

# Cleveland Controls

D-06120

## Temperature Meter



- Digital indicator, alarm, & transmitter in a low-cost, compact device
- Saves energy, easy to install, low power consumption
- Surface or panel mount
- Bright LED continuous temperature display, °F or °C
- Dual alarms with display & digital output
- ISA Sequence M alarm capability
- "Open" thermocouple indication
- Modbus communications
- 4-20 mA dc temperature retransmit signal



### Application

Series D-06120 Temperature Meter provides accurate measurement and display of boiler exit, oven, dryer, or any other process temperatures within the limits of its specifications.

Unlike standalone flue gas temperature gauges, the **D-06120 Temperature Meter** has an operational interface with boiler or building management controllers, recorders, annunciators and alarms. It has a highly visible, active display of flue gas temperature with dual alarm settings and outputs.

Typically, the operator sets the first alarm to the temperature at which maintenance should be scheduled to maintain optimum fuel use. The second alarm is set to shut down the boiler at the temperature that indicates excessive fouling and mechanical problems. Alarm signals interface with remote audible alarms (such as Cleveland Controls Model **L-05500**), and result in a safety shutdown by the control system. The meter outputs provide permanent records by recording (via the analog signal) or BMS (via the Modbus communications).

### Elevated Fuel Temperature = Elevated Fuel Costs

Every boiler has an optimum differential between flue gas temperature and steam or hot water temperature. Boiler suppliers provide the specific information for their boilers, but a typical differential is 75 °F to 100 °F. When flue gas temperature rises, fuel costs increase, often as much as 1.0% for every 40 °F rise above the design differential. Fuel savings are achieved by recognizing and reacting to increases in flue gas temperature. Even a 1% fuel savings will mean an excellent return on investment.

Elevated flue gas temperature is a symptom of many possible problems, including fouling of the tubes, unbalanced air/fuel ratio and mechanical problems such as baffle or seal failure. All of these increase fuel consumption and, potentially, can damage equipment. Scaling and fouling of the tube surfaces alone can increase fuel consumption by 3% to 8% depending on the scale thickness. Fouling and mechanical failure can both severely damage the boiler.

**Series 6120 Temperature Meter** is available in either panel-mounting or surface-mounting configurations. The bright LED display continuously indicates the process temperature. The thermocouple/cable assembly, available in a range of standard lengths, consists of a Type J thermocouple with mounting hardware for insertion into the process, and an insulated iron constantan cable of the required length to connect the sensor to the electronics. (Figures 2 and 3) Modbus communication for interface with SCADA systems or other controls is standard. Baud rate is selectable (9600 or 19.2 K). All parameters are set by entering the scrolling display. The following parameters are accessible and can be changed:

- **FGU:** Flue Gas Units (°F or °C).
- **AL1:** Alarm 1 set point
- **AL2:** Alarm 2 set point
- **SCA:** Serial Communication Address (Modbus)
- **SCR:** Serial communication rate (9600 or 19.2K).

**Operation**

When exposed to the process media, the thermocouple generates a millivolt electrical current in direct proportion to the process temperature. The millivolt output is transmitted through the cable to the electronics assembly, where it is converted to a displayed temperature reading.

As the temperature climbs above the set point for each alarm, its relay changes state, and the LED indicator flashes. When the temperature drops below the set point, Alarm 1 automatically resets (its contacts return to the normal state). Alarm 2 functions in exactly the same way if set up in the automatic mode. If set up in the manual reset mode, however, Alarm 2 will not reset when the temperature drops below its set point until the local reset button on the face of the meter is manually depressed, or until the remote reset button (ISA

**GUIDE SPECIFICATION**

A flue gas temperature meter and alarm system (ISA Sequence M) shall be provided for each unit. The meter shall consist of an electronics with Type J thermocouple for insertion into the process. The microprocessor-based electronics shall accept direct thermocouple input, provide LED display of temperature and alarms, flashing display of alarms and open thermocouple indication, dual alarm settings and digital outputs, Modbus communications, and retransmit temperature as a 4-20 mA dc signal. The electronics shall display temperature without the need for programming of the range (other than selection of °F or °C units). Supply Cleveland Controls model D-06120-A0-2422.

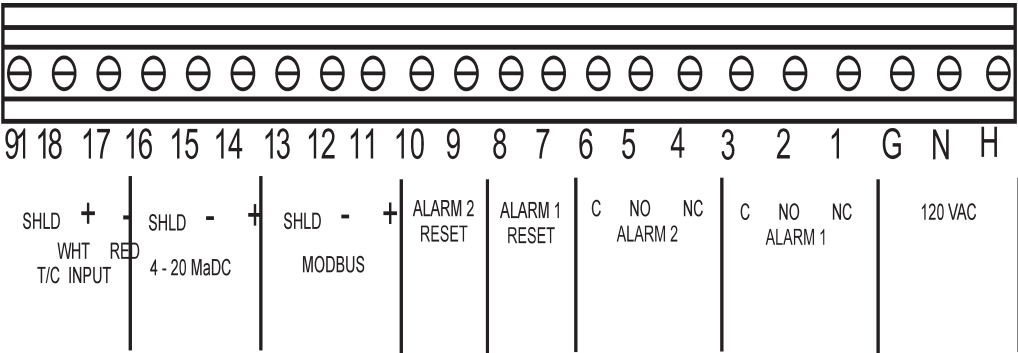
Sequence M) is manually depressed. In this case, the local reset button remains functional.

