

INTEGO TM

On-Line Bushing Monitoring & Transformer Partial Discharge

INTEGO TM has been designed to meet key customer requirements of easy and safe installation connecting to the bushing test tap point, resulting in a system that will work reliably in all environmental conditions.

Recognising the need for clearly presented information that enables fast decision making, data is presented in a visual format that is easily interpreted.

INTEGO TM along with **TOTUS** (online DGA) provides an overall transformer monitoring system from **CAMLIN POWER**.

Product Key Features

- Tap Adaptors that are easy to install and remove with secure protection against open circuit and over voltage conditions
- Effective noise rejection designed specifically for power transformers
- Embedded software avoiding the need for data to be sent to an external server for analysis
- Visualised data that is accessible via web browser on a range of smart devices
- Fully integrated intelligence and database
- Easy comparison of results with IEC Standards and IEEE / CIGRE guidelines

Bushing Monitoring Key Features

- Continuous Bushing Monitoring that enables early detection of fast developing faults such as sudden short circuit of capacitive layers
- Avoidance of false alarms through sophisticated averaging algorithms
- Highly stable relative Tan Delta and Capacitance measurement
- Excellent low level signal detection and accuracy
- Easy comparison of results with IEC Standards and IEEE / CIGRE guidelines



Rugged tap adaptor design for safe & secure connection

Partial Discharge Key Features

- Monitors PD activity in main tank and bushings
- Automatic & dependable noise rejection
- Genuine continuous 24/7
- User-Friendly, easy to understand
 - No need for expert interpretation
 - Easily graphed & correlated to other parameters (temperature, humidity, load, DGA etc)
 - Innovative ‘Camlin Triangle’ display of PD activity
 - Phase Resolved Partial Discharge (PRPD) patterns readily available for more advanced analysis
- Simple installation and commissioning
- UHF antennae option for RF PD detection



mail@camlinpower.com
camlingroup.com

Specification

Bushings Monitoring	
Input channels	Up to 3 sets of 3 phases
Simultaneous channels	3 (up to 9)
Sensors	Bushing Tap Adaptors
Input measuring range	0 - 200mA
Accuracy	Amplitude: 0.1%, Relative Phase Angle: 0.05°
Resolution	12 bit
Sampling rate	18 KS/s
Power system frequency	50 - 60Hz, ± 0.01 Hz

Partial Discharge	
Input channels	3 phases & 1 gating (option for additional 6)
Simultaneous channels	4 (10)
Sensors	Bushing Tap Adaptors, Ground RFCT, optional input for 1 UHF antenna for drain valve installation
Input measuring range	-10V to +10V
Accuracy	Amplitude: <5%
Resolution	12 bit
Sampling rate	100 MS/s
Bandwidth	Ultra-wide (<50MHz) & Wide (IEC60270)

Data	
Acquisition mode	Continuous
Trending	Hourly, daily, weekly, monthly
Storage	8 GB micro SD Card, > 1 year

Environmental Sensors	
Temperature sensors	Ambient, Top & Bottom Oil, -40 to +85°C, ± 1°C
Ambient moisture sensor	0 to 99% RH, ± 3%

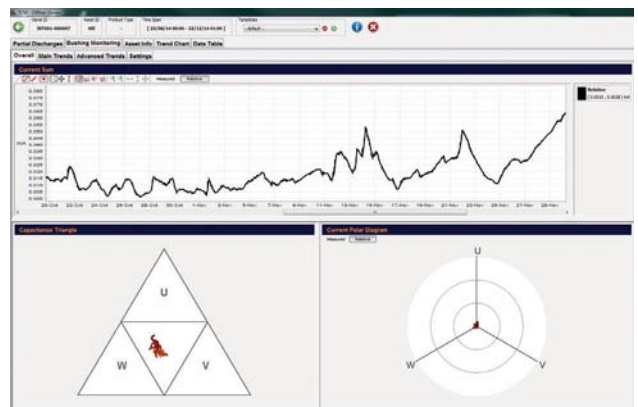
Communications	
Protocols	HTTP, ModBus, DNP3 & IEC61850
Carriers	RS232, RS485, Ethernet, 3G, Fibre, USB, PSTN Modem, Power Line Carrier

