

Attachment 9

Example Calibration Work Instruction Standard Operating Procedure

Document: SOP 1234	Issue Number: 1	Page 1 of 4	Signature:
--------------------	-----------------	-------------	------------

STANDARD OPERATING PROCEDURE					
Department	Engineering		Reference	SOP 1236	Page 1 of 4
Title	Calibration Procedure for Electronic Temperature Transmitter				
Issue Date	August 1999	ISSUE number	1	Copy Number	
Prepared by	Engineering Department				
	Approved By:		Approved By:		Approved for Issue:
Name					
Title	Engineering Manager		QA Compliance Manager		Documentation Management
Sign/Date	This document is a certified true copy of the original signed copy held in Documentation Management				

CONTENTS

1	OBJECTIVE	2
2	WARNINGS AND CAUTIONS	2
3	DOCUMENTS REQUIRED	3
4	TEST EQUIPMENT REQUIRED	3
5	TEST CONDITIONS REQUIRED	3
6	CALIBRATION	4
7	ADJUSTMENT	4
8	CALIBRATION TEST SHEET	4

Appendix 9

Document: SOP 1236	Issue Number: 1	Page 2 of 4	Signature:
--------------------	-----------------	-------------	------------

1.0 OBJECTIVE

1.1 This procedure describes the method for testing the accuracy, and calibrating an Electronic Temperature Transmitter with a Temperature Element fitted.

1.2 Definitions

CALIBRATION
The set of operations, which establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, or values represented by a material measure, and the corresponding known values of a reference standard.

PRODUCT CRITICAL INSTRUMENTS
A product critical instrument is an instrument whose failure may have a direct effect on product quality.

PROCESS / SYSTEM CRITICAL INSTRUMENT
A process / system critical instrument is an instrument whose failure may have a direct effect on process or system performance without affecting final product quality, or safety.

SAFETY / ENVIRONMENTAL CRITICAL INSTRUMENT
A safety / environmental critical instrument is an instrument whose failure may have a direct effect on safety / environment.

NON-CRITICAL INSTRUMENT
An instrument whose failure is deemed to have no effect on product quality, process / system performance, safety or the environment.

2.0 WARNINGS AND CAUTIONS

2.1 There may be some hazards involved in the de-commissioning, removal, testing, installation and re-commissioning of the particular device under test, therefore some precautions may be required.

2.1.1 Before de-commissioning the Temperature Transmitter you must ensure that no other equipment item will be affected when the device is disconnected, i.e. pumps starting or valves opening.

2.1.2 Consult the Manufacturer's Instruction Manual before disconnecting the Temperature Transmitter if you are not familiar with the specific device's wiring.

2.1.3 Before removing the Temperature Element you must ensure that it is either in a pocket or the process equipment or line has been de-pressurized, drained and washed if necessary.

2.1.4 Care must be taken not to excessively bend the Temperature Element when removing it from its insertion.

2.1.5 The Department's procedure regarding the de-contamination of equipment leaving and returning to the plant must be strictly adhered to.

2.1.6 Care should be taken when removing the Temperature Element from hot baths; firstly not to burn yourself or others in your vicinity and also to try and reduce the effects of Thermal Shock to the Element, which could result in damage.

Appendix 9

Document: SOP 1236	Issue Number: 1	Page 3 of 4	Signature:
--------------------	-----------------	-------------	------------

3.0 DOCUMENTS REQUIRED

3.1 Loop Diagram for the Loop containing the Temperature Transmitter.
Manufacturer's Instruction Manual for Temperature Transmitter.
Manufacturer's Specification for Test Equipment.
Calibration Test Sheet for Electronic Temperature Transmitter.

4.0 TEST EQUIPMENT REQUIRED

4.1 The following Test Equipment is required to test the accuracy and calibrate the Temperature Transmitter with Element fitted. The Test Equipment must be suitable to attain the level of accuracy specified for the process, and should meet the current site requirements regarding the Certification of Test Equipment.

- (a) 24 V.d.c. Power Supply Unit.
- (b) Digital Multimeter.
- (c) Temperature Bath(s).
- (d) Standard Reference / Standard RTD.

5.0 TEST CONDITIONS REQUIRED

5.1 Connect temperature transmitter (TT), 24 V.d.c. power supply unit (PSU) and digital multimeter (DMM) in circuit as shown below:

The diagram illustrates the test setup for a Temperature Transmitter (TT). It includes a Power Supply Unit (PSU) set to 24.00 V, a Digital Multimeter (D.M.M.) set to mA mode and displaying +8888888, and a Standard Reference set to +8888888. The TT is connected to a Temp. Bath. The Standard RTD is connected to the Standard Reference and the TT.

Appendix 9

Document: SOP 1236	Issue Number: 1	Page 4 of 4	Signature:
--------------------	-----------------	-------------	------------

6.0 CALIBRATION

6.1 Set a Temperature Bath to the Lower Test Point Temperature.

6.2 Place a Standard RTD into the bath, allow to stabilize and record the indicated temperature (in °C) on the associated Calibration Test Sheet.

6.3 Place the Temperature Element into the bath, and allow to stabilize.

6.4 Using the associated Calibration Test Sheet, record the mA reading on the Digital Multimeter.

6.5 Calculate the Equivalent Output Temperature (°C) and record the value on the associated Calibration Test Sheet.

6.6 Calculate the error in °C and record the value on the associated Calibration Test Sheet.

6.7 Set a Temperature Bath to the Higher Test Point Temperature.

6.8 Place a Standard RTD into the bath, allow to stabilize and note the indicated temperature (in °C).

6.9 Place the Temperature Element into the bath, and allow to stabilize.

6.10 Repeat the readings, calculations, and recordings as detailed in 6.4, 6.5, and 6.6 above.

6.11 Set a Temperature Bath to an Intermediate Test Point Temperature.

6.12 Place a Standard RTD into the bath, allow to stabilize and note the indicated temperature (in °C).

6.13 Place the Temperature Element into the bath and allow to stabilize.

6.14 Repeat the readings, calculations, and recordings as detailed in 6.4, 6.5, and 6.6 above.

6.15 Repeat 6.11 to 6.14 for all Intermediate Test Point Temperatures (i.e., sterilization temperatures, process operating temperatures).

6.16 If adjustment is required (see relevant document), then carry out adjustment as detailed in section 7.0.

7.0 ADJUSTMENT

7.1 Place the Temperature Element in a temperature bath at transmitter range zero point, together with a Standard RTD and allow to stabilize.

7.2 Adjust transmitter zero to obtain correct mA output signal reading on Digital Multimeter corresponding to actual temperature as indicated by the Standard RTD.

7.3 Place the Temperature Element in a temperature bath at transmitter range span point, with a Standard RTD, and allow to stabilize.

7.4 Adjust transmitter span to obtain correct mA output signal reading on Digital Multimeter corresponding to actual temperature as indicated by the Standard RTD.

7.5 Repeat 7.1 to 7.4 until no further adjustment is required.

7.6 Repeat 6.1 to 6.16 recording the results in the Post Calibration Section of the associated Calibration Test Sheet.

8.0 CALIBRATION TEST SHEET

8.1 Use the Calibration Test Sheet for an Electronic Temperature Transmitter.

8.2 Complete the Calibration Test Sheet including the details of the Temperature Transmitter and Element, the Process Details, the Test Equipment Details and indicate in the PASS/FAIL column if the results are within the Specified Process Accuracy by writing PASS or FAIL.

8.3 Sign and Date the Calibration Test Sheet when complete and forward to Relevant Engineering Department for approval.