

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000043528_01

AMS designation: F-701-20 for suspended particulate matter PM₁₀

Manufacturer: DURAG GmbH
Kollaustraße 105
22453 Hamburg
Germany

Test Laboratory: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and found to comply with:
VDI 4202-1 (2002), VDI 4203-3 (2004), EN 12341 (1998),
EN 15267-1 (2009) and EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 13 pages).

The present certificate replaces certificate 0000043528_00 of 30 September 2015.




Publication in the German Federal Gazette
(BAnz) of 26 August 2015

This certificate will expire on:
25 August 2025

German Federal Environment Agency
Dessau, 26 August 2020

TÜV Rheinland Energy GmbH
Cologne, 25 August 2020



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

Test Report:	720349 dated 6 July 2006
Initial certification:	26 August 2015
Expiry date:	25 August 2025
Certificate:	Renewal (of previous certificate 0000043528_00 dated 30 September 2015 valid until 25 August 2020)
Publication:	BAnz AT 26.08.2015 B4, chapter V 37 th notification

Approved application

The certified AMS is suitable for continuous ambient air monitoring of suspended particulate matter, PM₁₀ (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test performed at three different sites and/or different periods.

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

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for monitoring the AMS readings relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification

This certification is based on:

- Test report 720349 dated 6 July 2006 issued by TÜV Süd Industrie Service GmbH and statement on the QMS issued by TÜV Rheinland Energie und Umwelt GmbH on 18 March 2015
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

Publication in the German Federal Gazette: BAnz. 14 October 2006, No. 194, p. 6715, chapter IV number 1.1, UBA announcement dated 12 September 2006:

AMS designation:

F-701-20

Manufacturer:

VEREWA Umwelt- und Prozeßmesstechnik GmbH, Hamburg

Field of application:

For the continuous monitoring of the PM₁₀ fraction in ambient air (stationary operation)

Measuring range during performance testing:

0 to 200 µg/m³

Software version:

2.00b

Notes:

1. During performance testing, the cycle time was 3 h and the sample count rate was 1, which means that an automatic replacement of filters was carried out every 3 h with every filter spot being sampled only once.
2. The instrument must be calibrated on-site regularly using a gravimetric PM₁₀ reference method in accordance with EN 12341.

Test Report:

TÜV Süd Industrie Service GmbH, Munich
Report no.: 720349 dated 6 July 2006

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter V notification 28, UBA announcement dated 3 July 2013:

28 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1)

As of 1 January 2013, Verewa Umwelt- und Prozessmesstechnik GmbH and DURAG GmbH merged. The new manufacturer of the F-701-20 ambient air monitor for dust is DURAG GmbH.

Statement issued by TÜV Nord Umweltschutz GmbH & Co. KG on 30 May 2013

Publication in the German Federal Gazette: BAnz AT 01.04.2014 B12, chapter VI notification 25, UBA announcement dated 27 February 2014:

25 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter IV 28th notification)

The F701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH was equipped with a new evaluation electronics (F701 No11), new circuit boards for the Geiger-Müller amplifier assembly (F701 No32 and No33) a new housing (manufactured by Schroff) as well as new electronics for the optional filter band printer.

The current software version of the measuring system is: 3.04

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 4 October 2013

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chapter V notification 16, UBA announcement dated 17 July 2014:

16 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI 25th notification)

The latest software version of the F-701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH is: 3.10

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 27 March 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 37 UBA announcement dated 22 July 2015:

37 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 1.1) and of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter IV 16th notification)

The production process and quality management for the F701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH meet the requirements of standard EN 15267.

The test report on performance testing, report no. 720349, is available on the internet at www.qal1.de.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 18 March 2015

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, chapter V notification 4, UBA announcement dated 22 February 2017:

4 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V 37th notification)

The latest software version of the F-701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH is: 03.11R0005. Version V03.10R0001 is equally approved. The measuring system may now also be used with SD chips of a newer make (spec. V4.10, 22 January 2013).

