

HOWELL

**ENGINE DEVELOPMENTS, INC.
FUEL INJECTION APPLICATIONS**

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INSTALLATION INSTRUCTIONS MARINE OXYGEN SENSOR ADAPTOR

Installation of a heated oxygen sensor in a marine application allows use of a closed loop fuel injection system, or an air fuel ratio monitor used to optimize air and fuel mixtures for maximum power at high power settings, and maximum economy at lighter cruising loads.

Howell Engine Developments Marine Exhaust Manifold adaptor for Oxygen sensors can be installed in almost any cast iron or cast aluminum, water cooled, exhaust manifold. Provided the overall riser wall thickness is between .700" and 1.150". Our prototype installation was in the riser from a Mercruiser exhaust manifold typically used on Chevrolet marine engines. It can be installed in any flat surface, at least 6 inches before the cooling water is dumped into the exhaust stream.

The machining procedure used will require that the manifold, or riser, be clamped onto a Bridgeport or equivalent milling machine, in order to drill and bore the required holes in the manifold.

Once the part is clamped onto the milling machine, and a suitable flat surface selected or milled, drill a 29/32-inch hole through both outer and inner walls of the manifold. This is the tap drill size for a 3/4 NPT (tapered pipe thread).

Next, enlarge the hole in the outer manifold surface to 1.625-1.650" using a boring tool. This provides the hole size, with slight clearance, for the outer diameter of the oxygen sensor adaptor. It is very important to perform all machining steps without moving the riser once started, in order to keep the machined and drilled holes concentric, and both holes square to the flat milled outer wall surface. This will ensure the best water jacket seal possible.

With the manifold still clamped on the mill table, carefully tap the inner wall using a 3/4 NPT tap, to accept the smaller threaded end of the Oxy sensor adaptor. It is necessary to keep this tap straight and concentric with the outer hole. As you tap the hole, trial fit the adaptor until you get it tapped out large enough that the adaptor will thread in 3 or 4 threads before becoming tight in the tapered hole.

For final installation use pipe sealer on the tapered 3/4 NPT threads of the adaptor and tighten it thoroughly in the manifold (or riser). Put a bead of silicone gasket sealer around the adaptor next to the outer manifold wall, install the O-ring and flange nut to keep everything in place, and tighten just enough to slightly compress the O-ring. This should keep exhaust and water separated and sealed up.