

# Calibration Certificate



**Certificate No.: C129364 / L1004922**

<b>Calibration Object:</b>	Laser Vibrometer	Polytec, Inc 1 Cabot Road, Suite 102 Hudson, MA 01749 United States Telephone: 508-417-1040 Fax: 508-281-4725
<b>Manufacturer:</b>	Polytec, GmbH	
<b>Controller/Front-End Type:</b>	PDV-100	
<b>Controller/Front End SN:</b>	0127218	
<b>Sensor Head Type:</b>	PDV-100	
<b>Sensor Head SN:</b>	0127218	
<b>Calibration Procedure:</b>	Vib_Calibration_1217_02	
<b>Date of Calibration:</b>	September 26, 2024	
<b>Calibration Due Date:</b> <i>Confirmed by customer?</i>	September 26, 2026 Yes	
<b>Technician:</b>	EMh	
<b>Calibration Location:</b>	Polytec, Inc	
<b>Customer:</b>	<b>McGill University</b> Schulich School of Music 555 Sherbrooke Street West Montreal, QC H3A 1E3 Canada	

$\lambda=633\text{ nm}$

## Traceability:

This calibration has been carried out using test equipment and measuring instruments whose accuracy is traceable to national metrology institutes (e.g. PTB, NIST). The reference instruments listed were calibrated to their specified uncertainty, and the evidence of traceability is on file in our service laboratory.

**This calibration certificate includes the following protocols:**

Page	Object	Procedure
2	PDV-V	Part 1: Electrical Calibration
3	PDV-V	Part 2: Mechanical End Test
4	PDV-100	Alignment of Head Protocol
5	PDV-100	Alignment of Head Protocol

**Note:** The statement of compliance in this certificate was issued without taking the uncertainty of measurement into consideration. The customer shall assess the results and uncertainty when determining if the results meet their needs.

**Sign:**

*Elizabeth Mhanna*

**EMh**

# Velocity Decoder Calibration Protocol



## Part 1: Electrical Calibration

**Certificate No.: C129364 / L1004922**

**Device Type:** PDV-100

**Serial No.:** 0127218

**Decoder Type:** PDV-V

### Reference Conditions:

<b>Frequency<sup>1</sup>:</b>	1 kHz	<b>Measurement Procedure:</b> Synthetic Doppler signals substitute those which would come from the vibrometer optical system when acquiring a sinusoidal vibration of known frequency and amplitude. The output of the respective decoder is compared to the represented reference vibration amplitude.
<b>Amplitude<sup>1</sup>:</b>	70%	
<b>Target Temp.:</b>	(25 ± 3) °C	
<b>Actual Temp:</b>	23.7 °C	
<b>Uncertainty<sup>2</sup>:</b>	1.00%	

<sup>1</sup>In some measurement ranges, deviating values are possible (refer to table)

<sup>2</sup>The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, corresponding to a confidence level of approximately 95%.

### Reference Instruments

Type:	Tektronix AFG 3252C	Type:	Keithley 2001
Serial Number:	C011377	Serial Number:	4095680
Certificate No.:	3063882	Certificate No.:	US011-MIL-CI-23286148
Due Date:	Mar. 31, 2025	Due Date:	Nov. 30, 2024

### Measurement Values

Range	Amplitude @ Frequency	Set Value	Actual Value
20 mm/s/V	35 mm/s @ 1 kHz	1.9800 Vrms	1.9943 Vrms
100 mm/s/V	175 mm/s @ 1 kHz	1.9800 Vrms	1.9943 Vrms
500 mm/s/V	875 mm/s @ 1 kHz	1.9800 Vrms	1.9944 Vrms

### Comments

### Result of this Calibration Step:

No adjustments to the decoder were necessary

**Date**  
Sep. 27, 2024

**Technician**  
EMh

# Velocity Decoder Calibration Protocol



## Part 2: Mechanical End Test

**Certificate No.: C129364 / L1004922**

**Device Type:** PDV-100

**Serial No.:** 0127218

**Decoder Type:** PDV-V

### Reference Conditions:

<b>Frequency<sup>1</sup>:</b>	159.16 Hz	<b>Measurement Procedure:</b> The laser beam of the vibrometer is directed to the reference surface of a vibration calibrator, which is traceable to national standards for the realization of the physical units. The output of the respective decoder is compared to the reference vibration amplitude.
<b>Amplitude<sup>1</sup>:</b>	10.14 mm/s	
<b>Target Temp.:</b>	(25 ± 3) °C	
<b>Actual Temp:</b>	23.4 °C	
<b>Uncertainty<sup>2</sup>:</b>	3.00%	

<sup>1</sup>In some measurement ranges, deviating values are possible (refer to table)

<sup>2</sup>The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, corresponding to a confidence level of approximately 95%.

