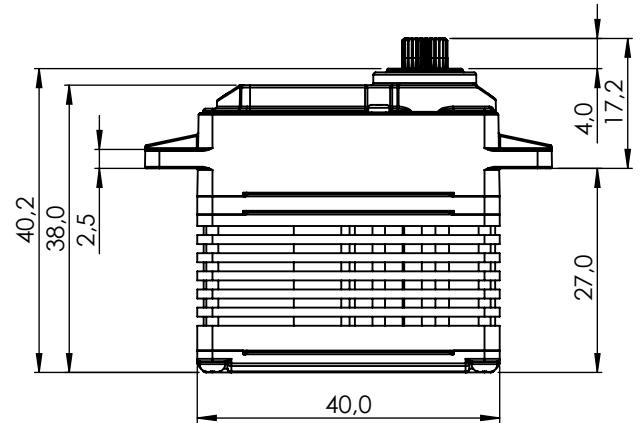


## GENERAL SPECIFICATION

| MD250MW-RS485                                |                                       |                   |                   |
|--|---------------------------------------|-------------------|-------------------|
| Control System                               | RS485                                 |                   |                   |
|  | Pulse Width -                         |                   |                   |
| Connector Type                               | Hitec 4P                              |                   |                   |
| Position Sensor Type                         | Contactless Magnetic Encoder          |                   |                   |
| Motor Type                                   | Cored Carbon Brush                    |                   |                   |
| Amplifier / MCU                              | 32bit programmable Digital            |                   |                   |
| Operating Voltage Range                      | 4.0V ~ 8.4V                           |                   |                   |
| Operating Voltage                            | At 4.8V                               | At 6.0V           | At 7.4V           |
| Operating Speed at no Load                   | 300°/s (50RPM)                        | 375°/s (63RPM)    | 462°/s (77RPM)    |
| Stall Torque                                 | 4.9kgcm (48.1Ncm)                     | 6.1kgcm (59.8Ncm) | 7.5kgcm (73.6Ncm) |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)                      | 1.2kgcm (11.8Ncm) | 1.5kgcm (14.7Ncm) |
| Rest Current                                 | 40mA                                  | 40mA              | 40mA              |
| Running Current at no Load                   | 110mA                                 | 150mA             | 190mA             |
| Stall Current                                | 1000mA                                | 1300mA            | 1600mA            |
| Deadband Width                               | n/a                                   | n/a               | n/a               |
| Operating Travel                             | Default                               | ±60°              |                   |
|  | Programmable                          | Max. 320°         |                   |
|  | Multi Turn/Continuous Rotation        | n/a / n/a         |                   |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)         |                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)        |                   |                   |
| Vibrations at no Load                        | -                                     |                   |                   |
| Connector Wire Length                        | 300mm                                 |                   |                   |
| Connector Wire Gauge                         | 22AWG                                 |                   |                   |
| Connector Wire Strand Count                  | 60/0.08                               |                   |                   |
| External Dimensions                          | 35.4 x 15.0 x 32.0mm                  |                   |                   |
| Weight*                                      | 40.0g                                 |                   |                   |
| Ball Bearing                                 | Dual Ball Bearing                     |                   |                   |
| Case Material                                | Engineering Plastic                   |                   |                   |
| Gear Material                                | 1 Metal-Plastic & 4 Steel Gears       |                   |                   |
| Gear Train Backlash                          | Max. 0.5°                             |                   |                   |
| Horn Gear Spline                             | H25T Ø6.0                             |                   |                   |
| Accessories                                  | Mounting Hardware, Servo Horn (M-I25) |                   |                   |
| IP-Rating                                    | IP4X                                  |                   |                   |
| Revision                                     | Rev. 1.0 / 05.01.2024                 |                   |                   |
| Changelog                                    | -                                     |                   |                   |
| *of the servo only w/o horns and accessories |                                       |                   |                   |

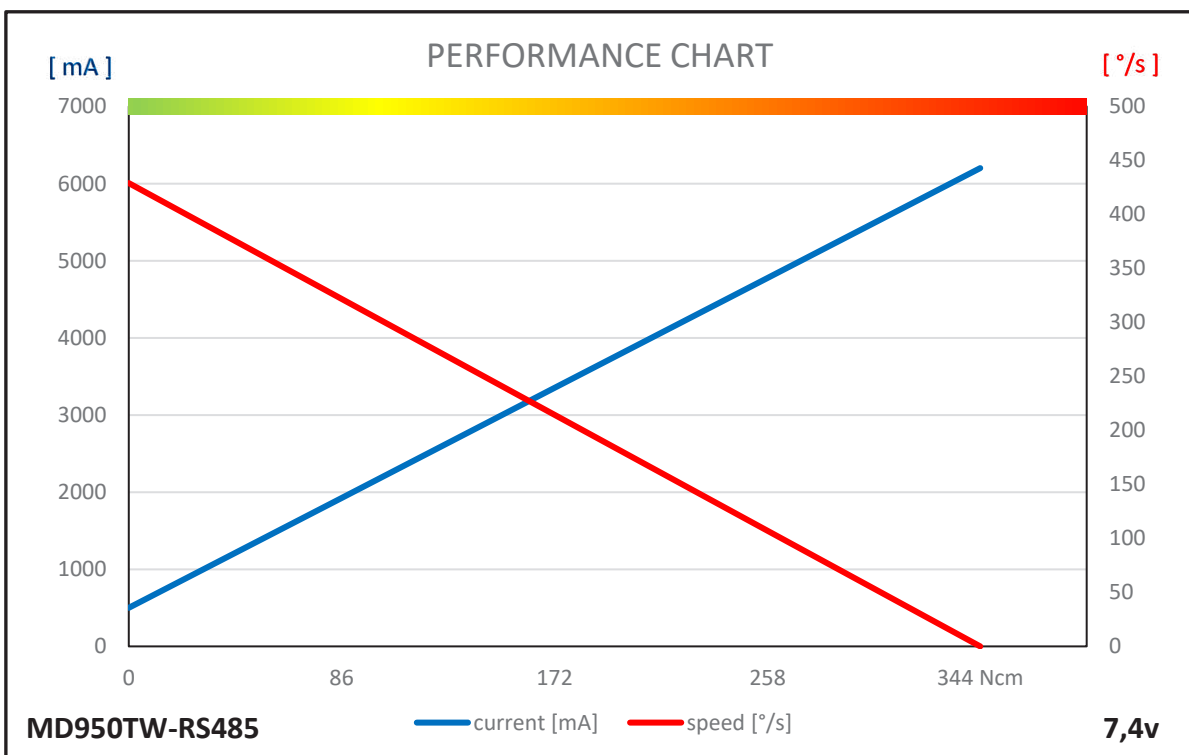
# MD950TW-RS485

#1-01675



1:1

## PERFORMANCE CHART

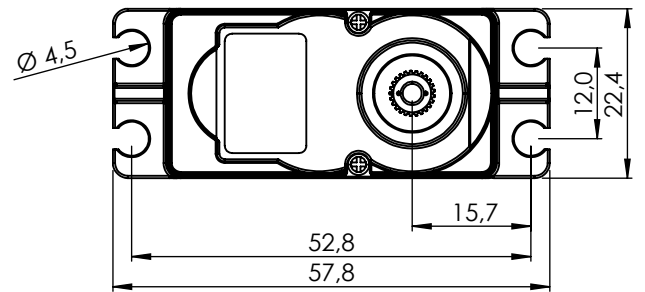
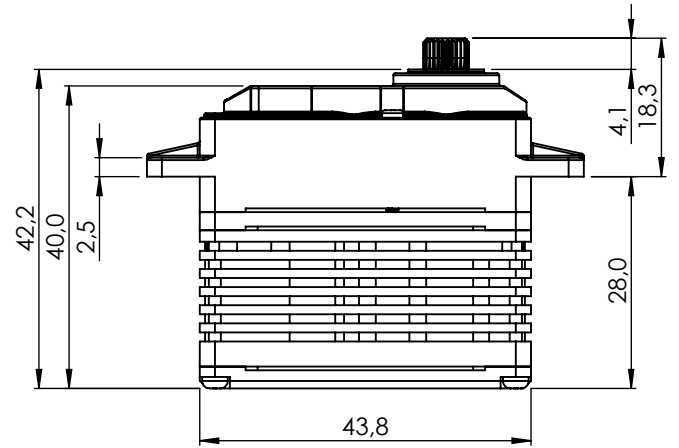


## GENERAL SPECIFICATION

| MD950TW-RS485                                |  |                     |                     |
|--|--|---------------------|---------------------|
| Control System                               | RS485  |                     |                     |
|  | Pulse Width -  |                     |                     |
| Connector Type                               | Hitec 4P   |                     |                     |
| Position Sensor Type                         | Contactless Magnetic Encoder                                       |                     |                     |
| Motor Type                                   | Coreless   |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital   |                     |                     |
| Operating Voltage Range                      | 4.0V ~ 8.4V  |                     |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 261°/s (44RPM)   | 353°/s (59RPM)      | 429°/s (71RPM)      |
| Stall Torque                                 | 21.0kgcm (206.0Ncm)  | 29.0kgcm (284.5Ncm) | 35.0kgcm (343.4Ncm) |
| Peak Efficiency Torque                       | 4.2kgcm (41.2Ncm)  | 5.8kgcm (56.9Ncm)   | 7.0kgcm (68.7Ncm)   |
| Rest Current                                 | 30mA   | 30mA                | 30mA                |
| Running Current at no Load                   | 300mA  | 390mA               | 500mA               |
| Stall Current                                | 3700mA   | 4800mA              | 6200mA              |
| Deadband Width                               | n/a  | n/a                 | n/a                 |
| Operating Travel                             | Default  | ±60°                |                     |
|  | Programmable   | Max. 320°           |                     |
|  | Multi Turn/Continuous Rotation                                     | n/a / n/a           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                     |                     |
| Vibrations at no Load                        | -  |                     |                     |
| Connector Wire Length                        | 300mm  |                     |                     |
| Connector Wire Gauge                         | 20AWG  |                     |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |                     |
| External Dimensions                          | 40.0 x 20.0 x 38.0mm   |                     |                     |
| Weight*                                      | 66.3g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                     |                     |
| Case Material                                | Engineering plastic & Aluminum Heatsink                            |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Titanium Alloy Gears                           |                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |                     |
| IP-Rating                                    | IP54   |                     |                     |
| Revision                                     | Rev. 1.0 / 05.01.2024  |                     |                     |
| Changelog                                    | -  |                     |                     |
| *of the servo only w/o horns and accessories |  |                     |                     |

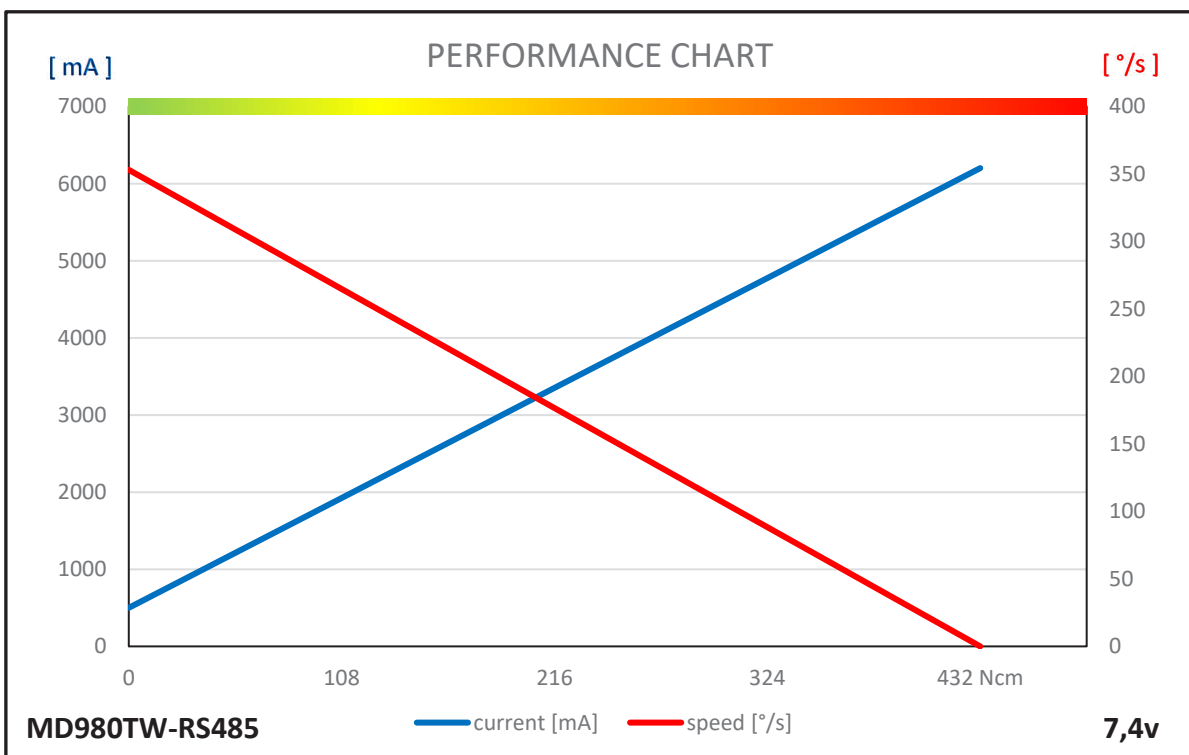
# MD980TW-RS485

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## PERFORMANCE CHART



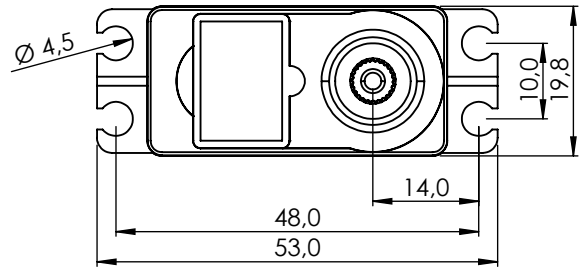
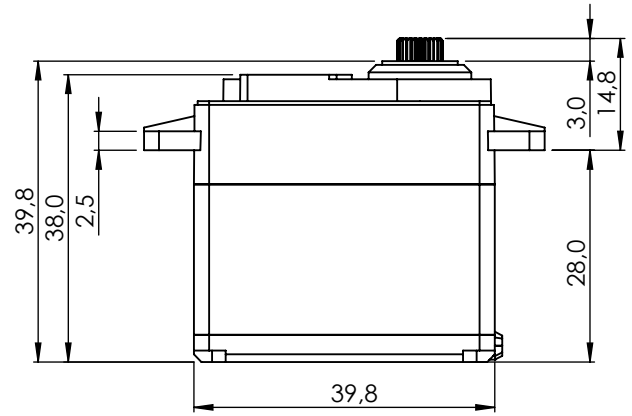
## GENERAL SPECIFICATION

| MD980TW-RS485                                |  |                     |                     |
|--|--|---------------------|---------------------|
| Control System                               | RS485  |                     |                     |
|  | Pulse Width -  |                     |                     |
| Connector Type                               | Hitec 4P   |                     |                     |
| Position Sensor Type                         | Contactless Magnetic Encoder   |                     |                     |
| Motor Type                                   | Coreless   |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital   |                     |                     |
| Operating Voltage Range                      | 4.0V ~ 8.4V  |                     |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 214°/s (36RPM)   | 286°/s (48RPM)      | 353°/s (59RPM)      |
| Stall Torque                                 | 26.0kgcm (255.1Ncm)  | 36.0kgcm (353.2Ncm) | 44.0kgcm (431.6Ncm) |
| Peak Efficiency Torque                       | 5.2kgcm (51.0Ncm)  | 7.2kgcm (70.6Ncm)   | 8.8kgcm (86.3Ncm)   |
| Rest Current                                 | 30mA   | 30mA                | 30mA                |
| Running Current at no Load                   | 300mA  | 390mA               | 500mA               |
| Stall Current                                | 4200mA   | 4800mA              | 6200mA              |
| Deadband Width                               | n/a  | n/a                 | n/a                 |
| Operating Travel                             | Default  | ±60°                |                     |
|  | Programmable   | Max. 320°           |                     |
|  | Multi Turn/Continuous Rotation   | n/a / n/a           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)  |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)   |                     |                     |
| Vibrations at no Load                        | -  |                     |                     |
| Connector Wire Length                        | 300mm  |                     |                     |
| Connector Wire Gauge                         | 20AWG  |                     |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |                     |
| External Dimensions                          | 43.8 x 22.4 x 40.0mm   |                     |                     |
| Weight*                                      | 76.7g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                     |                     |
| Case Material                                | Engineering plastic  |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Titanium Alloy Gears   |                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25, HD-IL25, HD-LL25, HD-IG25, HD-LG25) |                     |                     |
| IP-Rating                                    | IP54   |                     |                     |
| Revision                                     | Rev. 1.0 / 08.01.2024  |                     |                     |
| Changelog                                    | -  |                     |                     |
| *of the servo only w/o horns and accessories |  |                     |                     |

# D485HW

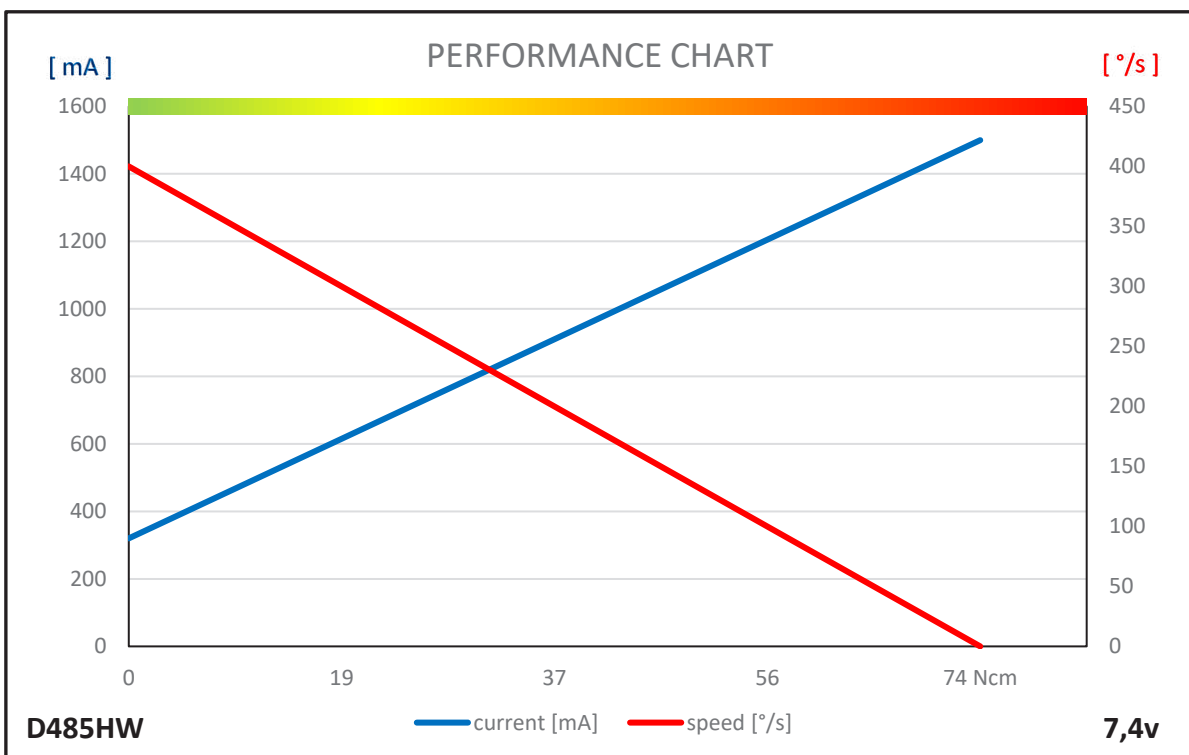
#1-00066

#1-02362 GP 30 Stück



1:1

## PERFORMANCE CHART





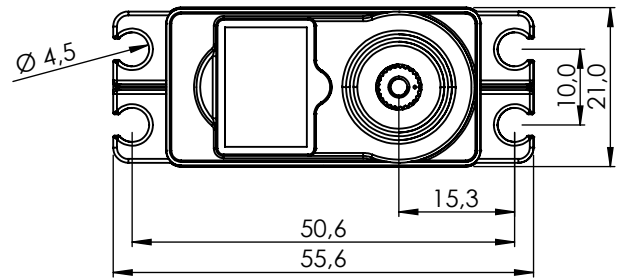
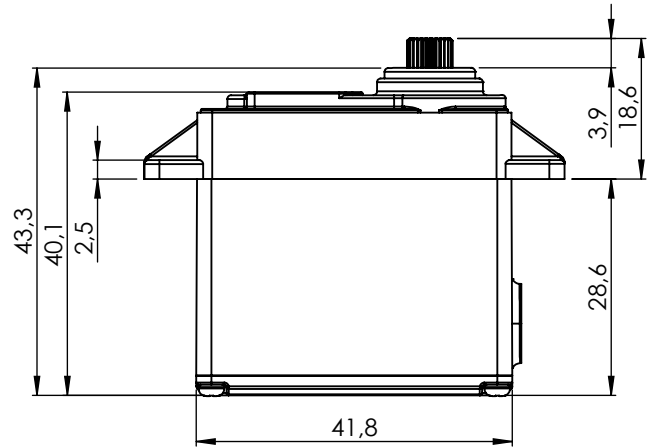
## GENERAL SPECIFICATION

| D485HW                                       |  |                   |                   |
|--|--|-------------------|-------------------|
| Control System                               | PWM / TTL (Half Duplex)  |                   |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                           |                   |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)  |                   |                   |
| Position Sensor Type                         | Indirect Drive / 1M Cycle Long Life                                |                   |                   |
| Motor Type                                   | Cored Metal Brush  |                   |                   |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive                       |                   |                   |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                   |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V           |
| Operating Speed at no Load                   | 300°/s (50RPM)   | 353°/s (59RPM)    | 400°/s (67RPM)    |
| Stall Torque                                 | 5.2kgcm (51.0Ncm)  | 6.4kgcm (62.8Ncm) | 7.5kgcm (73.6Ncm) |
| Peak Efficiency Torque                       | 1.0kgcm (9.8Ncm)   | 1.3kgcm (12.8Ncm) | 1.5kgcm (14.7Ncm) |
| Rest Current                                 | 30mA   | 30mA              | 30mA              |
| Running Current at no Load                   | 250mA  | 280mA             | 320mA             |
| Stall Current                                | 1000mA   | 1200mA            | 1500mA            |
| Deadband Width                               | 2µs  | 2µs               | 2µs               |
| Operating Travel                             | Default  | ±60°              |                   |
|  | Programmable   | Max. 175°         |                   |
|  | Multi Turn/Continuous Rotation                                     | n/a / n/a         |                   |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                   |                   |
| Vibrations at no Load                        | -  |                   |                   |
| Connector Wire Length                        | 300mm  |                   |                   |
| Connector Wire Gauge                         | 24AWG  |                   |                   |
| Connector Wire Strand Count                  | 40/0.08  |                   |                   |
| External Dimensions                          | 39.8 x 19.8 x 38.0mm   |                   |                   |
| Weight*                                      | 45.0g  |                   |                   |
| Ball Bearing                                 | Dual Ball Bearing  |                   |                   |
| Case Material                                | Engineering Plastic  |                   |                   |
| Gear Material                                | 4 Heavy Duty Resin Gears   |                   |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |                   |
| Horn Gear Spline                             | H25T Ø6.0  |                   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                   |                   |
| IP-Rating                                    | IP54   |                   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024  |                   |                   |
| Changelog                                    | -  |                   |                   |
| *of the servo only w/o horns and accessories |  |                   |                   |

