

Data acquisition and report generation for CEM systems Principles & Practice

Environmental reporting made
easy with **CEMData**

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Product Development & Process Support

Increasingly, clients require a DAHS that is:


- Universal
 - Stand-alone, i.e. analyser-independent
 - Communicates with other equipment and systems, e.g. DCS/SCADA
- User-friendly
- Able to facilitate compliant ***operation***
- Easy to install and configure
- Expandable/upgradable with changes to plant/legislation
- WID, LCPD, EN14181-compliant
- Fully Automatic - including EN14181 data input
- Feature-rich

Features of a good DAHS Universal



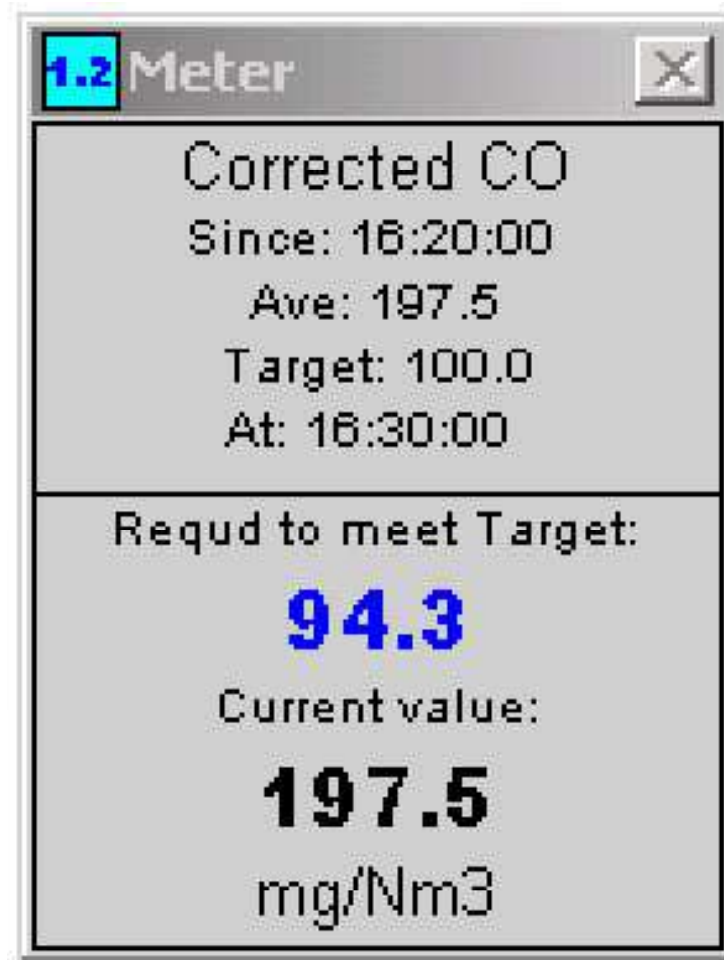
- Interfaces intelligently with equipment from any vendor, from simple field instruments to sophisticated analysers.
- Accepts a wide range of input types
 - e.g 0/4-20/21mA, 0-5V, 0-10V, VFC, RS232, RS485, RS422, Ethernet
- Supports industry-standard protocols
 - e.g. Modbus RTU, Modbus TCP
 - Expect to find some vendor-specific interfaces for added functionality but no vendor-fixed limitations
- Supports networking
- Provides real-time outputs (analogue and digital) in all these formats for calculated values and alarms.

Universal - Data input

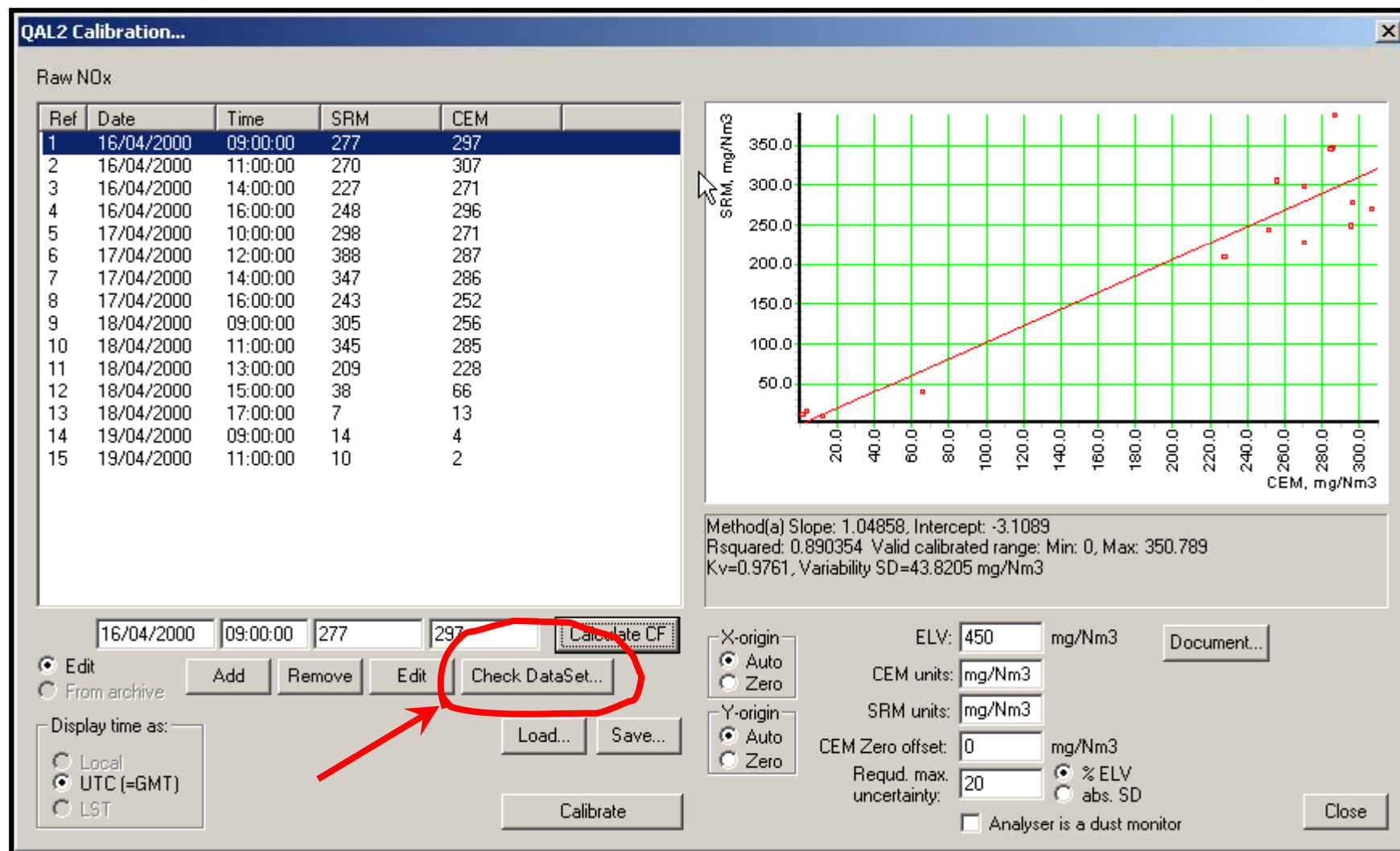


- ⌘ We continue to supply hard-wired data acquisition systems where necessary.
- ⌘ However, such systems are increasingly seen as costly (especially in cabling/marshalling), cumbersome, and non-future-proof.
- ⌘ There is an increasing demand for networked, multi-PC-based systems and installations with distributed data sources.
- ⌘ Serial-based and more importantly, networked solutions are more cost-effective, more powerful, more adaptable and more maintainable.
- ⌘ Active-X technology can provide powerful interactive front-end solutions for direct low-level communication with devices such as PLCs and certain analysers.

