



PART NO. DF-17
DUAL FLOW PCV VALVE
US PATENT NO. 9,376,945

SHOP MANUAL

REVISION 7



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MAINTENANCE

Unlike a stock PCV valve, your Dual Flow PCV Valve is a precision instrument. As such, it should be inspected periodically and cleaned if necessary.

M/E Wagner recommends checking that both the IDLE ball and CRUISE ball are freely moving at every oil change. If oil or sludge buildup impedes the motion of either ball, the Dual Flow PCV Valve must be disassembled and cleaned immediately. ***M/E Wagner is not liable for any damage resulting from improper airflow or loss of backfire protection due to an improperly maintained valve.***

WHAT IS A PCV VALVE?

The purpose of a PCV (Positive Crankcase Ventilation) system is to ventilate the engine's crankcase under a variety of driving conditions. Moisture and unburned hydrocarbons (called blowby) from the combustion process can contaminate and dilute the oil, and must be properly evacuated for the long term health of the engine. Also, unburned hydrocarbons from the crankcase can be a significant source of emissions if vented to the atmosphere. The PCV valve recirculates these harmful gases and burns them in the engine, improving crankcase and oil cleanliness while reducing emissions.

The PCV valve controls the flow rate of these blowby gases through the engine. Typically a PCV valve flows a small amount of air at idle, and an increased amount of air under cruising conditions. This

accommodates the increased amount of blowby gases produced when the engine is under a load during cruising conditions.

PCV SYSTEM GENERAL RECOMMENDATIONS

PCV Valve Mounting – The PCV Valve is typically installed in the valve cover on most applications. It is also possible to mount the PCV valve in the lifter valley on some V-8 applications.

The PCV valve can also be mounted inline, which is typical on some newer applications. In this method a PCV hose is connected to the inlet and outlet of the valve. The PCV hose draws crankcase vapors from the same sources listed above.

Fresh Air Inlet – The PCV system must have a source of fresh air to circulate through the crankcase. Any air inlet to the engine must be filtered.

On V-8 applications where the PCV valve is mounted in the valve cover, a breather or fresh air inlet tube is typically installed on the opposite valve cover.

PCV systems where the PCV valve is mounted in a central location such as the lifter valley typically use a breather or fresh air inlet on one or both valve covers. Alternately, some early applications may use a vented cap on the oil fill tube for this purpose.

Proper Baffling – The PCV Valve's mounting location must be properly baffled to prevent excessive oil consumption. See www.mewagner.com for more information on baffle recommendations. ****If excessive oil consumption is detected, the PCV valve's location and baffling should be examined.***

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DUAL FLOW PCV OVERVIEW

Stock style PCV valves have remained unchanged for over 50 years. A typical stock style PCV valve has one airflow channel; the airflow through this channel is controlled by a spring actuated piston. The flow rate at idle, the flow rate under cruising conditions, and the vacuum level where the valve transitions between these modes are controlled by the spring's stiffness and piston's geometry. These parameters are not adjustable by the user for tuning purposes.

Dual Flow PCV Technology puts the user in control of all aspects of the PCV system's performance. M/E Wagner is the first manufacturer to split PCV airflow into two separate circuits, an IDLE and CRUISE circuit. This patented technology allows the user to adjust the PCV system's flow rate, as well as the vacuum level where the valve transitions from IDLE to CRUISE mode.

HOW IT WORKS

- The Dual Flow PCV Valve can be in IDLE or CRUISE mode, depending on driving conditions.
- IDLE mode has a low flow rate.
- CRUISE mode has a high flow rate.
- The IDLE flow rate is controlled by the IDLE screw.
- The CRUISE flow rate is controlled by a combination of the user set IDLE flow rate, and internal porting in the valve (porting is precision machined and is not user adjustable).
- The vacuum level where the valve switches from IDLE to CRUISE mode is controlled by the CRUISE screw.

TUNING METHOD OVERVIEW

Tuning recommendations are offered as a starting point, however the user may experiment to find what works best for a particular engine.

The Dual Flow PCV Valve can operate in Dual Flow mode or Fixed Orifice Mode. Two springs are supplied to accommodate various ranges of vacuum when operating in Dual Flow mode.

Dual Flow Mode utilizes both the IDLE and CRUISE circuits. This mode flows a reduced amount of air under idle conditions and an increased amount of air under cruising conditions. This is the preferred mode of operation.

Two springs are available for use in Dual Flow mode. The high vacuum or low vacuum spring is selected based on the engine's manifold vacuum level at idle. See "Selecting a Tuning Method" for more details.

