



- **Building Management Systems (BMS)**

Seminar 1 – The Basics Explained

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Seminar 1 – The Basics Explained

- 1) What is a BMS?
- 2) What Does it Do?
- 3) Benefits
- 4) Operational Considerations

Seminar 2 - Advanced Management and Improvement Opportunities

- 5) *BMS System Architecture*
- 6) *BMS Programming*
- 7) *Extended BMS Functionality*
- 8) *Upgrades and Retrofits*

Industry Jargon, Terminology and Acronyms

- Building Management Systems (BMS) also known as Building Automation Systems (BAS), Building Management and Control System (BMCS), Integrated Building Management System (IBMS) Direct Digital Controls (DDC) and Building Controls,
- Other terms associated with Control Systems include:
 - Supervisory, Control and Data Acquisition (SCADA)
 - Programmable Logic Controllers (PLC)
 - Energy Management System (EMS)
 - Data gathering panels (DGP)
 - Modbus, Lonworks, and Bacnet – All refer to communications protocols
 - 'Front End' – legacy term used to refer to the BMS Operator Workstation
- Most Common Current industry term –
 - Building Management System (BMS) or
 - Integrated Building Management and Control Systems (IBMS)

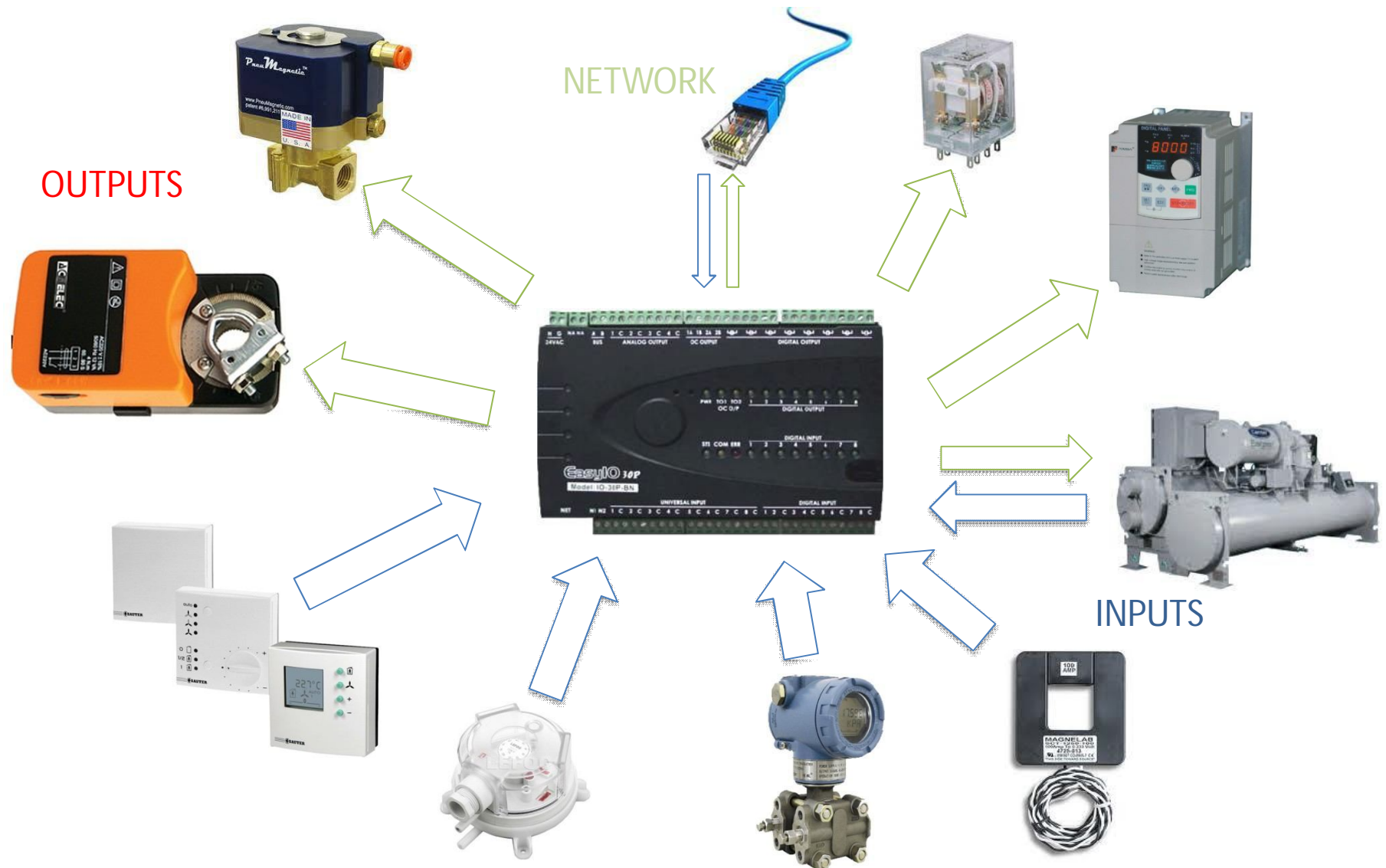
What is a Building Management System?