Operating Target meter:

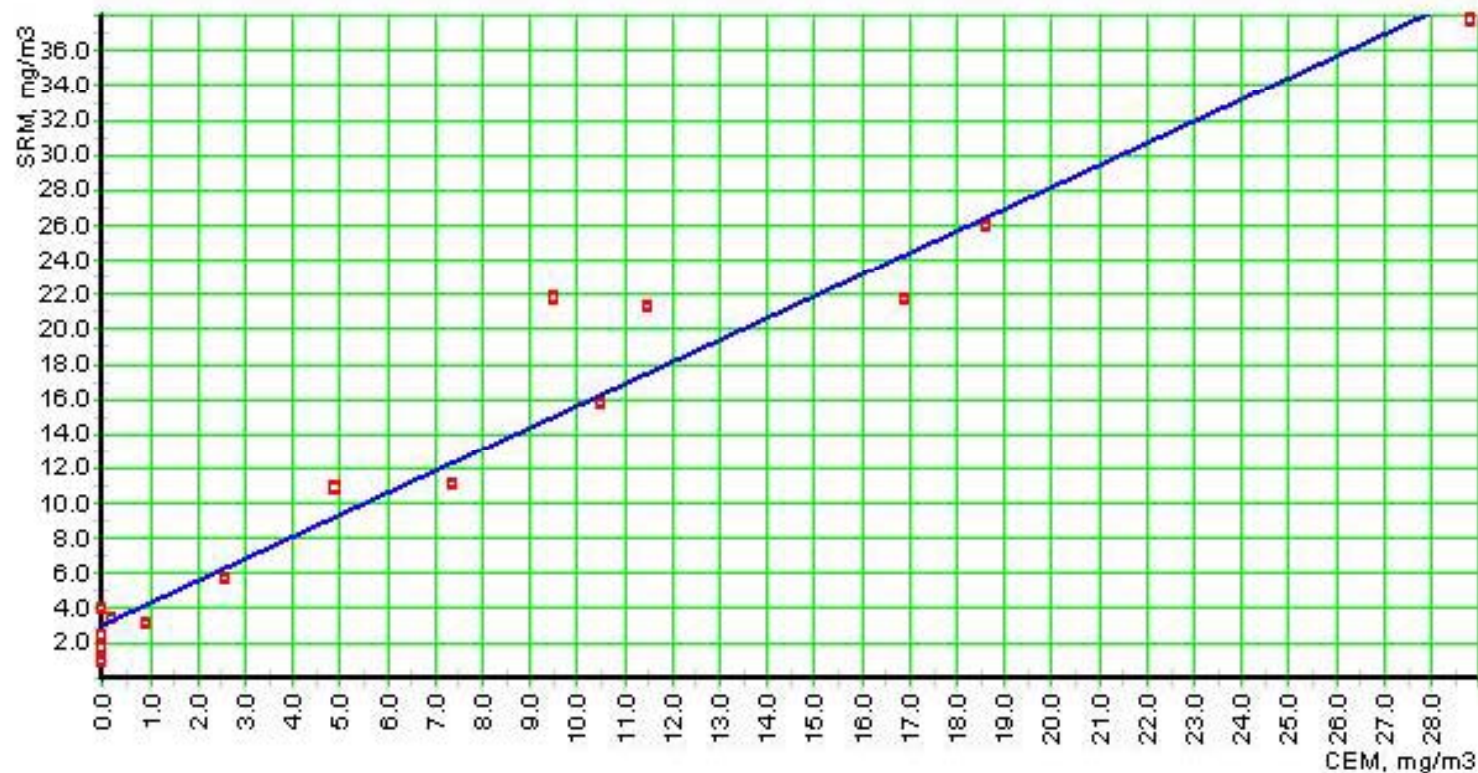


QAL2



BS EN14181 - Calibration

Calibration function for CO



Method(a) Slope: 1.25245, Intercept: 3.08509
Rsquared: 0.951679 Valid calibrated range: Min: 0, Max: 42.7626
Kv=0.9761, Variability SD=2.44039

QAL2 history at-a-glance

Calibration Function to EN14181

Measurement	Calibrated	Slope	Intercept	Methd.	Rsquared	Min. Valid Cal	Max. Valid Cal
O2	01/09/2005 10:01:44	1.0	0.0	(a)	1.0	0.0	44.
CO	23/09/2005 11:52:16	1.04858	-3.1089	(a)	0.890354	0.0	350.789
NOx		0.0	0.0	(a)	0.0	0.0	0.0