# D646WP

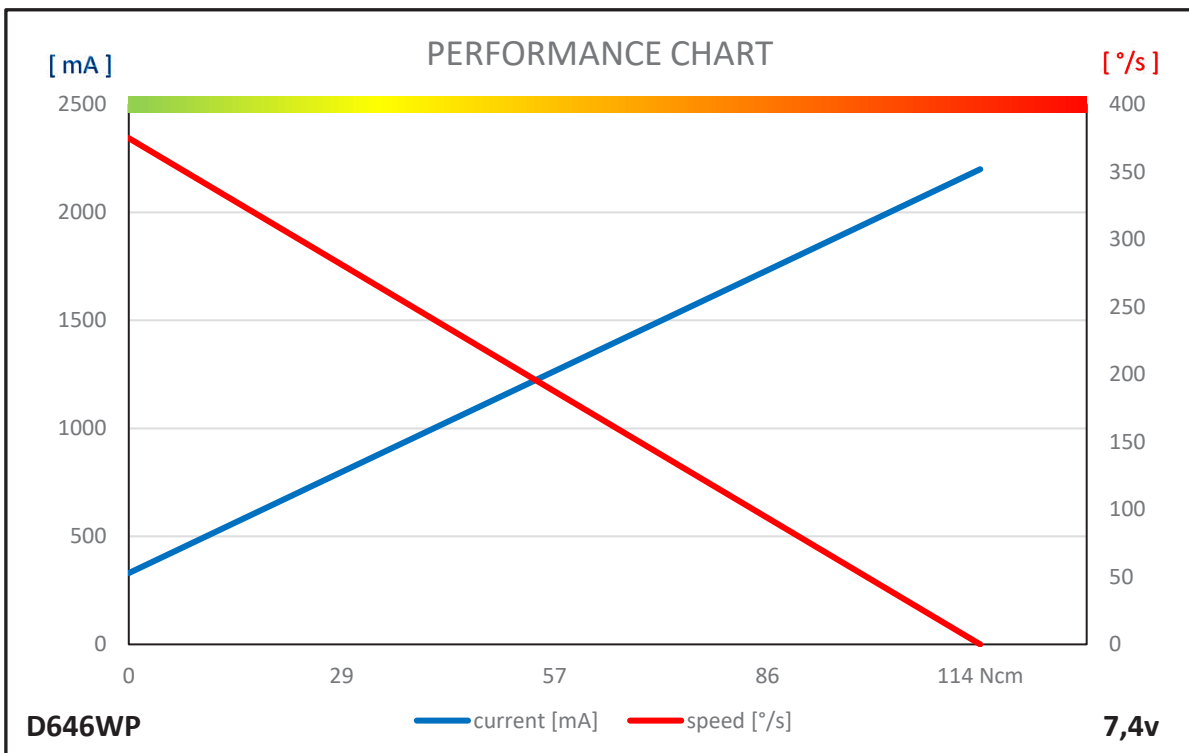
#1-00072

#1-02354 GP 24 Stück



1:1

## PERFORMANCE CHART

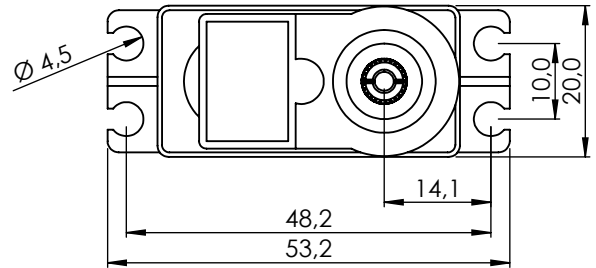
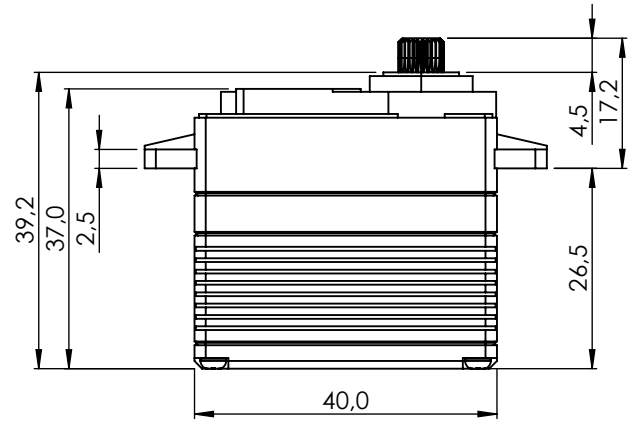


## GENERAL SPECIFICATION

| D646WP                                       |  |                   |                     |
|--|--|-------------------|---------------------|
| Control System                               | PWM / TTL (Half Duplex)  |                   |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                           |                   |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)  |                   |                     |
| Position Sensor Type                         | Contact Analog / 4 Slider / 1M Cycle Long Life                     |                   |                     |
| Motor Type                                   | Cored Carbon Brush   |                   |                     |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive                       |                   |                     |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                   |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V           | At 7.4V             |
| Operating Speed at no Load                   | 250°/s (42RPM)   | 316°/s (33RPM)    | 375°/s (63RPM)      |
| Stall Torque                                 | 7.5kgcm (73.6Ncm)  | 9.6kgcm (94.2Ncm) | 11.6kgcm (113.8Ncm) |
| Peak Efficiency Torque                       | 1.5kgcm (14.7Ncm)  | 1.9kgcm (18.6Ncm) | 2.3kgcm (22.6Ncm)   |
| Rest Current                                 | 30mA   | 30mA              | 30mA                |
| Running Current at no Load                   | 270mA  | 300mA             | 330mA               |
| Stall Current                                | 1500mA   | 1800mA            | 2200mA              |
| Deadband Width                               | 2µs  | 2µs               | 2µs                 |
| Operating Travel                             | Default  | ±60°              |                     |
|  | Programmable   | Max. 170°         |                     |
|  | Multi Turn/Continuous Rotation                                     | n/a / n/a         |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                   |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                   |                     |
| Vibrations at no Load                        | -  |                   |                     |
| Connector Wire Length                        | 300mm  |                   |                     |
| Connector Wire Gauge                         | 22AWG  |                   |                     |
| Connector Wire Strand Count                  | 60/0.08  |                   |                     |
| External Dimensions                          | 41.8 x 21.0 x 40.1mm   |                   |                     |
| Weight*                                      | 61.0g  |                   |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                   |                     |
| Case Material                                | Engineering Plastic  |                   |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Metal Gears                                    |                   |                     |
| Gear Train Backlash                          | Max. 0.5°  |                   |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                   |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                   |                     |
| IP-Rating                                    | IP67   |                   |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024  |                   |                     |
| Changelog                                    | -  |                   |                     |
| *of the servo only w/o horns and accessories |  |                   |                     |

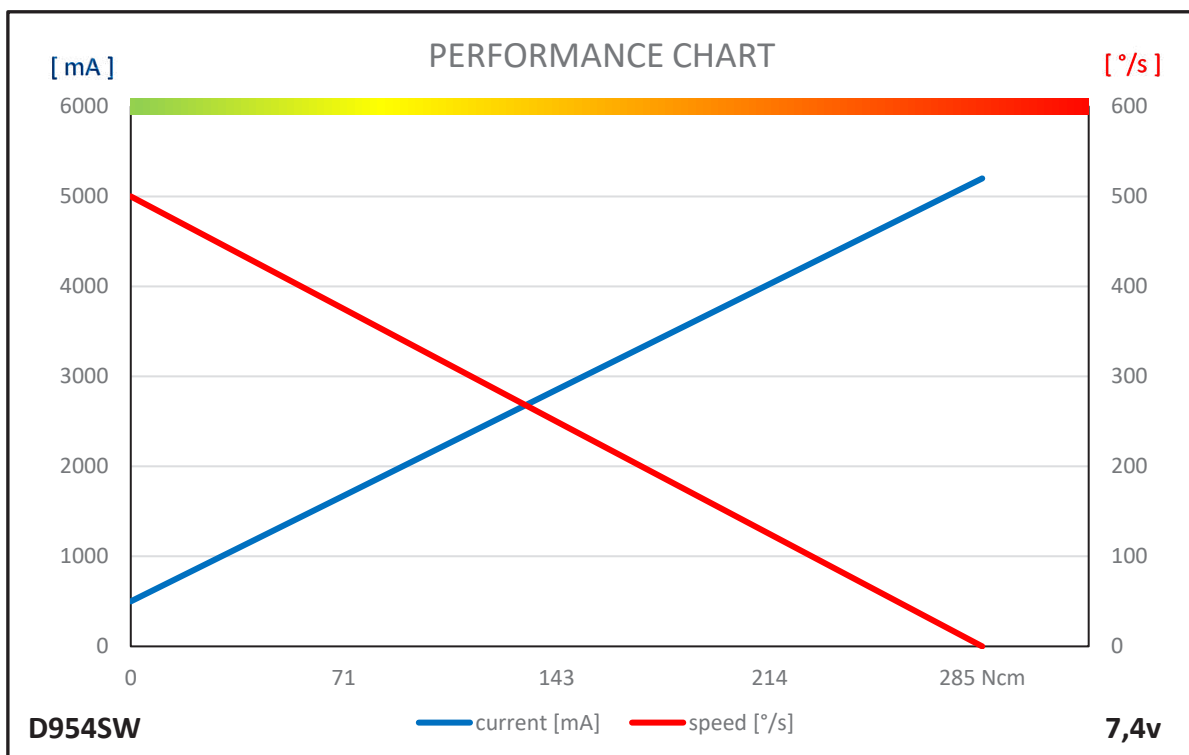
# D954SW

#116954



1:1

## PERFORMANCE CHART



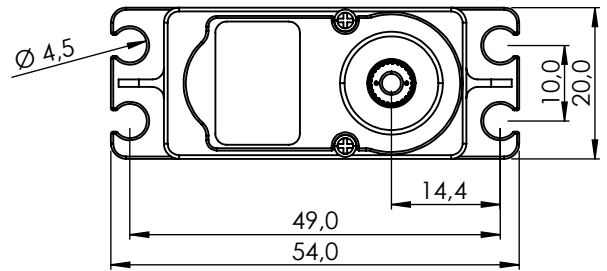
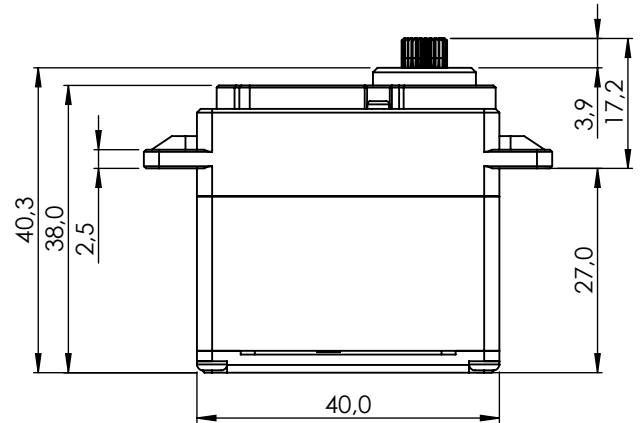
## GENERAL SPECIFICATION

| D954SW                                       |  |                     |                     |
|--|--|---------------------|---------------------|
| Control System                               | PWM / TTL (Half Duplex)  |                     |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                           |                     |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)  |                     |                     |
| Position Sensor Type                         | Indirect Drive / 1M Cycle Long Life                                |                     |                     |
| Motor Type                                   | Coreless   |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive                       |                     |                     |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                     |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 316°/s (53RPM)   | 400°/s (67RPM)      | 500°/s (83RPM)      |
| Stall Torque                                 | 16.0kgcm (157.0Ncm)  | 24.0kgcm (235.4Ncm) | 29.0kgcm (284.5Ncm) |
| Peak Efficiency Torque                       | 3.6kgcm (35.3Ncm)  | 4.8kgcm (47.1Ncm)   | 5.8kgcm (56.9Ncm)   |
| Rest Current                                 | 30mA   | 30mA                | 30mA                |
| Running Current at no Load                   | 300mA  | 400mA               | 500mA               |
| Stall Current                                | 3200mA   | 4200mA              | 5200mA              |
| Deadband Width                               | 1µs  | 1µs                 | 1µs                 |
| Operating Travel                             | Default  | ±60° **             |                     |
|  | Programmable   | Max. 175°           |                     |
|  | Multi Turn/Continuous Rotation                                     | n/a / n/a           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                      |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                     |                     |                     |
| Vibrations at no Load                        | -  |                     |                     |
| Connector Wire Length                        | 300mm  |                     |                     |
| Connector Wire Gauge                         | 20AWG  |                     |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |                     |
| External Dimensions                          | 40.0 x 20.0 x 37.0mm   |                     |                     |
| Weight*                                      | 66.0g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                     |                     |
| Case Material                                | Engineering Plastic & Aluminum Heatsink                            |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Steel Gears                                    |                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25) |                     |                     |
| IP-Rating                                    | IP54   |                     |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024  |                     |                     |
| Changelog                                    | -  |                     |                     |
| *of the servo only w/o horns and accessories |  |                     |                     |
| ** also available with 270°                  |  |                     |                     |

# D951TW

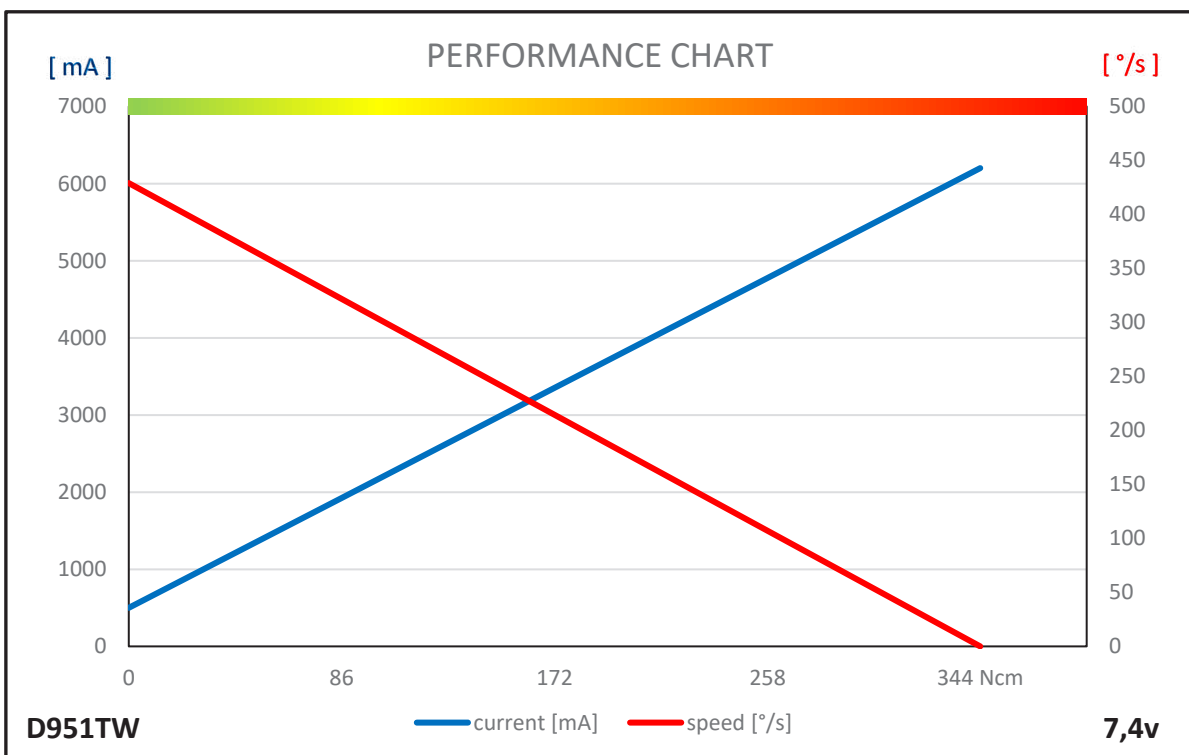
#116951

#1-02359 GP 24 Stück



1:1

## PERFORMANCE CHART

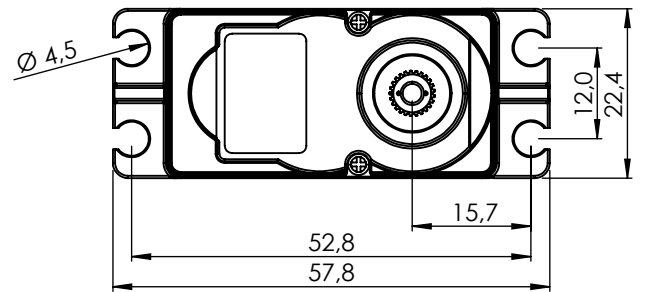
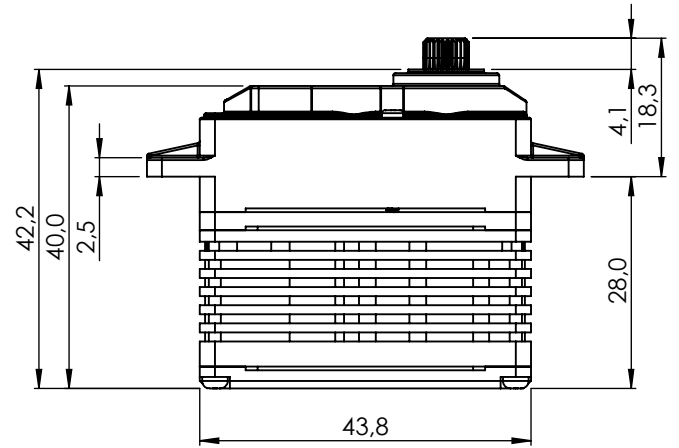


## GENERAL SPECIFICATION

| D951TW                                       |  |                     |                     |
|--|--|---------------------|---------------------|
| Control System                               | PWM / TTL (Half Duplex)                              |                     |                     |
|  | PWM Range 900µs   1500µs   2100µs                    |                     |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)                          |                     |                     |
| Position Sensor Type                         | Indirect Drive / 1M Cycle Long Life                  |                     |                     |
| Motor Type                                   | Coreless   |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive         |                     |                     |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                     |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 261°/s (44RPM)                                       | 353°/s (59RPM)      | 429°/s (71RPM)      |
| Stall Torque                                 | 21.0kgcm (206.0Ncm)                                  | 29.0kgcm (284.5Ncm) | 35.0kgcm (343.4Ncm) |
| Peak Efficiency Torque                       | 4.2kgcm (41.2Ncm)                                    | 5.8kgcm (56.9Ncm)   | 7.0kgcm (68.7Ncm)   |
| Rest Current                                 | 30mA   | 30mA                | 30mA                |
| Running Current at no Load                   | 300mA  | 390mA               | 500mA               |
| Stall Current                                | 3700mA   | 4800mA              | 6200mA              |
| Deadband Width                               | 1µs  | 1µs                 | 1µs                 |
| Operating Travel                             | Default  | ±60°                |                     |
|  | Programmable   | Max. 175°           |                     |
|  | Multi Turn/Continuous Rotation                       | n/a / n/a           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                        |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                       |                     |                     |
| Vibrations at no Load                        | -  |                     |                     |
| Connector Wire Length                        | 300mm  |                     |                     |
| Connector Wire Gauge                         | 20AWG  |                     |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |                     |
| External Dimensions                          | 40.0 x 20.0 x 38.0mm                                 |                     |                     |
| Weight*                                      | 80.0g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing                                    |                     |                     |
| Case Material                                | Aluminum Alloy                                       |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Titanium Alloy Gears             |                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |                     |
| Accessories                                  | Mounting Hardware, HD-IM25, HD-LS25, HD-OS25, HD-X25 |                     |                     |
| IP-Rating                                    | IP54   |                     |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024                                |                     |                     |
| Changelog                                    | -  |                     |                     |
| *of the servo only w/o horns and accessories |  |                     |                     |