**Installation**

The D-06120 meter is easy to install. For boiler applications, the thermocouple should be installed at the boiler flue gas exit above or as near to the point where the gases leave the last pass of the tubes or baffles. Drill a 5/8" hole for the thermocouple and mount the flange (see Figures 2-3). Another option is to replace the flue gas thermocouple using the 1/2" NPT connection (see Figure 3, B4).

Connect the cable (included with the product) to the electronics. The electronics can be panel-mounted or surface-mounted (Figure 3), depending upon selection at time of purchase.

The electronics wiring schematic is shown in Figure 1. Mount the electronics in a clearly visible location away from hot areas and close to a power source. Once power is applied, the process temperature is displayed without additional programming the electronics ("Install & Read" feature). The alarms are set via the front panel display.



**Figure 1: Terminal Strip Designations**

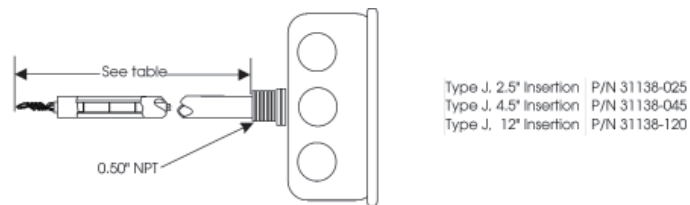


Figure 2: Thermocouple Options B1, B2, B3. See Nomenclature under "How to Order".

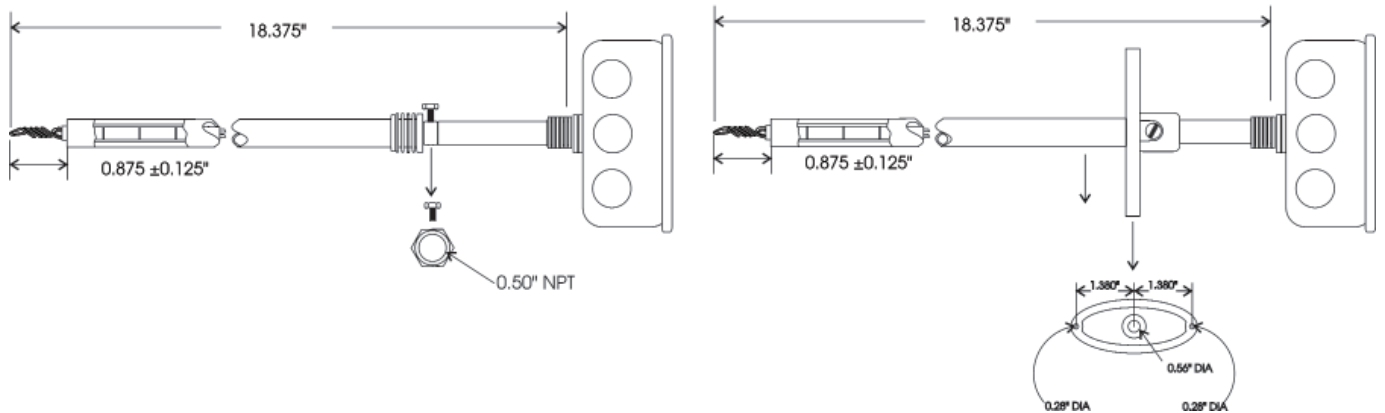


Figure 3: Thermocouple Option B4. See Nomenclature under "How to Order".

