

Ultimus I-III Dispenser Pressure Readout, Vacuum Readout, and Dispense Timer Validation Instructions

Introduction

These instructions provide the pressure, vacuum, and dispense timer validation procedures for the following dispensers:

- Ultimus™ I: P/N 7017041
- Ultimus II: P/N 7002003
- Ultimus III P/N 7017068 (legacy)

Specification List

Model	Pressure Accuracy	Vacuum Accuracy	Timer Accuracy
Ultimus I	±2.0 psi, 0–100 psi	±2.0 inH ₂ O, 0–18 inH ₂ O	±0.05%
Ultimus II	±0.3 psi, 0–15 psi	±2.0 inH ₂ O, 0–18 inH ₂ O	±0.05%
Ultimus III	±0.3 psi, 0–5 psi	±2.0 inH ₂ O, 0–18 inH ₂ O	±0.05%

Required Tools and Supplies

The following equipment is required for the performance of these procedures.

#	Description	Minimum Accuracy Requirement	Suggested Equipment	Purpose
1*	Precision pressure and vacuum test gauge	±0.05 psi at 0–100 psi ±0.33" H ₂ O	Fluke Model 700G06 pressure and vacuum test gauge	Reference standard for 100/15 psi pressure and 18" H ₂ O vacuum
2	0–100 psi test gauge, ±0.25% full scale accuracy	±0.25 psi	Wika model 312.20 6, P/N 9746892	Reference standard for validating the Ultimus I pressure readout
3	0–15 psi test gauge, ±0.25% full scale accuracy	±0.05 psi	Wika model 312.20 6, P/N 9746867	Reference standard for validating the Ultimus II and III pressure readouts
4	Slack tube manometer, 18-0-18"	±0.33" H ₂ O	Dwyer model 1211-36	Reference standard for validating the Ultimus I, II, and III vacuum readouts
5	Function generator, triggered 10 s pulse, ±1 ppm accuracy	±20 ppm for a 10 s triggered pulse; 5–24V for ON, 0V for OFF Load: 1,200 ohms	Tektronix AFG 3021B	Reference standard for validating the Ultimus I, II, and III dispense timer

*Item 1 is the preferred equipment and can be used in place of items 2-4. When item 1 is used, only item 5 is also required.

Optional Accessories

The following recommended Nordson EFD accessories are available to support the performance validation and field validation of the vacuum display.

Accessory	Description	Nordson EFD Part Number	Purpose
Input / output (I/O) cable, Ultimus I, II, III	8-pin DIN cable, color coded leads, stripped and tinned lead ends, 1.9 m (6 ft)	7017143	Connection to Ultimus I, II or III from the function generator for validation of the dispense timer
Vacuum calibration kit, Ultimus I, II, III	Nordson EFD vacuum calibration software, USB to RS-232 converter, RS-232 to modular plug cable	7028817	Adjustment of the Ultimus I, II or III vacuum readout validation; kit provides hardware and software for site-specific validation of the digital vacuum readout

Pressure Readout Validation

The Ultimus I-III digital pressure readings are validated against a pressure standard with a known minimum accuracy. The pressure standard must be at least ± 0.25 psi for Ultimus I and ± 0.05 psi for Ultimus II and III. Refer to the equipment list for suitable test gauges. The digital pressure readout accuracy specification of the Ultimus I-III is $\pm 2.0\%$ of full scale range. Each of the five pressure validation points are applied and confirmed by the calibrated pressure standard. Maximum readout deviation, as observed on the Ultimus digital pressure display, at any of the five points, is listed in the table below.

Pressure Readout Performance Validation Points

The following table provides the pressure validation points and maximum deviation for Ultimus I-III digital pressure readings.

