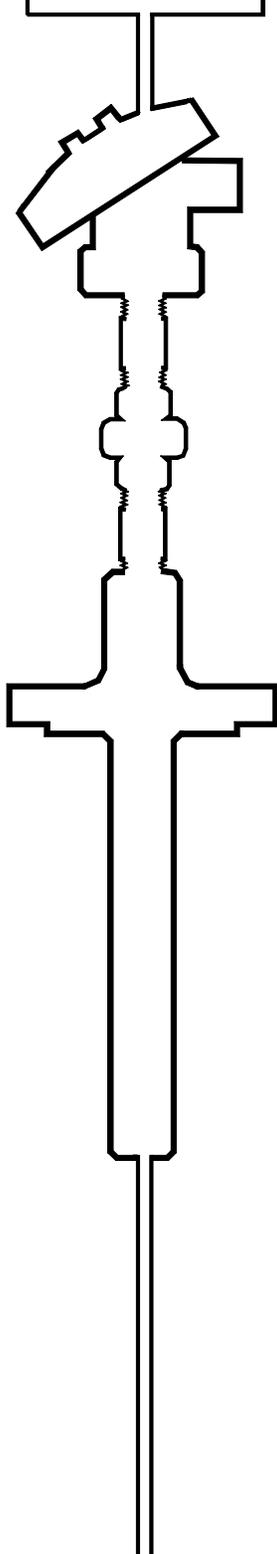


The logo consists of the letters "STI" in a bold, sans-serif font, enclosed within a rectangular border. A vertical line extends upwards from the top of the box, and a horizontal line extends to the left from the left side of the box.

**STI**

The text "MANUFACTURING, INC." is enclosed in a rectangular box. A horizontal line extends to the right from the right side of the box, and another horizontal line extends further to the right from the end of the first line.

**MANUFACTURING, INC.**

A vertical technical drawing of a tool, possibly a scraper or a similar implement. It features a long, thin shaft with several distinct sections: a top section with a curved, notched end; a middle section with a wider, cross-shaped flange; and a bottom section that tapers to a point.

**INSTALLATION  
AND  
MAINTENANCE  
MANUAL**

## **WARRANTY**

STI Manufacturing, Inc., warrants that all products will be manufactured in accordance with purchaser's order. There are no implied warranties of merchantability or of fitness for a particular purpose given in connection with the sale of any goods. The buyer's sole and exclusive remedy and the limit of STI Manufacturing, Inc.'s , liability for any loss whatsoever, shall not exceed the purchase price paid by the purchaser for the unit or units or equipment to which a claim is made.

## DISCLAIMER

STI Manufacturing, Inc., makes every effort to meet or exceed customer requirements and to comply with or exceed minimum standards set forth by the various monitoring organizations, agencies, and associations. However, due to the inherent problems in controlling the way in which Thermocouples, RTDS, Thermocouple Assemblies, and RTD Assemblies are installed, it is impossible for one set of instructions to cover every situation or every detail that may be required. The instructions and recommendations contained in this manual are provided as an aid to those attempting to work with these units who may not have had previous experience. These instructions are not intended to cover every assembly or every situation, and are not to be considered as an authoritative guide on the installation and maintenance of these elements and/or assemblies. All of the drawings are general in nature, and are not to be considered certified/final drawings. These drawings are provided to show the general make up (various parts) of a standard assembly. Again, since every assembly is custom designed and built to customer specifications, it is impossible to show detailed drawings, with every part, of every possible assembly. It is strongly recommended that a "Certified Drawing" be requested for each assembly acquired, and that these drawings be used to identify specific elements, or parts of assemblies. All specific questions concerning the installation, care and maintenance of these types of elements and/or assemblies should be directed to the supplier, manufacturer, or fabricator as they occur.

