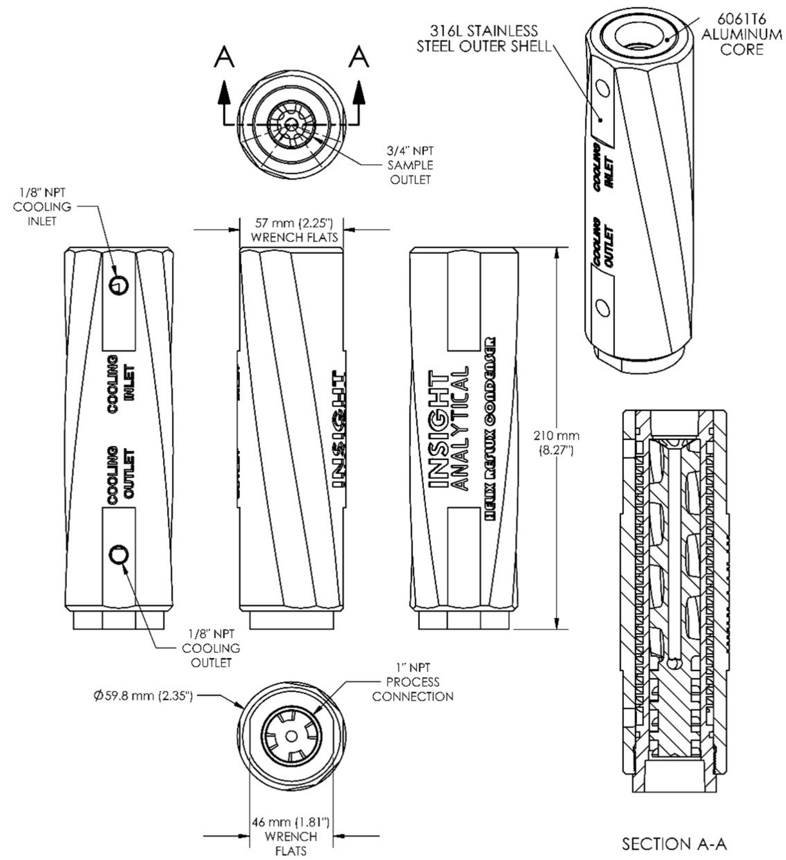
INSIGHT ANALYTICAL

Active Probe Condenser

A compact, cost-effective device for controlling the dew point temperature of sample gas in analytical sample systems.

The Insight Analytical Active Probe Condenser is designed to limit the dew point temperature of sample gas in analytical sample systems when mounted on the outlet of quill type sample probes. The function of this condenser is similar to distillation/reflux type sample probes, tube-in-tube heater exchangers, and shell and tube heat exchangers, where cooling air or liquid flowing though the stainless steel outer shell cools the inner aluminum core along with the sample gas flowing through it. If the dew point temperature of the sample gas is higher than the inlet temperature of the cooling fluid, liquids are condensed and will drain back down through the sample probe and into the process.

The condenser is typically mounted vertically at the process sample point above the sample probe with an isolation valve between the probe and condenser. Mounting of the condenser on the isolation valve is via a 1” NPT female thread on the bottom of the aluminum condenser inner core. Process gas flowing up through the condenser is cooled as it contacts the aluminum insert inside of the inner core. The lowest one third of the insert is a reflux section and includes six staggered rows of saddle shaped fins which function as both reflux/distillation saddles and cooling fins. The upper two thirds of the insert is a condenser section with the gas flowing through seven parallel helical grooves. The grooves are inclined at a 70° angle to the horizontal to provide the best compromise between maximizing condensed liquid quantity, drainage, and contact surface area, while minimizing response time and vertical velocity. The insert is coated with SilcoTek Dursan® hydrophobic and oleophobic coating to improve drainage and provide abrasion and corrosion resistance. After coating, the insert is permanently installed in the electroless nickel plated aluminum inner core via a shrink fit, which maximizes the heat transfer between the two parts.