Power	
AC	90 - 250 VAC, 47 - 63 Hz, 330W
DC	110 - 220 VDC

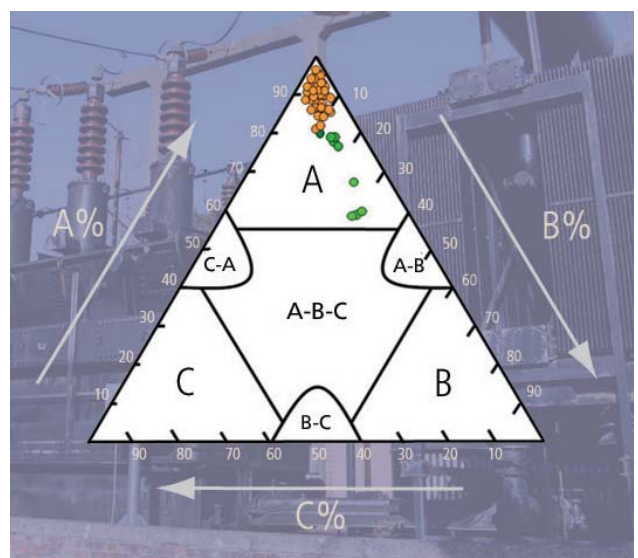
Alarms & I/O	
High-vis LED's	Red, Amber, Green
Alarm relay contact	3 x NO or NC, user configurable
Analog inputs	3 x PT100, 3 x 4 - 20 mA, 1 x Load CT
Digital inputs	5 x 24V isolated

Environmental	
Operating temperature	-40 to +55 °C
Storage temperature	-50 to +85 °C

Enclosure	
IP rating	IP56
Material	316 SS



Bushing Monitoring results



Camlin Triangle of PD Activity



TOTUS

Total Transformer Monitoring System

TOTUS incorporates DGA, Partial Discharge (PD) and Bushing Monitoring (BM) into one powerful unit.

TOTUS combines revolutionary technologies with cutting-edge software and diagnostics to create the world's leading transformer monitoring system.

Detect and diagnose problems at the earliest stage to avoid failures and extend the useful life of your transformer. The addition of an embedded web-server, equipped with powerful data analysis tools means users can manage & interpret information more effectively than ever before.

Overview

TOTUS has been designed for the modern asset manager. Each key parameter is monitored, analysed and presented graphically for immediate analysis.

The combination of technical innovation, build quality and superior customer & technical support puts **TOTUS** at the forefront of online transformer monitoring.

Why **TOTUS**?

- **TOTUS** is the **one and only** system which incorporates DGA, Partial Discharge and Bushing Monitoring in one unit
- Unique HMI with web interface enables the onsite display of DGA, PD and BM key parameters
- Simple user interface for commissioning, without requirement for external software
- Fully integrated technology which supports correlation of data from external inputs



1 Dissolved Gas Analysis (DGA)

DGA is the cornerstone of any successful transformer management program which **TOTUS** provides:

- 9 Gas + Moisture
- Leading-edge photo-acoustic spectroscopy (PAS)
- No consumables (calibration or carrier gas) requirements
- Multiple-tank option available
 - One unit for single phase bank of transformers
- Market leading specification providing an accurate and robust product

