

New Extended Thermocouples

Benefits

- ■ □ **Increased production**
- □ □ Higher efficiency
- □ □ Compliance with environmental regulations
- ■ ■ **Availability and Reliability**
- □ □ Life extension

There are two distinct benefits associated with extended exhaust thermocouples:

- They reduce the rate of thermal deterioration, delivering longer life and providing greater reliability
- Mineral insulation and metallic sheath provide superior protection against high temperature insulation breakdown, grounds and shorts



What it is

The exhaust thermocouples are key components of the gas turbine exhaust control and protection system.

In older generations of gas turbines, thermocouples with varying tip sizes were used. The differences in the diameter of the tip provided a required lag time between the protective and control channels to prevent nuisance trips during sudden load increases. The exhaust thermocouples were terminated in junction boxes on the exhaust plenum wall. This area is

typically exposed to very high temperatures, which can result in grounds and shorts caused by the breakdown of the organic insulation and insulation chafing due to vibration of the junction boxes and conduit. The extended exhaust thermocouples have mineral insulation shielded by metallic sheathing. The leads terminate in junction boxes located outside the load compartments, away from the high temperatures. They are available in types K (Chromel Alumel) and J (Iron Constantan).

Exhaust thermocouples provide the raw data used to estimate the firing temperature at the exit of the first stage nozzle of the unit. The average of exhaust temperature measurements, with the pressure ratio, allow the firing temperature to be estimated. The parts life of the combustion liners, transition pieces, turbine nozzles and buckets are all directly related to this temperature. Operation above the established temperature limits will result in a reduction of parts life.



How it works

Exhaust thermocouples are designed to be more sensitive and less prone to failure. The new design consists of a hermetically sealed unit with mineral insulation and with a high temperature alloy sheath. This sheath can withstand temperatures of up to 1,000°F (537.7°C) over its full length up to, but not including, the termination end. The exhaust thermocouples are installed in the exhaust wall and are shielded while gases are conveyed towards the sensing elements to make gas temperature measurement easier (see Figure 1 and 2). The junction box is located outside the lagging which allows termination at lower temperatures. To provide a high response junction, the reduced diameter of the thermocouple tip has been maintained. The thermocouples

may be purchased in quantities necessary for either over-temperature protection, control, or both. In any case, we recommend complete replacement. Extended exhaust thermocouples can be used on the Frame3, Frame5, Frame6, Frame7, Frame9 and for the PGT25 Gas Turbine.

Scope of Supply

The supply includes:

- Extended exhaust thermocouples (and materials for installation); the number is determined on the basis of the existing arrangement
- Junction boxes, interconnection cables between the local junction boxes and the control panel in the control room can be supplied on request

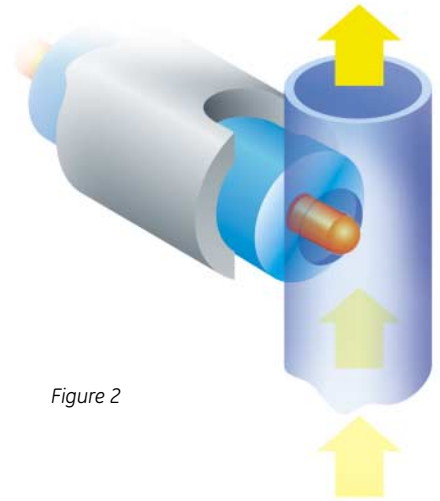


Figure 2

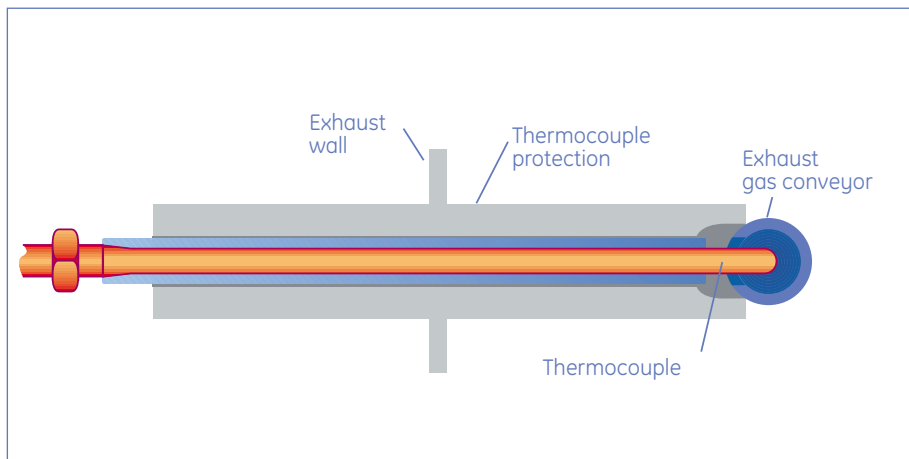


Figure 1



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