Food Industry Temperature Measurement

Introduction

The accurate measurement and control of temperature is critical to the quality and health-safety of food products. With the impact of the Food Safety Modernization Act (S510) and the dynamic nature of HACCP regulations throughout the food processing and service industries, many companies are searching for cost effective solutions that will enable them to comply.
Although there are many types of temperature measurement instruments that are adequate and convenient for most food service demands, the meat packing and processing businesses maintain a unique requirement for fast, accurate, robust and cost-effective tools which place some heavy demands on the thermometer manufacturer.

> **At TEGAM we have invested many years listening to meat processors around the country and are now introducing a complete line of instrument and probe solutions for the QC professional.**

This application note discusses several of these solutions, and reasons why these tools are so well-suited for their jobs.

The Combo Box

Bulk meat leaving the slaughterhouse is packaged in large palletized cardboard boxes called combo boxes or bins. These boxes are usually 4’ square and filled with meat maintained at near freezing for the journey to the processing plant. As part of the quality control function, the core temperature of the meat in the center of the box must be checked before the box is shipped from the packer and after it arrives at the processor. To check the core temperature, a long, sturdy temperature probe must be inserted through the 24” of meat to the center of the box. Often times the probe is inserted directly through the side of the box and into the meat.

Figure 1 – Combo Box in Use

TEGAM builds two types of combo-box probes; a "T" handled version and a Tri-Shape handled version. Both are available in standard K and T thermocouple types, as well as 2252Ω thermistor version. Each are available in 4", 18" and 30" lengths. Depending on the length, both are manufactured using a unique double and triple-walled, stainless steel tube design to maximize penetration strength while allowing tremendous control of penetration direction and depth.

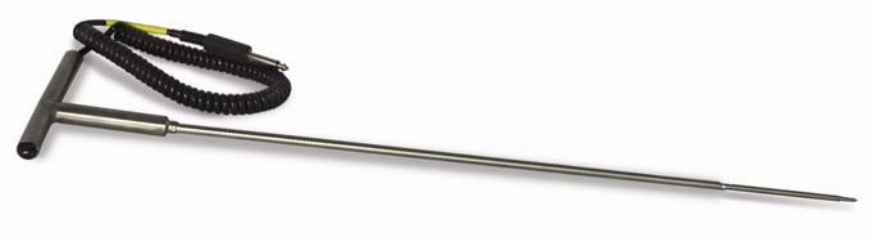

Figure 2 - "T" Handle Probe

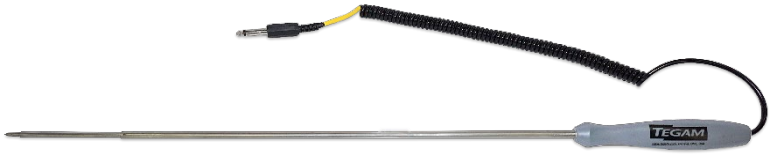

Figure 3 – Tri-Shaped Handle Probe

These probes are designed to provide the QC professional a wonderful tool for testing bulk meat in the difficult measurement conditions. Choose your sensor type, length and handle, and we'll process your order today.

The Continuous Production Line

Automation has provided the food industry with the benefits of increased production, increased quality and reduced costs. But even tightly controlled automated lines need regular QC with an independent thermometer to ensure that processes are operating properly and within spec. Many processed meats are cooked and cooled over several hours in continuous cooking houses. At various points in production operators will want to measure the core temperature of meats as low as 32°F, or as high as 160°F.

Figure 4 – Continuous Production Line in Operation

The key to testing temperature on a continuously moving production line is speed. Operators have a limited amount of time to complete a measurement as the product moves through a literal "window of opportunity" at various stages of the process. At these test points the operator might have 10-15 seconds to insert a probe and get a stable reading. To solve that problem, TEGAM developed a heavy-duty hypodermic probe.

