

## 1. General Description

The DA 26 Series has been developed for safety critical applications.

Highest reliability under harsh environmental conditions was our engineers' main concern - accordingly **contactless, wear-free position sensor** and **wear-free brushless motor technology** have been incorporated, maximizing life time and efficiency, reducing noise and electromagnetic emissions (EMI).



Typical applications:

- Robotics
- Automation
- Unmanned Vehicles:
- Flap and control surface actuation
- Swash-plate control
- Throttle control
- Landing gear actuation

## 1.1. Actuator Type Description

There are three major different DA-26 actuator types available:

Type	Interface
DA 26-30-5024-1	PWM-CMOS-level & PWM-Opto-Coupler-Interface with analog feedback
DA 26-30-5024-2	PWM-CMOS-level & PWM RS-422-Interface with analog feedback
DA 26-30-5024-3	RS-485 Data Communication Interface with digital and analog feedback
DA 26-30-5024-4	Redundant RS-485 Data Communication Interface with digital feedback and redundant power supply terminals

The DA 26 actuator range comes with a wide variety of command interfaces in order to ease the integration with the control system. The most basic interface is the traditional CMOS-level PWM interface. It allows interfacing to any off-the-shelf remote control systems and to many UAV control systems.

The downside of this interface is that it is susceptible to electro-magnetic noise, especially if long cables are used. This is the reason why we incorporated in the PWM versions of the DA 26 an opto-coupler or RS-422 interface which are far less susceptible to electro-magnetic noise as they feature a differential transmission of the command signal, but keep the traditional PWM encoding of the command.

All DA 26 actuators versions, that feature a PWM-based command interface, provide analog signal containing actuator position feedback information.

The DA 26 with RS-485 data communication interface allows for a deep integration of the actuators with the control system. All actuators can be connected to an actuator bus system, which can reduce the weight and complexity of the cabling. However, a star-type cabling topology can also be used.

The encoding of the commands to the actuator is done by a 6 bytes command frame, which is secured by a 16-bit CRC. Additional commands allow acquiring of diagnostic information from the actuator, such as voltage, current, and temperature. The control system can take advantage of the diagnostic information to e.g. avoiding an actuator overload condition.

For applications that require the maximum possible reliability, a redundant version is available. This version of the DA-26 actuator features a redundant RS-485 communication interface and a redundant power supply.

## 2. Electrical Specification

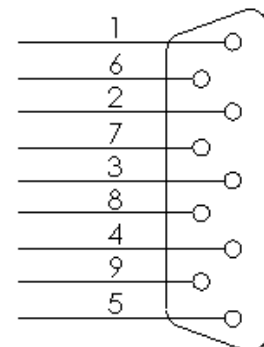
Operation Voltage Range:	12 – 32 V DC
No-load Current Consumption (at 28 VDC):	40 mA
Stall Current Consumption (at 28 VDC):	2000 mA

## 3. Interface Specification

### 3.1. CMOS PWM Interface

Interface Type:	Single Ended Interface
Input Levels:	CMOS Level
Bidirectional Interface:	Yes
Position Command:	Pulse Width Modulation

Single Ended CMOS with PWM	
Pin No.	
1	not connected
2	not connected
3	Feedback A / Differential Feedback Signal, Channel A
4	CMOS PWM, Command + Parameter
5	Case Ground
6	Power+
7	Power Return
8	Feedback SE / Single Ended Feedback Signal
9	Feedback B / Differential Feedback Signal, Channel B



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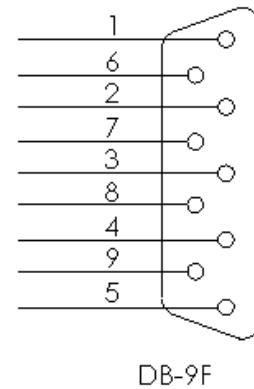
### CMOS/PWM Command Interface - Connecting Cable Pin Assignment

Comment: The CMOS PWM interface is always available independent of the chosen command interface type (opto-coupled PWM, RS422 PWM). This interface is always used to configure the actuator parameters.

