



- **Radiological Monitoring Network Alarm and Data Management**
- **Central Alarm Reporting and Parameter Control**
- **Customised Site Systems Incorporating Site Wide Monitoring / Building Monitoring and Work Area Monitoring**
- **Networked Options:- Gamma, Alpha/Beta in Air, Tritium, Iodine, Noble Gas and Liquid Effluent Monitoring**

Laboratory Impex Systems Ltd (LIS) is a leader in supplying radiation monitoring systems world-wide. Our expertise ranges from single room to site wide centrally controlled monitoring systems incorporating building, stack and area monitoring.

Each system can be tailored to customer specific requirements and offer a complete solution to any radiometric application. The LIS attention to detail has ensured that the continuous monitoring (CMS) range is recognised as standard, its modular nature enables turnkey solutions to be configured at little associated cost to the user.

Our intensive programme of development ensures state-of-the-art monitoring solutions at the time and allows the upgrade and remediation of current systems with minimal inconvenience to the user.

LIS offers the capability of networking both our own and other manufacturers radiation monitors allowing local and central control as appropriate.

An Environmental Monitoring System (EMS) consists of a number of physical and virtual components.

A typical networked system has three main elements: -

- Communications Controller - LIS-CC
- 9205EMS Alarm and Data Management System Software, customised to the site specific application
- Networked Individual Continuous Monitoring Stations (Gamma, Alpha/Beta, Noble Gas, Tritium, Iodine, Liquid and Stack Monitors)

Communications Controller - LIS-CC

The Communications Controller (CC) is designed to monitor, safeguard and maintain full network operation and provide an interface between the host 9205EMS Alarm and Data Management system and the Continuous Monitoring Stations. The CC polls the CMS network and on location of data, relays it to the host network computer.

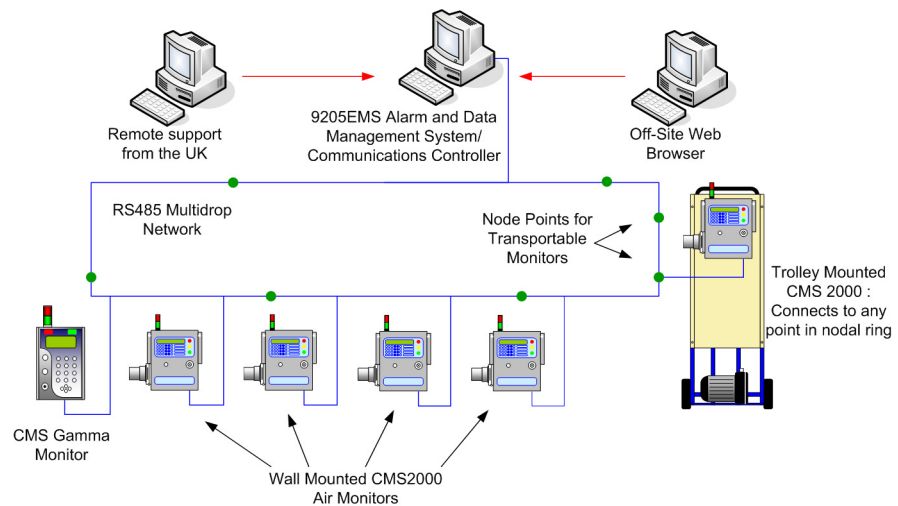
There are generally two CC's, each one capable of shadowing and mirroring the other, therefore minimising network failure. If the primary fails (i.e it does not send communications using the CC-CC link and is not polling the CMS network) the secondary will take over. When the former CC comes back online it assumes the role of the secondary until otherwise directed.



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Communications between the communications controller and the CMS network is usually via a dedicated RS485 multi drop bus, however alternatives such as telemetry, telephone modems and TCP/IP are available. The CC normally communicates with the host 9205EMS using Ethernet and TCP/IP.

LIS-CC Functionality

When data is collected by the CC from the CMS network it is sent to the host 9205EMS PC, after data collection has been acknowledged by the 9205EMS the CC polls the CMS network for the next set of data. If the CC detects a problem with its function it will automatically terminate and reload (the shadow CC then resumes the primary role), therefore a lack of response from the host 9205EMS or the CMS stations will cause the CC to restart.

A log manager facilitates automatic synchronisation of a secondary 9205EMS if coming back online after a period of downtime. Depending on user requirements, the CC can be set to automatically transfer polling responsibility at set times or can be set only change over when a failure occurs. When all CMS data has been polled, the CC performs other routine checking tasks such as checking clocks are synchronised etc.

