DigiVac
Scientific Measurement & Control

BULLSEYE DASH

Operational Manual

YOU MUST READ THIS MANUAL BEFORE USE

October 02, 2024

Table of Contents

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 white 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, Lithium batteries recommended
- Magnet for convenient mounting in the field
- Detachable sensor cable
- White backlight display
- Alarm that can trigger by setpoint adjustments
- Battery life of 2800mAh/25mA, or 127 hours (~ 5 days). For longer usage, use Micro-B USB power.
    - Battery life for 1 Watt gauge: **1 hr** for **4 AA alkaline** batteries, **4 hrs 15 min** for **4 AA Lithium** batteries
- Up to 2-watt power for driving high vacuum active gauges
- Field Calibration ability to use a DigiVac calibration module to enable field calibration of the DASH handheld gauge (available 2025)

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, Conflat, 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:

- DigiVac Quantum Sensors: DPP, DCP, DPCP

- Capacitance Manometers (CDG) mbar, Torr, or Pa: 0.1, 0.5, 1, 5, 10, 20, 50, 100, 1,000
- Pfeiffer: PKR251
- Sens4: std. mbar, std. Torr, std. Pa
- Edwards: APG200 Wide-Range Pirani, ASG2, AIM200-X
- Lesker: Pirani, Cold Cathode, Cold Cathode Pirani, AGC CM - 0.1 Torr ,0.5 Torr , 1 Torr, 5 Torr, 10 Torr, 20 Torr, 50 Torr, 100 Torr, 1000 Torr
- Agilent: PVG-500, PVG-550, FRG-700, PCG-750, FRG-720, CDG-500 CM - 1 Torr, 10 Torr, 100 Torr, 1000 Torr

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

- Scientific Resolution
- High Resolution
- Low Resolution

Units of Measurement

microns, millitorr, Torr, mbar, bar, kPa, kPag, 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

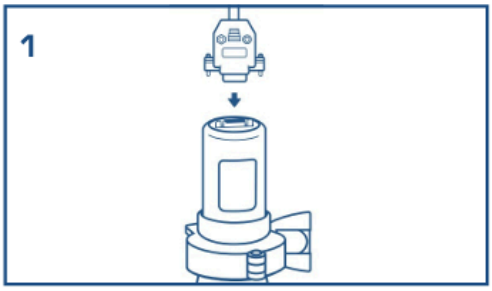
- Vacuum instrument with black rubber boot
- Includes: 10 foot sensor cable with FCC68 connector designed to plug directly into the sensor
- Vacuum sensor (specified by the user)
- Quick Start Guide or (this) user manual
- 4 AA alkaline pre installed in the instrument

Setting Up the Bullseye DASH

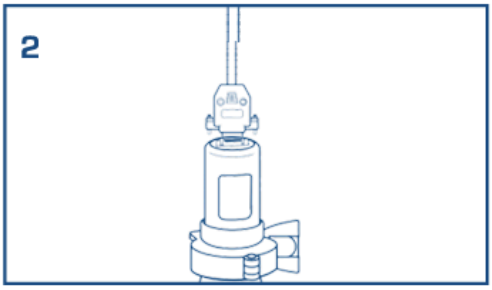
- Mount the DASH vacuum sensor into the system to be measured.

- Attach the sensor cable onto the sensor, using the provided FCC68-to-DB9 adapter if needed.
- Power on the device by pressing the HOME 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.