### 3.2. Opto-coupled PWM Interface

Interface Type:	Opto Isolated Differential Interface
Input Levels:	Low: <1.4 V DC / High: > 3.1 V DC
Bidirectional Interface:	No
Position Command:	Pulse Width Modulation
Command Input Current (at 4 VDC):	<5 mA

Differential Optocoupler Interface (PWM)	
Pin No.	
1	PWM Signal, Anode Optocoupler
2	PWM Signal, Cathode Optocoupler
3	Feedback A / Differential Feedback Signal, Channel A
4	<i>must be connected to pin #7</i>
5	Case Ground
6	Power+
7	Power Return
8	Feedback SE / Single Ended Feedback Signal
9	Feedback B / Differential Feedback Signal, Channel B

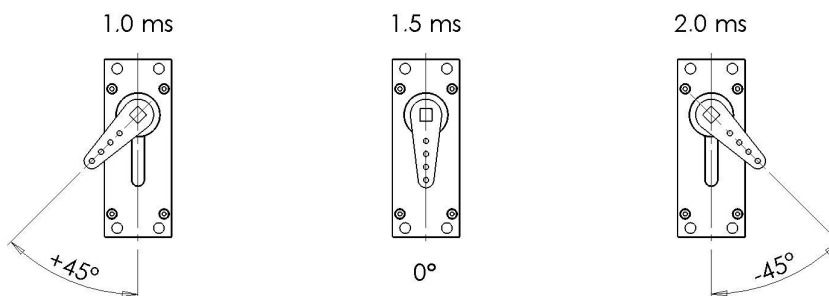


**Opto/PWM** Command Interface - Connecting Cable Pin Assignment

Comment: Pin no. 4 needs to be connected to pin no. 7 in order to activate the opto-coupler PWM interface. Servo configuration is still possible through the CMOS-level PWM interface (pin no. 4). Therefore it is required to remove the connection between pin no. 4 and pin no. 7 before connecting pin no. 4 to the PWM signal of the actuator programming adapter.

### 3.3. Pulse Width Modulation Specification

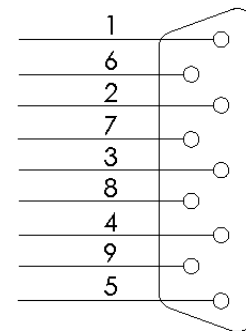
Nominal Pulse Repetition Rate:	50 Hz
Maximum Pulse Repetition Rate:	380 Hz
Minimum Pulse Repetition Rate:	1 Hz
Command Pulse Width (+45°/ max. CW):	1.0 ms
Command Pulse Width (0°):	1.5 ms
Command Pulse Width (-45°/ max. CCW):	2.0 ms



### 3.4. RS-422 PWM Interface (optional)

Interface Type:	Differential Interface
Input Levels:	RS-422 Levels
Bidirectional Interface:	No
Position Command:	Pulse Width Modulation

Single Ended CMOS with differential RS422 Interface (PWM)	
Pin No.	
1	RS422 A, Non-Inverting RS422 Input
2	RS422 B, RS422 Inverting RS422 Input
3	Feedback A / Differential Feedback Signal, Channel A
4	CMOS PWM, Command + Parameter
5	Case Ground
6	Power+
7	Power Return
8	Feedback SE / Single Ended Feedback Signal
9	Feedback B / Differential Feedback Signal, Channel B



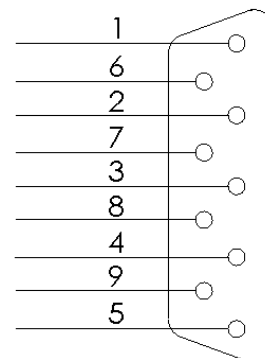
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**RS422/PWM** Command Interface - Connecting Cable Pin Assignment

### 3.5. RS-485 Bidirectional Data Communication Interface (optional)

Interface Type:	Differential Interface
Input Levels:	RS-485 Levels
Bidirectional Interface:	Yes
Position Command:	6 Byte Command Frame with 16 bit CRC

Differential RS485 Interface with Communication Protocol	
Pin No.	
1	Non-inverting RS485 Input /Output (A)
2	Inverting RS485 Input /Output (B)
3	reserved
4	reserved
5	Case Ground
6	Power+
7	Power Return
8	reserved
9	reserved



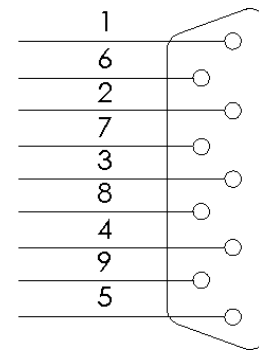
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**RS485** Command Interface - Connecting Cable Pin Assignment

### 3.6. RS-485 Redundant Data Communication Interface (optional)

Interface Type: Differential Interface  
 Input Levels: RS-485 Levels  
 Bidirectional Interface: Yes  
 Position Command: 6 Byte Command Frame with 16 bit CRC

Redundant RS485 Interface with Communication Protocol	
Pin No.	
1	Interface 1 – Non-inverting RS485 Input /Output (A)
2	Interface 1 - Inverting RS485 Input /Output (B)
3	Interface 2 – Non-inverting RS485 Input /Output (A)
4	Power+ (Backup)
5	Case Ground
6	Power+ (Primary)
7	Power Return (Primary)
8	Power Return (Backup)
9	Interface 2 - Inverting RS485 Input /Output (B)