# THERMOCOUPLES

**CAUTION: CHECK AND OBSERVE ALL APPROPRIATE SAFETY RULES AND REGULATIONS PRIOR TO PERFORMING ANY WORK INVOLVING THE INSTALLATION OF THESE PRODUCTS.**

## **Installation:**

Each element and assembly are thoroughly tested and inspected prior to shipment. It is recommended that a visual inspection be made prior to installation. There should be no dents or bends on the sheath material, and no damage to lead wire.

### 1. Element

- a. The thermocouple is a delicate instrument and should be handled with care.
  - (1). Keep element protected from contamination prior to installation.
  - (2). Avoid excessive bending of lead wire.
  - (3). Insure proper element is installed in proper location/environment.
- b. Procedures
  - (1). Insure no obstructions in thermowell if installing assembly, and no obstructions in transition or head, if installing thermocouple only.
  - (2). Insert thermocouple.
  - (3) Connect lead wires. (Insure positive wire to positive terminal and negative wire to negative terminal.)

### 2. Assembly:

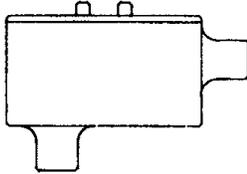
- a. Assemblies are pretightened. Do not over tighten when installing or damage to element may result.
- b. Procedures:
  - (1). Insure no obstructions in pipe or tubing where assembly is to be installed.
  - (2). Insert entire assembly.
  - (3). Tighten at insertion point (on thermowell (screw type) or flange bolts (flange type)).
  - (4). If thermowell portion of assembly must be welded in place, use caution not to expose element to excessive heat. (It is recommended that thermocouple element be removed from assembly while welding takes place. Remember to reconnect wiring to proper terminals during reinstallation.).
  - (5). For threaded thermowells with remote mounted heads it is recommended that the lead wires be disconnected from terminal block in head prior to installation of thermowell to insure the lead wire is not twisted and damaged. (Insure that wires are reconnected to proper terminals).
  - (6). Open head, expose terminal block.
  - (7). Install conduit and/or extension wire into conduit connection port on head of assembly.
  - (8) Connect extension wire to terminal block (Insure that positive and negative wires are properly connected to terminal block).
  - (9). Close head (Do not cross thread or over tighten)

3. General Maintenance:
  - a. Thermocouples should be checked regularly, and they should be checked in place, if possible.
    - (1). Testing (On-Site)
      - (a) Ohm-Meter. Generally, on-site testing can be achieved with a standard ohm-meter. This test will reveal whether grounded or ungrounded condition of the the thermocouple is still functional.. (The thermocouple must be removed from the thermowell assembly for viusal condition, (deterioration of sheath material, etc.), but this should be done only if there is an indication or a problem. **(NOTE: All plant safety rules should be followed before removing thermocouple elements and/or thermocouple/thermowell assemblies while plant is in operation).**
    - (2). Testing (Factory)
      - (a). Each thermocouple is made of material that is thoroughly tested during manufacture and fabrication.  
(Copies of Material Test Reports and Calibration Certificates are available, upon request, at the time of manufacture.)
  - b. General Instructions:
    - (1). Because of the limited access and limited accuracy of field testing of thermocouples, it is recommended that a program of replacement be implemented. The average life of the thermocouples should be determined based on the operating environment and other pertinent factors. Then a replacement schedule should be put in place to insure the maximum use of each thermocouple element, while guaranting the safety of the operating environment. It is strongly recommended that logs be kept indicating things such as:
      - (a) Calibration of the thermocouple (J, K, E, etc.)
      - (b) Date of installation.
      - (c) Date of replacement (if known). (If date of replacement has not been determined, then a schedule of test dates should be posted.)

