GE
Grid Solutions

Hydran M2-X

Enhanced Monitoring with Extended Sensor Life

When a transformer's insulation system is overstressed, the oil and paper undergo chemical degradation producing both hydro-carbon gases and moisture that dissolve into the insulating oil. This increased ageing will shorten the transformer's life, impact its reliability and in some cases can even lead to catastrophic failures.

The Hydran M2-X is the next generation of the field-proven family of Hydran DGA monitoring solutions. It provides continuous monitoring of gas and moisture levels to alert users of developing faults and minimize the risk of unplanned outages. The M2-X builds on GE's strong domain expertise to deliver an optimized, low maintenance monitoring device with an extended sensor life.

Key Benefits

- Small form factor, no moving parts, low maintenance, and support for APM software analytics, enabling fleet level deployments
- Condition monitoring for a wide range of transformers with mineral insulating oils or ester based fluids (natural and synthetic)
- Extending beyond DGA monitoring, through the connection of sensors, the Hydran M2-X can monitor other parameters such as top oil temperature, load current and through the use of IEEE based mathematical models, can provide further insight on changing transformer conditions
- Providing critical transformer gas behavior data for Asset Performance Management (APM) strategies, facilitating planning of site intervention and maintenance activities
- Supports a wide range of communication methods and protocols to enable easy and secure integration with GE's digital platforms including Perception™ transformer fleet management software, DS Agile substation HMI, PREDIX™, and other APM software tools, historians and SCADA systems

Applications

Advanced, flexible and expandable DGA monitoring solution tailored for utility and industrial transformers.

Easily integrates with Kelman multi-gas DGA devices and the Multilin 845 protection & control relay to provide continuous synchronization of chemical and electrical measurements for enhanced transformer monitoring.

Proven Technology

- Field proven solution, delivering online DGA solutions for over 40 years
- Over 50,000 Hydran units sold worldwide
- Estimated sensor life in excess of 10 years*
- 7 year product warranty

Expandable

- Compatible with various transformer oil types (standard mineral insulating oils and newer natural and synthetic ester based fluids)
- Available with the traditional Hydran composite gas (H2, CO, C_2H_2, C_2H_4) sensor or with a discrete Hydrogen only (H2) sensor
- Easily upgradable in the field to accept analogue signals to monitor other key transformer parameters
- Computation of winding hot spot and other IEEE transformer models for enhanced diagnostics of the transformer's condition (depending on sensors installed)
- Integrates with Kelman multi-gas DGA devices

Intuitive

- Easy to install on a single existing transformer valve, often without an outage required
- Integrated display and keypad for simplified local user interaction and data visualization
- Built-in moisture sensor provides water in oil measurement, critical to identifying paper degradation and leaking gaskets
- Compatible with GE's acclaimed Perception™ software to download, trend and analyze transformer health data

imagination at work

Technical Specifications

MEASUREMENTS

Fuel cell type sensor behind a gas permeable membrane in contact with transformer insulating oil

Range	25-2000 ppm (volume/volume H_2 equivalent)
Accuracy**	±10% of reading ±25 ppm
Response time	10 minutes (90% of step change)

"Composite Gas" Sensor

Relative sensitivity	H_2: 100% of concentration CO: 15 ± 4 % of concentration C_2H_2: 8 ± 2 % of concentration C_2H_4: 1.5 ± 0.5 % of concentration
Repeatability	highest of ±5% of reading or ±5 ppm

"Discrete H2" Gas Sensor (Mineral oil only)

Relative sensitivity	H_2: 100% of concentration Interference from CO, C2H2 and C2H4 less than 3% of concentration
Repeatability	highest of ±5% of reading or ±10 ppm

Moisture Sensor

Thin film capacitive type sensor immersed in insulting oil

Range	0-100% RH
Accuracy	± 2% RH
Repeatability	± 2% RH

FEATURES

Display

Backlit LCD, 128 x 64 pixels

Keypad to setup unit and acknowledge alarms

Communications

Standard RS-232 port (DB-9 connector), for local connection to computer for configuring the system

Standard RS-485 (terminal block), isolated to 2000Vac RMS, for remote communication or connection to local Hydran network

