BULLSEYE DASH

Operational Manual

YOU MUST READ THIS MANUAL BEFORE USE

February 27, 2024

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Section 1: Overview

The Bullseye DASH is a rugged portable vacuum instrument that was designed to make vacuum measurement easy, useful and intuitive while being suited for the demands of field use. It can power and read a wide variety of industry standard vacuum sensors and capacitance manometers.

Its main features include an LCD display with an orange backlight which shows large numerical fonts for a simple vacuum readout, as well as digital graphics to show graphs with time horizons of data from 2 minutes to 2 hours. This graphical display of vacuum pressure makes understanding system trends easy, and can display small changes in pressure with sub-second resolution.

Features

- Rugged design for field or laboratory use
- Dimensions: 6.2" x 3.7" x 1.3"
- Only requires 4 AA alkaline or Micro-B USB to Power
- Magnet for convenient mounting in the field
- Battery life of 2800mAh/25mA, or 127 hours (~ 5 days). For longer usage, use Micro-B USB power.

Vacuum Sensors and Ranges

The DASH's range is sensor-dependent; see Section 8: Accuracy Specs for all DASH-compatible sensors.

The vacuum interface is also sensor-dependent; NPT, KF16, KF25, Con-flat, and VCR options are all available. DigiVac also stocks a wide variety of vacuum interface adapters to provide the proper connection for your system, including hose barbs, reducers, clamps, and O-rings. Consult DigiVac for availability.

Currently Supported Sensors:

- Quantum Sensors (DPP, DCP, DPCP)
- Capacitance Manometers (0.1 Torr, 0.5 Torr, 1 Torr, 5 Torr, 10 Torr, 20 Torr, 50 Torr, 100 Torr, 1,000 Torr)
- Pfeiffer PKR251
- Edwards APG200 Wide-Range Pirani
- Edwards ASG2 Strain Gauge

Resolution

- 1 Torr to 10 Torr: 0.01 Torr increments
- 10 Torr to 100 Torr: 0.1 Torr increments
- 100 Torr to Atmosphere: 1 Torr increments

Units of Measurement

microns, millitorr, Torr, mbar, Bar, kPa, pascals, PSIA, mmHg, inHg, mmH2O, inH2O, PSIG

Section 2: Quick Start for Bullseye DASH

Start by unpacking the unit to verify you've received everything you've ordered.

Packing List

- Vacuum instrument with black rubber boot
- Attached: 10 foot sensor cable with FCC68 connector designed to plug directly into the sensor
- Vacuum sensor (specified by the user)
- Quick Start Guide or (this) user manual
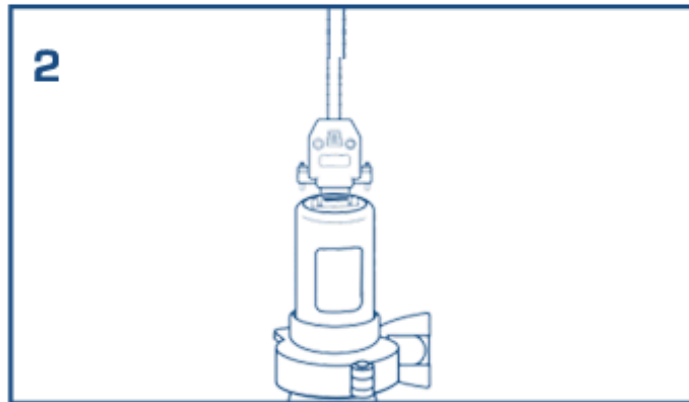
Setting Up the Bullseye DASH

- Mount the DASH vacuum sensor into the system to be measured.
- Attach the sensor cable onto the sensor, using the provided FCC68-to-DB9 adapter if needed.
- Power on the device by pressing the PWR/ENT button. It will take about 5 seconds to fully power up and for the reading to settle.
- Your gauge comes with 4 pre-installed AA batteries. You can also power the gauge by attaching a Micro-B USB power cable and a cell phone charging block.
- The battery door is underneath the black rubber boot, which must be removed to access the door.
- If need be, turn on the backlight using the Up arrow. The backlight does not affect gauge reading or accuracy.
- Read vacuum!

NOTE:

The DASH comes preconfigured and calibrated at the factory. No additional setting changes need to be done before putting the gauge into service.