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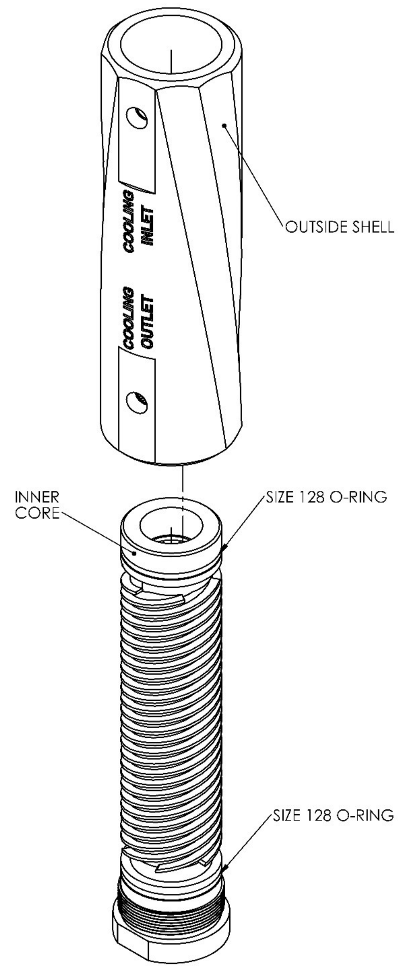
Making Measurements Matter.

Multi-start helical fins machined on the outer diameter of the inner core provide a large surface area for efficient heat transfer to the cooling fluid flowing between the inner core and outside shell and have a very low pressure drop. Low pressure drop is an important performance consideration if air from the cold side of a vortex type cooler is being used as the cooling fluid. While the condenser layout is similar to other countercurrent heat exchangers, where the hot sample gas and cooling fluid enter at opposite ends of the exchanger, this design is compatible with large temperature differentials between the hot and cold sides which are problematic for most shell and tube type heat exchangers. The outer shell and inner core are assembled with an M45 thread on the probe side of the condenser with sealing maintained by two size 128 O-rings. Although the outer shell and inner core are made from different materials, this design minimizes thermal stresses because the two parts are only rigidly connected at one end, which allows the two parts to expand and contract independently along their length.

Control of the sample gas outlet temperature is typically accomplished either by using a cooling liquid with at an appropriate temperature or using cooling air from a vortex cooler along with either manual or automatic flow control. An optional insulation cover is available for applications where the desired sample gas exit temperature is significantly different from ambient temperature.

This condenser is ideal for applications where a sample chiller or distillation/reflux probe might be used, but a more compact and cost effective solution is required. This product should only be used in applications where the sample gas, any entrained liquids, and the cooling fluid are compatible with the 316L stainless steel and nickel plated aluminum materials of construction. It is also important to ensure that the maximum temperature is not exceeded and that the minimum ambient temperature is safely above the freezing point if liquid is being used as the cooling fluid.



Technical Specifications

Maximum Pressure Rating	10340 kPag (1500 psig) for process gas 1380 kPag (200 psig) for cooling fluid
Temperature Range	-30°C to 149°C (-22°F to 300°F) for air cooling 1°C to 100°C (34°F to 212°F) for liquid cooling
Internal Sample Volume	49 cm^3 (3 in^3)
Recommended Sample Flow	0.5 to 10 NLPM (1 to 20 scfh)
Cooling Fluid Pressure Drop	60 NLPM (2.1 cfm) Air: 1.7 kPa (0.25 psi) pressure drop 3.8 LPM (1 US GPM) Water: 1.7 kPa (0.25 psi)
Dimensions and Weight	210 mm L x 60 mm Dia. (8.27” L x 2.35” Dia.), 2.5 kg (5.5 lbs)
Inlet and Outlet Cooling Port Size	1/8” NPT female thread
Sample Inlet Port Size	1” NPT female thread
Sample Outlet Port Size	¾” NPT female thread
Sample Wetted Materials	Electroless nickel plated 6061 T6 aluminum and Dursan® coated 6061 T6 aluminum
Coolant Wetted Materials	Electroless nickel plated 6061 T6 aluminum, 316L stainless steel, Aflas O-ring
Condenser External Surface	316L Stainless steel and electroless nickel plated aluminum
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
RoHS Compliance	Yes

Active Probe Condeser Insert