



DioxinMonitoringSystem®

General device details and features



DioxinMonitoringSystem®

Main features

- Automatic isokinetic sampling using EN 1948-1/TS 1948-5: dilution method
- Industrial design - application in incineration plants' environment
- Sampling up to 6 weeks (tested up to 9 months!)
- MCerts and US-ETV and ISO 9000 certified
- PM10, PM2.5 and PM1 application



MCERTs and US EPA ETV certification

- The **DioxinMonitoringSystem**[®] device is the most advanced and most reliable industrial isokinetic long term sampling device for persistent organic pollutants in stacks, including dioxins, PCB's, PAH's and HCB, as well as metals.
- Already in 2004 and 2005 the **DioxinMonitoringSystem**[®] device was improved, tested and certified by British Environment Agency **MCERTs** and by **US-EPA**.
- **DioxinMonitoringSystem**[®] is the best suitable device to the standard **EN 1948-1/TS 1948-5** worldwide.





Advantages - DioxinMonitoringSystem®

- **DioxinMonitoringSystem®** is the only commercial available device for long term monitoring of dioxins in conformity to the European standard EN1948-1 worldwide.
- **Dry sampling using EN 1948-1**
The dilution method works free from condensate.
Only a dry cartridge is transferred to the laboratory.
- **Low temperature for sampled dust**
In flue gas, dioxins are mainly absorbed on particles but also evaporated in the gas phase. By cooling the flue gas with dilution air a high portion of the gaseous dioxins is absorbed on the particles, so most of the dioxins are precipitated on the dust filter at a low temperature. At this low temperature, no further chemical reactions (losses) or synthesis (production) are possible.



DioxinMonitoringSystem® general features



- Control unit for computerized management of the individual processes
- Built for industrial environments
- Use of pure titanium for cartridges, nozzles and probes = NO GLASSWARE
- Sampling according to dilution method directly controlled accurate isokinetic sampling
- Reliable volume measurement
- Sophisticated temperature management
- Versatile sampling of many pollutants
- Dioxins (PCDD/PCDF), but also other POPs, heavy metals
- Sophisticated and experienced cartridge handling
- Best results in comparison measurements
- Automatic probe cleaning
- Automatic leak test
- Long time experience and development





DioxinMonitoringSystem[®] Standard version



- **Double probe** version available especially needed for improvement of the sampling representativity of stacks with diameter > 1.000 mm
- Fine dust sampling option **ParTrace[®]** for sampling and separating of PM10, PM2.5 and PM1 in parallel to the dioxins available
- Specification for dilution air provision
 - 6 bar
 - dew point < +5°C
 - 6 m³/h @ 1 bar nominal
 - 9 m³/h @ 1 bar max
- User interface in colour with keyboard