☐ Edit calibration data manually Apply 1.04858 -3.1089 ☐ B 0.890354 0.0 350.789

History... Calibrate... Close

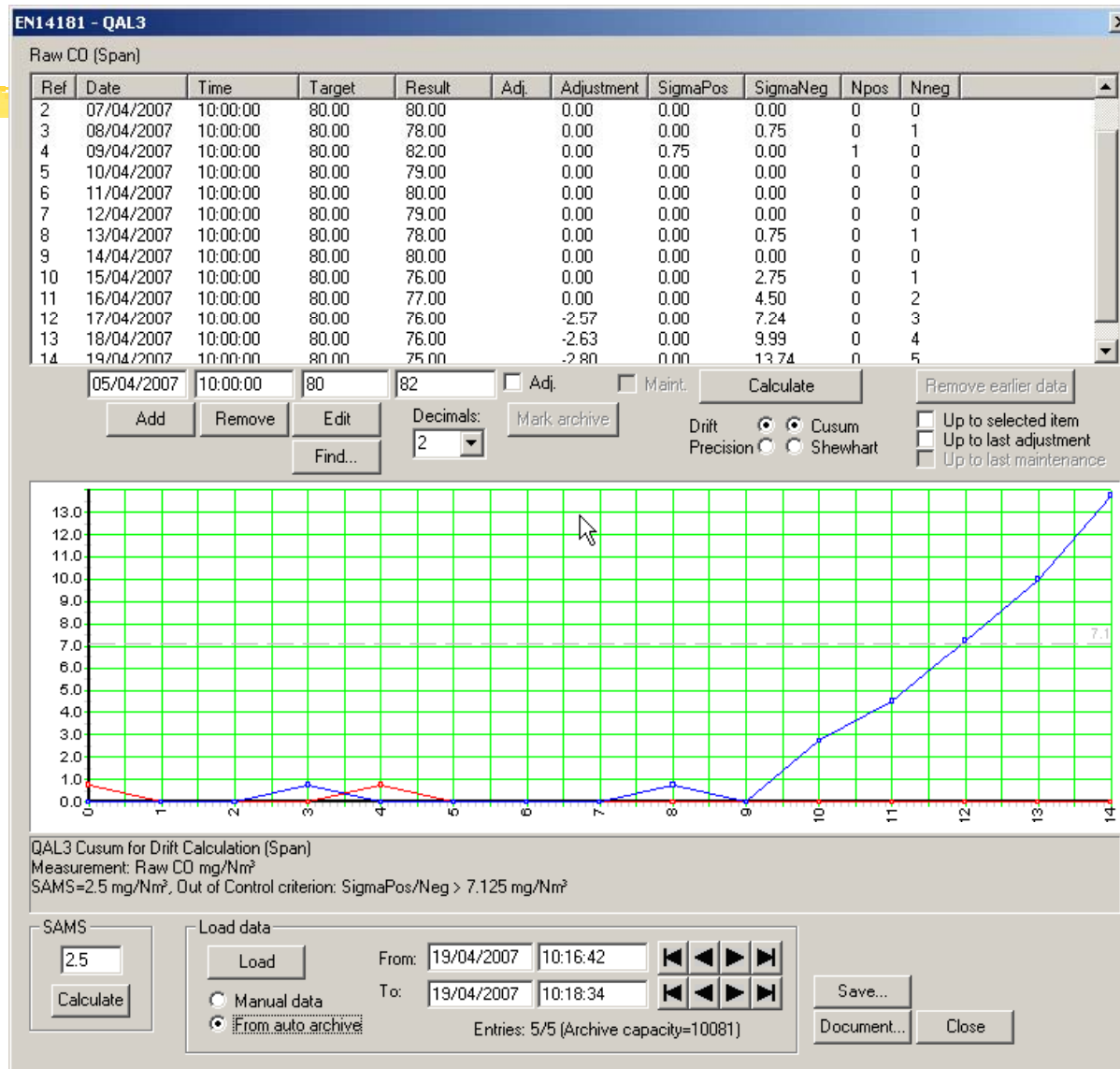
Calibration history

CO

Calibrated	Slope	Intercept	Mthd.	RSquared	MinValidCal	MaxValidCal	Kv	SD
23/09/2005 11:52:16	1.04858	-3.1089	(a)	0.890354	0	350.789	0.9761	43.8205
01/09/2005 10:45:44	1.25245	3.08509	(a)	0.951679	0	42.7626	0.9761	2.44039
01/09/2005 10:35:41	1.04858	-3.1089	(a)	0.890354	0	350.789	0	0
01/09/2005 10:35:31	1.04858	-3.1089	(a)	0.890354	0	350.789	0.9761	43.8205
01/09/2005 10:35:11	1.04858	-3.1089	(a)	0.890354	0	350.789	0	0
01/09/2005 10:33:08	1.04858	-3.1089	(a)	0.890354	0	350.789	0.9761	43.8205
01/09/2005 10:28:27	1.25245	3.08509	(a)	0.951679	0	42.7626	0.9761	2.44039
01/09/2005 10:26:14	1.25245	3.08509	(a)	0.951679	0	42.7626	0.9761	2.44039
01/09/2005 10:19:20	1.04858	-3.1089	(a)	0.890354	0	350.789	0	0
01/09/2005 10:03:09	1.04858	-3.1089	(a)	0.890354	0	350.789	0	0

Close

BS EN14181 - QAL3



Auto e-mail of alarm messages

Automatic e-mail alarm alerts

Alerts | Messages

Use this page to define the alerts to be sent by e-mail in response to alarms. Each alert must be linked to one alarm. An alarm can be assigned to any number of alerts.
Use the "Messages" page to define messages to carry the alerts.

Name	Alarm	Custom text	Delay-On sec	Sent in message
Paint Pr1-1 CO Ave 90ppm	Paint Pr1-1 CO Ave 90ppm			Paint Exceedance
Paint Pr1-1 CO Ave 150ppm	Paint Pr1-1 CO Ave 150ppm			Paint Exceedance
Paint Pr1-1 CO Acc 75ppm	Paint Pr1-1 CO Acc 75ppm			Paint Exceedance
Paint Pr1-2 CO Ave 90ppm	Paint Pr1-2 CO Ave 90ppm			Paint Exceedance
Paint Pr1-2 CO Ave 150ppm	Paint Pr1-2 CO Ave 150ppm			Paint Exceedance
Paint Pr1-2 CO Acc 75ppm	Paint Pr1-2 CO Acc 75ppm			Paint Exceedance
Paint Pr2 CO Ave 90ppm	Paint Pr2 CO Ave 90ppm			Paint Exceedance
Paint Pr2 CO Ave 150ppm	Paint Pr2 CO Ave 150ppm			Paint Exceedance
Paint Pr2 CO Acc 75ppm	Paint Pr2 CO Acc 75ppm			Paint Exceedance
Paint RT0 CO Ave 90ppm	Paint RT0 CO Ave 90ppm			Paint Exceedance
Paint RT0 CO Ave 150ppm	Paint RT0 CO Ave 150ppm			Paint Exceedance
Paint RT0 CO Acc 75ppm	Paint RT0 CO Acc 75ppm			Paint Exceedance
Paint T/C A CO Ave 90ppm	Paint T/C A CO Ave 90ppm			Paint Exceedance
Paint T/C A CO Ave 150ppm	Paint T/C A CO Ave 150ppm			Paint Exceedance
Paint T/C A CO Acc 75ppm	Paint T/C A CO Acc 75ppm			Paint Exceedance
Paint T/C B CO Ave 90ppm	Paint T/C B CO Ave 90ppm			Paint Exceedance
Paint T/C B CO Ave 150ppm	Paint T/C B CO Ave 150ppm			Paint Exceedance
Paint T/C B CO Acc 75ppm	Paint T/C B CO Acc 75ppm			Paint Exceedance
Plastics Lines 1/2 CO Ave 15...	Plastics Lines 1/2 CO Ave 150ppm			Plastics Exceedance
Plastics Line 3 CO Ave 150ppm	Plastics Line 3 CO Ave 150ppm			Plastics Exceedance

Paint T/C B CO Ave 150ppm Paint ED1 CO 150ppm None

Add Remove

Copy

Multiple Add...

