Cyclone FID – Description

For OEM and In-House Systems

Cyclone FID Configuration:

A manifold mount configuration flame ionization detector (FID) developed by Applications Uniques (AU) is now available to third party OEM designers in addition to use within AU instruments, specifically the ***Truculence*** instrument platform.

Detectors Components:

Cyclone is a complete, assembled & tested, flame ionization detector (FID). Operation requires various external circuits and support equipment.

Optional:
When ***Ringbolt*** support electronics are added, the module becomes a smart sensor called ***Fireworks II***. ***Ringbolt*** support electronics provide basic operational support and signal handling functions for the detector.

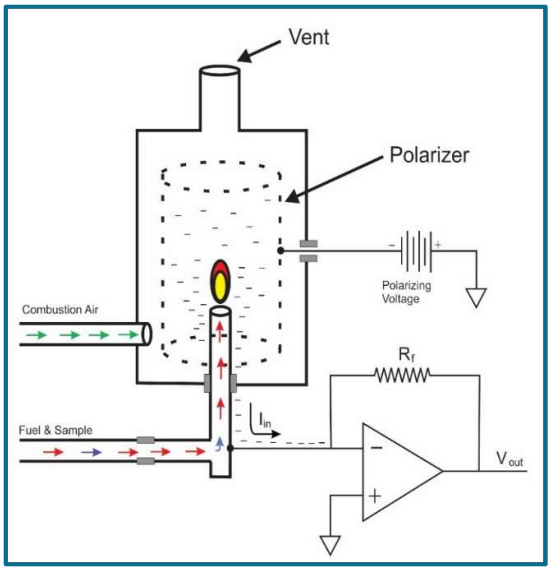

Figure 1 - Typical FID Diagram

Detector Design:

Cyclone is compact, having a base that is approximately 25 mm (1 in) square. It is about 75 mm long, including the exhaust plenum. It is designed to mount on a heated manifold and operate at temperatures up to 200 Dec C.

The two side-located ports will receive 1) combustion air and 2) fuel & sample that are to be pre-mixed in the manifold prior to entry to the FID. The FID will normally be at ambient pressure, and its effluent will be exhausted to atmosphere.

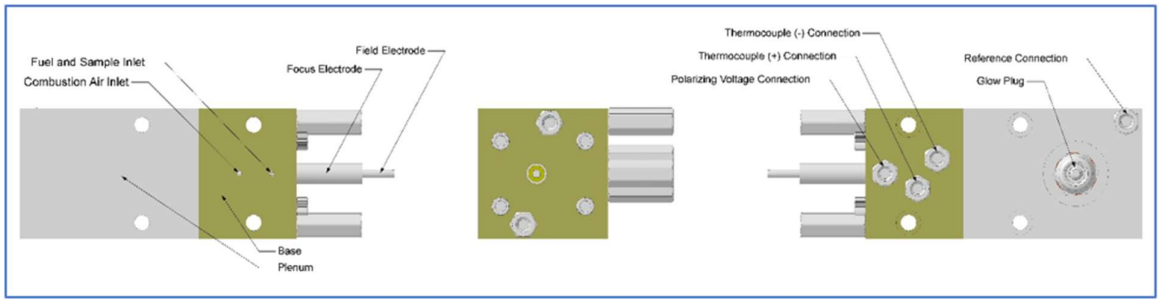

Figure 2 Cyclone OC Sensor - Gen5c

Support Electronic Connections:

The detector has 7 points of electronic connection to the FID-SE printed circuit boards (PCBs). A simple explanation of each of these follows:

1) **Polarizing Voltage** – The polarizing voltage produces a static electrical field within the detector. The strength of this field can be varied to adjust the signal collection efficiency. The range of adjustment is from 0 VDC to -150 VDC. This voltage is chosen, for a given set of operating conditions, to optimize two parameters: linearity of response and noise level.
2) **Focus** – The focus connection allows a steering voltage to be applied to the focus electrode within the detector. This voltage, in most applications, will be a DC voltage in the range of -5 VDC to near 0 VDC.
3) **Thermocouple (-)** – This point is attached to GND and is the reference for the flame sensing thermocouple device.
4) **Thermocouple (+)** – This signal is typically only a few millivolts (4 to 10 mV). It is amplified and monitored to sense the flame status (burning or not). This is a critical safety item to be monitored by the system and ensure that steps are taken to stop the flow of flammable gas should the flame either fail to light or be unavoidably extinguished without ability to reignite during operations.
5) **Glow Plug** – The glow plug contains an ignition coil which is energized with about 1.2 V (DC or RMS). A lighting sequence will typically be followed where the coil is energized for some period and the thermocouple value will be checked to determine if the flame is lit or if the sequence should be repeated. If the sequence is repeated a maximum number of times without success, an error condition should be indicated, and the system should take action to ensure safety.
6) **Signal** – The signal pin is located on the bottom of the detector and is where the detector signal, a small DC electrical current, is collected and quantified. This signal is typically amplified by a trans-impedance (electrometer) stage and routed to an analog to digital converter. The detector signal will range from as little as 1 pA to as much as 1 µA or more.
7) **Reference** – The reference connection is necessary for the glow plug circuit.

Project Names:

The project names mentioned in this document are derived from WWII Allied code words for various places and operations as follows:

- ***Truculence*** - Efate Island, New Hebrides	AU Instrument Platform
- ***Cyclone*** - Leyte Island, Philippines	Flame Ionization Detector
- ***Ringbolt*** - Tulagi Island, Solomon Islands	FID Support Electronics
- ***Fireworks*** - Oyamba, Solomon Islands	FID Smart Sensor Module

Revision History:

Rev A - Creation and initial Release – 27 March 2020
Rev B – Add block diagram, rebrand as Application Uniques (AU) – 18 May 2020.
Rev C – Updates to thermocouple and coil electrical specifications.
Rev D – Separate Support Electronics (***Ringbolt***) from FID (***Cyclone***) - 02 December 2020
Rev E – Updated Drawings - 02 July 2023
Rev AF – Convert from 200327-01-E to PD Doc Nos and branding – 21 May 2026