doble on-line monitoring doblePRIME PD-GUARD

Partial Discharge Analyzer

FOR THE CONTINUOUS MONITORING OF PARTIAL DISCHARGE

The doblePRIME PD-Guard continuously monitors partial discharge (PD) in transformers, rotating machines, cables and switchgear including GIS and metal clad. It analyzes RF emissions in the HF, VHF and lower UHF ranges. Install on critical assets and configure using a computer, tablet or web-enabled device to monitor PD activity. The doblePRIME PD-Guard provides local alarms and will communicate data and notifications across standard interface channels and through to networked supervisory systems. The Doble PRIME PD GUARD includes multiple PD analysis capabilities, including both Peak-to-Average-Power-Ratio (PAPR) and making measurements which meet IEC 60270, QIEC. QIEC is a useful analysis, and the addition of PAPR extends the frequency range for more extensive and focused diagnostics.

The doblePRIME PD-Guard works with a variety of sensors including antenna for airborne PD, CTs for individual or bundled conductors, UHF drain valve probes for in-tank applications and bushing tap connectors. Designed to fit your monitoring program, the doblePRIME PD-Guard can operate as a standalone device or as part of a doblePRIME Condition Monitoring Platform.

FEATURES

- An independent PD monitoring system, configured via computer, tablet or web-enabled device
- Visual alert status indication
- Built-in Expert System learns PD behavior and indicates changes in frequency and/or severity of measured PD levels
- Alarm relays for external notification
- Broadband RF signal detection including peak, average and quasi-peak
- Quasi-peak detector is designed in the spirit of the CISPR 16-1-1:2010 EMI standard and in line with best field practices
- Extensive diagnostic tools including QIEC (IEC 60270 compliant), quadratic rate, phase resolved analyses and PAPR, which extends the range of QIEC to broaden diagnostic capabilities

BENEFITS

- Monitor PD in critical and high-risk assets
- Save costly equipment by quickly reacting to rapid insulation deterioration warnings
- Identify problem areas, diagnose the severity of the situation and plan action and intervention
- Plan for further testing, maintenance and replacements in a proactive, risk management approach
- Use as a standalone product, networked to existing SCADA system, or as part of a doblePRIME Condition Monitoring Platform







