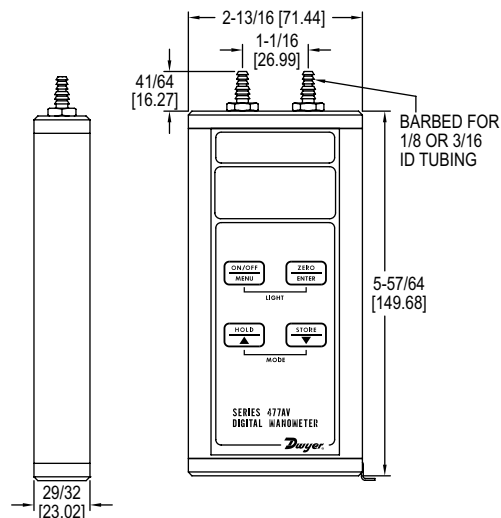




Series 477AV Handheld Digital Manometer

Specifications - Installation and Operating Instructions



The **Series 477AV Handheld Digital Manometer** is available with pressure, flow, and velocity measurements along with a number of other features. The 477AV uses a highly accurate differential pressure sensor to offer $\pm 0.5\%$ full-scale accuracy. It displays negative, positive, and differential pressure. For pressure, flow, and velocity there are selectable English and metric units, as seen in the model chart below. The built-in air velocity and volumetric flow calculations conserve time associated with cumbersome manual calculations. Additionally, up to 40 readings can be saved—perfect for HVAC technicians making Pitot tube traverses of airflow readings across a duct. The accuracy that the 477AV Series provides is critical to maintenance personnel and technicians who require a highly accurate standard to check their instrumentation or equipment, to ensure proper performance.

The digital display offers a backlight feature for easier viewing in darker areas. Meanwhile, battery conservation is monitored and displayed in the event of low battery condition. The digital manometer will automatically shut off after 20 minutes to prevent battery drain. This shut-off time can be reduced or disabled if desired. Series 477AV can be field-calibrated by setting zero & span values. Furthermore, the damping feature compensates for the fluctuating readings by averaging input values to display a more stable readout. Included is an audible and visual alarm to warn over flow, over pressure or over velocity.

SPECIFICATIONS

Service: Air and compatible gases.	Units of Pressure: in w.c., ft w.c., in Hg, psi, oz/in ² , mm w.c., cm w.c., mm Hg, mbar, Pa, kPa, hPa.
Wetted Materials: Consult factory.	Units of Velocity: fpm, fps, mph, m/h, m/s, k/h, knot.
Accuracy: $\pm 0.5\%$ FS, 60 to 78°F (15.6 to 25.6°C); $\pm 1.5\%$ FS from 32 to 60°F and 78 to 104°F (0 to 15.6°C and 25.6 to 40.0°C).	Units of Flow: cfm, m ³ /h, m ³ /s.
Pressure Hysteresis: $\pm 0.1\%$ FS.	Power Requirements: 9 V alkaline battery, installed non-functional, user replaceable.
Pressure Limits: See chart.	Process Connections: Two barbed connections for use with 1/8" (3.18 mm) or 3/16" (4.76 mm) ID tubing. Two compression fittings for use with 1/8" (3.18 mm) ID x 1/4" (6.35 mm) OD tubing for 477AV-7 and 477AV-8 only.
Temperature Limits: 0 to 140°F (-17.8 to 60°C).	Weight: 10.2 oz (289 g).
Compensated Temperature Limits: 32 to 104°F (0 to 40°C).	Compliance: CE.
Storage Temperature Limits: -4 to 176°F (-20 to 80°C).	
Display: 0.42" (10.6 mm) 4 digit LCD.	
Resolution: See chart.	