DioxinMonitoringSystem[®] Compact version



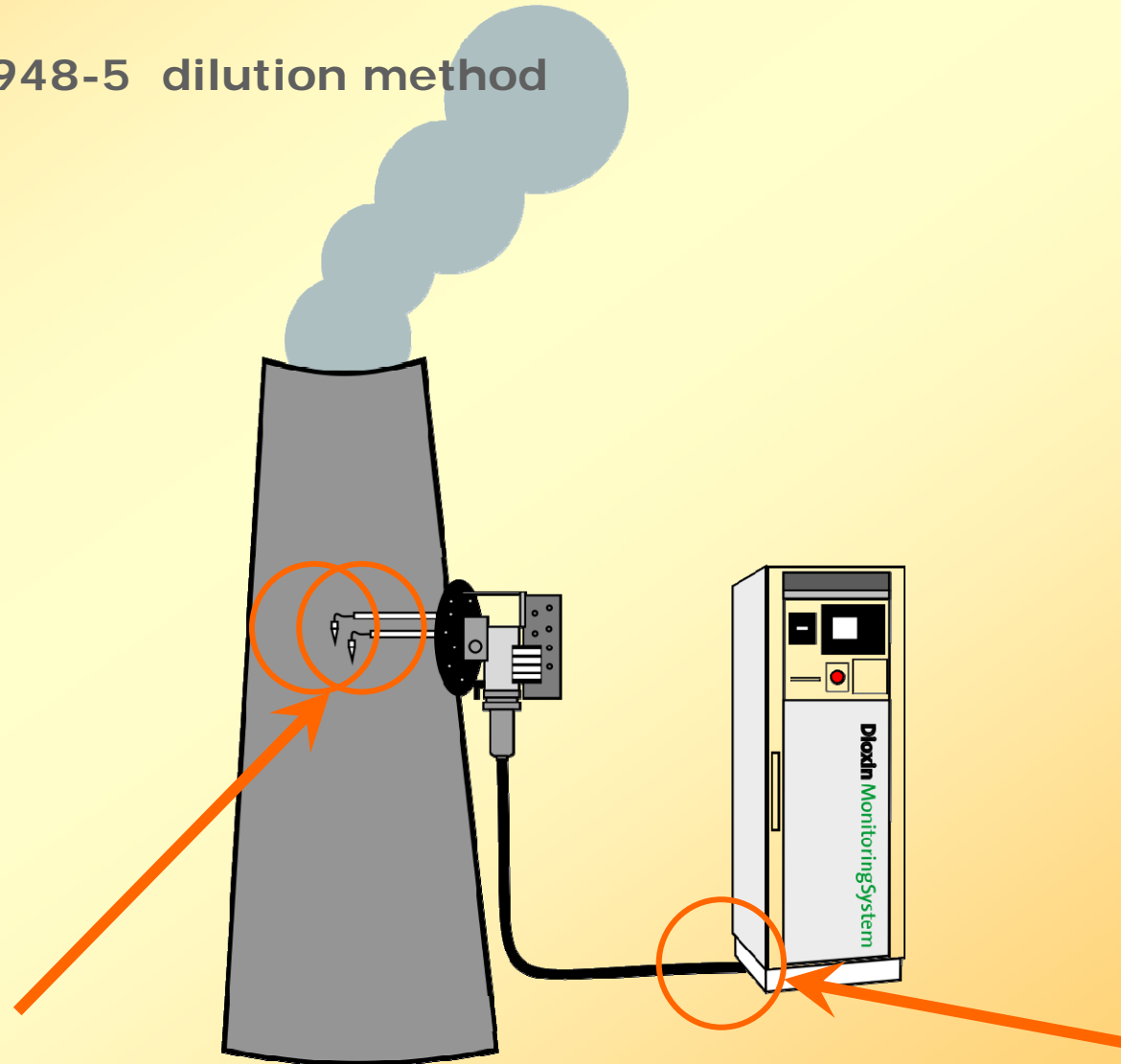
- **Single probe** version
- **Multiplex 1:2** option for alternating sampling from one of two chimneys available
- Specification for dilution air provision
 - 6 bar
 - dew point < -5°C
 - 4 m³/h @ 1 bar nominal
 - 7 m³/h @ 1 bar max
- User interface B/W with touch screen