doblePRIME PD-GUARD TECHNICAL SPECIFICATIONS

Inputs4 or 8 channels, multiplexedConnectorBNCInput impedance50 0Maximum Input+10 dBm for reading (+25 dBm with optional attenuation)Dynamic range60 dBDetection typesPeak, quasi-peak and average detectorSweep processingContinuous, Average, Max Hold and differentialBandwidth50 kHz to 50 MHzResolution Bandwidth9 kHz / 120 kHzNoise floorApproximately -90 dBm for peak detect (RBW 9 kHz)Resolution bandwidth50 MHz to 1000 MHzAccuracy± 100 kHz to 1000 MHzAccuracy± 100 kHz to 1000 MHzResolution bandwidth50 kHz to 1000 MHzNoise floorApproximately -80 dBm for peak detect or -90 dBm for average detect (RBW 9 kHz)Resolution bandwidth50 kHz to 1000 MHzResolution bandwidth\$ kHz / 120 kHzResolution bandwi		TUNERS (BOTH)			
Input impedance 50 0 Maximum Input +10 dBm for reading (+25 dBm with optional attenuation) Dynamic range 60 dB Detection types Peak, quasi-peak and average detector Sweep processing Continuous, Average, Max Hold and differential RFI TUNER 1 Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor 0 Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) Resolution bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor 0 Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 9 kHz) Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor 0 Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 9 kHz) Resolution bandwidth 9 kHz / 120 kHz Resolution bandwidth 9 kHz / 120 kHz CYUCHRONISATION Wired sync to external AC source Resolution bandwidth 9 kHz / 120 kHz Resolution bandwidth 9 kHz / 120 kHz	Inputs	4 or 8 channels, multiplexed			
Maximum Input +10 dBm for reading (+25 dBm with optional attenuation) Dynamic range 60 dB Detection types Peak, quasi-peak and average detector Sweep processing Continuous, Average, Max Hold and differential Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) Resolution bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 9 kHz) Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Resolution bandwidth 9 kHz / 120 kHz Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source EMI MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR	Connector	BNC			
(+25 dBm with optional attenuation)Dynamic range60 dBDetection typesPeak, quasi-peak and average detectorSweep processingContinuous, Average, Max Hold and differentialBandwidth50 kHz to 50 MHzResolution Bandwidth9 kHz / 120 kHzNoise floorApproximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz)Resolution bandwidth50 MHz to 1000 MHzAccuracy± 100 kHzResolution bandwidth120 kHz / 1 MHz / 6 MHzNoise floorApproximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz)Noise floorApproximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz)Noise floorApproximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz)Resolution bandwidth50 kHz to 100 MHz (seamless sweep using both tuners)Resolution bandwidth9 kHz / 120 kHzWired sync to external AC sourceEMI MODERF modesSpectrum Oscilloscope (Time resolved) Level meterRF modesSpectrum Oscilloscope (Time resolved) Level meterResults outputIPwr (Integrated Power) PAPER (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC LIEC 60270 compliant) Quadratic rate (QR)Host CPU, MEMORY AND BUSESENUHost CPUIntel/Marvell PXA270 @ 500MHz	Input impedance	50 Ω			
Detection types Peak, quasi-peak and average detector Sweep processing Continuous, Average, Max Hold and differential Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) REFI TUNER 2 Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Resolution bandwidth 9 kHz / 120 kHz Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source KEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) Quadratic rate (QR) Quadratic rate (QR) Act SPU, MEMORY AND BUSES ENU	Maximum Input				
Sweep processing Continuous, Average, Max Hold and differential Rei TUNER 1 Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) Resolution bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Resolution bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QLIEC (IEC 60270 comptiant) Quadratic rate (QR) UEC (IEC 60270 comptiant) QUIEC (IEC 60270 comptiant) Quadratic rate (QR) Host CPU Intel/Marvell PX4270 do 500MHz	Dynamic range	60 dB			
RFI TUNER 1 Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) RFI TUNER 2 Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Resolution bandwidth 120 kHz / 100 MHz (seamless sweep using both tuners) S0 kHz to 100 MHz Resolution bandwidth 9 kHz / 120 kHz MEASUREMENT MODES RF modes Spectrum Oscilloscope [Time resolved] Level meter Results output IPwr [Integrated Power] PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD)	Detection types	Peak, quasi-peak and average detector			
Bandwidth 50 kHz to 50 MHz Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) RFI TUNER 2 Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Bandwidth 50 kHz to 100 MHz So kHz to 100 MHz [seamless sweep using both tuners] Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) UCEV_MEMORY AND BUSES MEASUREMENT MODES	Sweep processing	Continuous, Average, Max Hold and differential			
Resolution Bandwidth 9 kHz / 120 kHz Noise floor Approximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz) RFI TUNER 2 Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 0 kHz / 120 kHz EMI MODE Bandwidth 9 kHz / 120 kHz CSYNCHRONISATION Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PAPR (Peak-Average Power Ratio) PAPR (Peak-Average Power Ratio) Quedratic rate (QR) CPU, MEMORY AND BUSES CPU, MEMORY AND BUSES	RFI TUNER 1				
Noise floorApproximately -90 dBm for peak detect or -100 dBm for average detect (RBW 9 kHz)Resolution bandwidth50 MHz to 1000 MHzAccuracy± 100 kHzResolution bandwidth120 kHz / 1 MHz / 6 MHzNoise floorApproximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz)Bandwidth50 kHz to 1000 MHzResolution bandwidth50 kHz to 1000 MHzResolution bandwidth9 kHz / 120 kHzBandwidth9 kHz / 120 kHzResolution bandwidth9 kHz / 120 kHzResolution b	Bandwidth	50 kHz to 50 MHz			
Inside the initial of the problem for average detect (RBW 9 kHz) or - 100 dBm for average detect (RBW 9 kHz) Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Bandwidth 50 kHz to 100 MHz EMI MODE EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) UIEC (PU, MEMORY AND BUSES ENU MEMORY AND BUSES	Resolution Bandwidth	9 kHz / 120 kHz			
Bandwidth 50 MHz to 1000 MHz Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) EMI MODE EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr [Integrated Power] PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) UEC (IEC 60270 compliant) Quadratic rate (QR) Net CPU, MEMORY AND BUSES	Noise floor				
Accuracy ± 100 kHz Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) Resolution bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz Resolution bandwidth 9 kHz	RFI TUNER 2				
Resolution bandwidth 120 kHz / 1 MHz / 6 MHz Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) EMI MODE EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz Vired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) UCPU, MEMORY AND BUSES Host CPU Host CPU Intel/Marvell PXA270 @ 500MHz	Bandwidth	50 MHz to 1000 MHz			
Noise floor Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz) EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz AC SYNCHRONISATION Wired sync to external AC source Measure Surger Resolution bandwidth Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Accuracy	± 100 kHz			
EMI MODE EMI MODE Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz AC SYNCHRONISATION Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Resolution bandwidth	120 kHz / 1 MHz / 6 MHz			
Bandwidth 50 kHz to 100 MHz (seamless sweep using both tuners) Resolution bandwidth 9 kHz / 120 kHz AC SYNCHRONISATION Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Noise floor	Approximately -80 dBm for peak detect or -90 dBm for average detect (RBW 6 MHz)			
[seamless sweep using both tuners] Resolution bandwidth 9 kHz / 120 kHz AC SYNCHRONISATION Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr [Integrated Power] PAPR [Peak-Average Power Ratio] PRPD [Phase Resolved PD] QIEC (IEC 60270 compliant) Quadratic rate (QR) Level MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz		EMI MODE			
AC SYNCHRONISATION Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Bandwidth				
Wired sync to external AC source MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Resolution bandwidth	9 kHz / 120 kHz			
MEASUREMENT MODES RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz		AC SYNCHRONISATION			
RF modes Spectrum Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	Wired sync to external AC source				
Oscilloscope (Time resolved) Level meter Results output IPwr (Integrated Power) PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz		MEASUREMENT MODES			
PAPR (Peak-Average Power Ratio) PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES Host CPU Intel/Marvell PXA270 @ 500MHz	RF modes	Oscilloscope (Time resolved)			
Host CPU Intel/Marvell PXA270 @ 500MHz	Recults output				
	Results output	PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant)			
Memory 64MB RAM, 32MB flash		PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR)			
		PRPD (Phase Resolved PD) QIEC (IEC 60270 compliant) Quadratic rate (QR) CPU, MEMORY AND BUSES			