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**Redundant RS485** Command Interface - Connecting Cable Pin Assignment

### 3.7. RS-485 Protocol Specification

Baud Rate: 115200  
 Number of Data bits: 8  
 Number of Stop bits: 1 or 2  
 Parity: None

Command/Response Frame:

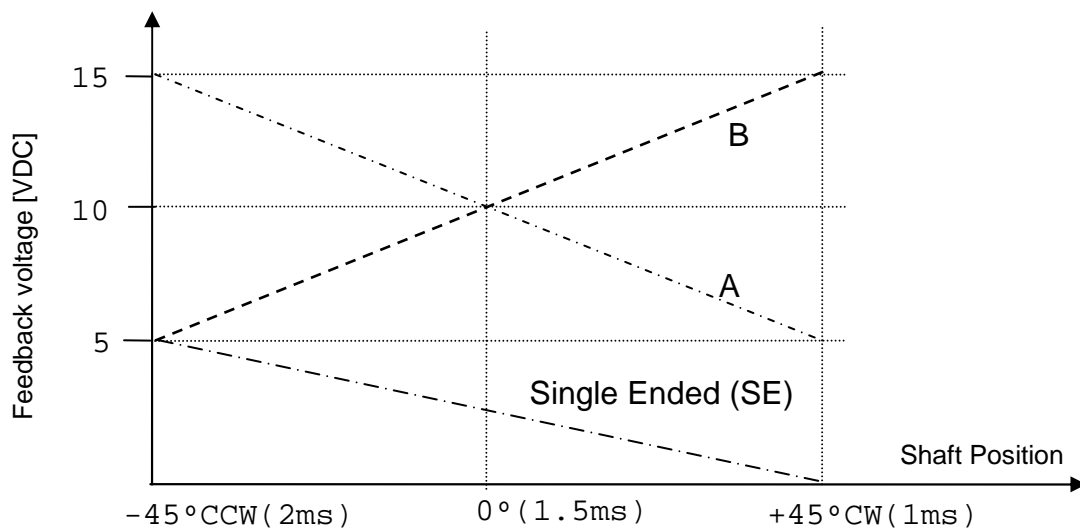
Byte #	Description
1	Command/Response-code
2	Actuator ID
3	Argument 1
4	Argument 2
5	CRC High-Byte
6	CRC Low-Byte

Commands:

- Load actuator ID
- Loss of communication position
- Loss of communication timeout
- New position
- Report station ID
- Restore factory defaults

### 3.8. Analog Position Feedback Interface

Output Type:	Differential Output (A-B) and Single Ended Output
Output Voltage (A-B) at -45° (max. CCW):	+10 VDC
Output Voltage (A-B) at +45° (max. CW):	- 10 VDC
Output Voltage (SE) at -45° (max. CCW):	0 VDC
Output Voltage (SE) at +45° (max. CW):	5 VDC

