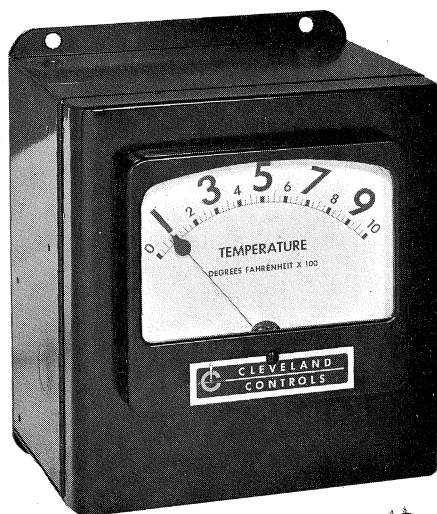


CLEVELAND FLU-TEMP GAGES

SERIES FG

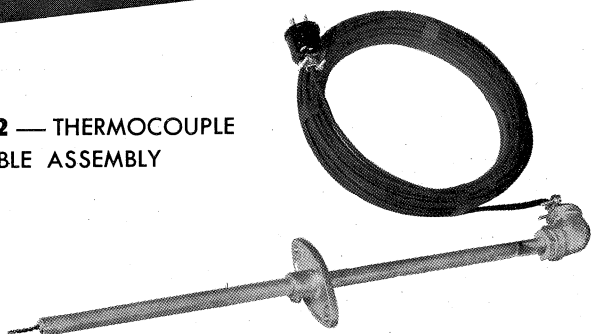
Bulletin FG-1450

PROVIDE CONTINUOUS INDICATION OF TEMPERATURE IN BOILER EXIT OR OTHER AREAS



**FIG. 1 — SERIES FG
FLU-TEMP GAGE**

**FIG. 2 — THERMOCOUPLE
— CABLE ASSEMBLY**



GENERAL DESCRIPTION

Cleveland Flu-Temp Gage Systems include the Indicating Unit (Gage) and a Thermocouple-Cable Assembly.

The Indicating Unit has a sealed millivolt meter with scale for reading temperatures from 0 to 1000° Fahrenheit.

Thermocouple-Cable assembly consists of the thermocouple at the end of an 18" rod for insertion in boiler breeching, which is provided with a flange for attachment to breeching surface, and a specified length of insulated Iron Constantan cable with plug for connection to the meter in the Indicating Unit. An adjustable resistance potentiometer on the gage is factory-calibrated for the length of the cable.

The thermocouple, exposed to exit gas temperature in the breeching, generates millivolt electrical current in direct proportion to the temperature. This current is transmitted through the cable to the gage meter, positioning the pointer to read the temperature on a calibrated scale.

Gages are available for surface or flush mounting. Thermocouple-cable assemblies are available in four standard lengths — 30, 50, 75 and 100 feet. Intermediate lengths and lengths up to 200 feet are available on special order.

APPLICATION

For use with combustion systems to indicate the efficiency of heat transfer in a boiler. Excessive temperatures of boiler exit gases indicate heat loss which may be caused by sooting or scale formations on boiler passages, or by the air being drawn or forced too rapidly over heating surfaces. Related to CO₂ content of exit gases, the temperature readings are useful in determining combustion efficiency or overall boiler efficiency.

Cleveland Flu-Temp Gages are also used to provide temperature readings in ovens, driers or other heated areas within the temperature range of the gage scale.

FEATURES AND SPECIFICATIONS

- Range of 0 to 1000°F.
- Sealed, heavy-duty meter with shock resistant movement mounting.
- Sensitive, highly dampened pointer action.
- Automatic compensation for ambient temperature variations.
- Large, easily-read dial.
- Field adjustable for changes in cable length.
- Surface or flush mounting gage enclosure.
- Entire meter unit easily replaced.
- Four standard cable lengths — 30, 50, 75 and 100 feet. Special lengths and lengths up to 200 feet available.
- Polarized plug-in connection of cable and gage.
- 18" thermocouple rod for insertion in breeching.
- Adjustable flange for mounting thermocouple rod to breeching.
- Thermocouple easily removed for inspection and cleaning.
- No exposed "cold couples".

STANDARD MODELS AVAILABLE

MODEL No.	CABLE LENGTH	MOUNTING
FG-30	30 feet	Surface
FG-50	50 feet	Surface
FG-75	75 feet	Surface
FG-100	100 feet	Surface

MODEL No.	CABLE LENGTH	MOUNTING
FG-30FM	30 feet	Flush
FG-50FM	50 feet	Flush
FG-75FM	75 feet	Flush
FG-100FM	100 feet	Flush

Other cable lengths up to 200 feet available on special order.

See reverse side for installation and operating instructions.



INSTRUCTIONS FOR INSTALLATION AND OPERATION

SERIES FG FLU-TEMP GAGES

MOUNTING

Mount the gage in a convenient location in the boiler room where temperatures are not excessive, preferably on a panel or in a cabinet with other controls and instruments. It is desirable that the gage be readable from a position in front of the boiler. Allow space below the enclosure for access to the resistance potentiometer adjustment with a small screwdriver. See Figure 3 for surface and Figure 4 for flush mounting dimensions.

