

Momentum and Reaction Wheels 0.04 - 0.12 Nms with integrated Wheel Drive Electronics



Product Overview

The TELDIX Momentum and Reaction Wheels come in four different sizes with an angular momentum storage capacity spanning a range between 0.04 Nms and 68 Nms. They accommodate the requirements of attitude control systems for satellites weighing less than 65 kg as well as for geostationary satellites reaching a mass of three tons and more.

It has been the approach of numerous recent space programs to deploy constellations, each consisting of several satellites for communication or earth observation purposes, in low earth orbits (LEO) instead of placing satellites in higher orbits. TELDIX has contributed to these activities and introduced its RSI 01-5 product line. The RSI 01-5 is a ball bearing momentum / reaction wheel system with digital electronics that is completely integrated into the wheel housing. It was first developed and manufactured for Orbital Sciences Corporation, USA, and was used in the ORBCOMM data communication system (a constellation of up to 36 satellites in low Earth orbit). Further contracts, e.g. PROBA-1, KaistSat, ESSAIM, and μ Sat followed. It has proven its reliability during the past years in orbit and on ground. Two versions are available with either 0.04 or 0.12 Nms momentum storage capacity both providing a reaction torque of 5 mNm.

The wheels are smart: They are controlled by a digital microprocessor, equipped with EEPROM, FPGA, and an RS 485 interface. Either torque or speed operating modes are possible. They have a design life of five years and weigh less than 0.6 kg or less than 0.7 kg at 0.04 Nms or 0.12 Nms angular momentum storage capacity, respectively.

All models can be used either as momentum or as reaction wheels.

TELDIX is one of the leading suppliers of Momentum and Reaction Wheels for spacecraft applications. Hundreds of wheels have been delivered for communications, earth observation, and scientific research satellites. Currently, 433 wheels installed in 188 satellites are in orbit representing more than 1760 years of operation (as of December 2002).

TELDIX participation in European satellite programs: Abrixas, Artemis, Astra-2B, -1K, Beppo-SAX, Demeter, DFS, ECS, Eurasiasat 1, Europe*Star, EUROSTAR 2000+, EUROSTAR 3000, Eutelsat II, Eutelsat W, GE-1E/Sirius-2, Hispasat 1A, 1B, 1C, Hot Bird, Inspector, ISO, Italsat, MARECS, MARS EXPRESS, MAROTS, Microscope, OTS, Parasol, Picard, Proba, Proteus/Jason, ROSAT, Skynet 4, Spacebus, Stentor, Symphonie A/B, TDF-1, TDF-2, Telecom-1, Telecom II, TELE-X, TUBSAT-B, Turksat 1, TV-SAT, TV-SAT-2.

Participation in international satellite programs:

Agila 2, Amos, Apple, Aqua, Aura, Arabsat II, -III, BSat 2, China-sat 8, Chandra, DFH3, Echostar VI, ETS-V, FBM, GE 5, GOES, Inmarsat II, Insat-1D, Insat-2, -3, Intelsat V, Intelsat VII, IRAS, KaistSat, iSKY, KitSat 3, MOS-1, MS-T5, MT Sat, Nahuel, NATO-IV, Nilestar, NSS-6, N-Star, OmegaSat, Orbcomm, Orion-1, -2, PanAmSat, Pioneer, Planet-A, SBIRS Low, Sinosat, Sirius 1-3, Sky-1, -2, ST-1, Step 4, Superbird, Telstar 5, Telstar 6-12, Tempo, Thaicom, Worldstar.

Main Technical Data

RSI 01-5/15

RSI 01-5/28

Angular Momentum at Nominal Speed

0.04 N m s

0.12 N m s

Operational Speed Range

± 1500 rpm

± 2800 rpm

Speed Limiter (EMF)

< 1700 rpm

< 3000 rpm

Reaction Torque

(at 1500 rpm)

5 mNm

(at 2800 rpm)

5 mNm

Dimensions:

- Diameter

95 mm

95 mm

- Height

102 mm

102 mm

- Mass

< 0.6 kg

< 0.7 kg

Power Consumption:

- Steady State at Nominal Speed

< 2 W

< 2 W

- Max. Torque at Nominal Speed

< 4 W

< 4 W

Power Interface:

- Supply Voltage

$14 \pm 3, 5 \pm 0.25$ V

$20 - 0.5; 5 \pm 0.25$ V

- Input Current

(14 V-line) < 0.20 A

(20 V-line) < 0.20 A

- Input Current

(5 V-line) < 0.12 A

(5 V-line) < 0.12 A

Electrical Interface:

RS 485

RS 485

- Full Duplex (9600, n, 8, 1)

Connector:

15-pin high density (GFSC type)

Telemetry Data:

Speed
Torque
Motor Current
Inner Temperature

3 Operational Modes:

Standby
Speed-Loop
Torque-Loop

Environmental Conditions:

- Operating Temperature

- 20 ... + 60 °C

- Non-Operating Temperature

- 35 ... + 70 °C

- Random Vibration

14.9 g rms (max. qual. level)

Lifetime

5 years (in-orbit)

2 years (storage)

TELDIX GmbH
Grenzhöfer Weg 36
69123 Heidelberg

Germany

Phone: +49 6221 512 0

Fax: +49 6221 512 305

<http://www.teldix.com>

Contact: Space Product Group

Phone: +49 6221 512 275

Fax: +49 6221 512 324

e-mail: space@teldix.de

TELDIX
A Northrop Grumman Company