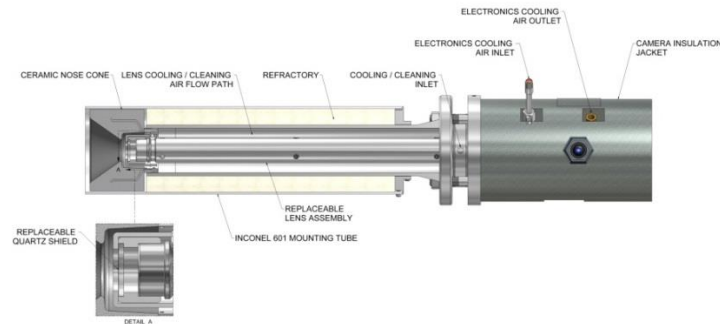


Canty Non Retractable High Temperature Cameras vs Retractable Systems

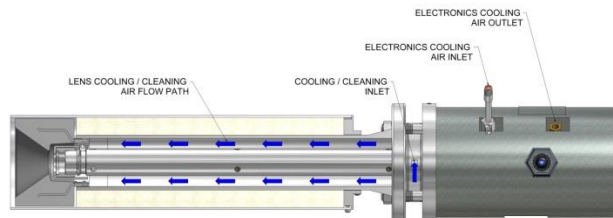
In general terms, a retraction system is used as a mechanism of protecting the optical lens component of a camera system from being exposed to high temperatures, which would cause the failure of this component, in the event air or water cooling was lost. Without a functioning automated retraction system, the lens component of these retractable cameras would fail instantly upon the loss of cooling.

The Canty approach is somewhat different in that the optical lens component is designed in such a way that **it does not require any cooling up to 1370°C** (UltraTemperature Camera), and limited air cooling up to 1650°C (ExtremeTemperature Camera). In an UltraTemperature camera system, a positive air flow runs over the lens in order to keep the optics clean. If the process which the camera is viewing is clean, this air does not need to operate at any time. If the process the camera system is viewing is somewhat dirty, this cleaning air should be operated. **If this cleaning air fails at any time, some dirt may be deposited at the tip of the camera on the replaceable quartz shield, but no damage will be done, and no components will fail.**

Between 1370°C and 1650°C processes, the ExtremeTemperature camera is used (see below for component / configuration).

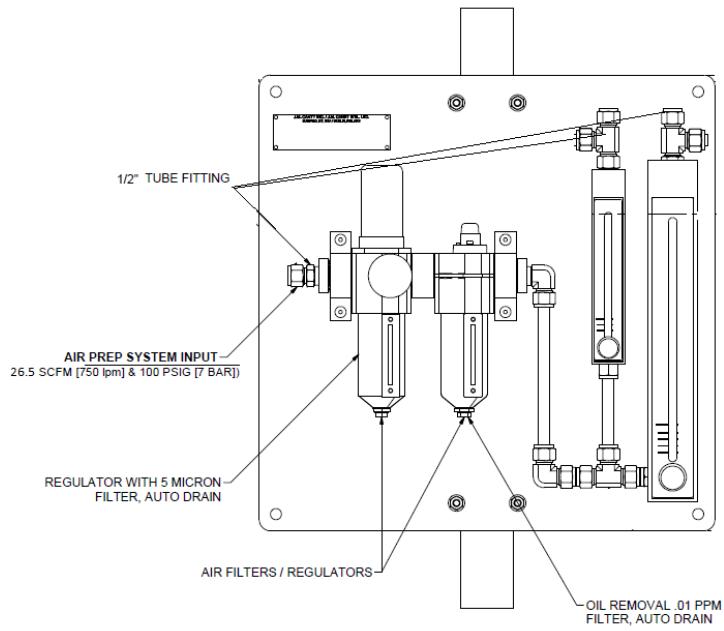
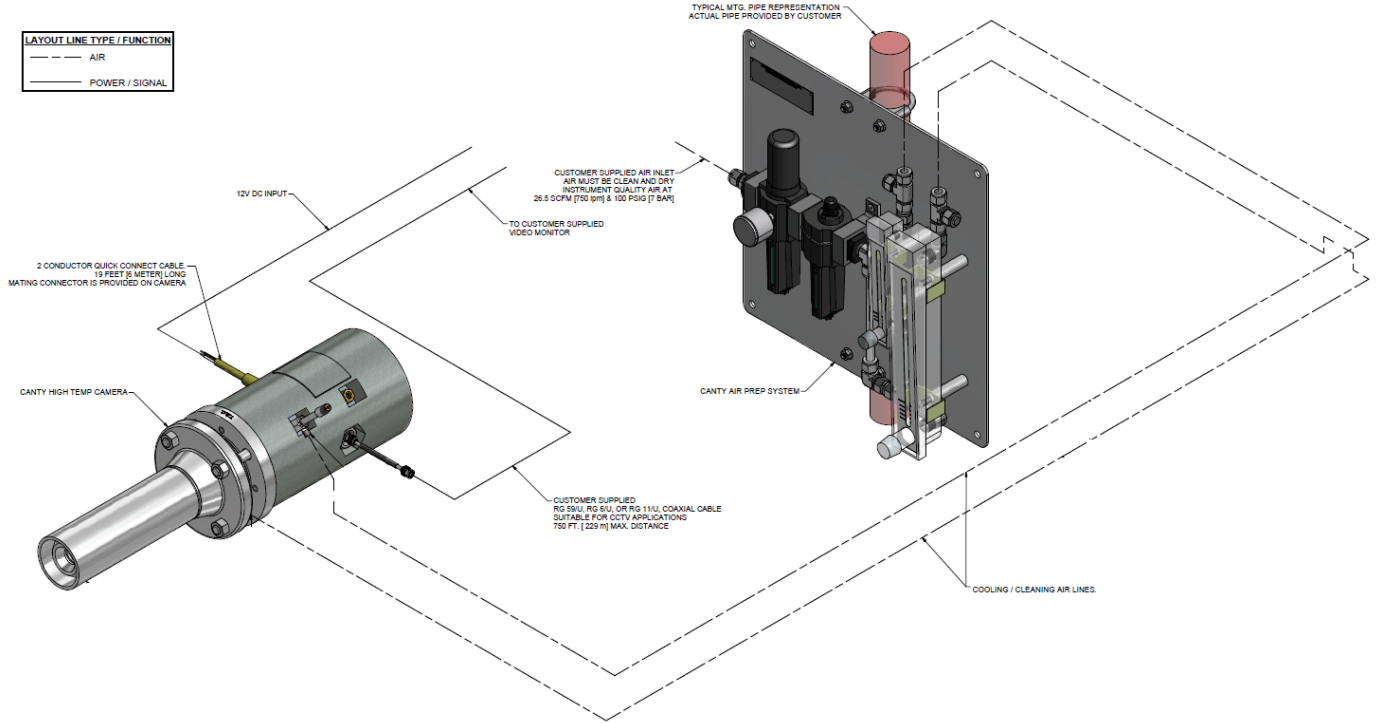