- BMS systems are “**Intelligent**” microprocessor based **controller networks** installed to monitor and control a buildings technical systems and services such as air conditioning, ventilation, lighting and hydraulics.
- More specifically they **link** the **functionality** of individual pieces of building equipment so that they operate as one complete **integrated** system.
- Now installed in **every major building** or facility with the availability of direct integration into all other building services such as security, access control, CCTV, fire, Lifts and other life and safety systems.
- Current generation BMS systems are now based on **open communications protocols** and are **WEB enabled** allowing integration of systems from **multiple system vendors** and access from anywhere in the world.

What Does *Intelligent Microprocessor Control* Mean?



What Does Intelligent Microprocessor Control Mean?



BMS Suppliers and Integrators

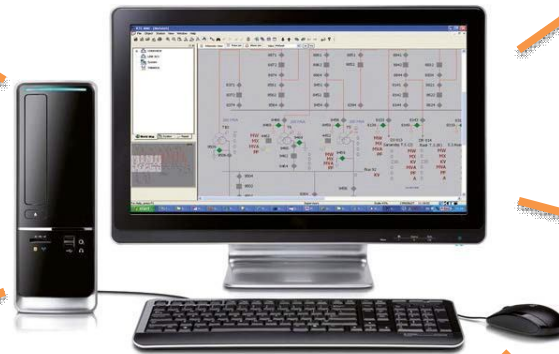
- Procured as a **complete system** that includes, engineering, supply, installation, programming and commissioning.
- Specialist Integrators that are either **directly associated** with the manufacturer or are **approved** re-sellers.
- All Integrators should have full factory **technical support**
- Need to work **closely** with **Mechanical** Services, **Mechanical Electrical and other** contractors.
- For new construction BMS is usually **included** within the mechanical or electrical services package.
- 'Tier 1 Company' **only refers** to a direct factory association and not to the quality of products or services...

