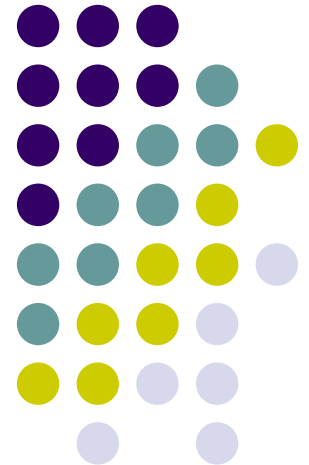


Practical Considerations for Using the “DART” Digital Reference Thermometer on Retort Systems

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IFTPS Annual Conference
February 21, 2007





Outline

- History and Context
- Anderson "DART" Digital Reference Thermometer
- Installation Examples
- Display & Sensor Options
- Certification
- Summary Recommendations



History and Context



- FDA Low Acid Canning Regulations
 - 21 CFR 113.40 "Each retort shall be equipped with at least one mercury-in-glass thermometer ..."
 - 21 CFR 100 (a) "Processing ...information shall be entered at the time it is observed by the retort ...operator...on forms that include ... the mercury-in-glass ... thermometer readings"
- Motivation for an alternative device ...
 - Environmental issues
 - Occupational safety issues
 - Reliability issues
- FDA is currently in the process of publishing a change to the regulations that will allow for alternative temperature reference devices

Anderson "DART" Digital Reference Thermometer



- Reference grade, RTD-based, electronic temperature measurement system for use in industrial environments
- Digital display reads to 0.1°F
- Meets PMO provisions
- Used successfully in the dairy industry for over a decade
- Display can be remotely located up to 1500' from probe

Anderson "DART" Digital Reference Thermometer



- Simple one-point zero calibration at 32°F
- Maintains $\pm 0.3^{\circ}\text{F}$ accuracy over operating range
- Error diagnostics
 - Sensor failure
 - Broken leads
 - Electrical short
 - Difference between dual RTD elements exceeds 0.5°F



Installation Examples

- DART installed beside the MIG thermometer on:
 - One Stork hydrostatic retort (6 months)
 - One Malo crateless retort (4 months)
 - Eight Allpax agitating water retorts (2 months)
- Excellent agreement with MIG thermometer in all applications
- No malfunctions