Set Alarm

Filter

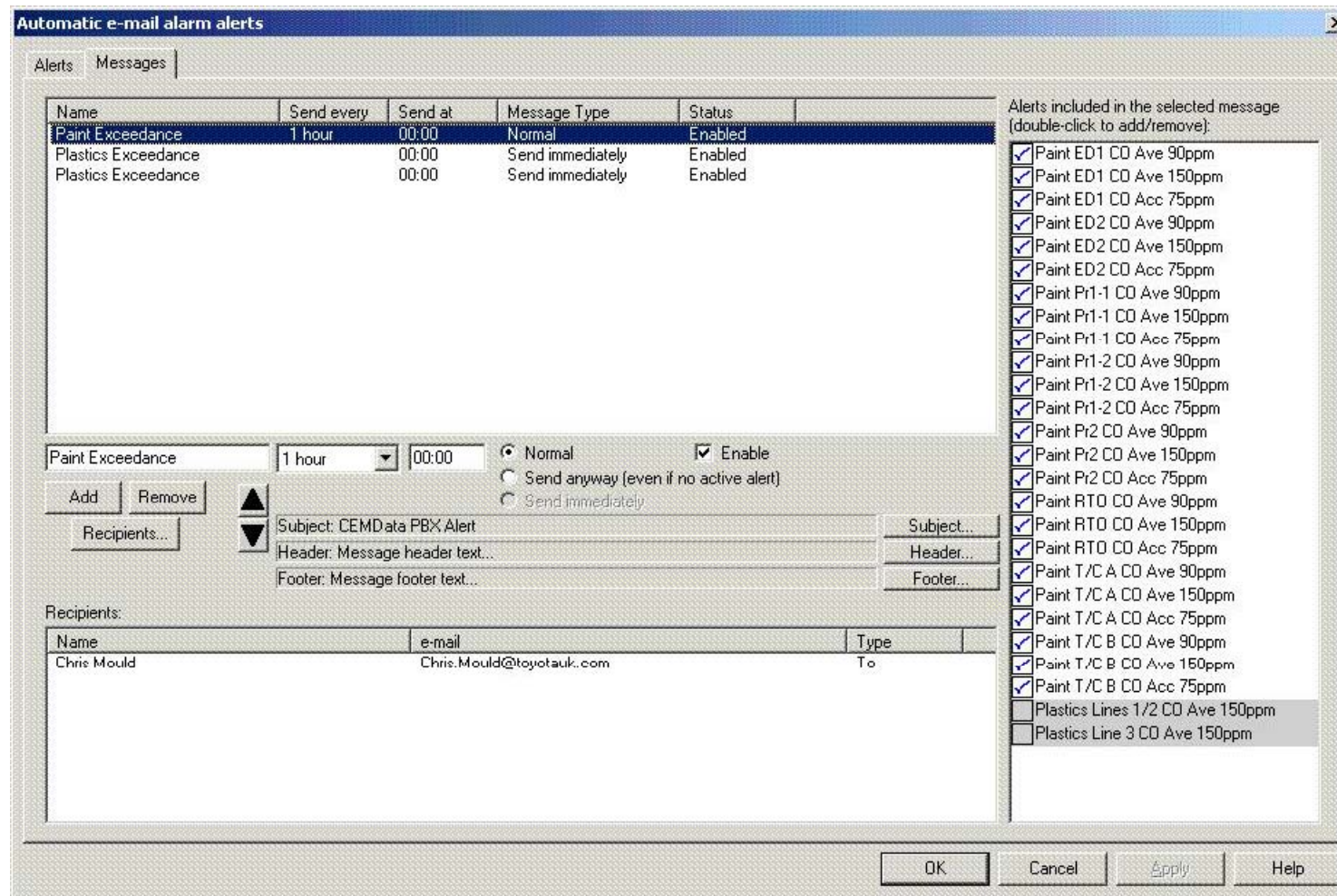
☐ Filter

☒ Prefix ☒ Show only

☐ Containing ☐ Hide

OK Cancel Apply Help

Auto e-mail of alarm messages



Automatic e-mail alarm alerts

Alerts Messages

Name	Send every	Send at	Message Type	Status
Paint Exceedance	1 hour	00:00	Normal	Enabled
Plastics Exceedance		00:00	Send immediately	Enabled
Plastics Exceedance		00:00	Send immediately	Enabled

Paint Exceedance 1 hour 00:00 ☒ Normal ☒ Enable
☐ Send anyway (even if no active alert)
☐ Send immediately

Add Remove Recipients...

Subject: CEMData PBX Alert Subject...
Header: Message header text... Header...
Footer: Message footer text... Footer...

Recipients:

Name	e-mail	Type
Chris Mould	Chris.Mould@toyotauk.com	To

Alerts included in the selected message (double-click to add/remove):

- ☒ Paint ED1 CO Ave 90ppm
- ☒ Paint ED1 CO Ave 150ppm
- ☒ Paint ED1 CO Acc 75ppm
- ☒ Paint ED2 CO Ave 90ppm
- ☒ Paint ED2 CO Ave 150ppm
- ☒ Paint ED2 CO Acc 75ppm
- ☒ Paint Pr1-1 CO Ave 90ppm
- ☒ Paint Pr1-1 CO Ave 150ppm
- ☒ Paint Pr1-1 CO Acc 75ppm
- ☒ Paint Pr1-2 CO Ave 90ppm
- ☒ Paint Pr1-2 CO Ave 150ppm
- ☒ Paint Pr1-2 CO Acc 75ppm
- ☒ Paint Pr2 CO Ave 90ppm
- ☒ Paint Pr2 CO Ave 150ppm
- ☒ Paint Pr2 CO Acc 75ppm
- ☒ Paint RTO CO Ave 90ppm
- ☒ Paint RTO CO Ave 150ppm
- ☒ Paint RTO CO Acc 75ppm
- ☒ Paint T/C A CO Ave 90ppm
- ☒ Paint T/C A CO Ave 150ppm
- ☒ Paint T/C A CO Acc 75ppm
- ☒ Paint T/C B CO Ave 90ppm
- ☒ Paint T/C B CO Ave 150ppm
- ☒ Paint T/C B CO Acc 75ppm
- ☐ Plastics Lines 1/2 CO Ave 150ppm
- ☐ Plastics Line 3 CO Ave 150ppm

OK Cancel Apply Help

Invalid and excluded data



- ⌘ The DAHS must remove from emissions calculations all data which are invalid.
- ⌘ Invalid data include those obtained during
 - ☒ Any occurrence that prevents the measurement from representing actual stack conditions

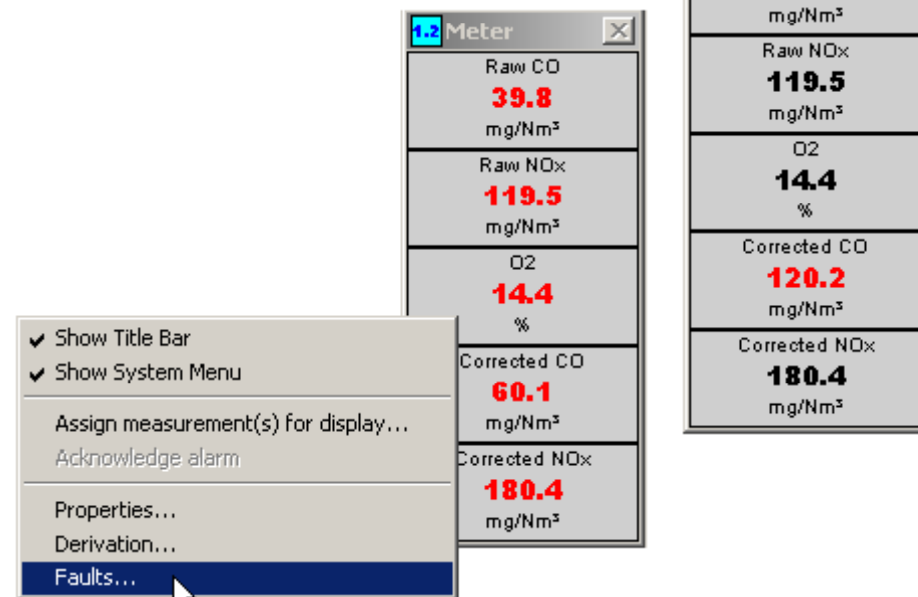
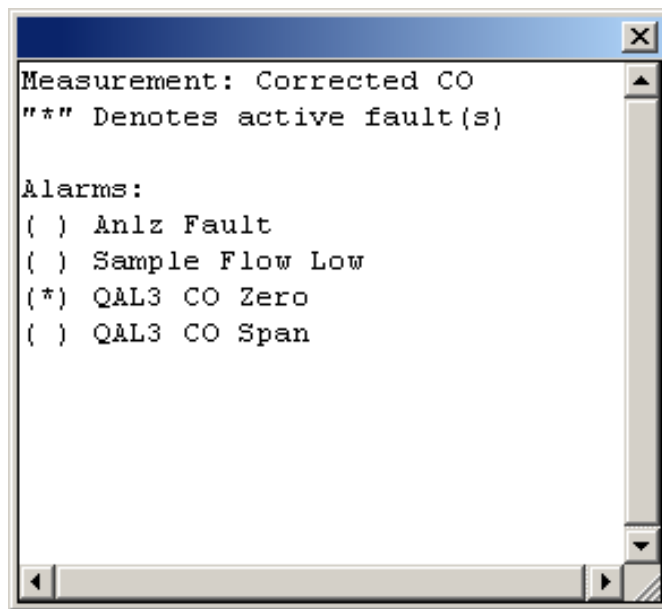
Basic principles – Data validity



- Every analogue input value, however transmitted, ***must*** be accompanied by at least one digital value to indicate the validity of the analogue value (“fault” signal).
- ***No measurement is of any use unless it is known whether or not the value can be relied upon.***
- For “live zero” analogue signals, non-validity may be designated by an “out-of range” signal, e.g. 2mA for a 4-20mA signal. The value may be decoded to indicate a binary “fault” condition.
 - Different values in the 0-4mA range can indicate different faults.

