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CERTIFICATE

TUV Approved

Certificate number: 0000038508_01

Manufacturer:	MRU GmbH Fuchshalde 8 74172 Neckarsulm Germany
Product:	NOVAplus
Components:	CO, NO, NO_2, SO_2, CO_2, O_2
Test Report:	936/21220650/A dated 14. August 2013
Valid until:	2023-10-03

The measuring equipment was tested and certified
in accordance with the European standard EN 15267 part 1 and 2 and
the "Performance Standard for Portable Emission Monitoring Systems",
Version 3.1, Environment Agency, Great Britain.

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Tested AMS
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Surveillance

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Cologne, 2019-07-01

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Test institute accredited to EN ISO/IEC 17025:2005 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.

Overview

The performance test of the NOVAplus measuring system for the component CO, NO, NO_2, SO_2, CO_2, O_2 was performed in accordance with the "Performance Standard for Portable Emission Monitoring Systems", Version 3.1, Environment Agency, Great Britain.
The test was carried out for the following component and ranges:

Component	Certification range	Supplementary range	Unit
CO	0 - 500	0 -1000	ppm
NO	0 - 300	0 -2000	ppm
NO_2	0 - 200	-	ppm
SO_2*	0 - 500	-	ppm
CO_2	0 - 12	0 - 20	Vol.-%
O_2	0 - 21	-	Vol.-%

* for detection of SO_2 the humidity of waste gas shall not exceed 10 Vol%

In conformity with the applicable standards, the following performance criteria were tested in the laboratory:

- Check of general requirements
- Output ranges and zero-point
- Security
- Indicator of measurement parameters
- Degrees of protection provided by enclosures
- Warm up time
- Determination of response time
- Repeatability standard deviation at zero and at span point
- Lack-of-fit,
- Zero and Span drift
- Influence of ambient temperature
- Influence of interfering components (cross-sensitivity)

A field test was not carried out.

The implemented software version is: version 1.09.15

Minimum requirements of "Performance Standard for Portable Emission Monitoring Systems", Version 3.1, Environment Agency, Great Britain have been fulfilled during performance testing.
The manufacturing process of the NOVAplus of MRU GmbH is controlled within the auditing procedure of the EN 15267-2. For the validity of the certificate an annual audit of the production process is necessary.

Field of Application

The NOVAplus is suitable for use at applications according to the certified components and measuring ranges. The tested ranges have been chosen with respect to the wide application range of the AMS.

The application for the requested certification corresponds to measurement as portable emission monitoring system for the measurement of stack.

The AMS is approved for the ambient air temperature range of +5 to +40°C.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the applications at which it will be installed.

Description of the AMS tested

This certificate applies to automated measurement systems conforming to the following description:

The measuring system NOVAplus is a portable emission monitoring system. The tested system is made for measuring CO, NO, NO_2, SO_2, CO_2, O_2.
The measuring system operates according to the principle of electrochemical cells for CO, NO, NO_2, SO_2 and O_2 and nondispersive infrared sensor for CO_2.

The portable emission monitoring system NOVAplus is attached in a stable suitcase to prevent damages of the measuring system and for transportation.

The measuring system consists of the following components:

- Base unit with condensate separator, sensor unit and data-printer
- Remote control unit (RCU)
- Gas sampling probe with exchangeable probe pipe and sampling line

The base unit contains a Li-Ion battery which is chargeable by external power supply .

The NOVAplus becomes operated by the remote control unit which is energized over the base unit by induction. It contains an SD-card reader and an USB port. So it is possible to save data on SD-card, laptop or to plot it with the built in printer.

The sample gas is pumped through a heated probe and a capillary tube. It is conducted through a peltier gas cooler and a star filter to remove water and particles. Between the star filter and the gas cooler a H_2O moisture sensor obseve the measuring gas. Behind the star filter an auto-zero solenoid valve is arranged. Ambient air can be absorbed there for zero and span calibration. After passing a non-return valve, two dust filters and a nozzle the gas flow is detected by a flow sensor.

After this procedure a part of the gas flow passes the NDIR sensor for the detection of CO_2. The sensor manifold which is fitted with the electrochemical sensors for the detection of O_2,

CO, NO, NO_2 and SO_2 is feeded by the other part of the gas flow. Afterwards the measuring gas is lead off to the ambient air.

An extra tube for purge air is implemented to protect the CO-sensor against high CO-concentrations. It is possible to adjust a CO-limit between 300 ppm and 10000 ppm in steps of 100 ppm. If the CO-level of the flue gas is higher than the adjusted level, the purge pump will be activated.

Due to cross sensitivities of the sensors for O_2, CO, NO_2 and SO_2 a calculation of compensation is implemented.