DISSOLVED GAS ANALYZER (DGA)
After three years of successful operation of Inch Energy, we are here to contribute the nation growth by making the things indigenous.

Following the path of nation growth and to fulfill the concept of “Make in India”, Inch Automation a group company of Inch Energy has established a manufacturing facility in IMT Manesar, Gurgaon in close vicinity of Delhi.

Inch Automation has joined hand with China leading Automation Company “Chongqing Chuanyi Automation Co. Ltd.” (http://www.cqcy.com/en/) to manufacture all type of Motorized/Pneumatic Actuator, Pressure/Differential Transmitter with state of art technology and experience.

Inch Automation has also joined hand with China leading Vibration Monitoring Company “Jiangying Jiangling Technology Co., Ltd.” (http://en.jyjl-tech.com/) to manufacture all type of Vibration monitoring system. It also include Vibration Sensor and transmitters, Reverse Monitoring sensor, Speed Sensor and meters, Portable vibration meters, LVDT etc.

Inch Automation understand the importance of T&D sector and joined hand with China leading T&D Monitoring product Company “Ningbo Ligong Online Monitoring Technology Co., Ltd.” (http://www.lgom.com.cn/index-e.aspx) to manufacture Online DGA (Dissolved Gas monitor)

We hope the advance technology from china which is hidden from long will be shared which is initiative to localize the products with local resources.
Ningbo LiGong Online Monitoring Technology Co., Ltd. (LGOM) specializes in innovative solutions for Condition Maintenance and Diagnosis (CMD) of electric power industry. We commit to provide Safe, Efficient, & Cost-Effective online monitoring products and services to our clients, facilitating the realization of CMD of critical substation equipment.

LGOM's electric substation monitoring technology and services provide ongoing, online analysis of the operating condition and performance of critical transmission and distribution equipment. Our monitoring technologies include on-line monitors and dissolved gas analysis for transformer, insulation monitor system for high voltage equipments. Our integrative substation monitoring services help ensure the highest level of critical equipment performance under safe operating condition, and provide equipment maintenance strategies.

LGOM's products include MGA2000 Transformer Online Multi-gas Analyzer, IMM3000 Capacitive Device Insulation Monitoring and Management System, IEM SF6 Insulation Equipment Monitoring System; MDD Intelligence Monitoring Diagnosis Device for Transformer, OFO-3 Oil Filter Online for OLTC, MWM-3 Micro-water Online Monitoring System for Transformer.

By performing the ISO 9001 quality system, we provide quality products and services to our clients. We believe that quality channels the market, creativity leads the market, and service cements the market.
Introduction of MGA2000

As of today, transformers play a more significant role in the power transmission & distribution, however, its maintenance is traditionally pre-planned & timely based, and off-line-executed, which is either costly, or may lead to inefficient maintenance or perhaps over maintenance. Over maintenance will result in considerable waste of manpower, financial resources and timing, consequently may decrease the utilization of facility, and increase the possibility of damage to equipment. Insufficient maintenance, on the other hand, may result in no awareness of incipient symptom and failure in transformers. Therefore, it is trended and imperative to use online monitoring technology applying the concept of: Condition Based Maintenance (CBM).

The “MGA2000 Transformer Online Multi-gas Analyzer” is a high reliable, online monitoring instrument and system. It can analyze the concentrations and accumulation rates of dissolved gases inside transformer oil continuously, real-time based and online achieved. Automatic diagnosis of transformer faults can be performed by the faults diagnosis expert system. Such the application is significant for avoiding accidents. Interpretation of dissolved gas analysis is based on IEC-60599-1999. The technology and its application provide technical assurance for the transition from the traditional planned maintenance to more advanced concept of Condition Based Maintenance.

MGA2000 System

MGA2000 are made up of GC Data Collector (MGA2000-01), Data Process Server, Carrier Gas, Communication Cable and Application Software.
MGA2000 Technology Features

- **Detection Principle:**
  Using Hotline nano crystalline semiconductor detector to measure hydrogen (H2), carbon monoxide (CO), carbon dioxide (CO2), methane (CH4), ethylene (C2H4), acetylene (C2H2), ethane (C2H6), oxygen (O2), total combustible gases (TGS) and moisture content.

**DETECTION COMPONENT**
Detection component adopt linear semiconductor sensor, it detects every gas in constant temperature at 60% The sensor is totally linear in the detecting range, providing technical fundamentals for online calibration

**EMBEDDED CONTROL UNIT**
Embedded control unit controls every component to work automatically. It acquire detection signal and save it in spectrum type. It communicates with water detector to get the water content and oil temperature parameters. It communicates with remote server and upload data to remote server with CAN/RS485/RJ45...Port in MODBUS/IEC61850/LGOM protocol.

**PID TEMPERATURE CONTROL UNIT**
PID temperature control unit controls the working temperature of chromatography component and the cabinet. It adopts PWM control mode and is able to keep the temperature accuracy at ±0.1% It communicates with embedded control unit with RS485 Port in MODBUS protocol.

