

Application Note

no. 67
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45 Meter Sensor Cable for Vacuum Now Possible!!

BACKGROUND

Philterc's standard fiberoptic cables use high loss multi-mode glass fibers that are limited to lengths of 3 - 15 m, depending upon the sensor model. With in-line connectors, extended lengths up to 30 m can be reached with some models.* A recent customer needed a total fiber cable length of 45 meters for a model D171 sensor in vacuum with high magnetic field. With one in-line connector, the D171 maximum length would be just 18 m.

PROBLEMS

Quartz fibers are good for long lengths, but they are far too expensive for the D171 model at 45 meter length. And, the fiber and jacket materials had to be vacuum compatible.

SOLUTION

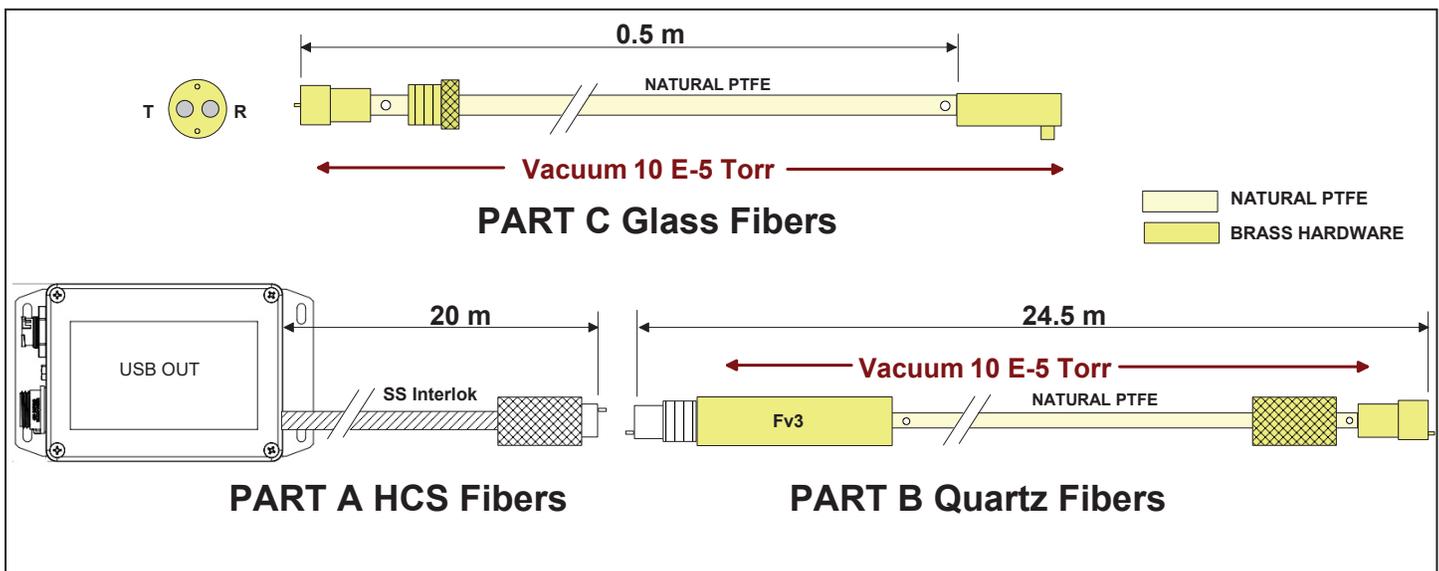
A 3-piece cost saving system was made comprising:

1. Part A - Two \varnothing 1000 μ m Hard Clad Silica Fibers, 20 m long in air
2. Part B - Two \varnothing 1000 μ m Bundles of \varnothing 200 μ m Silica/Silica (Quartz) Fibers, 24.5m long in vacuum
3. Part C - \varnothing 4320 μ m D171 Glass Fibers, 0.5 m long in Vacuum

Part B fiber bundles each have 19 fibers: one transmits light and one returns reflected light. Part B transmit fibers were randomly mixed with Part C glass fibers. Although Part B fibers illuminated just 10% of Part C fibers, this D171 sensor calibrated to an acceptable 70 mm displacement range.



* Ref: Philtec Application Note no.39 Long Fiberoptic Cables



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