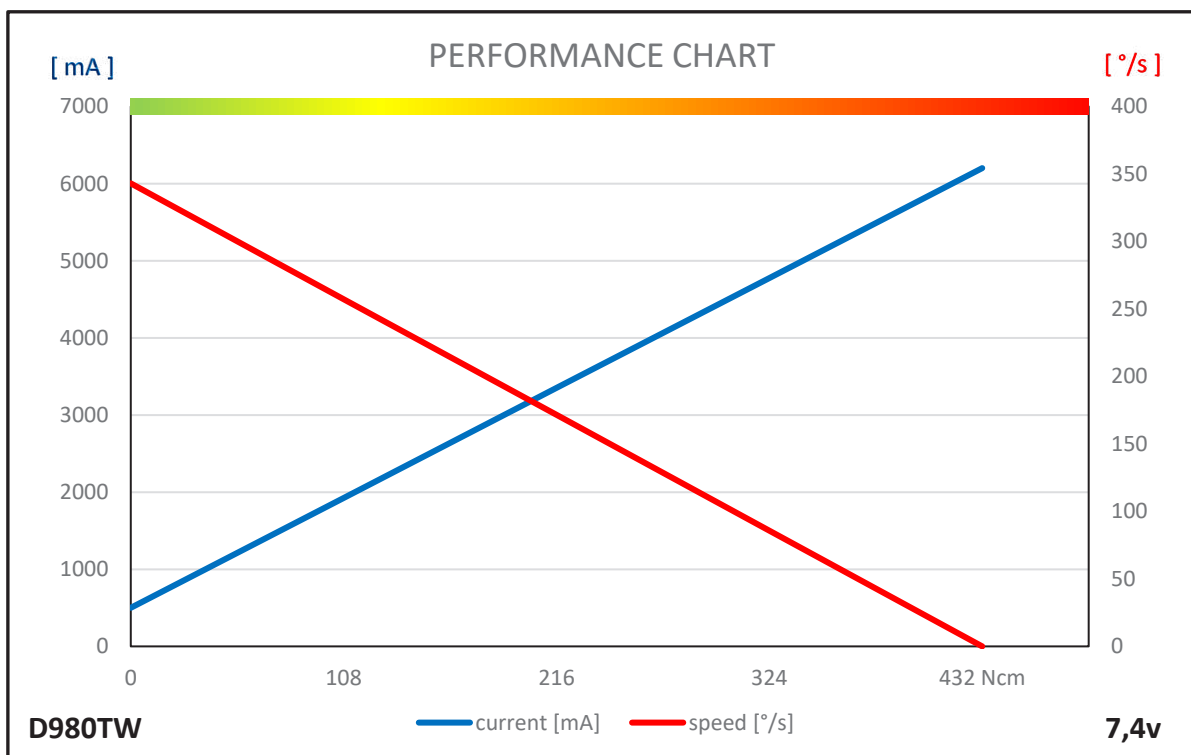
# D980TW

#1-02982



1:1

## PERFORMANCE CHART





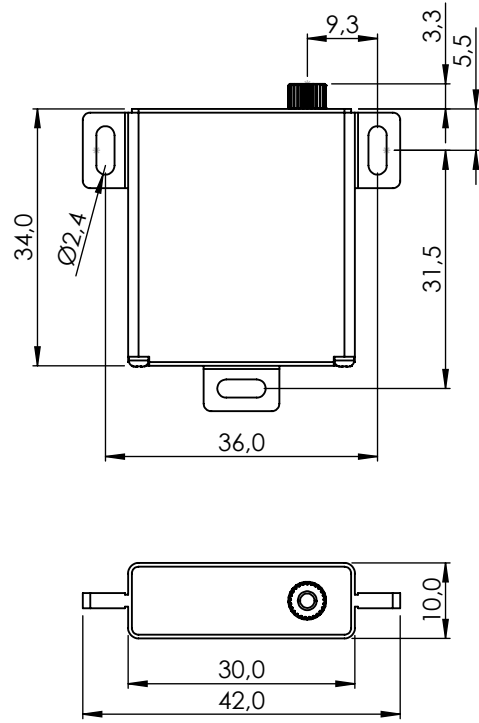
## GENERAL SPECIFICATION

| D980TW                                       |  |                     |                     |
|--|--|---------------------|---------------------|
| Control System                               | PWM / TTL (Half Duplex)  |                     |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs   |                     |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)  |                     |                     |
| Position Sensor Type                         | Indirect Drive / 4 Slider / 1M Cycle Long Life   |                     |                     |
| Motor Type                                   | Coreless   |                     |                     |
| Amplifier / MCU                              | 32bit programmable Digital with Mosfet Drive   |                     |                     |
| Operating Voltage Range                      | 3.5V ~ 8.4V  |                     |                     |
| Operating Voltage                            | At 4.8V  | At 6.0V             | At 7.4V             |
| Operating Speed at no Load                   | 214°/s (36RPM)   | 286°/s (48RPM)      | 343°/s (59RPM)      |
| Stall Torque                                 | 26.0kgcm (255.1Ncm)  | 36.0kgcm (353.2Ncm) | 44.0kgcm (431.6Ncm) |
| Peak Efficiency Torque                       | 5.5kgcm (54.0Ncm)  | 7.2kgcm (70.6Ncm)   | 8.8kgcm (86.3Ncm)   |
| Rest Current                                 | 30mA   | 30mA                | 30mA                |
| Running Current at no Load                   | 300mA  | 390mA               | 500mA               |
| Stall Current                                | 4200mA   | 4800mA              | 6200mA              |
| Deadband Width                               | 1µs  | 1µs                 | 1µs                 |
| Operating Travel                             | Default  | ±60°                |                     |
|  | Programmable   | Max. 175°           |                     |
|  | Multi Turn/Continuous Rotation   | n/a / n/a           |                     |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)  |                     |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)   |                     |                     |
| Vibrations at no Load                        | -  |                     |                     |
| Connector Wire Length                        | 300mm  |                     |                     |
| Connector Wire Gauge                         | 20AWG  |                     |                     |
| Connector Wire Strand Count                  | 80/0.08  |                     |                     |
| External Dimensions                          | 43.8 x 22.4 x 40.0mm   |                     |                     |
| Weight*                                      | 78.2g  |                     |                     |
| Ball Bearing                                 | Dual Ball Bearing  |                     |                     |
| Case Material                                | Engineering Plastic & Aluminum Heatsink  |                     |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Titanium Alloy Gears   |                     |                     |
| Gear Train Backlash                          | Max. 0.5°  |                     |                     |
| Horn Gear Spline                             | H25T Ø6.0  |                     |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (HD-IM25, HD-LS25, HD-OS25, HD-X25, HD-IL25, HD-LL25, HD-IG25, HD-LG25) |                     |                     |
| IP-Rating                                    | IP54   |                     |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024  |                     |                     |
| Changelog                                    | -  |                     |                     |
| *of the servo only w/o horns and accessories |  |                     |                     |

# HS-5125MG

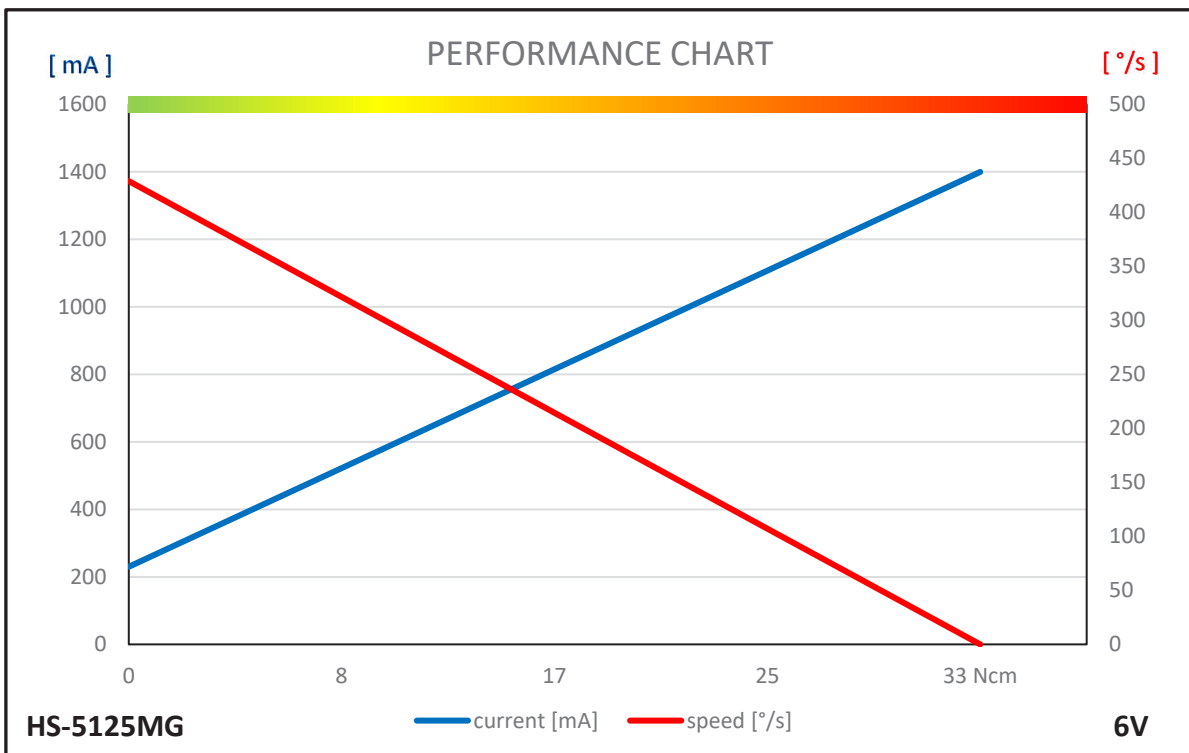
#113125

#1-03035 GP 15 Stück



1:1

## PERFORMANCE CHART



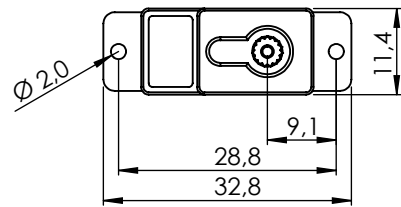
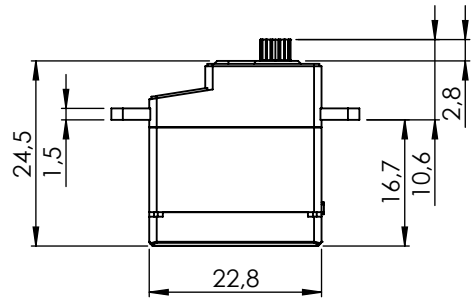
## GENERAL SPECIFICATION

| HS-5125MG                                    |  |                   |
|--|--|-------------------|
| Control System                               | PWM  |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs         |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                      |                   |
| Position Sensor Type                         | Contact Analog Potentiometer                     |                   |
| Motor Type                                   | Cored Metal Brush                                |                   |
| Amplifier / MCU                              | 8bit programmable Digital                        |                   |
| Operating Voltage Range                      | 3.5V ~ 8.4V                                      |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 333°/s (56RPM)                                   | 429°/s (71RPM)    |
| Stall Torque                                 | 2.8kgcm (27.5Ncm)                                | 3.3kgcm (32.4Ncm) |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)                                 | 0.7kgcm (6.9Ncm)  |
| Rest Current                                 | 3mA  | 3mA               |
| Running Current at no Load                   | 180mA  | 230mA             |
| Stall Current                                | 1100mA   | 1400mA            |
| Deadband Width                               | 2µs  | 2µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable                                     | Max. 175°         |
|  | Multi Turn/Continuous Rotation                   | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                    |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                   |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 300mm  |                   |
| Connector Wire Gauge                         | 22AWG  |                   |
| Connector Wire Strand Count                  | 60/0.08  |                   |
| External Dimensions                          | 30.0 x 10.0 x 34.0mm                             |                   |
| Weight*                                      | 24.0g  |                   |
| Ball Bearing                                 | Dual Ball Bearing                                |                   |
| Case Material                                | Engineering Plastic                              |                   |
| Gear Material                                | 1 Metal-Plastic & 4 Metal Gears                  |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |
| Horn Gear Spline                             | 25T Ø5.0   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (MS-L25, MS-ML25) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.0 / 08.01.2024                            |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-53

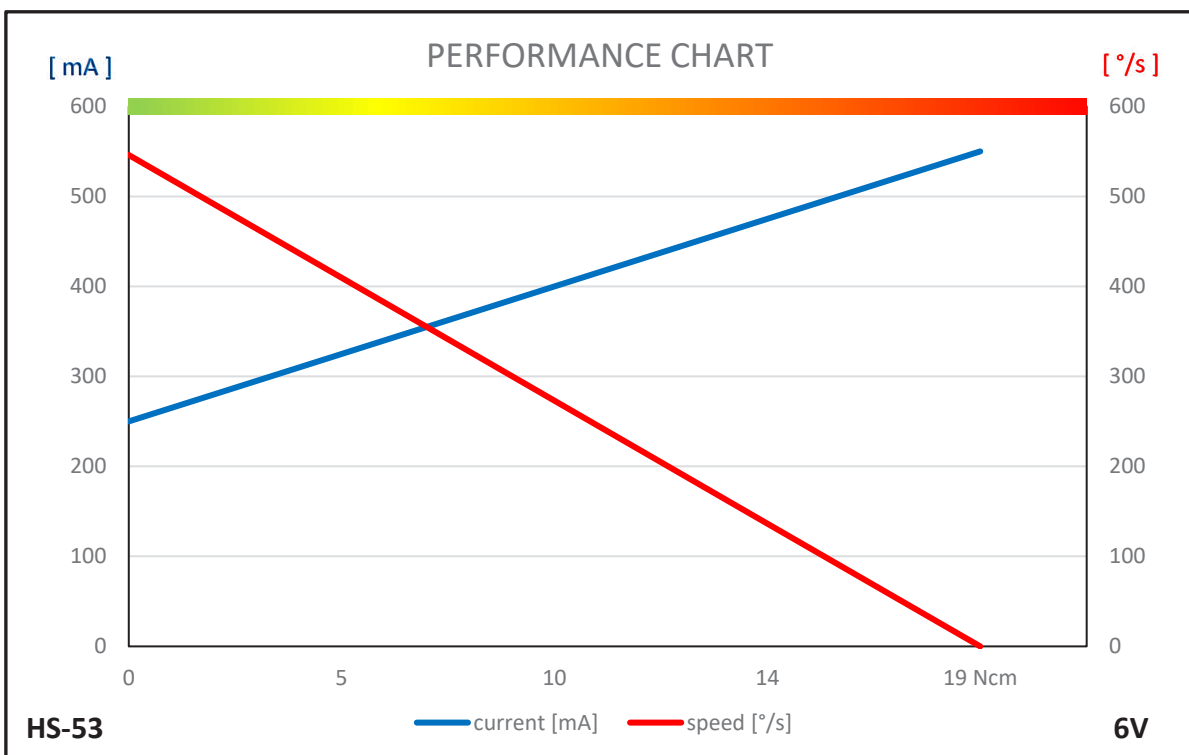
#112053

#112054 GP 20 Stück



1:1

## PERFORMANCE CHART



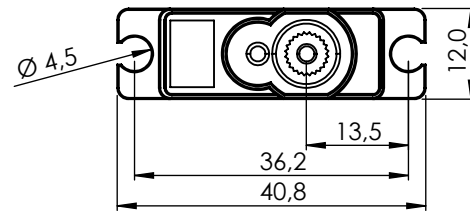
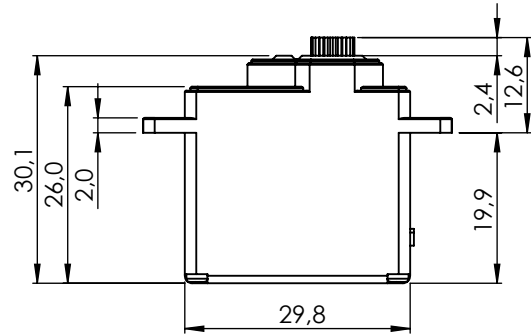
## GENERAL SPECIFICATION

| HS-53  |  |                   |
|--|--|-------------------|
| Control System                               | PWM                                      |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)              |                   |
| Position Sensor Type                         | Direct Drive / 2 Slider                  |                   |
| Motor Type                                   | Cored Metal Brush                        |                   |
| Amplifier / MCU                              | Analog                                   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V                              |                   |
| Operating Voltage                            | At 4.8V                                  | At 6.0V           |
| Operating Speed at no Load                   | 429°/s (71RPM)                           | 546°/s (91RPM)    |
| Stall Torque                                 | 1.5kgcm (14.7Ncm)                        | 1.9kgcm (18.6Ncm) |
| Peak Efficiency Torque                       | 0.3kgcm (2.9Ncm)                         | 0.4kgcm (3.9Ncm)  |
| Rest Current                                 | 8mA                                      | 10mA              |
| Running Current at no Load                   | 200mA                                    | 250mA             |
| Stall Current                                | 440mA                                    | 550mA             |
| Deadband Width                               | 5µs                                      | 5µs               |
| Operating Travel                             | Default                                  | ±60°              |
|  | Programmable                             | n/a               |
|  | Multi Turn/Continuous Rotation           | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)            |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)           |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 250mm                                    |                   |
| Connector Wire Gauge                         | 28AWG                                    |                   |
| Connector Wire Strand Count                  | 20/0.08                                  |                   |
| External Dimensions                          | 22.8 x 11.4 x 24.5mm                     |                   |
| Weight*                                      | 8.0g                                     |                   |
| Ball Bearing                                 | n/a                                      |                   |
| Case Material                                | Engineering Plastic                      |                   |
| Gear Material                                | 5 Resin Gears                            |                   |
| Gear Train Backlash                          | Max. 0.5°                                |                   |
| Horn Gear Spline                             | 15T Ø4.0                                 |                   |
| Accessories                                  | Tapping Screw, Servo Horns (FS-IL, FS-X) |                   |
| IP-Rating                                    | IP4X                                     |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024                    |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-81

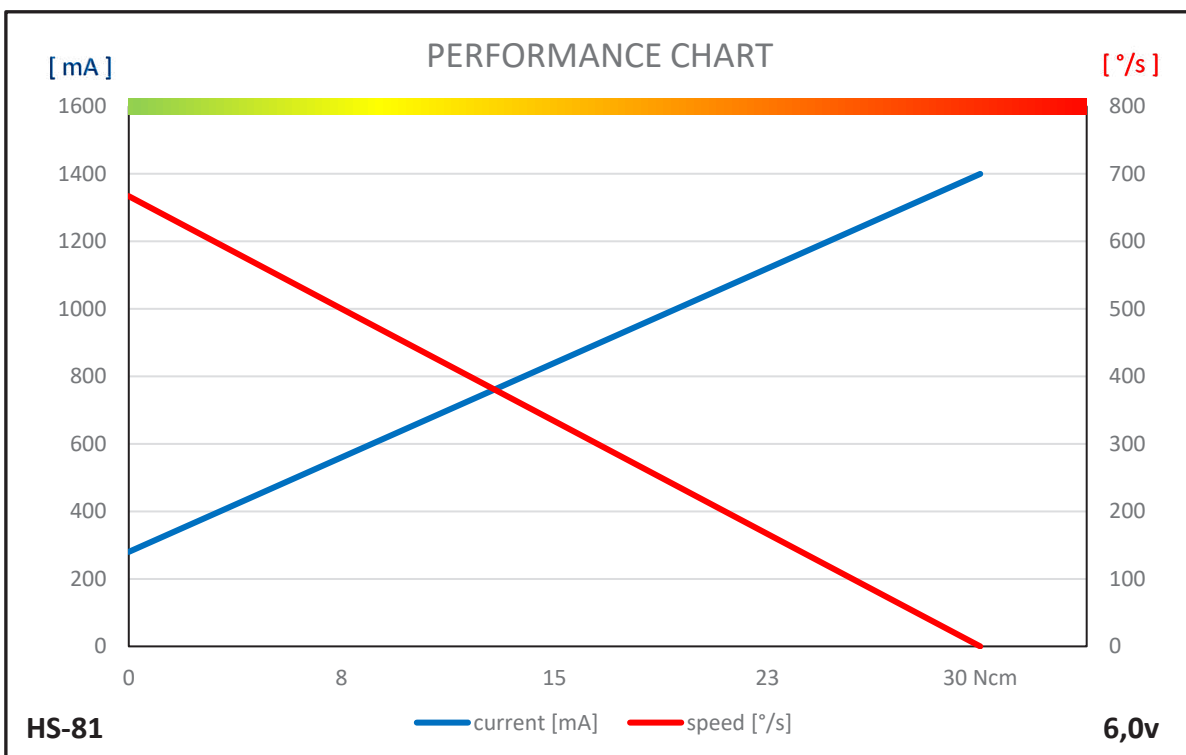
#112081

#112084 GP 20 Stück



1:2

## PERFORMANCE CHART



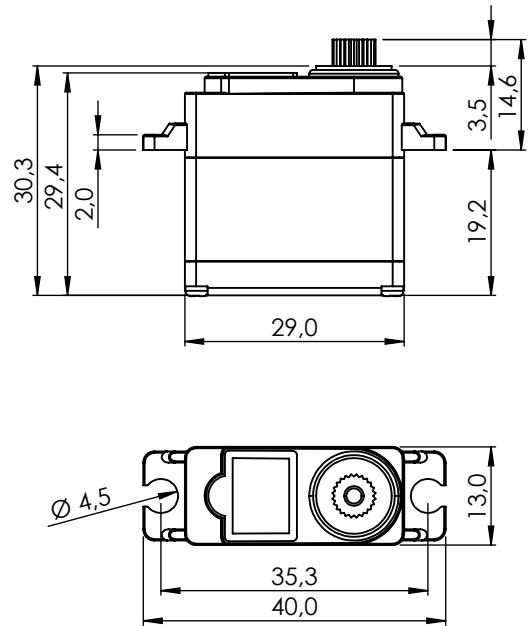
## GENERAL SPECIFICATION

| HS-81  |  |                   |
|--|--|-------------------|
| Control System                               | Pulse Width Modulation (PWM)                   |                   |
|  | PWM Range 900µs   1500µs   2100µs              |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                    |                   |
| Position Sensor Type                         | Direct Drive                                   |                   |
| Motor Type                                   | Cored / 3 poles Ferrite Motor                  |                   |
| Amplifier / MCU                              | Analog   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V                                    |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 546°/s (91RPM)                                 | 667°/s (111RPM)   |
| Stall Torque                                 | 2.6kgcm (25.5Ncm)                              | 3.0kgcm (29.4Ncm) |
| Peak Efficiency Torque                       | 0.5kgcm (4.9Ncm)                               | 0.6kgcm (5.9Ncm)  |
| Rest Current                                 | 9mA  | 9mA               |
| Running Current at no Load                   | 220mA  | 280mA             |
| Stall Current                                | -  | -                 |
| Deadband Width                               | 5µs  | 5µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable                                   | n/a               |
|  | Multi Turn/Continuous Rotation                 | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                  |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                 |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 250mm  |                   |
| Connector Wire Gauge                         | 28AWG  |                   |
| Connector Wire Strand Count                  | 20/0.08  |                   |
| External Dimensions                          | 29.8 x 12.0 x 26.0mm                           |                   |
| Weight*                                      | 16.6g  |                   |
| Ball Bearing                                 | n/a  |                   |
| Case Material                                | Engineering Plastic                            |                   |
| Gear Material                                | 3 resin & 1 Heavy Duty Resin Gears             |                   |
| Gear Train Backlash                          | n/a  |                   |
| Horn Gear Spline                             | 24T Ø5.76                                      |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I, M-X, M-O) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024                          |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-85MG