Dilution method - Standard version

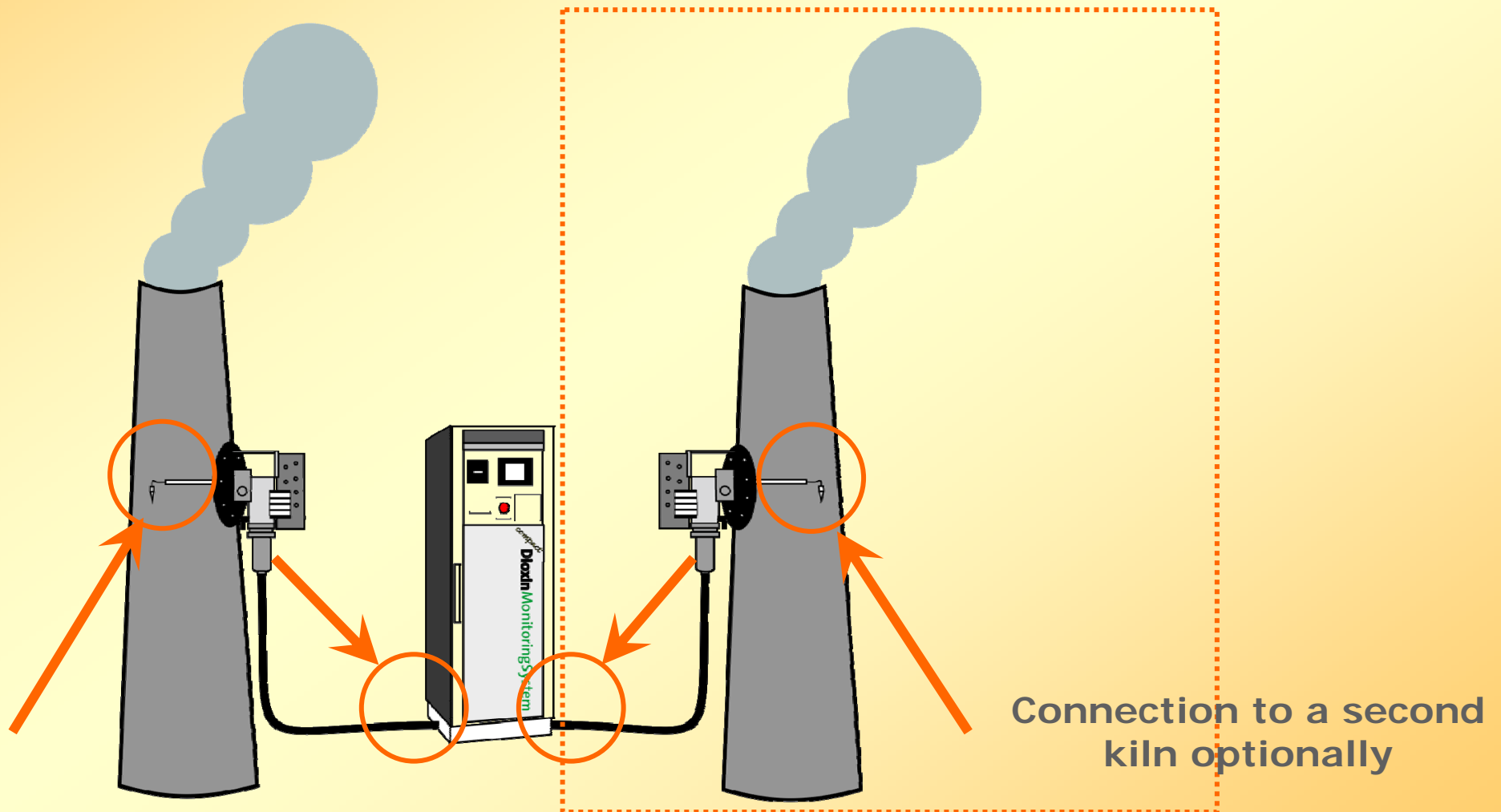
Method: EN1948-1/TS 1948-5 dilution method