MODEL CHART

Model	Pressure Range	Velocity Range		Available Pressure Units											Maximum Pressure	
		fpm	m/s	psi	in Hg	kPa	in w.c.	mm Hg	mbar	mm w.c.	Pa	ft w.c.	oz/in ²	hPa		cm w.c.
477AV-000	0 to 1.000 in w.c.	4004	20.34	-	0.0736	0.2491	1.000	1.868	2.491	25.40	249.1	0.0833	0.5780	2.491	2.540	5 psig
477AV-00	0 to 4.000 in w.c.	8009	40.69	0.1445	0.2942	0.996	4.000	7.473	9.96	101.6	996	0.3333	2.312	9.964	10.16	5 psig
477AV-0	0 to 10.00 in w.c.	12.66k	64.33	0.3613	0.7355	2.491	10.00	18.68	24.91	254.0	2491	0.8333	5.780	24.91	25.40	5 psig
477AV-1	0 to 20.00 in w.c.	17.91k	90.97	0.7225	1.471	4.982	20.00	37.36	49.82	508.0	4982	1.667	11.56	49.82	50.80	10 psig
477AV-2	0 to 40.00 in w.c.	25.33k	128.7	1.445	2.942	9.96	40.00	74.73	99.6	1016	9964	3.333	23.12	99.64	101.6	10 psig
477AV-3	0 to 200.0 in w.c.	56.63k	287.7	7.225	14.71	49.82	200.0	373.6	498.2	5080	-	16.67	115.6	498.2	508.0	30 psig
477AV-4	0 to 10.00 psi	66.62k	338.4	10.00	20.36	68.95	276.8	517.1	689.5	7031	-	13.07	160.0	689.5	703.1	30 psig
477AV-5	0 to 20.00 psi	94.22k	478.6	20.00	40.72	137.9	553.6	1034	1379	-	-	46.13	320.0	1379	1406	60 psig
477AV-6	0 to 30.00 psi	115.4k	586.2	30.00	61.08	206.9	830.4	1551	2069	-	-	69.20	480.0	2068	2109	60 psig
477AV-7	0 to 100.0 psi	210.7k	1070	100.0	203.6	689.5	2768	5171	6895	-	-	230.7	1600	6895	7031	150 psig
477AV-8	0 to 150.0 psi	258.0k	1311	150.0	305.4	1034	4152	7757	-	-	-	346.0	2400	-	-	200 psig

Displaying Pressure, Velocity, and Flow

The instrument measures pressure using a piezoelectric sensor. When the 477AV is powered on the pressure value and the unit of measurement will be shown. If you select the velocity or flow mode, then velocity or flow will be displayed instead. The mode selection will persist even after the instrument is turned off. In velocity and flow modes, if the reading exceeds 9,999, then a "K" will be displayed next to the unit of measurement and the display will read in units of 1,000 times the original unit of measurement.

Battery Installation

The unit is shipped with a 9 V alkaline battery which must be installed before operation. When battery replacement becomes necessary, use only a 9 V alkaline type such as Duracell® MN1604, Eveready® 522 or equivalent. Zinc-carbon types, often labeled heavy-duty are not recommended because of the increased potential for leakage. Alkaline batteries also offer a better value since they last up to three times longer in this device. To install the batteries:

1. Remove the two screws holding the bottom end-cap (marked BATTERY) in place.
2. Connect the battery to the enclosed battery clip observing correct polarity. Be careful not to trap wires between the battery, case, or foam pads which retain the battery. This could make it difficult to install the battery or remove it later for replacement.
3. Be sure the rubber gasket is properly seated in the gasket channel of the end-cap. Notice that the end-cap will only fit one way because the holes are slightly off center.
4. Place the “z” shaped wrist strap clip in one of the screw recesses and tighten the screws. Do not over-tighten.
5. Attach wrist strap to the clip.

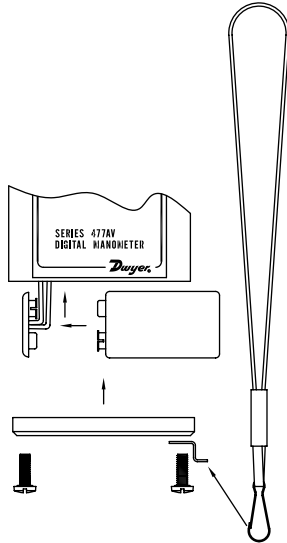


Figure 1

Pressure Connectors

The 477AV has two barbed connector ports for use with 1/8” (3.18 mm) or 3/16” (4.76 mm) I.D. tubing.

- For a single positive pressure, remove the end caps from the connectors and connect the tubing to the port marked “+” and vent the opposite port to atmosphere.
- For a single negative pressure (vacuum), connect the tubing to port marked “-” and vent the opposite port to atmosphere.
- To measure differential pressure, connect higher pressure to port marked “+” and lower pressure to port marked “-”. Manometer will indicate the difference between the two ports. Velocity and volumetric flow can be found similarly if that is the current mode.

Buttons and Menus

The 477AV’s menu is controlled with four buttons labeled **MENU**, **UP**, **DOWN**, and **ENTER**. The buttons are shown in Figure 2.