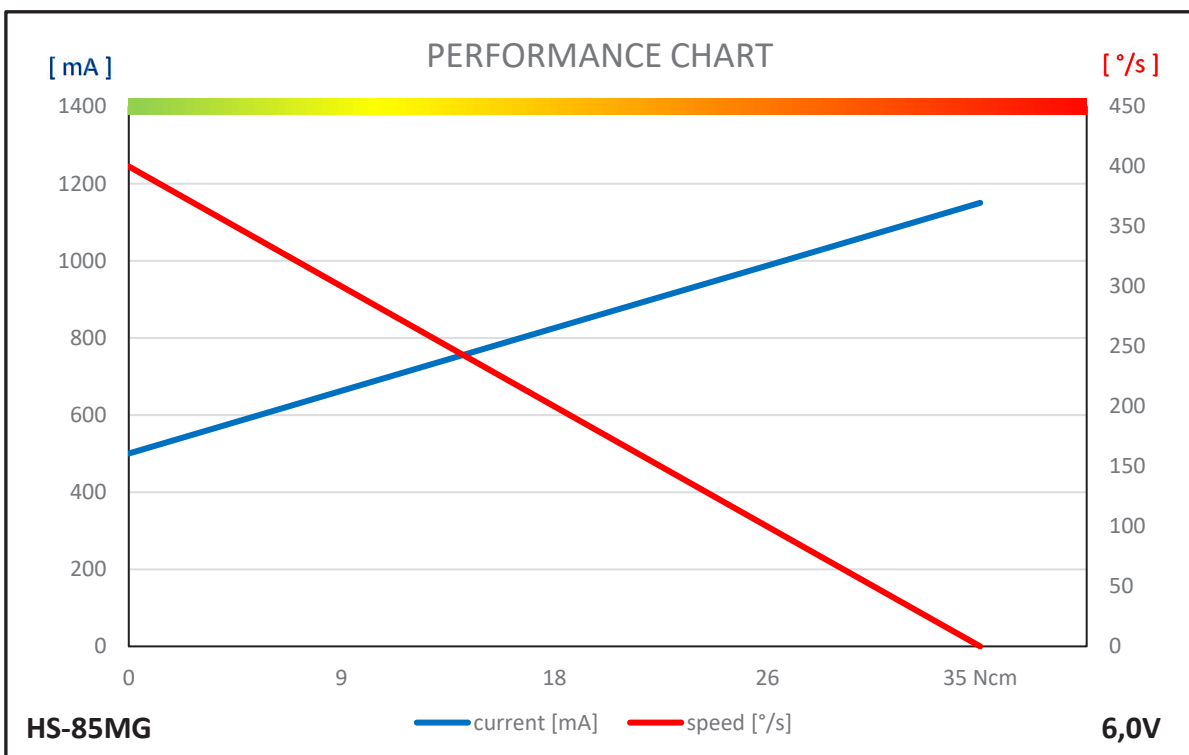
#112086

#112091 GP 20 Stück



1:1

## PERFORMANCE CHART





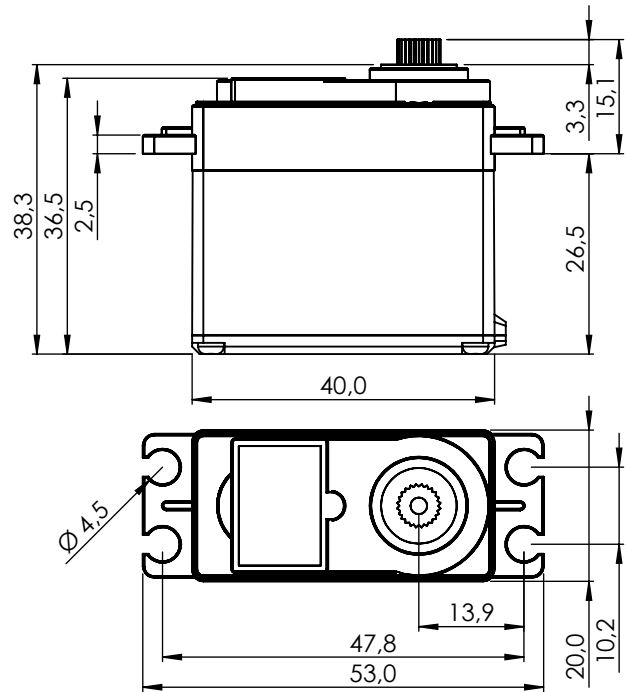
## GENERAL SPECIFICATION

| HS-85MG                                      |  |                   |
|--|--|-------------------|
| Control System                               | PWM  |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs       |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                    |                   |
| Position Sensor Type                         | Contact Analog Potentiometer                   |                   |
| Motor Type                                   | Cored / 3 Pole Ferrite Motor                   |                   |
| Amplifier / MCU                              | Analog   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V                                    |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 375°/s (63RPM)                                 | 429°/s (71RPM)    |
| Stall Torque                                 | 3.0kgcm (29.4Ncm)                              | 3.5kgcm (34.3Ncm) |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)                               | 0.7kgcm (6.9Ncm)  |
| Rest Current                                 | 8mA  | 8mA               |
| Running Current at no Load                   | 240mA  | 240mA             |
| Stall Current                                | -  | -                 |
| Deadband Width                               | 5µs  | 5µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable                                   | n/a               |
|  | Multi Turn/Continuous Rotation                 | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                  |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                 |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 250mm  |                   |
| Connector Wire Gauge                         | 28AWG  |                   |
| Connector Wire Strand Count                  | 20/0.08  |                   |
| External Dimensions                          | 29.0 x 13.0 x 29.4mm                           |                   |
| Weight*                                      | 21.9g  |                   |
| Ball Bearing                                 | Single Ball Bearing                            |                   |
| Case Material                                | Engineering Plastic                            |                   |
| Gear Material                                | 1 Resin & 4 Metal Gears                        |                   |
| Gear Train Backlash                          | Max. 0.5°                                      |                   |
| Horn Gear Spline                             | 24T Ø6.0                                       |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (M-I, M-X, M-O) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024                          |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-311

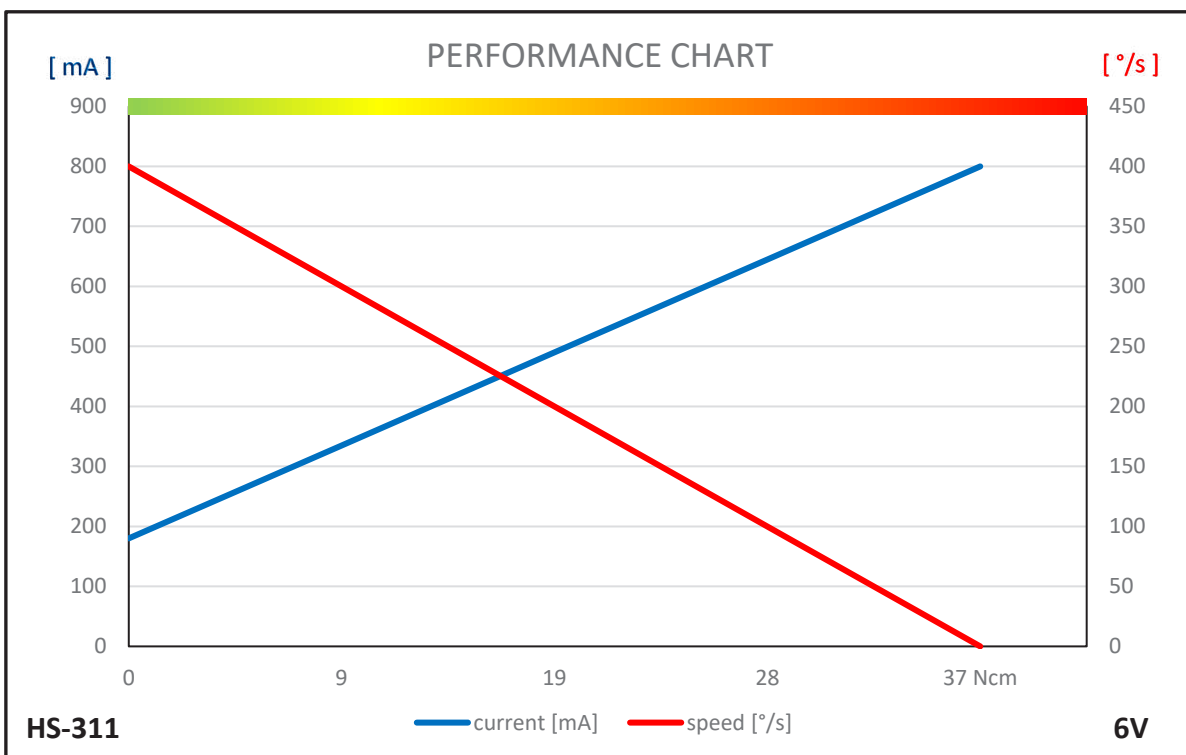
#112311

#IND-112314 GP 30 Stück



1:1

## PERFORMANCE CHART



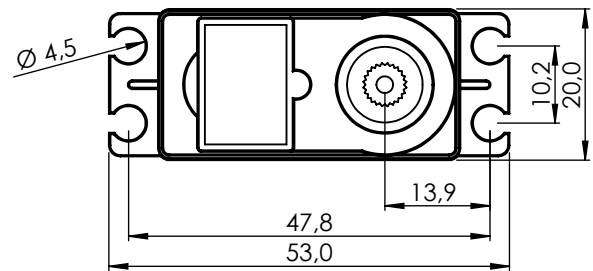
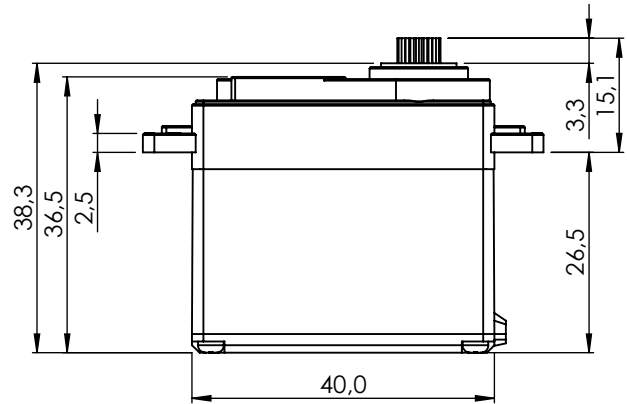
## GENERAL SPECIFICATION

| HS-311                                       |  |                   |
|--|--|-------------------|
| Control System                               | PWM  |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                       |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                                    |                   |
| Position Sensor Type                         | Direct Drive / 4 Slider  |                   |
| Motor Type                                   | Cored Metal Brush  |                   |
| Amplifier / MCU                              | Analog   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V  |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 316°/s (53RPM)   | 400°/s (67RPM)    |
| Stall Torque                                 | 3.0kgcm (29.4Ncm)  | 3.7kgcm (36.3Ncm) |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)   | 0.7kgcm (6.9Ncm)  |
| Rest Current                                 | 7mA  | 8mA               |
| Running Current at no Load                   | 160mA  | 180mA             |
| Stall Current                                | 700mA  | 800mA             |
| Deadband Width                               | 5µs  | 5µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable   | n/a               |
|  | Multi Turn/Continuous Rotation                                 | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                  |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                 |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 300mm  |                   |
| Connector Wire Gauge                         | 24AWG  |                   |
| Connector Wire Strand Count                  | 40/0.08  |                   |
| External Dimensions                          | 40.0 x 20.0 x 36.5mm   |                   |
| Weight*                                      | 43.0g  |                   |
| Ball Bearing                                 | Single Resin Bushing   |                   |
| Case Material                                | Engineering Plastic  |                   |
| Gear Material                                | 4 Resin Gears  |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |
| Horn Gear Spline                             | 24T Ø6.0   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (R-O, R-X, R-I, R-D, R-C, R-XA) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024  |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-322HD

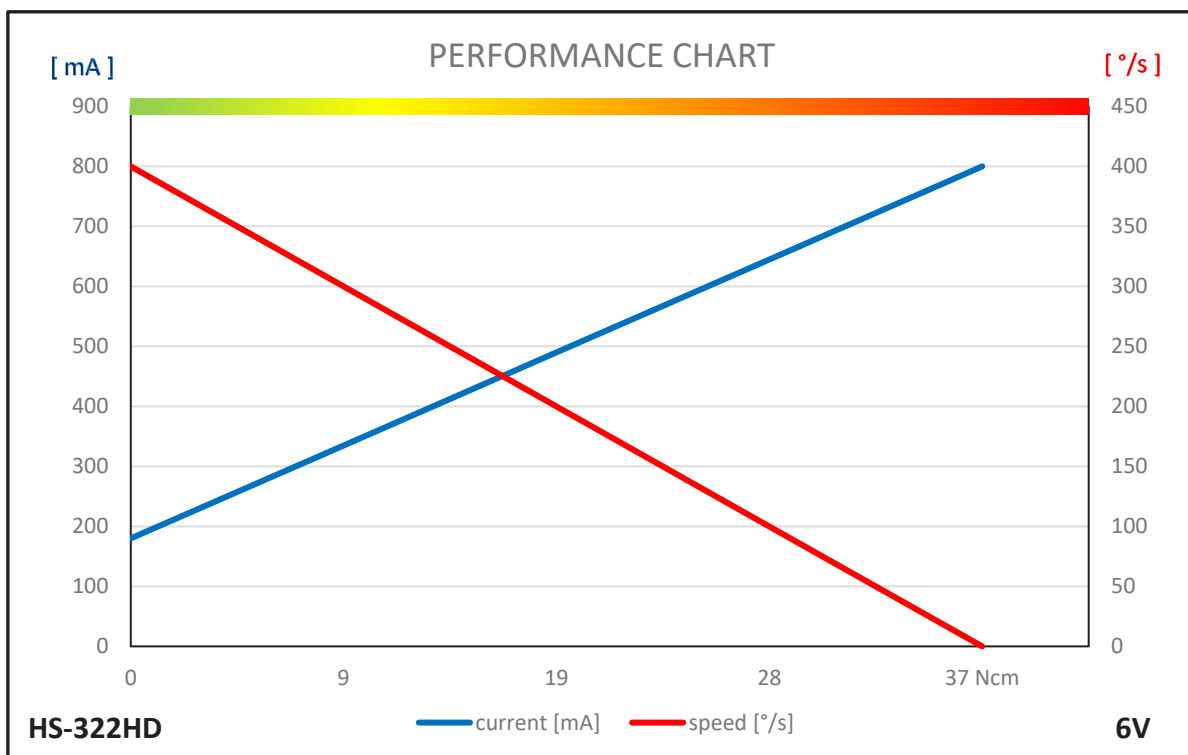
#112322

#112326 GP 30 Stück



1:1

## PERFORMANCE CHART



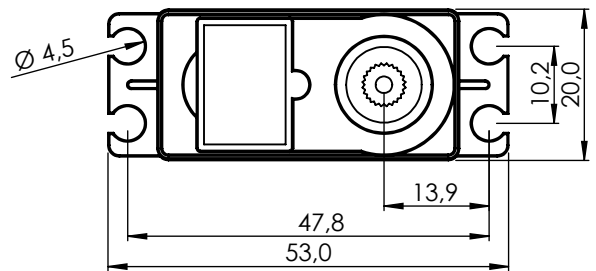
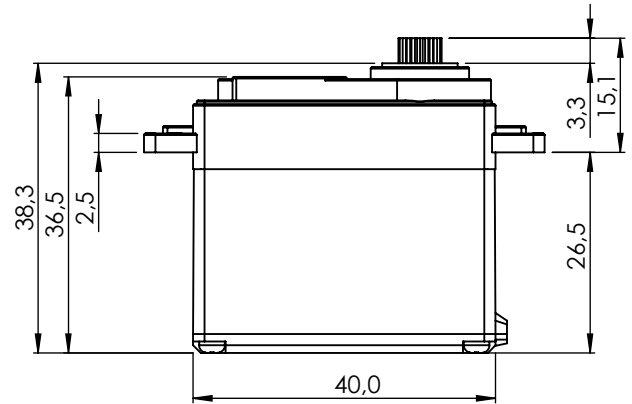
## GENERAL SPECIFICATION

| HS-322HD                                     |  |                   |
|--|--|-------------------|
| Control System                               | PWM  |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                 |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                              |                   |
| Position Sensor Type                         | Direct Drive / 4 Slider                                  |                   |
| Motor Type                                   | Cored Metal Brush  |                   |
| Amplifier / MCU                              | Analog   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V  |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 316°/s (53RPM)   | 400°/s (67RPM)    |
| Stall Torque                                 | 3.0kgcm (29.4Ncm)  | 3.7kgcm (36.3Ncm) |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)   | 0.7kgcm (6.9Ncm)  |
| Rest Current                                 | 7mA  | 8mA               |
| Running Current at no Load                   | 160mA  | 180mA             |
| Stall Current                                | 700mA  | 800mA             |
| Deadband Width                               | 5µs  | 5µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable   | n/a               |
|  | Multi Turn/Continuous Rotation                           | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                            |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                           |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 300mm  |                   |
| Connector Wire Gauge                         | 24AWG  |                   |
| Connector Wire Strand Count                  | 40/0.08  |                   |
| External Dimensions                          | 40.0 x 20.0 x 36.5mm                                     |                   |
| Weight*                                      | 43.0g  |                   |
| Ball Bearing                                 | Dual Resin Bushing                                       |                   |
| Case Material                                | Engineering Plastic                                      |                   |
| Gear Material                                | 2 Resin & 2 Heavy Duty Resin Gears                       |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |
| Horn Gear Spline                             | 24T Ø6.0   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (R-O, R-X, R-I, R-D, R-C) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024                                    |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-325HB

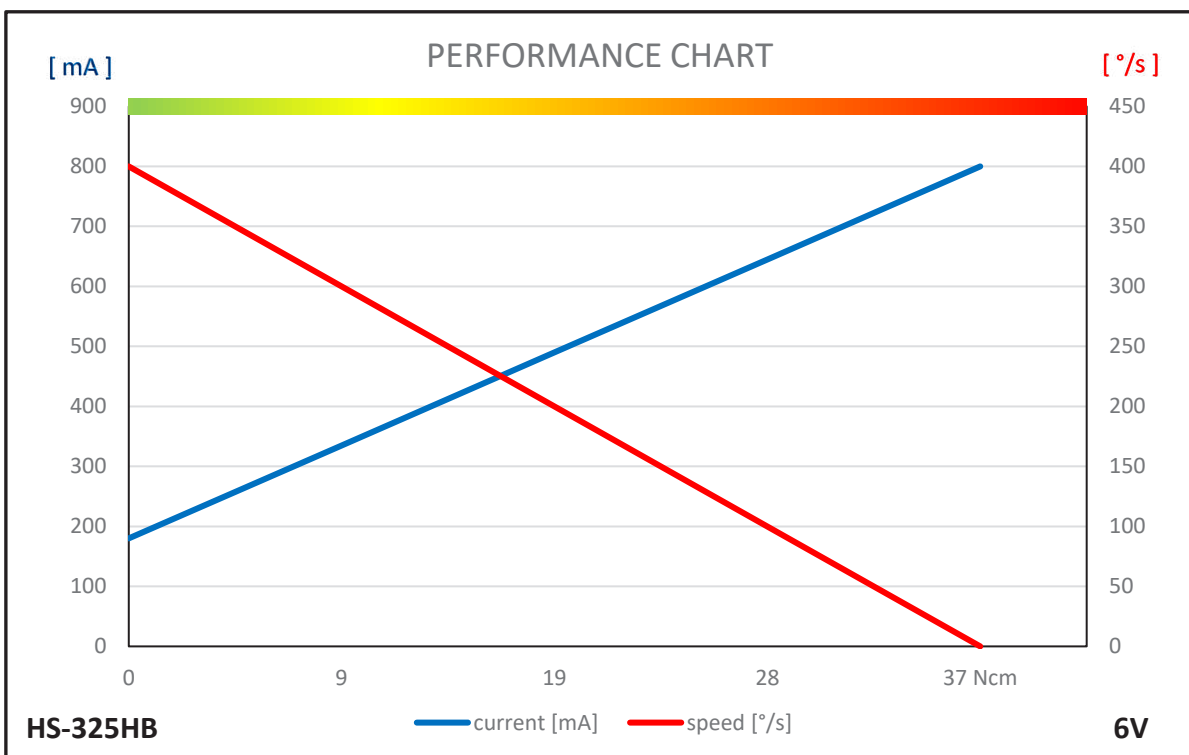
#112325

#1-02361 GP 30 Stück



1:1

## PERFORMANCE CHART



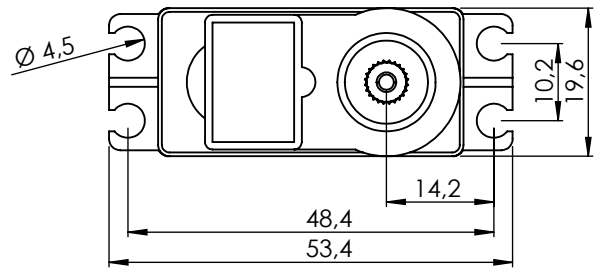
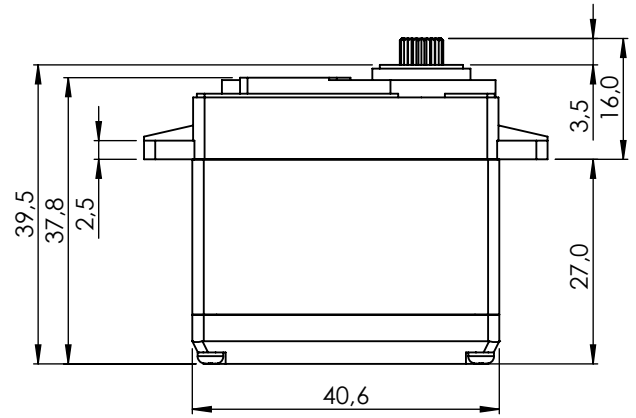
## GENERAL SPECIFICATION

| HS-325HB                                     |  |                   |
|--|--|-------------------|
| Control System                               | PWM  |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                 |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                              |                   |
| Position Sensor Type                         | Direct Drive / 4 Slider                                  |                   |
| Motor Type                                   | Cored Metal Brush  |                   |
| Amplifier / MCU                              | Analog   |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V  |                   |
| Operating Voltage                            | At 4.8V  | At 6.0V           |
| Operating Speed at no Load                   | 316°/s (53RPM)   | 400°/s (67RPM)    |
| Stall Torque                                 | 3.0kgcm (29.4Ncm)  | 3.7kgcm (36.3Ncm) |
| Peak Efficiency Torque                       | 0.6kgcm (5.9Ncm)   | 0.7kgcm (6.9Ncm)  |
| Rest Current                                 | 7mA  | 8mA               |
| Running Current at no Load                   | 160mA  | 180mA             |
| Stall Current                                | 700mA  | 800mA             |
| Deadband Width                               | 5µs  | 5µs               |
| Operating Travel                             | Default  | ±60°              |
|  | Programmable   | n/a               |
|  | Multi Turn/Continuous Rotation                           | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                            |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                           |                   |
| Vibrations at no Load                        | -  |                   |
| Connector Wire Length                        | 300mm  |                   |
| Connector Wire Gauge                         | 24AWG  |                   |
| Connector Wire Strand Count                  | 40/0.08  |                   |
| External Dimensions                          | 40.0 x 20.0 x 36.5mm                                     |                   |
| Weight*                                      | 43.0g  |                   |
| Ball Bearing                                 | Dual Resin Bushing                                       |                   |
| Case Material                                | Engineering Plastic                                      |                   |
| Gear Material                                | 2 Resin & 2 Heavy Duty Resin Gears                       |                   |
| Gear Train Backlash                          | Max. 0.5°  |                   |
| Horn Gear Spline                             | 24T Ø6.0   |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (R-O, R-X, R-I, R-D, R-C) |                   |
| IP-Rating                                    | IP4X   |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024                                    |                   |
| Changelog                                    | -  |                   |
| *of the servo only w/o horns and accessories |  |                   |