Similar to the UltraTemperature camera, a positive air flow runs over the lens in order to keep the optics clean, and also provides lens cooling in this case, with a typical air flow path seen below.



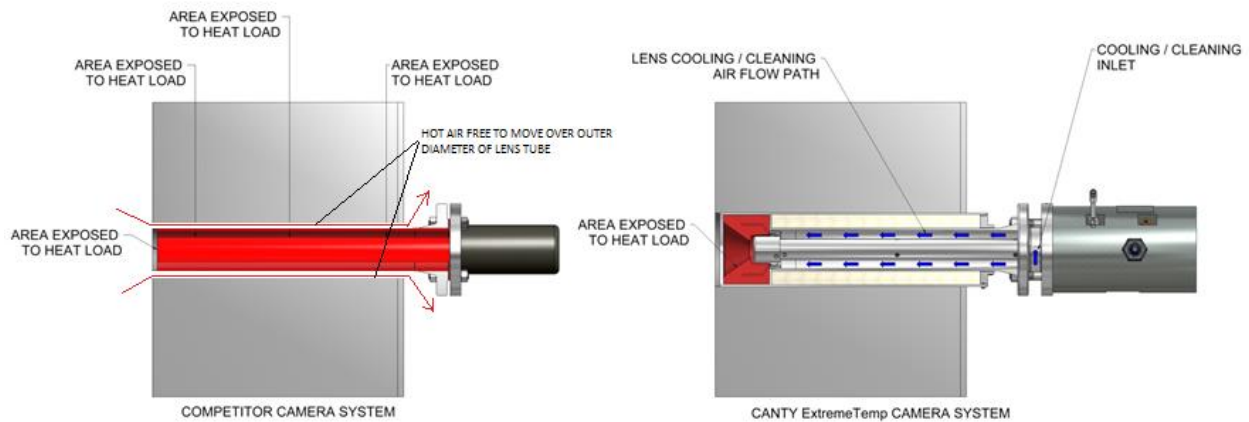
Note that the electronics cooling air is a common requirement for Canty and retractable type systems, and does not have any influence on whether a retraction system would be required or not.

The air supply to the camera system is typically controlled and regulated via an air panel, similar to what is shown below.



In an ExtremeTemperature camera, if the cleaning / cooling air fails, there is no instantaneous failure of any components. If the process is operating close to the camera specification upper limit of 1650C, the user will have sufficient time (~2 hours) to either get the air supply up and running again, or to manually remove the camera system from the process.

The fact there is no instantaneous component failure should air fail, is down to 2 primary points. Firstly, the lens system is made up of a patented series of quartz lenses, which can handle higher temperatures than any type of lens system on a retractable camera system. Secondly, the system is installed on the process in such a way that only minimal surface area is exposed to the elevated process temperatures. The Canty mounting tube is fixed in place so that the tip does not protrude into the process itself, and the outer diameter of the lens tube is tightly packed with refractory material. This means that only the tip of the system is exposed to elevated temperatures, and no hot air passes over the outer diameter of the lens tube. In comparison, in a retractable type system, the lens tube is positioned in the middle of a thru hole into the process without surrounding insulation, where hot air can freely flow from the process, over the outer diameter of the lens, and out of the process (see below)



It is due to this type of installation that the lens of the retractable type camera systems require constant air cooling, and have issues of instantaneous component failure should the air supply fail.

Eliminating the need for an automated retraction device, makes for a simpler installation and less ongoing maintenance for the overall system. A camera with a retraction system typically features a series of solenoid valves, pneumatic actuators, and low flow alarm devices, which is all extra equipment which must be maintained in comparison with a non retracting system. It is regularly observed that the retraction system itself can often fail, particularly when installed in dusty environments, where over time the mechanism itself becomes coated and therefore jams in place when the system attempts to retract. Typically in a Canty UltraTemperature or ExtremeTemperature camera, the only maintenance item is the replaceable quartz shield at the lens tip which may see deposits of material if the lens air is reduced or fails.

Overall a non retractable system allows for a simpler initial installation, and much less ongoing maintenance.