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chapter V notification 5, UBA announcement dated 21 February 2018:

5 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 1.1) and of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter V 4th notification)

The latest software version of the F-701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH is: 03.11R0008. The measuring system may also be equipped with the Buschjost 8288200.9638.02400 control valve instead of the Buschjost 8288200.9624.02400 control valve.

Statement issued by TÜV Rheinland Energy GmbH dated 29 September 2017

Publication in the German Federal Gazette: BAnz AT 17.07.2018 B9, chapter III notification 28, UBA announcement dated 3 July 2018:

28 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (p. 6715, chapter IV number 1.1) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V 5th notification)

The latest software version of the F-701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH is: 04.11R0009

The instrument housing was adapted to be fitted into a 19" rack.

The measuring system is also available as instrument version with external pump. This version is clearly marked by the letter "F" in the model code system F-701-20 PM xx2-xxxxxF and thus identifiable.

Statement issued by TÜV Rheinland Energy GmbH dated 2 May 2018

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV notification 12, UBA announcement dated 27 February 2019:

12 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 3 July 2018 (BAnz AT 17.07.2018 B9, chapter III 28th notification)

The latest software version of the F-701-20 measuring system for suspended particulate matter, PM₁₀, manufactured by DURAG GmbH is: 4.11R0010.

Instead of the VT-A Drivecontrol manufactured by Ebmpapst used to control the clamping motor so far, the measuring system may also be equipped with the DSA-B60 drive control manufactured by miControl GmbH.

The measuring system can be equipped with the option "dust content analysis", consisting of a filter belt printer with corresponding control electronics as well as a roll with cover foil. The letter "E" in the model code system F-701-20 PM xx2-xxxxxE clearly marks and identifies this option.

Statement issued by TÜV Rheinland Energy GmbH dated 14 September 2018

Certified product

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

The F-701-20 ambient air quality measuring system consists of the PM₁₀ sampling head, the meteorology sensor, the intake tube with active ventilation, the F-701-20 analyser itself incl. glass fibre filter tape, the required connecting tubes and cables as well as adapters, the roof flange as well as the manual in German.

The F-701-20 ambient air quality measuring system uses beta-attenuation as its measurement principle.

The particulate sample passes the PM₁₀ sampling head at a flow rate of 1 m³/h (=16,67 l/min) and reaches the F-701-20 analyser through the intake pipe.

For the performance test the AMS was used with an activated auxiliary tube heating. The auxiliary tube heating keeps the temperature of the sample inlet tube +5°C above the ambient air temperature.

The instrument itself is of a compact design. Except for the sampling probe (intake tube, sampling head), the meteorological sensor to measure air pressure and ambient temperature and the installation for the active ventilation of the intake tube, all components are built in one unit.

The AMS is controlled with the help of a micro controller board.

A step motor transports the filter belt from the supply roll to the take-up roll. The Geiger-Müller tube determines the mass increase on the filter belt on the basis of the attenuation of radiance emitted by the C-14 source. A pump sucks in air. A flow meter measures the flow and a by-pass valve keeps it at a constant flow rate of 1000 l/h. Electronics save the data and control the measurement procedure, which enables a user-optimised handling via a touchscreen.

In a regular test sequence, an unloaded filter spot is inserted in between the C-14 source and the counter tube at the beginning of the sequence. Radiance intensity is measured over a period of 300s. This implies that impulses generated by the counter tube are used as a measure of beta attenuation.

Subsequently, the filter adapter is opened and the filter belt is transported until the assessed filter spot reaches the extraction position. The filter adapter is then closed and the extraction process starts. Once sampling is completed, the filter adapter is opened again and the filter paper is brought into its original position under the counter tube. The filter adapter is closed and the radiance intensity is measured for 300 s again.

Dust load is then determined from the count rates before and after the extraction and dust concentration is calculated from setting it of from extracted air.

The measured values determined are shown in the display and are available both as 4–20 mA analogue signals and via a serial RS232 interface (e.g. using the Bayern-Hessen protocol, Gesytec).

General remarks

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacturing process for the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at gal1.de.

