RTS specifications

Sensor device specifications

Measurement range	500Nm	1kNm	2kNm	Unit	Note
Model	RTS-E500	RTS-E1k	RTS-E2k		
Torque specifications					
Rated capacity	0.5	1	2	kNm	
Safe overload		200		%RC	
Maximum overload		300		%RC	∗1
Overall error		0.03		%RC	∗2
Non-linearity		0.02		%RC	∗3
Hysteresis		0.02		%RC	∗4
Repeatability		0.02		%RC	∗5
Resolution		0.02		%RC	
Temperature specifications					
Temperature influence at zero point		0.003		%RC/℃	
Temperature influence on sensitivity		0.003		%Load/℃	
Compensation temperature range		−10～+60		℃	
Operational temperature range		−20～+80		℃	
Storage temperature range		−20～+85		℃	
Rotation specifications					
Maximum RPM	10,000		6,000	rpm	
Continuous RPM	10,000		6,000	rpm	
Rotation variation at zero point		0.05		%RC	
Machine characteristics					
Inertia moment	0.0047	0.0047	0.0181	kg·m²	
Torsion stiffness	800	1,600	5,600	kNm/rad	
Torsion character frequency	5.6	5.8	5.6	kHz	∗6
Torsion degree	0.6×10⁻³	0.6×10⁻³	0.35×10⁻³	rad	
Maximum thrust load	10	20	30	kN	
Maximum radial load	10	20	30	kN	
Maximum curve moment	0.5	1	2	kNm	
Weight of rotor	3	3	5	kg	

∗1 : By static torque test including non-linearity and hysterics. ∗2 ∗3 : Reference values ∗4 : By static torque test ∗5 : @BW=100Hz ∗6 : Torsion angle at rated torque

Measurement display device specifications (AD7891)

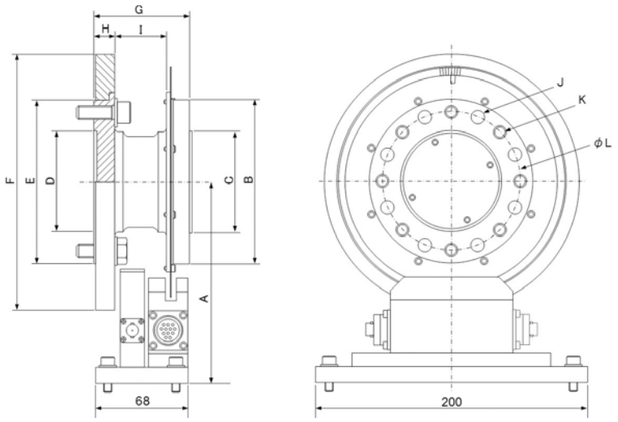
Display	5.7 inch TFT LCD
Displayed contents	Digital display of 3-component force, torque
Data output section	
Data interface	Analog voltage (0 to +/-10V)
	Digital data output
	CAN
	Data file recording

We have a high-speed control model that can run at a model cycle of 5 kHz.
Please consult with A&D for more details.

Exterior dimensions of RTS-E

Type	A	φB	φC	φD	φE	φF	G	H	I	J	K	φL	Bolt strength grade	Screwing torque
RTS-E500/1kNm	148	φ120.8	φ75 g6	φ75 H7	φ120	φ188	70	15	38	8-Mφ10	8-Mφ10	101.5	10.9 or greater	60Nm
RTS-E2kNm	165.5	φ155.8	φ90 g6	φ90 H7	φ155	φ223	80	18	46	8-Mφ12	8-Mφ12	130.0	10.9 or greater	100Nm

Caution : Hexagon or cap bolts are used to attach the sensor.



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⚠ Attention to Safety! ●For proper use, read the instruction manuals carefully before use.

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●Appearance and/or specifications subject to change for improvement without notice.
●Contents of this catalog last updated May 2009.