3 Bushing Monitoring (BM)

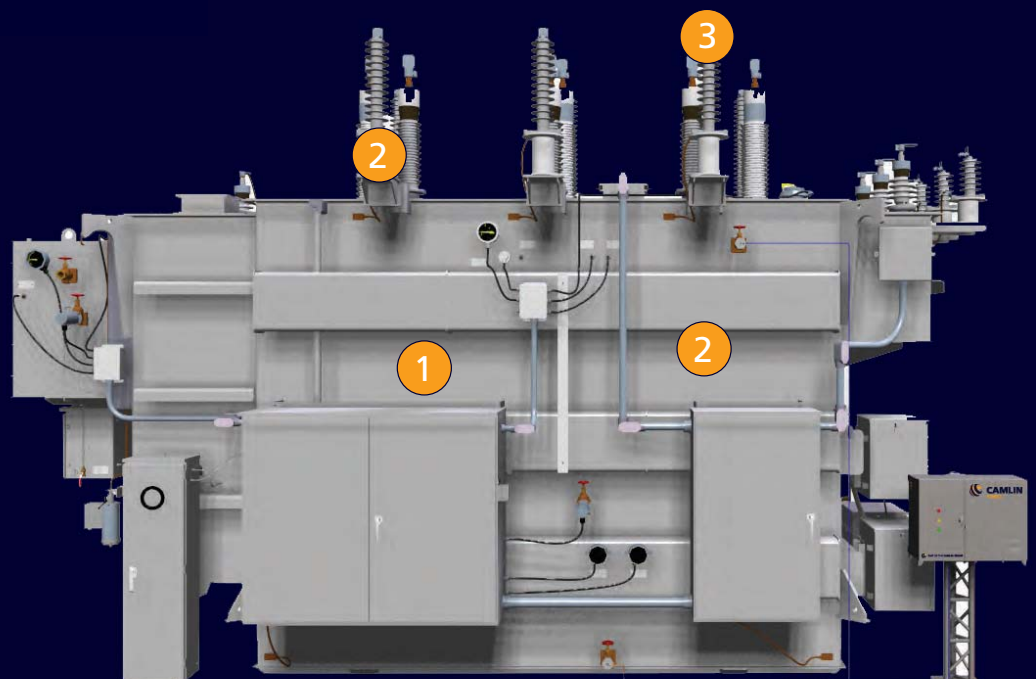
A bushing failure can be a catastrophic event resulting in widespread collateral damage. Such major events can be avoided through early detection of potential defects via online bushing monitoring. **TOTUS** provides an effective solution.

- Early detection of fast developing faults e.g. sudden short circuit of capacitive layers
- Avoidance of false alarms through advanced algorithms
- Automatic separation of PD in bushings
- Highly stable relative Tan Delta & Capacitance measurement
- Simple commissioning with no manual tuning and additional softwares

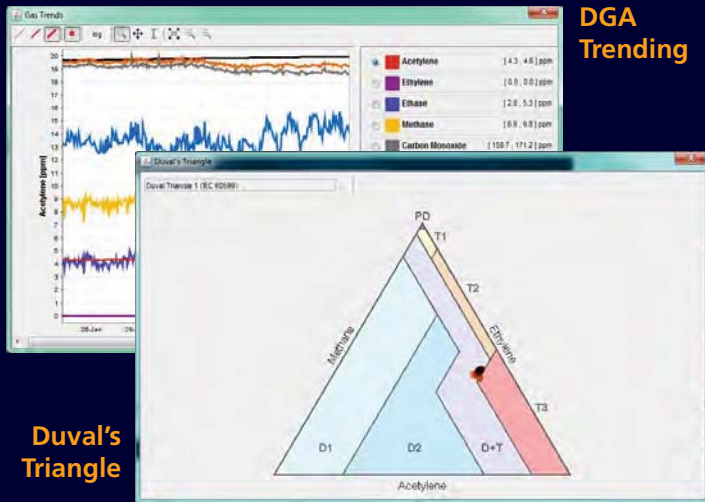
2 Partial Discharge (PD)

The revolutionary PD technology of **INTEGO™** can now be incorporated into **TOTUS**. Unique noise rejection algorithms, continuous monitoring, embedded intelligence and state-of-art analysis tools all mean PD can now be reliably, easily and successfully applied to transformers.

- Unique Tap adaptor design ensures a reliable / safe installation with protection against voltage surges
- Effective noise rejection designed **specifically** for transformers
- **Continuous** monitoring which ensures all significant PD activity is captured
- Data converted into visual graphics which are easily interpreted for the non PD expert

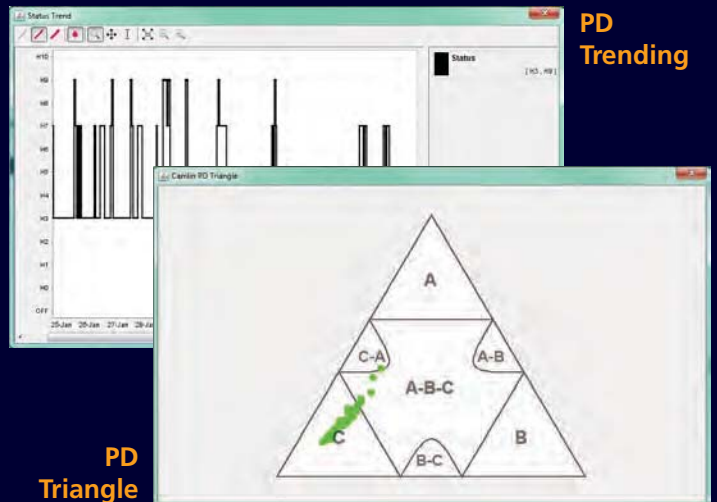


Unique Web App Features - Fully flexible web based software incorporating Partial Discharge, DGA and Bushing Monitoring.