Dilution method - Compact version

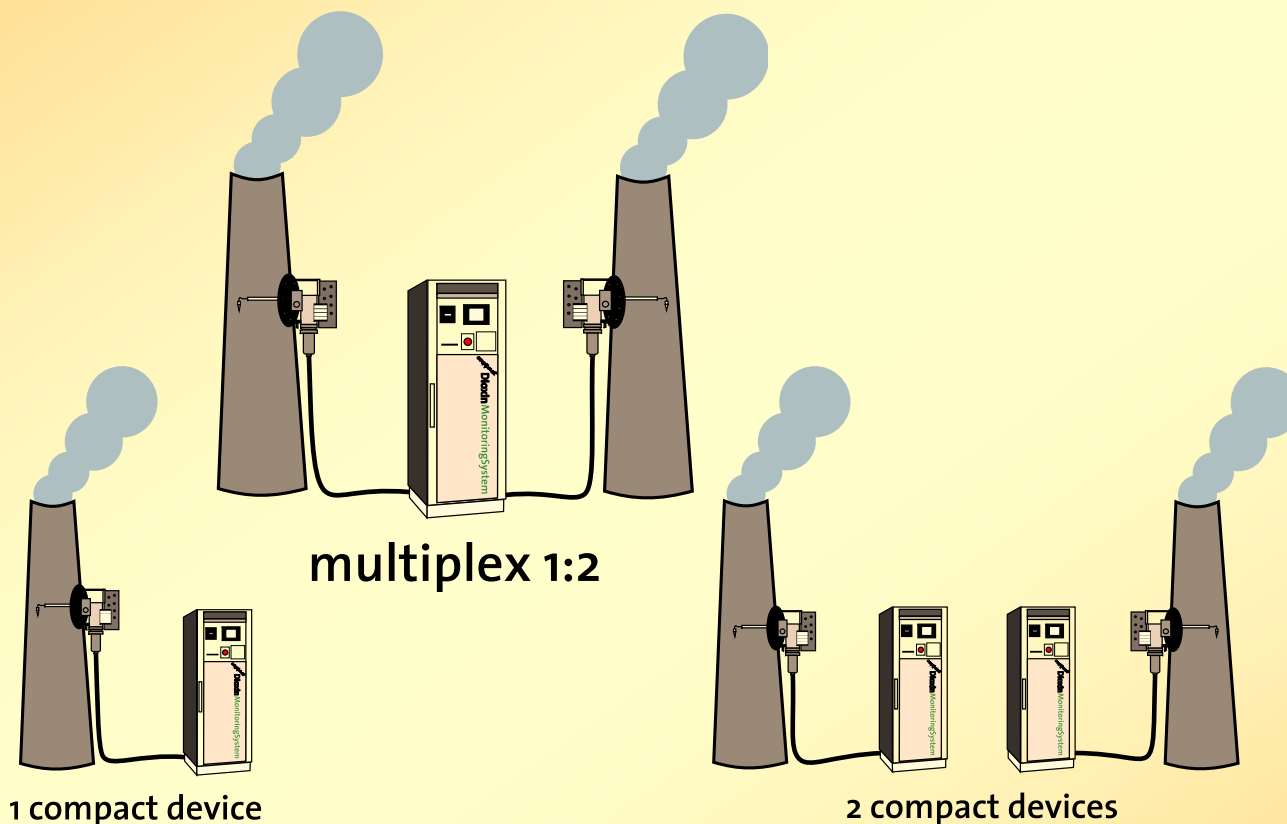
Method: EN1948-1/TS 1948-5 dilution method





Multiplex 1:2 version

The multiplex 1:2 version is an extension for the **compact DioxinMonitoringSystem®** device to operate 1 of 2 sampling units alternating with one control unit only. It represents a very cost efficient solution, designed for special applications and redundancy use.