In the event that the springs need to be identified, the following length chart may be used. Note that the low vacuum spring is a weaker spring (due to smaller wire diameter) even though its uncompressed length is longer than that of the high vacuum spring.

Spring Length Reference Chart

Spring	Uncompressed Length	Wire Dia.
High Vacuum (10"+ Hg.)	1.50"	0.018"
Low Vacuum (7"-10" Hg.)	1.75"	0.016"

Fixed Orifice Mode utilizes the IDLE circuit only, and is used for engines with extremely low idle vacuum levels. The spring is removed from the valve in fixed orifice mode, effectively locking out the CRUISE circuit. In this mode, the flow rate of the IDLE circuit is intentionally increased, and the valve flows an increased amount of air at all times. This is also useful when idle vacuum signals are unstable. Full backfire protection is maintained when using fixed orifice mode.

SELECTING A TUNING METHOD

To select a tuning method, the following steps should be used:

1. Connect a vacuum gauge to a **manifold vacuum source**. *Note that the vacuum tuning port on the DF-17 PCV valve is **not** an acceptable measurement point for this reading. A manifold vacuum source on the engine must be used.*
2. Warm up the engine.
3. With the engine at idle (in *PARK* for automatics), observe the idle vacuum level.
4. Using the chart below, determine which tuning mode and which spring (if applicable) will be used. Go to the shop manual section listed below for next steps on the tuning method selected.

Valve Configuration Selection

Manifold vacuum at idle:	Tuning mode:	Spring:	Go to shop manual section:
Greater than 10" Hg	Dual Flow Mode	High Vacuum Spring	Dual Flow Mode Instructions P.3
Between 7" and 10" Hg	Dual Flow Mode	Low Vacuum Spring	Dual Flow Mode Instructions P.3
Less than 7" Hg, or if vacuum is unsteady or choppy when viewed with a vacuum gauge	Fixed Orifice Mode	N/A	Fixed Orifice Mode Instructions P.4

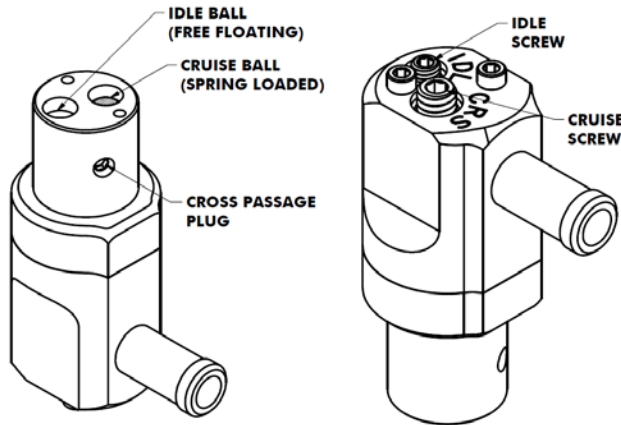


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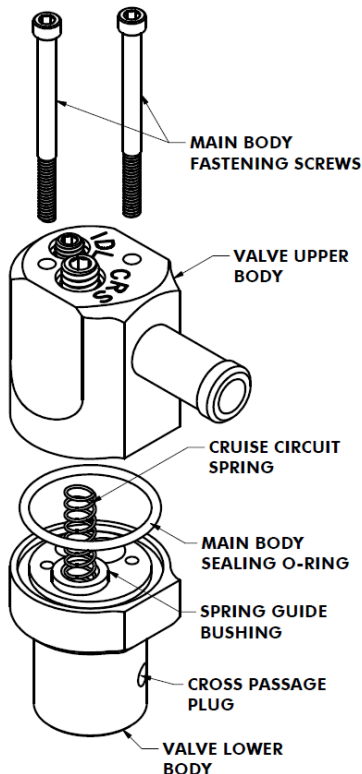
DUAL FLOW MODE INSTRUCTIONS



Dual Flow Mode utilizes both the IDLE and CRUISE circuits. This mode flows a reduced amount of air under idle conditions and an increased amount of air under cruising conditions.

CHANGING THE CRUISE CIRCUIT SPRING

Based on the table in "Selecting a Tuning Method", it may be necessary to change the cruise circuit spring. **Valves are shipped from M/E Wagner in Dual Flow mode with the high vacuum spring installed unless noted otherwise.** If it is necessary to change the spring, use the following steps:



1. **Disassemble valve:** Using the allen wrench supplied in the kit, remove the (2) main body fastening screws. This will permit the upper and lower body to be separated.

2. **Change the CRUISE circuit spring:** After removing the upper body, remove the existing CRUISE circuit spring and swap in the desired spring.

