

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040216

Certified AMS: Model 5030i SHARP with PM₁₀-pre-separator for particulate matter PM₁₀

Manufacturer: Thermo Fisher Scientific
27 Forge Parkway
Franklin, MA 02038
USA

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

**This is to certify that the AMS has been tested
and found to comply with:**

**VDI 4202-1: 2010, VDI 4203-3: 2010, EN 12341: 1998,
Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods: 2010
EN 15267-1: 2009 and EN 15267-2: 2009**

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000040216

Publication in the German Federal Gazette
(BAnz.) of 01 April 2014

German Federal Environment Agency
Dessau, 29 April 2014



i. A. Dr. Marcel Langner

This certificate will expire on:
31 March 2019

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 28 April 2014



ppa. Dr. Peter Wilbring

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TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Cologne

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Test report:	936/21209885/G of 20 September 2013
Initial certification:	01 April 2014
Date of expiry:	31 March 2019
Publication:	BAnz AT 01 April 2014 B12, chapter IV, No. 7.3

Approved application

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

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test at four different test sites respectively time periods.

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

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

Basis of the certification

This certification is based on:

- test report 936/21209885/G of 20 September 2013 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz AT 01 April 2014 B12, chapter IV, No. 7.3)
Announcement by UBA from 27 February 2014

AMS designation:

Model 5030i SHARP with PM₁₀-pre-separator for particulate matter PM₁₀

Manufacturer:

Thermo Fisher Scientific, Franklin, USA

Field of application:

For permanent monitoring of suspended particulate matter PM₁₀ in ambient air (stationary operation)

Measuring range during the performance test:

Component	Certification range	Unit
PM ₁₀	0 - 1000	µg/m ³

Software version:

V02.00.00.232+

Restrictions:

None

Notes:

1. The requirements of the coefficients of variation R^2 as per Standard EN EN 12341 were not fulfilled by both candidates for the location Cologne (winter), Bornheim (summer) and Teddington (summer).
2. The reference equivalence function for Teddington (summer) is not within the limits of the acceptance range as per Standard EN 12341.
3. The requirements according to the Guide "Demonstration of Equivalence of Ambient Air Monitoring Methods" are fulfilled for measuring component PM₁₀.
4. The measuring system must be operated in a lockable measuring cabinet.
5. The measuring system must be regularly calibrated on location with the gravimetric PM₁₀ reference method according to EN 12341.
6. It is recommended to operate the measuring system with the threshold for the relative humidity being 58 %, especially at sites where the ratio of volatiles in suspended particulate matter is significantly high.
7. The test report on the performance test can be viewed on the internet at www.qal1.de.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21209885/G of 20 September 2013

Certified product

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

The model 5030i SHARP ambient air measuring system consists of the PM₁₀ sampling head, the heated sampling tube (dynamic heating system DHS), the (optional) extension tube, the ambient air sensor (incl. radiation protection shield), the vacuum pump, the nephelometer assembly (=SHARP optic module), the central unit (=SHARP beta module, identical to Model 5014 i beta) incl. fibreglass filter belt, the respective corresponding connection lines, cables and adapters, the roof duct incl. flange and the manual in German.

The model 5030i SHARP ambient air measuring system is based on the combination of the measuring principles particle light dispersion (nephelometry) and beta reduction. The term SHARP stands for "Synchronised Hybrid Ambient Real-time Particulate".

The particle sample passes through the PM₁₀ sampling head with a flow rate of 1 m³/h (=16.67 l/min) and flows via the heated sampling tube (DHS = dynamic heating system) to the actual model 5030i SHARP measuring system.

The nephelometer assembly is located beneath the heated tube. The fine dust passes laterally through the insulated nephelometer and then flows into the radial tube above the radiometric assembly. The nephelometer consists of a light-dispersion based photometer with a pulsed near-IR LED which works with a central wavelength of 880 nm.

A radial, insulated tube connects to the sampling tube at the point where the nephelometer is attached to the housing of the measuring system. The nephelometer can thus be easily detached from the actual measuring system. The model 5030i SHARP measuring system (nephelometer measurement with radiometric measurement combination) can thereby be easily converted into the model 5014i BETA measuring system.