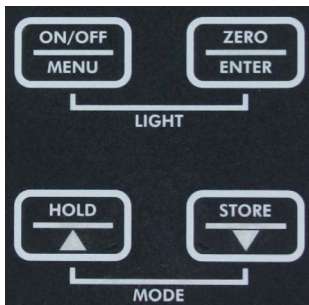


Figure 2: 477AV manometer



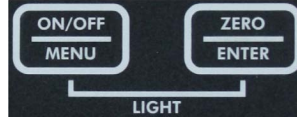
On/Off Power

Pressing and holding the **ON/OFF** button will turn the unit on or off.



Zeroing Readings

The 477AV is calibrated at the factory, but users are recommended to zero the instrument before each use. To set a new zero point, press and hold the **ZERO** button with both ports vented to atmospheric pressure. This setting can be cleared only by a factory default.



Display Backlight

The 477AV has a display backlight to be used in the dark or in poor lighting conditions. It can be turned on or off by pressing and holding the **MENU** and **ENTER** buttons at the same time. The backlight setting is not saved after the 477AV is turned off.



Display Hold

To hold or freeze a value, press and hold down the **HOLD** button. When the Hold function is enabled, the pressure/velocity/flow reading will not change, and the unit of measure will toggle with the word “HOLD”. If the Store function is used when Hold is enabled, the reading on the display (not the actual reading) will be stored. This function cannot be used when a menu is being displayed.



Storing Readings

Pressing and holding the **STORE** button will store a reading in the memory. The display will flash “MEM” and the reading’s memory location (e.g. “MEM” and “5”). The 477AV has the ability to store up to 40 readings in the memory. Readings that are saved will remain in memory even if the unit is powered off. If the Hold function is enabled, then the stored value will be the value on the display (not the actual reading).



Measurement Mode

The 477AV can be set to display pressure, velocity, or volumetric flow. The mode can be changed by pressing and holding the **HOLD** and **STORE** buttons simultaneously. Once a mode is selected, the menu will continue to prompt for unit of measurement, K-factor, duct shape and duct size when applicable. Duct size and shape are input in inches or centimeters, depending on whether the primary unit of measure is metric or English. Settings for all modes are retained in the memory even if the mode is changed or the 477AV is turned off.

The mode cannot be changed if there are readings saved in memory, or if the Hold feature is on. (This prevents a user from accidentally saving readings with different units of measure.) If a user tries to access the mode submenu when readings are saved, the display will flash “ERR Log”. If a user tries to access the mode submenu when the Hold feature is active, the display will flash “ERR Hold”.

1. Press and hold the **UP** and **DOWN** arrows simultaneously.
2. Using the **UP** and **DOWN** arrows, find the mode (velocity, pressure, or flow) you want.
3. Press **ENTER** to confirm the desired mode.
4. The display will prompt for units of measurement. Scroll through the options with the **UP** and **DOWN** arrows until the unit of choice is found.
5. Press **ENTER**.



Advanced Menu

In addition to the features accessible directly from the buttons, there is an advanced menu that allows access to stored values in memory, mode of operation, digital dampening, measurement statistics, calibration, power saving, audible alarm, and factory defaulting the device. The complete diagram of the advanced menu can be found on the last page of this instruction manual or the back of the unit.

1. Press and release the **MENU** button to access the advanced menu.
2. Use the **UP** and **DOWN** arrow buttons to cycle through the menu options.
3. Press **ENTER** once the desired option is selected.
4. Use the **UP** and **DOWN** arrow buttons to make changes to that option.
5. Press **ENTER** to save the changes.
6. Press **MENU** button to return to the menu or home screen.

Memory (MEM)

Saved readings can be viewed by pressing **MENU** and then **ENTER**. There will be two options: "LOG" and "AVG".

"LOG" shows saved readings in the order they were stored. "AVG" displays the average value of the saved readings and is updated based on the content of the log files. Empty memory locations are not shown. If no readings have been stored, the display will read "----". When the memory is full, the display will flash "ERR FULL" and discard the reading. A reading cannot be stored when a menu is being displayed.

Erasing Stored Readings

Stored readings can be erased using the menu.

1. Press **MENU** and MEM will be displayed.
2. Press **ENTER**.
3. Press **ENTER** as "LOG" is displayed on top of the screen.
4. Scroll using the **UP** and **DOWN** arrows to the value you wish to erase (or any if you want to erase all).
5. Press **ENTER**.
6. This will take you to the "Erase" submenu. The "Erase" submenu has three options; "no" will do nothing, "OnE" will erase the most recently viewed reading, and "ALL" will erase all stored readings.