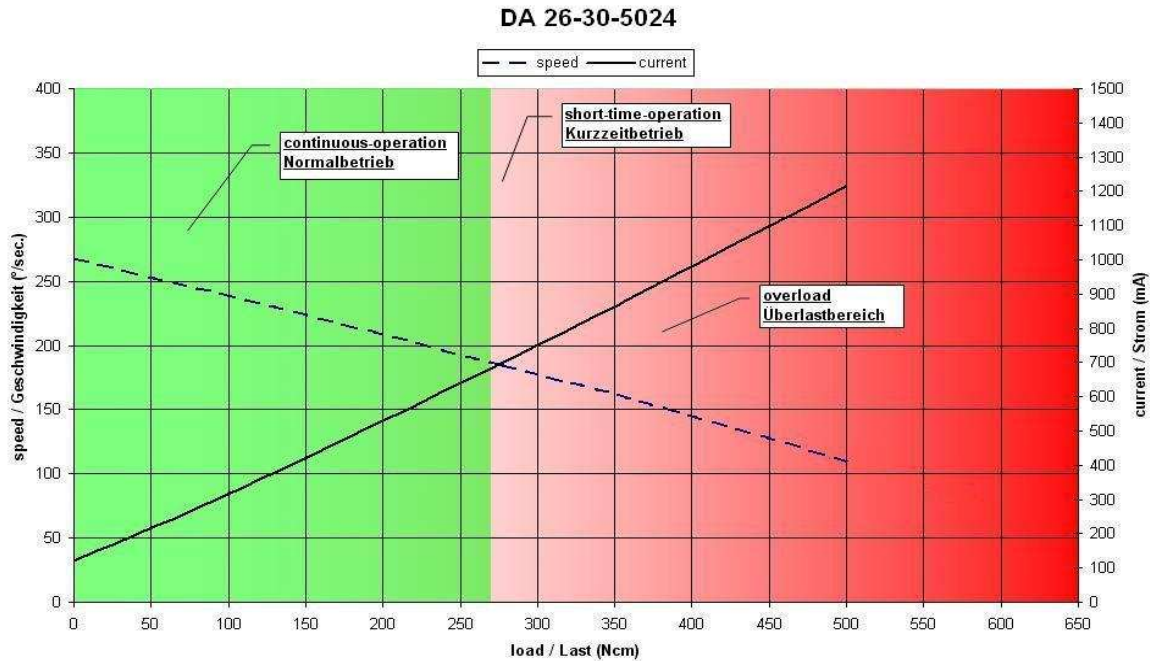


### 3.9. Command Interface Matrix

Interface	Standard	RS-422 Option	RS-485 Option	Redundant RS-485 Option
CMOS PWM	Yes	Yes	No	No
Opto-coupler PWM	Yes	No	No	No
RS-422 PWM	No	Yes	No	No
RS-485	No	No	Yes	Yes
Redundant RS-485	No	No	No	Yes
Analog Feedback	Yes	Yes	No	No
Digital Feedback	No	No	Yes	Yes
Redundant Power Supply	No	No	No	Yes

#### 4. Performance Specification

No Load Speed: 260°/sec.  
 Stall Torque: 500 Ncm [800 oz-in]  