After the particle sample has passed through the nephelometer the particles are separated on the fibreglass filter belt of the radiometric measurement. The filter belt is located between the proportional detector and the ¹⁴C beta emitter. The beta ray travels upwards through the filter belt and the accumulating dust layer. The intensity of the beta ray is reduced by the increasing dust load, which then leads to a reduced beta intensity that is measured by the proportional detector. The mass on the filter belt is calculated from the continuous integrated count rate.

In order to maintain the sample flow at its nominal value the flow and the regulation of the proportional valve are measured continuously.

The PM concentrations are shown on the display on the front of the measuring system as SHARP- (=hybrid values), PM (= radiometric measurement values (the same as in model 5014i BETA)) and NEPH (=scattered light measurement values). The measurement values can be provided as data in a variety of output forms (analogue, digital, Ethernet).

General notes

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 manufacture of 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 Energie und Umwelt 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 can be applied to the product or used in publicity material for the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet: qal1.de.

Certification of Model 5030i SHARP with PM₁₀-pre-separator for particulate matter PM₁₀ is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267

Certificate No. 0000040216: 29 April 2014

Validity of the certificate: 31 March 2019

Test report: 936/21209885/G of 20 September 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 01 April 2014 B12, chapter IV, No. 7.3
Announcement by UBA from 27 February 2014

Calculation of overall uncertainty

PM10 5030i Sharp	23,8% $\geq 28 \mu\text{g m}^{-3}$	Orthogonal Regression				Betw een Instrument Uncertainties	
	$W_{CM} / \%$	n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	Reference	Candidate
All Data	9.2	202	0.967	1.009 +/- 0.013	-0.392 +/- 0.327	0.63	1.10
< 30 $\mu\text{g m}^{-3}$	8.0	161	0.903	0.986 +/- 0.024	0.109 +/- 0.431	0.63	1.13
$\geq 30 \mu\text{g m}^{-3}$	13.7	41	0.938	1.112 +/- 0.044	-5.181 +/- 1.940	0.63	1.22

SN3	Dataset	Orthogonal Regression				Limit Value of 50 $\mu\text{g m}^{-3}$	
		n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	$W_{CM} / \%$	% $\geq 28 \mu\text{g m}^{-3}$
Individual Datasets	Bornheim Winter	42	0.976	0.987 +/- 0.024	0.975 +/- 0.745	8.46	42.9
	Cologne Winter	43	0.947	1.033 +/- 0.037	-1.570 +/- 1.256	12.91	53.5
	Bornheim Summer	71	0.952	0.986 +/- 0.026	0.461 +/- 0.534	8.69	9.9
	Teddington Summer	46	0.855	0.975 +/- 0.056	0.655 +/- 0.813	7.25	0.0
Combined Datasets	< 30 $\mu\text{g m}^{-3}$	161	0.899	0.982 +/- 0.025	0.625 +/- 0.439	7.85	4.3
	$\geq 30 \mu\text{g m}^{-3}$	41	0.938	1.102 +/- 0.044	-4.835 +/- 1.911	13.38	100.0
	All Data	202	0.966	0.994 +/- 0.013	0.286 +/- 0.329	9.29	23.8

SN4	Dataset	Orthogonal Regression				Limit Value of 50 $\mu\text{g m}^{-3}$	
		n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	$W_{CM} / \%$	% $\geq 28 \mu\text{g m}^{-3}$
Individual Datasets	Bornheim Winter	42	0.981	1.027 +/- 0.022	-0.073 +/- 0.689	9.19	42.9
	Cologne Winter	45	0.944	1.049 +/- 0.038	-2.653 +/- 1.250	13.58	51.1
	Bornheim Summer	75	0.935	1.017 +/- 0.030	-1.191 +/- 0.623	10.35	9.3
	Teddington Summer	46	0.833	0.921 +/- 0.057	0.304 +/- 0.831	16.19	0.0
Combined Datasets	< 30 $\mu\text{g m}^{-3}$	167	0.876	0.996 +/- 0.027	-0.601 +/- 0.485	9.32	4.2
	$\geq 30 \mu\text{g m}^{-3}$	41	0.929	1.128 +/- 0.048	-5.747 +/- 2.091	14.88	100.0
	All Data	208	0.960	1.029 +/- 0.014	-1.242 +/- 0.359	10.32	23.1

