

ECOSOFT CEMS Data Systems



The ECOSOFT Data System is designed to support complex multi level solutions for emission monitoring systems in different applications. Primary target is to meet Large Combustion Plant Directive, Waste Incinerator Directive and providing a full compliance to EN14181 standard.

ECOSOFT CEMS system is consisting from ECM 8816 data loggers operating the ECO Logger software. Central ECOSOFT system is operated on a Windows platform allowing different advanced communications to outside world.

ECOSOFT is designed to support different languages and is easy to be adjusted to local legislative in respective country. System concept is modular allowing to design any CEMS ranging from simple solutions up to very complex ones. ECOSOFT also allows advanced support of communication to different SCADA and control systems. System configuration and maintenance is supported by advanced remote Internet access from the Service Centre.

ECM 8816 datalogger

ECM 8816's compact design combines a menu-driven firmware package with versatile I/O module options for optimum performance in monitoring systems. ECM 8816 offers a broad range of communication to upper systems and portable devices of system operators and servicing personal. ECM 8816 datalogger is primarily designed for CEMS in accordance to EN 14181 standard.

DL software capabilities

Built-in capabilities of the Model ECM 8816 far exceed more expensive PLC's or PC-based data loggers, with no customer software programming required. The Model ECM 8816 onboard menu is offering a broad repertoire of available functions.

The Model ECM 8816 interfaces with virtually any sensor output, whether analog or digital and is readily adapted to the newest serial-based analyzers, including stack gas monitors, particle / flow instruments and gas chromatographs. Representing the culmination of over 20 years of experience in the field of microprocessor-based data acquisition components, each Model ECM 8816 is backed by ECM's reputation for quality, reliability and uncompromising service.



Many practical features needed specifically for ambient and CEMS are built in. For example, the Model ECM 8816 computes and stores block and rolling averages (up to 3 user-selectable averages per parameter), as well as more complex mathematical functions (vector average calculations, sensor linearization, standard deviations, etc.) using built-in math channels. It detects and reports alarms based on digital inputs, min/max analog input levels, or logger-computed parameters. Monitored data and calibration results are treated separately. ECM 8816 is designed to provide automatic calibration or calibration check of connected analyzers, including automatic multi point calibration. Reports of topical or stored data are provided in either tabular or graphical form.

Beyond standard functions ECM 8816's language (similar to BASIC) allows free programming of input / output channels to allow control of monitoring system components like channel switching, purge control, filter and flow watch, etc.

Model ECM 8816 Hardware and I/O Options

The Model ECM 8816 hardware is optimized for CEMS and ambient air monitoring applications. Its flexibility is based on rear-mounted I/O modules in different combinations. These I/O modules can fit analyzer analog outputs, digitally controlled devices and multi-point calibrators, provide analog output signals (instantaneous, averaged or computed) to an upper system or strip-chart recorder. In addition to these features, a MODBUS interface permits bi-directional data transfer of plant operational

parameters between the Model ECM 8816 and upper systems. The meteorological interface module provides direct support for wind speed and direction, rainfall, temperature and other sensors. The Model ECM 8816 can be used as a stand-alone data logger or as a node in a multi-station monitoring system, with any of ECM's PC-based data management software packages. ECM data systems simplify real time and historical data management and automate reporting tasks to meet European Standards and local regulations. Most international regulatory requirements for stack emissions and ambient air quality monitoring can also be achieved with ECM data systems using the Model ECM 8816 Data Logger. The logger can be specified with up to 4 I/O modules.