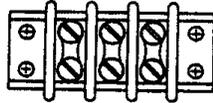


# THERMOCOUPLE HEADS, TERMINAL BLOCKS, AND WIRING DIAGRAMS:

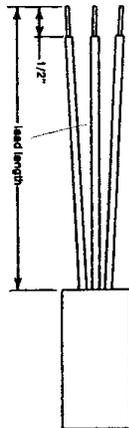
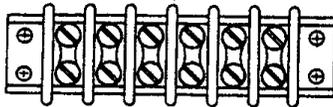
Explosion Proof Head



Single Terminal Block

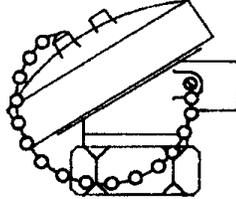


Dual Terminal Block

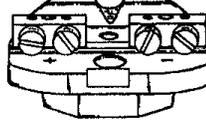


Standard 3-wire  
Configuration  
(RTD or T/C  
with Drain Wire)

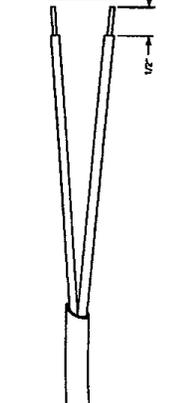
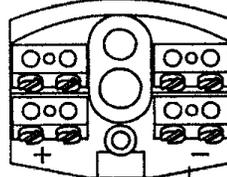
Cast Aluminum/  
Cast Iron Head



Single Terminal Block

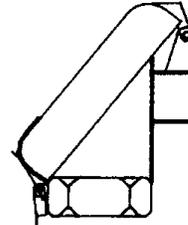


Dual Terminal Block



Standard 2-Wire  
Configuration  
(RTD or T/C)

Cast Aluminum/  
Flip Top Head



# RTDs

CAUTION: CHECK AND OBSERVE ALL APPROPRIATE SAFETY RULES AND REGULATIONS PRIOR TO PERFORMING ANY WORK INVOLVING THE INSTALLATION OF THESE PRODUCTS.

## Installation:

Each element and assembly are thoroughly tested and inspected prior to shipment. It is recommended that a visual inspection be made prior to installation. There should be no dents or bends on the sheath material, and no damage to lead wire.