It should be noted that the measurement mode cannot be changed unless the memory values are erased. (This prevents a user from accidentally saving readings with different units of measure.)

Changing Measurement Mode

Besides changing the measurement mode using the front buttons, it can also be changed in the menu. The 477AV can be set to display pressure, velocity, or volumetric flow. Once a mode is selected, the menu will continue to prompt for unit of measurement, K-factor, duct shape and duct size when applicable. Duct size and shape are input in inches or centimeters, depending on whether the primary unit of measure is metric or standard. Settings for all modes are retained in the memory even if the mode is changed or the 477AV is turned off.

The mode **cannot** be changed if there are readings saved in memory, or if the Hold feature is on. (This prevents a user from accidentally saving readings with different units of measure.) If a user tries to access the mode submenu when readings are saved, the display will flash "ERR Log". If a user tries to access the mode submenu when the Hold feature is active, the display will flash "ERR Hold".

1. Press **MENU** and MEM will be displayed.
2. Press **DOWN** arrow and MODE will be displayed.
3. Press **ENTER**.
4. Using the **UP** and **DOWN** arrows, find the mode (velocity, pressure, or flow) you want.
5. Press **ENTER** to confirm the desired mode.
6. The display will prompt for units of measurement. Scroll through the options with the **UP** and **DOWN** arrows until the unit of choice is found.
7. Press **ENTER**.

Dampening Function

The "DAMP" submenu compensates for the fluctuating readings by averaging input values to display a more stable readout. The dampening value can be set to any number between 1 to 9. The default value is set to 4. Here are the steps to change the damp value.

1. Press **MENU**.
2. Scroll using the **UP** and **DOWN** arrows to select "DAMP" and press **ENTER**.
3. Using the **UP** and **DOWN** arrows, choose a number in the range of 1 to 9 and press **ENTER**.

Statistics

Minimum and maximum readings can be viewed in the "STAT" submenu. While they are being viewed, the unit of measure will toggle with the word "MIN" or "MAX". The minimum and maximum values can be reset by pressing and holding the **ENTER** button when viewing the values. They are also reset when the 477AV is turned off, and when the mode of operation is changed. Here are the steps to get to minimum and maximum values.

1. Press **MENU**.
2. Scroll down to **STAT** and press **ENTER**.
3. Scroll to view the minimum and maximum values.

Calibration

If the measurements are not reading within specifications compared to a calibrated reference, the zero and span values can be adjusted in the calibration menu. When zero calibration is performed, both ports should be vented to atmospheric pressure. When span calibration is performed, positive pressure equivalent to the max end of the factory pressure range should be applied to the positive pressure port with the negative port vented to atmospheric pressure. This setting can be cleared by a factory default.

1. Press **MENU** and MEM will be displayed.
2. Press **DOWN** arrow until CAL is displayed.
3. Press **ENTER**.
4. Vent the pressure ports to atmospheric pressure.
5. Press and hold **ENTER**.
6. Press **DOWN** arrow.
7. Apply pressure to the positive pressure port.
8. Press and hold **ENTER**.

Auto Power Off

The 477AV will turn off if no key is pressed for a set amount of time. The default time is 20 minutes, but may be changed using the menu to any value from 1 to 20 minutes, or disabled. Here are the steps.

1. Press **MENU**.
2. Scroll with the **UP** and **DOWN** arrows to "OFF" option and press **ENTER**.
3. Using the **UP** and **DOWN** arrows, select a minute value for the auto-shut off.
4. Press **ENTER** to lock in that value.
5. Press **MENU** twice to return to the main screen.

Sound

The 477AV can be set to beep during button presses. This feature can be turned on or off using the "BEEP" menu option. Here are the steps.

1. Press **MENU**.
2. Scroll down to the "BEEP" menu option and press **ENTER**.
3. Using the **UP** and **DOWN** arrows, select "ON" or "OFF" and press **ENTER**.

Factory Default

The 477AV can be reset to factory conditions using the menu's "RSET" option. This will reset all settings, including a zero or span. Here are the steps.

1. Press **MENU**.
2. Scroll using the **UP** and **DOWN** arrows to "RSET" and press **ENTER**.
3. Scroll down to "YES" and press **ENTER**.

Over Pressure/Under Pressure Alarm

If over pressure or under pressure is applied to the unit, "OvFL" or "UnFL" will display respectively and an audible alarm will sound. The threshold is $\pm 10\%$ of the 477AV's range. Do not exceed the maximum rated pressure of this manometer; doing so could cause a permanent damage to the sensor, rupture the housing, and/or cause injury.