Data validity

- ⌘ The DAHS should:
- ⌘ Give immediate indication of invalid data
- ⌘ Be able to display the reason



Exclusions



- A permit may define certain conditions during which data are not to be included in the analysis for compliance
 - e.g. Gas turbines during start-up
 - (operation at <70% full load)
- Other conditions need to be definable for reporting, e.g.
 - Incinerator not burning waste

Exclusions



- ⌘ Data which may be perfectly valid (i.e. truly representing the stack conditions) may nevertheless have to be excluded ***from a report*** if relating to a period of operation (or non-operation) outside the reporting requirements of the permit.
- ⌘ The data may be required for other purposes, or be eligible for inclusion in a different kind of report.
- ⌘ The DAHS must be able to provide automatic data exclusion based on plant status or other signals.

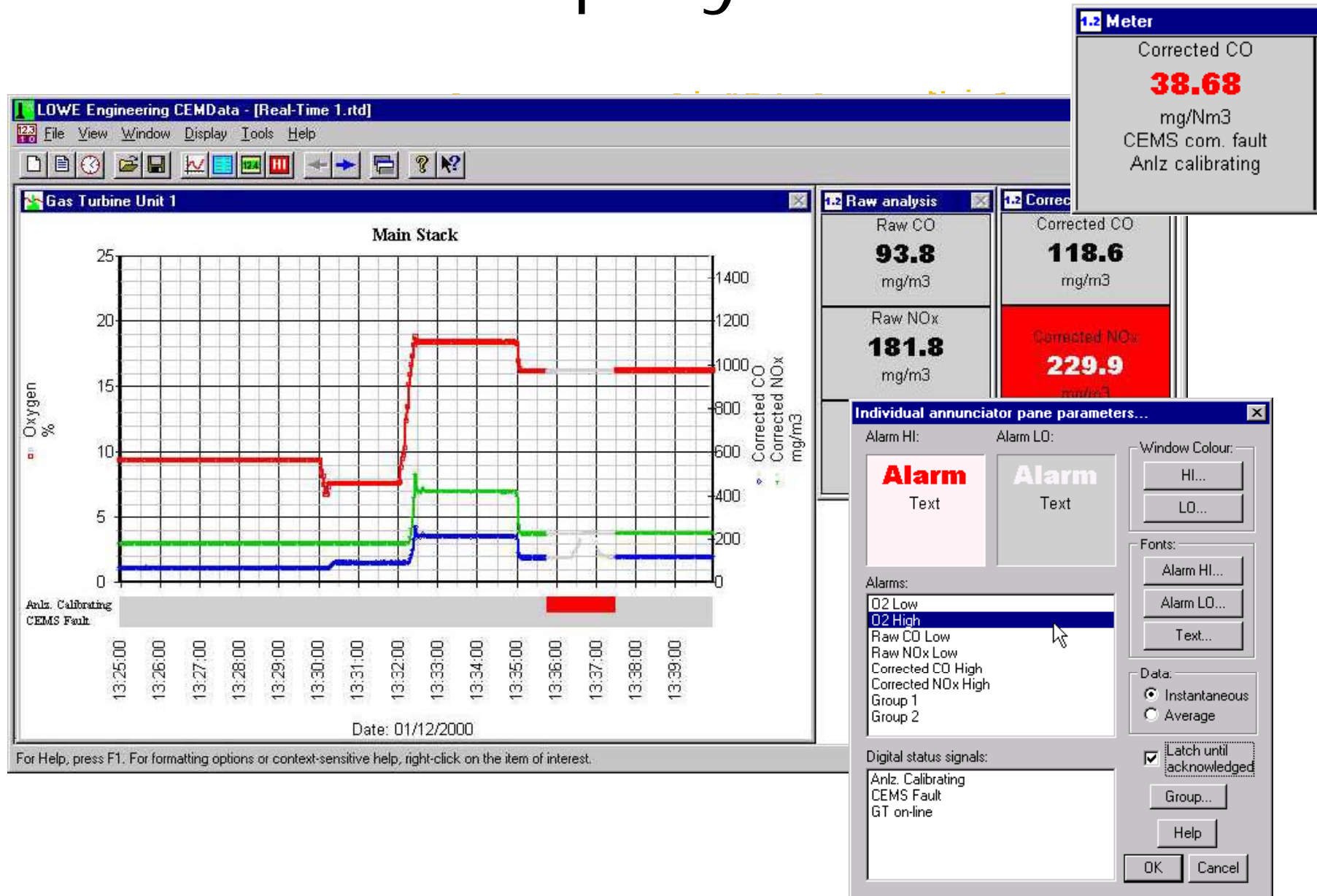
So... a good DARS/DAHS

(Data Acquisition and Reporting/Handling System):

