

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000056504

**Certified AMS:** LaserHawk 360 DI for Dust

**Manufacturer:** Teledyne Monitor Labs  
5 Inverness Drive East  
Englewood, CO 80112  
USA

**Test Institute:** TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested  
and found to comply with the standards:  
EN 15267-1 (2009), EN 15267-2 (2009), EN 15267-3 (2007)  
and EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate  
(this certificate contains 6 pages).



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000056504

Publication in the German Federal Gazette  
(BAnz.) of 03 May 2021

This certificate will expire on:  
02 May 2026

German Federal Environment Agency  
Dessau, 02 June 2021

TÜV Rheinland Energy GmbH  
Cologne, 01 June 2021



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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 the certificate D-PL-11120-02-00.

**Test report:** 936/21243744/B of 15 September 2020  
**Initial certification:** 03 May 2021  
**Expiry date:** 02 May 2026  
**Publication:** BAnz AT 03.05.2021 B9, chapter I number 1.4

### Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13<sup>th</sup> BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17<sup>th</sup> BImSchV), 27<sup>th</sup> BImSchV, 44<sup>th</sup> BImSchV and TA Luft. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a ten-month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of -20 °C to +50 °C.

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

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

### Basis of the certification

This certification is based on:

- Test report 936/21243744/B of 15 September 2020 of TÜV Rheinland Energy GmbH
- 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 AT 03.05.2021 B9, chapter I number 1.4  
Announcement by UBA dated 31 March 2021:

**AMS designation:**

LaserHawk 360 DI for Dust

**Manufacturer:**

Teledyne Monitor Labs, Englewood CO, USA

**Field of application:**

For measurements at plants according to 13<sup>th</sup>, 27<sup>th</sup>, 44<sup>th</sup> BImSchV and TA Luft

**Measuring ranges during the performance test:**

Component	Certification range	Supplementary measurement ranges	Unit
Dust	0 – 20	0 – 50 / 0 – 100 / 0 – 200 / 0 – 300	mg/m <sup>3</sup>

**Software version:**

68332 Board Version (UA): 2.01  
Neuron Board Version (UB): 1.65

**Restrictions:**

1. The measuring device can only be used if it is impossible to fall below the dew point.
2. The requirement for the suitability test according to DIN EN 15267-3 for the correlation coefficient  $R^2$  of the calibration function was not met.

**Notes:**

1. The maintenance interval is three months.
2. The dust concentration is measured in the moist exhaust gas under operating conditions.

**Test report:**

TÜV Rheinland Energy GmbH, Cologne  
Report No.: 936/21243744/B of 15 September 2020



**Certified product**

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

The AMS LaserHawk 360 DI works on the principle of scattered light measurement (backward scattering). The measurement is carried out contactless, continuously and without sampling in the flue gas flow above the dew point. The red light from a laser diode is sent into the measuring channel and illuminates the dust particles in the measuring volume. This light is scattered by the particles in the measuring volume. Dust particles in the exhaust duct reflect some of the projected laser light back into the optical system of the device. The detector of the measuring device detects this backscattered light. The ratio of the measured scattered light intensity to the emitted transmitted light intensity corresponds to the particle density in the measurement volume.

The measured scattered light intensity is proportional to the dust concentration. Since the scattered light intensity does not only depend on the number and size of the particles, but also on their optical properties, the measuring system must be calibrated by a gravimetric comparison measurement for an exact measurement of the dust concentration. The suitability-tested measuring system LaserHawk 360 DI consists of the following main assemblies:

**Optical head unit**

The optical head unit contains all active electronic elements that are necessary to project a modulated red LASER light beam into the exhaust duct and to receive, detect and amplify the returned signal. A numerical display and a keyboard are available for operating the measuring device and are attached directly to the measuring head. An automatic zero and reference point control option is integrated in the optical head unit.