1
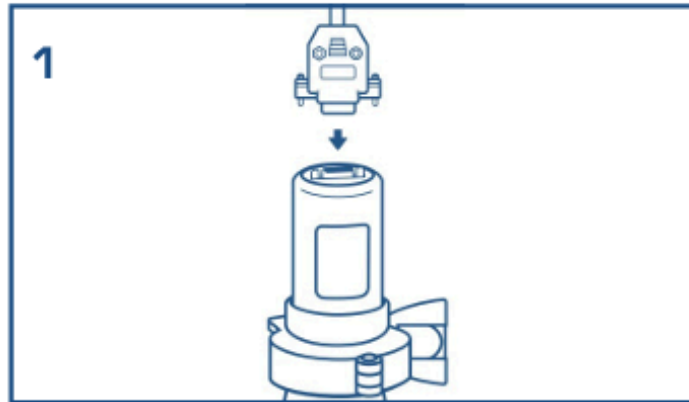
Attach provided adapter to Sensor

2

Take the cable coming off the DASH and plug it into the adapter

3

10 Torr CM

Bullseye DASH

You are now ready to use your Dash

Section 3: Menu Settings Flowchart

DigiVac
Scientific Measurement & Control

1020 Campus Drive, Morganville, NJ 07751
DigiVac.com | Sales@digivac.com | 732-765-0900
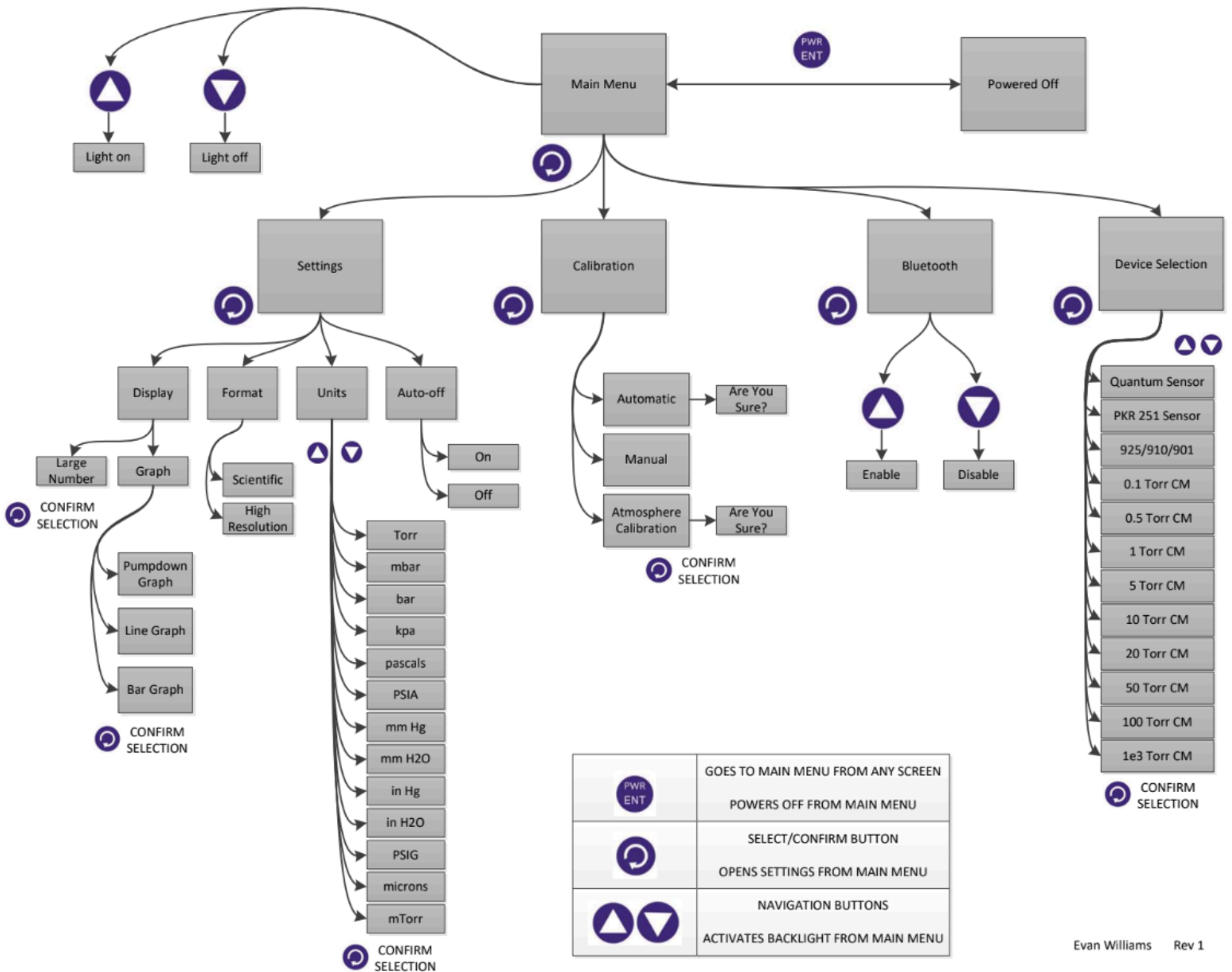
Section 4: Menu and Display Options