Product Model	Verification Points (psi)	Maximum Deviation
Ultimus I (100 psi)	20, 40, 60, 80, 95	± 2.0 psi
Ultimus II (15 psi)	2, 6, 9, 12, 15	± 0.3 psi
Ultimus III (5 psi)	1, 2, 3, 4, 5	± 0.3 psi

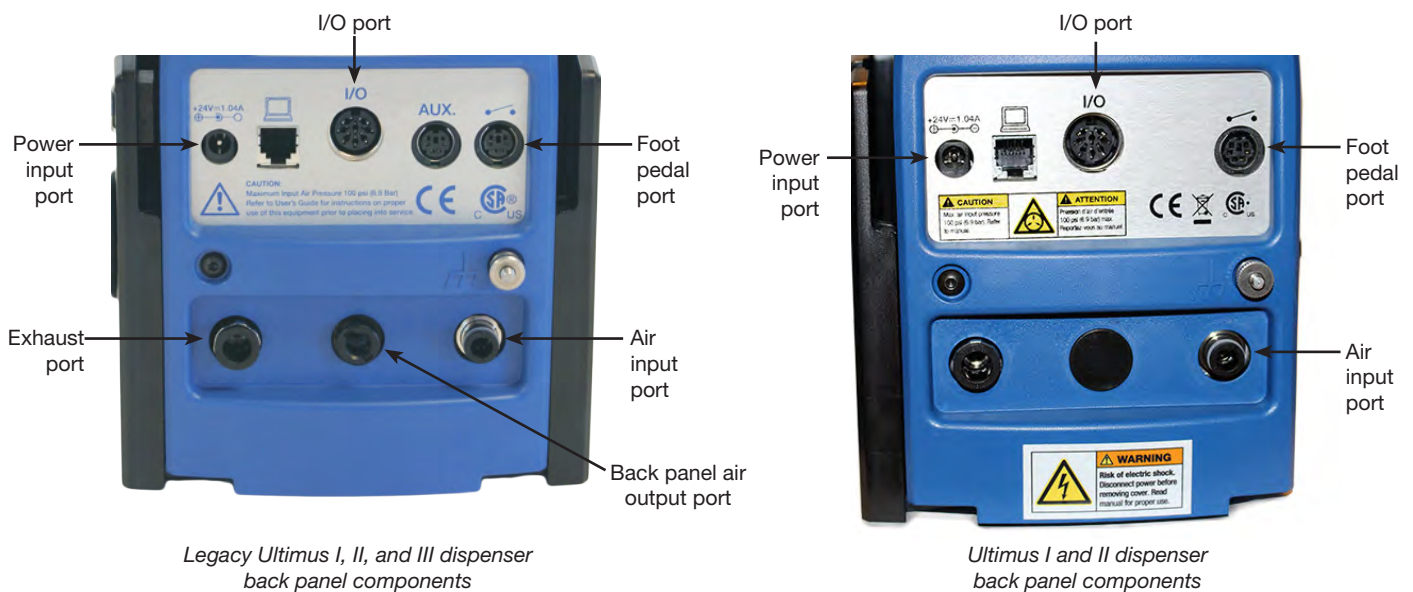
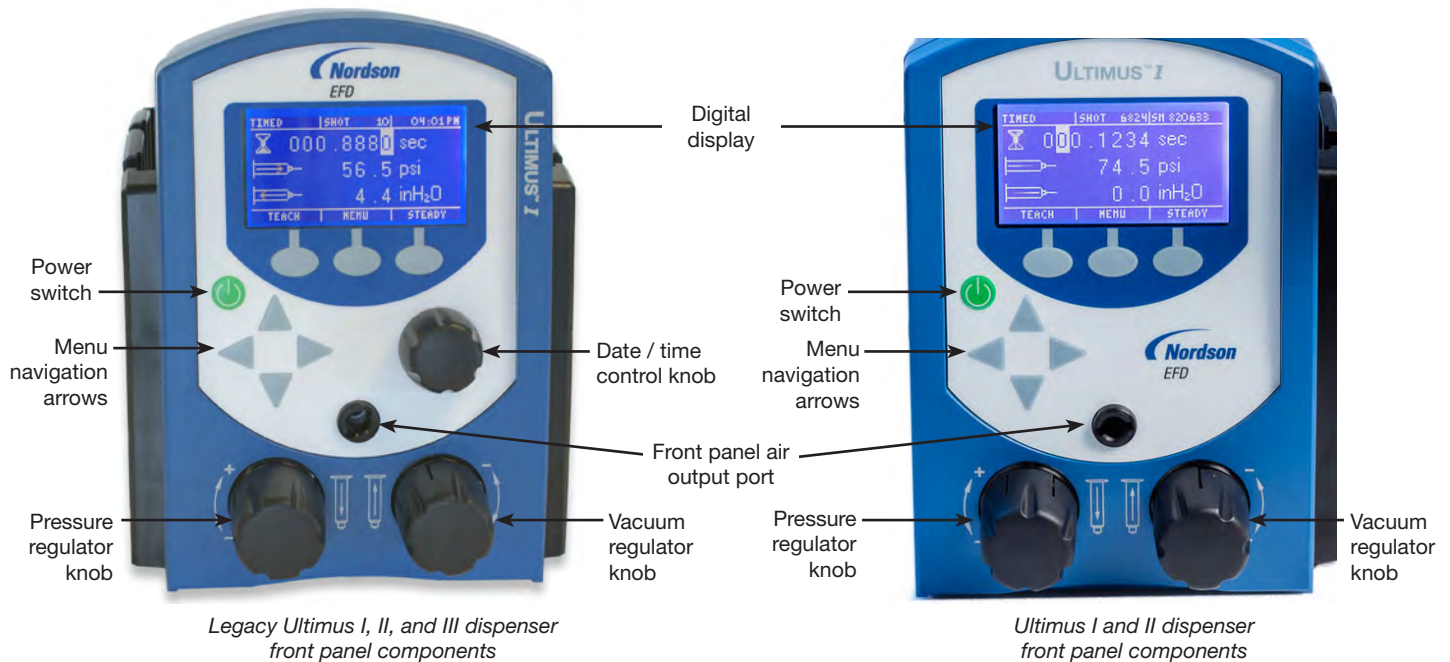
Validation Procedure