Installation Examples

Hydrostatic Retort Installation



RTD sensor at retort



Display mounted remotely
in control room



Installation Examples

Crateless Retort Installation



RTD sensor at retort



Display mounted locally at retort



Installation Examples

Rotary Water Immersion Retort Installation



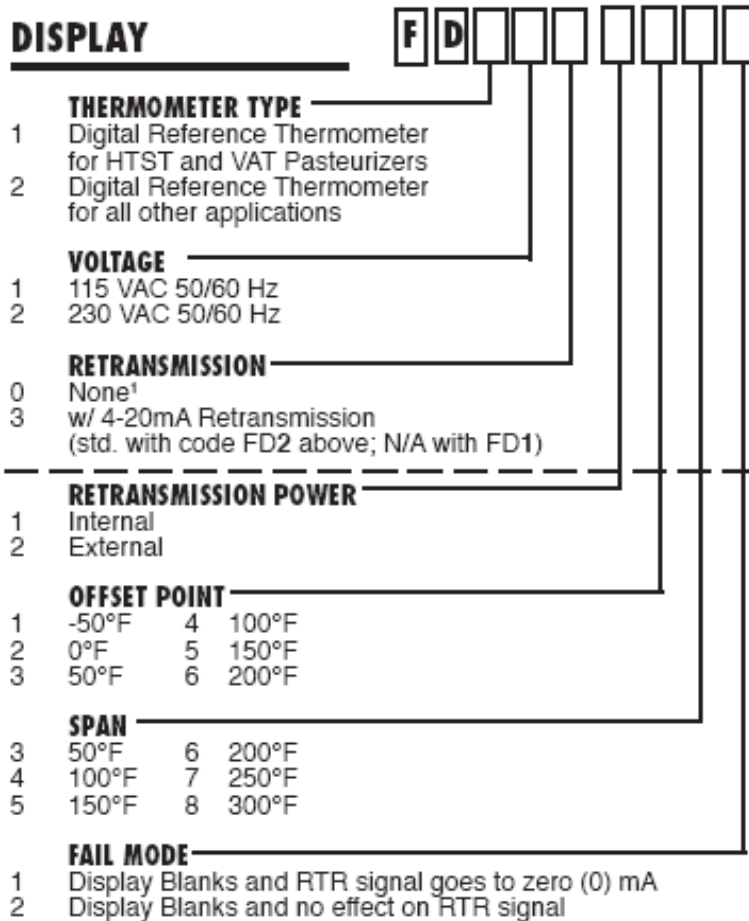
RTD sensor at retort



Display mounted remotely
on operator deck



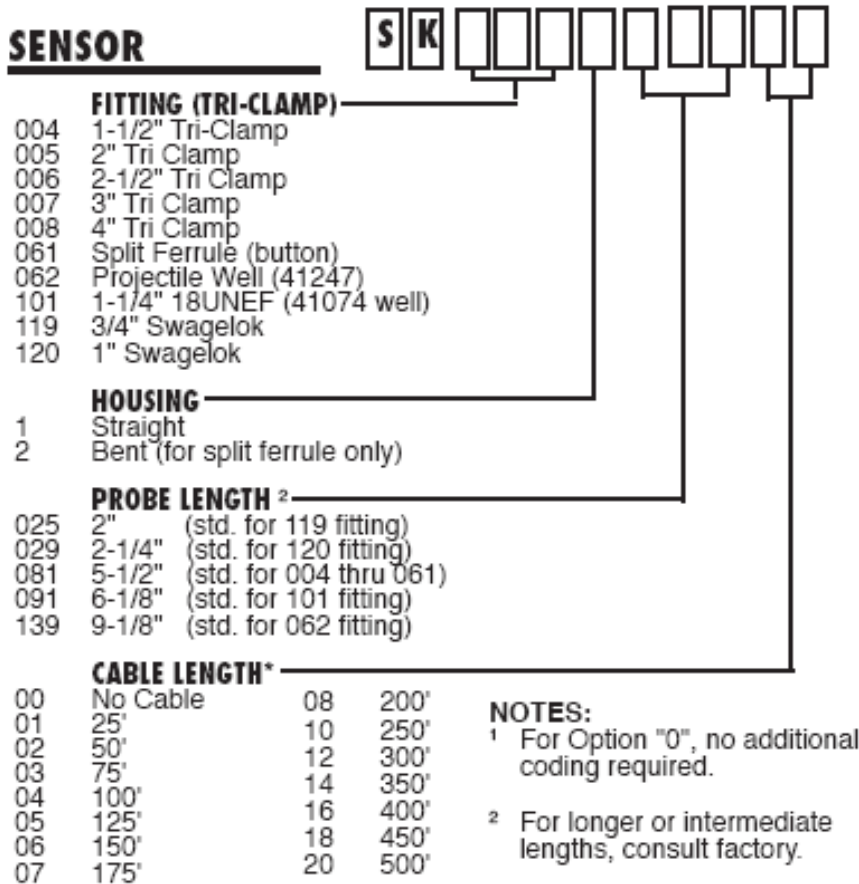
Display Options



- Type: Digital Reference Thermometer for HTST
- Voltage: 115 VAC
- Retransmission: None
- Offset: 0°F
- Span: 300°F



