GE
Digital Energy

Hydran M2

Mark III Enhanced DGA monitoring for transformers

The Hydran™ M2 is a continuous on-line dissolved gas and moisture in oil monitoring device that alerts personnel of developing fault conditions in their transformer. It provides key monitoring information and minimizes the risk of unplanned outages.

Through the connection of additional sensors (for example top and bottom tank oil temperature, transformer load or ambient temperature), additional information can be captured and used to correlate with DGA and moisture values for a more in-depth analysis of the transformer's condition.

This wealth of data can, not only be transmitted raw using the M2's wide range of communication options but can also be converted into useful information through the on-board calculation of IEEE® standard's based transformer mathematical models in order to provide further condition information.

With the latest Mark III version, the Hydran M2 monitor has been completely overhauled with new electronic boards and power supply to make it RoHS compliant, address any obsolescence issue and further improve this time proven product.

It now offers additional features like:

- Improved sensor
- Worldwide power supply
- Ability to support up to 4 optional input/output cards
- Internal multimode fibre optic communication option
- Compatibility with GE's acclaimed Perception™ Fleet software to download, trend and analyze data, like with any other GE DGA monitoring equipment

Key Benefits

- Continually measures dissolved fault gases + moisture in oil
- Can connect additional sensors (for load, oil temperature)
- Built-in calculation of transformer models based on IEEE standard
- Wide range of communisation options
- Proven design with very large global installed base

Applications

Power Utilities

- All-in-one solution for important medium size transformers
- Focuses and prioritizes asset replacement strategy

Industrial Plants

- Reduces the risk of process interruption due to power failure
- Minimizes costly production downtime

Asset Supervision

- Easy to permanently install on a single transformer oil valve. No extra piping or pump required. Inputs for other sensors
- Gas sensor responds 100% to Hydrogen (general fault gas) and is also sensitive to Carbon Monoxide (overheated paper) Acetylene (arcing) and Ethylene (overheated oil) thus covering main failure root causes
- Moisture sensor measures water in the oil, a result of insulating paper degradation (produces CO + water) or leaking gaskets
- Optional 5 year sensor guarantee

Configurable Alarms

- An alarm is raised when an abnormal level of fault gas or moisture is detected
- Two alarm levels (one for Alert and one for Alarm) can be set to show increasing severity
- Alarms can also be set on values from optional analogue input cards or from optional calculated transformer models
- Automatic self-test every 15 days will trigger service alarm if it detects a fault, including power failure, oil valve closed, sensor or battery needing replacement

Communication

- Local LCD display
- Wide range of digital communication protocols (Hydran, Modbus®, DNP 3.0) and methods (RS-485, modem, Ethernet, fibre optic) depending on options selected
- Optional analogue outputs (4-20mA)
- 5 dry contact relays also available

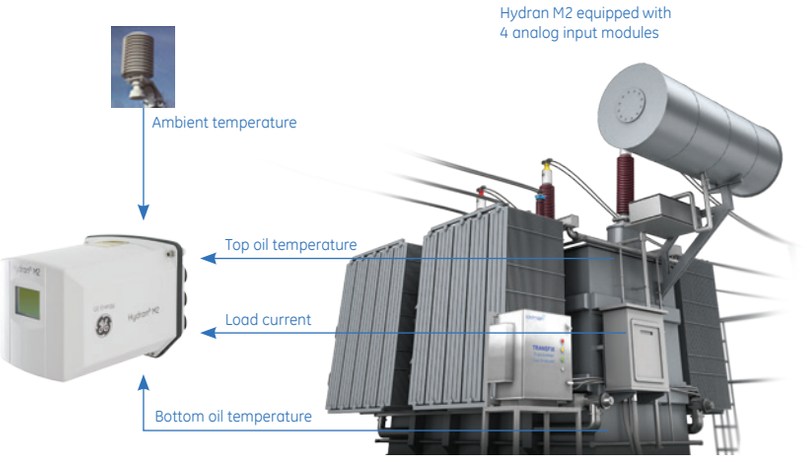
imagination at work

Transformer Models

The Hydran M2 offers transformer mathematical models based on IEEE standards and correlated with field experience. They use inputs from the available sensors and transform the received data into useful real time information to further understand the overall health of the transformer.

Possible models output examples:

- Estimated winding hot spot temperature
- Moisture level in paper
- Moisture bubbling temperature
- Insulation ageing
- Overloading capacity
- Cooling efficiency
- OLTC temperature differential



Technical Specifications

MEASUREMENTS

Gas Sensor

- Fuel cell type sensor behind a gas permeable membrane in contact with mineral transformer insulating oil through a flooded manifold
- Measurement range 0-2000 ppm (volume/volume, H_2 equivalent)
- Measurement accuracy: ± 10 % of reading ± 25 ppm (H_2 equivalent)
- Measurement repeatability: highest of
- ± 5 % of reading or ± 5 ppm
- 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
- Response time: 10 minutes (90% of step change)

Moisture Sensor

- Thin film capacitive type sensor immersed in mineral insulting oil through a flooded manifold.
- Measured range 0-100% RH
- Measurement accuracy ± 2% RH
- Measurement repeatability: ± 2% RH

FEATURES

Display

- Backlit LCD, 128 x 64 pixels
- Keypad to setup unit and acknowledge alarms

Digital Communications

- RS-232 port (DB-9 connector), for local connection to computer for configuring the system
- RS-485 (terminal block), isolated to 2000Vac RMS, for remote communication or connection to local Hydran network
- Gas and moisture level and trend data output using Hydran, Modbus or DNP 3.0 protocols over RS-485

Alarms

- 5 different alarms: Gas and Moisture Alert (Hi), Gas and Moisture Alarm (HiHi), Service Alarm (sensor, temp, ...)
- 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

Others

- External sampling port for glass syringe with Luer stop cock

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 (-4°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 IP66

Power Requirements

- 90–132 Vac or 180–264 Vac switch mode power supply, 47–63 Hz, 475VA max

Mechanical

- 315mm (12.4") long x 219mm (8.63") wide x 196mm (7.72") high
- Has a 1.5" NPT male thread but can also mount on a 1" or 2" female NPT valve using optional adapters
- Installed weight 7.5Kg (16.5lb)
- Shipping weight 9.0Kg (20lb)

OPTIONS

- Finned heat sink adapter (1.5") for use when ambient temp > 40°C (104°F) or oil temp > 90°C (194°F).
- Valve adaptor 1" to 1.5" or 2" to 1.5"
- Transformer models calculations
- 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
- Maximum of 4 cards, combination of either input and output cards
- PSTN analogue modem V92/56K
- Network Ethernet communication using copper (RJ-45) or multimode fibre optic (ST)
- Oil temperature sensor, magnetic mount, (4-20mA)
- Split core load CT (4-20mA)
- Ambient temperature sensor (4-20mA)
- H201Ci-1 display repeater

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