# HS-645MG

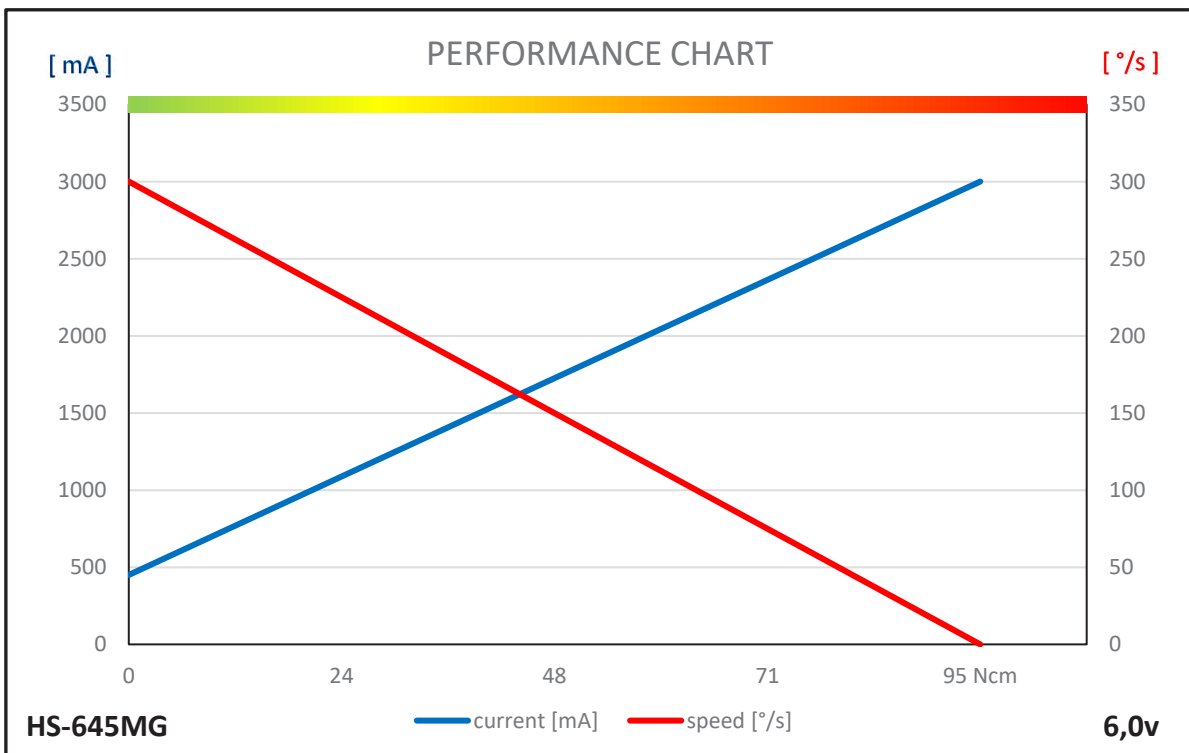
#112645

#112648 GP 30 Stück



1:1

## PERFORMANCE CHART





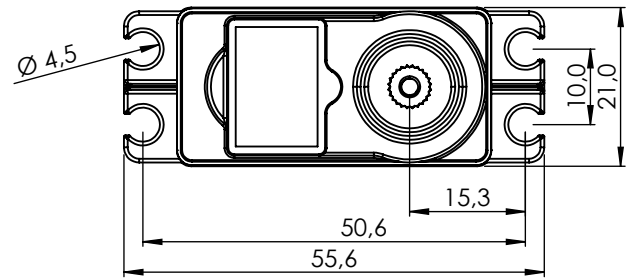
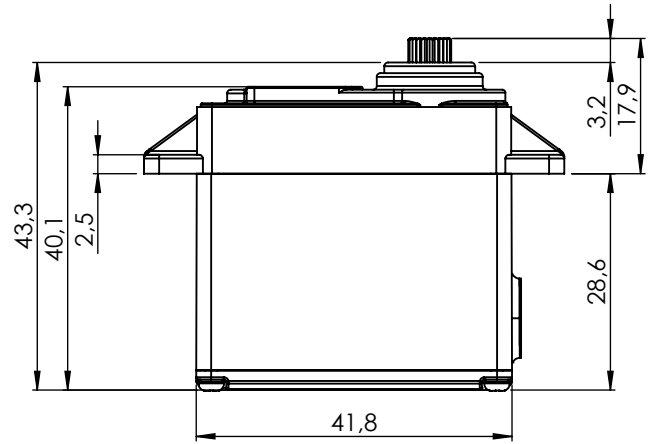
## GENERAL SPECIFICATION

| HS-645MG                                     |   |                   |
|--|---|-------------------|
| Control System                               | PWM   |                   |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                        |                   |
| Connector Type                               | Hitec 3P (JR 3P compatible)                                     |                   |
| Position Sensor Type                         | Contact Analog Potentiometer                                    |                   |
| Motor Type                                   | Cored Metal Brush   |                   |
| Amplifier / MCU                              | Analog  |                   |
| Operating Voltage Range                      | 4.8V ~ 6.0V   |                   |
| Operating Voltage                            | At 4.8V   | At 6.0V           |
| Operating Speed at no Load                   | 250°/s (42RPM)  | 300°/s (50RPM)    |
| Stall Torque                                 | 7.7kgcm (75.5Ncm)   | 9.6kgcm (94.2Ncm) |
| Peak Efficiency Torque                       | 1.5kgcm (14.7Ncm)   | 1.9kgcm (18.6Ncm) |
| Rest Current                                 | 9mA   | 9mA               |
| Running Current at no Load                   | 350mA   | 450mA             |
| Stall Current                                | -   | -                 |
| Deadband Width                               | 8µs   | 8µs               |
| Operating Travel                             | Default   | ±60°              |
|  | Programmable  | n/a               |
|  | Multi Turn/Continuous Rotation                                  | n/a / n/a         |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                   |                   |
| Storage Temperature Range                    | -30°C ~ +80°C (-31°F ~ +176°F)                                  |                   |
| Vibrations at no Load                        | -   |                   |
| Connector Wire Length                        | 300mm   |                   |
| Connector Wire Gauge                         | 22AWG   |                   |
| Connector Wire Strand Count                  | 60/0.08   |                   |
| External Dimensions                          | 40.6 x 19.6 x 37.8mm  |                   |
| Weight*                                      | 55.2g   |                   |
| Ball Bearing                                 | Dual Ball Bearing   |                   |
| Case Material                                | Engineering Plastic   |                   |
| Gear Material                                | 1 Metal-Plastic Gear & 3 Metal Gears                            |                   |
| Gear Train Backlash                          | Max. 0.5°   |                   |
| Horn Gear Spline                             | 24T / Ø6.0  |                   |
| Accessories                                  | Mounting Hardware, Servo Horns (R-0, R-XA, HD-IS, HD-LS, HD-OS) |                   |
| IP-Rating                                    | IP4X  |                   |
| Revision                                     | Rev. 1.1 / 04.01.2024   |                   |
| Changelog                                    | -   |                   |
| *of the servo only w/o horns and accessories |   |                   |

# HS-646WP

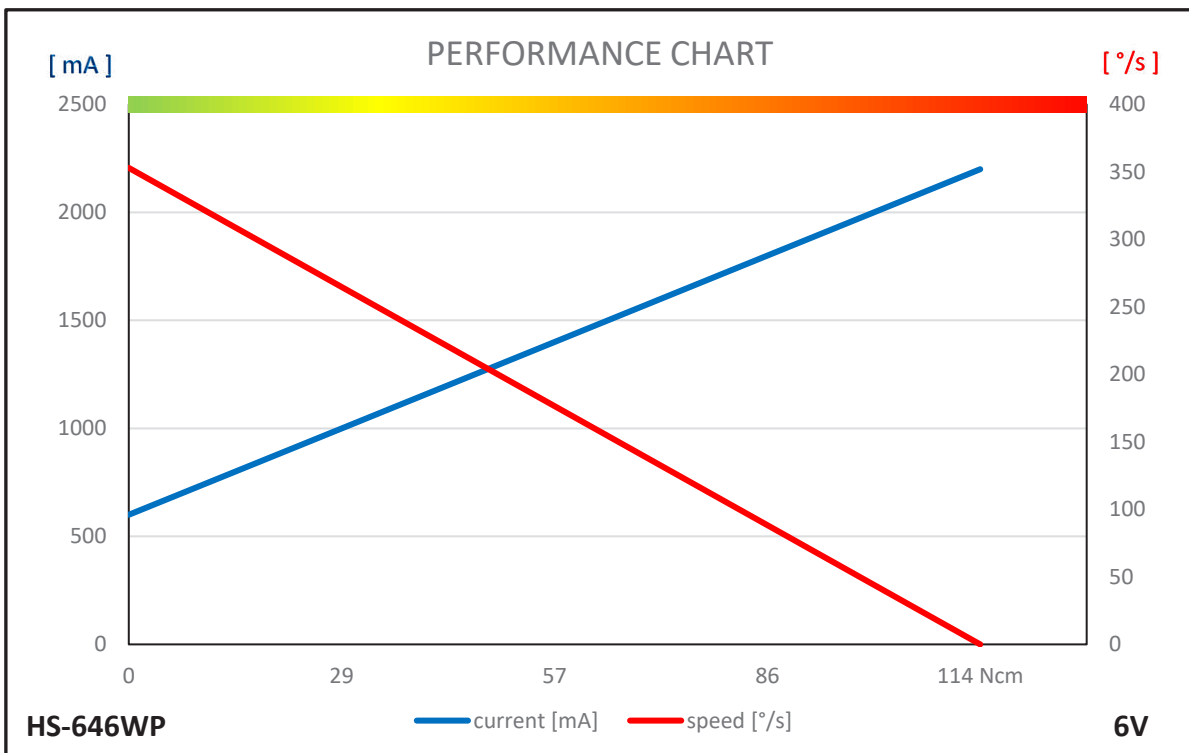
#115646

#1-02352 GP 24 Stück



1:1

## PERFORMANCE CHART

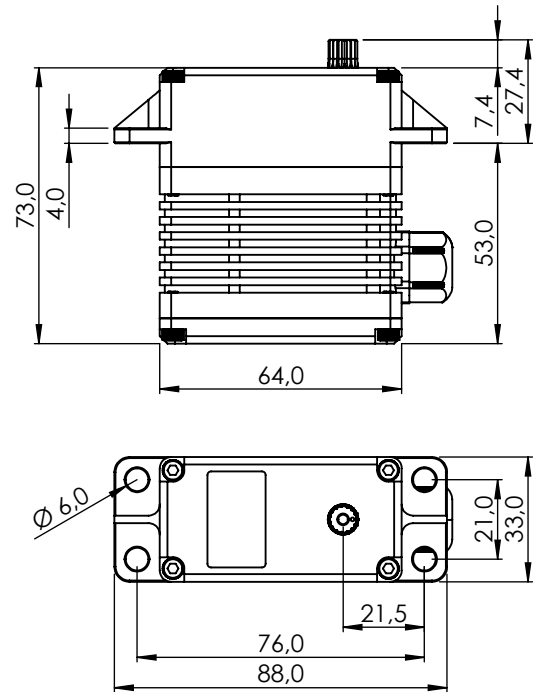


## GENERAL SPECIFICATION

| HS-646WP                                     |   |                     |
|--|---|---------------------|
| Control System                               | PWM   |                     |
|  | Pulse Width 900µs 1500µs (Center) 2100µs                        |                     |
| Connector Type                               | Hitec 3P (JR 3P compatible)                                     |                     |
| Position Sensor Type                         | Indirect Drive / 4 Slider / 1M cycle Long Life                  |                     |
| Motor Type                                   | Cored Carbon Brush / 3 Pole Ferrite Motor                       |                     |
| Amplifier / MCU                              | Analog  |                     |
| Operating Voltage Range                      | 6.0V ~ 7.4V   |                     |
| Operating Voltage                            | At 6.0V   | At 7.4V             |
| Operating Speed at no Load                   | 300°/s (50RPM)  | 353°/s (59RPM)      |
| Stall Torque                                 | 9.6kgcm (94.2Ncm)   | 11.6kgcm (113.8Ncm) |
| Peak Efficiency Torque                       | 1.9kgcm (18.6Ncm)   | 2.3kgcm (22.6Ncm)   |
| Rest Current                                 | 8mA   | 8mA                 |
| Running Current at no Load                   | 400mA   | 600mA               |
| Stall Current                                | 2000mA  | 2200mA              |
| Deadband Width                               | 4µs   | 4µs                 |
| Operating Travel                             | Default   | ±60°                |
|  | Programmable  | n/a                 |
|  | Multi Turn/Continuous Rotation                                  | n/a / n/a           |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)                                   |                     |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)                                  |                     |
| Vibrations at no Load                        | -   |                     |
| Connector Wire Length                        | 300mm   |                     |
| Connector Wire Gauge                         | 22AWG   |                     |
| Connector Wire Strand Count                  | 60/0.08   |                     |
| External Dimensions                          | 41.8 x 21.0 x 40.0mm  |                     |
| Weight*                                      | 61.0g   |                     |
| Ball Bearing                                 | Dual Ball Bearing   |                     |
| Case Material                                | Engineering Plastic   |                     |
| Gear Material                                | 1 Metal-Plastic & 3 Metal Gears                                 |                     |
| Gear Train Backlash                          | Max. 0.5°   |                     |
| Horn Gear Spline                             | 24T Ø6.0  |                     |
| Accessories                                  | Mounting Hardware, Servo Horns (R-0, R-XA, HD-IS, HD-LS, HD-OS) |                     |
| IP-Rating                                    | IP67  |                     |
| Revision                                     | Rev. 1.1 / 04.01.2024   |                     |
| Changelog                                    | -   |                     |
| *of the servo only w/o horns and accessories |   |                     |

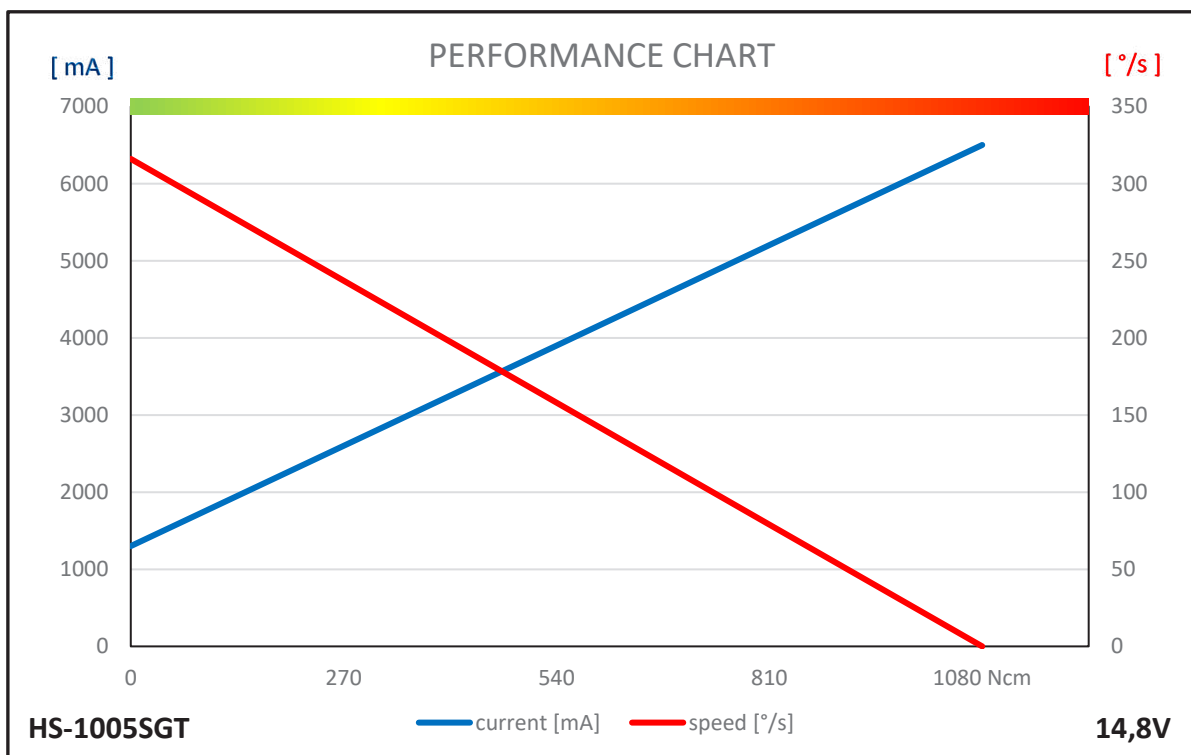
# HS-1005SGT

#138105



1:2

## PERFORMANCE CHART

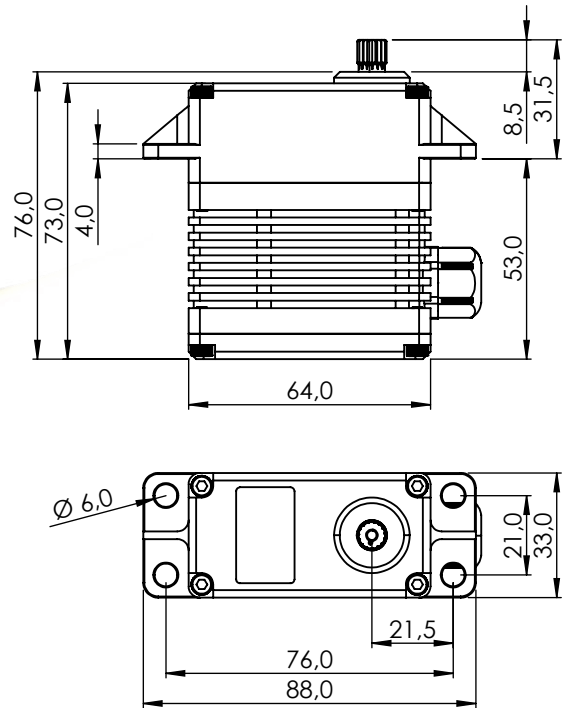


## GENERAL SPECIFICATION

| HS-1005SGT                                   |  |                       |
|--|--|-----------------------|
| Control System                               | PWM                                      |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs |                       |
| Connector Type                               | Hitec 3P (JR 3P compatible)              |                       |
| Position Sensor Type                         | Indirect Drive / 1M Cycle Long Life      |                       |
| Motor Type                                   | Cored Carbon Brush                       |                       |
| Amplifier / MCU                              | Digital with Mosfet Drive                |                       |
| Operating Voltage Range                      | 9.0V ~ 16.8V (Signal: 3.5V ~ 8.4V)       |                       |
| Operating Voltage                            | At 11.1V                                 | At 14.8V              |
| Operating Speed at no Load                   | 231°/s (38RPM)                           | 316°/s (53RPM)        |
| Stall Torque                                 | 84.0kgcm (824.0Ncm)                      | 110.0kgcm (1079.1Ncm) |
| Peak Efficiency Torque                       | 16.8kgcm (164.8Ncm)                      | 22.0kgcm (215.8Ncm)   |
| Rest Current                                 | 90mA                                     | 130mA                 |
| Running Current at no Load                   | 1100mA                                   | 1300mA                |
| Stall Current                                | 5500mA                                   | 6500mA                |
| Deadband Width                               | 2µs                                      | 2µs                   |
| Operating Travel                             | Default                                  | ±60°                  |
|  | Programmable                             | n/a                   |
|  | Multi Turn/Continuous Rotation           | n/a / n/a             |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)            |                       |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)           |                       |
| Vibrations at no Load                        | IEC-60068-2-64                           |                       |
| Connector Wire Length                        | 250mm                                    |                       |
| Connector Wire Gauge                         | 18AWG (Signal: 20AWG)                    |                       |
| Connector Wire Strand Count                  | 120/0.08 (80/0.08)                       |                       |
| External Dimensions                          | 64.0 x 33.0 x 73.0mm                     |                       |
| Weight*                                      | 310.0g                                   |                       |
| Ball Bearing                                 | Dual Ball Bearing                        |                       |
| Case Material                                | Aluminum Alloy                           |                       |
| Gear Material                                | 1 Metal-Plastic & 3 Steel Gears          |                       |
| Gear Train Backlash                          | Max. 0.5°                                |                       |
| Horn Gear Spline                             | 15T Ø8.0                                 |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MO)     |                       |
| IP-Rating                                    | IP54                                     |                       |
| Revision                                     | Rev. 1.1 / 04.01.2024                    |                       |
| Changelog                                    | -  |                       |
| *of the servo only w/o horns and accessories |  |                       |