9205EMS - Alarm and Data Management System

The LIS Alarm and Data Management System consists of PC work stations with associated hardware and the 9205EMS software. This provides a reliable, comprehensive and easy to operate system suitable for all network CMS applications. If high dose rates or contamination levels are detected on the monitoring network then the software provides visual and/or audible indications to personnel.

9205EMS PC Workstation

The 9205EMS work stations receive and log data from the monitors via base station transceivers and communications controllers. At each 9205EMS work station, data is logged for display, alarm and archive purposes. Desk top PC's can be provided, as well as printers to provide a hardcopy log of alarms, status information, screen dumps and monitor calibration data where needed.

9205EMS Application Software

The 9205EMS software has been designed for intuitive ease of use, a necessity in the event of emergency. Features of the software include mimic display of the buildings and/or site, alarm control, historical data, logging and graphical trending of results.

Facility floor plans highlight detector locations and provide live information of radiation levels. Symbols change both colour and shape to indicate status, in the case of an alarm level the corresponding radiation measurement is provided alongside the symbol; an audible alarm and visual banner on the display swiftly notify the operator. In summary, the 9205EMS applications software allows illustration/use of (but is not limited to) the following:-

- Site Layouts (including instrument locations)
- District Maps
- Matrix Displays (tabular views of the status of all monitors)
- Status (on all screens including date, time, colour codes and unique display names)
- Monitor Dose-rate Level Trend Displays
- Event Log
- Histograms and Historic Data
- Alarm Lists (Active, Historic, Configured, Unacknowledged)

Communications Failure

If any failure in the site network occurs, warnings are generated and are displayed, these include:-

- Backbone failure (failure between communication links between primary and secondary 9205 PC's)
- Primary/Secondary CC Failure
- CMS to CC Communications Failure
- Not connected (any particular part of the system) shows an indication

System Security

Three classes of user password protection are employed, these are identified as Operator, Supervisor and Engineer to facilitate a high level of security for the system.

A log of all security access events is generated and displayed by the 9205EMS when users log on and log off using their password. Additionally there is an auto log off facility which logs off a supervisor or engineer should there be no activity for 900 seconds.

Radiological Alarms

Alarms and alert indications are generated when radiation levels exceed the pre-set levels. The data-logger includes a 'watchdog' that monitors alarm and system failures. Changes in the status in any part of the 9205EMS system are indicated on the 9205 displays. Some changes cause audible alarms, visual alarms which can be optionally latched or unlatched.

It is possible to group events by type (alarm, warning, information, event, normal, acknowledge) as well as acknowledge them individually. Information on the site display is presented in an unambiguous form: should an abnormal event occur, the operator easily assesses relevant data.

Alarm Priority Status

All alarms and events are recorded whatever their priority on the alarm banner, event page and event printer. However, on the site and district maps the alarms can be prioritised,, as only one status indication can be present at any one time. Priority as follows:-

Activity Alarm, Activity Alert, Fail and Normal.

Qualification of Data Processing

Raw data for all detector positions from the area monitors is continually collected by the system and archived. This provides the facility the option to fully investigate an incident and provides assurance that all calculated results can be traced.

Trend Displays

Three types of trend are available which are selected by the data period chosen:-

Real time - the latest data is displayed

Live Trends - the period requested includes the current date/time

Historic Trends - the period displayed is in the past.

Graphical Displays provide:-

- Live updates of logged data
- Recall data by minute/hour/day/month/year
- Results from positions for any point in time
- Results from up to 4 positions with time
- Results in integrated dose/dose rate units
- Linear or logarithmic displays
- Auto/manual scaling

Networked Products include: -

Gamma Monitoring CMS Gamma Range

The CMS-GAMMA is a compact, mains-powered, gamma monitor designed specifically for building, area and process monitoring in nuclear facilities. The monitor offers all the classic functionality of its predecessor the CMS-1LG with wide range capability providing measurements from ambient background up to 10Sv/h (1000rem/h). See CMS Gamma Datasheet or contact LIS directly.

Positron Monitor - PG10

The PG-10 Positron Detector is a complete assembly for the measurement of positron and Beta emitting radioactive gases. Designed for wall or panel mounting, The PG detector is panel mounted and contains a measurement chamber and plastic scintillation detector. See PG10 Positron Gas Monitor datasheet or contact LIS directly.

