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Element Sensor Systems

- **The Company**

Element started developing gas detectors in co-operation with the Science Institute at the University of Iceland in 1992, then under the name RKS Sensor Systems. The relationship with the University is still maintained. The gas detector systems form the main product line of the company together with Medistor, a data acquisition system. The company also imports and redistributes various other complementary products.

- **Markets**

Element started selling its products early in 1993 on the Icelandic market. Today, the company is marketing and selling its products to both the Icelandic and international markets. Locally the company takes care of all the marketing and sales efforts and partly on the international market. Most of the international market, however, is managed through co-operation with Sabroe Refrigeration A/S in Denmark.

The target market groups are companies that sell or use refrigerant systems and food producers. Other target groups are companies and institutes in environmental monitoring including educational establishments, research facilities, power distribution companies and consultants.

- **Research and development**

Element maintains a powerful development programme based on the quality control standard ISO 9001. The company also participates in research projects with companies and institutes engaged in environmental research.

- **Artificial Shrimp**

The cooking operation in traditional shrimp processing plants has a tremendous influence on production yield. European customers insist the core temperature of shrimp in the cooking process is recorded in order to ensure product quality. The sensors available today, have proven inadequate causing tremendous problems. The Technological Institute of Iceland and Element Sensor Systems have applied for and



received a grant from the Icelandic Research Council to develop an artificial shrimp which can withstand the conditions inside the cooker and record the shrimp core temperature in the cooking process. The sensor will be connected to Medistor, a data acquisition instrument made by Element Sensor Systems. This equipment will ensure a quick and reliable temperature record.

- **Fresh Sense**

Icelandic Fisheries Laboratories and Element Sensor Systems received a grant in 1996 to develop an instrument to sense the freshness of fish. The instrument is based on multi-gas sensor systems. The project is well under way and a new European grant is being sought to validate the multi-gas sensor system method for fish freshness. A grant has also been received from the Icelandic Research Council to modify the Fresh Sense system to monitor malodour from the fishmeal industry, raw material and volatile breakdown products.

Existing gas detector products

Existing products are gas detectors, which use both semiconductor and electrochemical sensors. The difference between these sensors are the range, cross sensitivity / selectivity, accuracy, life time, cost and calibration intervals (see Table 1).

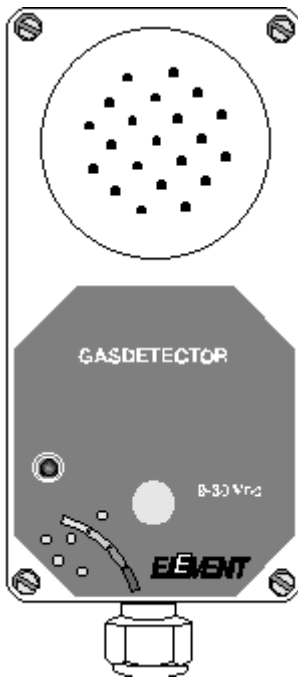
Table 1

| | Semiconductor sensor | Electrochemical sensor |
|----------------|----------------------|------------------------|
| Life time | 5 years | 1,5 years |
| Selectivity | Good | Better |
| Accuracy | Good | Better |
| Calibration | Once a year | 3 times/ year |
| Gas range | 10-10.000 | 1-100ppm |
| Temp. range | -40 to +60 °C | -25 to +45 °C |
| Humidity range | 0 – 90%RH | 0 – 90%RH |
| Price | Low | High |

Gas detectors for Freon leakage is available only with semiconductor sensors.

Element now uses a Motorola 68HC microprocessor in the gas detectors.

The semiconductor sensor is both temperature- and humidity-sensitive and the electrochemical sensor is temperature-sensitive. To reduce the risk of false alarm with changes in temperature or humidity, the detectors have temperature and humidity sensors to compensate for these parameters. The detector, therefore, has 4 inputs; gas contamination, temperature at the gas sensor, temperature sensor for the ambient temperature and humidity sensor.



The detectors have outputs for pre-and main alarm for gas contamination, which is possible to connect to the Element Control Unit.

The levels for the pre-and main alarm are adjusted inside the detector, which also has two relays with SPDT contacts and LEDs (three colours) for the alarms. There is an option to insert into the detector a current loop output (0-20mA or 4-20mA) for gas contamination, ambient temperature and humidity.

It is possible to select different gas types with the use of DIP switches, as well as alarm active, 4-20mA or 0-20mA and one switch for service (to eliminate time delay).

The power supply for the detectors can be from 9-30V DC.

Control Unit (6 channel and 12 channel)

The Element Control Unit is constructed to receive alarm signals from the gas detectors and it also contains a 24V power supply for the detectors. This can be supplied with 220V ac and/or 24V dc. Up to 3 detectors can be

connected onto each channel. This means that a 12 channel unit can monitor up to 36 detectors.

Outputs from the control unit are:

- LEDs (two colours) on each channel for pre-and main alarm
- Alarm contact to external bell
- Alarm contact to telephone dialling card, which can be installed into the control unit.
- Relay outputs (SPDT) for pre-and main alarm
- Fail LED
- Battery LED
- Error code display

Calibration

It is very simple to calibrate the detectors with the calibration cup and particular gas, (100ppm for ammonia and 500ppm for freon R22). When the cup is set over the sensor the detector will go into calibration mode. While in that mode, calibrated gas is flushed into the cup for 20 seconds. It is necessary to keep the cup on for 3-4 minutes. If the calibration is successful, the light will flash green for few seconds, otherwise red. After calibration the detector alarm outputs and current loop outputs will be disabled for 20 minutes, giving the gas a chance to disappear.



NEW



Detector to P-NET

Design work has started on a new generation of gas detectors with a connection to P-NET. The PD4000 (or another master) from Process Data will be used to monitor alarms and data and logging data from the detectors.

Element proposes to use the H8300 microprocessor from Hitachi for the new detectors.

It is planned to have the possibility of setting the alarm levels and configuration from the master and then transfer it to the individual detectors, (as the DIP switches are used for the existing products).

It will be possible to receive the following main data from the detector through P-NET:

1. Gas contamination, temperature, humidity and mV
2. Gas calibration value
3. Alarm conditions
4. Configuration
5. Errors

Each detector will have up to 7 channels which are as follows;

- gas channel
- temperature at the gas sensor channel
- humidity channel
- two PT100/1000 channels and
- two mV channels.

The master, will therefore, have the possibility of sending signals to relays for main-and pre alarms, dialling card and external bell. If we can find an existing low-cost unit with these possibilities, it will be an excellent solution.