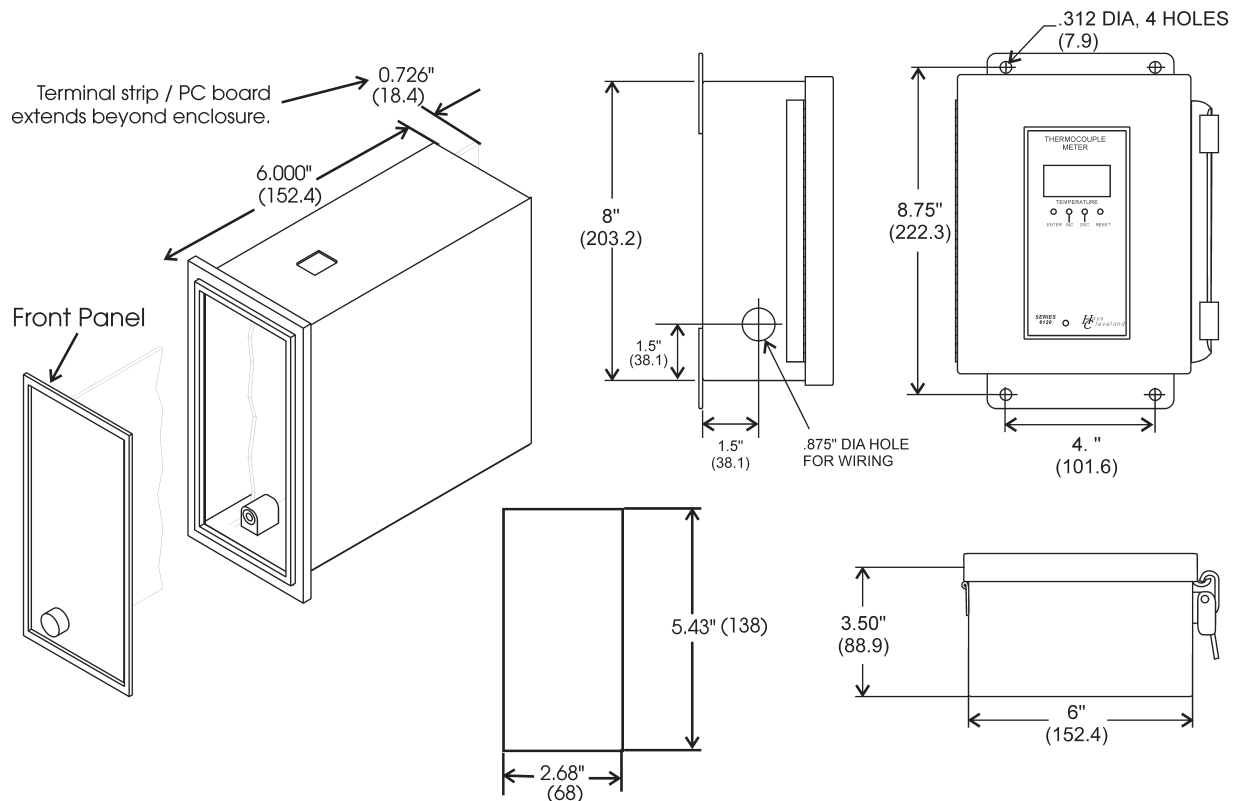


Figure 4: Dimensions for panel and surface mount options.

## SPECIFICATIONS

- **Thermocouple Specification:**
  - Type J, Iron and Constantan is standard
  - Linear range is 32 °F to 999 °F or 0 to 537 °C
  - Suitable for use in oxidizing or reducing environments: if other material is required for a different temperature range, please contact Cleveland Controls.
- **Probe insertion** up to 18"
- **Indication:**
  - LED Display, 0.43" Height
  - Alarm 1 & Alarm 2 Indicators
  - "Open Thermocouple" Indication: displays the over-range reading on the meter In the event of thermocouple failure
- **Temperature Units:** operator set for °F or °C
- **Display range settings:** 32 °F - 999 °F ; 0 - 537 °C
- **Alarm Settings:** 2 alarms, independently adjustable, 32 °F to 999 °F or 0 °C to 537 °C
- **Contact rating:**  
10 amps, 12 v. AC SPDT, non-inductive.
- **Retransmit Output:**  
4-20 mA dc, directly proportional to thermocouple temperature, where 32 °F = 4 mA dc and 999 °F = 20 mA dc, 750 Ω maximum
- **Output** is grounded but not isolated
- **Alarm Contact Rating:**  
10 amps, 120 V ac, SPDT, non-inductive.
- **Accuracy:**  
±4 °F ( ±2.2 °C) over entire operating range.
- **Power Requirements:**  
120 V ac ± 10%, 50/60 Hz
- **Ambient Temperature Limits for Meter Housing:**  
32 °F to 130 °F; 0 °C to 60 °C
- **Fuse:** One, rated 1 Ampere
- **Relative Humidity:** 0-90% non-condensing
- **Mounting:**  
Select panel or surface-mountable housing
- **Shipping Dimensions:**  
To be determined at order entry.
- **Shipping Weight:**  
To be determined at order entry.
- **Construction Material:** Durable plastic construction
- **Approvals:**  
UL and CUL pending

SPECIFICATIONS ARE SUBJECT TO CHANGE.

## HOW TO ORDER

The basic catalog number for the Cleveland Controls' **Series 6120 Temperature Meter** is shown below. Use this table to select the complete model nomenclature to suit mounting and cable length requirements.

**6120-A\*0-ABCD**

### A = Package:

- 1 **Semi-Flush for Panel Mounting**
- 2 **Surface Mount**

### B = Thermocouple Options:

- 0 Customer supply.
- 1 Type J, 2.5" insertion (P/N 31138-025 )
- 2 Type J, 4.5" insertion (P/N 31138-045)
- 3 Type J, 12" insertion (P/N 31138-120)
- 4 Type J, Flue Gas Temperature, variable insertion, 6" to 18" (P/N 31138-618)

### C = Alarm #2 Setup (Factory Set, Field Adjustable)

- 1 Local Manual Reset of Alarm #2 included.
- 2 Remote Manual Reset of Alarm #2 included.
- 3 Auto Reset of Alarm #2 included.

### D = Thermocouple Cable for Code B, above:

- 0 Customer Supply-N/A
- 1 50' length (P/N 31139-050)
- 2 100' length (P/N 31139-100)
- 3 Special length exceeding 100' (specify with order)

\* Current Model Designation =A



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