Typical System Components – BMS Hardware

Range to Suit Applications



Operator Workstations



High Point Counts



Built In Displays



Limited Features



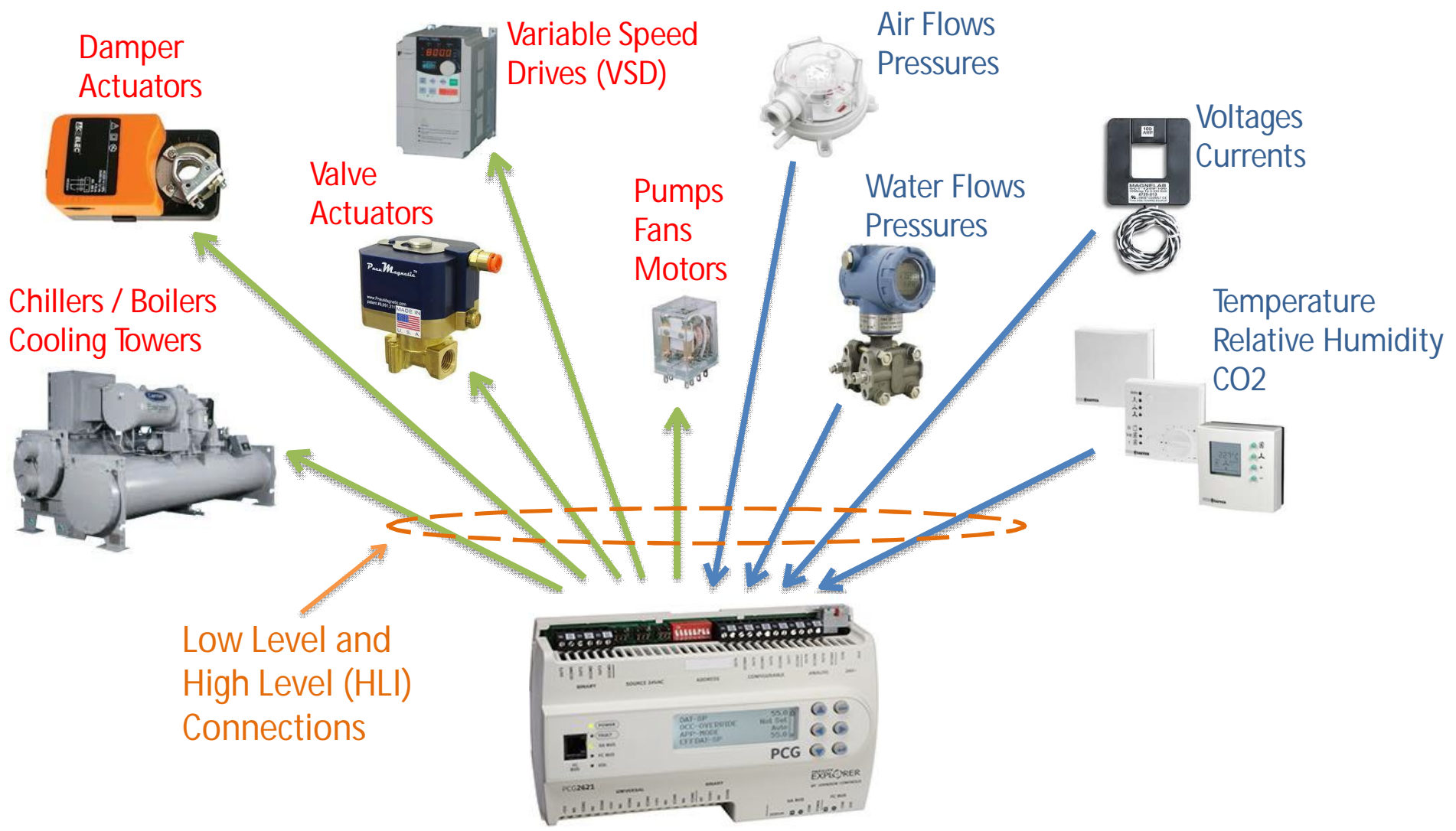
Application Specific



Small Point Counts



Typical System Components – Field Devices



Damper Actuators



Valve Actuators



Variable Speed Drives (VSD)