Document history

Certification of the F-701-20 measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Basic testing

Test Report: 720349 dated 6 July 2006
TÜV Süd Industrie Service GmbH, Munich

Publication: BAnz. 14 October 2006, No. 194, p. 6715, chapter IV number 1.1
UBA announcement dated 12 September 2006

Notifications

Statement issued by TÜV Nord Umweltschutz GmbH & Co. KG on 30 May 2013
Publication: BAnz AT 23.07.2013 B4, chapter V notification 28
UBA announcement dated 3 July 2013
(Manufacturer changed name)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 4 October 2013
Publication: BAnz AT 01.04.2014 B12, chapter VI notification 25
UBA announcement dated 27 February 2014
(new evaluation electronics, housing and circuit board, new software version)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 March 2014
Publication: BAnz AT 05.08.2014 B11, chapter V notification 16
UBA announcement dated 17 July 2014
(New software version)

Initial certification according to EN 15267

Certificate no. 0000043528: 30 September 2015
Expiry date of the certificate: 25 August 2020
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 18 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 37
UBA announcement dated 22 July 2015

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016
Publication: BAnz AT 15.03.2017 B6, chapter V notification 4
UBA announcement dated 22 February 2017
(software updates)

Statement issued by TÜV Rheinland Energy GmbH dated 29 September 2017
Publication: BAnz AT 26.03.2018 B8, chapter V notification 5
UBA announcement dated 21 February 2018
(New software version, adapted hardware)

Statement issued by TÜV Rheinland Energy GmbH dated 2 May 2018
Publication: BAnz AT 17.07.2018 B9, chapter III notification 28
UBA announcement dated 3 July 2018
(Design and software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 14 September 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 12
UBA announcement dated 27 February 2019
(Design and software changes)

Renewal of the certificate

Certificate no. 0000043528_01: 26 August 2020
Expiry date of the certificate: 25 August 2025

Expanded uncertainty $U(c)$ of the individual results for system 1 (S/N 10759), excerpt from test report no. 720349 dated 6 July 2006 issued by TÜV Süd Industrie Service GmbH

Gerät 1 (Seriennr. 10759)
Bezugswert (I_2): 50 $\mu\text{g}/\text{m}^3$

Verfahrenskenngröße	Anforderung	Ergebnis	Unsicherheit in $\mu\text{g}/\text{m}^3$	Quadrat der Unsicherheit in $(\mu\text{g}/\text{m}^3)^2$
Reproduzierbarkeit	≥ 10	10	2,00	4,00
Vertrauensbereich nach DIN EN 12341 (CI95)	$\leq 5 \mu\text{g}/\text{m}^3$	3,95	2,28	5,20
Temperaturabhängigkeit am Nullpunkt	$\leq 2 \mu\text{g}/\text{m}^3$	-0,30	-0,17	0,03
Temperaturabhängigkeit des Messwertes	$\leq 2 \mu\text{g}/\text{m}^3$	-0,36	-0,21	0,04
Drift am Nullpunkt	$\leq 2 \mu\text{g}/\text{m}^3$	0,0003	0,0002	0,00000003
Drift des Messwertes	$\leq 2 \mu\text{g}/\text{m}^3$	-1,12	-0,65	0,42
Netzspannung	$\leq 2 \mu\text{g}/\text{m}^3$	-1,44	-0,83	0,69
Querempfindlichkeit	$\leq 6 \mu\text{g}/\text{m}^3$	-1,40	-0,81	0,65
Unsicherheit durch Filterwechselzeit	-	0,14	0,08	0,01
Unsicherheit des Prüfstandards	$\leq 1 \mu\text{g}/\text{m}^3$	2,00	1,15	1,33
$\sum_k U^2(c_k)$				12,38
$U(\bar{c}) = 2U(\bar{c})$				7,04 $\mu\text{g}/\text{m}^3$
$\frac{U(\bar{c})}{I_2}$				14,1%

Expanded uncertainty U(c) of the averages for system 1 (S/N 10759), excerpt from test report no. 720349 dated 6 July 2006 issued by TÜV Süd Industrie Service GmbH

Gerät 1 (Seriennr. 10759)

B₁ (I₁):