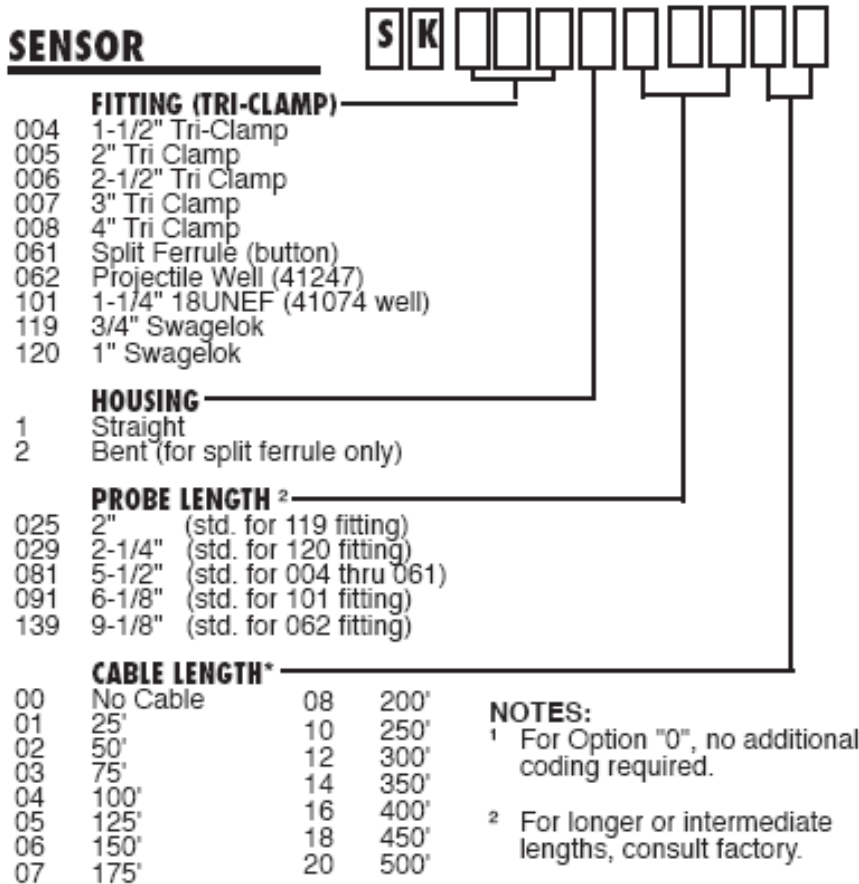
Sensor Options



- Determine probe location, fitting size and type
 - Install in a location using the same criteria as that for MIG thermometer
 - Determine probe length: 2", 2-1/4", 5-1/2", 6-1/8", 9-1/8"
 - 1-1/4" 18UNEF is standard for MIG thermometer
 - Can adapt to other fitting styles



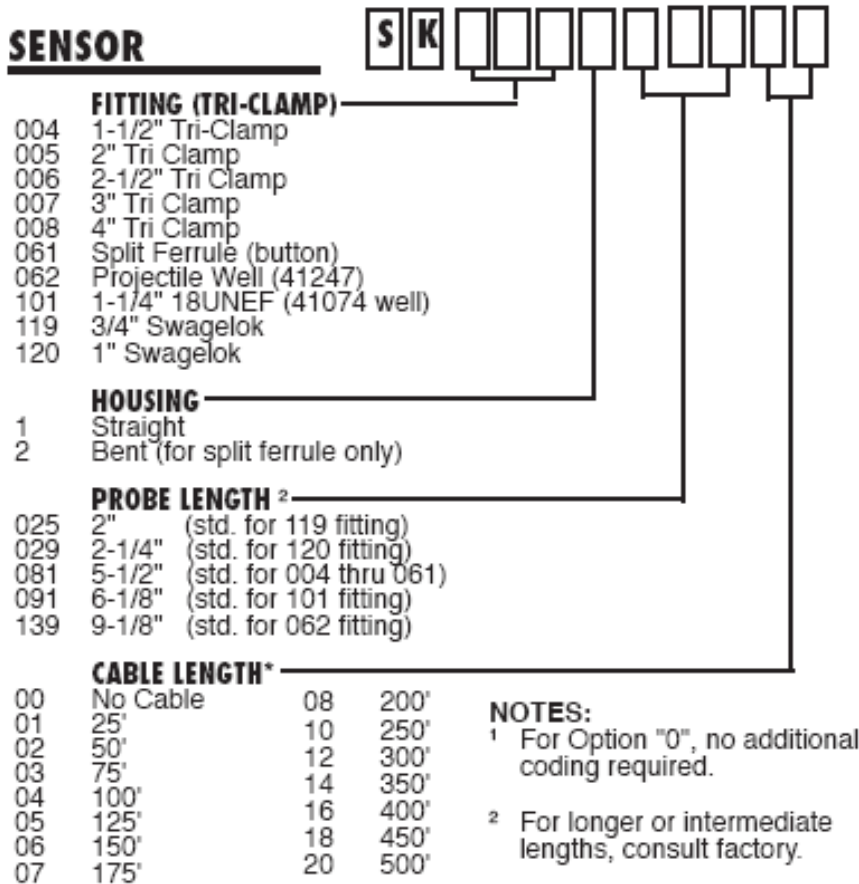
Sensor Options



- Thermowell
 - Allows for probe removal during processing
 - Slows response time
 - Requires solid contact of probe and thermowell
 - Order thermowell from Anderson to match probe



Sensor Options



- Determine where the display will be located
 - Impacts length of cable needed
 - Remotely located display can limit which methods can be used for certification



Certification



**Certificate of Compliance
and Accuracy**
Certificate #C0625243

This is to certify that the parts, components, and/or assemblies delivered to this order have been inspected and meet the requirements of the applicable drawings and specifications, including surface finish when specified. Quality Assurance procedures provide for maintenance of adequate records for acceptance of raw materials used in the fabrication of our products. These records are on file and are available for review at any reasonable time.

