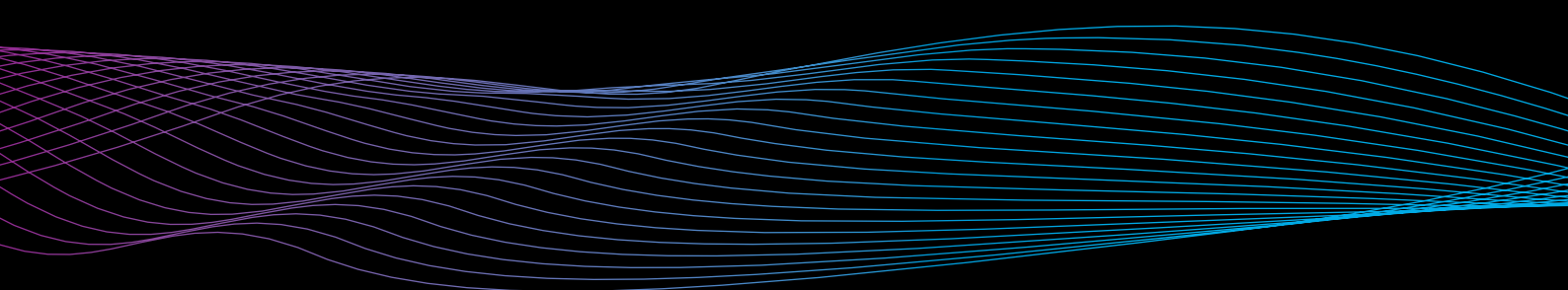


Continuous Duty

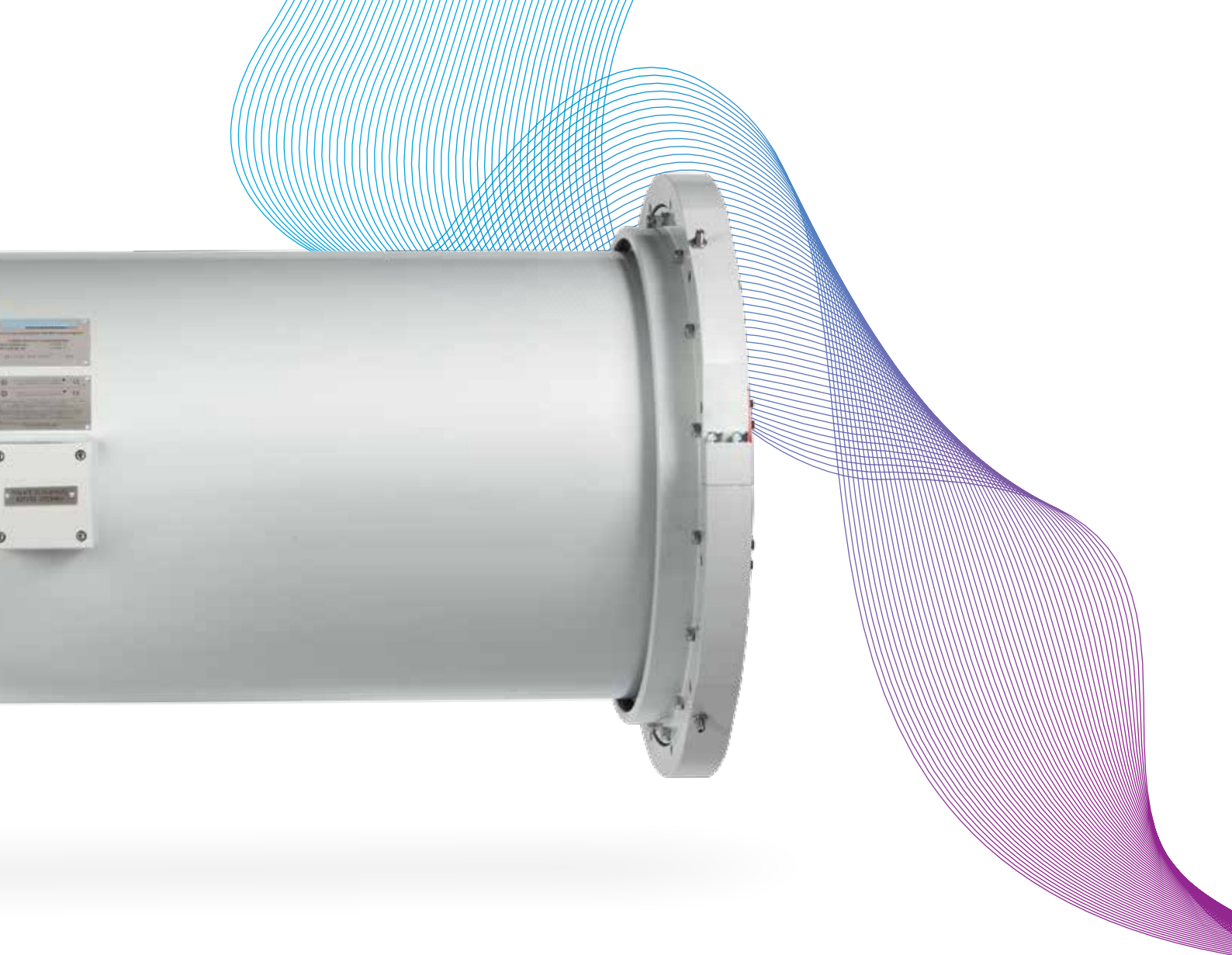


Torqueters
LIMITED
high performance test & measurement systems





Torquetronic™ Continuous Duty
Torque Measurement. Directly and
accurately measures the power
of turbomachinery in the Oil, Gas
and Petrochemical industries.



Measuring steady state torque and torsional vibration in a single product. Our Torquetronic™ Continuous Duty Torque measurement system is the recognised industry standard for accurate power measurement of mechanically driven turbo machinery in the Oil, Gas and Petrochemical industries.

Designed specifically for continuous duty operation, Torquetronic™ directly measures the absorbed power of equipment mechanically driven by gas or steam turbines. Ideally suited for use with turbomachines that run continuously for many years between shutdowns and have installed lives of greater than 20 years.

First introduced in 1974, we have over 1,000 systems in Up stream, Mid stream and Down stream applications world wide with unrivalled reliability.

The Torquetronic™ system delivers repeatable and accurate torque measurement, better than 1%, while operating in the demanding environmental conditions of the Oil, Gas and Petrochemical industries, providing a continuous validation of the process and turbine performance.

The benefits of a Torquetronic™ continuous duty torque measurement system.