Calculation of overall uncertainty slope corrected

PM10 5030i Sharp Slope and Intercept Corrected	23.8% $\geq 28 \mu\text{g m}^{-3}$	Orthogonal Regression				Betw een Instrument Uncertainties	
	$W_{CM} / \%$	n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	Reference	Candidate
All Data	9.6	202	0.967	1.000 +/- 0.013	0.003 +/- 0.324	0.63	1.09
< 30 $\mu\text{g m}^{-3}$	8.5	161	0.903	0.976 +/- 0.024	0.504 +/- 0.427	0.63	1.12
$\geq 30 \mu\text{g m}^{-3}$	13.8	41	0.938	1.102 +/- 0.044	-4.729 +/- 1.922	0.63	1.21

SN3	Dataset	Orthogonal Regression				Limit Value of 50 $\mu\text{g m}^{-3}$	
		n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	$W_{CM} / \%$	% $\geq 28 \mu\text{g m}^{-3}$
Individual Datasets	Bornheim Winter	42	0.976	0.978 +/- 0.024	1.358 +/- 0.738	8.82	42.9
	Cologne Winter	43	0.947	1.023 +/- 0.037	-1.159 +/- 1.244	13.10	53.5
	Bornheim Summer	71	0.952	0.976 +/- 0.026	0.850 +/- 0.529	9.12	9.9
	Teddington Summer	46	0.855	0.965 +/- 0.055	1.048 +/- 0.805	7.89	0.0
Combined Datasets	< 30 $\mu\text{g m}^{-3}$	161	0.899	0.972 +/- 0.025	1.016 +/- 0.435	8.34	4.3
	$\geq 30 \mu\text{g m}^{-3}$	41	0.938	1.092 +/- 0.043	-4.387 +/- 1.893	13.54	100.0
	All Data	202	0.966	0.985 +/- 0.013	0.676 +/- 0.326	9.65	23.8

SN4	Dataset	Orthogonal Regression				Limit Value of 50 $\mu\text{g m}^{-3}$	
		n_{c-s}	r^2	Slope (b) +/- u_b	Intercept (a) +/- u_a	$W_{CM} / \%$	% $\geq 28 \mu\text{g m}^{-3}$
Individual Datasets	Bornheim Winter	42	0.981	1.018 +/- 0.022	0.318 +/- 0.683	9.37	42.9
	Cologne Winter	45	0.944	1.039 +/- 0.037	-2.231 +/- 1.238	13.78	51.1
	Bornheim Summer	75	0.935	1.007 +/- 0.030	-0.785 +/- 0.618	10.70	9.3
	Teddington Summer	46	0.833	0.911 +/- 0.057	0.701 +/- 0.823	16.69	0.0
Combined Datasets	< 30 $\mu\text{g m}^{-3}$	167	0.876	0.986 +/- 0.027	-0.196 +/- 0.480	9.81	4.2
	$\geq 30 \mu\text{g m}^{-3}$	41	0.929	1.117 +/- 0.047	-5.288 +/- 2.072	14.97	100.0
	All Data	208	0.960	1.019 +/- 0.014	-0.837 +/- 0.355	10.60	23.1

CONFIRMATION

Notification: 0000040216_00_01_rev1
on changes according to EN 15267 regarding certificate 0000040216 dated 29 April 2014

Measuring system: Model 5030i SHARP with PM₁₀-pre-separator for particulate matter PM₁₀

Manufacturer: Thermo Fisher Scientific
27 Forge Parkway
Franklin, MA 02038
USA

German Federal Environmental Agency (UBA)

**Announcement about the uniform practice in
monitoring emissions and ambient air.**

17 July 2014

Federal Gazette BAnz AT 05.08.2014 B11

**V. Notifications to the uniform practice for the continuous monitoring of
emissions and ambient air:**

**27 Notification as regards Federal Environmental Agency notices of 27 February 2014
(Federal Gazette (BAnz) AT 01.04.2014 B12, chapter IV, no. 7.3)**

The flow and the vacuum sensor of the Modell 5030i SHARP measuring system with PM₁₀-pre-separator for monitoring suspended particulate matter PM₁₀ manufactured by Thermo Fisher Scientific will hereafter come with internal parylene coating. The corresponding sensor board will now be mounted vertically within the instrument.

Additionally, the measuring system is fitted with a relief valve between pump outlet and bypass filter.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 29 March 2014

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 8 September 2014


i. A. Dipl.-Ing. Guido Baum


i. A. Dipl. Ing. Carsten Röllig

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Am Grauen Stein
51105 Cologne

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.