Refer to the Ultimus Operating Manual and Quick Start Guide for connection and setup instructions.

1. Connect a foot pedal to the foot pedal port on the rear panel.
2. Set the air pressure to the minimum setting by turning the pressure regulator knob fully counterclockwise.
3. Set the vacuum to the minimum setting by turning the vacuum regulator knob fully counterclockwise.
4. Verify that the rear panel exhaust port is open.
5. Connect the 100 psi or 15 psi test gauge to the front or rear panel air output port.
6. Connect the dispenser air input to a 100 psi regulated air supply.
7. Plug the power supply DC connector into the rear panel power input port.
8. Plug the power supply into an AC power source.
9. Press the power switch to power ON the Ultimus dispenser.
10. Select STEADY mode using the Ultimus screen and/or menu controls.
11. Select "psi" for pressure units using the Ultimus menu controls.
12. Press and hold the foot pedal.
13. Adjust the pressure regulator to the first verification point specified in the "Pressure Readout Performance Validation Points" on page 2 as monitored on the test gauge.
NOTE: Adjust to verification points in a clockwise direction, never counterclockwise.
14. Ensure that the test gauge reading is exact by releasing and pressing the foot pedal, adjusting the pressure regulator if necessary, to attain a repeatable pressure.
15. Record the pressure reading from the Ultimus digital display.
16. Release the foot pedal.

Validation Procedure (continued)

17. Repeat steps 12 through 16 for all verification points.
18. Evaluate the five pressure digital display readings against the maximum deviation criteria shown in the “Pressure Readout Performance Validation Points” on page 2.



Vacuum Readout Validation

The Ultimus I-III digital vacuum readings are validated against a calibrated vacuum standard. Accuracy of the standard must be at least ± 0.33 inH₂O. Refer to the equipment list for a suitable vacuum test instrument. The digital vacuum readout accuracy specification of the Ultimus I-III is ± 2.0 inH₂O. Each of the six vacuum validation points are applied and confirmed by the calibrated vacuum standard. The Ultimus I-III exhaust port must be unobstructed for this assessment. Maximum readout deviation, as observed on the Ultimus digital vacuum display, at any of the six points is ± 2.0 inH₂O.