 Travel Angel: ±50° (100° total stroke)  
 Continuous (rated) Torque: 270 Ncm [375 oz-in]  
 Rated Speed (at cont. torque): 180°/sec.  
 Resolution: < 0.1°  
 Speed over torque curve and current over torque curve (measured at 28 VDC, 20°C)

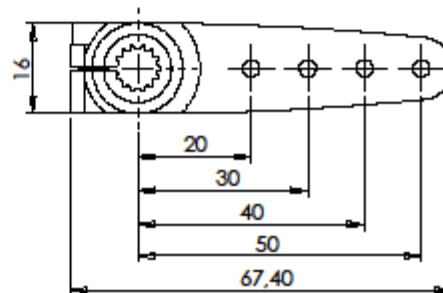
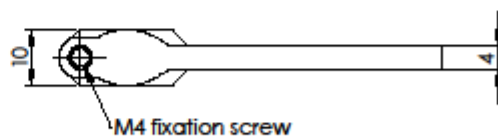
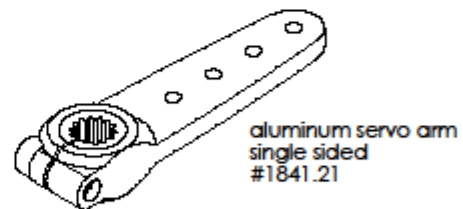
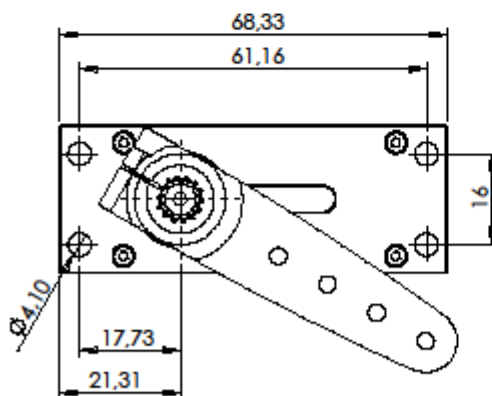
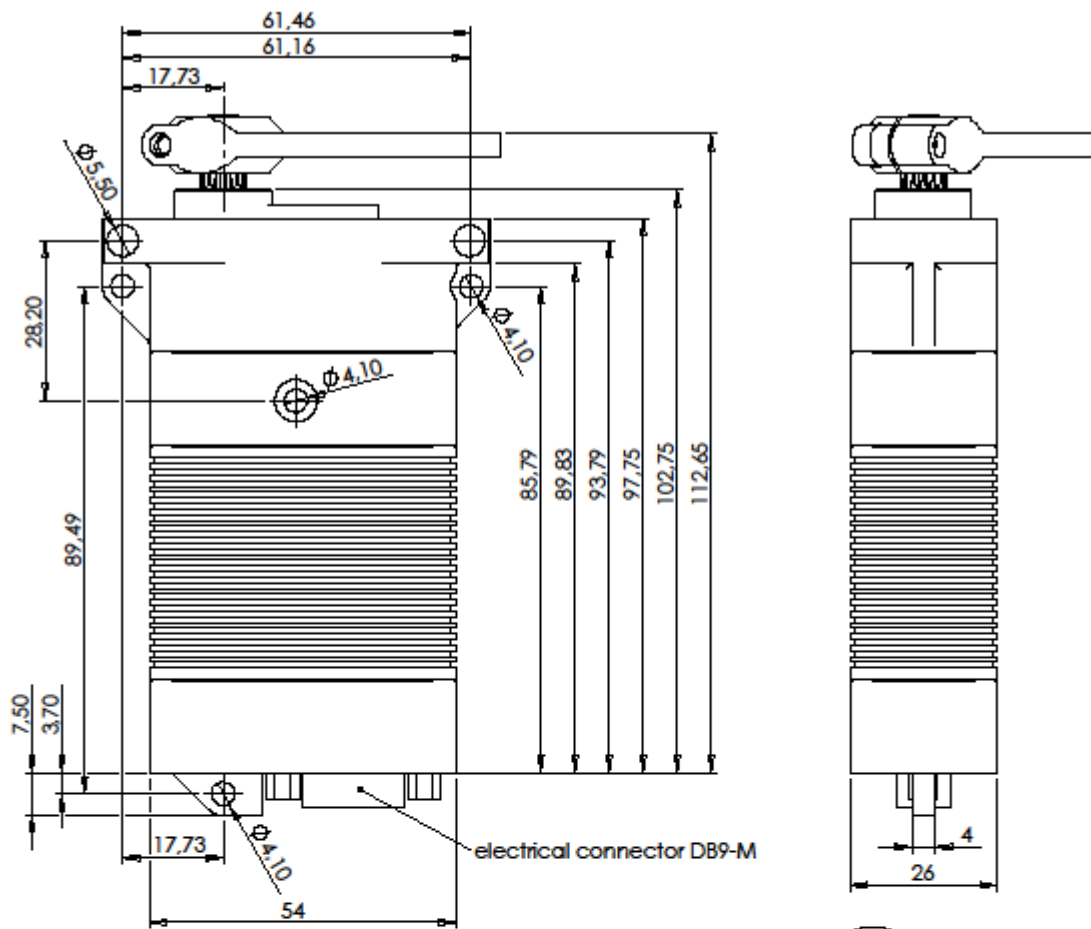


