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# Liquid Level Sensing in a Hydraulic System

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Over the years, Trans-Tek has developed numerous variations on standard LVDT product lines. The Series 240 DC LVDT, being one of the highest volume sellers, probably contains the most modifications. One spin-off derived from specific customer requirements is a group of DCDTs which can be submersed in nonconductive, noncorrosive fluids at ambient pressure conditions. This style transducer is an interesting alternative, making exposure to this kind of medium possible. Although not commonly advertised, there are unique model numbers with the same working ranges as the regular Series 240:

Std. Series 240	Mod. Series 240	Stroke
0240-00000	0240-00060	±0.050"
0241-00000	0241-00050	±0.100"
0242-00000	0242-00030	±0.250"
0243-00000	0243-00050	±0.500"
0244-00000	0244-00070	±1.000"
0245-00000	0245-00040	±2.000"
0246-00000	0246-00030	±3.000"

From the outside, these special LVDTs look identical to their catalog counterparts. Internally, some materials are replaced or omitted altogether, making them compatible with the nonconductive, noncorrosive fluid. This surrounding fluid - often times hydrocarbon-based fluid or silicon oil- can migrate into the transducer over time. Integral signal conditioning provides DC-in/DC-out operation with excellent resolution and non-linearity. Electrically, these modified transducers perform exactly as the standard version, with specifications line for line the same as those shown for the Series 240.

A leader in the field of remotely operated robotic cleaning and inspection systems uses a Model 0246-00030 to sense hydraulic fluid level. In addition to designing and manufacturing application-specific equipment, work teams are deployed to implement these sophisticated systems for on-site environmental services. A key advantage: the ability of these remote vehicles to eliminate hazardous materials without directly exposing personnel. As part of their company mission, this company believes

the best way to inspect and clean a confined space is from the outside.

At a customer's request, one Series of robotic system was upgraded to include the Model 0246-00030 as part of a hydraulic level detection feature. This robot is used around the intake pipe of a nuclear reactor's cooling system. The cleaning mechanism located at the front end removes sludge and sediment buildup from the pipe's inner walls. As a safety issue, the customer was concerned with hydraulic oil potentially leaking from the robot and entering the intake stream of fresh water used as reactor coolant.



To accomplish the modification, the length of the core assembly extension rod was extended and attached to a float on the end. Resting on the surface of the hydraulic fluid, the core assembly passes through the ID hole of the LVDT, which is housed in a PVC tube. Nearly any change in fluid level causes a displacement of the core assembly and floatation device. As a result, a sudden drop in fluid level is detected by the LVDT and could indicate a leak. In this extreme case, the transducer's output signal, wired through a relay circuit and fault ground, would trigger an automatic shut down of the robot's generator and pumping systems.

The Model 0246-00030 was chosen over the standard model because of the potential for leaking fluid. Exposure of the standard LVDT to these conditions could lead to eventual failure, defeating the purpose of this cleverly designed safety feature.