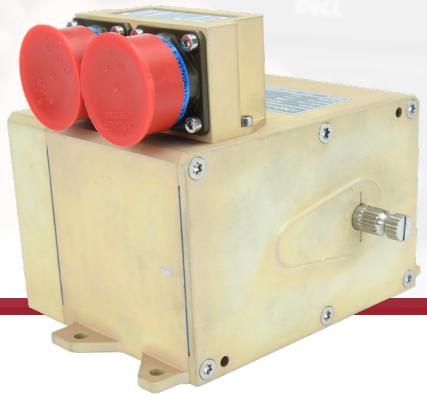
TS1000
TRIM ACTUATOR



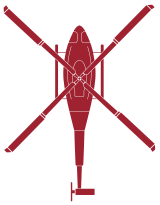
TS1000 is a rotary type electromechanical trim actuator designed for use on a civil utility rotorcraft.

It is integrated into the helicopter rotor flight control system and transfers the commands from the autopilot computer to the mechanical flight control system as physical movement. Then mechanical flight control system provides control input to the servo hydraulic actuators that actuate the primary controls of the helicopter. When the autopilot mode is disabled, trim actuators provide the pilot an artificial feeling under normal flight scenarios, thus providing a more controlled and comfortable flight. Additionally, the trim actuator is used for the neutral point of the controls for a trimmed flight.

STANDARDS

DO-160G
DO-254

APPLICATIONS



Rotorcraft - Trim actuation

KEY FEATURES

- Unique design for manned platforms
- High precision control at the output shaft
- Lightweight structure
- Redundant Architecture
- Equipped with Shear Pin for Jamming
- Customized Artificial Feeling
- Anti Backlash system at the output shaft

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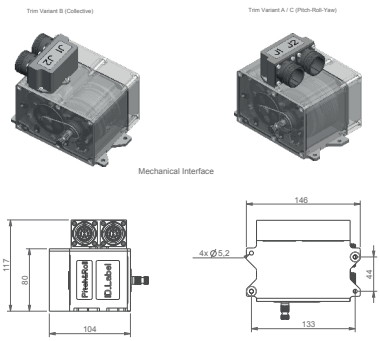
Product Specifications (@ 25° ± 10°C)

Parameter	Pitch and Roll	Collective	Yaw
Output Shaft Angular Travel (Clutch engaged and clutch disengaged)	80°±2°	80°±2°	80°±2°
Maximum output shaft rotation speed (@ 1Nm load, 28 VDC)	2.5±0.4°/s	5.0±0.5°/s	2.5±0.4°/s
Shear pin torque	35±5 Nm	35±5 Nm	35±5 Nm
Artificial feel (spring) pre-loading	1.5±0.2 Nm	5.5±0.5 Nm	5.5±0.5 Nm
Out-of-Detent switch threshold setting	1.0°±0.3°	2°±0.4°	2°±0.4°
Output shaft mechanical backlash	≤ 0.3°	≤ 0.3°	≤ 0.3°
Nominal motor consumption (@ 1Nm load, 28VDC)	≤ 0.5 A	≤ 0.5 A	≤ 0.5 A
Maximum motor consumption (@ 6Nm load, 28VDC)	≤1 A	≤1 A	≤1 A
Maximum motor peak current at start-up (@ 28VDC)	≤2 A	≤2 A	≤2 A
Weight	≤ 2.2 kg	≤ 2.2 kg	≤ 2.2 kg

Environmental Specificaition

Operating Temperature	DO 160G, Section 4	-40°C/+50°C
Ground Survival Temperature		-62°C/+71°C
Short Term Operation Temperature (30 mins)		+70°C
Altitude		20000 ft
Temperature Shock	DO 160G, Section 5	Category B
Humidity	DO 160G, Section 6	Category B
Impulse	DO 160G, Section 7	Category A
Vibration	DO 160G, Section 8	"Category R (Sine-on-random) Curve G with F1=NMxFM=26.1 Hz and F2=2xNMxFM=52.2 Hz"
Dripping Water	DO 160G, Section 10	Category W
Fluid Contamination	DO 160G, Section 11	"Fuels: JP-5, JP-8, Jet A or A1 Oils: MIL-PRF-23699 Hydraulic fluid: MIL-PRF-83282 or MIL-PRF-87257"
Sand and Dust	DO 160G, Section 12	Category D
Fungus	DO 160G, Section 13	Category F
Salt fog	DO 160G, Section 14	Category S