40 µg/m³

Verfahrenskenngröße	Unsicherheit (Einzelwert) in µg/m³	Zeitbasis	Anzahl n _k	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	2,00	24 h	365	0,01
Vertrauensbereich nach DIN EN 12341 (CI95)	2,28	1 a	1	5,20
Temperaturabhängigkeit am Nullpunkt	-0,17	1 a	1	0,03
Temperaturabhängigkeit des Messwertes	-0,21	1 a	1	0,04
Drift am Nullpunkt	0,0002	3 Wochen	21	0,000000001
Drift des Messwertes	-0,65	3 Wochen	21	0,02
Netzspannung	-0,83	1 a	1	0,69
Querempfindlichkeit	-0,81	1 a	1	0,65
Unsicherheit durch Filterwechselzeit	0,08	24 h	365	0,000018
Unsicherheit des Prüfstandards	1,15	1 a	1	1,33
			$\sum_k U^2(c_k)$	7,98
			$U(\bar{c}) = 2U(\bar{c})$	5,65 µg/m³
			$\frac{U(\bar{c})}{I_1}$	14,1%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		

Expanded uncertainty U(c) of the individual results for system 2 (S/N 10760), excerpt from test report no. 720349 dated 6 July 2006 issued by TÜV Süd Industrie Service GmbH

Gerät 2 (Seriennr. 10760)
Bezugswert (I₂): 50 µg/m³

Verfahrenskenngröße	Anforderung	Ergebnis	Unsicherheit in µg/m³	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	≥ 10	10	2,00	4,00
Vertrauensbereich nach DIN EN 12341 (CI95)	≤ 5 µg/m³	3,95	2,28	5,20
Temperaturabhängigkeit am Nullpunkt	≤ 2 µg/m³	0,80	0,46	0,21
Temperaturabhängigkeit des Messwertes	≤ 2 µg/m³	-1,68	-0,97	0,94
Drift am Nullpunkt	≤ 2 µg/m³	0,0010	0,0006	0,00000033
Drift des Messwertes	≤ 2 µg/m³	-1,04	-0,60	0,36
Netzspannung	≤ 2 µg/m³	-1,64	-0,95	0,90
Querempfindlichkeit	≤ 6 µg/m³	-0,50	-0,29	0,08
Unsicherheit durch Filterwechselzeit	-	0,14	0,08	0,01
Unsicherheit des Prüfstandards	≤ 1 µg/m³	2,00	1,15	1,33
			$\sum_k u^2(c_k)$	13,04
			$U(\bar{c}) = 2u(\bar{c})$	7,22 µg/m³
			$\frac{U(\bar{c})}{I_2}$	14,4%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		

Expanded uncertainty U(c) of the averages for system 2 (S/N 10760), excerpt from test report no. 720349 dated 6 July 2006 issued by TÜV Süd Industrie Service GmbH

Gerät 2 (Seriennr. 10760)
B₁ (I₁): 40 µg/m³

Verfahrenskenngröße	Unsicherheit (Einzelwert) in µg/m ³	Zeitbasis	Anzahl n _k	Quadrat der Unsicherheit in (µg/m ³) ²
Reproduzierbarkeit	2,00	24 h	365	0,01
Vertrauensbereich nach DIN EN 12341 (CI95)	2,28	1 a	1	5,20
Temperaturabhängigkeit am Nullpunkt	0,46	1 a	1	0,21
Temperaturabhängigkeit des Messwertes	-0,97	1 a	1	0,94
Drift am Nullpunkt	0,0006	3 Wochen	21	0,000000016
Drift des Messwertes	-0,60	3 Wochen	21	0,02
Netzspannung	-0,95	1 a	1	0,90
Querempfindlichkeit	-0,29	1 a	1	0,08
Unsicherheit durch Filterwechselzeit	0,08	24 h	365	0,000018
Unsicherheit des Prüfstandards	1,15	1 a	1	1,33
			$\sum_k u^2(c_k)$	8,70
			$U(\bar{c}) = 2u(\bar{c})$	5,90 µg/m ³
			$\frac{U(\bar{c})}{I_1}$	14,7%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		