Attach provided adapter to Sensor

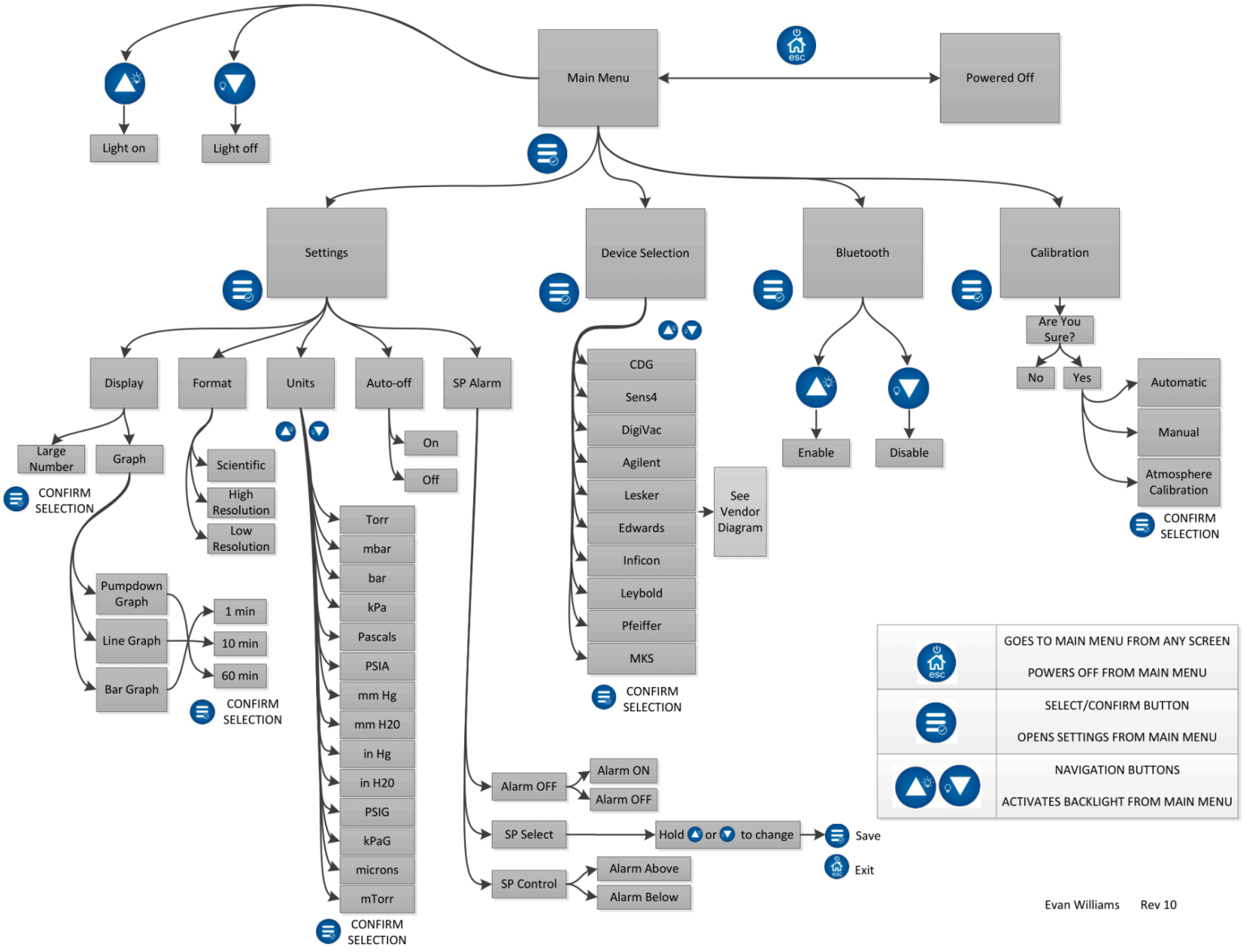


Take the cable coming off the DASH and plug it into the adapter

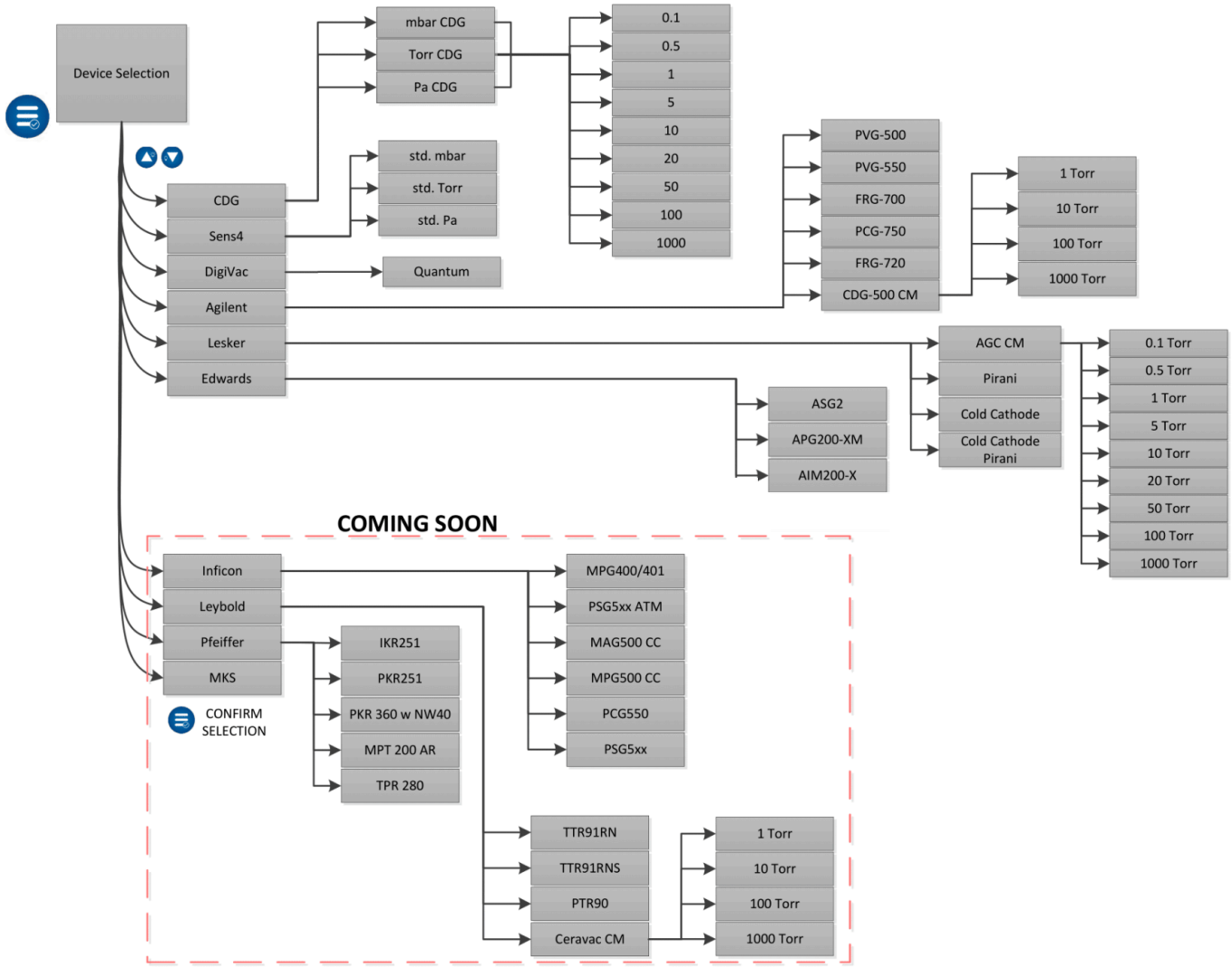
You are now ready to use your Dash

Section 3: Menu Settings Flowchart

Main Menu Diagram



Device Selection Vendor + CDG Diagram



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.

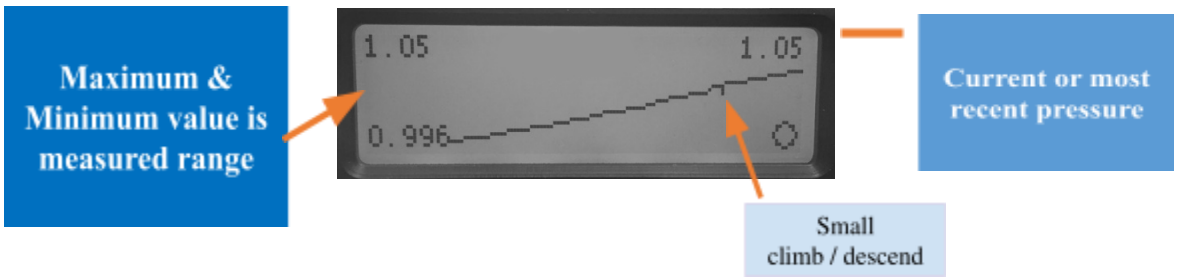
The graphical display mode features a user-selectable line graph, bar graph, or pump down graph with time horizons of anywhere from 2 minutes to 2 hours.

The large number display has 3 formats: **Scientific, High Resolution and Low Resolution**. The Scientific format has two digits of precision with a base ten exponent (ex. 760 Torr would read 7.6E+2). This format was modified in 2024 to increase precision with additional decimal places displayed. 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. The Low Resolution format when selected displays less significant digits, rounding to a neater reading.