Connector Identification		J2		
Part Number		D38999/20WE26PN		
Shell Type		Shell Material	Shell Finish	
Wall Mount Receptacle		Aluminum	Olive Drab Cadmium	
Shell Size		Insert Arrangement	Orientation	
26 (E)		26	N	
Contact Size / Rating		Wire Size	Contact Type	
20 / 7.5A		24,22,20	Pin / Crimp	
MATING CONNECTOR		D38999/26WE26SN		
Pos	Signal	Type	Direction	Characteristics
A	Clutch Power	DC Supply	Input	28VDC 500mA
B	Clutch Power Return	DC Return	Input	28VDC 500mA
M	Motor Enable 2 CMD	28VDC/Open Discrete	Input	28VDC 33mA
C	Resolver 2 EXCT +	AC Supply	Input	3VAC 2048Hz (rating?)
D	Resolver 2 EXCT -	AC Return	Input	3VAC 2048Hz (rating?)
K	Resolver 2 Sine +	Analog Signal	Output	3VAC 2048Hz (rating?)
J	Resolver 2 Sine -	Analog Signal	Output	3VAC 2048Hz (rating?)
L	Resolver 2 Cos +	Analog Signal	Output	3VAC 2048Hz (rating?)
Y	Resolver 2 Cos -	Analog Signal	Output	3VAC 2048Hz (rating?)
b	Motor Direction CW	GND/Open Discrete	Output	28VDC 25mA
P	Out-Of-Detent IN	REFERENCE	Input	28VDC 110mA
F	Out-Of-Detent Out	REFERENCE/OPEN	Output	28VDC 110mA
R	Case Ground	Chassis / 0V Ref	0V Ref	0V Ref / Chassis Connection

(front view)

Connector Identification		J1		
Part Number		D38999/20WE26PA		
Shell Type		Shell Material	Shell Finish	
Wall Mount Receptacle		Aluminum	Olive Drab Cadmium	
Shell Size		Insert Arrangement	Orientation	
26 (E)		26	A	
Contact Size / Rating		Wire Size	Contact Type	
20 / 7.5A		24,22,20	Pin / Crimp	
MATING CONNECTOR		D38999/26WE26SA		
Pos	Signal	Type	Direction	Characteristics
A	Clutch Power	DC Supply	Input	28VDC 500mA
B	Clutch Power Return	DC Return	Input	28VDC 500mA
H	28VDC Power	DC Supply	Input	28VDC 2A
G	28VDC Power Return	DC Return	Input	28VDC 2A
M	Motor Enable 1 CMD	28VDC/Open Discrete	Input	28VDC 33mA
N	PWM CMD CW	GND/Open Discrete	Input	28VDC 100mA
P	PWM CMD CCW	GND/Open Discrete	Input	28VDC 100mA
C	Resolver 1 EXCT +	AC Supply	Input	3VAC 2048Hz (rating?)
D	Resolver 1 EXCT -	AC Return	Input	3VAC 2048Hz (rating?)
K	Resolver 1 Sine +	Analog Signal	Output	3VAC 2048Hz (rating?)
J	Resolver 1 Sine -	Analog Signal	Output	3VAC 2048Hz (rating?)
L	Resolver 1 Cos +	Analog Signal	Output	3VAC 2048Hz (rating?)
Y	Resolver 1 Cos -	Analog Signal	Output	3VAC 2048Hz (rating?)
b	Motor Direction CCW	GND/Open Discrete	Output	28VDC 25mA
R	Case Ground	Chassis / 0V Ref	0V Ref	0V Ref / Chassis Connection

(front view)

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