The Bullseye DASH has two modes of display: Large Number and Graph.

The large number display is a simple numerical readout in whatever unit of measurement you've chosen.

The graphical display mode features a user-selectable line graph, bar graph, or pump down graph with time horizons of anywhere from 2 minutes to 2 hours.

The large number display has two formats: **Scientific** and **High Resolution**. The Scientific format has two digits of precision with a base ten exponent (ex. 760 Torr would read 7.6E+2). The High Resolution format is the raw vacuum data, which provides more granular readings but may appear noisy at pressures closer to atmosphere and/or when reading in microns/millitorr.

If the sensor has failed or been disconnected, the DASH screen will read SENSOR?. The screen will also read Overrange or Underrange if the vacuum level is lower or higher than the sensor's range (ex. A 10 Torr capacitance manometer will read Overrange if the vacuum level is > 10 Torr or it will read Underrange when the vacuum level is < 0.05 Torr).

The graphing options plot time horizontally and log pressure vertically. The vertical pressure scale is logarithmic, indicating order of magnitude from less than 1 Torr to atmosphere

The graphs will automatically adjust their range based on the time horizon chosen.

The pump down graph here is shown with a linear pressure scale that is fit to the pressure range of the data set.

The height of the graph display is the **pressure range** of the data set in a ***linear scale*** (not log). The top left figure is the **maximum value in this range**, and the bottom left figure is the **minimum value in this range**. The top right figure is the **current or most recent value** in the instrument.

This visualization can show a very small climbing or descending trend that the vacuum analysis algorithm has not declared as a leak or pumping.

The **UP** and **DOWN** buttons turn the backlight on/off and scroll through the menu, the **SEL** button enters the configuration menu and confirms the selection, and the **PWR/ENT** button turns the gauge on or off, and exits to the main screen. Refer to **Section 3: Menu Settings Flow Chart** for more information.
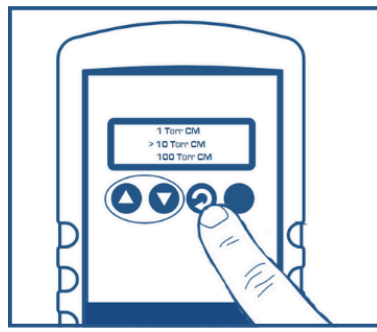
1. Press Enter to bring you to the Settings Menu

2. Use Arrow Buttons to scroll through Menu options to find: Device Selection

3. Use the Enter button to select: "Device Selection"
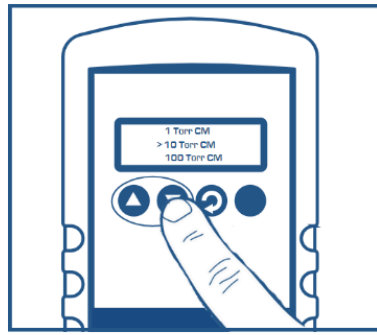
4. Use the Arrow buttons to scroll through the "Device Selection" options to find your sensor of choice. (Match the Sensor you would be pairing the DASH with)

5. Use the Enter button to select Sensor of Choice

6. You are now ready to use your Dash

Section 5: Maintenance and Service

The **Bullseye DASH** is designed for trouble-free use with little or no maintenance required. A few best practices should be followed. Mount the sensor in flange-down orientation if possible. Vacuum sensors are a consumable part that can be damaged by liquid ingress, positive

pressure, or process contaminants. Protecting them from excess damage will extend their lifespan.

