



HYDRAN® 201R Model *i*

On-Line Monitoring of Transformer Key-Fault Gases



The HYDRAN® instruments are early warning devices that will alert personnel to developing fault conditions that could lead to equipment failures and unscheduled outages. They warn personnel when diagnostic or remedial actions are needed.

- The HYDRAN® 201R Model *i* is an intelligent fault monitor that reads a composite value of gases, in ppm, generated by faults and provides output capability for communications.
- The HYDRAN® 201R Model *i* consists of a HYDRAN® 201Ti intelligent transmitter, plus a HYDRAN® 201Ci-1 one-channel controller and the HYDRAN® HOST software.
- The H201Ti is an instrument that attaches to a valve on the transformer to be monitored. The H201Ci-1 handles communications and provides display, alarms and analog outputs.



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Electrical and thermal stresses break the dielectric oil into a variety of gases. These gases are indicative of developing faults in the electrical apparatus, and their early detection will trigger the necessary action to prevent costly equipment failures. Since the mid-seventies the HYDRAN® instruments have been used worldwide by leading electrical utilities as essential elements in maintenance programs and have prevented failures of critical power system components.

Applications

The HYDRAN® 201R Model *i* is easily installed on oil-filled electrical equipment for on-line continuous monitoring of the following new, recently serviced and chronically overloaded equipment:

- Power transformers
- Reactors
- Auto transformers
- Instrument transformers
- Arc furnace transformers
- Rectifier transformers
- Distribution transformers
- Tap changers
- Oil-filled power cables



Horizontally on the transformer wall



Horizontally on the drain valve



Horizontally on the return pipe from the coolers

The HYDRAN® on-line instruments detect and monitor key-fault gases dissolved in dielectric oil



Benefits

- Timely field measurements
- On-time, proactive decision-making
- Reduced unplanned outages
- More predictable and reliable maintenance schedules
- Better control of load on gassing equipment
- Safer work environment
- Assistance in the decision-making process for keeping equipment on-line or removing from service

Key Features

- Hourly and daily trend (ppm changes during target period) with alarm features
- History logging of data and events up to a year and 500 events with date and time stamping
- Adjustable alarms on gas levels and trends
- Networking capabilities
- Sensor and system self-test and diagnostics
- All-software calibration
- Remote or local configuration, sensor calibration and program upgrading
- Full stand-alone capabilities when host computer is not required
- Connection to a SCADA system, either locally at the substation or remotely via optional modem

Communication and Networking

The HYDRAN® HOST software provides assistance to one or more HYDRAN® 201R Model *i* instruments via an RS-232 serial communications link.

An optional modem in the HYDRAN® 201C*i*-1 enables remote access over a telephone line.

Up to 32 HYDRAN® controllers can be networked together and monitored through a single RS-232 computer port.

Remote communications via optional modem



Local communications on site using a portable or a local computer



Specifications

General

Description of Instrument	Continuous, on-line, intelligent gas-in-oil monitor
Instrument Components	Standard H201 sensor and HYDRAN® 201Ti intelligent transmitter in cylindrical enclosure; plus HYDRAN® 201Ci-1 one-channel controller
Gas Response	Hydrogen (H ₂), carbon monoxide (CO), acetylene (C ₂ H ₂), ethylene (C ₂ H ₄)
Medium	Mineral, insulating oil for transformers
Application	Transformer monitoring; specifically, detection of incipient faults in oil-filled electrical equipment

Sensor Analytical Performance

Sensor Principle	Gas-permeable membrane and combustible gas detector
Sampling Method	Flooded port with 1-inch NPT male threads
Measurement Range	0-2000 ppm (volume/volume, H ₂ equivalent) Note: Other ranges are available
Accuracy	For 0-2000 ppm range: ± 10 % of reading ± 25 ppm (H ₂ equivalent)
Relative Sensitivity	H ₂ : 100 % of concentration CO: 18 ± 3 % of concentration C ₂ H ₂ : 8 ± 2 % of concentration C ₂ H ₄ : 1.5 ± 0.5 % of concentration
Response Time	10 minutes (90 % of step change)
External Sampling Port	Designed for glass syringe with Luer stop cock; close with 5/32-inch Allen screw

Overview: H201Ti Intelligent Transmitter

Hardware	Microprocessor; watchdog; clock
Software	Real-time operating system; menu-driven interface
Functions	Gas level, hourly trend and daily trend readings; gas level, gas trends and fail alarms; history logging; periodic sensor test; calibration, configuration and self-test; net working; remote control via H201Ci controller (optional modem); remote, embedded software upgrading
Communications	One port at a time, user-selectable as RS-232 link (DB-9 connector) to connect host computer, or as supervisory link to connect H201Ci controller
Display	Backlit liquid crystal display (LCD); 2 lines x 16 characters
Keypad	Six keys: Enter, Up, Down, Change, Esc and End
Alarm Contacts	Gas High, gas High-High and Fail alarm contacts; one NO and one NC contacts (type C) per alarm; 125 VA @ 250 V a.c., 60 W @ 220 V d.c.
Standard Analog Output	0-1 mA; non isolated; 0-2000 ppm range; 2 V maximum
Optional Analog Output	4-20 mA; isolated; 0-2000 ppm range; 10 V maximum; 1500 V RMS isolation level