### Reference Instruments

Type:	Keithley 2001	Type:	Metra VC-10
Serial Number:	4095680	Serial Number:	90923
Certificate No.:	US011-MIL-CI-23286148	Certificate No.:	50817
Due Date:	Nov. 30, 2024	Due Date:	Jan. 31, 2025

### Measurement Values

Range	Amplitude @ Frequency	Set Value	Actual Value
20 mm/s/V	10.14 mm/s @ 159.16 Hz	2.0280 Vrms	2.0142 Vrms
100 mm/s/V	10.14 mm/s @ 159.16 Hz	0.4056 Vrms	0.4027 Vrms
500 mm/s/V	10.14 mm/s @ 159.16 Hz	0.0811 Vrms	0.0806 Vrms

### Comments

#### Result of this Calibration Step:

No adjustments to the decoder were necessary

**Date**  
Sep. 27, 2024

**Technician**  
EMh

# Alignment of Head Protocol



**Certificate No.: C129364 / L1004922**

**Device Type:** PDV-100

**Serial No.:** 0127218

**Optics Check:** A separate test is done to check interferometer performance. Various check points are tested to assure the interferometer meets manufacturer specifications. The optical sensitivity is optimized by aligning the interferometer and maximizing signal beam power. The output beam(s) are then checked on a test surface for maximum signal level and a clean, stable signal.

## Reference Instruments

Type:	Thor Labs PM100A	Type:	Thor Labs S160C
Serial Number:	P1001255	Serial Number:	190506213
Certificate No.:	491452024122	Certificate No.:	491452024122
Due Date:	Jan. 31, 2025	Due Date:	Jan. 31, 2025

<b>Probe Beam:</b>	
1) Output power of beam	DEAD
2) Beam has correct continuous profile	Fail
3) Beam is centered in aperture of lens	Fail
<b>Optical Alignment:</b>	
4) Alignment of detector modules	Fail
5) Rest Carrier	Fail
<b>End Test:</b>	
6) Background signal level without surface reflections	Fail
7) Velocity signal is free of noise and instabilities	Fail

- ☐ PASSED VERIFIED  
☒ FAILED VERIFIED

Failure on this page does not affect calibration, only your ability to obtain an optimal signal level.

## Comments

Before laser tube and power supply replacement and optical alignment. (Laser initially turned on but then flickered and disappeared signifying the end of the life of the laser tube)

**Date**  
Sep. 27, 2024

**Technician**  
EMh



# Alignment of Head Protocol



**Certificate No.: C129364 / L1004922**

**Device Type:** PDV-100

**Serial No.:** 0127218

**Optics Check:** A separate test is done to check interferometer performance. Various check points are tested to assure the interferometer meets manufacturer specifications. The optical sensitivity is optimized by aligning the interferometer and maximizing signal beam power. The output beam(s) are then checked on a test surface for maximum signal level and a clean, stable signal.

## Reference Instruments

Type:	Thor Labs PM100A	Type:	Thor Labs S160C
Serial Number:	P1001255	Serial Number:	190506213
Certificate No.:	491452024122	Certificate No.:	491452024122
Due Date:	Jan. 31, 2025	Due Date:	Jan. 31, 2025

<b>Probe Beam:</b>	
1) Output power of beam	0.59 mW
2) Beam has correct continuous profile	Pass
3) Beam is centered in aperture of lens	Pass
<b>Optical Alignment:</b>	
4) Alignment of detector modules	Pass
5) Rest Carrier	Pass
<b>End Test:</b>	
6) Background signal level without surface reflections	Pass
7) Velocity signal is free of noise and instabilities	Pass

- ☒ **PASSED VERIFIED**  
☐ **FAILED VERIFIED**

## Comments

After laser tube and power supply replacement and optical alignment.

**Date**  
Sep. 27, 2024

**Technician**  
EMh