Optional: Ethernet or Fiber Optic over TCP/IP

Protocols

Standard: Modbus®, DNP 3.0
Optional: IEC 61850 over TCP/IP

Alarms

Gas and Moisture Alert (Hi), Gas and Moisture Alarm (HiHi), System Alarms

Gas alarms can be set on gas level reached or on hourly or daily trend (gas level rate of change)

Moisture alarms can be set on level reached or average level

Alarms can also be configured for optional additional analogue inputs or for calculation results from optional transformer models

5 dry contact relays (type C, SPDT), NO/NC, 3A@250Vac resistive load, 3A@30Vdc resistive load

Manual Sampling

Easily accessible external oil sampling port, for use with glass syringe with Luer stopcock

ENVIRONMENT

Conditions

Operating ambient temperature	-40°C to +55°C (-40°F to +131°F)
Operating ambient humidity	0-95% RH, non-condensing
Oil temperature at valve	-40°C to +105°C (-40°F to +221°F) with finned heat sink adapter option
Oil pressure at valve	0-700KPa (0-100psi) Vacuum resistant sensor

Enclosure Rating

NEMA Type 4X certified, meets requirements of IP56

Power Requirements

90–132 Vac or 180–264 Vac switch mode universal power supply, 47–63 Hz, 650VA max

Mechanical

Has a 1.5" NPT male thread, can mount on 1.5" NPT valve or greater using optional adapters

Dimensions	315 x 219 x 196 mm 12.4 x 8.63 x 7.72 "
Installed weight	7.5Kg (16.5lb)
Shipping weight	9.0Kg (20lb)

PRODUCT OPTIONS & SENSORS

Finned heat sink adapter (1.5") for use when ambient temp > 40°C (104°F) or oil temp > 90°C (194°F).

Valve adaptors 2" to 1.5"

Transformer models calculations (for mineral oil only)

Analogue input cards, 4-20mA, 10V load max, isolated to 2000Vac RMS

Dual digital input cards for dry contacts, internal wetting 24Vdc, isolated 2000Vac

Analogue output cards, 4-20mA, 10V load max, isolated to 2000Vac RMS

PSTN analogue modem V92/56K

GSM/GPRS wireless modem

Network Ethernet communication using copper (RJ-45) or multimode fiber optic (ST)

Oil temperature sensor, magnetic mount, (4-20mA)

Split core load CT (4-20mA)

Ambient temperature sensor (4-20mA)

Hydran M2X -	Ox	Sx	Ax	Bx	Cx	Dx	Nx	Gx	Vx	Px	Lx	Selection Description
Oil type	O0											Mineral Oil
	O1											Natural Ester Oil
	O2											Synthetic Ester Oil
Sensor type		S0										Composite gas sensor
		S1										Hydrogen only sensor (with mineral oil only)
Card slot A,B,C,D			A0	B0	C0	D0						No analogue card
			A1	B1	C1	D1						Analogue Input card, 4-20mA
			A2	B2	C2	D2						Analogue Output card, 4-20mA
			A3	B3	C3	D3						Digital dual input card
Communication							N0					Serial communication over RS485
							N1					TCP/IP Ethernet over copper with RJ45 connector
							N2					TCP/IP Ethernet over MM Fibre with ST connector
							N3					Modem analogue PSTN
							N4					Modem wireless GPRS/3G/4G
Valve								G0				Installtion on gate valve (standard)
								G1				Installation on globe valve
Adapter									V0			No adapters (1.5" NPT)
									V1			Finned Heat-sink adapter (1.5")
									V2			Valve adaptor 2" to 1.5"
									V3			Valve adaptor 2" to 1.5" + Heat sink adapter
Protocol										P0		Multi-protocol (Modbus and DNP3)
										P1		IEC 61850
Language											L0	English labels and manuals
											L1	French labels and manuals
											L2	Spanish labels and manuals
											L3	German labels and manuals
											L4	Russian labels and manuals

**Fuel cell sensor life projection based on accelerated aging test showing estimated MTTF of 11.5 years*
*** Accuracy is quoted for the sensors at calibration, for H_2 equivalent performance*

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