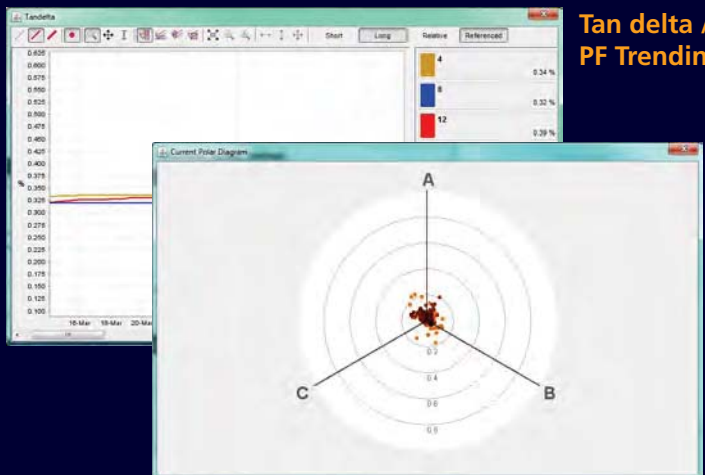
DGA Trending

Duval's Triangle



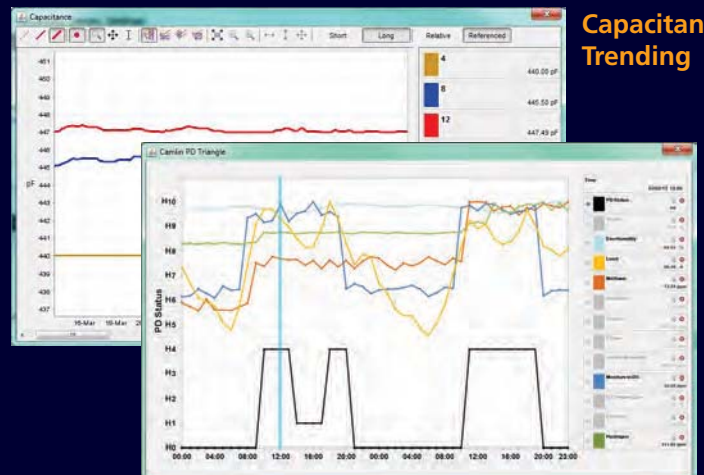
PD Trending

PD Triangle



Tan delta / PF Trending

Polar Plot



Capacitance Trending

Combined DGA, PD, Thermal & Load Trend

Data and Communications

- Embedded webserver and web-based software
 - Full control & comms via secure, flexible web-access
 - Powerful apps for smartphone and tablet
 - PC software for off-line viewing
 - Extensive analysis tools for all levels of users
 - Full compatibility with asset management systems
- Incorporated LCD touch screen
 - On-site analysis and graphing
 - Easy control of unit
 - Web-access for support and comms
- Extensive comms & I/O options
- Data hub for 3rd party monitors
- Load and Temperature as standard



Secure access data from any smart device

Specification

Parameter	
H ₂	5 - 5,000 PPM
CH ₄	1 - 50,000 PPM
C ₂ H ₆	1 - 50,000 PPM
C ₂ H ₄	1 - 50,000 PPM
C ₂ H ₂	0.1 - 50,000 PPM
CO	1 - 50,000 PPM
CO ₂	3 - 50,000 PPM
H ₂ O (RS)	0 - 100% RS
Accuracy	± 5% or ± LDL (whichever is greater)
O ₂	100 - 50,000 PPM (±10%)
N ₂	10,000 - 150,000 PPM (±15%)

Data (DGA)	
Measurement frequency	1 - 24 hours
Storage	8 GB microSD card, 15+ years