∗RTS-ADCC-02-BP2-10202

Supported by advanced technology

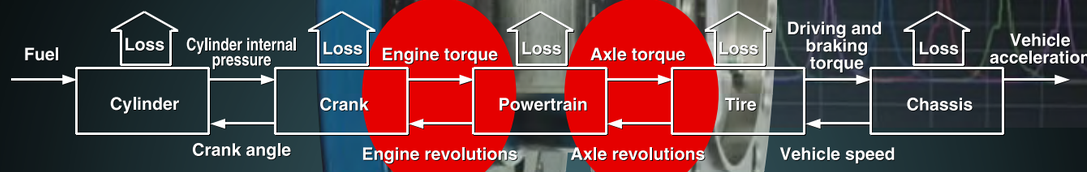
RTS

Rotation Torque Sensor

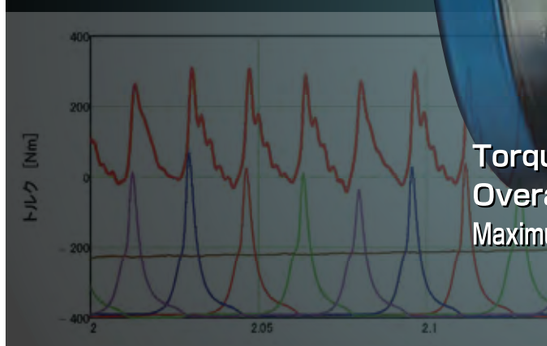
Features

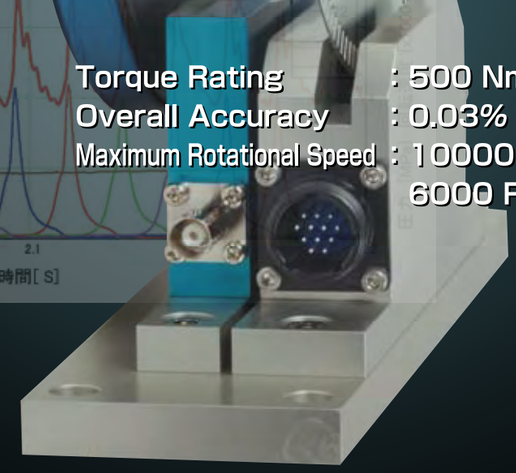
- Measures true torque using a distributed force sensor system
- Enables direct coupling to crankshaft
- Synchronizes torque measurement with rotation angle
- Measures thrust and radial force simultaneously

Energy Flow Model based on Torque Demand Concept



RTS Product Scope





Torque Rating : 500 Nm/1 kNm/2 kNm
Overall Accuracy : 0.03%
Maximum Rotational Speed : 10000 RPM(500 Nm/1 kNm)
6000 RPM(2 kNm)

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The RTS is a shaft torque sensor with distributed force detection and was created from A&D's DSP technology and high-speed telemetry technology.
The RTS enables simultaneous, non-contact measurement of torque, thrust, and radial forc es.
It is possible to measure and display high-speed, detailed phenomenon at 10 times resoluti on and 10 times speed.

Supported by advanced technology

Rotation Torque Sensor

High Accuracy of 0.03%

Features of Distributed Force Measurement Technology

- With conventional torque sensors and component force meters, there is a bridge circuit made up of 4 strain gauges for each torque or component force. However, the RTS utilizes a distributed force system that evenly distributes dedicated 4 element strain gauges at the sensors.
- The distributed force detection method makes it possible to perform model calculation using components forces in the area of strain. This makes it is possible to calculate true torque precisely without the influence of thrust and radial forces, while still simultaneously measuring thrust and radial forces.
- Because torque is measured as multiple distributed forces, it is possible to lower the noise of model-calculated torque signals compared to conventional methods.
- The distributed force detection method uses 4-element strain gauges. These specially designed strain gauges are arranged for heat balance within an extremely small area to form a bridge circuit that eliminates the influence of heat gradients and temperature changes.

20 Mbps Telemetry (Realizing real-time, high precision measurement through the development of a high-speed, high-capacity telemeter.)

- Large amounts of digital distributed force data are simultaneously sampled and transferred using a 20 Mbps telemeter.

Simultaneous rotation measurement

- The douser of a rotary encoder is attached to a sensor and its rotation angle information is measured simultaneously. After processing angular information, angular velocity, component forces, and work rate are output as processing data.

Model cycle processing and frame measurement

The torsion gauge signal is digital and is calculated by the DSP at high speed using the matrix-vector method.

Digital/analog data linkage

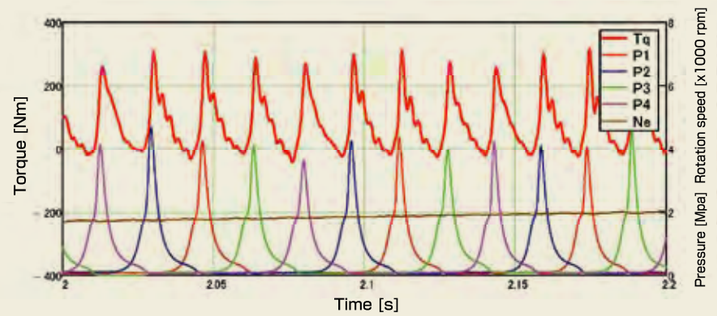
Noise-free and high precision torque can be used as a feedback signal via the digital data link. All data can be stored on a PC.

■CAN, Ethernet
■Analog system, DA voltage output ±10V

Frame measurement

Frame data output : Can block-transfer 20μ second sampling data
The recording of frame measurement can be started by a timer, an interval, or external trigger.