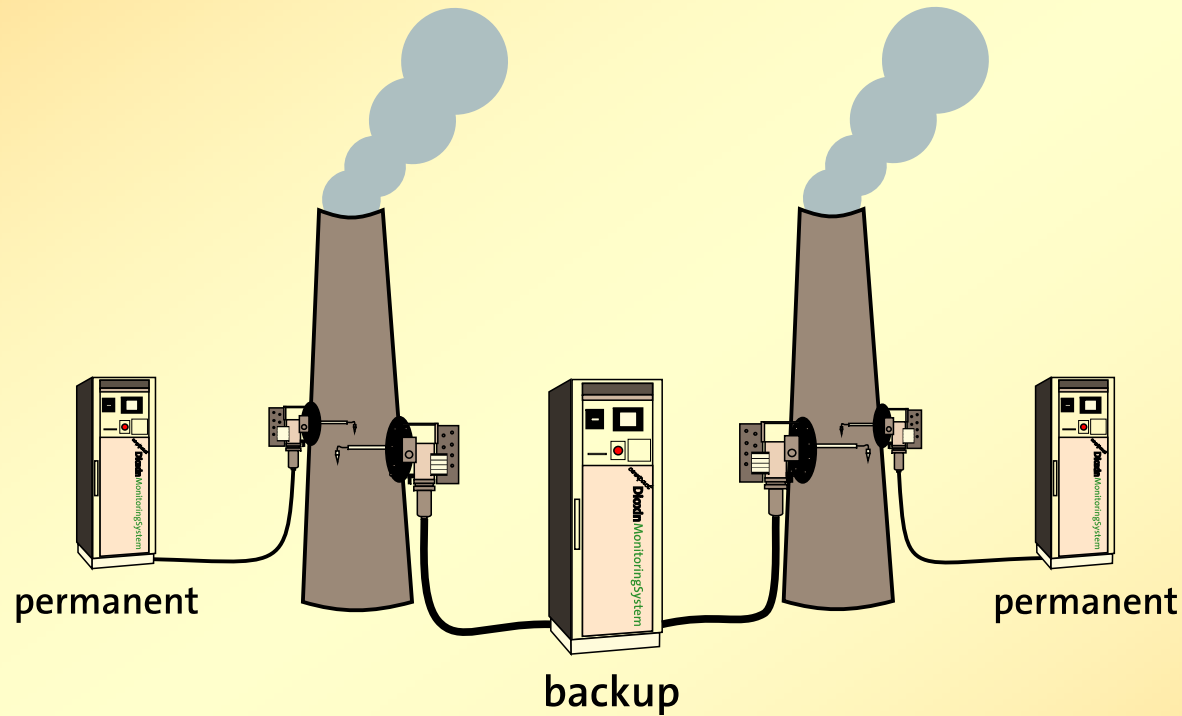
Features

- Independent , sequential operation of the sampling units
- Programmed manual or configured automatic switching
- Compact devices upgradeable to multiplex 1:2
- Multiplex devices upgradeable to 2 separate compact devices



Multiplex 1:2 - the redundancy solution

- one of two sampling lines alternating
- backup-device for two permanent monitored lines





DioxinMonitoringSystem® sampling

Sampling Method

The **DioxinMonitoringSystem**® device uses the dilution method of the standard EN 1948-1/TS1948-5 standard. Many advantages underline the versatile use of this method.

Dry sampling

The dilution method used in the devices avoids condensation, whereas the cooled probe method and the filter/condenser method condense the humidity inside the filter/absorber. Referring to EN 1948-1, this liquid phase has to be collected and transferred completely to the laboratory. E.g. sampling of 1 m³/h at 20% humidity produce 4 kg of condensate in one day, 28 kg in one week and consequently 108 kg in one month. The dilution method condenses no humidity. Therefore a dry cartridge is transferred to the laboratory.

Complete sampling of the dust fraction

The EN 1948-1/TS1948-5 standard requires the precipitation of the fine dust fraction with better than 99.5% as a minimum requirement. The dilution method uses a dry filter at 40°C temperature, precipitating all dust particles. The fine dust fraction precipitation efficiency is 99.5 % @ 0.3 µm and 99.9 @ 0.6 µm.

New investigations in Germany have shown, that in modern municipal waste incineration plants the portion of the fine dust fraction is higher than 60%. Other long term sampling devices for dioxins use wet glass wool for dust precipitation, which is not sufficient, because fine dust can pass the cartridge, already precipitated dust can be solved only and washed through the cartridges.

Low sampling temperature

In flue gas, dioxins are adsorbed to particles but also evaporated in the gas phase. By cooling the flue gas with dilution air, a high portion of the gaseous dioxins are adsorbed by the particles, thus, most of the dioxins are precipitated on the dust filter at the temperature of 40°C. At this low temperature, no further reactions (losses) or synthesis (formation) are possible.

