PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Signature® Flow Meter with TIENet® 360 LaserFlow® and LaserFlow® Ex Velocity Sensor

Manufactured by:

Teledyne ISCO
4700 Superior Street,
Lincoln,
Nebraska,
68504-1398
USA

has been assessed by CSA Group
and for the conditions stated on this certificate complies with:

Performance Standards and Test Procedures for Continuous Water Monitoring Equipment, Part 3: Performance standards and test procedures for water flowmeters, Environment Agency, Version 4, March 2020

The combined performance characteristic (U_c, the expanded uncertainty) is **4.97%**(LaserFlow®) and **2.80%** (LaserFlow® Ex) - Class 2

Certification Ranges			
Model	**Fluid Velocity (m/s)**	**Water Depth (m)**	**Channel Width (m)**
LaserFlow®	±0.25 - ±1.7	0.01 - 0.75	0.1 - 2.4
LaserFlow® Ex	0.25 - 2.25	0.2 - 0.75	0.1 - 2.4

Project No.: 80215327
Certificate No: CSA MC140265/05
Initial certification: 14 February 2017
Certificate issued: 21 July 2025
Renewal date: 20 July 2026

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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Form 3005
Issue 6

Certificate Contents

Approved Site Application

Any potential user should make sure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For general guidance on monitoring techniques refer to the Environment Agency guidance available at www.mcerts.net

The product is suitable for use, where it is appropriate, for regulated applications such as abstraction, effluent discharge, ultraviolet disinfection and industrial processing.

The field trial for the LaserFlow® took place for three months on the final effluent weir of an industrial processing plant.

The field trial for the LaserFlow® Ex took place for four months between the 17th March 2020 and the 17th July 2020 at the treatment plant influent (91st Avenue Wastewater Treatment Plant, Phoenix, AZ).

Basis of Certification

This certification is based on the following test report(s) and on CSA Group's assessment and ongoing surveillance of the product and the manufacturing process:

R1 WRc Report Number UC10409.1 dated October 2014
R2 WRc Report Number UC9578 v03 dated July 2013
R3 Signature LaserFlow Field Test Report dated 12.09.14
R4 CSA Evaluation report 80037354, dated June 2021

Product Certified

The Signature® Flow Meter with TIENet® 360 LaserFlow® and LaserFlow® Ex Velocity Sensor system consists of the following parts:

- Signature® Flow Meter (100 to 230 V AC). Hardware version A0.
- TIENet® model 360 LaserFlow® Velocity Sensor. Hardware version C2 (firmware v2.1.13 or higher).
- TIENet® model 360 Ex LaserFlow® Ex Velocity Sensor. Hardware version X0 (Firmware v3.02.009).
- Optional external power loss alarm (required for MCERTS conformity).

This certificate applies to all instruments fitted with software version 1.21.037 onwards (Signature® Flow Meter serial number 214B01774 & TIENet® model 360 LaserFlow® Velocity Sensor serial number 214B01652 onwards or Signature® Flow Meter serial number 214B01774 & TIENet® model 360 Ex LaserFlow® Ex Velocity Sensor serial number 219B03402 onwards).

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: LaserFlow® 0°C to +60°C, LaserFlow® Ex -10°C to +60°C
Instrument IP rating: IP68

The instrument meets MCERTS Class 2 requirements for the combined performance characteristic as specified in Table 6 of the MCERTS performance standard. Details of individual performance characteristics are summarised below.

The lab testing was conducted using 3 laser velocity measurement points. The field test was conducted using 13 points.

Results are expressed as error % reading, unless otherwise stated.

Test	*Result expressed as % of the certification range*				*Other results*	*Class*	*MCERTS specification*
	<0.5	*<1*	*<2*	*<5*			
LABORATORY TESTS							
General requirements/initial checks							
Protection against unauthorised access	Password protected						cl. 3.1.2
Indicative device and/or analogue digital output signal	The flowmeter displays totalised volume and/or flow rate						cl. 3.1.3
Units of measurement	The flowmeter records in metric units						cl. 3.1.6 & 3.1.7
Combined performance characteristic (Uc) (note 1)							
LaserFlow®	**4.97%**					**2**	cl. 6.4 - Table 6 - class specific
LaserFlow® Ex	**2.80%**					**2**	
Warm-up time							cl. 6.1.2 - no specification assigned, to be reported
LaserFlow®					73 secs		
Mean error, x							cl. 6.3.2 - Table 6 - class specific
LaserFlow®				3.6		2	
LaserFlow® Ex				-2.1			
Repeatability, U_R							cl. 6.3.2 - Table 6 - class specific
LaserFlow®			1.30			2	
LaserFlow® Ex		0.61				1	
Supply voltage, X_V (100 to 240AC)							cl. 6.3.3 - Table 6 - class specific
LaserFlow®	0.04					1	
Output impedance, X_O (note 2)							cl. 6.3.4 - Table 6 - class specific
LaserFlow®	<0.01					1	