- Steady state torque and torsional vibration in a single system
- Mechanical Simplicity and Integrity – one piece spacer shaft, no rotating electronics
- Accuracy: 1% of Full Load
- Torsional vibration measurement, up to 10kHz sample rate
- Exceptional speed and power capability: 15,000 rpm – 80 MW
- Certified for use in hazardous areas: ATEX / CSA, IECEx, GOST R approved
- In service calibration and diagnostic capability
- Complete engineered solution: Coupling, Torquemeter and Coupling Guard
- 30 year proven reliability
- Compatible with any brand and type of high performance coupling

HOW IT WORKS

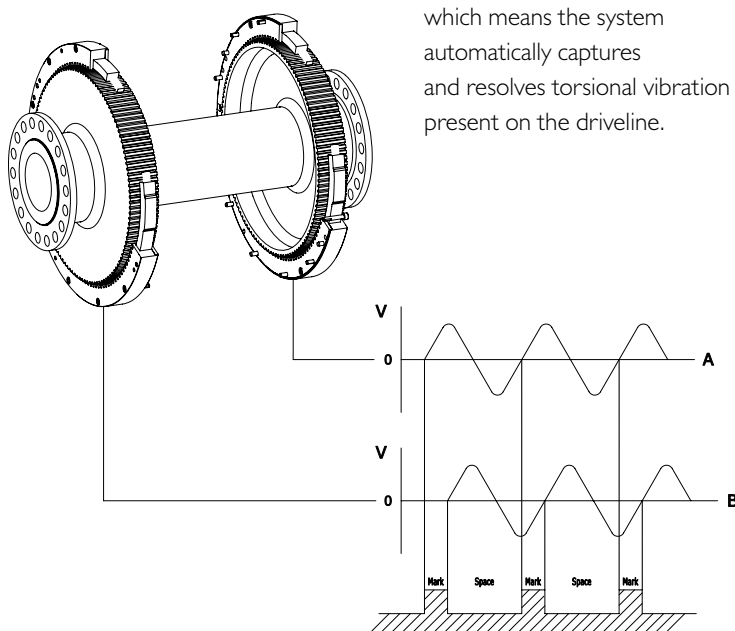
THE TORQUETRONIC™ SYSTEM USES PHASE SHIFT TECHNOLOGY TO MEASURE THE SHAFT TWIST ACROSS THE COUPLING SPACER CONNECTING THE DRIVING AND DRIVEN MACHINES.

As the shaft rotates, the integral toothed flanges machined in the spacer shaft generate sinusoidal signals in the pair of fully circumferential "multipole" coils mounted in the stationary coupling guard.

The twist generated is measured by comparing the phase shift between the pair of sine waves.

Our 800 series signal processor measures the frequency and phase displacement of the two signals and converts these signals to torque, power and speed.

The high number of teeth present in our multipole design provides a high measurement resolution which means the system automatically captures and resolves torsional vibration present on the driveline.

