Tantalum Capacitor

Industry: **Electrical and Electronics**
Product: **ZR22 and ZR402**

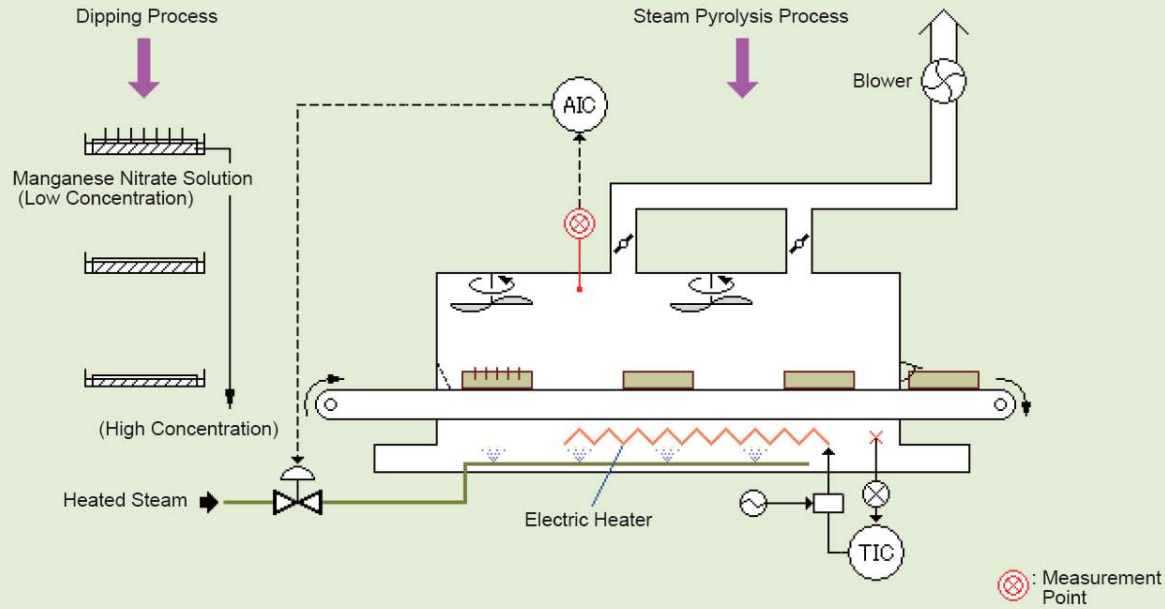
Introduction

Tantalum Capacitors are electrolytic capacitors that use a material called tantalum for the electrodes. Large values of capacitance similar to aluminum electrolytic capacitors can be obtained. Also, tantalum capacitors are superior to aluminum electrolytic capacitors in temperature and frequency characteristics. In comparison with aluminum electrolytic capacitors, they are for similar capacitance and volume ratings generally more expensive, with lower effective series resistance. They usually have longer life, especially at moderately elevated temperatures. For surface mount devices, they are generally smaller.

Tantalums exploit the tendency of tantalum to form a protective oxide surface layer. They use tantalum powder, pressed into a pellet shape, as one "plate" of the capacitor with the oxide as the dielectric, and an electrolytic solution or conductive solid as the other "plate". Because the dielectric layer can be very thin (thinner than the similar layer in, for instance, an aluminum electrolytic capacitor), a high capacitance can be achieved in a small volume. Once tantalum powder is baked in order to solidify it, a crack forms inside the unit. An electric charge can be stored on this crack. Because of the size and weight advantages, tantalum capacitors are useful in portable telephones, pagers, personal computers, and automotive electronics.

In tantalum capacitor manufacturing, there is a steam pyrolysis process where tantalum pellets are decomposed by steam. Humidity control in this process is important to maintain product quality and improve yield. Stable humidity measurement at high temperatures of 200 to 400 °C is required. The ZR402G/HS Direct In Situ Zirconia High Temperature Humidity Analyzer is easy to maintain as it requires no sampling system and utilizes a long life sensor with fast response. It is widely used in humidity instrumentation applications and has been well received in the marketplace.

Steam Pyrolysis Process in Tantalum Capacitor Manufacturing



Process

A tantalum pellet with an electrode plate applied is immersed in a manganese nitrate solution. This dipping process allows the manganese nitrate to penetrate the porous part of the pellet. After dipping, the pellet is forwarded to the pyrolysis process where the manganese nitrate is decomposed under high temperature and humidity conditions to form a manganese dioxide coating by the reaction Mn(NO3)2 -> MnO2 + 2NO2. These steps are repeated until the coating is sufficient. To improve the coating uniformity and yield, the humidity is controlled.

* Maintains the quality of the tantalum capacitor manufacturing process
* Ensures stable, continuous humidity measurement
* Reduces operating costs

Field Data

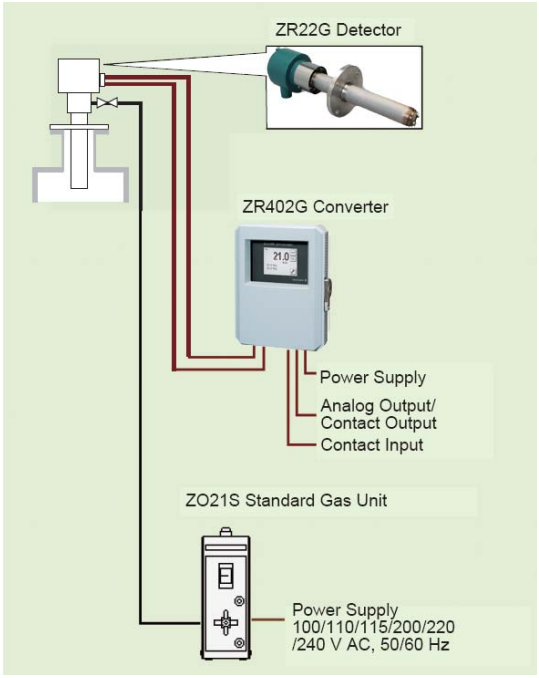
Measurement point:	Inside the steam pyrolysis furnace
Temperature:	200 to 400ºC
Pressure:	10 to 20 Pa
Humidity:	25 to 80 volume % H_2O

Product Recommendations

Sensor- ZR22 Oxygen Detector
Protector- ZR22R Probe Protector
Analyzer- ZR402 Oxygen analyzer
AV550 Oxygen Averaging Analyzer
Calibration-
MC1 Single channel manual calibration unit
AC1 Single channel automatic calibration unit
IAC24 Integral automatic calibration unit
AC4/AC8 Multi channel automatic calibration unit

Notes

As the sensor inside a pyrolysis furnace is hot, it can be easily damaged if cooler water drips onto it. The sensor should be installed with the probe head pointing downward. For more information contact you local Yokogawa Analytical Marketing Department.



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