



# Bruce Technologies Inc.

18 Esquire Road, North Billerica, MA 01862

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| <p><b><u>Product</u></b></p> <p>7716 Hydrogen Ignition Module</p>   | <p><b><u>Date</u></b></p> <p>September 2006</p> <hr/> <p><b><u>Target Implementation Date</u></b></p> <p>December 2006</p> |
| <p><b><u>Part Name</u></b></p> <p>SCAV SiC H2 IGNTN ASSY BDF4<br/>         SCAV SiC H2 IGNTN ASSY BDF200<br/>         SCAV SiC H2 IGNTN ASSY BDF41<br/>         I/A 7716 SiC H2 IGNTN CNTRL</p>   | <p><b><u>Part Number</u></b></p> <p>9051788<br/>         9051900<br/>         TBD<br/>         9051782</p>                 |
| <p><b><u>Product Description</u></b></p> <p>The 7716 Hydrogen Ignition system was designed as a replacement for the 7616 Hydrogen Burnoff. Updates include up-to-date electronics package with a solid state relay design for longer fault free operation and replacement of the heater coil ignition system with a silicon carbide heater design.</p>  |  |
| <p><b><u>Product Specifications</u></b></p> <ul style="list-style-type: none"> <li>• (2) 450 watt Silicon Carbide heaters</li> <li>• (2) CAL3300 temperature readouts to verify 760°C obtained</li> <li>• Warning alarm for failure of one SiC heater</li> <li>• Lock-out alarm for failure of both SiC heaters</li> <li>• Programmable heater ON circuit via function output</li> <li>• 60 Second time delay to allow temperature to reach &gt;760°C prior to enabling alarm monitor circuit.</li> </ul> |  |





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## Model 7716 H2 Ignition Module Assembly

### Overview

The 7716 Hydrogen Ignition system was designed as a replacement for the 7616 Hydrogen Burnoff. Updates include up-to-date electronics package with a solid state relay design for longer fault free operation and replacement of the heater coil ignition system with a silicon carbide heater design.

Since H<sub>2</sub> is not burned on low temperature Anneal processes, the process tube effluent gas may combine with air in the scavenger system and become explosive. To prevent combustion, a Hydrogen Ignition module with dual Igniters, placed in the scavenger, are used to ignite the Hydrogen before it is exhausted through the scavenger. The Hydrogen Ignition module assembly is virtually maintenance free; however, the igniters may require occasional replacement depending on their usage.



### Components and Installation

The Model 7716 Hydrogen Ignition module system consists of two units. The ignition unit is mounted in the scavenger, and an electronic assembly is mounted remotely.

The ignition unit is mounted just below the scavenger exhaust. Effluent gas from the process tube flows past the igniter coils, igniting the residual hydrogen, before entering the facilities exhaust.



### Igniter Elements

The two igniter elements are Silicon Carbide heaters mounted to a ceramic insulator. The temperature of each element is monitored using two type K thermocouples connected to two temperature readout modules.

### Coil Fail Detection

The Igniter elements operate simultaneously during normal operation. If one coil fails or a temperature less than 760°C is indicated, the electronic assembly initiates a warning alarm (typically Alarm 3) to the system DDC controller. Hydrogen flow is not interrupted. If both coils fail or a temperature less than 760°C is indicated on both coils, the electronic assembly initiates a failure alarm (typically alarm 4) to the system DDC. In this case, Hydrogen flow is immediately halted and a High flow purge of the process tube is initiated.





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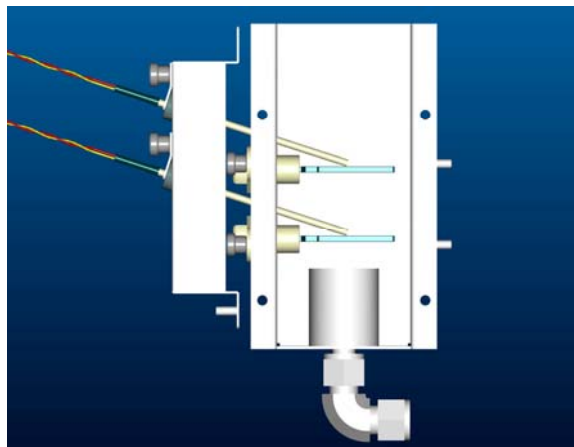
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## **7716 Electronics Assembly**

The 7716 H2 Ignition module electronics assembly consists of a power section and temperature monitoring section.

Upon application of the heater on command from the DDC (typically output 8), the solid state relay is energized powering the two silicon carbide hydrogen igniter elements.

Temperature of each igniter is monitored individually by two type K thermocouples connected to the two temperature monitors. These monitors each have two alarm setpoints programmed. One alarm setpoint is factory set at 760°C for the warning alarm (typically alarm 3) for an indication of a fault on one of the two Silicon carbide igniters. The second alarm setpoint is set for 775°C. This setpoint is used to monitor failure of both silicon carbide igniters. This condition will cause a failure alarm (typically alarm 4) and also cause the Hydrogen flow to stop and initiate a Nitrogen purge.



A timer relay is installed in each alarm circuit to prevent nuisance alarms when the heater command is not programmed or during the time the heater command is programmed on and the Silicon carbide heaters are heating up to temperature. This is factory set at 60 seconds.