3. **Reassemble valve:** Being sure to reinstall the main body sealing o-ring, reassemble the upper and lower body. Reinstall the (2) main body fastening screws and hand tighten.

TUNING IN DUAL FLOW MODE

1. **Set CRUISE circuit transition for initial tuning:** The CRUISE screw controls the vacuum level where the valve transitions from IDLE mode to increased flow CRUISE mode. Turn the CRUISE screw clockwise until it is flush with the top of the valve. Back out the CRUISE screw counterclockwise 10 turns, or ½" above flush. This ensures the CRUISE circuit will be off for initial tuning.

2. **Set IDLE flow rate:** The IDLE screw controls the flow rate of the valve in IDLE mode. The IDLE flow rate also influences the valve's flow rate in CRUISE mode; CRUISE modes adds a preset amount of flow to the IDLE flow rate via CNC machined internal porting.

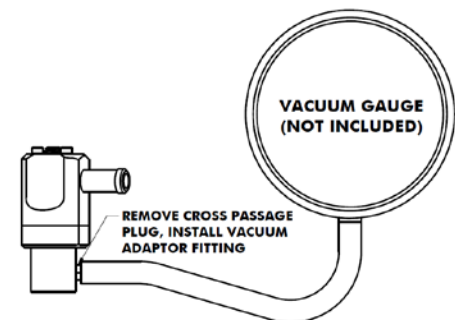
Turn the IDLE screw clockwise until lightly seated, then use the **manifold vacuum** reading previously determined in "Selecting a Tuning Method" and the table below to determine the number of IDLE screw turns out (counterclockwise) from lightly seated that should be used as a starting point for your engine.

Example: A 302 cubic inch engine with 15 inches of manifold vacuum at idle should set the IDLE circuit screw to 1 turn CCW from lightly seated.

		IDLE circuit screw setting vs. manifold vacuum (in. Hg) at idle			
		7"-10"	10"-14"	14"-18"	18"+
ENGINE SIZE CU. IN.	Less than 250	3/4 turn	5/8 turn	1/2 turn	1/2 turn
	250 - 400	1-1/2 turns	1-1/4 turns	1 turn	3/4 turn
	400+	2 turns	1-3/4 turns	1-1/2 turns	1-1/4 turns
Maximum setting 3 turns		Use Low Vac. Spring	Use High Vacuum Spring		

CAUTION: User assumes all responsibility when determining flow rates. Proper PCV baffling is required. An inline air-oil separator may be required. Oil consumption and spark plug fouling should be carefully monitored.

3. **Connect vacuum gauge to PCV valve for CRUISE circuit tuning:** Using the included allen wrench remove the CROSS PASSAGE PLUG. Thread the VACUUM ADAPTOR FITTING hand tight into the cross passage port. Connect a vacuum line from the fitting to a vacuum gauge.



4. **Install Valve:** Connect PCV line to manifold vacuum fitting intended for PCV usage. Install valve to valve cover. Valve will not insert into valve cover fully with vacuum adaptor fitting attached, and may need to be held in place during tuning. If this is necessary a glove should be worn since the valve will quickly become hot.

5. **Warm up engine.**

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VISIT OUR WEBSITE FOR ADDITIONAL INFORMATION AND HOW-TO VIDEOS PAGE 3 OF 4



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DUAL FLOW PCV VALVE

PART NO. DF-17 US PATENT NO. 9,376,945

6. Set CRUISE circuit transition level: Slowly turn the CRUISE SCREW clockwise until valve transitions from IDLE to CRUISE mode (vacuum tuning port reading will move off of zero to 3" or more when valve enters CRUISE mode). *Some engines may require the CRUISE screw to be nearly flush with the top of the valve before the vacuum transition occurs, this is normal.* Now turn the CRUISE SCREW counterclockwise slowly until valve transitions back to IDLE mode (vacuum will drop back to 0-1"). Turn the CRUISE SCREW counterclockwise an additional (3/4) turn to obtain the final setting.

Vacuum Gauge Reading from PCV Tuning Port*	IDLE Mode	CRUISE Mode
	0-1" Hg	3"+ Hg

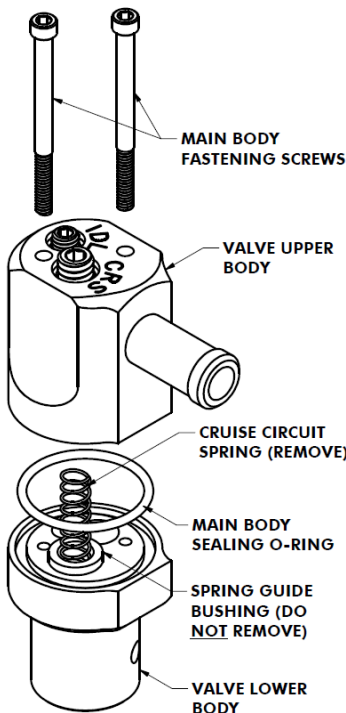
*NOTE: Vacuum reading from the DF-17 tuning port will not match typical manifold or ported vacuum readings. It is a measurement of an internal circuit of the valve.