The equipment listed below was 100% functionally tested and/or calibrated and meets all requirements of applicable specifications. The test equipment used for calibration is NIST traceable and records are available for review at any reasonable time.

"Dart" Digital Reference Thermometer

Model(s): FD110, SK101109101 Range: -50 to 350 F
 Serial No(s): 0619278, 0625243
 Calibration Date: 6/6/2006 Manufacturer: Anderson Instrument Co., Inc.
 Surface Finish: Meets or exceeds 3-A standards (#09-08)
 Accuracy: +/-0.30 degrees
 Comments:

	Test Point	Reference	Tolerance	This Instrument	Error
DART (degrees)	100 F	100.0000	+/- .30	100.0000	0.0000
	220 F	220.0000	+/- .30	220.0000	0.0000
	230 F	230.0000	+/- .30	230.0000	0.0000
	240 F	240.0000	+/- .30	240.0000	0.0000
	250 F	250.0000	+/- .30	249.8000	-0.2000

Request a **Certificate of Compliance and Accuracy** from Anderson at the time the DART is ordered to establish the baseline accuracy of the device.

Perry Fonda
Perry Fonda, Calibration Dept.

Matt Hennigan
Matt Hennigan, Quality Assurance

156 Auriesville Road • Fultonville, NY 12072
 (800) 833-0081 • (800) 726-6733 (fax)
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 www.andinst.com

Test Point	Reference	Tolerance	This Instrument	Error
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230 F	230.0000	+/- .30	230.0000	0.0000
240 F	240.0000	+/- .30	240.0000	0.0000
250 F	250.0000	+/- .30	249.8000	-0.2000



Certification

- Periodically, the DART must be “tested for accuracy”
- Resolution to 0.1°F creates new challenges
- Since the retort MIG thermometer cannot resolve to 0.1°F , it cannot be used to certify the DART
- One should not use a retort MIG thermometer as the temperature reference for DART adjustments
- However, comparing the DART against a retort MIG thermometer can be done for general verification



Certification

- Certification is the only way to document accuracy and temperature stability of the device over time
- Certification is done at target processing temperatures using a NIST traceable temperature reference
- Certification at process temperature requires a reference device with at least 5 times the resolution (0.02°F) of the DART
- Calibration, if needed, is done at 32.0°F after which the device is recertified at the target processing temperatures



Post Installation Certification

1. Remote Certification

- Probe and display are certified in a remote location
- Similar to how MIG thermometers are currently certified
- May not be practical if depending on how the display is mounted



Post Installation Certification



2. In-place certification

- Requires a port proximate to the DART
- Must be done under conditions of uniform temperature
- Requires a reference-grade digital temperature device e.g. Wahl TM612



Post Installation Certification



3. Local Certification

- Requires a reference-grade oil bath
- Example
 - Hart Scientific 6102
 - Portable
 - Weighs less than 10 lb.
 - Spill-proof lid
 - Uniformity is $\pm 0.02^{\circ}\text{C}$ or better
 - 35°C to 200°C
 - RS-232 ports
- May be logistically awkward or difficult



Summary Recommendations

1. Conduct a trial by purchasing one or more units for installation beside the existing MIG thermometer
 - Uncovers issues related to your operations
 - Acclimate operators and management to the concept
 - Collect temperature data to document performance
 - Develops confidence in new technology
2. At the time of purchase, request a **Certificate of Compliance and Accuracy** to be made on the DART at target processing temperatures. Include venting temperatures if applicable.
3. Prior to installation, have the DART and retort MIG thermometer both verified for agreement against the same certified standard



Summary Recommendations

4. Determine your plan to certify the DART's accuracy over time and obtain needed temperature reference equipment
5. Order a thermowell for the DART if your MIG thermometer is currently installed in a thermowell
6. Mount the display case where it can be kept at a temperature $< 100^{\circ}\text{F}$
7. Use tamper evident seal on probe and display



Thank you!