



CONDITION MONITORING

Calisto[®] R9

HIGH-ACCURACY & LOW-MAINTENANCE DGA MONITOR





Technical Specifications

APPLICATION											
Online monitoring of fault gases, air components and moisture in transformer insulating liquids.											
TECHNOLOGY											
Gas measurements	Patented photo-acoustic method with automatic self calibration										
	H2 by thermal conductivity										
	O2 by fluorescent dye sensor										
	N2 by total headspace pressure										
Gas extraction	Oil-immersed Teflon® tubing ¹										
Moisture measurements	Oil-immersed relative saturation (RS) sensor										
Communications	DNP3, Modbus, IEC 61850 (option) with substation hardened IOs										
PERFORMANCE											
		H2	CO	CH4	C2H2	C2H4	C2H6	CO2	O2	N2	H2O
Lower detection limit ²	ppm	5	1	1	0.5	1	1	20	100	10,000	2 ppm or 2% RS
Top of range	ppm	5000	40,000	20,000	40,000	50,000	50,000	50,000	50,000	150,000	100% RS
Accuracy ³ +/- (LDL+X% of reading)	%	X=5	X=5	X=5	X=5	X=5	X=5	X=5	X=10	X=15	3 ppm or 2% RS
Repeatability +/- (LDL+Y% of reading)	%	Y=3	Y=3	Y=3	Y=3	Y=3	Y=3	Y=5	Y=5	Y=10	2 ppm or 2% RS
Resolution at LDL	ppm	1	0.5	0.5	0.5	0.5	0.5	5	50	100	1 ppm or 1% RS
Measurement interval		1 hr	1 hr	1 hr	1 hr	1 hr	1 hr	1 hr	1 hr	1 hr	1 second
Step response in 1 hour	%	70%	80%	90%	90%	90%	90%	90%	40%	30%	100%
OPERATION											
Operating temperature range	-40 to +55° C standard, -50 to +40 with Cold Kit option										
Storage temperature range	-50 to +75° C										
Operating oil temperature range	-40 to +120° C										
Operating oil pressure range	Full vacuum to 40 psi										
Operating humidity range	0 - 99% RH										
Storage humidity range	5 - 95% non-condensing										
Elevation range	Up to 2500 m										
CONSTRUCTION											
Width x height x depth	Instrument: 28.4 x 26.26 x 13.5 inches (72.1 x 67 x 34.3 cm)										
	Shipping: 33 x 30 x 17 inches (83.8 x 76.2 x 43.2 cm)										
Weight	Instrument: 125 lbs (57 kg)										
	Shipping: 143 lbs (65 kg)										
Enclosure	Powder-coated 304L stainless steel										
Oil circulation	Anti-cavitation reciprocating pump										

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CONSTRUCTION	
Oil flow monitoring	Proprietary method with low flow error
Oil lines	3/8 inch OD stainless steel; see manual for length guidelines
Air bubble elimination	Intelligent bubble trap
Enclosure temperature conditioning	Thermoelectric feedback
Oil temperature conditioning	Passive heat exchanger plus thermoelectric feedback
Cooling	Forced air
Equipment protection	Thermal cut-off fuse (77° C), over-current mains fuse
Oil sampling	External quick-connect port
INSTALLATION	
Mechanical	4 shock-mount vibration isolators
Electrical power	100-240 VAC -15% +10%, 50-60 Hz, 1 phase, 520 VA. or 110-250 VDC, 520 VA. Test report available for 240 VAC +15%.
Electrical disconnect	10A client breaker
Commissioning time	5 hours installation plus 4-12 hours for first readings
MAINTENANCE	
Visual inspection every 12 months.	
COMMUNICATIONS	
Interface	Calisto R9 Software web server
Protocols	Modbus, DNP3 Level 2, see Options below.
	Time synchronization NTP and IEEE 1588
Ports	2 copper Ethernet
	2 SFP cages for optical Ethernet
	RS-485
	USB for local connection only
Analog	3 4-20mA inputs
	12 optional 4-20mA outputs (see Options below)
Relays	2 standard plus 8 optional NO/NC, 250VAC, 1500VA; 250VDC, 140W (see Options)
Door indicators	2 LED indicators for power up, error, alarms
Data storage	10 years
DGA data management and diagnostics	Inside View software, Doble Prime (both sold separately)
REGULATORY	
CE marking	Low Voltage Directive 2014/35/EU
	EMC Directive 2014/30/EU
	WEEE Directive 2012/19/EC
	RoHS Directive 2011/65/EU, 2015/863 (RoHS 3)
Electromagnetic Compatibility and Immunity	IEC 61326-1: 2013
	IEC 61850-3: 2013
	IEC 61000-6-5: 2015
Safety	UL 61010-1:2012
	CAN/CSA C22.2 No. 61010-1-12: 2017



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REGULATORY	
	IEC 61010-2-030:2017
	IEC 61010-2-081:2020
Environmental	IEC 60529:2013 IP66
	NEMA 250:2020 Type 4X
	IEC 60068-2-6: 2007 Sinusoidal Vibration
	IEC 60068-2-1: 2007 Cold Storage, Cold Start, Cold Operation
	IEC 60068-2-78: 2012 and IEC 60068-2-30: 2005 Damp Heat
	IEC 60068-2-14: 2009 Change of Temperature
	IEC 60068-2-11:1981 Salt Fog
REACH	Regulation No 1907/2006 (EU REACH of 219/223 SVHCs)
OPTIONS	
Software (license key required)	IEC 61850
Hardware	8 optional NO/NC output relays, 250VAC, 1500VA; 250VDC, 140W
	12 optional 4-20mA outputs
	Cold kit option for operating range from -50 to 40° C.
	Internal Touchscreen Display
ACCESSORIES	
	Calisto R9 mounting stand
	Calisto precision oil-temperature probe (4-20mA)
	All metal stainless-steel flexible oil lines
	Insulated oil lines for low-temperature installations
	Calisto isolation valves
	Quick-Connect Plug (to keep dust out of oil-sampling port)
WARRANTY	
30 month standard with 1, 2, and 3 year extended warranty options.	
SERVICE AND SUPPORT	
On-site commissioning service and on-site maintenance program available on request.	
NOTES	
Product improvement developments may result in specification of appearance changes at any time.	
¹ Teflon® is a registered trademark of DuPont. Solubility coefficients are built-in for mineral and synthetic ester liquids. Product is not compatible with silicone or natural ester transformer liquids.	
² All ppm in mineral oil	
³ Accuracy in factory	

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