This heavy-duty hypodermic probe utilizes a double-walled stainless steel design. The sensor is welded into the tip of a hypodermic needle creating a low-mass, high-speed temperature probe. The hypodermic section is encased, for most of its length, inside and stainless steel jacket to maximize durability. The slender design minimizes damage to the product while its 4" length allows for core temperatures of sausages up to 8" in diameter.

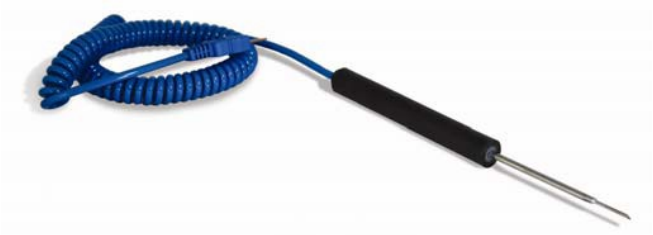

Figure 5 - High-Speed Hypodermic Probe

The Smokehouse

The smokehouse, like the continuously moving production line, requires speed of measurement; however, its reason is different. Meats being cooked in smokehouses and large ovens need to have their temperatures taken at various times during the process. Because core temperatures are rarely monitored inside the oven, operators must open the oven doors, take several measurements, then close the oven and continue cooking. Obviously, the longer those oven and smoker doors are open, the more heat is lost, and the longer the total cooking process will take.

Figure 6 – Meat Being Monitored in a Smokehouse

Again, the TEGAM heavy-duty hypodermic probe, with its slender profile and high speed, will get the job done quickly, easily, and without damaging the product.

The Meters

TEGAM manufactures a complete line of handheld, digital thermometers in thermocouple, thermistor and RTD versions to match the probe that best fits the needs of the demanding auditor and QC professional working in environments where wide temperature swings and varying humidity levels exist.

> **These instruments include features like large buttons and switches for easy operation with gloved hands; your choice of sensor type, °F or °C calibrations; selectable resolution; ergonomic handheld design, MIL STD Shock, Drop & Vibration Rating; Free Cloud Account & Mobile App; temperature compensation and easy to clean membrane keypads.**

For example, the 911B is a single input K,J,T & E thermocouple thermometer with 0.04% basic accuracy and selections for °F, °C and resolution. The 912B is a dual channel version of the 911B with a MIN/MAX record feature for each channel. With membrane keypads and no need for a rubber boot, the 911B and 912B offer the best combination of price, durability and accuracy available.

The 931B and 932B are the Bluetooth® enabled single and dual channel thermocouple thermometers. Both thermometer models hold up to 1000 time-stamped data points and transmit data wirelessly via low energy Bluetooth connection to a free cloud account. This line also comes with free iOS and Android apps allowing for remote monitoring from any connected device.

Figure 6 - TEGAM models 911B & Bluetooth® 931B

The Calibrators

In addition to digital thermometers, TEGAM manufactures handheld temperature simulators that can be used to verify and calibrate all the digital thermometers, digital displays, controllers, monitors and dry wells used in your production and quality control programs.

TEGAM manufactures several models that simulate up to 14 different thermocouple types, thermistors and RTDs to match your facility's instrumentation.

Figure 9 – TEGAM Model 940A

The Recommendation

TEGAM is a U.S. manufacturer of various test and measurement instruments and calibration standards. TEGAM has been designing and manufacturing digital thermometers and probes for various industrial applications for over 25 years. We have worked closely with meat processors for many years to understand the unique measurement environments and challenges that face our food producers. We have developed a robust line of instruments and probes to meet these challenges and encourage you to talk to our applications engineers and try the TEGAM products that fit your specific applications. We think you will be impressed with our attention to detail and desire to make your investment in reliable temperature measurement equipment effective and sound.

Visit us today at www.tegam.com or call us at 440-466-6100.

