



# Drive module for variable intake manifold BMW V8

New in our programme!

Vehicle	Product: Electric drive module EAM-S	
BMW	PIERBURG No.	O.E. No.*
E60, E61, E63, E64, E65, E66, X5	7.22940.01.0	11 61 7 505 805

Motor Service has newly introduced to its line of products an electric drive module for BMW vehicles.

The new V8 Otto engine from BMW is equipped, as the first mass produced engine worldwide, with an intake manifold module in which the length of the suction channels can be changed in an infinitely variable manner.

The intake manifold is adjusted by the electric drive module EAM-S.

#### Characteristics:

- Well proven driving concept with a DC motor
- Position indication through integrated potentiometer
- High torque owing to a worm gear
- Rugged design owing to the die-cast aluminium housing
- Position control through the engine controller (ECU)
- Fast response



Product view



Drive module at the intake manifold



Location of the drive module within the BMW 645i

The right of changes and deviating pictures is reserved. Assignment and usage, refer to the each case current catalogues, TecDoc CD respectively systems based on TecDoc.

\* The reference numbers given are for comparison purposes only and must not be used on invoices to the consumer.



**Background:**

**Why use a variable intake manifold?**

The performance of an engine is dependent on the mass of the fuel/air mixture combusted per unit of time by the engine. One possibility of increasing this mass throughput is that of self or resonance charging:

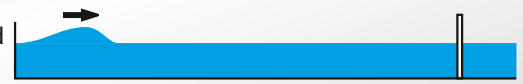
Upon closing of the intake valves, a pressure wave (burst) is produced which passes backwards through the intake manifold at the speed of sound. The burst is reflected at the inlet of the manifold and again passes through the intake manifold in the direction of the cylinders. If the conditions are such that the burst arrives precisely at the point of time at the cylinder when the inlet valves open, it will then cause the pressure to increase and thus a mass increase within the cylinder. This can be clarified by using the example of a water channel (so-called "shallow water analogy", shown on the right). This effect is dependent on both the engine speed and the length of the intake manifold.

**"Shallow water analogy":**

The gate ("inlet valve") produces a wave which passes along the channel ("intake manifold").



The wave is reflected at the end of the channel.

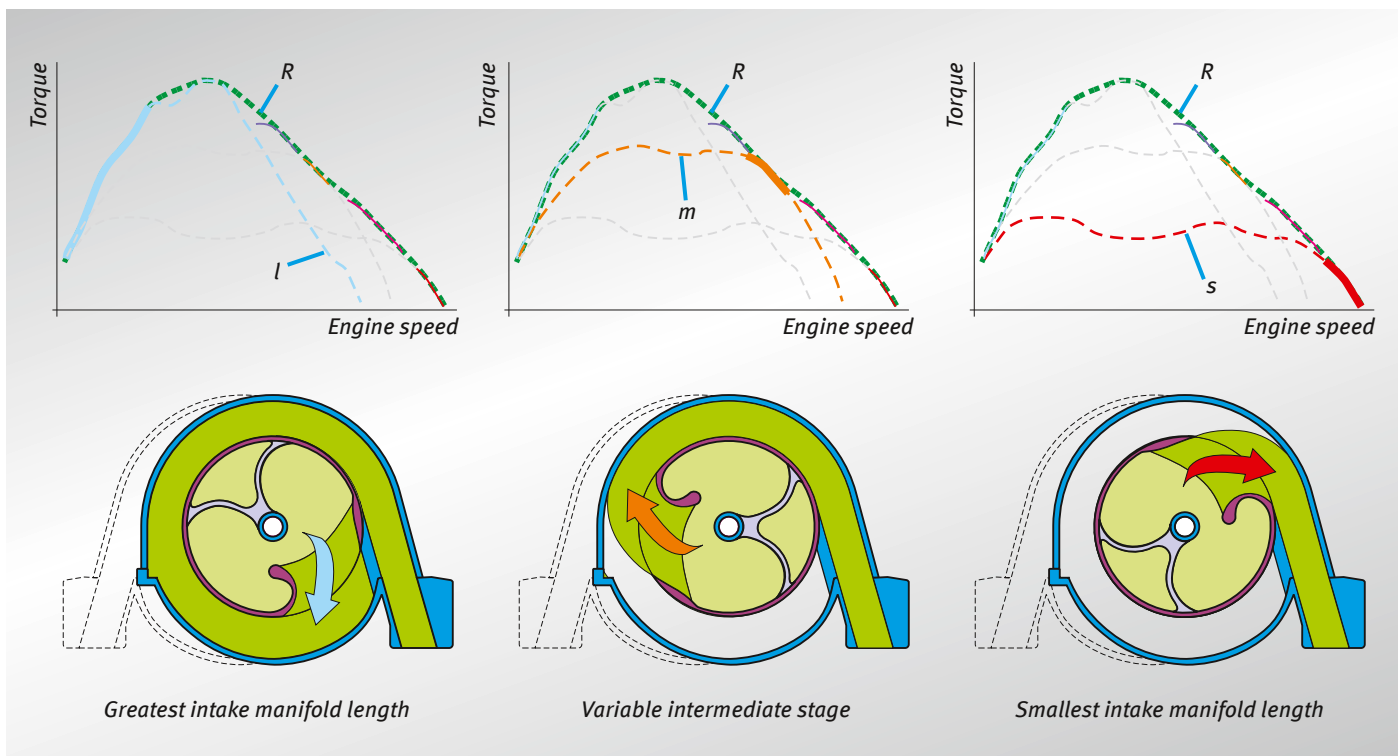


The gate ("inlet valve") is precisely opened at the point of time when the reflected wave returns.



Long intake manifolds are most effective at lower engine speeds. This corresponds to curve "l" in the schematic given below. Short intake manifolds deliver the best performance only at higher engine speeds (see curve "s"). For any range in between, there theoretically result an infinite number of curves "m". Engine management will synchronise the

length of the intake manifold in an infinitely variable way with the current engine speed, the result being an optimum torque characteristic. This optimum torque characteristic is represented by the envelope curve "R", which results from the superposition of the individual curves for any arbitrary intake manifold length.



Operating principle of an infinitely variable intake manifold (schematic)