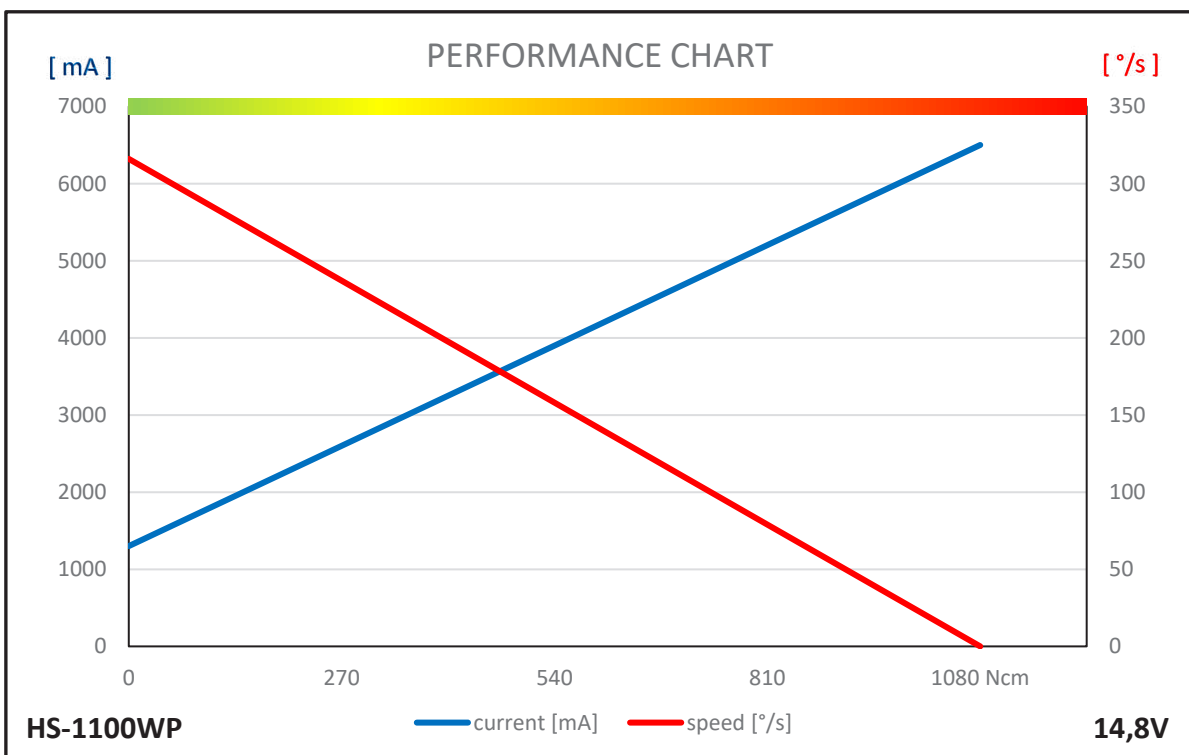
# HS-1100WP

#138100



1:2

## PERFORMANCE CHART

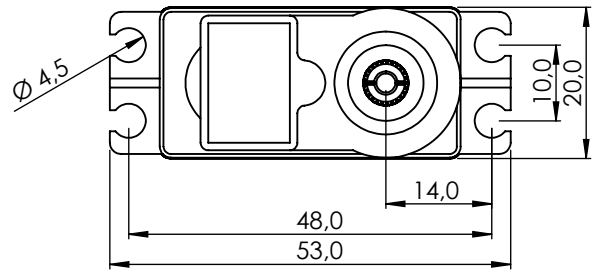
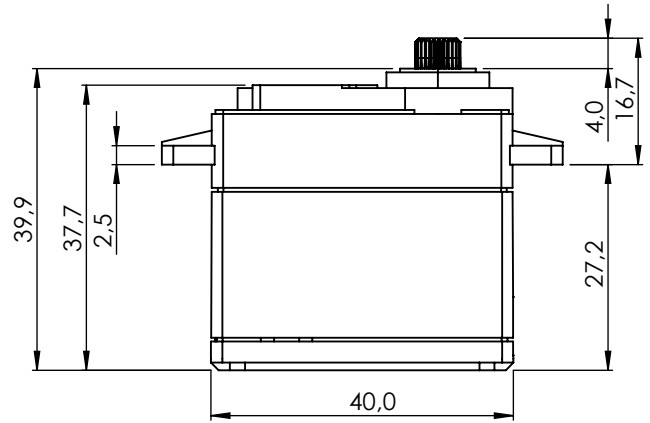


## GENERAL SPECIFICATION

| General Specification                        |  | HS-1100WP |                       |
|--|--|-----------|-----------------------|
| Control System                               | PWM                                      |           |                       |
|  | Pulse Width 900µs 1500µs (Center) 2100µs |           |                       |
| Connector Type                               | Hitec 3P (JR 3P compatible)              |           |                       |
| Position Sensor Type                         | Indirect Drive / 1M Cycle Long Life      |           |                       |
| Motor Type                                   | 5 Poles DC Cored Carbon Brush            |           |                       |
| Amplifier / MCU                              | Digital with Mosfet Drive                |           |                       |
| Operating Voltage Range                      | 9.0V ~ 16.8V (Signal: 3.5V ~ 8.4V)       |           |                       |
| Operating Voltage                            | At 11.1V                                 |           | At 14.8V              |
| Operating Speed at no Load                   | 231°/s (38RPM)                           |           | 316°/s (53RPM)        |
| Stall Torque                                 | 84.0kgcm (824.0Ncm)                      |           | 110.0kgcm (1079.1Ncm) |
| Peak Efficiency Torque                       | 16.8kgcm (164.8Ncm)                      |           | 22.0kgcm (215.8Ncm)   |
| Rest Current                                 | 90mA                                     |           | 130mA                 |
| Running Current at no Load                   | 1100mA                                   |           | 1300mA                |
| Stall Current                                | 5500mA                                   |           | 6500mA                |
| Deadband Width                               | 2µs                                      |           | 2µs                   |
| Operating Travel                             | Default                                  |           | ±60°                  |
|  | Programmable                             |           | n/a                   |
|  | Multi Turn/Continuous Rotation           |           | n/a / n/a             |
| Operating Temperature Range                  | -20°C ~ +60°C (-4°F ~ +140°F)            |           |                       |
| Storage Temperature Range                    | -30°C ~ +80°C (-22°F ~ +176°F)           |           |                       |
| Vibrations at no Load                        | -  |           |                       |
| Connector Wire Length                        | 250mm                                    |           |                       |
| Connector Wire Gauge                         | 18AWG (Signal: 20AWG)                    |           |                       |
| Connector Wire Strand Count                  | 120/0.08 (80/0.08)                       |           |                       |
| External Dimensions                          | 64.0 x 33.0 x 73.0mm                     |           |                       |
| Weight*                                      | 320.0g                                   |           |                       |
| Ball Bearing                                 | Dual Ball Bearing & Dual Needle Bearing  |           |                       |
| Case Material                                | Aluminum Alloy                           |           |                       |
| Gear Material                                | 1 Metal-Plastic & 3 Steel Gears          |           |                       |
| Gear Train Backlash                          | Max. 0.5°                                |           |                       |
| Horn Gear Spline                             | 15T Ø8.0                                 |           |                       |
| Accessories                                  | Mounting Hardware, Servo Horn (I-MO)     |           |                       |
| IP-Rating                                    | IP67                                     |           |                       |
| Revision                                     | Rev. 1.1 / 04.01.2024                    |           |                       |
| Changelog                                    | -  |           |                       |
| *of the servo only w/o horns and accessories |  |           |                       |

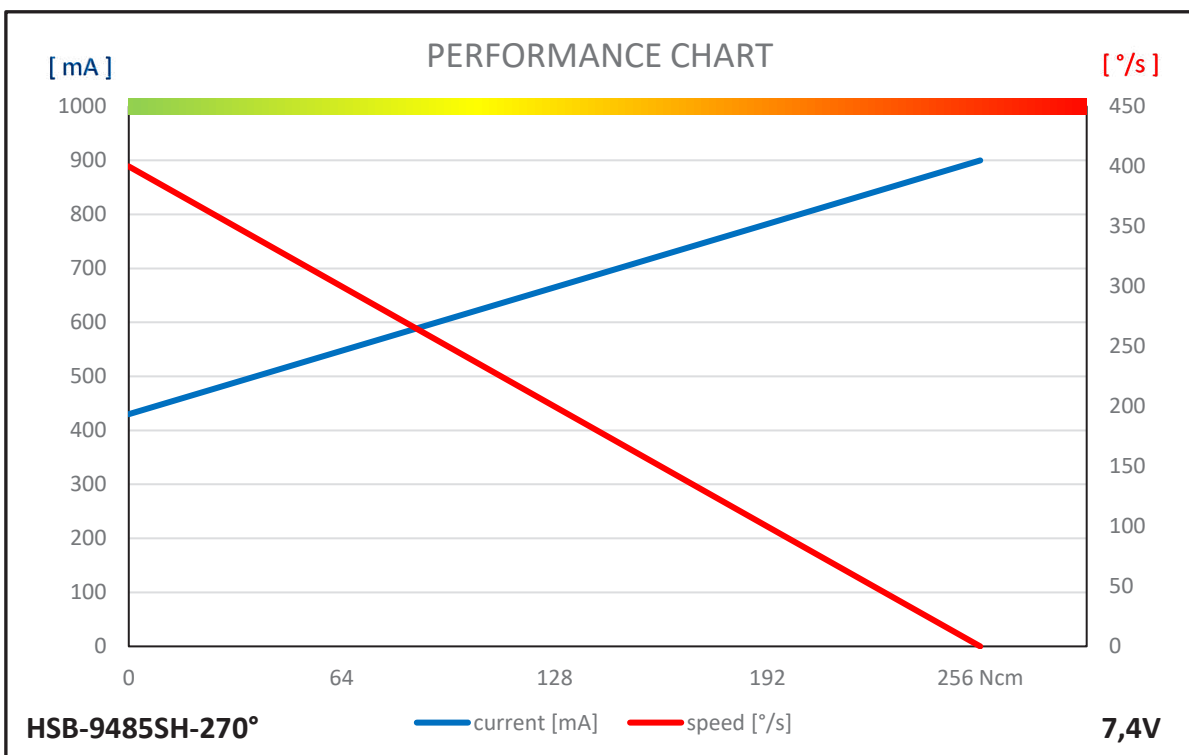
# HSB-9485SH-270°

#1-00409



1:1

## PERFORMANCE CHART





## GENERAL SPECIFICATION

| HSB-9485SH-270°                         |  |                     |
|---|--|---------------------|
| Control System                          | PWM  |                     |
|   | Pulse Width 900µs 1500µs (Center) 2100µs               |                     |
| Connector Type                          | Hitec 3P (JR 3P compatible)                            |                     |
| Position Sensor Type                    | Indirect Drive / 4 Slider / 1M Cycle Long Life         |                     |
| Motor Type                              | BLDC   |                     |
| Amplifier / MCU                         | 16bit programmable Digital Amplifier with Mosfet Drive |                     |
| Operating Voltage Range                 | 4.0V ~ 8.4V  |                     |
| Operating Voltage                       | At 6.0V  | At 7.4V             |
| Operating Speed at no Load              | 333°/s (56RPM)   | 400°/s (67RPM)      |
| Stall Torque                            | 26.0kgcm (255.1Ncm)                                    | 26.0kgcm (255.1Ncm) |
| Peak Efficiency Torque                  | 5.2kgcm (51.0Ncm)                                      | 5.2kgcm (51.0Ncm)   |
| Rest Current                            | 30mA   | 30mA                |
| Running Current at no Load              | 360mA  | 430mA               |
| Stall Current                           | 1100mA   | 900mA               |
| Deadband Width                          | 1µs  | 1µs                 |
| Operating Travel                        | Default  | ±60°                |
|   | Programmable   | Max. 270°           |
|   | Multi Turn/Continuous Rotation                         | n/a / n/a           |
| Operating Temperature Range             | -20°C ~ +60°C (-4°F ~ +140°F)                          |                     |
| Storage Temperature Range               | -30°C ~ +80°C (-22°F ~ +176°F)                         |                     |
| Connector Wire Length                   | 300mm  |                     |
| Connector Wire Gauge                    | 20AWG  |                     |
| Connector Wire Strand Count             | 80/0.08  |                     |
| External Dimensions                     | 40.0 x 20,0 x 37.7mm                                   |                     |
| Weight*                                 | 62.0g  |                     |
| Ball Bearing                            | Dual Ball Bearing                                      |                     |
| Case Material                           | Engineering Plastic                                    |                     |
| Gear Material                           | 1 Metal-Plastic & 3 Steel Gears                        |                     |
| Gear Train Backlash                     | Max. 0.5°  |                     |
| Horn Gear Spline                        | H25T Ø6.0  |                     |
| Accessories                             | Servo Horn (HD-LS25)                                   |                     |
| IP-Rating                               | IP54   |                     |
| Revision                                | Rev. 1.0 / 09.01.2024                                  |                     |
| Changelog                               | -  |                     |
| *of the servo w/o horns and accessories |  |                     |



**Anwendungsbeispiel für HiTEC-Servos**

Hier im Roboter-Arm

**Typical application for HiTEC servos –**

here in a robot arm

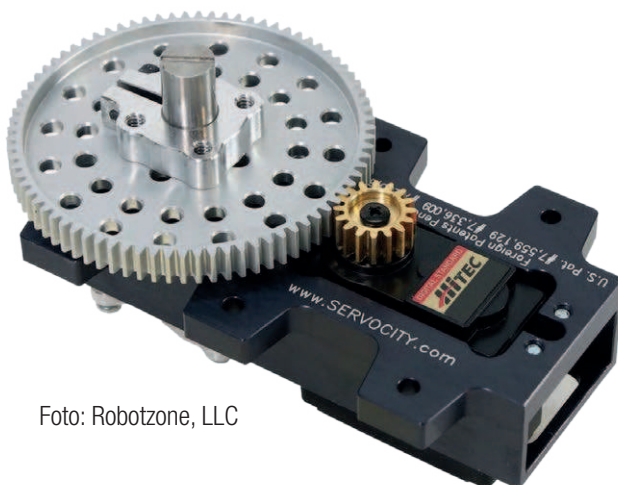


Foto: Robotzone, LLC



**Anwendungsbeispiel für HiTEC-Servos**

Hier in einem Robotergetriebe

**Typical application for HiTEC servos –**

In this case in a robot gearbox

# ***KUNDENINDIVIDUELLE ANPASSUNG***

Als Schwesterunternehmen der Firma Hitec RCD Korea Inc. sind wir in der Lage individuelle Kundenwünsche zu realisieren. Folgende Anpassungen/Modifikationen sind dabei möglich:

- Änderung von Kabeltyp und Kabellänge
- Änderung der Steckverbindung
- Anpassung des Zubehörs
- Anpassung der Verpackung (Umverpackung und Gebindegröße)
- Programmierservice
- Montageservice
- Erweiterte Wareenausgangsprüfung (Teststand und Protokollierung)
- Änderung der Beschriftung (Name Plate, Serien-Nr., etc.)
- Anpassung des Produkts (z.B. Getriebeübersetzung)
- Erfüllung von besonderen Zertifizierungswünschen
- Tracing von Komponenten
- Spezielle Liefervereinbarung (Rahmenaufträge, garantierte Lieferfähigkeiten)

# PROGRAMMIERGERÄTE

Digitale Hitec Aktuatoren verfügen über die Möglichkeit unterschiedliche Einstellungen anzupassen beziehungsweise Sicherheitsfeatures zu aktivieren. Das Ändern dieser Parameter kann mit Hilfe von unterschiedlichen Programmiergeräten erfolgen.

## HFP-30

Das Hitec HFP-30 bietet umfangreiche Einstellungsmöglichkeiten und Testfunktionen. Aufgrund der kompakten Abmessungen eignet sich das HFP-30 ideal für den mobilen Einsatz, da kein Computer benötigt wird. Mit dem HFP-30 lassen sich alle digitalen Hitec PWM-Aktuatoren programmieren.



## DPC-11

Das Hitec DPC-11 ist ein kostengünstige Programmierschnittstelle, welche in Verbindung mit einem Computer mit Windows-Betriebssystem verwendet wird. Hierbei lassen sich alle Einstellungen bequem modifizieren und optional auch abspeichern. So können beispielsweise die gewählten Einstellungen mit geringem Aufwand archiviert, oder auf weitere Servos übertragen werden. Die Anbindung erfolgt über USB.



## DPC-CAN

Mit der Hitec DPC-CAN Schnittstelle lassen sich Hitec CAN- und UAVCAN-Servos konfigurieren, aktualisieren, oder testen. Hierfür stehen unterschiedliche Software-Applikationen bereit. Hierfür ist ein Computer mit Windows-Betriebssystem notwendig. Die Anbindung erfolgt über USB.





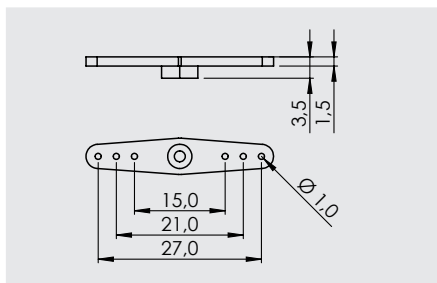
# SERVO ABTRIEBSARME

Für das gesamte Hitec Servo-Portfolio steht eine Vielzahl von Abtriebsarmen zur Verfügung. Im Lieferumfang der Servos ist zumeist eine Auswahl geeigneter Abtriebsarme enthalten.

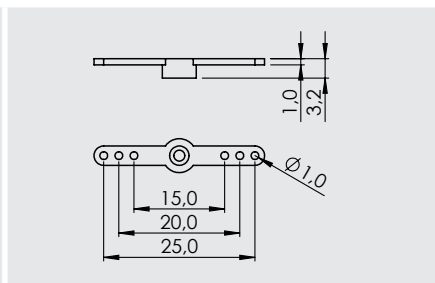
Bei Sonderwünschen können Sie aus dem breiten Sortiment wählen, bitte nehmen Sie hierzu Kontakt zu uns auf.