Battery Monitor

The 477AV monitors its battery voltage whenever it's powered on. If the voltage is low, the "LOW BAT" icon will appear on the display. A weak battery can cause inaccurate measurements. It is recommended to replace the battery as soon as possible to ensure top functionality. Do not leave an exhausted battery in the unit due to potential leakage.

Maintenance

The Series 477AV Handheld Digital Manometer is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

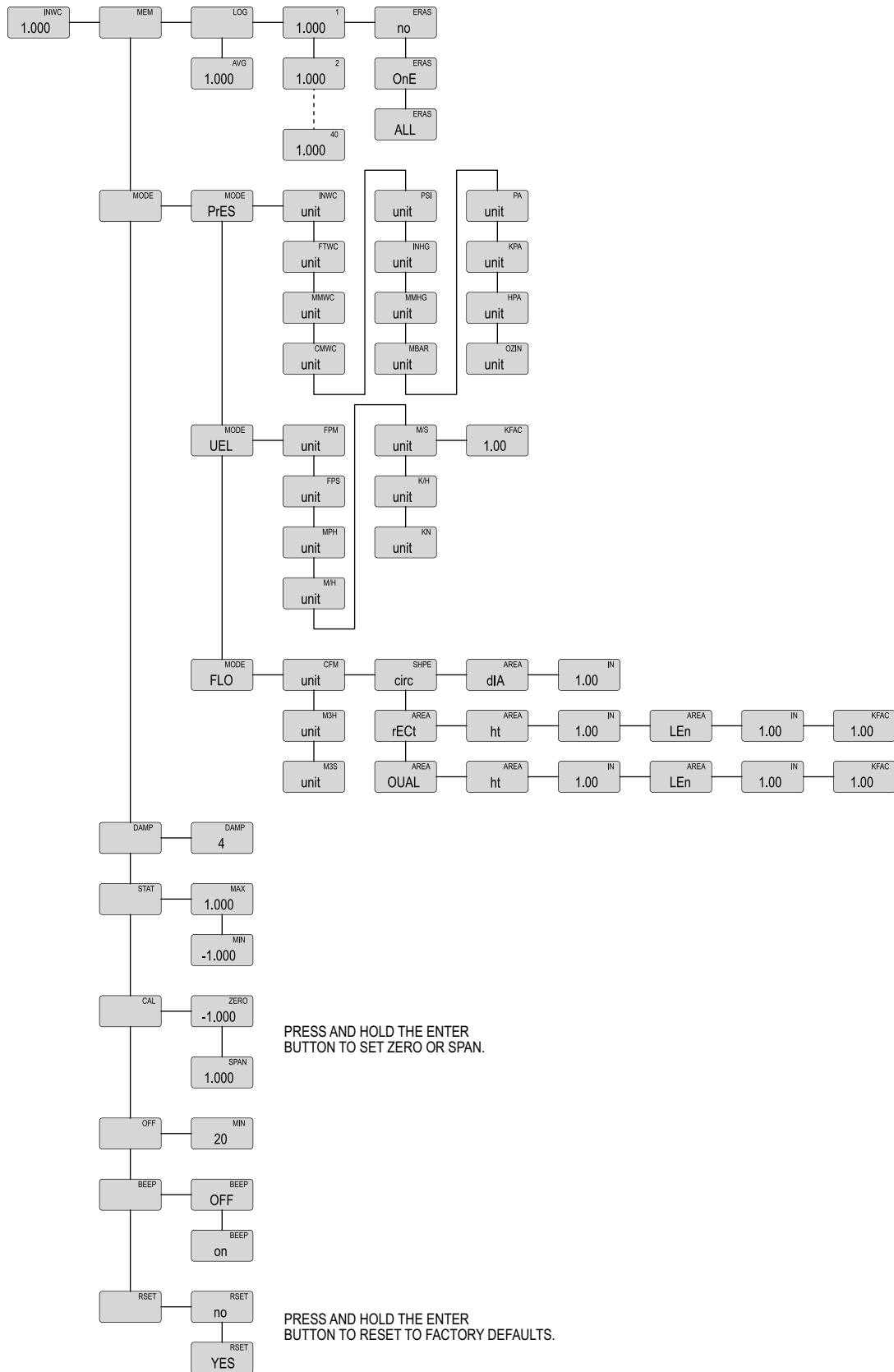


Figure 3: 477AV menu options

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