Partial Discharge	
Input channels	3 phases & 1 gating (option for additional 3), simultaneous acquisition on all channels
Simultaneous channels	4 (7)
Sensors	Bushing Tap Adaptors, Ground RFCT, optional UHF Antenna for drain valve installation
Input measuring range	-10V to +10V
Accuracy	Amplitude: <5%, time resolution: 10 ns
Resolution	12 bit
Sampling rate	100 MS/s
Bandwidth	Ultra-wide (<50MHz) & Wide (IEC60270)

Data (Partial Discharge & Bushing)	
Acquisition mode	Continuous
Trending	Hourly, daily, weekly, monthly
Storage	8 GB micro SD Card, > 1 year

Bushing Monitoring	
Input channels	2 sets of 3 phases, simultaneous acquisition on all channels
Simultaneous channels	3 (6)
Sensors	Bushing Tap Adaptors
Input measuring range	0 - 200mA
Accuracy	Amplitude: 0.1%, Relative Phase Angle: 0.05°
Resolution	12 bit
Sampling rate	18 KS/s
Power system frequency	50 - 60Hz, ± 0.01 Hz

Alarms	
High-vis LED's	Red, Amber, Green
Alarm relay contact	4 x NO or NC, user configurable

I/O	
Analog inputs	3 x PT100, 3 x 4 - 20 mA, 1 x Load CT
Digital inputs	5 x 24V isolated

Communications	
Protocols	ModBus, DNP3 & IEC61850
Carriers	RS232, RS485, Ethernet, 3G, Fibre
HMI	7" High Resolution Colour LCD

Power	
Power	90 - 250 VAC, 47 - 63 Hz, 300W

Environmental	
Operating temperature	-40 to +55 °C (option for -60 °C)
Operating humidity	5 - 95% RH, non-condensing
Oil temperature range	-40 to +120 °C

Enclosure	
H x W x D	996 x 720 x 310 mm
IP rating	IP56
Material	304 SS (316 option)



CAMLIN
POWER

camlinpower.com

Head Office

Camlin Power
31 Ferguson Drive
Knockmore Hill Industrial Park
Lisburn BT28 2EX
Northern Ireland

+44 (0)28 9262 6989
mail@camlinpower.com

International Sales & Support Offices

North America

Camlin Power Inc
1765 N. Elston Ave. Unit 105
Chicago, IL 60642
USA

+1 (773) 598 4126
mail@camlinpower.com

Europe

Camlin Power
Zum Brückenberg 31A
59872 Meschede
Germany

+49 (0)172 283 72 02
mail@camlinpower.com

China

Camlin Power
Room 101, Building No.6,
600 West Yunling Road,
Putuo District, Shanghai, 200333
China

+86 (0)159 2160 1457
mail@camlinpower.com

South America

Camlin Power
Azul Loureiro, 910
SP/Brasil
São Paulo
Brazil

+55 (13) 3386 2571
mail@camlinpower.com

Asia Pacific

Camlin Power
Suite 1A ,Level 2
802 Pacific Highway
Gordon NSW, 2072
Australia

+61 (0)426 118 101
mail@camlinpower.com

Russia

Camlin Power
The Russian Federation, 115054
Moscow
Bakhrushina str., 32, bld. 1
Russia

+7(985)757-00-46
mail@camlinpower.com



CAMLIN

SPECIFICATION	RANGE	ACCURACY	RESOLUTION
DC Current Measurement:	± 200 A	±5%	±100mA
DC Voltage Measurement:	±400 V	±5%	±50mV
AC Current Pickup Threshold (MCon timing):	10 mA	±0.5mA	
Timing parameters:		±0.2 ms	±0.1 ms
Handset Power Supply:	10-15 V DC, 24W		
Inline Power Supply:	85-265 V AC		
	50 / 60 Hz		
Profile Battery Supply :	8x AA (Rechargeable (NiMH) or standard alkaline)		
	8 hours under normal usage		
Screen:	5.7" Color Display, 640 x 480 (VGA)		
Operating temperature:	-20°C to +50°C (-4°F to +122°F)		
Handset record storage:	≥ 1000 records		

PROFILE P3 with accessories

- DC Probe (Hall Effect CT)
- 3 Peg CTs
- DC Voltage probes
- DC power supply
- USB memory stick & lead
- Peli™ case

Offline Interface Unit

- Interface unit (provides 24V DC signal across circuit breakers)
- AC power lead
- Four 5 metre colour coded leads
- PROFILE P3 handset connection cables
- Breakout box
- Carry case with strap