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

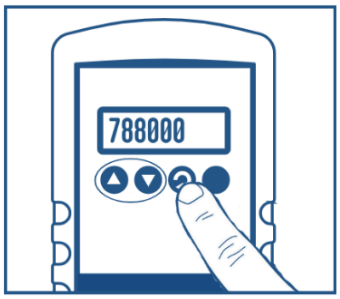
The height of the graph display is the **pressure range** of the data set in a ***linear scale*** (not log). The top left figure is the **maximum value in this range**, and the bottom left figure is the **minimum value in this range**. The top right figure is the **current or most recent value** in the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

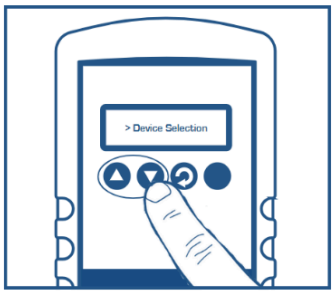
The **UP** and **DOWN** buttons turn the backlight on/off and scroll through the menu, the **MENU** button enters the configuration menu and confirms the selection, and the **HOME** button turns

the gauge on or off, and exits to the main screen. Refer to Section 3: Menu Settings Flow Chart for more information.

Changing DASH Sensor Pairing

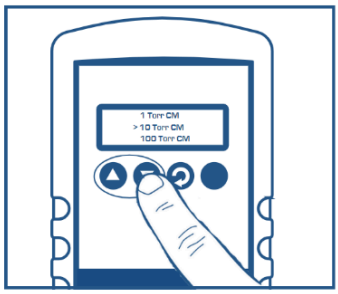


1. Press Enter to bring you to the Settings Menu

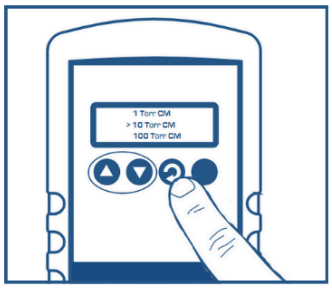


2. Use Arrow Buttons to scroll through Menu options to find: Device Selection

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. In 2024 DigiVac refined the calibration process for better accuracy and reliability.

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. A confirmation step ("Are you sure?") has been added before calibration to prevent accidental actions.

Starting in 2025 the DASH will have a **Field Calibration Option**. This option will give you the ability to use a DigiVac calibration module to enable field calibration of the DASH handheld gauge.

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	AGC 0.1 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.50%
Kurt J. Lesker	AGC 0.5 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 1 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 5 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 10 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 20 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 50 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 100 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	AGC 1,000 Torr	Capacitance Manometer	~ 3 decades below full scale	± 0.20%
Kurt J. Lesker	Pirani	Pirani	3.750 x 10-4 to 760 Torr	3.75 x 10-4 to 7.60 x 10-4 Torr: ±50% 7.60 x 10-4 to 75 Torr: ±15% 75 to 760 Torr: ±50%
Kurt J. Lesker	Cold Cathode	Inverted Magnetron	7.600 x 10-10 to 1.000 x 10-2 Torr	7.60 x 10-10 to 7.60 x 10-3 Torr: ±30%

Kurt J. Lesker	Cold Cathode Pirani	Cold Cathode Pirani Combination Gauge	760 to 7.600 x 10-10 Torr	7.60 x 10-10 to 76 Torr: ±30% 76 to 760 Torr: ±50%
Agilent	CDG-500 1 Torr	Capacitance Manometer	0.001-1 Torr	± 0.20%
Agilent	CDG-500 10 Torr	Capacitance Manometer	0.01-10 Torr	± 0.20%
Agilent	CDG-500 100 Torr	Capacitance Manometer	0.1-100 Torr	± 0.20%
Agilent	CDG-500 1000 Torr	Capacitance Manometer	1-1000 Torr	± 0.20%
Agilent	PVG-500	Pirani	5*10-4 to 1000 mbar	100 to 1000 mbar: ± 50% 1*10-3 to 100 mbar: ± 15% 5*10-4 to 1*10-3 mbar: ± 50%
Agilent	PVG-550	Pirani	3.75 x 10-4 to 750 Torr	1x10-3 to 100 mbar: ± 15 % 100 to 1000 mbar: ± 50 % 5x10-4 to 1x10-3 mbar: ± 50 %
Agilent	FRG-700	Pirani Inverted Magnetron	3.8*10-9 to 760 Torr	± 30%
Agilent	PCG-750	Pirani Capacitance Diaphragm Gauge	5*10-5 to 1500 mbar	950 to 1050 mbar: ± 2.5% 100 to 950 mbar: ± 5% 1*10-3 to 100 mbar: ± 15% 5*10-5 to 1*10-3 mbar: ± 50%
Agilent	FRG-720	Pirani Bayard-Alpert Combination Gauge	3.8*10-10 to 760 Torr	1*10-8 to 1*10-2 mbar: ± 15%
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-XM	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	AIM200-X	Active Inverted Magnetron	7.501×10^{-3} to 7.501×10^{-10} Torr	1×10-2 to 1×10-8 mbar: ±30%
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, kPag, 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

