



# ENGINEERING REPORT

Dodge Ram 6.7L Cummins 2013-2018 Thermostatic Bypass Valve Kit | SKU: MMTC-RAM-TBV

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## REPORT AT A GLANCE

- **Goal:** Create a Thermostatic Bypass Valve that outperforms the stock unit. The Mishimoto unit should fit directly into the Ram without any cutting or modification required. A thermostat and full bypass should be available.
- **Results:** The Mishimoto bypass valve showed 14.3% improved flow when compared to the stock unit with a thermostat. On full thermostatic bypass, the Mishimoto unit was better by 28.6%.
- **Conclusion:** The Mishimoto thermostatic bypass valve is a valuable upgrade for Ram owners who drive their vehicles hard, tow a lot, or drive in hot climates. The valve helps to ensure transmission temperatures stay at optimal values during all driving conditions.

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DESIGN OBJECTIVES

- Create a thermostatic bypass valve that reduces restriction and flows better than the stock unit.
- Must have thermostat and bypass options.
- Must be a direct fit, with no cutting or permanent modification necessary.

DESIGN AND FITMENT

The R&D process began by evaluating the stock unit and understanding how the Ram team chose to package the thermostatic bypass valve. We needed to next understand how the unit worked and address potential points of failure. Upon further inspection, it became apparent that the stock unit was restrictive. Several internal flow channels necked down for machining purposes, which will cause back pressure and decreased flow. Also noted as a potential failure point was the small thermostat.

To increase flow, the Mishimoto unit removes the restrictions of the stock valve. An increased thermostat size was added to ensure failure does not occur. Finally, a full thermostat bypass was created to allow maximum flow to the transmission cooler. All the changes increased

the flow to the transmission cooler, which will help keep transmission temperatures low during extreme conditions. Figure 2 below shows the flow increase between the stock and Mishimoto radiators.



Figure 1: The stock and Mishimoto Thermostatic Bypass Valve outside the truck.

PERFORMANCE TESTING

The test was conducted on a bench testing rig. A large pump and flow meter were used to determine flow rates through the valve. The transmission fluid was set at ambient temperature with the pump supplying the same flow rate and pressures across all tests. The test was first performed with the stock unit and the thermostat was forced open. Next, the Mishimoto unit was tested with a thermostat forced fully open. Finally, the Mishimoto unit was tested with the bypass in place.

CONCLUSION

As seen in Figure 2, the Mishimoto valve outperformed the stock valve by increasing the flow by 14.3% when a thermostat was used and 28.6% when the thermostat was removed. This increase in flow will help provide better transfer of fluid to the front transmission cooler. This flow improvement will result in lower transmission cooler temperatures. The larger thermostat is more robust than the factory unit, which is known to fail.

TESTING DONE BY:

Jason Wettig, Mishimoto Product Engineer

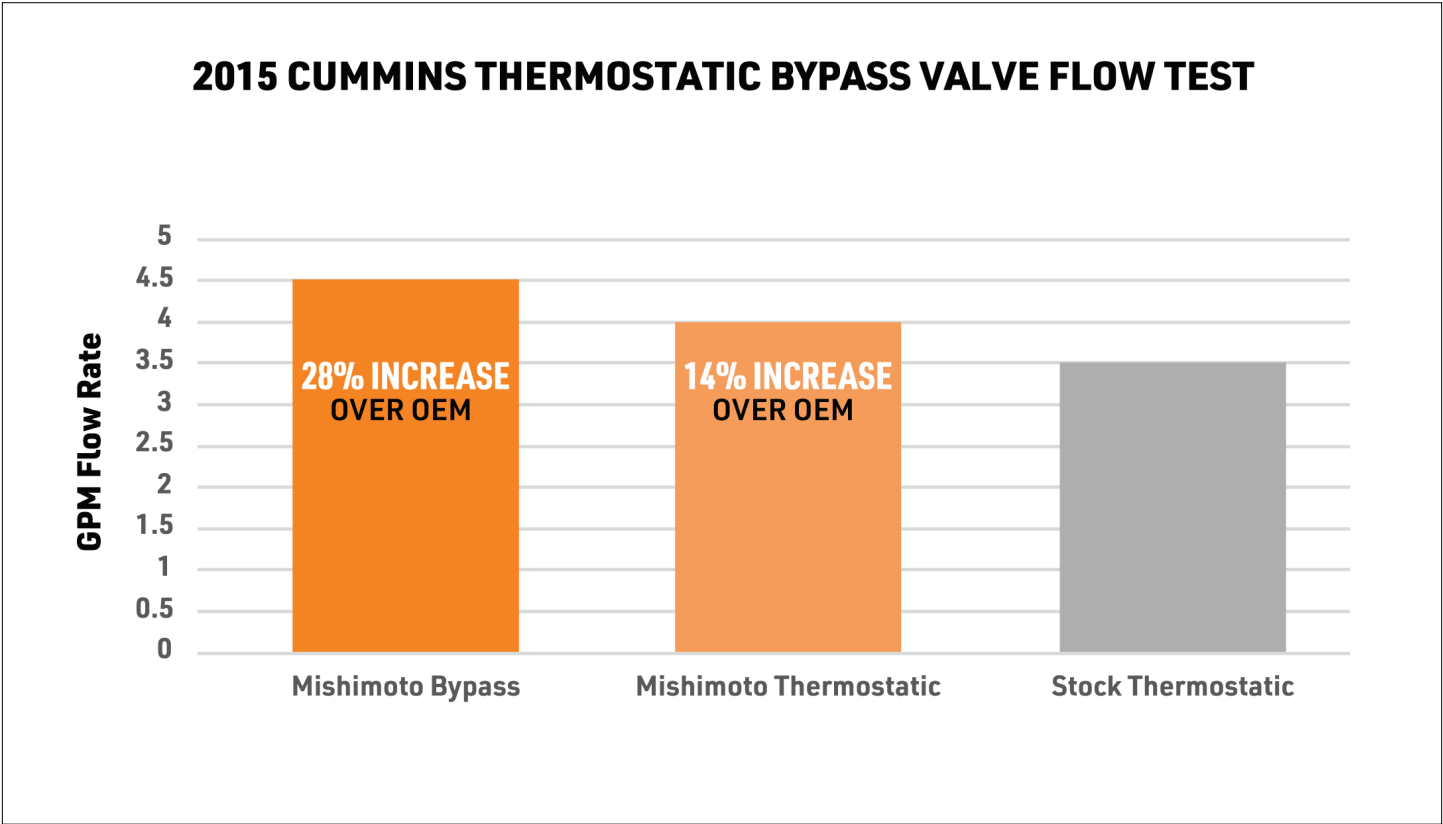


Figure 2: The Mishimoto Thermostatic Bypass Valve and the stock valve flow rates. The Mishimoto unit, with its improved geometry, showed an increase in flow rate.



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