Example of torque measurement between crankshaft and flywheel

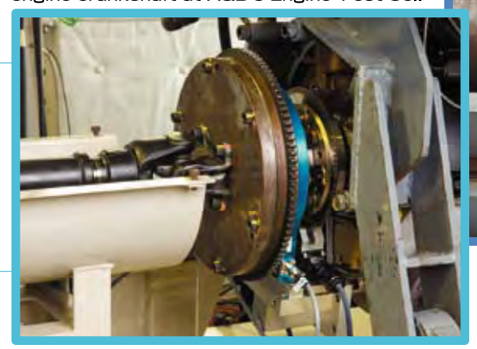


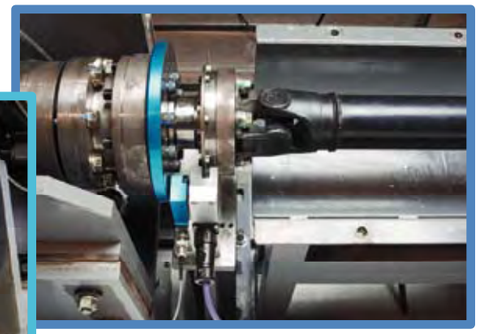
■Torque measurement at Engine Test Cell

You can see that the generated torque waveforms are different at each cylinder, as well as the synchronization of the torque waveform and inner cylinder pressures.

Tq : Torque waveform
P1-P4 : Inner pressure of each cylinder
Ne : Rotation speed

Operation example with direct couplin g to an engine crankshaft at A&D's Engine T est Cell

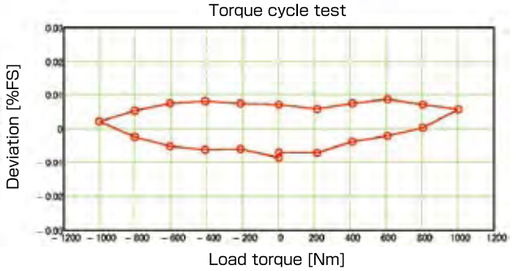




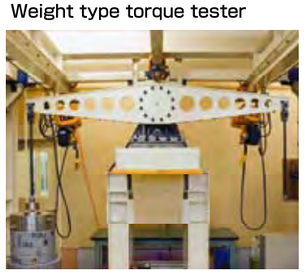
Installation example of coupling to dynamometer intermediate shaft at A&D's Engine Test Cell

Torque sensor evaluation

Torque cycle test



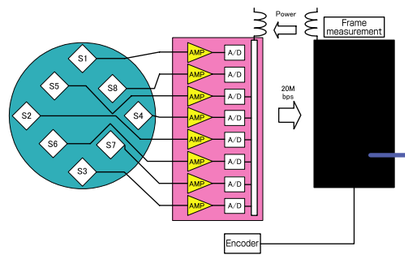
Weight type torque tester

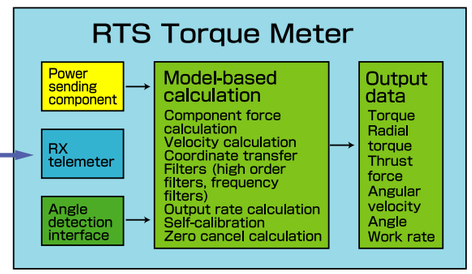


Example of torque meter features

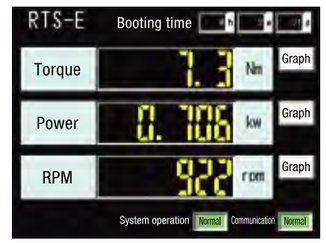
Cycle test
This test loads positive or negative torque continuously.
It is the strictest evaluation method for torque meters.
The RTS shows a performance of 0.01% FS (FS=1kNm).

RTS concept diagram

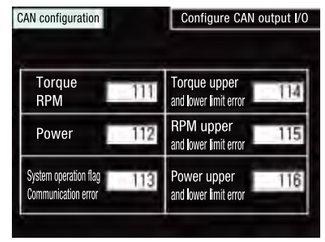




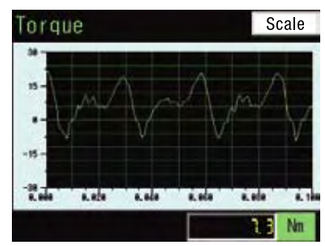
Setting and operation screens



Digital display
- Torque, power, and rotational speed are displayed digitally.



Setting display
- CAN settings
- Settings for analog output
- Upper and lower limit settings
- Torque zero correction



Trend graph display
- The trend graph displays the torque, power, and RPM.