Standard ECM 8816 Equipment

Model ECM 8816 Data Logger
 CPU : AMD 64bit
 RAM: 512MB
 Storage: 40GB
 Optical drive: DVDRW
 Output interface:
 RS232/RS485/RS422/Ethernet
 Case: 19" rack case, 4U
 I/O interface connector : Cannon DB25
 Dimensions: 482.5x450x177mm

Analog Input module

Channels: insulated 8 differential
 Resolution: 16-bit
 Input type: mV, V , mA
 Input range: $\pm 150\text{mV}$, $\pm 500\text{mV}$, $\pm 1\text{V}$,
 $\pm 5\text{V}$, $\pm 10\text{V}$, $0 \pm 20\text{mA}$
 Sample rate: 10 Samples/Second
 Accuracy: $\pm 0.1\%$
 Input Impedance: 20M Ohms

Analog output modul

Photo-isolation: 3750 Vrms
 Channels: 4
 Output type: mA, V
 Output range: 0-20mA, 4-20mA,
 0-5V, $\pm 5\text{V}$, 0-10V, $\pm 10\text{V}$
 14-bit resolution
 Accuracy: $\pm 0.1\%$ of FSR
 Resolution: $\pm 0.02\%$ of FSR

Binary Input

Channels: 16 contact

Binary Output

Output Channels: 7 relay outputs
 Output Type: 7 Form A

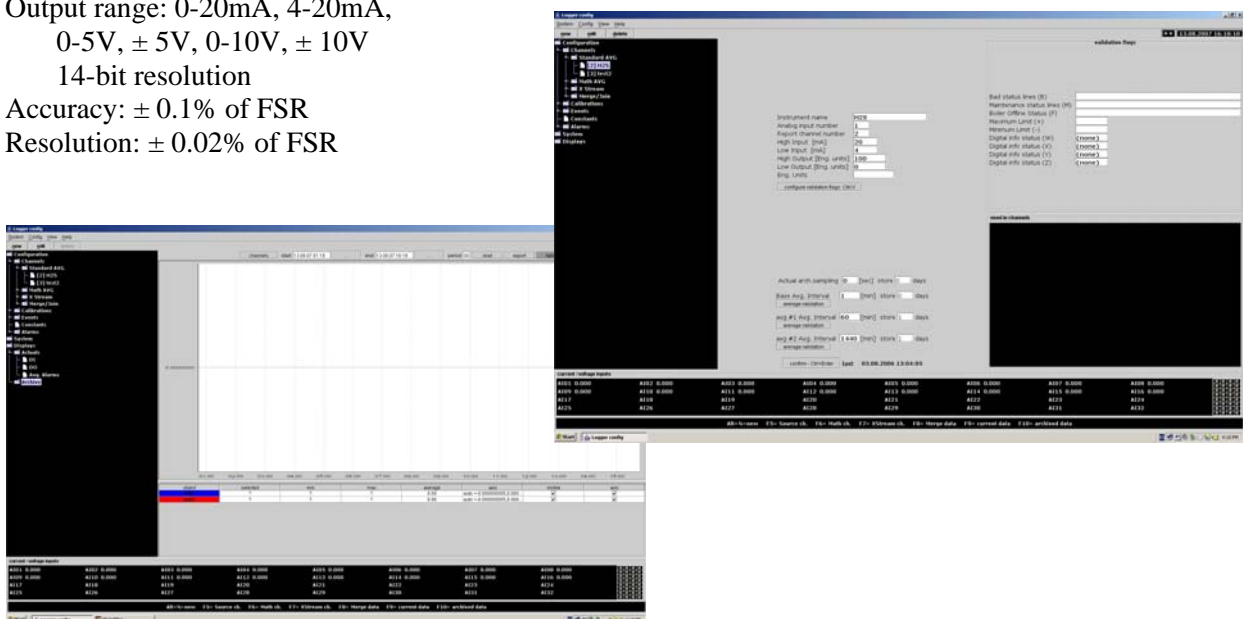
Expected Life: 100.000.000 cycles

Communication options

Modbus Protocol Serial Interface
 External Modem with Cable
 Ethernet TCP/ IP communication
 Bluetooth / IR communication
 GPRS communication
 Extension of serial RS232/485 port for up to 16 in total

Display

External LCD PC Monitor or optical 19" rack case with integrated LCD display & keyboard or integrated front panel with 1024 x 768 display and keyboard.