#### 5. Environmental Specification

Operating Temperature Range: -30°C...+70°C [-22°F...+ 158°F]  
 Storage Temperature Range: -55°C...+85°C [-67°F...+18 5°F]

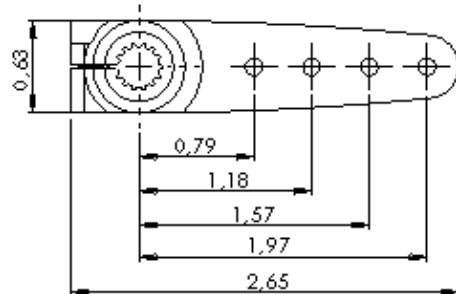
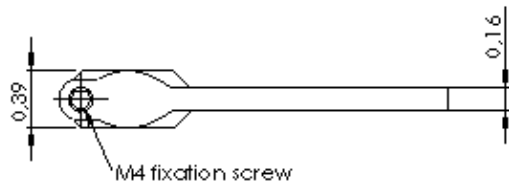
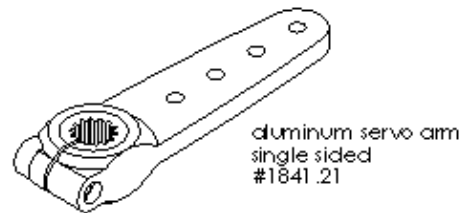
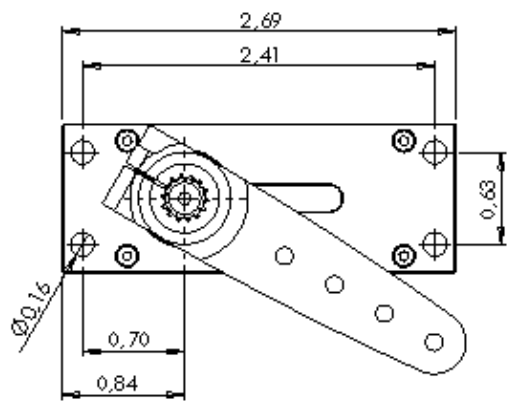
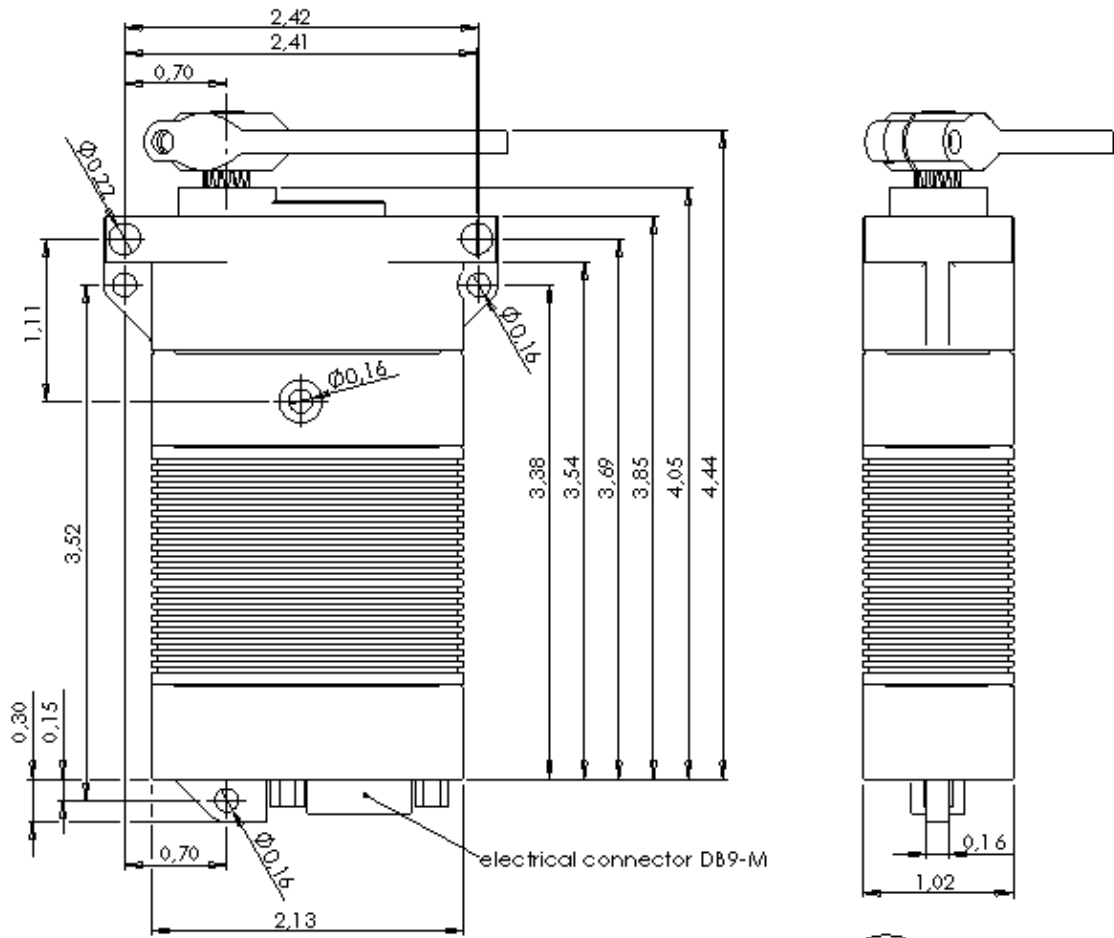
#### 6. Mechanical Specification

Weight (±5%): 270 g [9.5 oz]  
 Dimensions (tolerance ±0.2 mm): 54 mm x 102.8 mm x 26.0 mm  
 [tolerance ±0.008 in] [2.13 in x 4.05 in x 1.02 in]  
 Mechanical Backlash: < 0.5°  
 Mechanical Limits: ± 50°  
 Angular Backlash: < 0.5°  
 Case Material: Saltwater corrosion resistant  
 Aluminum alloy, hart coat treated  
 Splash water resistance: Yes  
 Salt water resistance: Yes  
 EMI / RFI shielding: Yes  
 Gear set: Hardened steel  
 Gear protection system: Volz ISS-System (optional)



