Installing a K-TYPE THERMOCOUPLE

1 OVERVIEW

The STE101 is a Type K Thermocouple exhaust gas temperature sensor, with mating connector.

By installing industrial rated Type K type thermocouples in the exhaust manifold of each engine bank the GAC DDM101 can measure and track exhaust temperatures. The thermocouple adjustments (THERMOCOUPLE 1 and THERMOCOUPLE 2) are calibrated at the factory to receive equal input signals from the thermocouples. If a difference in either bank's exhaust temperature is measured by the DDM101, a control loop will readjust the fuel balance automatically to minimize the difference.

Thermocouples must be installed in the center of each exhaust stream. The following describes the installation and troubleshooting of these sensors.

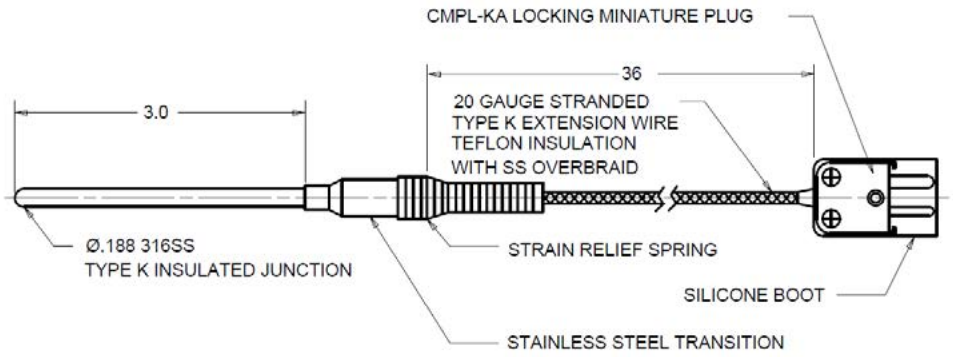

Figure 1: Type K Thermocouple

Figure 2: GAC STE101 Kit

- Type K Thermocouple with 1200ºF (650ºC)
- Mating connector
- Locking miniature Jack
- Silicone Rubber Boot
- 1/4" NPT Male Compression Fitting

2 DETERMINING THERMOCOUPLE PLACEMENT

A thermocouple measures temperatures at their tip. The tip should be placed in the center of the exhaust stream to accurately measure the hottest point. The following uses an example of a dual exhaust outlet on a QTS30 engine. Your engine exhaust location may vary.

1. Locate the exhaust temperature probe in the engine exhaust outlet as near as possible to the point where all of the cylinders merge.
2. If the exhaust outlet is not easily accessible, place the sensor in the manifold outlet pipe.

Figure 3: Exhaust Cylinder Merge

3 INSTALLING A THERMOCOUPLE

- Use caution when installing the sensor. The sensor is easily damaged.
- Use Type-K wire and connectors only.
- Do not mix dissimilar metals.

Using the mounting hardware included in the STE101 kit, install one thermocouple in the exhaust manifold of each bank.

1. Determine placement location for the thermocouple in each exhaust using the thermocouple dimensions to determine mounting location and manufacturer's information.
   - Route the wires away from any ignition components.
   - If the cabling length must be extended you must use the same type grade thermocouple wire to prevent temperature compensation errors. The extension wire and connector wire are specific to the thermocouple type being used. Using the incorrect wiring components between control and process thermocouple can result in erroneous readings. Contact your GAC contact for details on the cabling recommendations.
   - Avoid bending the thermocouple sheath.
2. Mark weld-in bung placement.
3. Drill and weld a bung.
4. Insert compression fitting into bung.

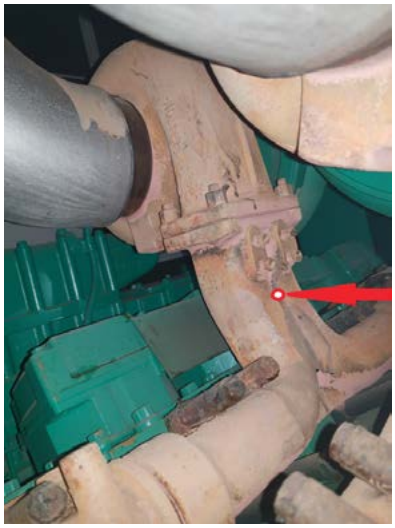

Figure 4: Mark Weld-In Bung Placement

Figure 5: Compression Fitting

Figure 6: Bung

5. Dry fit the sensor into the bung. Ensure the tip of the probe is within the outlet exhaust flow.
6. Apply anti-seize compound to the compression fitting threads and NPT threads.
7. Mount the sensor using the 1/4" NPT fitting.
8. Tighten compression fitting and sensor finger tight. Turn the sensor 2 full turns past finger tight.
9. Connect the sensor, ensuring the connector protection boot is in place.

Figure 7: Insert Compression Fitting with Sensor Into Bung

To prevent future problems, examine protection tubes for excessive corrosion, wear, oxidation and physical damage. Protection tubes exhibiting damage and/or excessive corrosion should be replaced.

Wiring should be examined for damaged insulation and tight connection points

4 TROUBLESHOOTING

Do not alter the factory settings of THERMOCOUPLE 1 or THERMOCOUPLE 2 adjustments unless a significant unbalance exists. If a balance does occur, first try to correct the issue using the standard mechanical and electronic balancing methods described above. If a problem persists, determine which exhaust channel is higher in temperature and adjust the bank's THERMOCOUPLE adjustment counter-clockwise to equalize the exhaust temperature.

General Issue	Possible Solution
Thermocouples not responding	If a one or both of the thermocouples signals are lost (open circuit detected) the TC 1 or TC 2 fault LED will light and the balancing function will shut off. Do not alter the factory settings. If using the GAC DDM101, adjust the TEMP. BAL GAIN potentiometer.
Thermocouples not responding	If a problem persists: • Determine which exhaust channel is higher in temperature and adjust the bank's THERMOCOUPLE adjustment CCW to equalize the exhaust temperature. • Adjust the cooler banks THERMOCOUPLE adjustment clockwise to equalize the exhaust temperature.
Periodic Examination	To prevent future problems, examine protection tubes for excessive corrosion, wear, oxidation and physical damage. Protection tubes exhibiting damage and/or excessive corrosion should be replaced. Wiring should be examined for damaged insulation and tight connection points.