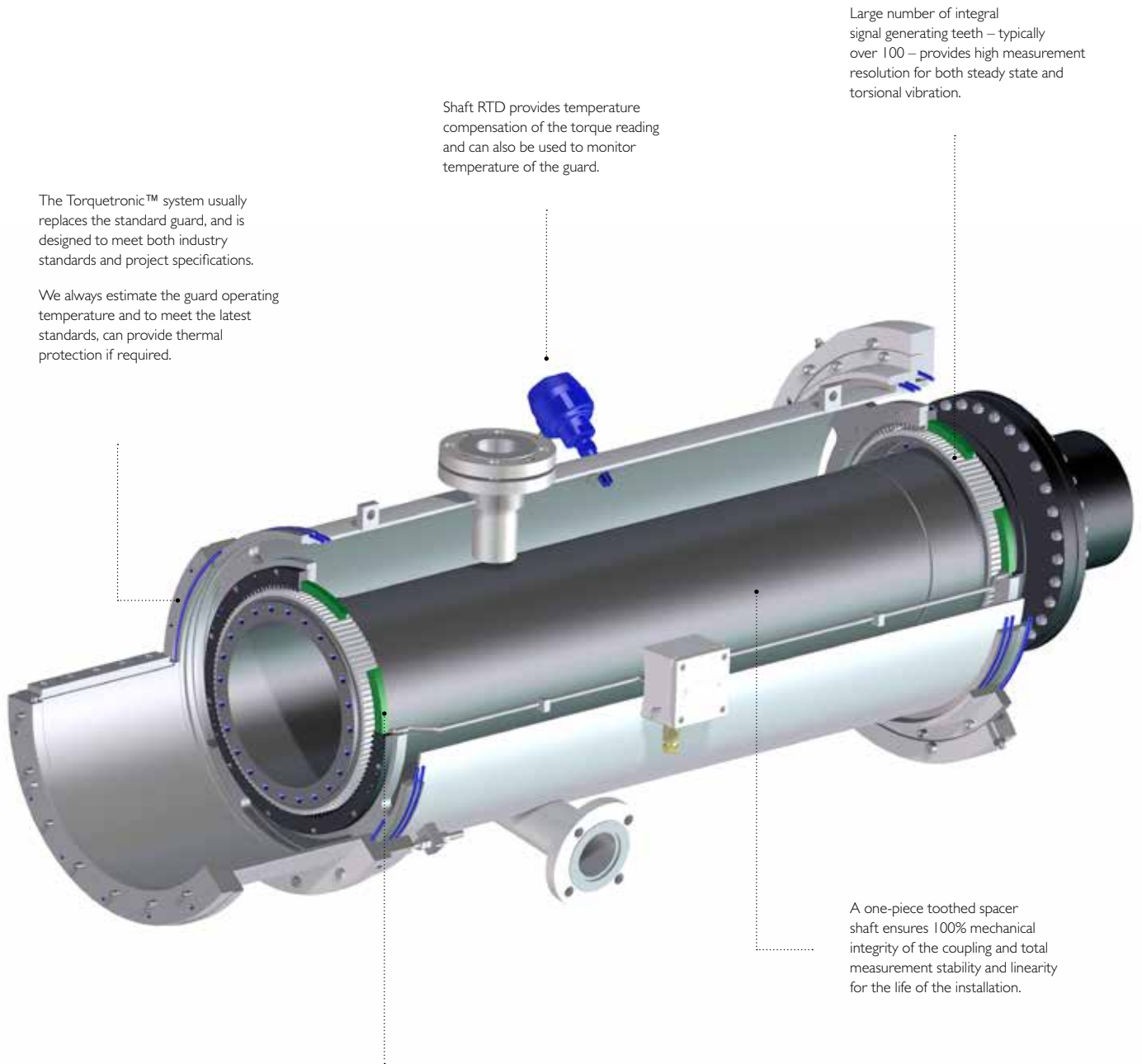


- When torque is applied to a rotating shaft a twist is produced.
- This twist is directly proportional to the torque applied.
- Twist is measured from the phase displacement between signals generated at either end of the spacer shaft.

Couplings™

The Torquetronic™ system is compatible with gear, disc or diaphragm couplings from any supplier and is not limited to a single coupling style or manufacturer. Torquemeters Limited co-operate fully with all the coupling suppliers to ensure integrity of torque measurement for the power transmission application.

For projects where spare couplings are specified, these are suitable for use with the installed torquemeter and no spare sensing equipment is required.



The Torquetronic™ system usually replaces the standard guard, and is designed to meet both industry standards and project specifications.

We always estimate the guard operating temperature and to meet the latest standards, can provide thermal protection if required.

Shaft RTD provides temperature compensation of the torque reading and can also be used to monitor temperature of the guard.