Test	Result expressed as % of the certification range				Other results	Class	MCERTS specification
	<0.5	<1	<2	<5			
Ambient air temperature, X_T (0°C to +60°C, Ex -10oC to +60oC)							cl. 6.3.6 - Table 6 - class specific
LaserFlow®		0.54				2	
LaserFlow® Ex	0.21					1	
Relative humidity, X_{RH} (95%)							cl. 6.3.6 - Table 6 - class specific
LaserFlow®			1.2			3	
LaserFlow® Ex			1.0				
Incident Light							cl. 6.3.7 - Table 6 - class specific
LaserFlow®	0.09					1	
Sensor Location							cl. 6.3.8 - Table 6 - class specific
LaserFlow®			1.10			3	
Direct Solar Radiation, X_{SV}							cl. 6.3.10 - Table 6 - class specific
LaserFlow®	0.48					3	
LaserFlow® Ex	0.33						
Bi-directional flow							cl. 6.3.13 - no specification assigned, to be reported
LaserFlow®					-4.7	3	

Test	Result expressed as % of the certification range				Other results	Class	MCERTS specification
	<0.5	<1	<2	<5			
Fill Level							cl. 6.3.18 - no specification assigned, to be reported
LaserFlow®							
Mean error, x							
TP 1 0.19 m and 0.45 m/s				-4.17			
TP 2 0.11 m and 0.75 m/s			1.77				
TP 3 0.05 m and 1.6 m/s				3.60			
TP 4 0.5 m and 0.45 m/s				-4.30			
TP 5 0.5 m and 0.75 m/s					-5.45		
TP 6 0.5 m and 1.0 m/s					-5.25		
TP 7 0.7 m and 0.45 m/s					-5.42		
TP 8 0.7 m and 0.75 m/s					-6.59		
TP 9 0.7 m and 1.0 m/s					-7.67		
Repeatability, U_R							
TP 1 0.19 m and 0.45 m/s	0.45						
TP 2 0.11 m and 0.75 m/s		0.61					
TP 3 0.05 m and 1.6 m/s			1.33				
TP 4 0.5 m and 0.45 m/s		0.98					
TP 5 0.5 m and 0.75 m/s			1.18				
TP 6 0.5 m and 1.0 m/s			1.05				
TP 7 0.7 m and 0.45 m/s			1.77				
TP 8 0.7 m and 0.75 m/s			1.05				
TP 9 0.7 m and 1.0 m/s			1.41				
LaserFlow® Ex							
Mean error, x							
TP 13 0.2 m and 0.104 m/s					-6.04		
TP 14 0.2 m and 0.354 m/s			-1.87				
TP 2 0.2 m and 0.917 m/s					-8.23		
TP 15 0.4 m and 0.156 m/s					-9.27		
TP 10 0.4 m and 0.40 m/s					-6.51		
TP 17 0.7 m and 0.101 m/s				-4.89			
Repeatability, U_R							
TP 13 0.2 m and 0.104 m/s	0.01						
TP 14 0.2 m and 0.354 m/s	0.02						
TP 2 0.2 m and 0.917 m/s	0.01						
TP 15 0.4 m and 0.156 m/s	0.00						
TP 10 0.4 m and 0.40 m/s	0.01						
TP 17 0.7 m and 0.101 m/s	0.00						

Test	Result expressed as % of the certification range				Other results	Class	MCERTS specification
	<0.5	<1	<2	<5			
Effect of conduit size							cl. 6.3.17 - no specification assigned, to be reported
LaserFlow®							
Mean error, x							
HRW8 1m				-3.44			
HRW10 1m					-7.05		
HRW18 1m					-9.41		
HRW13 2.4m					-5.92		
HRW14 2.4m			-1.24				
HRW15 2.4m					-9.07		
HRW17 2.4m			-1.93				
Repeatability, U_R							
HRW8 1m	0.00						
HRW10 1m	0.01						
HRW18 1m	0.01						
HRW13 2.4m	0.00						
HRW14 2.4m	0.01						
HRW15 2.4m	0.00						
HRW17 2.4m	0.00						
LaserFlow®							
Mean error, x							
HRW8 1m				-2.53			
HRW10 1m					-6.51		
HRW18 1m					-7.92		
HRW13 2.4m					-6.04		
HRW14 2.4m			-1.87				
HRW15 2.4m					-9.27		
HRW17 2.4m				-4.89			
Repeatability, U_R							
HRW8 1m	0.01						
HRW10 1m	0.01						
HRW18 1m	0.01						
HRW13 2.4m	0.01						
HRW14 2.4m	0.02						
HRW15 2.4m	0.00						
HRW17 2.4m	0.00						
Response Time (either increasing or decreasing flow)							cl. 6.3.19 - ≤30 seconds
LaserFlow®					21 secs		
LaserFlow® Ex					30 secs		