STORAGE

On board data storage of 32GB

PERIPHERALS

USB 1.1 host and client controllers RS485 network interface (Modbus RTU Slave) Ethernet interface (Modbus TCP Server, HTTP, VNC, WebDAV Server) Status LED (Condition, Info, Warning, Action) Status Relay, 240VAC 5A (Condition, Info, Warning, Action)

ENVIRONMENTAL

Humidity	0-95% non- condensing			
TEMPERATURE				
Operating temperature Extended temperature Storage temperature	-20°C to +50°C -40°C to +75°C -20°C to +70°C			
MECHANICAL DATA				
Height	200mm / 7.9 in			
Width	330mm / 13.0 in			
Depth	82mm / 3.2 in			
Weight	2kg / 4.4 lbs			
Construction	Anodized aluminum			

MOUNTING OPTIONS

Panel mount DIN Rail Rubber feet

POWER S	UPPLY		
External supply	24 V DC @ 1 A		
An optional power adapter global mains voltage	ptional power adapter can be supplied to suit al mains voltage		
Ask about complete enclosu specific environment, netwo			



Doble Engineering Company Worldwide Headquarters

85 Walnut Street, Watertown, MA 02472 USA tel +1 617 926 4900 | fax +1 617 926 0528 www.doble.com Specifications are subject to change without notice. Doble is ISO certified. Doble is an ESCO Technologies Company. MKT_SL_PD_GUARD_11/17