Alpha/Beta Particulate in Air Monitor SmartCAM

The Lab Impex Systems (LIS) SmartCAM is a next generation Continuous Air Monitor (CAM) that gives the user unparalleled performance in terms of detectable limit, sensitivity and speed to alarm. The unit utilizes state-of-the-art Spectral Measurement Analysis in Real Time (SMART) Technology that provides real advances in alpha measurement techniques.

Alpha/Beta Particulate in Air Monitor CMS2000

The CMS2000 Continuous Air Monitor allows fast, accurate, alpha or beta particulate and combined alpha-beta particulate in air measurement. Available as installed as wall mount, Trolley mount or hand transportable. A gamma doserate detector may also be fitted to the standard CMS-2000 to enable complete interventional monitor of an area and reduce the need for individual monitors. For more details, please see CMS-2000 Alpha/Beta Particulate in Air Monitor datasheet or contact LIS directly.

H3 in Air Monitor - CMS-H35L

The CMS-H35L is a Wall mount ION chamber based Tritium Monitor, suitable for most area, through wall and stack application, the H35L provide fast reliable monitoring. See CMS-H35L Tritium in air monitor data sheet.

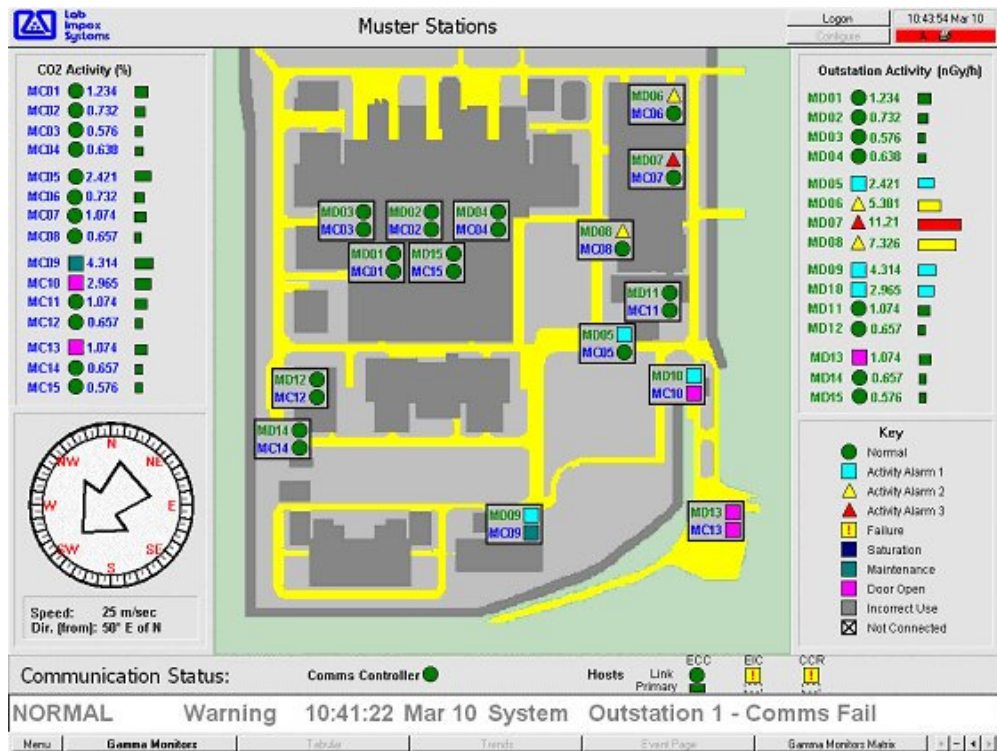
Other Manufacturers Monitoring Systems

The 9205EMS system can be connected to a wide range of other manufacturers monitors that may be already present at the facility, this includes equivalents to the Lab Impex range as well as Meteorological sensors, contamination monitors, Criticality systems etc.

Application Details

The 9205EMS Alarm and Data Management area monitoring system has many monitoring applications in both the Nuclear and Medical industries including: -

- Nuclear Power establishment site wide monitoring
- Stack monitoring applications
- Nuclear Medicine PET Laboratory monitoring
- Radioactive waste container monitoring
- Radioactive waste transport monitoring
- Linear Accelerator Facilities monitoring
- Fixed source radiotherapy area monitoring
- Conventional Radiotherapy Department Patient monitoring
- High Energy Physics experiment radiation protection monitoring



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