ENGLISH

Model HIP

INSTALLATION, OPERATION & MAINTENANCE MANUAL

00-HIP03 Rev D
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Delta Controls
CORPORATION

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1. Theory of Operation

Model HIP is a handheld, battery-operated tool that uses infrared pyrometry to measure the internal temperature of a Claus thermal reactor. All materials radiate energy as a function of their absolute temperatures. Model HIP senses the amount and spectrum (wavelengths) of the infrared energy being emitted by the hot face of the refractory. The sensed energy is converted into a signal, which can be used to accurately display the refractory operating temperature.

1.1 Considerations when using Infrared Pyrometry in Claus Thermal Reactors

To effectively measure temperature, the instrument needs a clear, unobstructed view into the vessel. The infrared energy must pass through the reacting gases without being absorbed by them. The instrument must “look” through those same gases without seeing them or sensing their high temperatures. This is accomplished by using optical bandpass filters. The selected sensing spectrums avoid errors due to absorption, reflection, etc.

A potential problem using infrared pyrometry in a Claus thermal reactor is that sulfur or other solids can accumulate on the lens or in the nozzle which blocks the infrared radiation, and requires expensive maintenance to clean the lens and optical path. Model HIP is designed to be maintenance free.

2. Operation

2.1 Push Buttons

Power/Save* – Press to turn pyrometer on and off.
Note: The pyrometer automatically turns off after 10 minutes to preserve battery life.

°F/Up* – Press to select measurement in °F. After releasing the button, current measurement will be displayed for 10 seconds, even when HIP is removed from HIR port.

°C/Down* – Press to select measurement in °C. After releasing the button, current measurement will be displayed for 10 seconds, even when HIP is removed from HIR port.

Backlight/Next* – Toggle to turn on and off. **Note: Backlight automatically turns off after one minute.**

Full
Low

Battery Status Indicator – Shown in lower left corner. “Low Battery” text will appear under temperature; accuracy may fluctuate with low battery power.

**Secondary button uses.*

2.2 Measuring Utilizing a Sight Port

The HIP pyrometer measures temperature through sight ports used by process pyrometers and ports viewing the reaction furnace. If sight port glass is clean and not discolored, glass optical characteristic variances will not affect accuracy.

A. Hold HIP flange against sight port glass to aim pyrometer down the bore hole. **Note: The unit must be held steady on the sight glass at least 5 seconds to allow the signal to stabilize.**

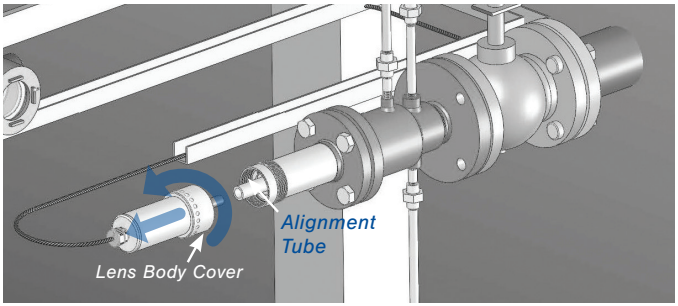
2.3 Measuring Utilizing a Model HIR Lens Assembly

HIP's flange is removable so the lens tube is insertable to Delta Controls Model HIR's sight port to calibrate or troubleshoot issues.

B. Unscrew lens body cover without twisting or kinking the fiber optic cable. (Figure 1)

C. Slide lens body cover and fiber optic cable away from the main body of the unit. **Note: A low temperature reading will occur on the HIR output.** (Figure 1)

Figure 1



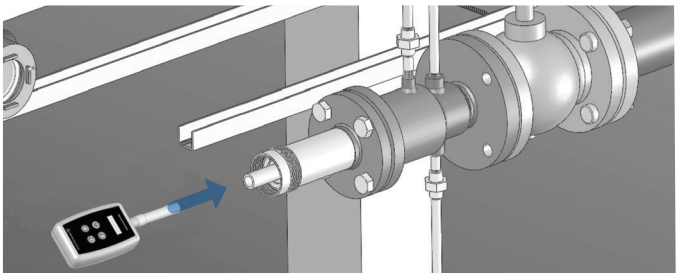
D. Secure lens body cover; do not suspended it by the fiber optic cable.

E. Inspect optical path in alignment tube ensuring there is no material build-up and tube is properly aimed down the borehole.

F. Turn on HIP and select desired unit of measure.

G. Insert lens probe into the alignment tube. (Figure 2)

Figure 2



H. Wait 5 seconds before recording the temperature to allow the signal to stabilize.

2.4 Changing Batteries

Remove the two screws from back cover back to access battery compartment. Replace with three lithium AA batteries.

NOTE

Remove batteries if HIP will be stored for an extended period of time or if stored in temperatures above 122 °F (50 °C). If the batteries are not removed, battery leakage can damage the HIP.

3. Transmissivity Measurement

3.1 Transmissivity Measurement

Transmissivity measurement (Trans=X.XX) is located beneath the temperature measurement and should read between 0 and 1.00. This value indicates the amount of light reaching the sensor relative to an unobstructed sight path. A value of ≥ 0.95 is normal. Values below 0.95 may indicate the occurrence of sight path attenuation, possibly due to material build-up on window or inside the nozzle.

NOTE

HIP uses a two-wavelength ratiometric measurement above approximately 1292 °F (700 °C). Below approximately 1292 °F HIP reverts to a single wavelength measurement. The two-wavelength measurement mode is accurate with transmissivities below 0.05. The single wavelength mode measurement is affected by sight path occlusions and will read incorrectly if any obstructions are present.

If the transmissivity is below 0.95:

A. Investigate cause of obstruction. Take corrective action (i.e., improve insulation, align sight tube) or schedule maintenance activities (i.e., clean window, clean the nozzle).

B. Calibrate HIR to Model HIP's temperature measurement.

3.2 Calibration

The Model HIP can be returned to Delta Controls factory for periodic calibration verification with NIST traceability.

4. Specifications

Measurement Range:	+1472 °F to +3092 °F (+800 °C to +1700 °C)
Display:	LCD display with backlight
Power Required:	3 Lithium AA batteries
Ambient Temperature Limits:	-4 °F to +158 °F (-20 °C to +70 °C)

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