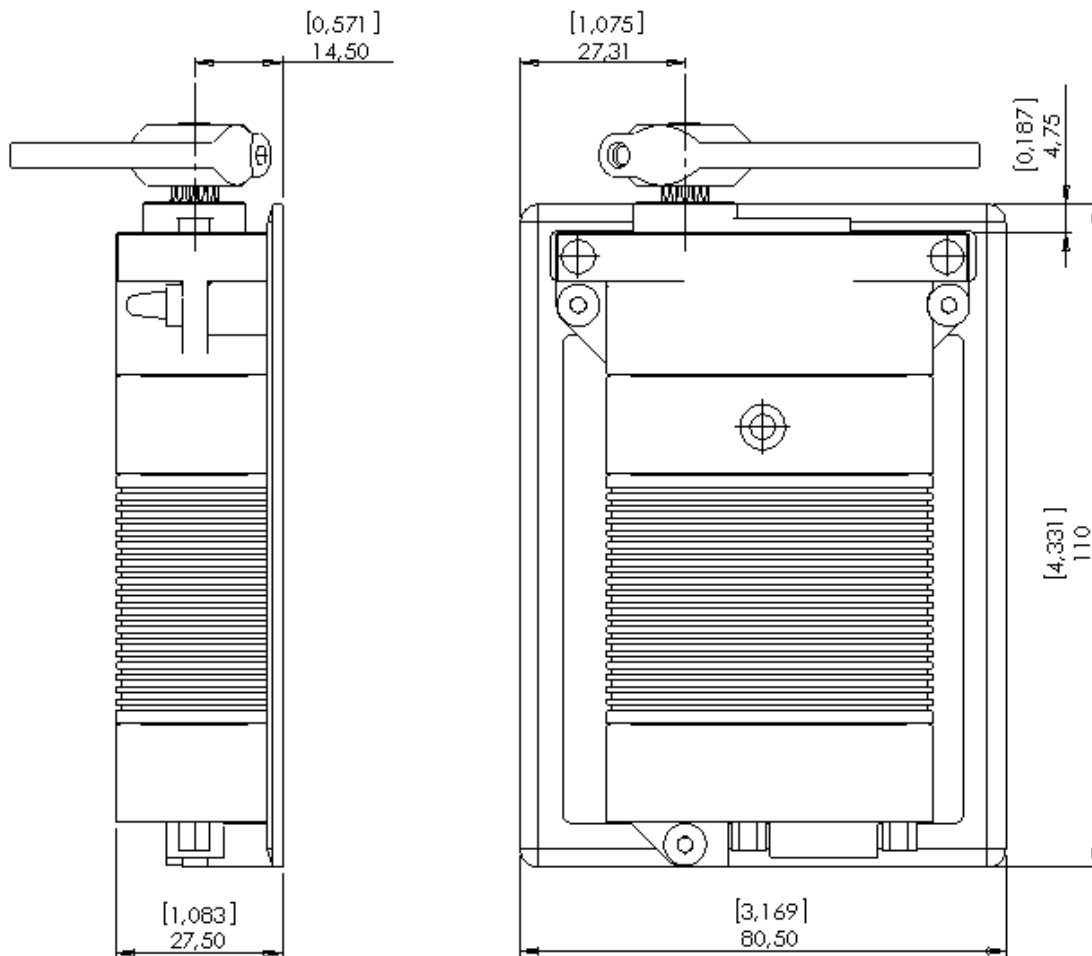
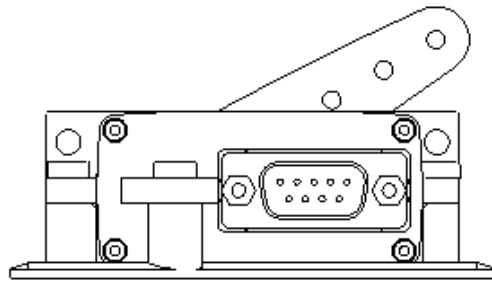
**DA 26-30-5024**