### 1. Element

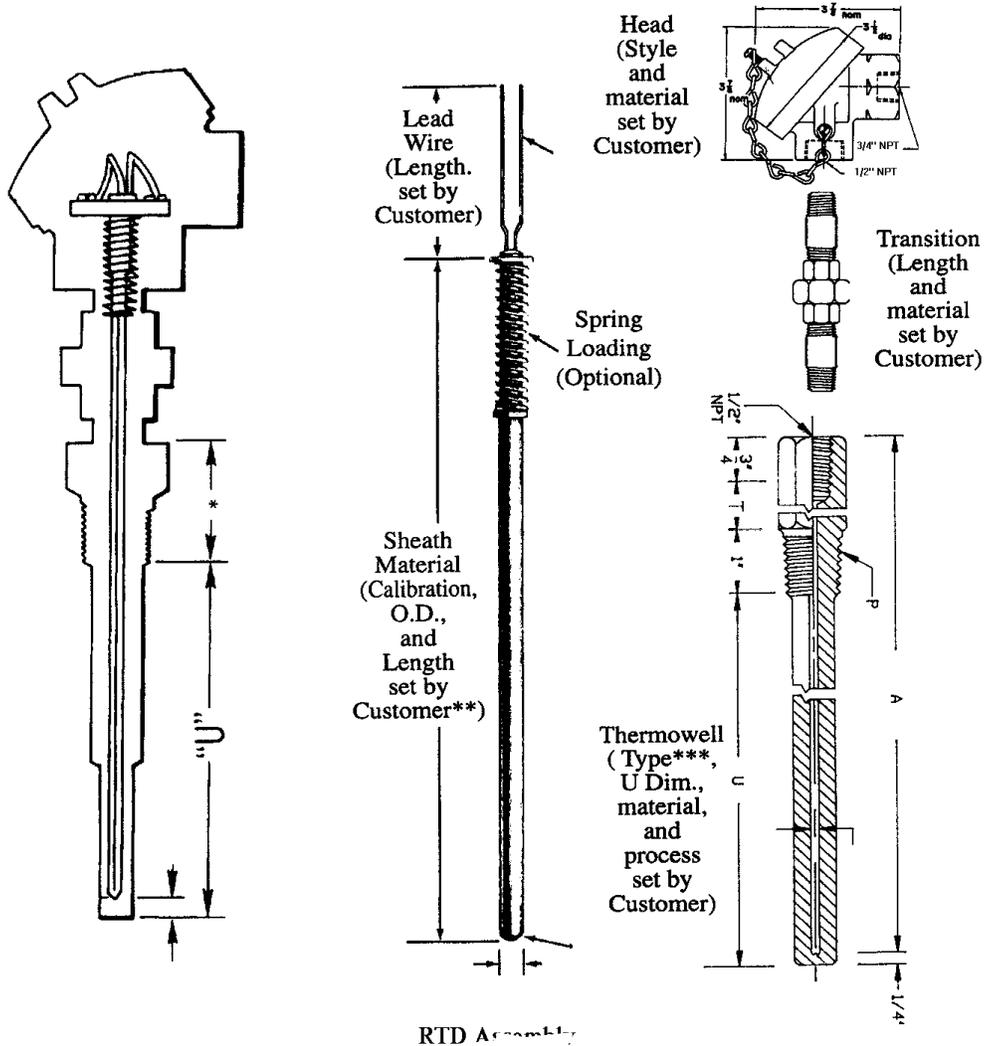
- a. The RTD is a delicate instrument and should be handled with care.
  - (1). Keep element protected from contamination prior to installation.
  - (2). Avoid excessive bending of lead wire.
  - (3). Insure proper element is installed in proper location/environment.
- b. Procedures
  - (1). Insure no obstructions in thermowell, transition or head.
  - (2). Insert RTD.
  - (3). Connect lead wires. (RTDs do not require reference junctions like those on thermocouples, therefore all connections can be made without regard to polarity.) Three and four wire RTDs are color coded. Matching colors indicate the compensated loop.

### 2. Assembly:

- a. Assemblies are pretightened. Do not over tighten when installing or damage to element may result.
- b. Procedures:
  - (1). Insure no obstructions in pipe or tubing where assembly is to be installed.
  - (2). Insert entire assembly.
  - (3). Tighten at insertion point (on thermowell (screw type) or flange bolts (flange type)).
  - (4). If thermowell portion of assembly must be welded in place, use caution not to expose element to excessive heat. (It is recommended that RTD be removed from assembly while welding takes place. Remember to reconnect wiring during reinstallation.).
  - (5). Open head, expose terminal block.
  - (6). Install conduit and/or extension wire into conduit connection port on head of assembly.
  - (7). Connect extension wire to terminal block. RTDs do not require reference junctions like those on thermocouples, therefore all connections can be made without regard to polarity. Three and four wire RTDs are color coded. Matching colors indicate the compensated loop.
  - (8). Close head (Do not cross thread or over tighten)