Two measurement positions compared to traversing

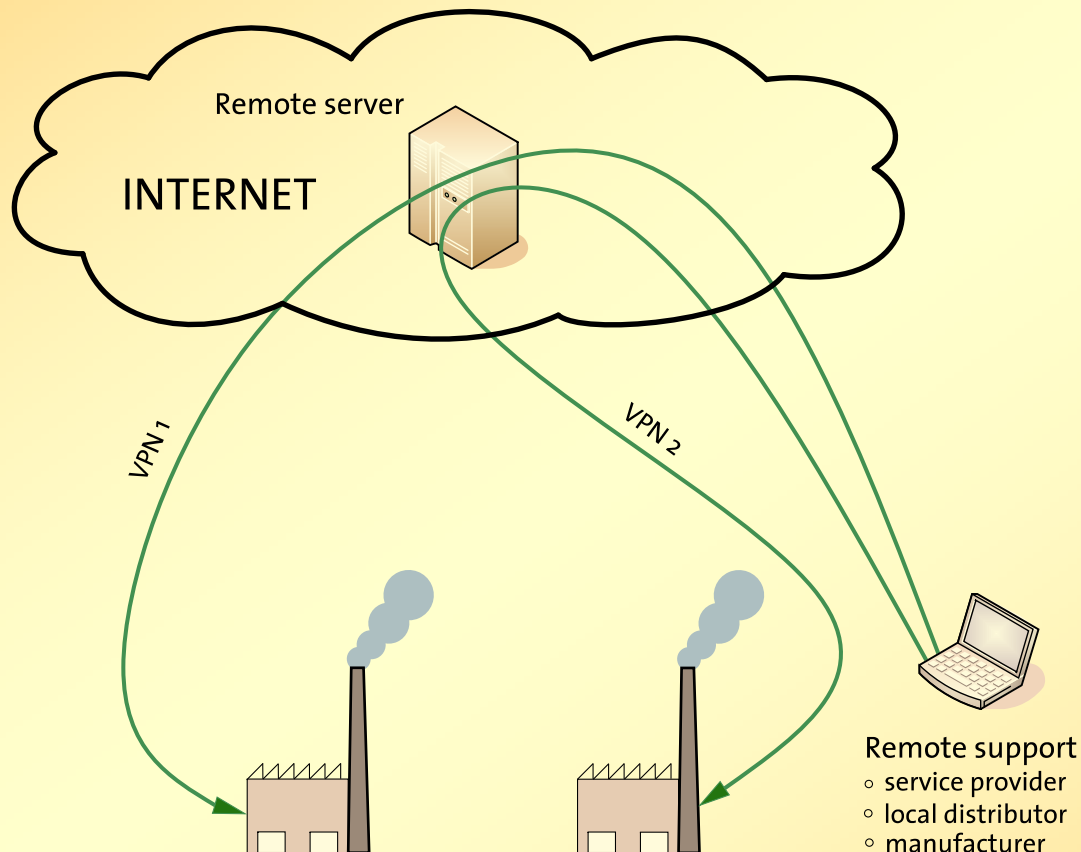
EN 1948-1/TS 1948-5 requires representative sampling. For highest accuracy, traversing shall be done according EN 13284-1, using 4, 9 or 16 positions in the stack. EN 1948-1 allows the use of two (but not one !) measurement positions instead of traversing. In this case (two positions instead of traversing) the measurement uncertainty has to be increased by only 10% (part 3, Annex B.3).

The dilution method is a complex method, which needs many adjustments during measurement. The **DioxinMonitoringSystem® provides these adjustments automatically - accurate I-TEQ values are the result.**



Remote Services

Devices on site can be monitored, supported and controlled with remote control through a secured access using internet connections. This enables quick response through service partners and smooth operation.



Technical Data

Access:

Connection through internet with
cable (DNX)
wireless (UMTS)

Security:

