



# Hydran 201Ti (Mark IV)

## Essential DGA monitoring for transformers

Transformers are key and expensive components of the electrical grid and knowledge of their health condition is essential to having a reliable network. When a transformer's insulation system is overstressed, gases are produced that dissolve in the oil. Dissolved Gas-in-oil Analysis (DGA) is recognized as the best indicator of developing faults.

The Hydran™ 201Ti is a small and easy to setup continuous Dissolved Gas-in-oil Analysis (DGA) monitor. It provides the basic information used by IEEE® Standard C57.104 and can be used as an essential first line of defence for the transformers in your fleet to obtain advance warning of a failure condition and minimize the risk of unplanned outages.

The 201Ti's composite-gas sensor provides the world renown "Hydran gas value" using fuel cell technology (described as fixed instruments - method 3 in the standard). It responds 100% to Hydrogen (general fault gas) and is also sensitive to Carbon Monoxide (overheated paper), Acetylene (arcing) and Ethylene (overheated oil), thus covering all the main transformer failure root causes.

Because the monitoring unit mounts on a single valve and uses Dynamic Oil Sampling, there is no need for a pump or extra piping to connect to different valves. Due to its uncomplicated features and the easily understood information it provides, the 201Ti has been amongst the monitors of choice for many years, with one of the largest installed base of any monitor.

### Key Benefits

- Continually measures composite fault gas to give you an insight into the transformer's condition
- Communicates gas ppm and gas rate of change values remotely to avoid site visits and enable remote supervision
- Fourth generation of this proven and continuously improved design, with over 25,000 units sold worldwide
- Supports new lower flammability ester based oils as well as mineral transformer insulation oils

### Applications



#### Power Utilities

- Simple and effective solution for less-critical transformers
- Focuses and prioritizes asset replacement strategy



#### Industrial Plants

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

### Easy Asset Supervision

- Permanently mounts on a single transformer oil valve. No extra piping or pump required
- 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

### Configurable Alarms

- An alarm is raised when an abnormal level of fault gas is detected
- Two alarm levels (one for Alert and one for Alarm) can be set to show increasing severity
- Alarms can be set on gas ppm levels or on gas rate of change (ROC) over an hour or a day
- 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

### Mark IV Improvements

- Completely overhauled with improved sensor durability, new electronic boards and power supply to make it RoHS compliant while increasing device reliability and capabilities
- Local USB port to replace the RS-232 port no longer found on most field laptops
- Digital output of registers using Modbus® protocol communication over isolated RS-485
- Suitable for transformers using mineral insulating oil but now also ester based oils (natural or synthetic)
- Compatibility with GE's acclaimed Perception™ software to download, trend and analyze transformer data

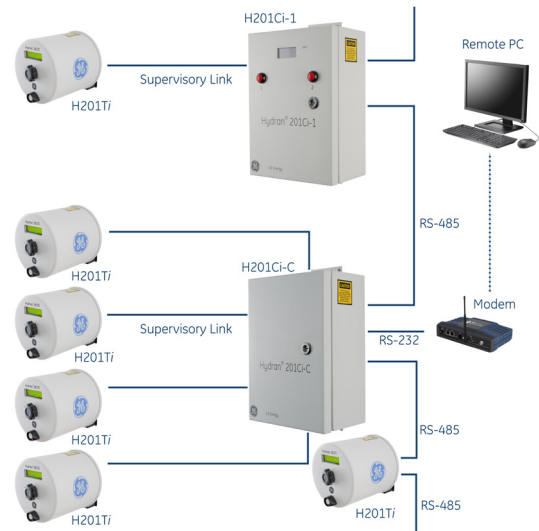


## Controllers

The Hydran 201Ti can be connected to optional controllers to facilitate communication with multiple units and create a local network.

- The Ci-1 controller is a one channel controller that replicates some of the human interface functions (gas value display, alarm buttons). This is ideal when the 201Ti is mounted out of reach on an upper valve of the transformer. It also brings down the alarm relay contacts and the analogue output for easier wiring.
- The Ci-C controller receives the gas ppm data from up to four 201Ti, providing a single communication point for all four monitors. It has no alarm relay or analogue output. This is ideal when protecting 3 single phase transformers + 1 spare.

It is possible to "daisy-chain" up to 32 controllers or 201Ti through their RS-485 port. The maximum chain distance (all cables added up) is 1200m (4000ft). All the 201Ti connected to any of the daisy-chained controllers can be accessed through any controller in the local network, thus facilitating communication by only having to fit one RS-232 modem for example.



## Technical Specifications

### MEASUREMENTS

#### Sensor

Fuel cell type sensor behind a gas-permeable membrane in contact with transformer insulating oil  
 Measurement range 0-2000 ppm (volume/ volume, H<sub>2</sub> equivalent)  
 Measurement accuracy  $\pm 10\%$  of reading  $\pm 25$  ppm (H<sub>2</sub> equivalent)  
 Responsive: 10 minutes (90% of step change)

#### Relative Sensitivity

H<sub>2</sub>: 100% of concentration  
 CO:  $15 \pm 4\%$  of concentration  
 C<sub>2</sub>H<sub>2</sub>:  $8 \pm 2\%$  of concentration  
 C<sub>2</sub>H<sub>4</sub>:  $1.5 \pm 0.5\%$  of concentration

### FEATURES

#### Display

Backlit LCD, 2 lines x 16 characters  
 Keypad to setup unit and acknowledge alarms

#### Digital Communications

USB port (type B connector) for local connection to laptop computer for configuring the system  
 RS-485 (terminal block), isolated to 2000 Vac RMS, for supervisory link connection to optional controllers and for remote communication  
 Gas level (ppm) and gas rate of change (hourly or daily ppm) outputs using Modbus or Hydran Protocols over RS-485

### Analog Communications

Gas level ppm output using 4-20mA for 0-2000 ppm range, 10V load maximum, isolated to 2000 Vac RMS

### Alarms

3 different alarms: Gas Alert (Hi), Gas Alarm (HiHi) and Service Alarm (battery, sensor, temp)  
 Gas alarms can be set on gas level reached or on hourly or daily trend (gas level rate of change)  
 3 dry contact relays (type C, SPDT), NO/NC, 3A@250Vac resistive load, 3A@30Vdc resistive load

### Manual Sampling

Easily Accessible  
 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 (-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 IP66

### Power Requirements

90-132 Vac or 180-264 Vac switchable, 47-63 Hz, 475VA max

### Mechanical

Cylindrical shape, diameter 178mm (7") x length 180mm (7-1/8")  
 Mounts on either 1", 1.5" or 2" female NPT valve  
 Installed weight 5.6Kg (12lb)  
 Shipping weight 6.9Kg (15lb)

### OPTIONS

Adapters for non NPT valves  
 Finned heat sink adapter (1.5"), for use when ambient temperature is above 40°C (104°F) or oil temperature is above 90°C (194°F)  
 Special tube wrench for sensor installation and removal  
 H201Ci-1 one-channel controller  
 H201Ci-C four-channel controller  
 Accessories/options for controllers

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