BESCHEINIGUNG

Mitteilung: 0000040216_00_02_rev1
über Änderungen nach DIN EN 15267 zum Zertifikat: 0000040216 vom 29. April 2014

Messeinrichtung: Modell 5030i SHARP mit PM₁₀-Vorabscheider
für Schwebstaub PM₁₀

Hersteller: Thermo Fisher Scientific
27 Forge Parkway
Franklin, MA 02038
USA

Umweltbundesamt

**Bekanntmachung über die bundeseinheitliche Praxis bei der
Überwachung der Emissionen und der Immissionen.**

Vom 25. Februar 2015

Veröffentlichung: BAnz AT 02.04.2015 B5

**IV. Mitteilungen zur bundeseinheitlichen Praxis bei der Überwachung von
Emissionen und Immissionen:**

- 26 **Mitteilung zu den Bekanntmachungen des Umweltbundesamtes vom
27. Februar 2014 (Banz AT 01.04.2014 B12, Kapitel IV Nummer 7.3) und vom
17. Juli 2014 (Banz AT 05.08.2014 B11, Kapitel V 27. Mitteilung)**

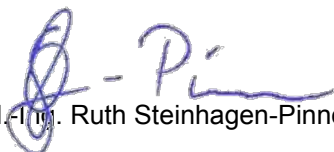
Die aktuelle Softwareversion der Messeinrichtung Modell 5030i SHARP mit PM₁₀-Vorabscheider
für Schwebstaub PM₁₀ der Fa. Thermo Fisher Scientific lautet:


V 02.02.05 (111578-00).

Das Ventil für den automatischen Nullpunktsabgleich wird in Zukunft ein vernickeltes Gehäuse
haben und mit einer Viton Elastomer Dichtung ausgestattet.

Stellungnahme der TÜV Rheinland Energie und Umwelt GmbH vom 22. September 2014

TÜV Rheinland Energie und Umwelt GmbH
Köln, 30. April 2015


i. A. Dipl.-Ing. Ruth Steinhagen-Pinnow


i. A. Dipl.-Ing. Carsten Röllig

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Durch die DAkkS nach DIN EN ISO/IEC 17025:2005 akkreditiertes Prüflabor. Die Akkreditierung gilt nur für den in
der Urkundenanlage D-PL-11120-02-00 aufgeführten Akkreditierungsumfang

CONFIRMATION

Notification: 0000040216_00_03
on changes according to EN 15267 regarding certificate 0000040216_00 dated 29 April 2014

Measuring system: 5030i SHARP with PM₁₀-pre-seperator for particulate matter PM₁₀

Manufacturer: Thermo Fisher Scientific
27, Forge Parkway
Franklin, MA 02038
USA

German Federal Environmental Agency (UBA)

**Announcement about the uniform practice in
monitoring emissions and ambient air
dated 22 February 2017
Federal Gazette: BAnz AT 15.03.2017 B6**

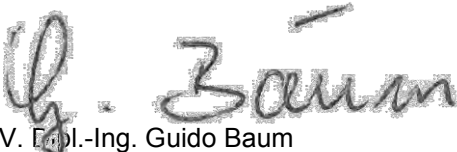
**V Notifications to the uniform practice for the continuous monitoring
of emission and ambient air:**

- 2 Notification as regards Federal Environment Agency notices of
27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 7.3) and
of 25 February 2015 (BAnz AT 02.04.2015 B5 chapter IV 26th notification)

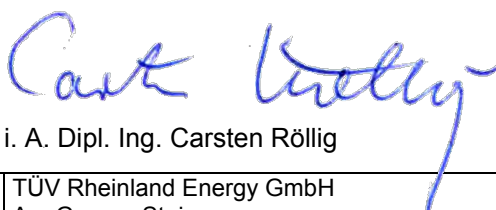
The 5030i SHARP measuring system with PM₁₀ pre-separator for PM₁₀ suspended
particulate matter manufactured by Thermo Fisher Scientific may also be operated
with a GAST 87R647-PDS-HV-913 vacuum pump.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 22 October 2015

TÜV Rheinland Energy GmbH
Cologne, 28 March 2017



i. V. Dipl.-Ing. Guido Baum



i. A. Dipl. Ing. Carsten Röllig

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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.