Test	Parameter	Result	Class	MCERTS specification
FIELD TESTS				
Error under field conditions (LaserFlow®)	Maximum error (%)	8.60	3	cl. 7.3 - Table 6
	Minimum error (%)	-5.94		
	Mean error (%)	-2.88		
	Proportion of errors ≤5%	70.0		
	Proportion of errors ≤8%	96.0		
Error under field conditions (LaserFlow® Ex)	Maximum error (%)	5.57	3	cl. 7.3 - Table 6
	Minimum error (%)	-12.39		
	Mean error (%)	-3.29		
	Proportion of errors ≤5%	79.0		
	Proportion of errors ≤5%	92.0		
Up-time (%) (note 3)				cl. 7.4 >95%
LaserFlow®		96.2%		
LaserFlow® Ex		97.0%		
Maintenance		Scheduled (Note 4)		cl. 7.5 - to be reported

Note 1: The combined performance characteristic reported is the root-sum-square addition of the maximum errors recorded in the following tests: mean error, repeatability, supply voltage, output impedance, ambient air temperature, incident light, sensor location and direct solar radiation.

Note 2: A simulated level input using a Teledyne ISCO TIENet® 310 ultrasonic level sensor was used to evaluate the software / electronics response of the Signature unit.

Note 3: Battery power to the Signature failed and caused both sensors to go inactive for an extended amount of time. Power was restored by exchanging batteries after ~48 hours.

Note 4: Maintenance of the site consisted of three primary tasks: changing of batteries on Signature and calibrating level for the sensor. Two deep cycle marine batteries were exchanged on the Signature approximately every 3 weeks. Level calibration was undertaken twice, six weeks apart.

Description

The Signature® Flow Meter is designed for open channel flow monitoring applications using any combination of flow and parameter measurement technologies and sampling, depending on what is required at the measurement site.

The TIENet® 360 LaserFlow® sensor is an Area Velocity flow measurement device that remotely measures flow in open channels with non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. From above the flow stream, the sensor uses advanced technology to measure velocity with a laser beam at single or multiple points below the surface of the wastewater stream. The sensor measures both forward and reverse flows.

The TIENet® 360 Ex LaserFlow® Ex sensor is an intrinsically safe Area Velocity flow measurement device that remotely measures flow in open channels with non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. From above the flow stream, the sensor uses advanced technology to measure velocity with a laser beam at single or multiple points below the surface of the wastewater stream.

The Signature® Flow Meter can calculate flow using standard open channel level-to-flow conversions, as well as user-defined equations, level to area data points or level to flow data points, depending upon the measurement device(s) used in the application and the program specified by the user.

The Signature® Flow Meter allows multiple simultaneous flow technologies, input for pH and temperature, accepts input from SDI-12 devices and Modbus devices, provides multiple analog output signals, and includes other interface options. The Signature has a graphical display for viewing of parameter measurements and instrument configuration. It is compatible with Teledyne Isco Flowlink software which allows on site or remote data collection or instrument configuration. The Signature has a front panel notification LED to indicate an alarm condition. The Signature is capable of communicating through an Ethernet modem, a cellular modem, or an USB interface.

The Signature® flow meter has features to verify data integrity. It logs events such as changes in calibration and power outages to validate data accuracy. Data can be reviewed to detect any type of data alteration. Program reports, summary reports, and time series data are retrievable using a USB flash drive.

With multiple smart interface options and multi-parameter logging (such as pH), the Signature® Flow Meter provides a common platform for control action, reporting, and communication.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this Certificate. 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 system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of CSA Certificates'.

2. The design of the product certified is defined in the CSA design schedule for certificate No. CSA MC140265.

3. If the certified product is found not to comply, CSA Group should be notified immediately at the address shown on this certificate.

4. The certification marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of CSA Certificates'.

5. This document remains the property of CSA Group and shall be returned when requested by CSA Group.