



## High Bandwidth 4 Channel Capacitance Probe Amplifier for Turbine Installations FE-596-CDT4



The FE-596-CDT4 is a 4 channel Capacitance Probe system for gas turbine measurements of blade tip clearance and time of arrival. The system has high bandwidth and low noise which facilitates vibration analysis applications.

Both triaxial fully guarded and low capacity pseudo triaxial type probes may be used. Probes may be situated up to 30m away from the FE596CDT4 by using a combination of Mineral Insulated (MI) & Low Capacity Triaxial Extension (LCTE) cables. Remote configuration and monitoring over a LAN or WAN is very simple and powerful. Auto-Tune & Auto-Balance commands quickly optimise the FE596CDT4 to work with any connected Probe / Cable combination. Gains may be set over a wide range to achieve the best possible Signal to Noise Ratio (SNR), whilst avoiding clipping with large signals. Commands allow for diagnosis of both System and Probe health. Multi-colour LEDs indicate the status of each channel.

For maximum versatility the system is powered from 24V DC

- Wide Measurement Bandwidth  
0.16Hz to 375kHz -3dB (-0.1dB >200kHz)
- Low Noise ( $0.5\text{aF}/\sqrt{\text{Hz}}$ )
- Auto-Tuning for input cable lengths up to 30m
- Auto-Balance to remove static capacitive & resistive leakages.
- Maintains high measurement accuracy with high Probe & cable temperatures
- Quasi-DC Mode for Static Measurements
- Remote configuration and control via ethernet with stand-alone operation



Rugged Instrumentation.... with **FYLDE** analogue performance

Measurement Type	4 identical channels	High speed, low noise AM based CDT system, with auto tune and balance for use with capacitance measurement probes.	
Sensitivity (Gain)	6 Ranges	7.5V/pF 15V/pF 30V/pF 45V/pF 60V/pF 75V/pF ( $\pm 0.25\%$ )	
Outputs	Blade Passing Signal	BPS outputs provide $\pm 10V$ min. Will drive 100m (min) of $50\Omega$ coax	
Mode	Rotor Barring Mode 2 Normal Dynamic Mode 1 Quasi DC (Static) Mode 0	Bandwidth 160mHz - 375kHz -3dB ( $-0.1dB \geq 200kHz$ ) Bandwidth 900mHz - 375kHz -3dB ( $-0.1dB \geq 200kHz$ ) Bandwidth DC - 375kHz -3dB ( $-0.1dB \geq 200kHz$ )	Static capacitive & resistive leakages are rejected. Static capacitive & resistive leakages are rejected. Allows short term static calibration.
Probe Drive Capability	Max Cable Length Cgo (Guard to Outer cap.) Cgi (Guard to Inner cap.)	28m of Fylde LCTE cable + 1m M.I cable (note 1) 3000pF (note 2) 3500pF max. (note 3) 3500pF (note 2) 4500pF max. (note 3)	
Noise (30V/pF)	4m LCTE Cable 20m LCTE Cable 28m LCTE Cable	RTI 0.52 aF / $\sqrt{Hz}$ RTO 20mV peak RTI 0.79 aF / $\sqrt{Hz}$ RTO 40mV peak RTI 1.18 aF / $\sqrt{Hz}$ RTO 50mV peak	(RTI Referred To Input, aF = $10^{-6}pF$ ) (RTO Referred To Output, @30V/pF setting).
Carrier Signal Auto Tune Dynamic Leakage Auto Balance	Energisation Range Rejection Range	750kHz Sinewave @ 25Vrms 0pF to 3330pF 5.5pF // 75k $\Omega$ (note 4) 70pF // 2200 $\Omega$ (note 4)	Triaxial Guard conductor drive. Minimises Probe / Cable current drive. Removes dynamic capacitive & resistive leakages Removes static capacitive & resistive leakages
Control Sync Probe Cable Power Temperature Range Temperature Coef.	Comms Interface Output / Input Compatibility Compatibility Supply	Ethernet Sinewave. 750kHz >5V pk-pk / 750kHz $\pm 0.5\%$ >2V pk-pk Triaxial Fully Guarded or Low Capacity Pseudo Triaxial. Mineral Insulated Triaxial and / or Flexible Triaxial. 20V to 36V DC 80W max (24W typical). Working -25°C to +60°. Storage -35°C to +85°C. <500ppm/°C (-25°C to 60°C).	Text based command set with system health reporting Synchronises system oscillators between multiple units.
Enclosure	Type Size Weight	Anodized, Machined aluminium enclosure. 300mm x 200mm x 47mm (not including connectors). 4.0kg.	
Connectors	Probe (4 off) BPS Output (4 off) Carrier Sync Comms Power inlet	Tri-axial Lemo skt type No. ERN00650CLL. BNC. BNC. RJ-45 3 Pin Amphenol.	

(note 1) LCTE = Fylde Low Capacitance Triaxial Extension cable. Cgo & Cgi approx. 100pF/m. M.I. cable capacitance typically 150pF/m. Longer cable lengths may be possible, but not guaranteed.

(note 2) Should be possible with any combination of MI / LCTE cable. (note 3) Maximum values of Cgo & Cgi may not be attainable under all combinations of cable types / lengths.

(note 4) Minimum value of Lumped Capacitance / Resistance on the end of 4m LCTE Cable that can be nulled out.