Central ECOSOFT

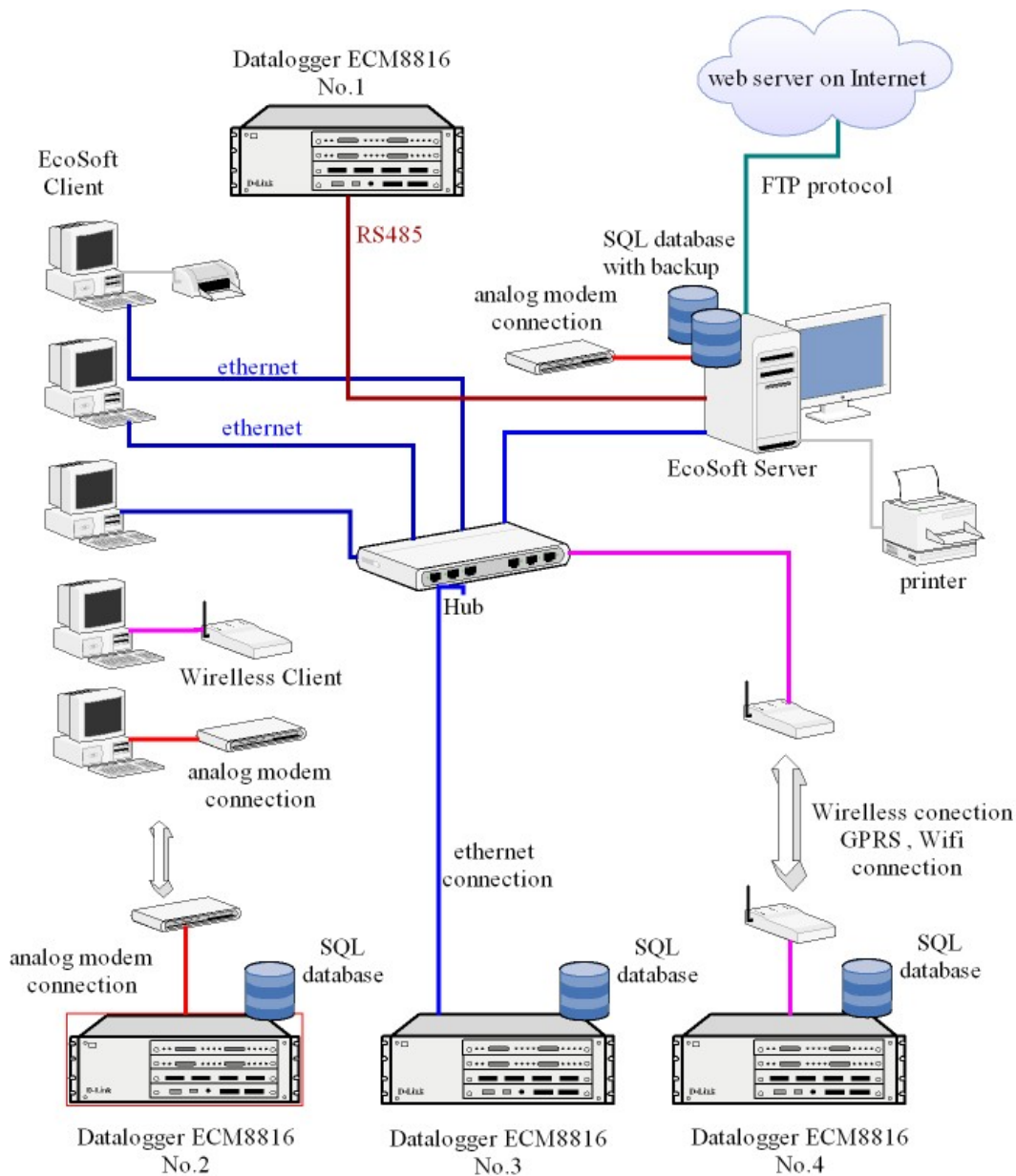
This software package is using Windows environment SQL database system and three layers of communication.

