CEM-DAS

Continuous Emission Monitoring
Data Acquisition System

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Measurement made easy

When burning, coal, petroleum products, natural gas as well as municipal and hazardous waste, pollutants are created that are emitted with the flue gas.

Laws and regulations govern allowable emissions, which are measured with Continuous Emission Monitoring Systems (CEMS). Following, the Data Acquisition System acquires these measured concentrations. It averages and normalizes them to standard conditions. After the comparison with Emission Limit Values, emission reports are created, which are used by authorities to issue plant permits or trade emissions.

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Reporting made easy

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01 Schematic diagram
for a CEM-DAS set-up
for one stack

Continuous Emission Monitoring reporting
CEM-DAS - Continuous Emission Monitoring Data Acquisition System - is a PC-based Data Acquisition and Handling System for Continuous Emission Monitoring (CEM). It is a complete, networkable system for continuous recording, and evaluation of emission data for all industries. CEM-DAS is scalable to support smallest one stack installations up to multiblock plants with numerous measuring points. CEM-DAS consists of a CEM-DAS and a DAA (Data Acquisition Application) license, which can be installed on one or two separate platforms. CEM-DAS has proven its robustness in a German TÜV test which requires 99% uptime.

Field data from gas analyzers, dust monitors, etc. are acquired via conventional I/O's or Modbus TCP/IP and averaged to 5 sec. averages. These data are further processed in the CEM-DAS. All results and reports are saved in a database and for redundancy purpose on an external data storage, e.g. the end-users file system or a Network Attached Storage (NAS).

In case the CEM-DAS server is installed in a control room, a Data Acquisition Unit, located next to the CEMS, can be used optionally to buffer field data. This allows the CEM-DAS server to retrieve and process all data after a network communication issue or a server shut-down. This way no report is lost and potential issues with authorities are avoided.

Any client PC, e.g. installed in a control room, equipped with a web browser allows access to the CEM-DAS server. It offers the same functionality as the CEM-DAS server, i.e. view bar and line charts, display alarms and reports, etc.

The system is designed for remote maintenance. This allows remote users to access CEM-DAS, e.g. to support the commissioning process or help with day-by-day questions.

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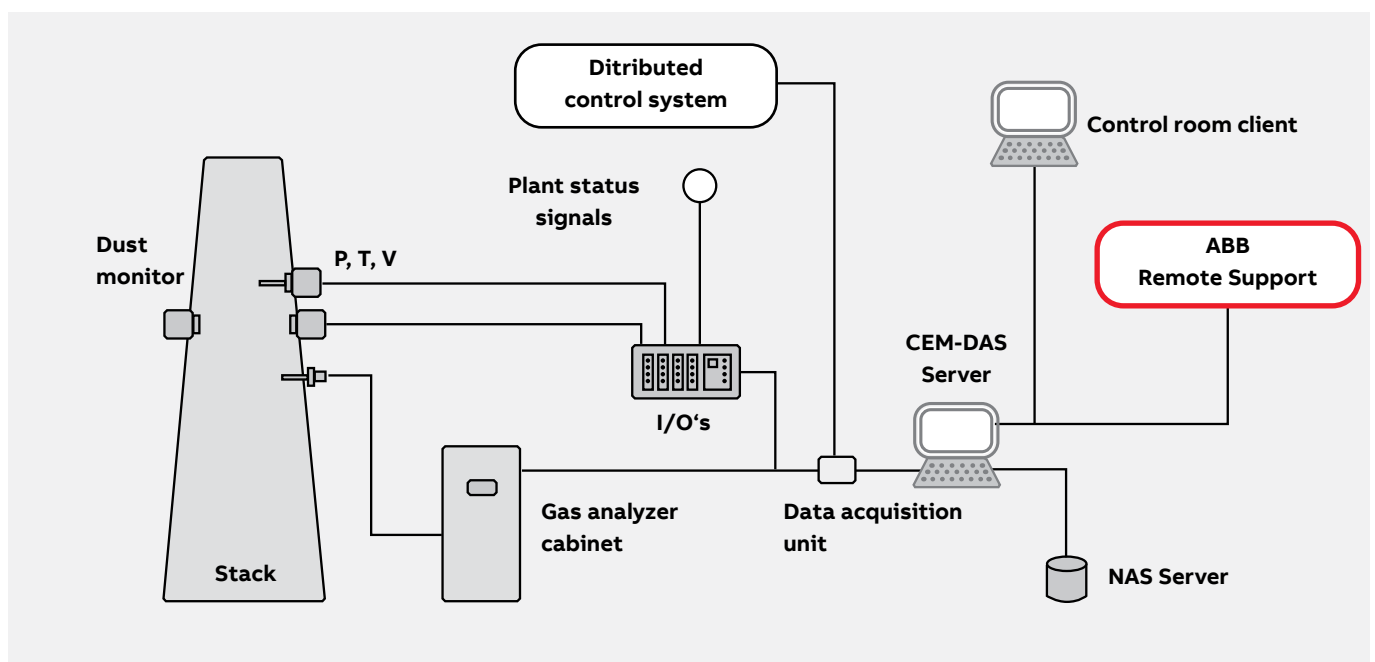
Technical Data

CEM-DAS Server

The CEM-DAS server is the front-end for the end-user. Time synchronization can be established via a network time protocol or a radio clock. The default set-up comes with two individual passwords with access rights for a high level and a standard user.