## 15T (Ø4,0)

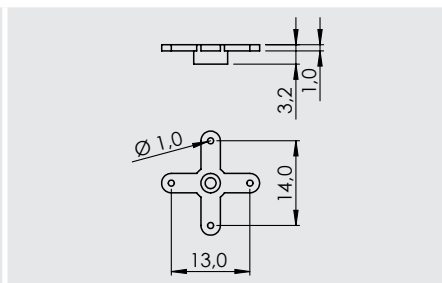
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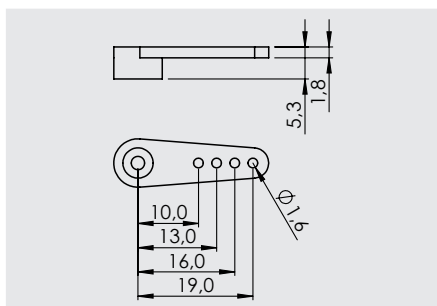
FS-IS15



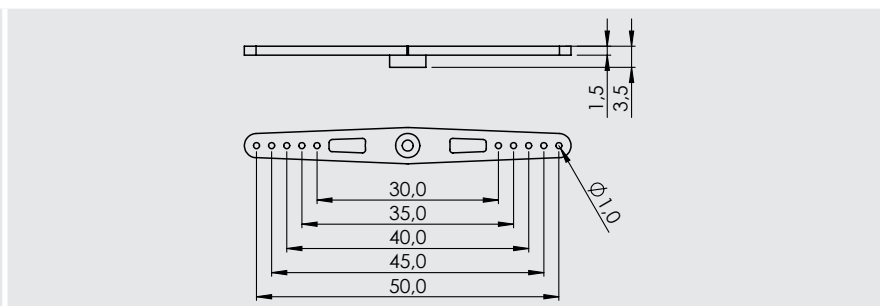
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HD-M15-L

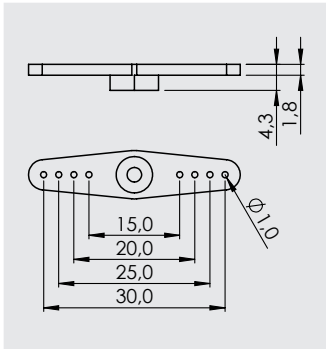


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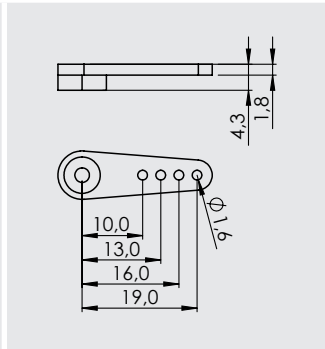


## 25T (Ø5,0)

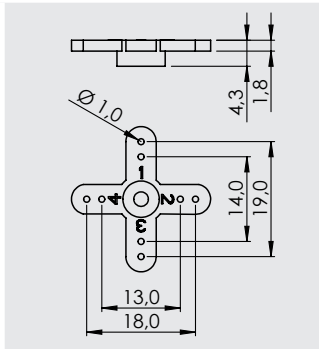
**MS-I25**



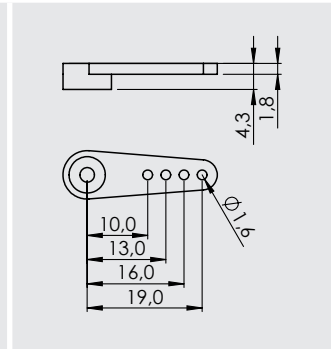
**MS-L25**



**MS-X25**

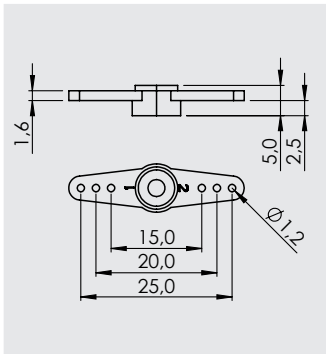


**MS-ML25**

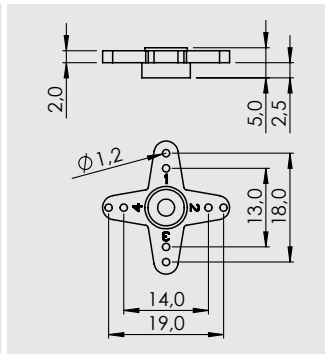


## 24T (Ø6,0)

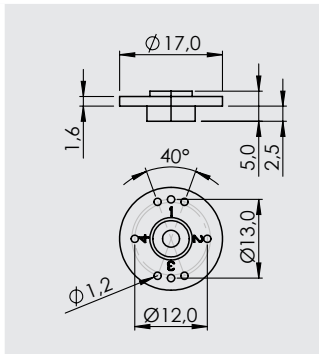
**M-I24**



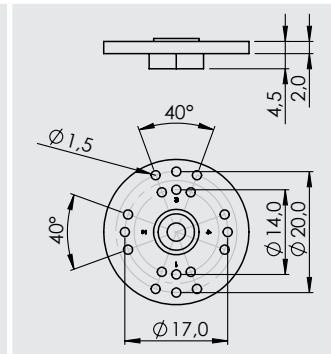
**M-X24**



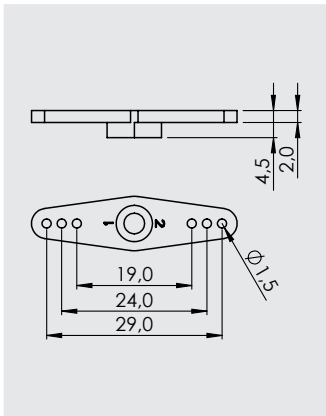
**M-024**



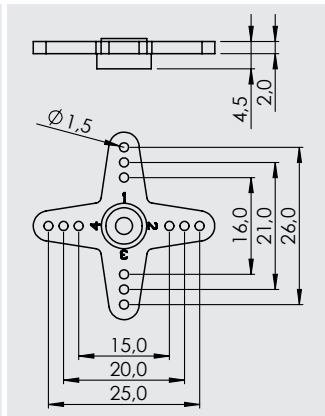
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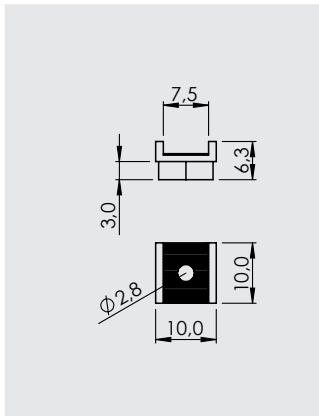
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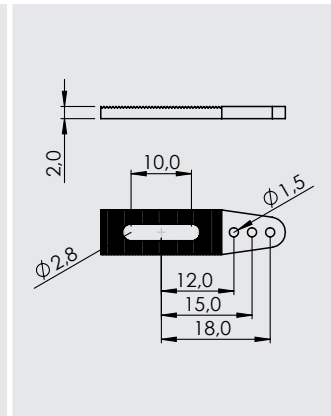
**R-X24**



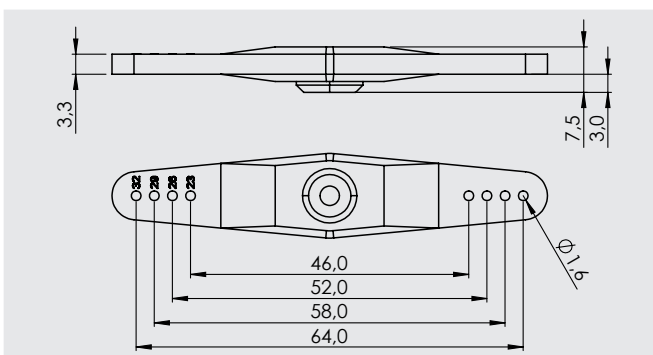
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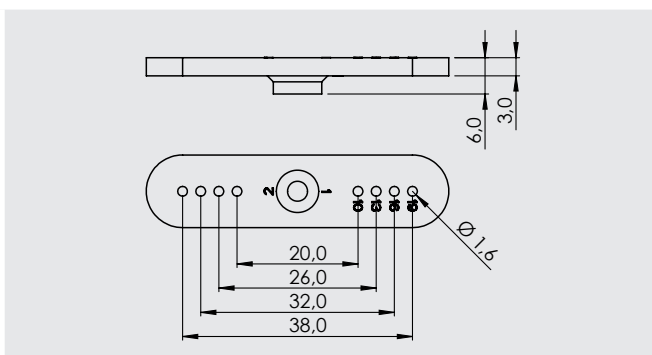
**R-D**