7. Verify CRUISE transition level: Rev engine quickly and aggressively. Vacuum gauge needle should briefly jump off of zero (valve enters CRUISE mode briefly) during rev. Vacuum reading must return to 0-1" (valve returns to IDLE mode) when engine idles.

8. Remove vacuum gauge and fitting: Shut off engine. Remove vacuum gauge and vacuum adaptor fitting. **Reinstall cross passage plug.** Install valve fully in valve cover and connect PCV line.

9. Road test: Drive the vehicle and determine if any adjustments to the IDLE flow rate need to be made. See "Airflow Recommendations" for more details.

10. Iterate IDLE flow: If it is determined that changes are needed to the IDLE flow rate, repeat steps 1-9 while making changes to the IDLE flow baseline in 1/4 turn increments.



FIXED ORIFICE MODE INSTRUCTIONS

Fixed orifice mode utilizes the IDLE circuit only. In this mode, the flow rate of the IDLE circuit is intentionally increased, and the valve flows an increased amount of air at all times. This is useful when idle vacuum signals are weak or unstable. Full backfire protection is maintained when using fixed orifice mode.

1. Disassemble valve: Using the allen wrench supplied in the kit, remove the (2) main body fastening screws. This will permit the upper and lower body to be separated.

2. Remove CRUISE circuit spring: After carefully removing the upper

body, remove the CRUISE circuit spring. This will disable the CRUISE circuit completely, directing all airflow through the valve through the IDLE circuit. Do not remove the bronze spring guide bushing.

3. Reassemble valve: Being sure to reinstall the main body sealing o-ring, reassemble the upper and lower body. Reinstall the (2) main body fastening screws and hand tighten.

4. Set IDLE flow rate: With engine running at idle (in PARK for automatics), tune IDLE SCREW to obtain desired idle flow rate. Since the CRUISE circuit no longer adds an additional amount of airflow during cruising conditions, M/E Wagner recommends using an increased idle flow rate. The following IDLE circuit settings (number of turns counterclockwise from lightly seated) are recommended to ensure the crankcase is properly ventilated, your engine may require more airflow. Carburetor / Injection tuning may be necessary in conjunction with this adjustment.

IDLE circuit screw setting (Max setting 3 turns)	Engine Size, Cubic Inches		
	Less than 250	250-400	400+
	3/4 turn	1-1/2 turns	2 turns

CAUTION: User assumes all responsibility when exceeding stock flow rates. Proper PCV baffling is required. An inline air-oil separator may be required for applications with high flow rates. Oil consumption and spark plug fouling should be carefully monitored when exceeding stock flow rates.

5. Set CRUISE screw: The CRUISE screw is no longer used, however it must still be installed to the valve. Turn the CRUISE screw until it is approximately flush with the top of the valve. Exact positioning is not critical in this mode.

6. Install Valve: Install valve to valve cover. Connect PCV line to manifold vacuum source intended for PCV usage.

7. Warm up engine.

8. Road test: Drive the vehicle and determine if any adjustments to the IDLE flow rate need to be made. See "Airflow Recommendations" for more details.

9. Iterate IDLE flow: If it is determined that changes are needed to the IDLE flow rate, repeat steps 4-8 while making changes to the IDLE flow baseline in 1/4 turn increments.

AIRFLOW RECOMMENDATIONS

After road testing the following guidelines may be used to optimize the IDLE flow rate. See separate "Frequently Asked Questions" sheet for additional tuning assistance.

Inadequate PCV Flow	Excessive PCV Flow
<ul style="list-style-type: none"> Oil quickly becomes dirty Oil smell inside vehicle while driving Oil residue on firewall or valve covers Oil in base of air cleaner (on vehicles with closed PCV systems) Oil leaks due to excessive crankcase pressure (Note – oil leaks may have other causes unrelated to the PCV) 	<ul style="list-style-type: none"> Idle tuning difficulties Unresponsive idle mixture screws on carburetor Oil consumption through the PCV system (also check baffling) Spark plug fouling due to oil consumption (also check baffling)