all measurements in Millimeter



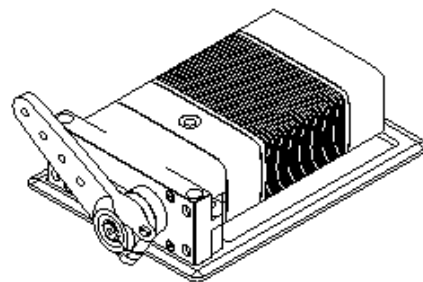
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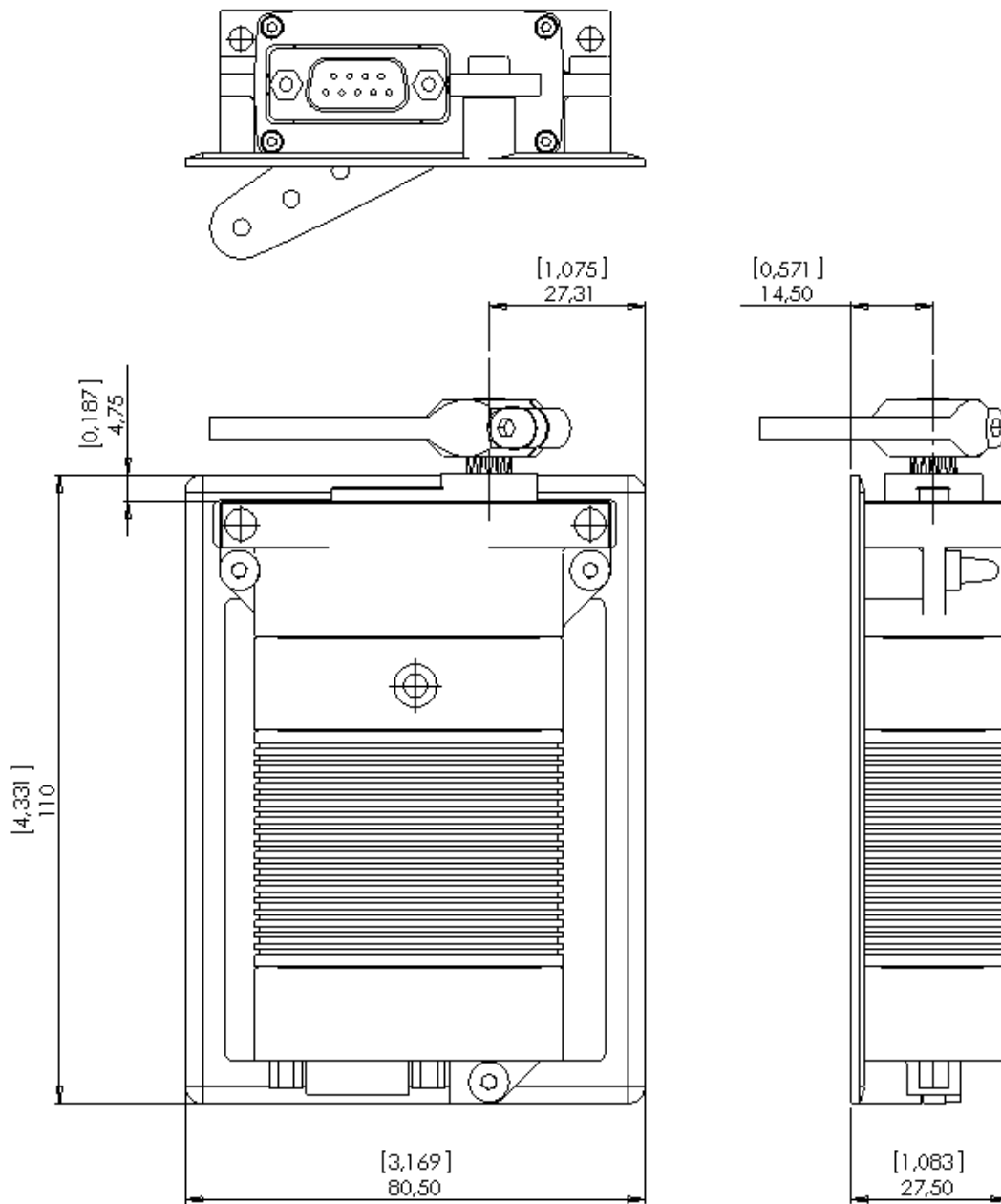
all measurements in inch



**DA 26-30-5024**  
with Mounting Frame Left # 1841.30

dimensions: [Inches]  
mm

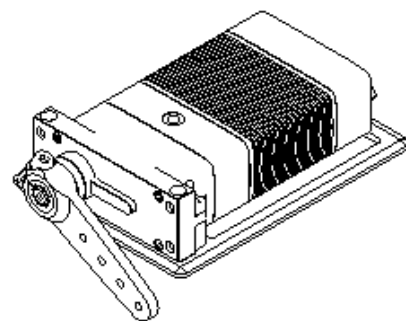




**DA 26-30-5024**

with Mounting Frame Right # 1841.31

dimensions: [Inches]  
mm



## 7. Ordering Information

### 24-30 V Actuators

### Options

Type	Interface	Item number	I	P	W	M	H
DA 26-30-5024-1	CMOS+OPTO	# 26.30.5024-1	○	●	●	●	-
DA 26-30-5024-2	CMOS+RS422	# 26.30.5024-2	○	●	●	●	-
DA 26-30-5024-3	RS485	# 26.30.5024-3	○	●	●	●	-
DA 26-30-5024-4	RS485 redundant	# 26.30.5024-4	○	●	●	●	○

● standard      ○ optional      - not available  
 M = wear-free Magnet Position Sensor replacing conventional potentiometer

### Interfaces:

CMOS+OPTO = single ended CMOS (PWM) + differential opto-coupler interface (PWM)

CMOS+RS422 = single ended CMOS (PWM) + differential RS422 interface (PWM)

RS485 = differential RS485 interface with communication protocol

RS485 redundant = as above, additionally with redundant power supply and redundant RS 485 Interface



### Options

Type	Supplementary code*	
<b>I</b> = ISS Gear-Protection-System	.I	optional
<b>P</b> = Position Feedback		standard
<b>W</b> = Waterproof - IP67		standard
<b>M</b> = Magnet Position Sensor		standard
<b>H</b> = Humidity Sensor	.H	optional

\* to be added to item number ( e.g. # 26.30.5024-1.I )

### Accessories 26mm class

Type	Item number
Alu arm - double sided	# 1841.20
Alu arm - single sided	# 1841.21
Alu disc	# 1841.22
Alu mounting frame - left , 1pc.	# 1841.30
Alu mounting frame - right , 1pc.	# 1841.31
Programming tool DA 26 (PWM)	# 985.4
Programming tool DA 26 (RS485)	# 985.5