Pumps Fans Motors



Air Flows Pressures



Water Flows Pressures



Voltages Currents



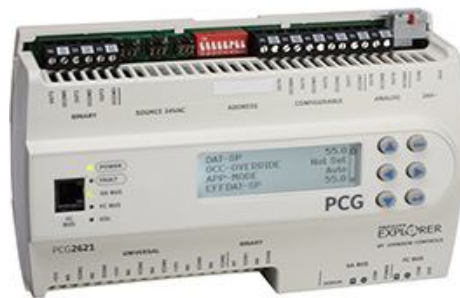
Temperature Relative Humidity CO2



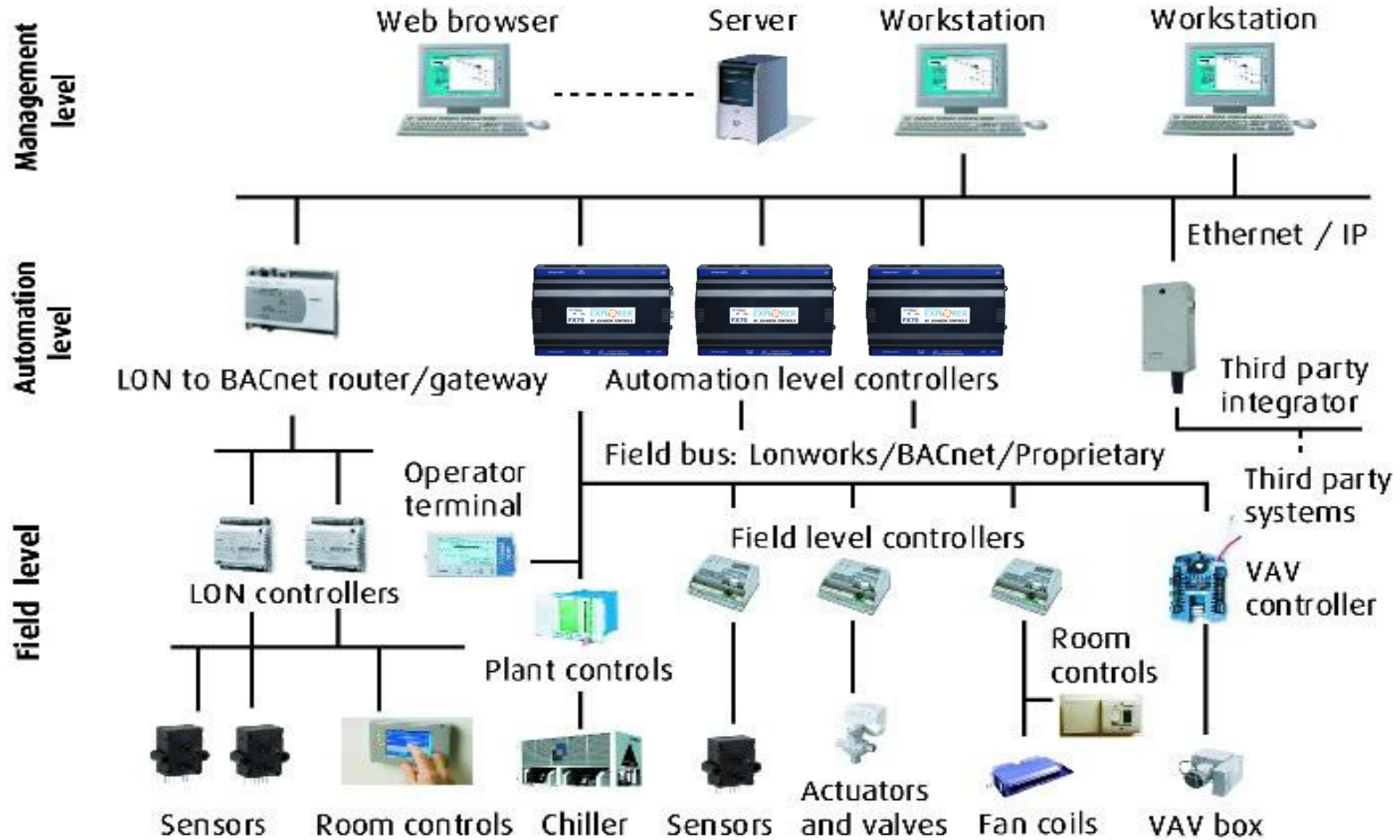
Chillers / Boilers Cooling Towers



Low Level and High Level (HLI) Connections

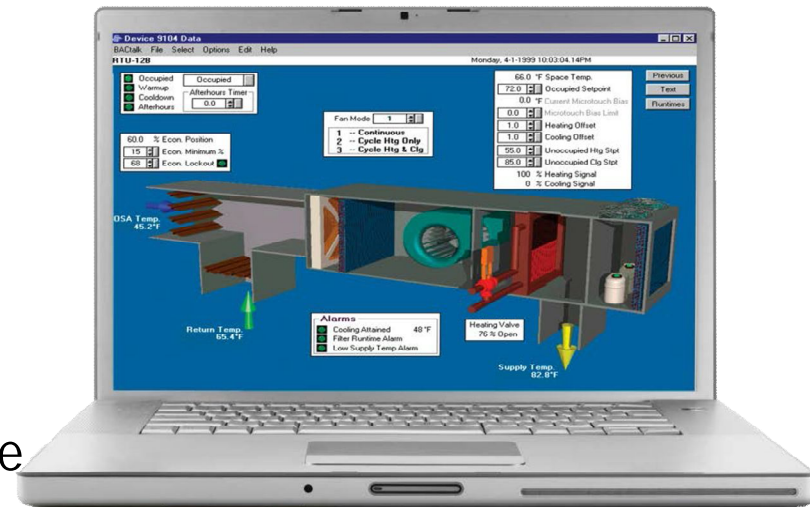


Typical System Components - Networks



Typical User Interface Options

- Can be a basic LCD display through to full Graphic Operator Workstations.
- The Graphic Interface must be intuitive to use and not require an Engineering degree to interpret
- They must provide sufficient level of detail to enable the operator to determine what is happening and what is going to happen next
- Graphics need to provide access to parameters for tuning and seasonal information needs to be built into the system