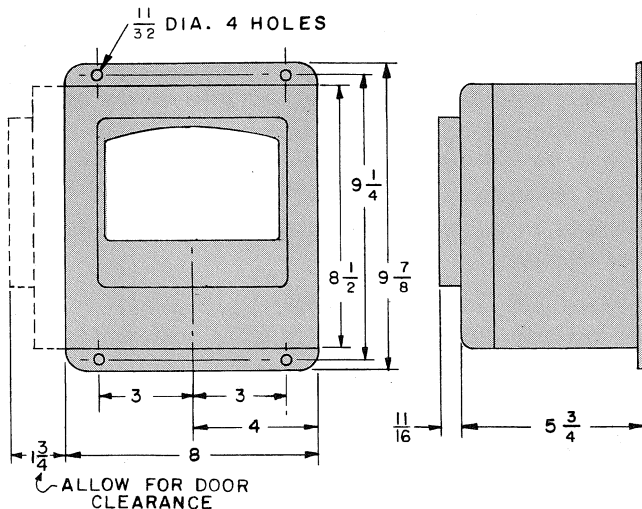


FIG. 3 — SURFACE MOUNTING DIMENSIONS

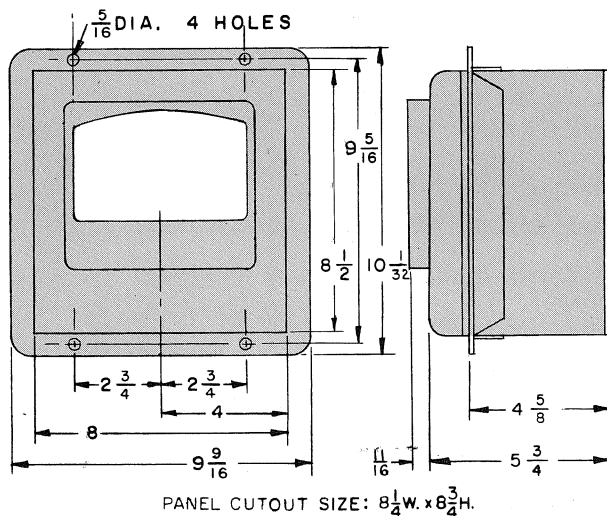


FIG. 4 — FLUSH MOUNTING DIMENSIONS

Since exit gas temperature indicates the degree to which the boiler is absorbing the heat generated by the firing equipment, the permissible gage reading is determined by comparing it with the steam temperature. The table below shows the relationship between steam pressure and temperature. Exit gases within 150° of steam temperatures are generally considered satisfactory. Within 100° denotes excellent heat transfer efficiency.

TABLE SHOWING RELATIONSHIP OF STEAM PRESSURE AND TEMPERATURE

Steam Pressure (psi)	0+	1	5	10	15	50	100	150
Steam Temp (°F)	212	215	225	240	250	295	338	365

If gage readings are consistently too high, either one or both of the following conditions exist:

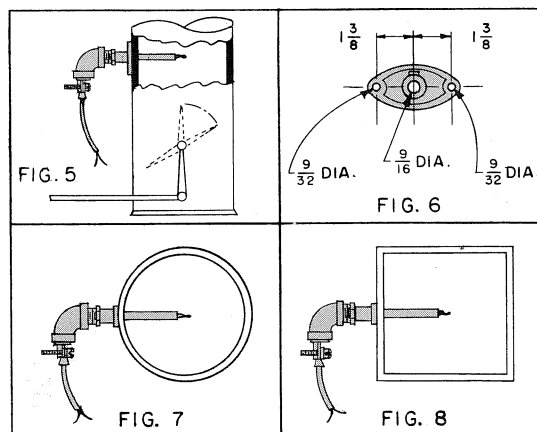
1. Soot or scale formations on boiler passages are creating an insulating effect.
2. The heated gases are being drawn through the boiler passes

THERMOCOUPLE INSTALLATION

Install the thermocouple assembly in the boiler exit above and as near as possible to the point where the gases leave the last pass of tubes or baffles. If installation is near an outlet damper, make sure the damper blade does not strike the thermocouple or rod when it is turned (see Figure 5). If a barometric damper is used, the thermocouple must be installed between this damper and the boiler.

Mount the thermocouple flange by drilling two 1/8" holes in the side of the breeching and using #10 sheet metal screws for fastening it to the breeching surface. Drill a 5/8" clearance hole for the thermocouple rod. Use the flange itself as a template for locating hole positions, or use dimensions in Figure 6.

Insert the thermocouple rod and adjust the depth of penetration to reach the approximate center of the passage (see Figures 7 and 8). In large breechings the thermocouple rod should be inserted to its maximum depth. Tighten set screw securely.



CABLE INSTALLATION

In running the cable from the thermocouple assembly to the meter, make certain that it does not contact hot surfaces of the breeching.

Since the resistance potentiometer in the gage is factory adjusted for the length of cable supplied, the cable should not be shortened. Any excess length should be coiled. If cable is too short and location of gage cannot be changed, a new thermocouple assembly should be ordered from the factory. Adjusting the resistance potentiometer to the new length of cable requires the use of a flue thermometer, and should be done only by a qualified combustion service engineer.

The electrical transmission in the cable is so slight that no codes stipulate wiring specifications. However, for appearance and protection, it is recommended that it be enclosed in Greenfield or pipe conduit, but no other wires should be run in the same conduit. If no conduit is used, cable should not be taped to or placed in proximity with any wires carrying line voltage.

The cable is provided with a polarized 2-pronged plug which must be inserted in the socket at the base of the gage.

OPERATING INSTRUCTIONS

so rapidly that they do not have time to transfer their useful heat.

To make corrections, make sure first that heat transfer surfaces are clean, then make necessary adjustments or corrections on the rate of air flow through the boiler to bring temperatures within the permissible range.

MAINTENANCE

Cleveland Flu-Temp Gages require no maintenance such as lubrication, etc. The Thermocouple should be withdrawn periodically for inspection and cleaning — at least once a month is recommended.

It should be remembered that CLEANLINESS OF BOILER SURFACES AND PROPER CONTROL OF DRAFT ARE THE MOST IMPORTANT FACTORS IN SECURING MAXIMUM EFFICIENCY IN BOILER OPERATION.