- First layer is broad range of different loggers, communications to network of analyzers and other sources of process information.
- Second layer is network communication to operator terminals, data presentation devices and remote accessibility to selected data would be requested by local law.
- Third layer is internet or remote terminal access from the Service Center for System supervision, modification and updates.

Server connecting features

There are different options how to connect the datalogger to central PC, also called server:

An RS485 on physical wires is the most often used interface, however, a dial up modem communication, LAN connection or wireless GSM and alternative radio link are also supported.



Client SW reports & description of report fields

As standard, the software, is providing daily, monthly and yearly reports. There are many options available. For CEMS these are categories of power generation boilers where one, two or even three parallel fuel operation is supported with proper calculations. An other category are waste incinerators, where mainly for hazardous waste incinerators specific pollutants must be monitored and reported. ECOSOFT allows to support beyond CEMS also ambient air and even water quality monitoring systems.

Example of Yearly Protocol

	normal						
Engineering units	CO	SO2	NOx	TRS	TZL	CxHy	O2
	mg/Nm3r	mg/Nm3	mg/Nm3	mg/Nm3	mg/Nm3	mg/Nm3	%
Emission limit	250	200	400	10	50	50	
TC (%) %	10	10	10	10	14	10	
N 48h >1,1EL+1	15	0	1	0	1	1	
% HPH < 2*EL	98.67	99.92	99.99	100.00	99.86	99.62	99.62
N / %PDHF	6/1.7	4/1.1	7/1.9	6/1.7	6/1.7	12/3.3	
Emitted mass [kg] < EL	0.00	7729	0.00	1146	0.00	0.00	
Q flue gas *1000 [m3 Ndry] < EL	0.00	835693	0.00	1019324	0.00	0.00	
Emitted mass [kg] > EL	129609	0.00	265362	0.00	20576	3710	
Q flue gas *1000 [m3 Ndry] > EL	1019073	0.00	1017822	0.00	1019324	1019324	

date	Offline	status	star up	shut down	ZmQ	ZmP	CO	SO2	NOx	TRS	TZL	CxHy	O2
		**	N	Z	Q	P	mg/Nm3r	mg/Nm3r	mg/Nm3r	mg/Nm3r	mg/Nm3r	mg/Nm3r	%
01/2006	0.0	7440	0.0	0.0	0.0	0.0	126.71	21.02	168.79	0.92	15.53	6.05	7.69
02/2006	0.0	6680	0.0	0.0	0.0	140	254.34	3.83	224.52	1.33	25.48	8.53	8.24
03/2006	0.0	7280	0.0	0.0	0.0	160	133.28	1.75	273.66	1.76	24.26	3.61	8.51
04/2006	0.0	7100	0.0	0.0	0.0	100	136.89	1.54	344.20	1.46	22.17	5.78	7.55
05/2006	0.0	7300	0.0	0.0	0.0	140	110.67	3.04	291.58	1.41	22.59	2.06	7.60
06/2006	0.0	7080	0.0	0.0	0.0	120	116.22	12.43	266.58	1.30	22.64	4.51	8.28
07/2006	0.0	7340	0.0	0.0	0.0	100	137.40	9.58	261.87	1.30	23.22	6.94	8.73
08/2006	1160	6110	3.0	1.0	0.0	130	99.45	10.45	312.62	1.20	23.37	2.84	8.52
09/2006	0.0	7060	0.0	0.0	0.0	140	139.93	5.96	314.36	0.51	21.11	4.04	8.60
10/2006	0.0	7320	0.0	0.0	0.0	120	144.75	5.41	320.19	0.62	22.65	4.08	8.45
11/2006	90	6660	3.0	1.0	0.0	210	105.23	1.86	349.43	0.82	22.24	2.65	8.49
12/2006	0.0	7240	0.0	0.0	0.0	200	103.22	4.62	338.61	0.76	22.32	2.48	7.81
Sum/Priem:	1250	84710	60	20	0.0	1560	133.00	6.68	289.44	1.11	22.32	4.44	8.20