Overview: H201Ci-1 One-Channel Controller

Display	Digital, light-emitting diodes (LED's); 0-1999 ppm scale
Standard, Analog Output (Not Isolated)	Jumper configurable: 0-1 mA, 4-20 mA, 0-1 V or 0-10 V; 0-2000 ppm range
2nd Analog Output (Isolated, Optional)	Jumper configurable: 0-1 mA, 4-20 mA, 0-1 V or 0-10 V; 1500 V RMS isolation level; 0-2000 ppm range
Gas High and High-High Alarms	Duplicate alarms in H201Ti: gas level, hourly trend and daily trend
Fail Alarm	Duplicates alarm in H201Ti: power failure, loss of communications, sensor and other system malfunctions; upon system fault, analog outputs are set to zero and display is blanked
Alarm Contacts	Gas High, gas High-High and Fail alarm contacts; one NO and one NC contacts (type C) per alarm; 125 VA @ 250 V a.c., 60 W @ 220 V d.c.
Illuminated Push Buttons (Alarm Indicators)	Two illuminated push buttons (gas High and High-High alarms) mounted on door, latched on when corresponding alarm condition is detected, turned off by pushing button when alarm condition is cleared

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Communications/Networking

Supervisory Link	Connects with one H201Ti; 3000 V opto-isolated; a three-twisted-pairs (16 or 18 AWG) cable with overall shield is required; maximal length: 1300 m (4000 ft); power supply: separate, isolated, impedance-protected, +15 V d.c.
RS-485 Local Network Link (Not Isolated)	Standard RS-485 communication port allows daisy-chaining of up to 32 H201Ci controllers (H201Ci-C's and/or H201Ci-1's and/or H201Ci-4's) via a single plug-in 3-screw connector; one twisted triad (16 or 18 AWG) with overall shield required; maximal total daisy-chain length: 1300 m (4000 ft)
RS-232 Link	Standard RS-232 port (DB-9 connector) allows serial communications with a local host computer (or remotely with optional modem); any H201Ti can be accessed through any H201Ci controller in the local network
Recommendation	Run all communication cables in flexible or rigid, metallic conduits for maximal mechanical and electrical protection

Miscellaneous: H201Ti Intelligent Transmitter

Enclosure	NEMA 4X (IP 66); white cylindrical aluminum housing; 178 mm (7 inch) diam. x 180 mm (7 1/8 inch)
Electronic Modules	Totally encased CPU and I/O modules; swappable and waterproof
Enclosure Heating/Cooling	325 W heating plate; convection cooling; maintains unit between 15 and 65 °C (59 and 149 °F)
Brass Adaptor	With 1.5-inch male NPT threads (standard); mounting on transformer valve; other dimensions are available
Temperatures	Oil at the valve: -50 to +90 °C (-58 to +194 °F) With finned, high-temperature adaptor (1.5-inch male thread only) for oil temperatures up to 105 °C (221 °F) Ambient: -50 to +55 °C (-58 to +131 °F)
Oil Pressure	0-700 kPa (0-100 psi); no vacuum allowed
Power Supply	100/115/200/230 V a.c. ± 10 % (100 V a.c. meets EN 61010 standard), 50/60 Hz, 350 VA maximum
EMI/RFI/ESD Compatibility	Meets IEEE C37.90 and IEC 255-4, 801-2, 801-4 standards
Weight	Installed 6 kg (13 lb); shipping 7.3 kg (16 lb)

Miscellaneous: H201Ci-1 Controller

Enclosure	NEMA 4X (IP 66) steel enclosure; baked enamel, textured white finish
Dimensions	Approximately 250 x 350 x 200 mm (10 x 14 x 8 inches)
Operating Temperature	-50 to +55 °C (-58 to +131 °F) with standard internal heater
Power Supply	100/115/200/230 V a.c. ± 10 % (100 V a.c. meets EN 61010 standard), 50/60 Hz, 120 VA maximum
EMI/RFI/ESD Compatibility	Meets IEEE C37.90 and IEC 255-4, 801-2, 801-4 standards
Weight	Installed: 10 kg (22 lb); shipping: 11 kg (24 lb)

Options and Accessories

Brass Adaptor	With 1.5-inch male NPT threads (standard); mounting on transformer valve; other dimensions are available
Finned, High-Temperature Adaptor	With 1.5-inch male NPT valves for oil temperatures up to 105 °C (221 °F)
HYDRAN® 200i	Hand-held, electronic calibrator, battery-operated
HYDRAN® 103B	Transformer incipient fault detector
HYDRAN® 201TW	Special tube wrench for sensor installation and removal
HYDRAN® 200DR	Chart recorder
HYDRAN® HOST Software	Supports all H201Ti functions plus networking and embedded software upgrading; available in Windows® version
Modem	Smart, high-speed modem allows computer access via a telephone line

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