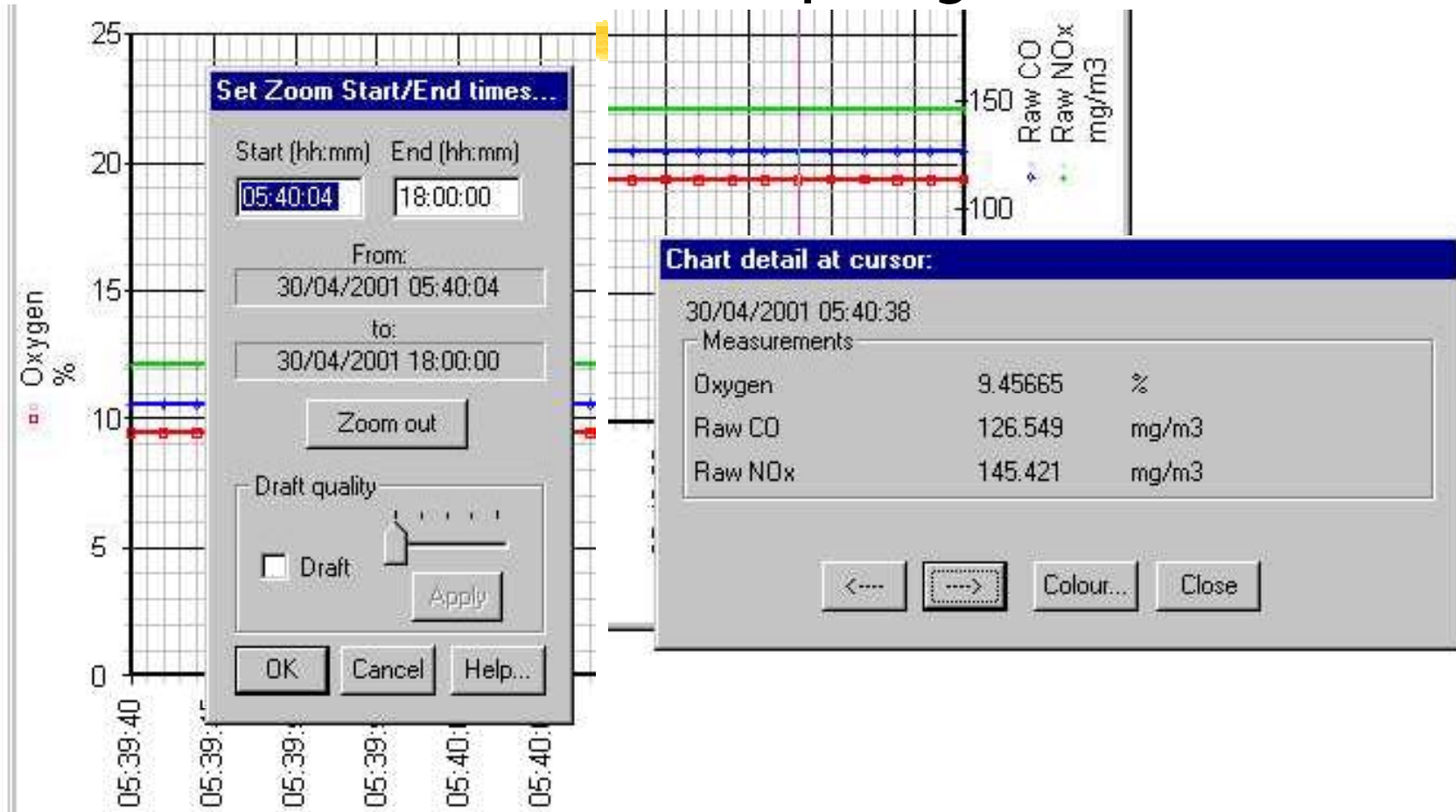


- Handles data acquisition, storage, archiving, security, retrieval
- Performs calculations
- Produces reports
- Provides a helpful, user-friendly interface between (often non-technical) users and the complex requirements of evolving legislation
- Provides comprehensive real-time display features to assist compliant operation
- Can be expanded/upgraded to suit legislative/plant changes, e.g. support of BS EN 14181
- Special features, e.g. Auto e-mail of alarm messages

Real-time displays

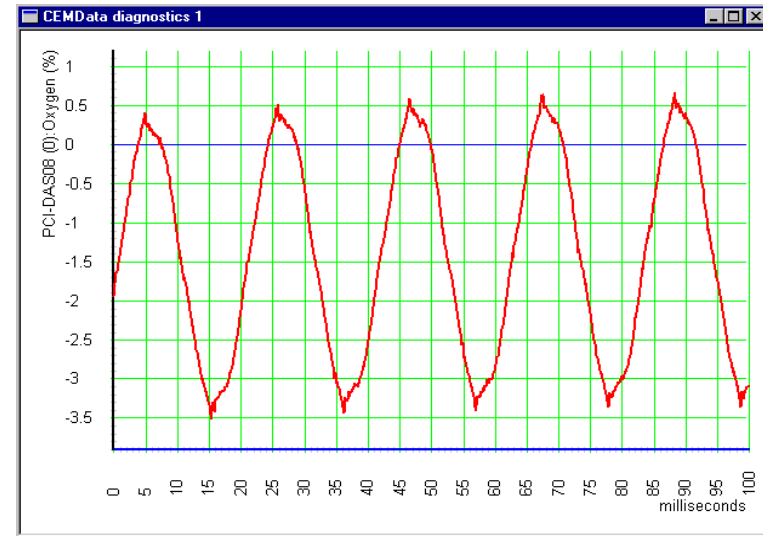


Historical data displays



Maintenance tools for hardwired I/O

- Includes virtual maintenance tools:
 - Physical check of all physical I/O
 - Instant on-line measurement and display of noise, etc.



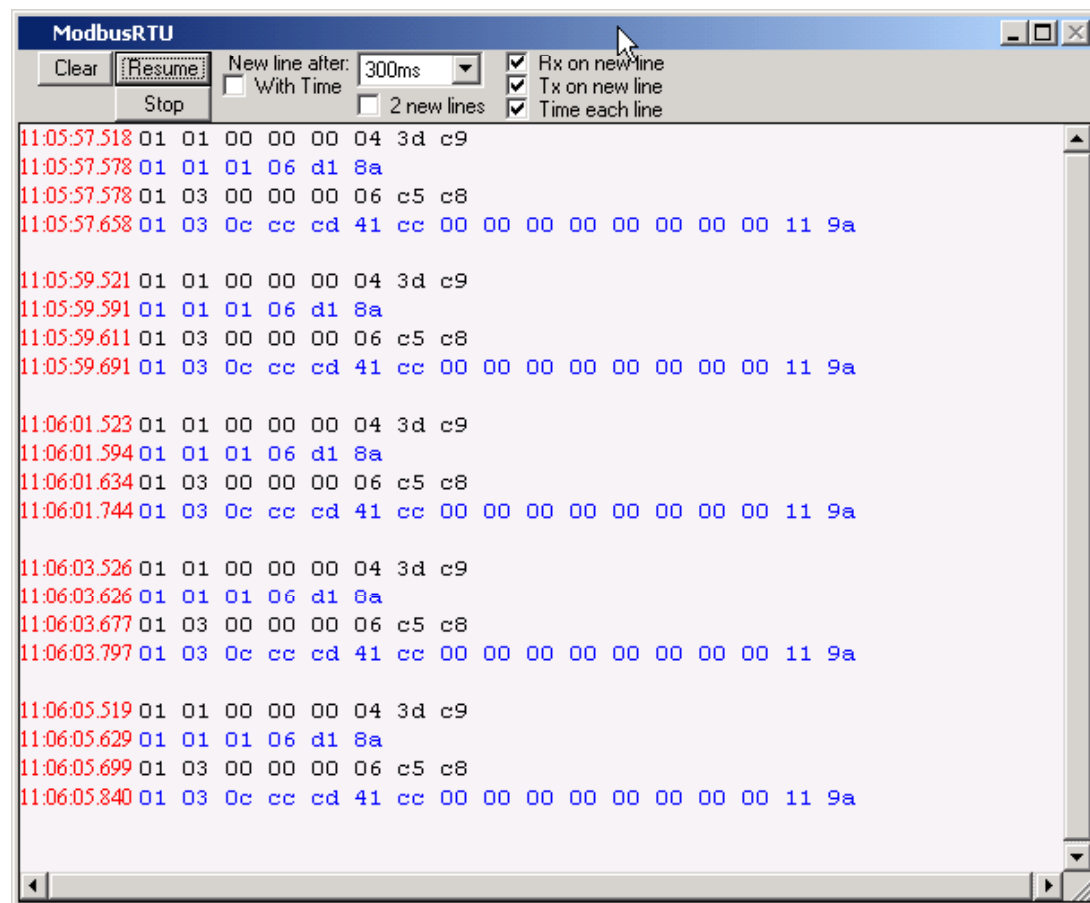
Every [CEMData](#) installation includes:

A virtual digital storage oscilloscope, software-assignable to each hard-wired analogue input

Tools for testing analogue/digital outputs without affecting data acquisition

Maintenance tools for serial data

⌘ Built-in DataScope (sniffer)