Support of national versions

ECOSOFT is allowing an easy conversion of all human interface texts to different national versions. Special national characters or local alphabet (Cyrillic, ...) can be easily implemented. National versions in English, Finnish, Estonian, Russian, Polish, Hungarian, Romanian, Slovak, Czech, Serbian are ready, others within software delivery time.

Data and setup backups

All setup and measured data can be routinely backed up either on built in CD/DVD drive, or, can be exported to external PC.

Mixed fuel and switched system support

For those CEMs working with multiple sources in time switched mode, separated data reports are generated.

Fully supported are also those CEMs monitoring mixed fuel boilers. Instantaneous weighted emission limit corrected to reference Oxygen is calculated in real time.

Software is in full compliance with LCPD and WID.

Data recovery features (transfer of historical data from DL to PC)

To secure the highest possible data recovery, both the ECO Logger and ECO Soft are working with their independent data bases. ECO Logger is keeping the one month history minimum and the data base is cyclically re-written. This approach allows to reduce all data losses caused by potential hardware or power mains problems of PC server. Temporarily lost data are from datalogger data base automatically downloaded.

SMS and email notification support

Both the ECO Logger and ECO Soft are supporting active distribution of warning SMS or email messages. Conditions are selectable. In this way a service technician or system supervisor can be

immediately informed of any new hardware problem. Other conditions such as emission limit overruns or expected EN 14181 QAL3 problems can be reported.

Data archive capacity

Capacity of ECO Logger archive are increments of 2 GB up to 80% of disk capacity allowing to keep XXX data records creating a XXX month history of 8 component CEM. 1,5 GB of archive means about 16 million of records. Recommended storage is one year of one hour or 30 minutes average based data and 15 days of 1 minute average data. Periodic routine back up is certainly matter of any reasonable safety policy, but 1,5 GB archive capacity is good for more than 5 years of data storing.

HW inputs scan frequency

ECO Logger is allowing a 1 second A/D scan frequency for all data inputs independently to number of interfacing modules.

Concentration predict feature

On the level of operative data the ECO Soft can provide to system operator two sets of data: instantaneous concentrations already calculated to normal and reference conditions calculated predictions of assessed time interval. This software feature is providing the system operator a very powerful tool to keep the emission levels of the source under full control. The calculated predicted data are setting up the on line calculated emission target concentration under which the time averaged concentration will pass the emission limit condition. Therefore most of the unwanted emission limit overruns can be fully eliminated.

EN 14181 support

ECO Soft in cooperation with ECO Logger is fully supporting all EN 14181 system requirements such as:

- calculation of concentration through QAL2 calibration function
- statistical evaluation of calibration interval validity condition
- automated QAL3 calibration check
- automated cusum calculation
- automated result reporting

Such and support is virtually eliminating all the extra works related to EN 14181 implementation.

QAL2 and QAL3 interfaces

For each monitored parameter the ECO Soft can be configured according to by EN14181 requested parameters:

extended uncertainty

calibration curve offset and slope

These parameters are then used in weekly QAL3 and calibration curve validity evaluations.

External alarm (contact closure) support

ECO Soft is also supporting a function of local alarm by closing a dry potential free contact closure. This contact can alert the system operator immediately. Conditions of such an alarm can be configured by system set up-

Data exports (excel, FTP...)

ECO Soft final calculated data can be easily exported to either Windows Excel format, or, uploaded to an external FTP server.

Especially the upload to FTP server is enabling an easy and virtually cost free data access to all authorized third partners which by the local law could be the EPA or State Inspectors; however, are supporting an access also to external system supervisor.