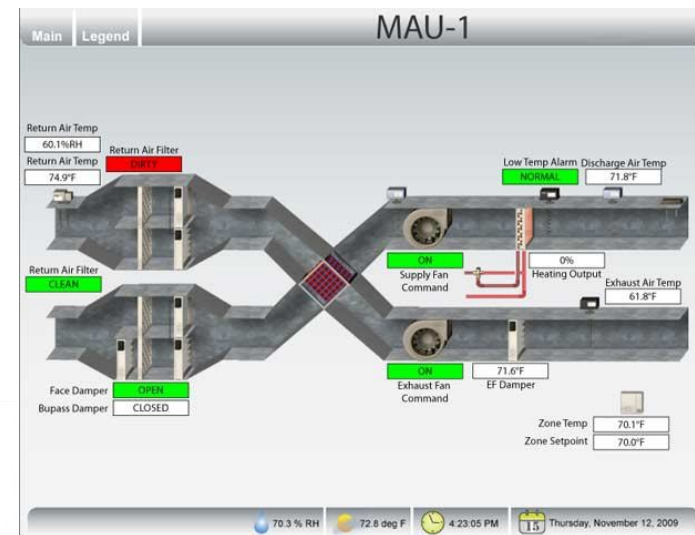
BMS Simple User Interfaces – Built in Display

- User defined menus.
- Built into the BMS controller or a remote device
- Password protected
- Monitor and control field points, operating setpoints, time schedules, alarm management, even trend data



BMS Simple User Interfaces – WEB Server

- WEB Server built into a BMS network controller
- User defined menus and graphic pages
- Password protected, multiple access levels
- Monitor and control field points, operating setpoints, time schedules, alarm management, even trend data



BMS Workstation - AHU Graphic Display Sample

The screenshot displays a BMS workstation interface for an AHU (Air Handling Unit) graphic display. The main window title is "L25 HIGH RISE PERIMETER A H U". The interface is divided into several sections:

- Object Selector (Left Panel):** Lists various objects such as "44 Market St", "P2 Plant", "Hot Water Plant", "AHU 2", "Cold Supply Air Setpoint Reset", "Hot Supply Air Setpoint Reset", "Outside Air Volume Control", "Condenser Water System", "Domestic Hot Water", "Generators", "Miscellaneous Fans", "P2 Plant", "P1 Plant", "High Rise", "Low Rise", "Carpark", "Lighting", and "Manuals".
- Main Graphic Area:**
 - Energy Consumption:** Shows a sun icon and a value of 13.4 °C.
 - Temperature and Humidity:** Displays 41.0 °C and 22.1 °C, 8.4 dp°C, and 30.2 %RH.
 - CO2 Levels:** Shows CO2 at 626.0 ppm.
 - Boilers:** Displays 37.7 °C and 21.3 °C.
 - Chillers:** Shows a "COOLING CONTROL" section with "Lowest Zn sp" set to 21.1 °C, Hi 24.0 °C, and Lo 21.1 °C. It also shows "De Humidity" and "Dewpt Sp" at 13.0 °C.
 - Request Status:** A table of requests for different levels (L25 to L28) with status indicators (N, S, E, W).
- Status Bar (Bottom):**
 - 0.30 Remaining Runtime (Counts down from 30.0 Minutes)
 - 107.00 Total Incoming Cool Requests for SGHW System
 - Min OIA Damper: 50 % Open
 - Mixing Plenum DP: 10.00 kPa
 - Running: 50 %
 - Mixed Air Temp: 17.2 °C
 - SAT East: 21 %
 - SAT West: 14.4 °C
 - Supply Air Setpoint: 13.63 °C
 - Pressure Setpoint: 235.00 kPa
 - AHU Active: Inactive

BMS The Basics Explained – Recap...

- BMS systems are “**Intelligent**” microprocessor based **controller networks** installed to monitor and control a buildings technical systems and services such as air conditioning, ventilation, lighting and hydraulics.
- Scalable from just **one** device to **thousands** of devices
- Link the **functionality** of individual pieces of building equipment so that they operate as one complete **integrated** system.
- Provide the building owners and operators with the **tools** to **manage** the **performance** and energy **efficiency** of their buildings
- Can be **integrated** into all other **building services** such as security, access control, CCTV, fire, Lifts and other life and safety systems.

1200 BUILDINGS