**GASES SEPARATION METHOD:**
Combined Chromatographic column
Chromatography Component (Self-Calibration Function Is Optional)
MGA2000 online monitoring system can detect the content of H2,CO,CH4,CO2, C2H4,C2H2,C2H6 gas within 7 minutes. After extraction process, the system will keep the chromatography component working in constant temperature around 60 °C The system will switch the 6-way valve and let the gas sample flow through chromatography column to be separated. MGA2000 online monitoring system reserves calibration gas connector for online alibration.

- **QUANTITATIVE MODE:**
  Quantitative by peak height
• **SAMPLING:**
  Automatic sampling by multi-way valve

• **DISSOLVED GAS EXTRACTION PROCESS**
  1. Vacuum pump vacuums the Gas Extraction Component and the control system will open the magnetic valve to get oil sample into Oil storage can.
  2. Oil pumps start oil cycling for half an hour.
  3. The motor start and the oil sample in storage can vibrate frequently. When system becomes equilibrium, magnetic valve will open.
  4. Gas pump start gas cycling and the quantitative pipe will be fulfilled by gas sample. Dissolved Gas Extraction component works efficiently and it won't contaminate oil. The system can work continuously.

• **GAS EXTRACTION TECHNIQUE:**
  Both Fiber diffusion and Dynamic negative pressure method

• **AUTO CALIBRATION TECHNIQUE:**
  Periodic Self-Calibration Automatically To Ensure Monitoring Reliability

**CALIBRATION & SETUP**
  1. Sever software setup
     According to actual data, input relative info into the software
  2. Client software setup
     According to client software manual, make the relative adjustments
  3. Wireless GPRS model setup
     A. Wireless GPRS model setup
        Adjust the terminal ID, band rate of the COM, load of package; connect mode of the server, server IP, and server port
     B. SIM Card setup
        Write down the number of each SIM card; initial the SIM card by SMS

• **SELF-PROVISION OF CARRIER GAS:**
  Configured with Carrier Gas Generator and extra cylinder needless

• **TEMPERATURE CONTROL:**
  Dual-loops, multiple modes constant temperature control for the separator, oil pipe, valve, detector, and column

• **DATA-ACQUIREMENT:**
  Δ-Σ A/D Converter using over sampling technology, 24b resolution, automatic calibration of measurement range and zero point after gain change

• **COMMUNICATION MODE:**
  Field Data acquisition system communicating with data processing server via CAN2.0/RS485.
• **NETWORK PROTOCOL:**
  System supports TCP/IP network protocols, remote monitoring and remote maintenance.

• **DISPLAY MODE:**
  Report/tendency diagram.

• **DISPLAY CONTENT:**
  H₂, CO, CO₂, CH₄, C₂H₄, C₂H₂, C₂H₆, O₂, TCG, H₂O, relative/absolute accumulation rate.

• **ALARM MODE:**
  Two levels alarm, sonic/signal light alarm signal can be transmitted for remote monitoring. Equipment has facility to give SMS alert to more than three users whenever any fault gas violates the predefined limit.

  - Shielding EMI with Isolated power
  - Filter to block the Lightening Surge
  - Optical Coupler for the I/O terminals
  - Current Surge Protection
  - Data repeater
  - Analyzer Cabinet conforms to IP 55
  - Uses the proprietary Base line Self tracking
  - Has a Remote self-check & maintenance program

### MGA2000 Detecting Indices

<table>
<thead>
<tr>
<th>Number</th>
<th>Gases &amp; Moisture Parameters</th>
<th>Typical Detection Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>H₂</td>
<td>5–5,000 ppm</td>
</tr>
<tr>
<td>2</td>
<td>CH₄</td>
<td>5–5,000 ppm</td>
</tr>
<tr>
<td>3</td>
<td>C₂H₆</td>
<td>5–5,000 ppm</td>
</tr>
<tr>
<td>4</td>
<td>C₂H₄</td>
<td>3–5,000 ppm</td>
</tr>
<tr>
<td>5</td>
<td>C₂H₂</td>
<td>1–3,000 ppm</td>
</tr>
<tr>
<td>6</td>
<td>CO</td>
<td>10–10,000 ppm</td>
</tr>
<tr>
<td>7</td>
<td>CO₂</td>
<td>20–30,000 ppm</td>
</tr>
<tr>
<td>8</td>
<td>O₂</td>
<td>500–25,000 ppm</td>
</tr>
<tr>
<td>9*</td>
<td>H₂O</td>
<td>2–100%RS should have facility for measurement of moisture in oil in ppm</td>
</tr>
</tbody>
</table>
MGA2000 Technical Specifications

- **Analysis Cycle**: Less than 1 hour, user specified
- **Data Storage Lifetime**: 10 year
- **Temperature Control Precision**: ±0.1.
- **Temperature Range**: -40.~+50.
- **Humidity Range**: 5~95%, no condensation
- **Power Supply**: 230 VAC, 50 Hz
- **Balance Time**: 10 Minutes
- **Carrier Gas**: High purity compress air, Pressure 0.3 MPa
- **EMC Performance**: IEC61000 and GB/T17626
- **Accuracy**: +10%
- **Repeatability**: +3% to 10%
- **External Temp. Range**: -20°C ~ +55°C
- **Communications**: USB&IEC 61850 compliant
- **Oil temperature range**: -20°C to +120°C
- **Sensitivity**: 100%