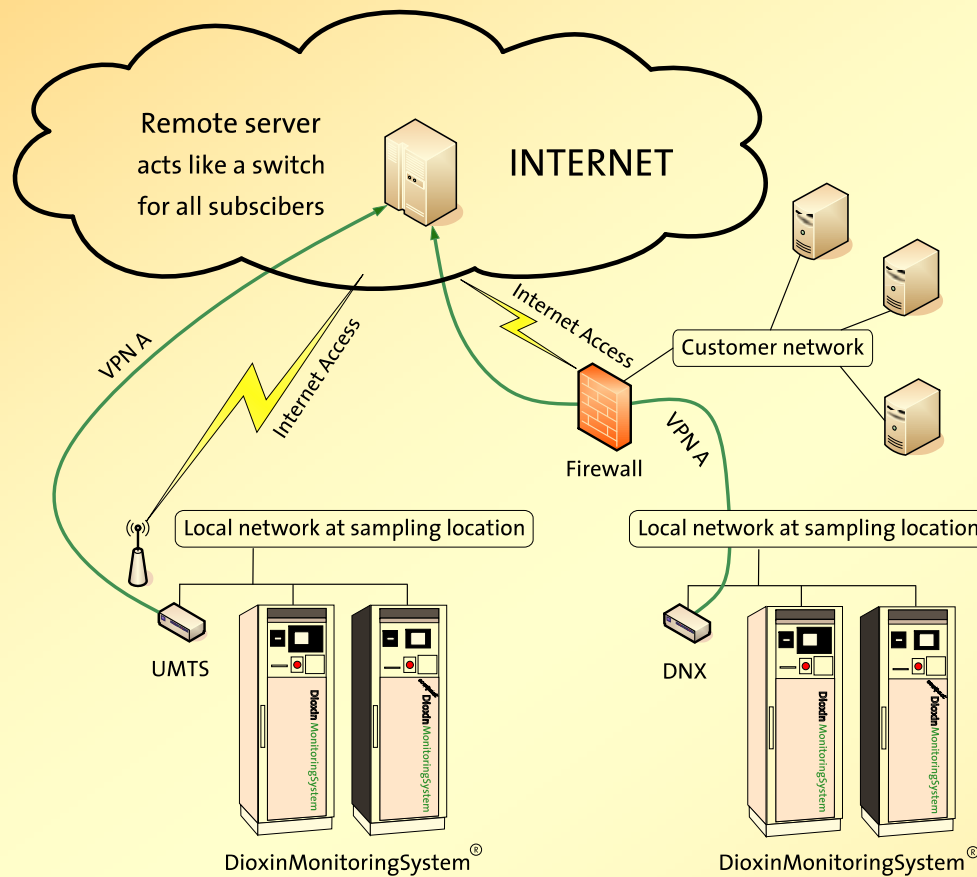
VPN tunnel connection

Application:

internal access, e.g. from control room
external access, e.g. by service partners



Remote Services



- telecontrol of operation
- easy installation
- easy handling
- TCP/IP connection
- DNX or UMTS connections
- long distance connections possible
- error handling made easy
- firewall and password protected



ParTrace[®] Emission

Sampling of fine dust fractions

- **Analytical targets**

- PM, PM10, PM2.5, PM1
- everything else which is particle focussed (metals, etc.)

- **Application**

Add on for standard version
of **DioxinMonitoringSystem[®]** devices





ParTrace[®] Emission compact

Sampling of fine dust fractions

- **Analytical targets**
 - PM, PM10
 - everything else which is particle focussed (metals, etc.)
- **Application**

Add-on for standard version of **DioxinMonitoringSystem[®]** devices





General device features

- **Experience**
a large number of devices are in operation worldwide since 1993
- **Industrial design**
Ensuring low maintenance requirements and low costs.
Construction free from glass parts (front door using security glass)
- **Upgradeability of existing devices**
DioxinMonitoringSystem[®] standard devices can be updated easily for the use of the **ParTrace[®]** option

DioxinMonitoringSystem[®] compact devices can be updated easily for the use of the the **Multiplex 1:2** option



Laboratory procedure

Preparation

- **Cartridge cleaning**
- **Placement of filters**
- **Spiking sampling standard**
 $^{13}\text{C}_{12}$ - Sampling standard pg
for each 100 m³ addition of

1,2,3,7,8-PeCDF 400
1,2,3,7,8,9-HxCDF 400
1,2,3,4,7,8,9-HpCDF 800

Evaluation

- **Spiking with extraction standard**
 $^{13}\text{C}_{12}$ -Extraction standard pg

2,3,7,8-TCDF 400
1,2,3,7,8,9-HxCDD 400
1,2,3,4,6,7,8-HpCDF... OCDD 800
- **Sample preparation according to EN 1948-2**
- **Analysis of filter cartridge and calculation of I-TEQ according to EN 1948-3**

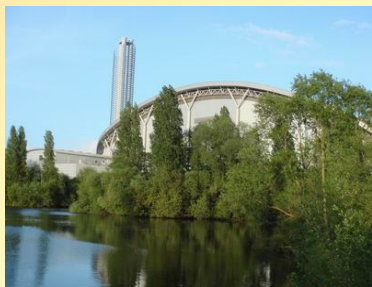


Shipping of filter cartridge
in a special case



Worldwide references

**Monitoring
Systems GmbH**



Applications:

Incineration plants
(municipal waste,
hazardous waste,
industrial, etc.)

Cement production

Brick production

Petrochemical industry

Metallurgic industry

etc.

Total: 150
(by 2016)



List of references by criteria

Country	Kilntype	Fueltype
9 Austria	1 brick production	4 cement
8 Belgium	4 cement kiln	1 factory waste
1 Canada	14 fluidised bed	8 hazardous waste
2 China	97 grate	9 industrial waste
1 Denmark	8 metallurgic plant	5 liquid waste
71 France	1 pyrolysis	112 municipal waste
8 Germany	8 rotary kiln	1 oilbrick plant
20 Italy	1 sinter plant	1 solid waste
9 Korea	3 spray	3 sewage sludge
4 Netherlands	5 static	1 others
2 Portugal	3 others	
4 Spain		
4 UK		
1 USA		
1 other		

Total: 150

(by 2016)



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