An office or industrial PC must meet the following minimum specifications:
- WIN10Pro IoT 2019 (64Bit), English version
- Intel® Core™ i3-6100TE/2,7 GHz Tray
- Memory: 8 GB DDR RAM
- Hard Drive (HDD or SSD): 2x500 GB SATA (RAID 1)
- 2 Ethernet ports

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Data Acquisition Unit

The Data Acquisition Unit (DAU) is an optional controller and is typically installed close to the CEMS. It allows the data acquisition and buffering of field data into a ring buffer. Its purpose is to allow the CEM-DAS server to retrieve and process data after a communication failure to the DAU or a temporary CEM-DAS server shut-down. The quantity of data buffered depends on the memory installed and the number of signals acquired. 30 days is the minimal buffer size. Typically, multiple weeks can be buffered.

Measured values and status signals are acquired/transferred via analog and digital input/output modules. The Modbus TCP/IP protocol according the VDI 4201 can be used for ABB CEMS. Modbus TCP/IP can be used for bi-directional communication to Distributed Control Systems or other destinations.

The controller (office or industrial PC) must meet the following minimum specifications:
- WIN10Pro IoT 2019 (64Bit), English version
- Intel® Pentium® N4200 (IPC)
- Memory: 8 GB DDR RAM
- Hard Drive (HDD or SSD): 128 GB
- 2 Ethernet ports

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01 Example for
CEM-DAS I/Os

I/O Modules
The following fan-less and networkable modules (protection class IP 20) from Beckhoff Automation GmbH & Co. KG are available for CEM-DAS. All modules are designed for DIN rail assembly.

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BK9050, Ethernet TCP/IP "Compact" Bus Coupler for up to 64 Bus Terminals
Distance between stations:
100 m between hub/switch and Bus Coupler

KL3142, 2-channel analog input terminal,
0…20 mA, 16 bit,
differential input

KL3054, 4-channel analog input terminal,
4…20 mA, 12 bit,
single-ended

KL3458, 8-channel analog input terminal,
4…20 mA, 12 bit,
single-ended

KL1808, 8-channel digital input terminal,
24 V DC, 2-wire,

KL1809, 16-channel digital input terminal,
24 V DC, 2-wire,

KL4424, 4-channel analog output terminal,
4…20 mA, 12 bit

KL4428, 8-channel analog output terminal,
4…20 mA, 12 bit

KL2404, 4-channel digital output terminal,
24 V DC, 2-wire

KL2808, 8-channel digital output terminal,
24 V DC, 2-wire

KL9010, End terminal

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Main features

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01 Bar chart display
of CEM-DAS for
five components

Compliance
- Compliant to all plants covered by the Industrial Emission Directive 2010/75/EU
- QAL1 certified according
  - EN 14181
  - EN 15267-1 and EN 15267-2
  - MCERTS Performance Standards and Test Procedures for Environmental Data Management Software
  - German Uniform Practice in monitoring emissions
  - German teletransmission interface (EFÜ)
  - VDI 4201-3 for Modbus TCP/IP interfaces
- Saving all configurations enables seamless documentation for authorities
- Secure internet access to CEM-DAS installations, e.g. for local authorities to read emission reports via CEM-DAS Connect

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Handling
- Easy access to CEM-DAS via web browser from any PC without any additional software installation
- Multi-user password management for different user groups with tailored access rights
- Emission predictions allow plant-managers to fine-tune their operation with respect to meeting emission limits and plant efficiency
- Reports are available in pdf format and csv or txt format to allow post-processing e.g. of measurements in MS Excel
- Modbus TCP/IP connection for minimal cabling effort to ABB CEMS and/or distributed control systems

Availability
- Redundancy available for data storage, CEMS and CEM-DAS servers
- Remote access allows for immediate support from CEM-DAS expert
- System back-ups allow fastest recovery after a server defect

Options
- Multiple user licenses (two licenses are default)
- Calibration check reports according EN 14181/ QAL3 (CUSUM)
- CO_2 emission trading module according EU 600, 601 / 2012
- Extended password protection
- CEM-DAS Connect for secure internet access
- EFÜ for installations in Germany