The arcing zone of high voltage self-blast gas circuit breakers is challenging to diagnose directly due to the combination of temperatures in the 30,000 K range and densities of the order $10^{25} \text{ m}^{-3}$. Instead proxy measurements are made, typically in the heating volume of the breakers. In this contribution we compare pressure measurements of the SF$_6$ gas from two sensors to 3D computational fluid dynamics (CFD) simulations. The simulated pressure evolution is evaluated at the same position as the actual sensors are placed, so in that sense the CFD simulations can be thought of as a synthetic diagnostic. The overarching purpose of this quantitative comparison of CFD simulations with measurements is to improve our understanding of the physics of current interruption in gas circuit breakers. The strategy has already been successfully applied to turbulence measurements in fusion plasmas. Further, questions will be generated in the case where agreement is poor between simulation and experiment. This in turn guides us as to what should be (i) modified in the simulation and/or (ii) additionally measured to answer the questions posed and thereby improve our knowledge of the physical processes.