3. General Maintenance:
  - a. RTDs should be checked regularly, and they should be checked in place, if possible.
    - (1). Testing (On-Site)
      - (a) Check the resistance of the element at room temperature with a standard VoltOhm Meter. After checking circuit diagram connect one lead to one side of the element, and the other lead to the remaining side of the element. The resistance reading should match the value shown on a resistance temperature table. **Current through the element should not exceed 10 milliamps.** The insulation resistance between any lead wire and the metal sheath should be greater than 200 megohms (DC). (NOTE: If the element is wet, dry it in an oven at approximately 250 degrees F for about 3 hours then perform the test).
      - (b) Field Calibration:
        - (1). If the continuity check shows the RTD to be operational, a further check of accuracy can be performed in the field. Fill a clean thermos bottle or other uncontaminated container with distilled water and crushed ice. Insure that the water level does not cause the ice to float. Allow at least one-half hour for the ice bath to reach equilibrium temperature, then insert the element tip as deep as possible, without touching the bottom. Use a Wheat stone Bridge to measure the resistance of the element. A setting of 2 millamps of current or less should be used. (NOTE: If the bridge does not compensate for the lead wire resistance, take one reading with the element in the circuit, and subtract it from the resistance of the two common lead wires. Compare this reading with the nominal resistance value at 32 degrees F from a resistance table or 0 degrees centigrade.
        - (2). Testing (Factory)
          - (a). Each RTD is made of material that is thoroughly tested during manufacture and fabrication.  
(Copies of Material Test Reports and calibration Certificates are available, upon request, at the time of manufacture.)
  - b. General Instructions:
    - (1) Because of the limited access and limited accuracy of field testing of RTDS, it is recommended that a program of replacement be implemented. The average life of the RTD should be determined based on the operating environment and other pertinent factors. Then a replacement schedule should be put in place to insure the maximum use of each RTD element, while guaranting the safety of the operating environment. It is strongly recommended that logs be kept indicating things such as:
      - (a) Resistance of the RTD (10 ohm, 1 00 ohm, etc.)
      - (b) Date of installation.
      - (c) Date of replacement (if known). (If date of replacement has not been determined, then a schedule of test dates should be posted.)
      - (d) Material of winding or resistor.
      - (e) Curve or standard (DIN, SAMA, Other).

# RTD<sub>s</sub>/RTD ASSEMBLY DIAGRAMS:



RTD Assembly  
All tolerances meet or exceed industry standards.

## RTD Assembly

All tolerances meet or exceed industry standards.

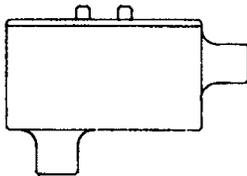
\*Srew of Socket Weld Type Thermowell Standard: 1 3/ 4 in. Flange Type Thermowell Standard: 2 1/ 4 in

\*\*Resistance value @ 0 deg. C., standard I.E., DIN< SAMA, other,. Material of winding, platinum, copper, etc.

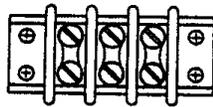
\*\*\*Flanged thermowells should include matching nozzle specifications.

## RTDS HEADS, TERMINAL BLOCKS, AND WIRING DIAGRAMS:

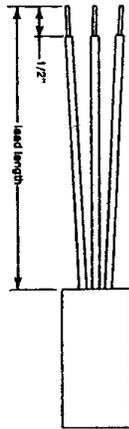
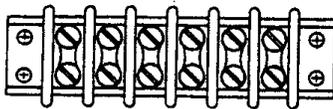
Explosion Proof Head



Single Terminal Block

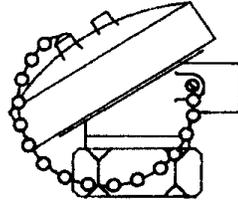


Dual Terminal Block

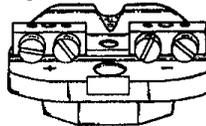


Standard 3-wire  
Configuration  
(RTD or T/C  
with Drain Wire)

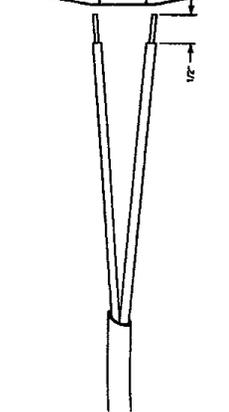
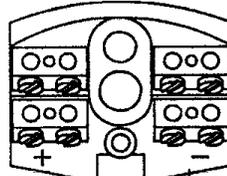
Cast Aluminum/  
Cast Iron Head



Single Terminal Block



Dual Terminal Block



Standard 2-Wire  
Configuration  
(RTD or T/C)

Cast Aluminum/  
Flip Top Head