DigiVac
Home of Vacuum Engineering Excellence

Scientific Notation						Scientific Notation		Gauge		Scientific Notation	Gauge	
Torr	Torr/mmHg	mTorr/microns	PSI-A	PSI-G	Bar	mbar	mbar/hPa	inH_2O	KPA	Pa	inHg	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

Section 9: Terms of Use, Limited Warranty, and Liability Waiver

THE DIGIVAC COMPANY ("DIGIVAC") offers all of its products with the following terms and conditions and notices as follows. By accepting and/or using a DIGIVAC product, you hereby acknowledge and agree to the following terms and conditions, and acceptance of these terms and conditions are a condition precedent to any purchase/sale agreement between you and DIGIVAC.

Exclusive Obligation: The DIGIVAC product you are purchasing has been designed for a specific use within a set of suitable operating conditions, as set forth in its User Manual, or as indicated otherwise by DIGIVAC. Any use of the DIGIVAC Product for any purpose or under any conditions, other than those specified, shall render any limited warranty void, and shall expressly invalidate any liability of DIGIVAC for damages as a result of such misuse.

User limitation: You may not modify, copy, distribute, transmit, display, perform, reproduce, publish, license, create derivative works from, transfer, or sell, any information, software, products or services obtained from or created by DIGIVAC to any third party, without the express written consent of DIGIVAC to do otherwise. Any violation of this provision shall give rise to an indemnification of DIGIVAC by you, for any third party claims arising out of such violation.

THIRTY (30) DAY LIMITED Warranty: All DIGIVAC products are warranted against any manufactured defect for a period of thirty (30) days from date of purchase, unless such product is a custom-work for you and not a standard DIGIVAC product. Any product qualifying as a custom-work shall not be warranted against any defects for any purpose, and your acceptance of such custom-work shall relieve DIGIVAC of any liability for any purpose. WITH THE EXCEPTION OF THE LIMITED WARRANTY ABOVE, YOU AGREE ANY DIGIVAC PRODUCT IS PROVIDED AS IS, EXCLUSIVE OF ANY WARRANTY, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED.

Limitation Of Liability: You agree and acknowledge, DIGIVAC shall have no liability to you whatsoever for any direct, indirect, punitive, incidental, special consequential damages arising out of or connected with the use or misuse of its products. In particular, given the nature of DIGIVAC products, you agree and acknowledge, under no circumstances whatsoever shall DIGIVAC be liable to you for any consequential damages for damage to any non-DIGIVAC product or service, arising from the failure, use or misuse of a DIGIVAC product, including, but not limited to, any vacuum system, engine, vehicle, factory, or the like. In the event, a court of law with proper jurisdiction finds DIGIVAC liable to you for any purpose, you agree and acknowledge DIGIVAC's maximum liability shall not exceed the purchase price of one unit of product giving rise to such liability, or $250.00, whichever is greater.

Entire Obligation: These terms and conditions express the entire obligation of DIGIVAC with respect to its products. If any part of these terms and conditions are deemed void, invalid, unenforceable or illegal, including, but not limited to, the warranty disclaimers, liability disclaimers and liability limitations set forth above, then the unenforceable clause or sentence may be disregarded with the remainder of these terms and conditions valid and enforced. In the event the unenforceable clause or sentence leaves a void in these terms and conditions, a provision closely matching the intent of the unenforceable provision should be deemed inherent within these terms and conditions, slightly modified to render such provision valid and enforceable. General: These terms and conditions are governed by the laws of the State of New Jersey, USA. You hereby consent to the exclusive jurisdiction and venue of the Courts of New Jersey, in all disputes arising out of or relating to the use of this product. Use of this product is unauthorized in any jurisdiction that does not give effect to all provisions of these terms and conditions.

Modification of Terms and Conditions: DIGIVAC reserves the right to change the terms, conditions, and notices under which their products are offered.