Reporting

Report Template Manager

Report Templates | Measurement Data | Digital Status Signals/Alarms

Report template: Daily emissions

Measurement name: mg/m3

Corrected CO
Corrected NOx

Report period: Daily

Remove Add
Copy Settings
Paste Settings

Oxygen
Raw CO
Raw NOx
Corrected CO
Corrected NOx
GT Fuel
DB Fuel
GT Power
ST Power

Data acquisition system availability:

Max. period off-line: ☒
Cumulative time off-line: ☒
Diary off-line: ☒
Percent availability: ☒

Input data

☐ 10 minute averages
☐ 1/2-hourly averages
☐ Hourly averages
☐ Daily averages
☐ Weekly averages
☒ Other:

1 minute
2 minutes
3 minutes
4 minutes
5 minutes
6 minutes
10 minutes
12 minutes
15 minutes
20 minutes
30 minutes
1 hour
2 hours

Input data

☒ 10 minute averages
☐ 1/2-hourly averages
☐ Hourly averages
☐ Daily averages
☐ Weekly averages
☐ Other:

95% confidence interval

1 minute

Deduct 95% Confidence Interval

Averages

☐ Fixed period
☒ Rolling

Roll period

24 hours
7 days
Custom hours:

Rolling % within limits:

☐ % within limits

☐ High limit A
☐ High limit B
☐ Low limit A
☐ Low limit B

Statistical data for the report period

Values not exceeded by:

☒ 95% of valid data points
☐ 97% of valid data points
☐ Custom: 0 %

Percentiles:

☐ 95th percentile
☐ 97th percentile
☐ Custom: 0 th

Interpolation

☐ Use linear interpolation
☒ Use mean of higher/lower
☐ Use higher point
☐ Use lower point

Total data points

High limit A: 50
High limit B: 150 mg/m3

Max. period above limit: ☒
Cumulative time above limit: ☒
Diary above limit: ☐
Percent valid data points within limit: ☒

Missing Data...

Low limit A: 0
Low limit B: 0 mg/m3

Max. period below limit: ☐
Cumulative time below limit: ☐
Diary below limit: ☐
Percent valid data points within limit: ☐

OK Cancel Apply Help

Report generation

CEMData

Report Template Manager

Report Templates | Measurement Data | Digital Status Signals/Alarms | Data Reduction | Data Reduction - 2nd stage

Report template: Daily

Measurement name: mg/Nm3

Report period: Daily

Remove Add

Copy Settings

Paste Settings

Input data

Min. valid points for ave. 30

95% confidence interval

Deduct 95% Confidence Interval

Averages

Fixed period

Rolling

Roll period

24 hours

7 days

Custom hours

Rolling % within limits

% within limits

High limit A

High limit B

Low limit A

Low limit B

Statistical data for the report period

Values not exceeded by:

95% of valid data points

97% of valid data points

Custom: 0 %

Percentiles:

95th percentile

97th percentile

Custom: 0 th

Interpolation

Use linear interpolation

Use mean of higher/lower

Use higher point

Use lower point

High limit A 100

High limit B 0

mg/Nm3

Max. period above limit

Cumulative time above limit

Diary above limit

Percent valid data points within limit

Number of high limit exceedances

Missing Data...

Low limit A 0

Low limit B 0

mg/Nm3

Max. period below limit

Cumulative time below limit

Diary below limit

Percent valid data points within limit

Number of low limit violations

OK Cancel Apply Help

Point-and-Click to select:
Measurements
Average period and type
Statistical data

Exclusion
alarms

Report Template Manager

Report Templates | Measurement Data | Digital Status Signals/Alarms | Data Reduction | Data Reduction - 2nd stage

Report template file: E:\CB\TPL\Templates.tpl (File version: 18)

Template names:

Daily

Add Copy Delete

Template file:

Open... Save As...

Set Default...

Report type

Daily

48-Hourly

Weekly

Monthly

Quarterly

Annual

For the selected template, measurements will be EXCLUDED from reported data whenever one or more alarms is active if checked in the list below:

O2 Low

O2 High

Raw CO Low

Raw NOx Low

Corrected CO High

Corrected NOx High

Anlz. Calibrating

CEMS Fault

GT Off-line

ST Off-line

Spare Alarm 1

Spare Alarm 2

Spare Alarm 3

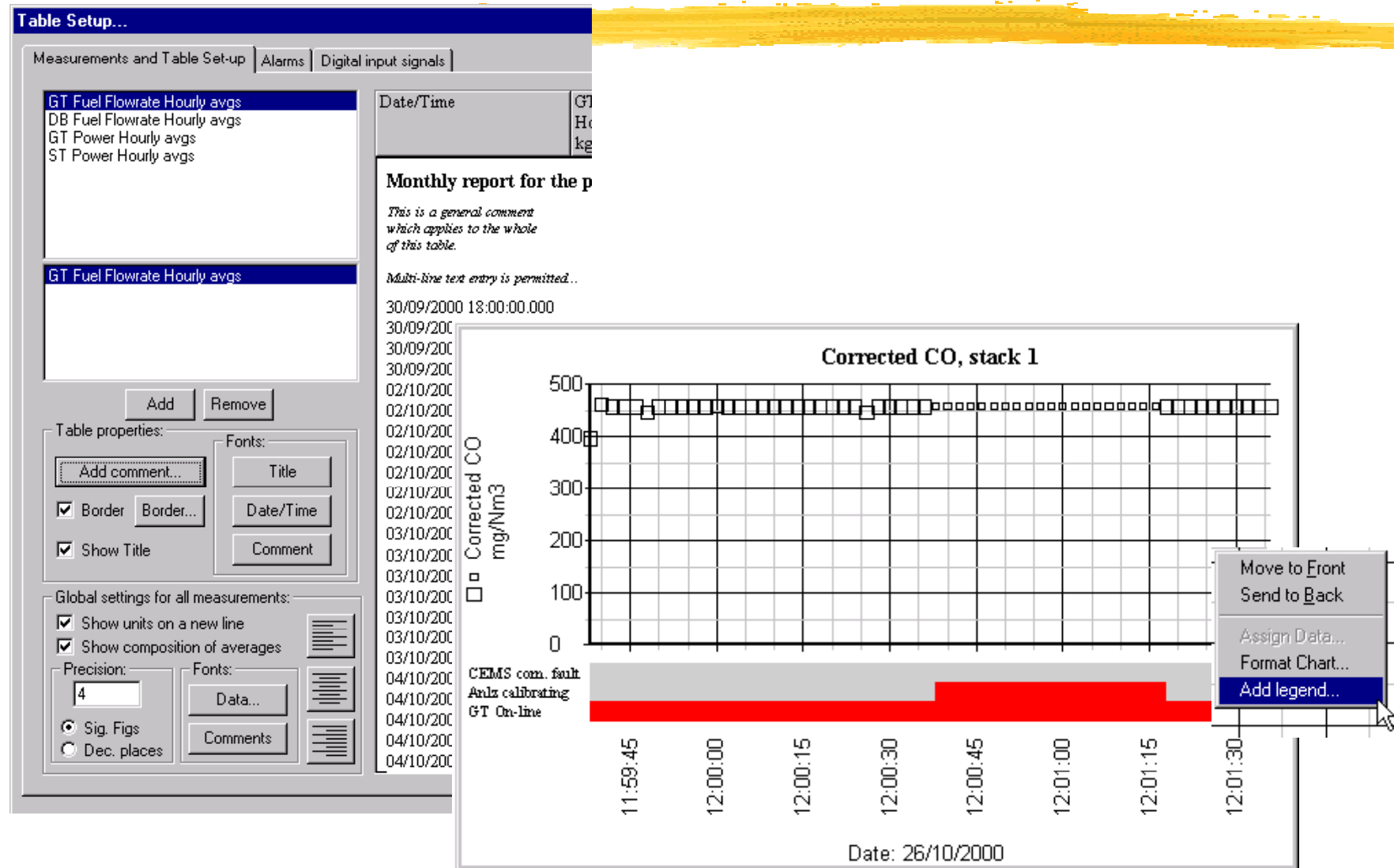
Spare Alarm 4

Spare Alarm 5

Spare Alarm 6

OK Cancel Apply Help

Reporting



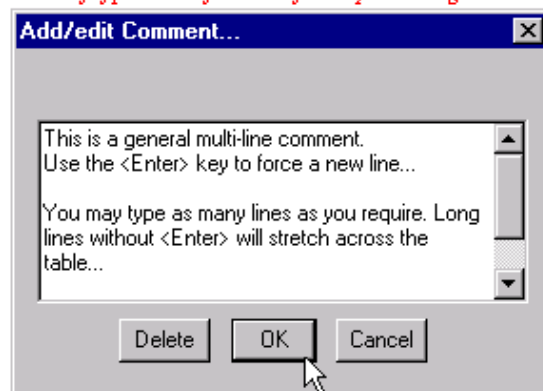
Reporting

Monthly report for the period ending Tuesday 31 October 2000 00:00:00

This is a general multi-line comment.

Use the <Enter> key to force a new line...

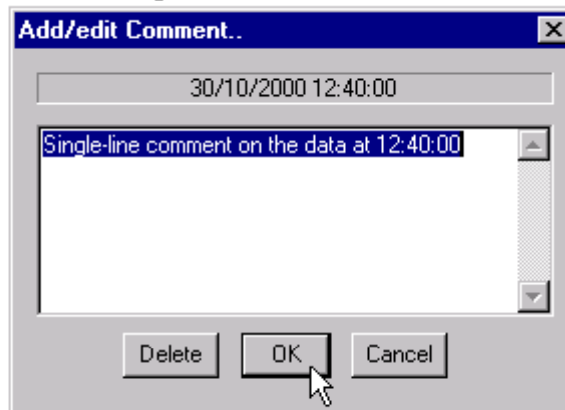
You may type as many lines as you require. Long lines without <Enter> will stretch across the table...



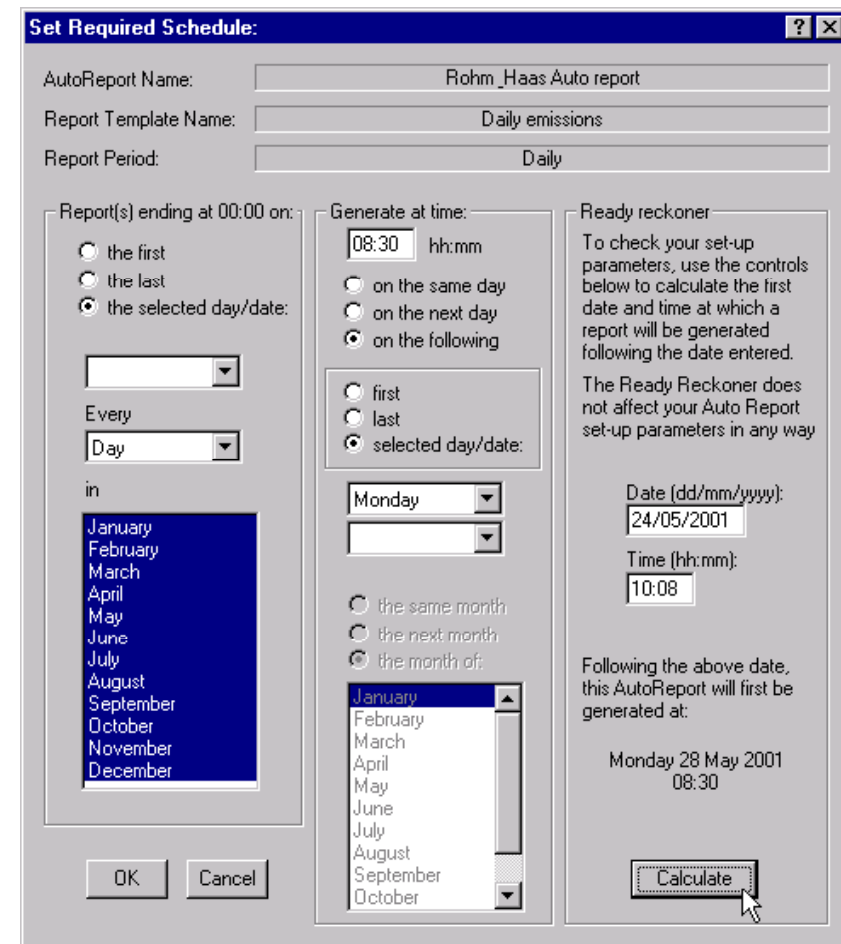
A dialog box titled "Add/edit Comment..." with a text area containing the same multi-line comment text as above. At the bottom are "Delete", "OK", and "Cancel" buttons. A mouse cursor is pointing at the "OK" button.

03/10/2000 10:00:00.000

30/10/2000 12:40:00	HI	Single-line comment on the data at 12:40:00
30/10/2000 12:50:00	HI	
30/10/2000 13:00:00	HI	
30/10/2000 13:10:00	HI	
30/10/2000 13:20:00	HI	
30/10/2000 13:30:00	HI	
30/10/2000 13:40:00	HI	
30/10/2000 13:50:00	HI	
30/10/2000 14:00:00	HI	
30/10/2000 14:10:00	HI	
30/10/2000 14:20:00	HI	
30/10/2000 14:30:00	HI	
30/10/2000 14:40:00	HI	
30/10/2000 14:50:00	HI	
30/10/2000 15:00:00	HI	



A dialog box titled "Add/edit Comment.." with a text area containing "Single-line comment on the data at 12:40:00". At the bottom are "Delete", "OK", and "Cancel" buttons. A mouse cursor is pointing at the "OK" button.



A dialog box titled "Set Required Schedule:" with various configuration options for an auto-report.

AutoReport Name: Rohm_Haas Auto report

Report Template Name: Daily emissions

Report Period: Daily

Report(s) ending at 00:00 on:

- ☐ the first
- ☐ the last
- ☒ the selected day/date:

Every Day in

Generate at time:

08:30 hh:mm

- ☐ on the same day
- ☐ on the next day
- ☒ on the following

☐ first

☐ last

☒ selected day/date:

Monday

the same month

the next month

the month of:

January

Ready reckoner

To check your set-up parameters, use the controls below to calculate the first date and time at which a report will be generated following the date entered.

The Ready Reckoner does not affect your Auto Report set-up parameters in any way

Date (dd/mm/yyyy): 24/05/2001

Time (hh:mm): 10:08

Following the above date, this AutoReport will first be generated at:

Monday 28 May 2001 08:30

Calculate

For...

- ⌘ User-friendliness
- ⌘ Low cost
- ⌘ Enthusiastic technical support
- ⌘ Rapid response
- ⌘ State-of-the-art

The market leader...

CEMData