Ordering Information

Probes

	Sensor Type	Probe Tip Style	Old Model #	New Model #	Thermometers						Calibrators			
					Thermocouple				Thermistor	RTD				
					911A, 912A	931A, 932A	874C, 874F	875C, 875F	865, 866	868, 869	840A	845	850	855
J	TYPE J	Immersion	8723	9J603MTC05	•	•					•	•	•	•
		6-Input Switch Box	8022	8022	•	•					•	•	•	•
K	TYPE K	Wire	8712	9K002MTC36	•	•	•				•	•	•	•
			8712-6	9K002MTC72	•	•	•				•	•	•	•
		Extension (M-F)	80141	80141	•	•	•				•	•	•	•
		Immersion	8713	9K603MTC05	•	•	•				•	•	•	•
		Penetration	87104	9K604MTC04	•	•	•				•	•	•	•
			87104-18	9K604MTC18	•	•	•				•	•	•	•
			87114-18	9K104MTC18	•	•	•				•	•	•	•
			87104-30	9K604MTC30	•	•	•				•	•	•	•
			87114-30	9K104MTC30	•	•	•				•	•	•	•
		Surface	83115	9K605MTC08	•	•	•				•	•	•	•
		Air/Gas	8716	9K606MTC08	•	•	•				•	•	•	•
		Hypodermic	87127	9K607MTC03	•	•	•				•	•	•	•
		Griddle	8737A	8737A	•	•	•				•	•	•	•
		6-Input Switch Box	8012	8012	•	•	•				•	•	•	•
T	TYPE T	Wire	8752	9T002MTC36	•	•		•			•	•	•	•
		Immersion	N/A	9T603MTC05	•	•		•			•	•	•	•
		Penetration	87504	9T604MTC04	•	•		•			•	•	•	•
			87504-18	9T604MTC18	•	•		•			•	•	•	•
			87514-18	9T104MTC18	•	•		•			•	•	•	•
			87504-30	9T604MTC30	•	•		•			•	•	•	•
			87514-30	9T104MTC30	•	•		•			•	•	•	•
			87514-36	9T104MTC36	•	•		•			•	•	•	•
		Surface	N/A	9T605MTC06	•	•		•			•	•	•	•
		Air/Gas	N/A	9T606MTC08	•	•		•			•	•	•	•
		Hypodermic	87527	9T607MTC03	•	•		•			•	•	•	•
		6-InputSwitchBox	8052	8052	•	•		•			•	•	•	•
X	THERMISTOR (2252Ω)	Wire	8662	9X002PHN36					•				•	
		Immersion	8663	9X603PHN04					•				•	
		Penetration	86504	9X604PHN04					•				•	
			86504-18	9X604PHN18					•				•	
			86514-18	9X104PHN18					•				•	
			86514-30	9X104PHN30					•				•	
			86504-30	9X604PHN30					•				•	
			86514-36	9X104PHN36					•				•	
		Surface	8665A	9X605PHN04					•				•	
		Air/Gas	8666	9X606PHN04					•				•	
Y	RTD (100Ω)	Immersion	8693	9Y603TA408						•			•	•
		Surface	8695A	9Y605TA406						•			•	•
		Air/Gas	8696	9Y606TA408						•			•	•

Meters

Model	Description	Sensor	Calibration	Inputs
911B	Thermocouple Thermometer	K,J,T, E	F&C	1
912B	Thermocouple Thermometer	K,J,T, E	F&C	2
931B	Data Logging Thermocouple Thermometer	K, J, T, E, B, N, R, S	F&C	1
932B	Data Logging Thermocouple Thermometer	K, J, T, E, B, N, R, S	F&C	2
865	Thermistor Thermometer	Thermistor	F	1
866	Thermistor Thermometer	Thermistor	C	1
868	Platinum RTD Thermometer	RTD	F	1
869	Platinum RTD Thermometer	RTD	C	1

Calibrators

Model	Description	Sensor
940A	Thermocouple Calibrator/Simulator	K,J,T,E
945A	Thermocouple Calibrator/Simulator	K,J,T,E,N,B,R,S,G,C,D L,P,U
850	Thermocouple Calibrator/Thermometer	K,J,T,E, Ohms, RTD, Thermistor
855	Thermocouple Calibrator/Thermometer	K,J,T,E,N,B,R,S,G,C,D, Ohms, RTD