Large number of integral signal generating teeth – typically over 100 – provides high measurement resolution for both steady state and torsional vibration.

A one-piece toothed spacer shaft ensures 100% mechanical integrity of the coupling and total measurement stability and linearity for the life of the installation.

There are no rotating electronics fitted to the torsion shaft. Signals are generated in fully encapsulated stationary coils that are rated for operation at up to 150°C and a life in excess of twenty years.



TORQUEMETER SIGNALS



FIELD MOUNTED

816

CONTROL ROOM/
DCS



803

RS485

ETHERNET

RS485

ETHERNET

ANALOG 4-20mA / $\pm 10V$



813

RS485

ETHERNET

ANALOG 4-20mA / $\pm 10V$

TYPICAL SYSTEM CONFIGURATION

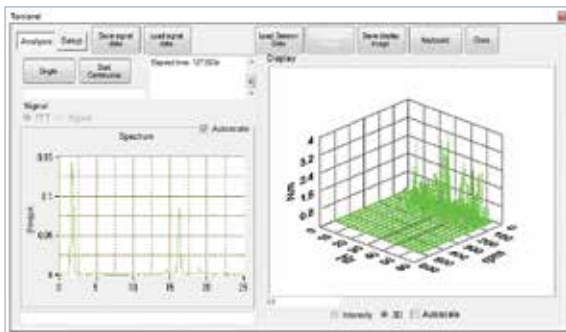
Torsional Vibration

The high measurement resolution of a Torquetronic™ system means it automatically captures any torsional vibration present on the driveline.

TorqTo™ processes the data, sampled at up to 10KHz, and provides detailed analysis.

TorqTo™ performs a Fast Fourier Transform (FFT), and displays resonant torsional frequencies against amplitude.

Analysis can also be displayed in a Campbell diagram / colour map of torsional frequencies against machine speed or Modal plot orders against machine speed.



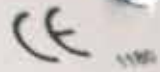
SHAFT SERIAL No.

NP CODE RJO 08737

2012



II 2 G Ex ia IIC T3 Gb (-40°C ≤ T_a ≤ 150°C)
Baseefa03ATEX0545X, IECEx BAS09.0052X



II 3 G Ex nL IIC T3 Gc (-40°C ≤ T_a ≤ 150°C)
Baseefa04ATEX0226X, IECEx BAS09.0053X



Intrinsically Safe Exia for Class 1, Div. 1 Groups A, B, C, & D T3 (-40°C ≤ T_{amb} ≤ 150°C)
Class 1, Zone 0 IIC T3 (-40°C ≤ T_{amb} ≤ 150°C)
Connected to Torquetronic 613 or 700 as per drawing E53701



C US



C US

Non-Incendive for Class 1, Div 2 Groups A, B, C & D T3 (-40°C ≤ T_{amb} ≤ 150°C)
Class 1, Zone 2 IIC T3 (-40°C ≤ T_{amb} ≤ 150°C)
Connected to Torquetronic 613 or 700 as per drawing

TRANSDUCER TYPE 4936
See instructions for connections

ALL TORQUETRONIC™ SYSTEMS ARE
STATICALLY AND DYNAMICALLY CALIBRATED
FOR OPTIMUM ACCURACY.

TRACEABLE TO INTERNATIONAL STANDARDS,
THEY ARE SUPPLIED CERTIFIED FOR USE IN
HAZARDOUS ENVIRONMENTS TO ATEX, IECEx,
CSA AND GOST R STANDARDS.



Hazardous Area Certification

ATEX, IECEx, CSA and GOST R certified:

Intrinsically Safe for Zone 1 / Div 1 applications

- II 2G Ex ia IIC T3 Gb (-40C < Ta < 150C)
- Exia for Class I, Div 1 Groups A, B, C and D T3 (-40C < Ta < 150C)

And for Zone 2 / Div 2

- II 3G Ex nL II T3 Gn (-40C < Ta < 150C)
- Non Incendive for Class I, Div 2 Groups A, B, C and D T3 (-40C < Ta < 150C)

Dynamic calibration

During our dynamic calibration test, the coupling spacer is spun with the torquemeter up to trip speed to define the system datum at zero torque. Dynamic calibration is an integral part of our unique in-service system check which enables operators to confirm torquemeter operation, even many years after installation.

Accuracy

Torque and power measuring accuracy is better than 1% of the machine rating and importantly can be verified during operation.



OUR TECHNOLOGY
YOUR TORQUE MEASUREMENT GUARANTEE.



Our unique Torquetronic™ sensing system is based on the fundamental properties of the coupling material in which an applied torque always produces a precise twist. Static calibration is therefore valid throughout the life of the system. And because no electronic gain is added during signal processing, the system is immune from electronics drift.

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