**Purge air system**

The purge air system delivers filtered air to the optic head. The purge air system consists of the fan motor, the hose, the air filter, the fan mounting plate and the protective cover. The purge system directs filtered air into the purge air flange to prevent the optical surfaces of the device from being contaminated.

**Calibration kit**

The calibration kit is a test device that is intended for installation in front of the exit window of the optical head during maintenance work or revisions. The test device can be used to simulate measured values. It also contains test standards that are used in order to be able to carry out zero and reference point checks in the meantime. Each calibration kit is specific to the monitor for which it was set. It is marked with a serial number that matches that of the monitor for which it has been set. Two test standards and an opaque plate for zero point control are supplied with each measuring device. These test filters are intended for use in the calibration kit.

**Light trap**

The optional light trap is a device that prevents laser light that touches the chimney wall opposite the optical head from being reflected back into the viewing optics. The light trap unit is usually only required if a user's chimney diameter is less than 2 m (but may be necessary for larger diameters based on the length of the fastening pipe, the measuring range and other factors). In case of doubt, the manufacturer should be consulted. The light trap is part of the tested scope of the measuring device, but was not required for the investigations in the field, as there was a distance of approx. 5 m to the opposite canal wall.

### 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 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 certification mark may be applied to the product or used in advertising materials for the certified product.

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

The relevant version of this certificate and its expiration is also accessible on the internet: [qal1.de](http://qal1.de).

### History of documents

Certification of LaserHawk 360 DI 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. 0000056504: 02 June 2021  
Expiry date of the certificate: 02 May 2026  
Test report 936/21243744/A dated 15 September 2020  
TÜV Rheinland Energy GmbH, Cologne  
Publication: BAnz AT 03.05.2021 B9, chapter I number 1.4  
Announcement by UBA dated 31 March 2021



**Calculation of overall uncertainty according to EN 14181 and EN 15267-3**

**Measuring system**

Manufacturer	Teledyne Monitor Labs
AMS designation	LaserHawk 360 DI
Serial number of units under test	36000225 / 36000226
Measuring principle	Scattered Light (Backscattering)

**Test report**

Test laboratory	TÜV Rheinland
Date of report	2020-09-15

**Measured component**

Certification range	Dust	0 - 20 mg/m <sup>3</sup>
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**Calculation of the combined standard uncertainty**

**Tested parameter**

			u <sup>2</sup>	
Standard deviation from paired measurements under field conditions *	u <sub>D</sub>	0.205 mg/m <sup>3</sup>	0.042	(mg/m <sup>3</sup> ) <sup>2</sup>
Lack of fit	u <sub>inf</sub>	0.098 mg/m <sup>3</sup>	0.010	(mg/m <sup>3</sup> ) <sup>2</sup>
Zero drift from field test	u <sub>d,z</sub>	-0.035 mg/m <sup>3</sup>	0.001	(mg/m <sup>3</sup> ) <sup>2</sup>
Span drift from field test	u <sub>d,s</sub>	0.323 mg/m <sup>3</sup>	0.104	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of ambient temperature at span	u <sub>t</sub>	0.265 mg/m <sup>3</sup>	0.070	(mg/m <sup>3</sup> ) <sup>2</sup>
Influence of supply voltage	u <sub>v</sub>	0.098 mg/m <sup>3</sup>	0.010	(mg/m <sup>3</sup> ) <sup>2</sup>
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub>	0.162 mg/m <sup>3</sup>	0.026	(mg/m <sup>3</sup> ) <sup>2</sup>

\* The larger value is used :  
"Repeatability standard deviation at set point" or  
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u <sub>C</sub> )	$u_c = \sqrt{\sum (u_{max, j})^2}$	0.51 mg/m <sup>3</sup>
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.01 mg/m <sup>3</sup>

**Relative total expanded uncertainty**

<b>Requirement of 2010/75/EU</b>	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>10.1</b>
<b>Requirement of EN 15267-3</b>	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>30.0</b>
	<b>U in % of the ELV 10 mg/m<sup>3</sup></b>	<b>22.5</b>