Note: The Bullseye DASH was tested and configured at the factory to work with the vacuum sensor it was purchased with. For instructions on how to change the driver so the DASH will work with a different sensor, please see the diagram above, the quick start guide in **Section 2: Quick Start for Bullseye DASH**, or contact the technical support department at DigiVac.

Section 6: Calibration

All gauges are tested under real vacuum in our factory using certified reference standards. DigiVac offers standard calibration and repair services as well as NIST-certified calibration, where we record the DASH's readings at specific test points compared to a certified reference standard and issue paperwork with the results.

The calibration for the DASH is performed in the factory with a certified voltage reference. User adjustments to the calibration menu are not necessary and may result in the gauge malfunctioning.

Section 7: Bluetooth Model Operation
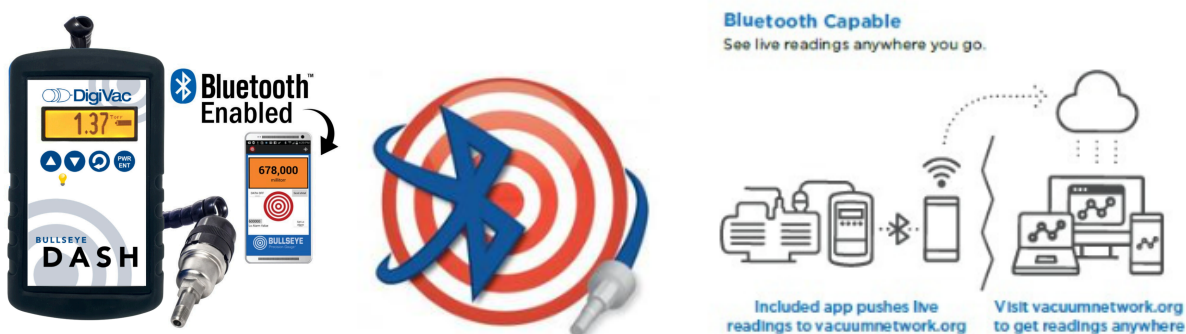
The Bullseye DASH can be ordered with a Bluetooth module, which interfaces with the Vacuum Gauge Application for remote, real-time vacuum monitoring and graphing through a phone or tablet. The vacuum data can then be read and exported via vacuumnetwork.org to a .csv file and shared. The app can be found by searching "**Vacuum Gauge**" in the Apple Store or Google Play Store. The app range is up to 300 feet under ideal conditions.

To enable Bluetooth monitoring, scroll to the menu section marked Bluetooth, and enable or disable the signal with the up or down arrow. See the Vacuum Gauge Application instructional addendum to enable app functioning.

Section 8: Accuracy

Mfr.	Sensor	Type	Range	Accuracy (as percent of reading, unless noted)
DigiVac	DCP	Capacitance Manometer + Piezo	0.01 to 1,000 Torr	0.01 to 0.099 Torr: ± 3% 0.100 Torr to 9.99 Torr: ± 2% 10 Torr to 1000 Torr: ± 3%
DigiVac	DPP	Pirani + Piezo	7.5x10E-6 to 1000 Torr	7.5x10E-6 to 7.5x10E-5: ± 50% 7.5x10E-5 to 6x10E0: ± 14% 6x10E0 to 7.5x10E+1: ± 5% 7.5x10E+1 to 1000 Torr: ± 2%
DigiVac	DPCP	Capacitance Manometer, Piezo, + Pirani	7.5x10E-6 to 1000 Torr	7.5x10E-6 to 7.5x10E-5: ± 50% 7.5x10E-5 to 7.5x10E-3: ± 20% 7.5x10E-3 to 1000 Torr: ± 3%
Kurt J. Lesker	0.1 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.50%
Kurt J. Lesker	0.5 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	1 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	5 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	10 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	20 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	50 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	100 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
Kurt J. Lesker	1,000 Torr	Capacitance Manometer	~ 2.5 decades below full scale	± 0.20%
MKS	925	Pirani	1x10E-5 Torr to Atmosphere	5x10E-4 to 10-3 Torr: ± 10% 10-3 to 100 Torr: ± 5% 100 Torr to ATM: ± 25%
MKS	910	Pirani + Piezo	1x10E-5 to 1,500 Torr	5x10E-4 to 1x10E-3 Torr: ± 10% 1x10E-3 to 11 Torr: ± 5% 11 to 1000 Torr: ± 0.75%