Vacuum Readout Performance Validation Points

The following table provides the vacuum validation points and maximum deviation for Ultimus I-III digital vacuum readings.

Product Model	Verification Points (inH ² O)	Maximum Deviation
Ultimus I, II or III	2, 6, 8, 10, 12, 18	± 2.0 inH ² O

Validation Procedure

Refer to the Ultimus Operating Manual and Quick Start Guide for connection and setup instructions.

NOTE: The vacuum readout can be field-calibrated using the Ultimus I, II, III Vacuum Calibration Kit (P/N 7028817), available from Nordson EFD. A description and contents of the kit is shown under “Optional Accessories” on page 1.

1. Set the air pressure to the minimum setting by turning the pressure regulator knob fully counterclockwise and pushing the knob to lock the setting.
2. Set the vacuum to the minimum setting by turning the vacuum regulator knob fully counterclockwise.
3. Connect the vacuum test instrument to the front or rear panel air output port.
4. Verify that the rear panel exhaust port is open.
5. Connect the dispenser air input to a 100 psi regulated air supply.
6. Plug the power supply DC connector into the rear panel power input port.
7. Plug the power supply into an AC power source.
8. Press the power switch to power ON the Ultimus dispenser.
9. Select “inH₂O” for vacuum units using the Ultimus menu controls.
10. Adjust the vacuum regulator to the first verification point specified in the “Vacuum Readout Performance Validation Points” on page 4 as monitored on the vacuum test instrument.
11. Ensure that the reading on the vacuum test instrument is exact, adjusting if required.
12. Record the vacuum reading from the Ultimus digital display.
13. Repeat steps 10 through 12 for all verification points.
14. Evaluate the six vacuum digital display readings against the maximum deviation criteria shown in the “Vacuum Readout Performance Validation Points” on page 4.

Dispense Timer Validation

The accuracy specification of the Ultimus I-III dispense timer is $\pm 0.05\%$ of the selected time setting. Validation of the Ultimus I-III dispense timer is performed by comparing an external time pulse that is known to be accurate to the internal timing reference of the Ultimus I-III. This timing reference establishes the dispense timer accuracy of the Ultimus I-III. The external time pulse is wired to the "Voltage Initiate" circuit on pins 1 and 2 of the I/O connector and measured by the Ultimus I-III TEACH feature.

The measured TEACH result shown on the Ultimus I-III display will be:

External Pulse Time minus 0.0060 s (seconds).

Ultimus I-III dispensers add 0.0060 s to all dispense times to compensate for solenoid lag.

Tektronix AFG 3021B Function Generator Setup

The Tektronix AFG 3021B function generator, or an other verified pulse generator, can be used. Setup for an AFG 3021B is provided below. A single external time pulse of 10.0 s is specified to provide a high-resolution measurement.

Function:	Pulse
Run Mode:	Burst, N-Cycle = 1
Frequency/Period:	Period, Period = 12.00000000 s
Duty/Width:	Width, Width = 10.000 s
Amplitude/High:	High, High = 10.00 v
Offset/Low:	Low, Low = 0 mv
Output Menu:	Load = High Z, Noise Add = Off
Output:	50 ohm connector
Channel Button:	ON to Enable Trigger
Trigger:	Manual, Panel Button

Validation Procedure

Refer to the Operating Manual for instructions on connecting to the I/O connector and for using the TEACH mode.

1. Configure the pulse generator as described above.
2. Connect the pulse generator output to pins 1 and 2 of the I/O connector.
3. Plug the power supply DC connector into the rear panel power input port.
4. Plug the power supply into an AC power source.
5. Press the power switch to power ON the Ultimus dispenser.
6. Select the TEACH mode.
7. The time display should be zero. If not, press the CLEAR button.
8. Initiate the external 10 s time pulse:
 - The Ultimus I-III time display will ideally read 9.9940 s at the conclusion of the 10.0 s initiate pulse.
 - For a 10 s initiate pulse, the acceptable readout range is 9.9890 to 9.9990 s $[(10.0 - 0.006) \pm 0.005 \text{ s}]$.



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