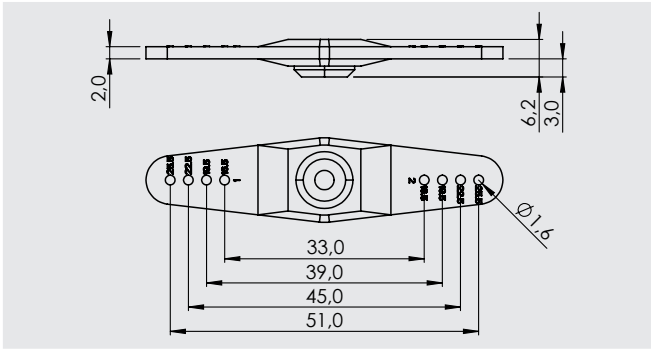
**HD-IL24**



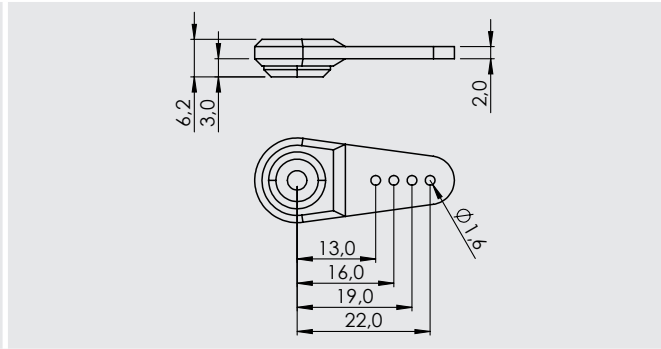
**HD-IM24**



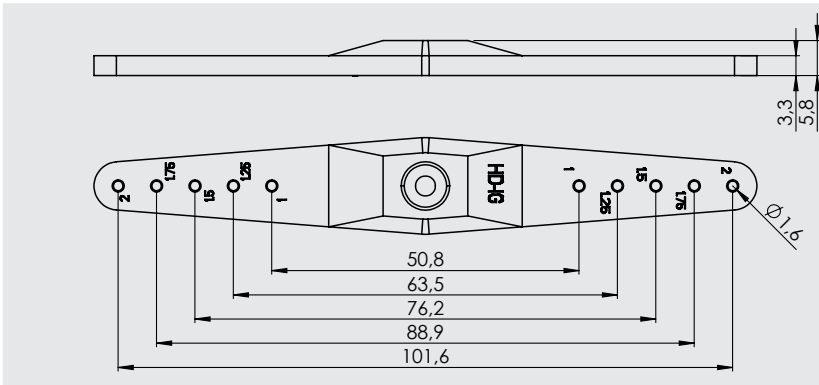
HD-IS24



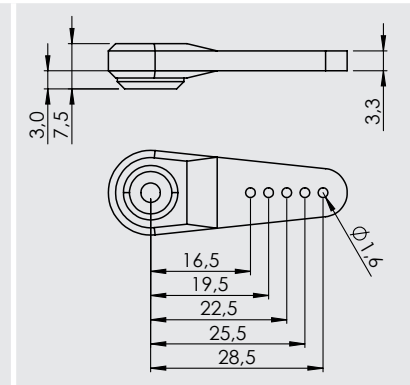
HD-LS24



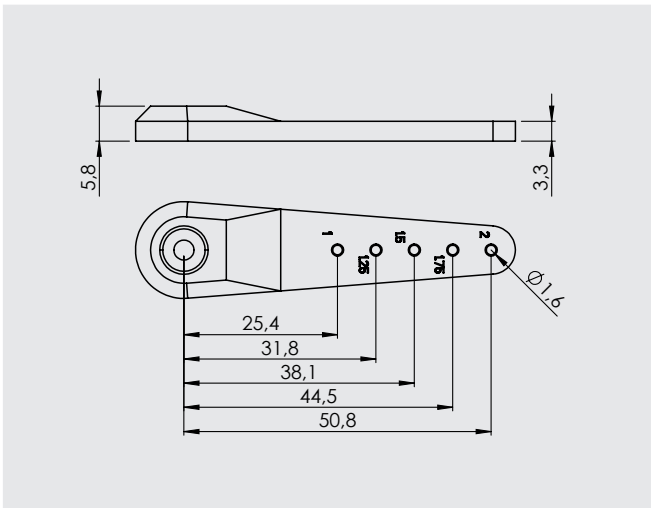
HD-IG24



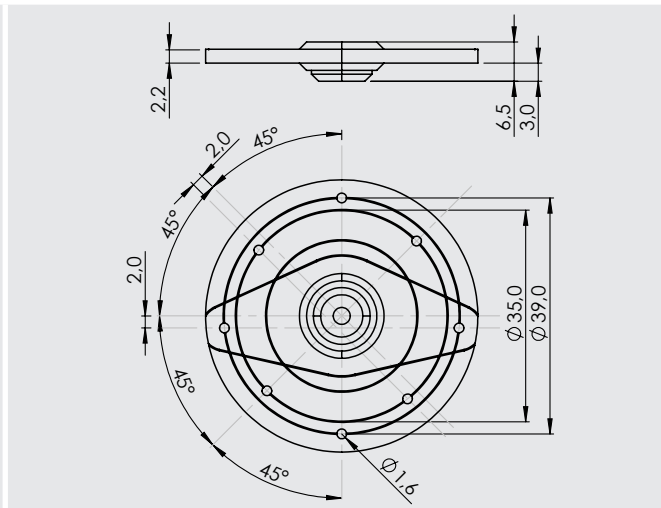
HD-LL24



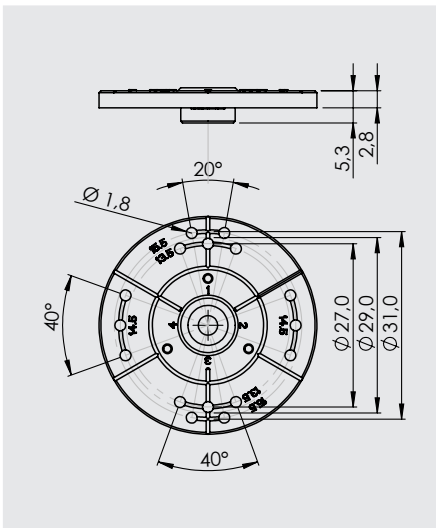
HD-LG24



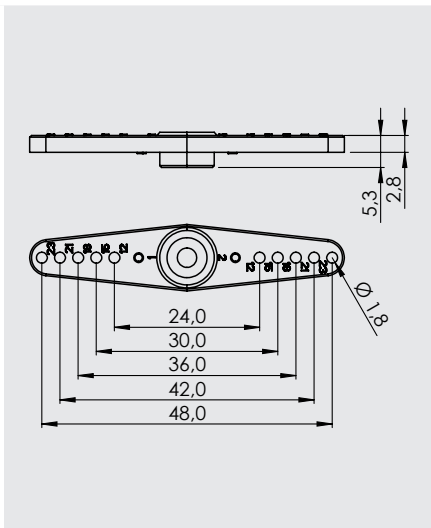
HD-OS24



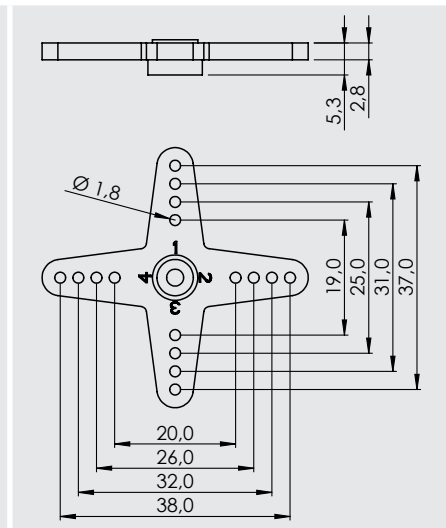
Q-024



Q-I24

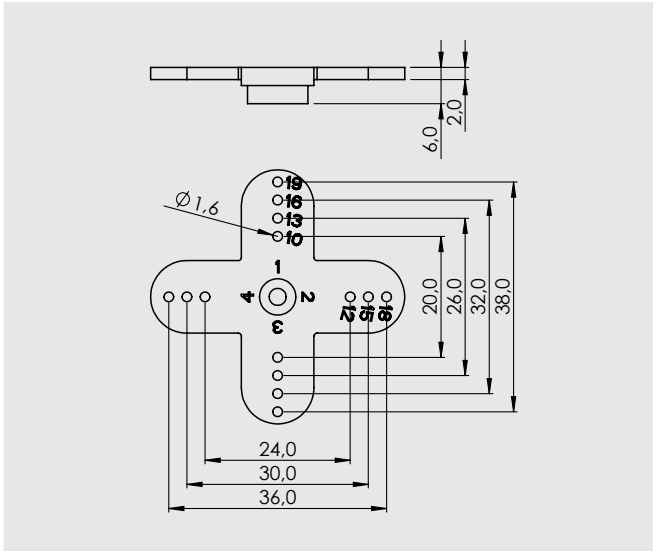


Q-X24

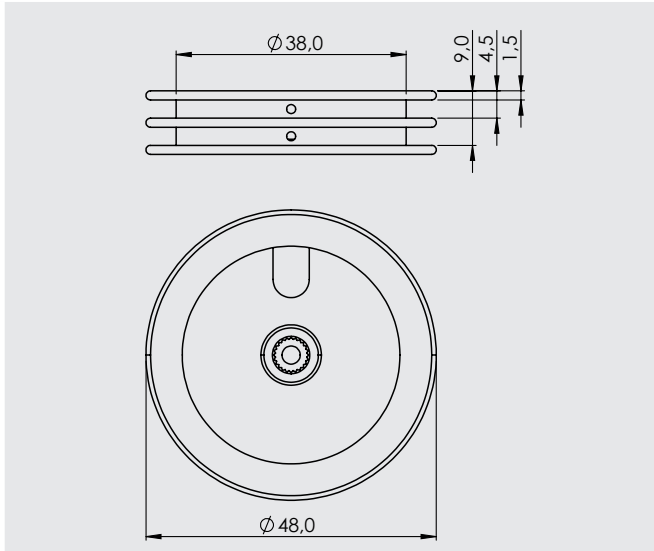




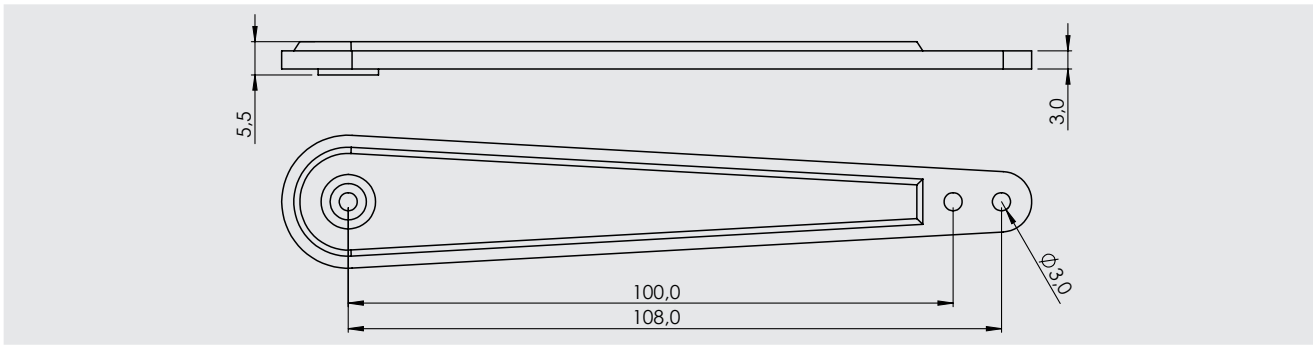
**R-XA24**



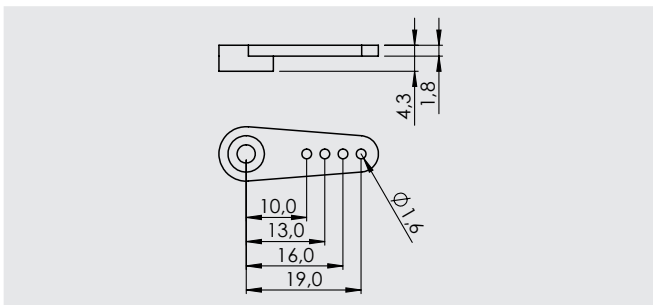
**SP-24**



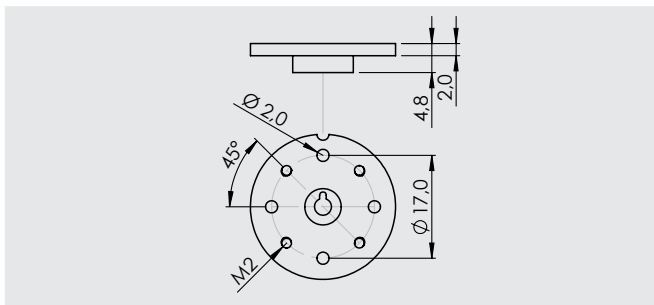
**715SA-24**



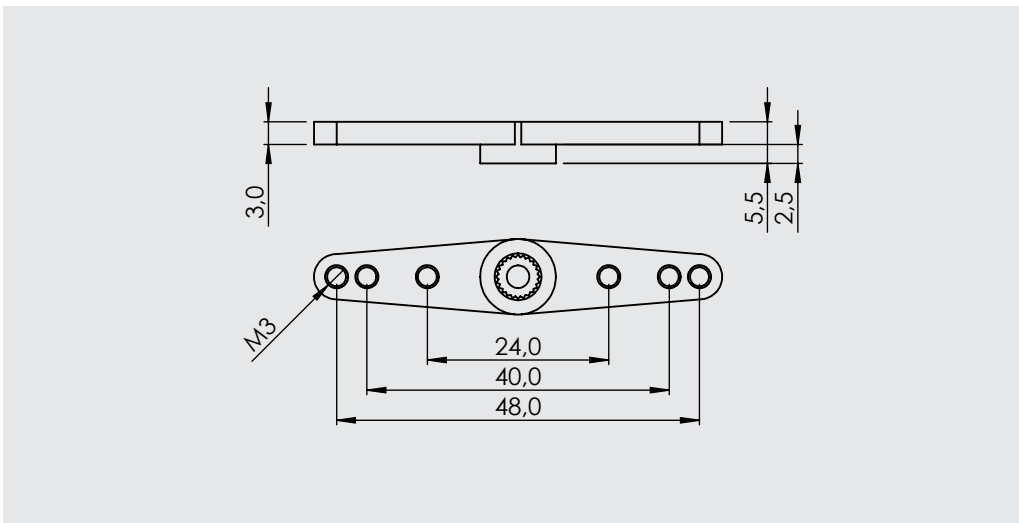
**R-ML24**



**R-M024**

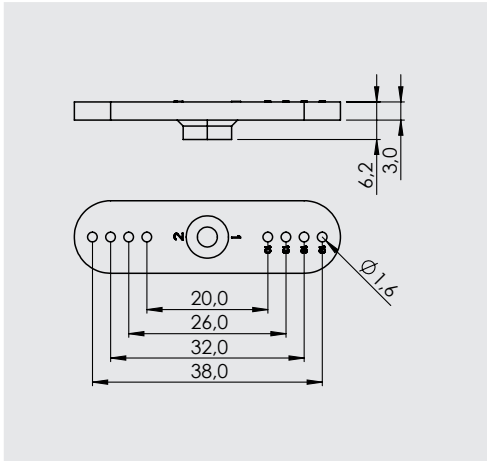


**Q-MI24**

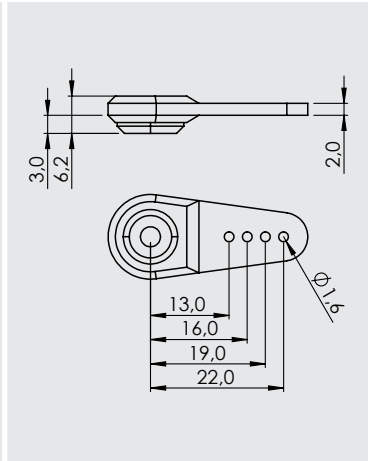


# H25T (Ø6,0)

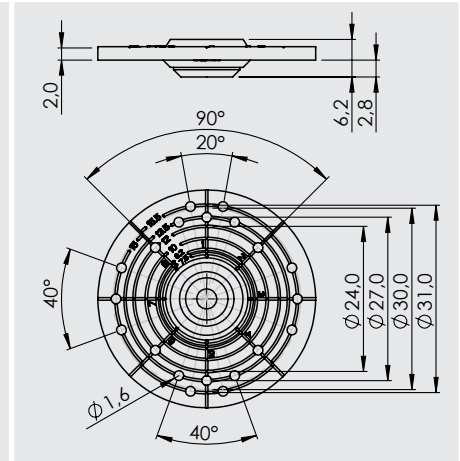
**HD-IM25**



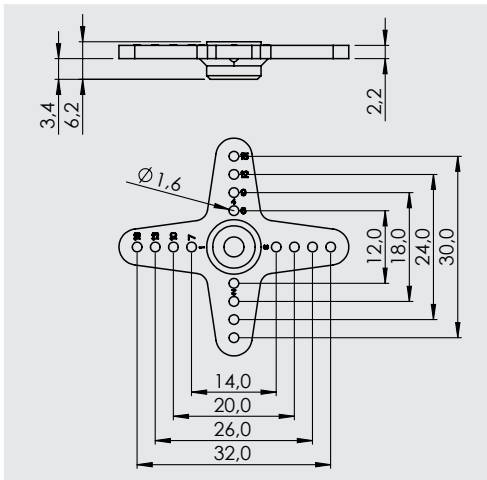
**HD-LS25**



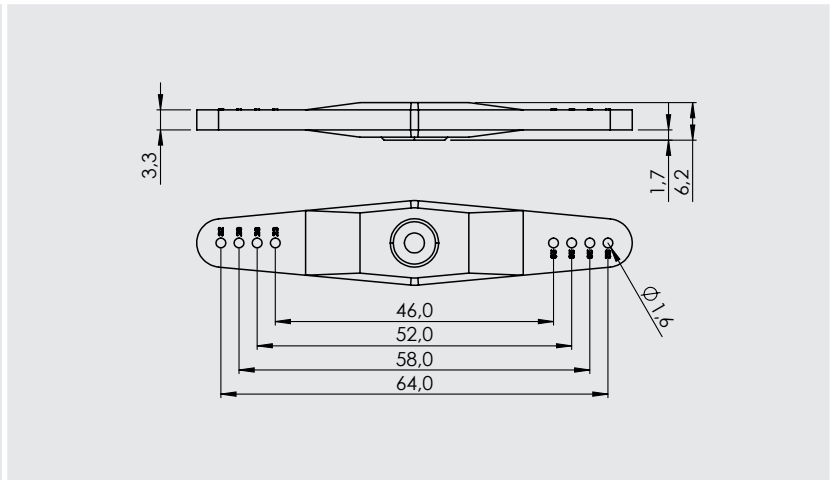
**HD-OS25**



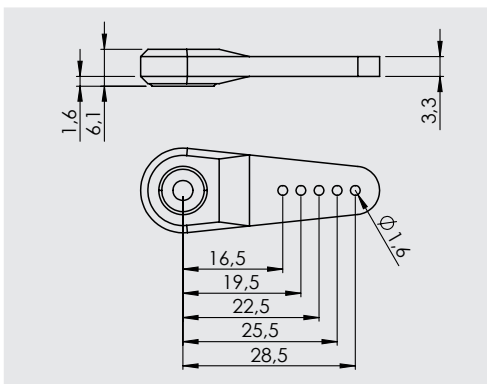
**HD-XS25**



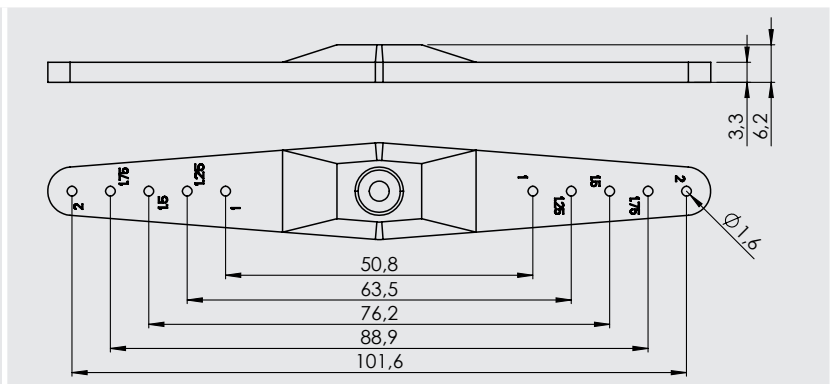
**HD-IL25**



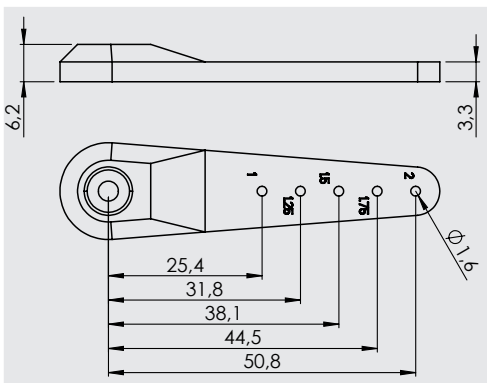
**HD-LL25**



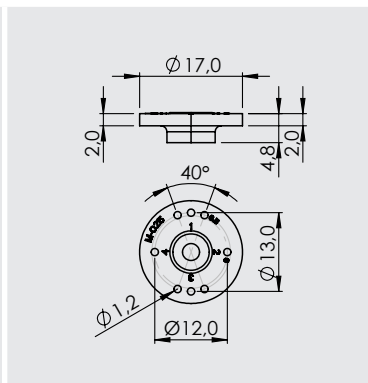
**HD-IG25**



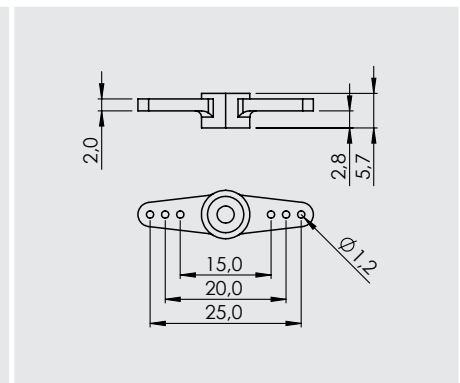
**HD-LG25**



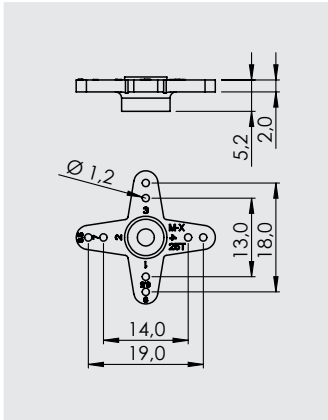
**M-025**



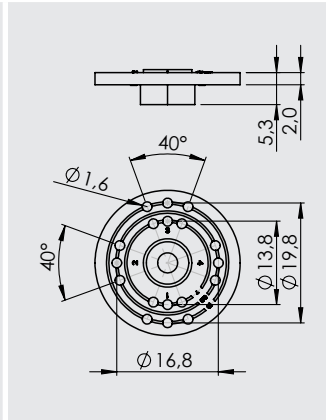
**M-I25**



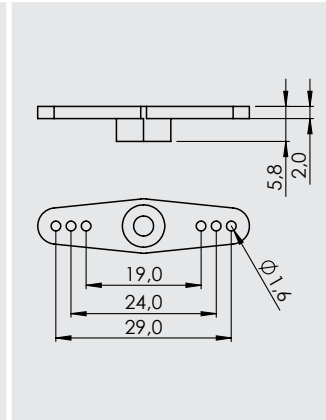
**M-X25**



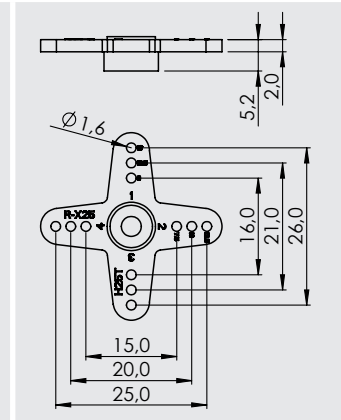
**R-025**



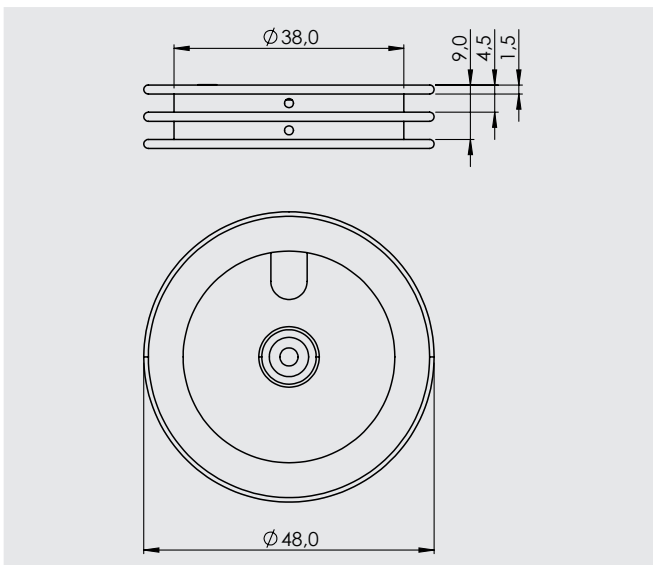
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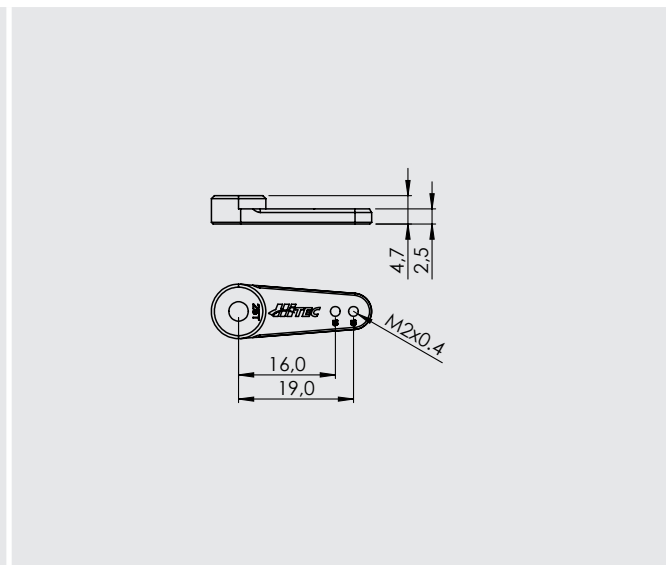
**R-X25**



**SP-25**

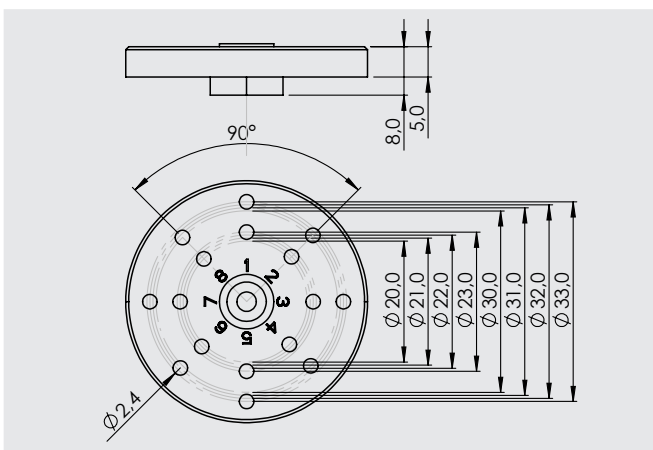


**R-ML25**

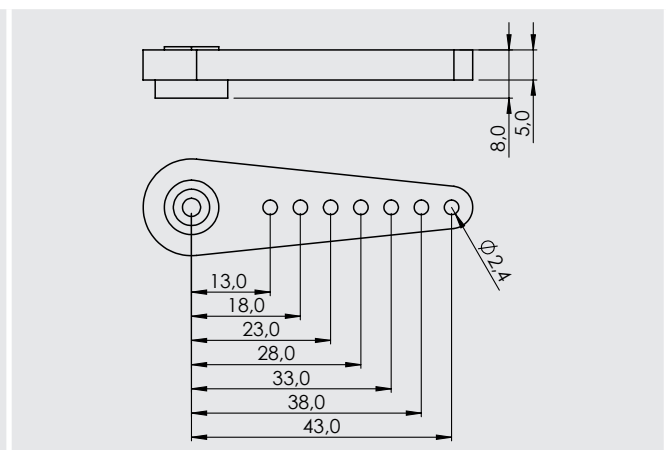


**15T (Ø8,0)**

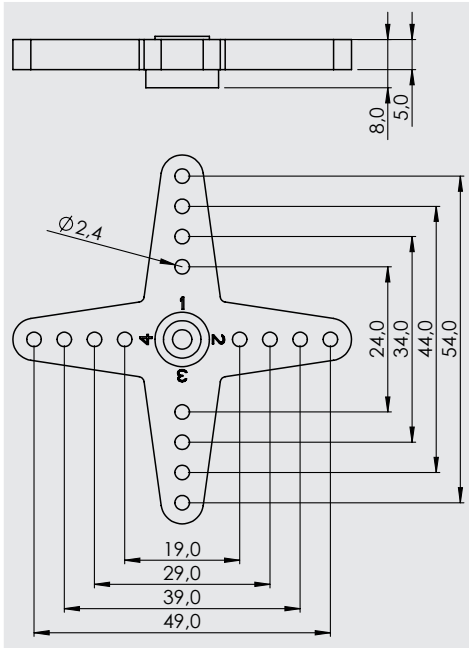
**Q-0A15**



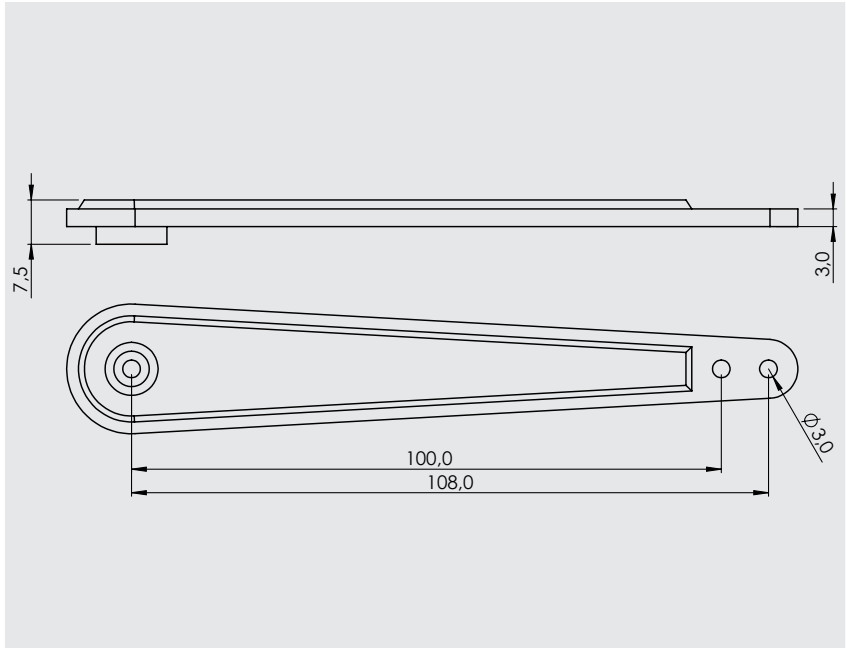
**Q-IA15**



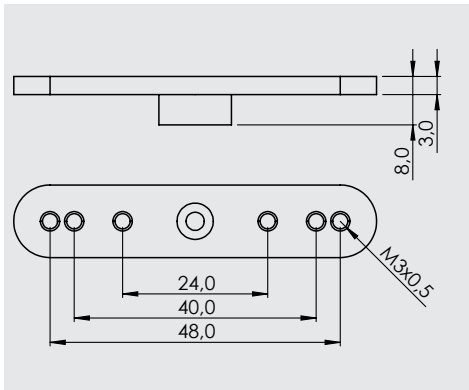
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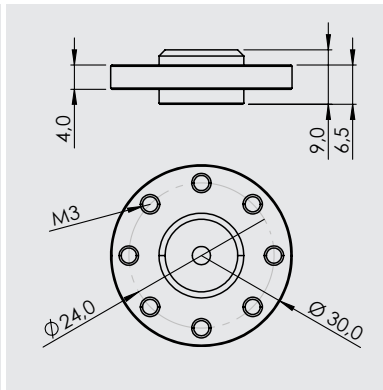
825SA-15



Q-MIA15



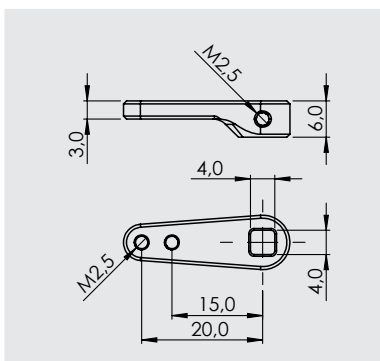
I-M015



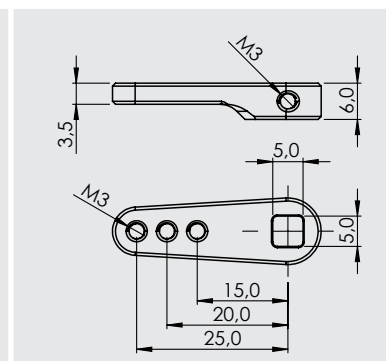
**SQUARE 4**

**SQUARE 5**

MIS4-A

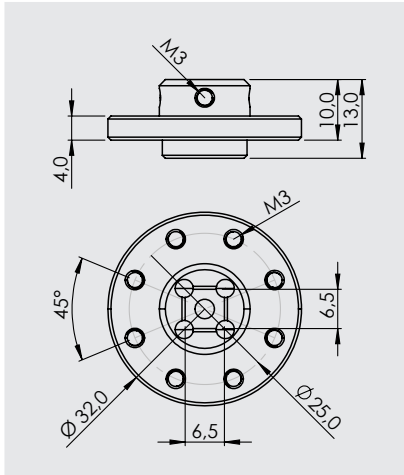


MIS5-A

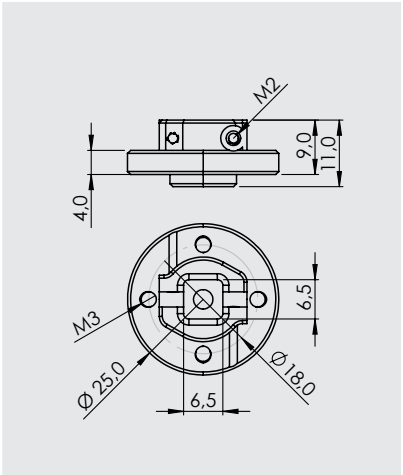


# SQUARE 6.5

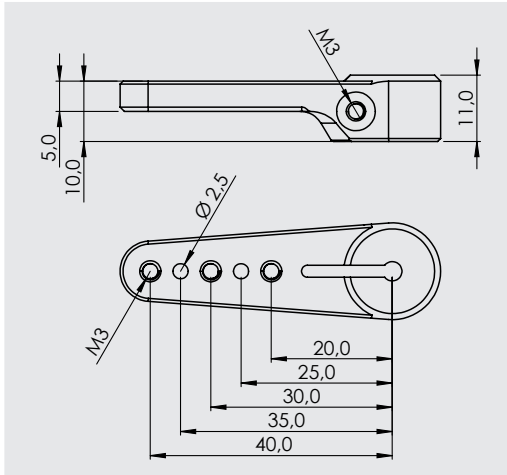
**MOS6.5-S**



**MOS6.5-A**



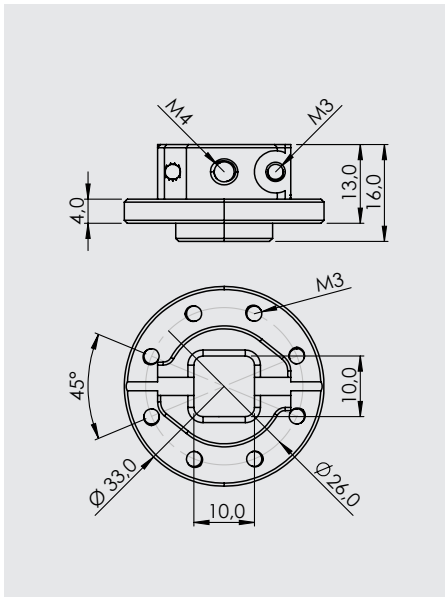
**MIS6.5-A**



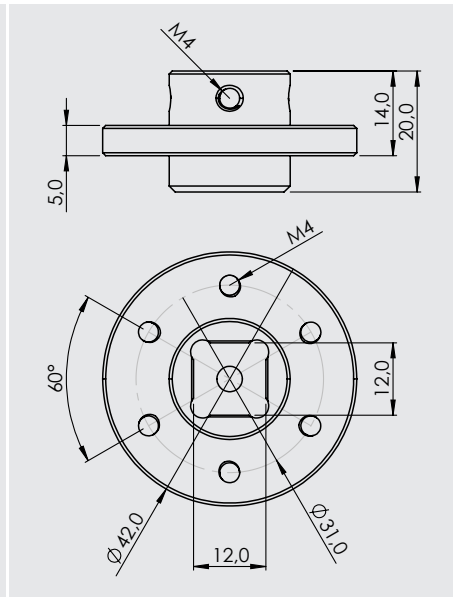
# SQUARE 10

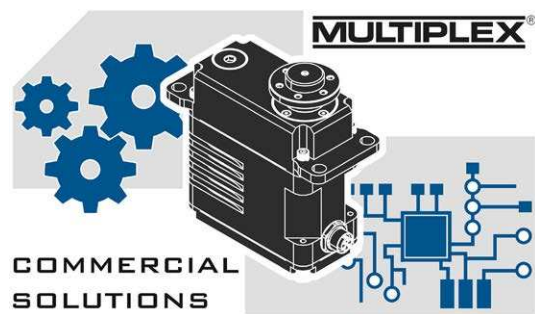
# SQUARE 12

**MOS10-A**



**MOS12-S**





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