MKS	901	Pirani + Piezo	1x10E-5 to 1,500 Torr	5x10E-4 to 1x10E-3 Torr: ± 10% 1x10E-3 to 100 Torr: ± 5% 100 Torr to ATM: ± 25%
Pfeiffer	PKR251	Cold Cathode Pirani	5x10E-9 to 1x10+3 mBar	+/- 30%
Edwards	APG200	Pirani	5x10E-4 to 1,000 mBar	5x10E-4 to 1,000 mBar: ± 50% 1x10E-3 to 100 mBar: ± 15% 100 to 1,000 mBar: ± 50%
Edwards	ASG2	Strain Gauge	1 to 1,000 mBar	± 0.2% full scale

Section 9: Units of Measurement and Conversions

The DASH reads in the following **units of measurement**:

microns, millitorr, Torr, mbar, Bar, kPa, pascals, PSIA, mmHg, inHg, mmH2O, inH2O, PSIG

Use the conversion chart below as needed.

Unit Conversions

Tel: (732) 765-0900
Fax: (732)-765-1800
Sales@digivac.com

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Torr (Scientific Notation)	Torr/mmHg	mTorr/microns	PSI-A	PSI-G	Bar	mbar (Scientific Notation)	mbar/hPa	inH$_2$O (Gauge)	KPA	Pa (Scientific Notation)	inHg (Gauge)	ATM
1.00E-09	1E-09	0.000001	0	-14.696	0	1.33E-09	0	-406.83	0	1.33E-07	-29.92	0
1.00E-05	0.00001	0.01	0	-14.696	0	1.33E-05	0	-406.83	0	1.33E-03	-29.92	0
1.00E-04	0.0001	0.1	0	-14.696	0	1.33E-04	0	-406.83	0	1.33E-02	-29.92	0
1.00E-03	0.001	1	0	-14.696	0	1.33E-03	0.001	-406.83	0	1.33E-01	-29.92	0
5.00E-03	0.005	5	0	-14.696	0	6.67E-03	0.007	-406.83	0.001	6.67E-01	-29.92	0
1.00E-02	0.01	10	0	-14.696	0	1.33E-02	0.013	-406.82	0.001	1.33E+00	-29.92	0
1.00E-01	0.1	100	0.002	-14.694	0.0001	1.33E-01	0.133	-406.77	0.013	1.33E+01	-29.92	0.0001
1.10E-01	0.11	110	0.002	-14.694	0.0001	1.47E-01	0.147	-406.77	0.015	1.47E+01	-29.92	0.0001
5.00E-01	0.5	500	0.01	-14.686	0.0007	6.67E-01	0.667	-406.56	0.067	6.67E+01	-29.9	0.0007
1.00E+00	1	1000	0.019	-14.677	0.0013	1.33E+00	1.333	-406.29	0.133	1.33E+02	-29.88	0.0013
5.00E+00	5	5000	0.097	-14.599	0.0067	6.67E+00	6.666	-404.15	0.667	6.67E+02	-29.72	0.0066
1.00E+01	10	10000	0.193	-14.503	0.0133	1.33E+01	13.332	-401.48	1.333	1.33E+03	-29.53	0.0132
1.00E+02	100	100000	1.934	-12.762	0.1333	1.33E+02	133.322	-353.3	13.332	1.33E+04	-25.98	0.1316
7.41E+02	741	741000	14.329	-0.367	0.9879	9.88E+02	987.919	-10.21	98.792	9.88E+04	-0.75	0.975
7.60E+02	759.9998	759,999.82	14.696	0	1.0133	1.01E+03	1,013.25	-0.05	101.325	1.01E+05	0	1
7.75E+02	775	775000	14.986	0.29	1.0332	1.03E+03	1,033.25	7.98	103.325	1.03E+05	0.59	1.0197
1.00E+03	1000	1000000	19.337	4.641	1.3332	1.33E+03	1,333.22	128.41	133.322	1.33E+05	9.45	1.3158

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