

DOCUMENT TITLE: **PREVENTIVE MAINTENANCE PROCEDURE, TCM II**

DOCUMENT TYPE: ☐ Calibration ☒ Preventive Maintenance

EQUIPMENT NAME: **TCM II**

EQUIPMENT NUMBER: **TE82905**

AUTHOR(S): **ADAM TOWNSEND** DATE: **January 30, 2019**

REVISED BY: **N/A** DATE: **N/A**



(TE82905)



(TE82905-2)

EQUIPMENT REQUIRED

Quantity	Part Number	Description
1	TE82905	CHM Simulator Test Fixture

DISPOSABLES REQUIRED

Quantity	Part Number	Description
N/A	N/A	N/A

REFERENCE DOCUMENTATION

Document Number	Description
730001799	Operating Procedure, Calibration, and PM
730000295MP	Quality System Document Control

DEFINITIONS AND ABBREVIATIONS

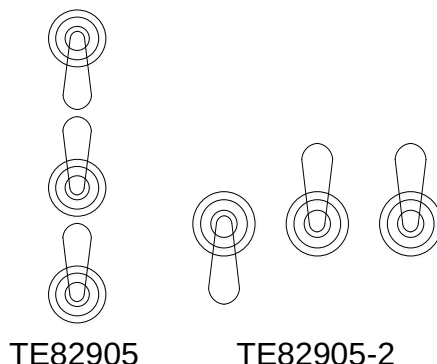
Term	Definition/Abbreviation
PM	Preventive Maintenance: The servicing, for the purpose of, maintaining equipment in satisfactory working order, by performing systematic inspection, detection, and correction of potential failures. PM activities may include tests, measurements, and parts replacement.
TCM II	Temperature Control Module II
LED	Light Emitting Diode
CHN, CN, UNIT	Abbreviated terms for Channel
CHM	Column Heater Module
AC	Alternating Current

PROCEDURE

1. Test Setup

- 1.1. With TCM II powered off, plug TCM II into AC power.
- 1.2. Connect 3 cables from TE82905 labeled CN1, CN2, and CN3 to TCM II ports labeled CHM 1, CHM2, and CHM3. (CN1 to CHM 1, CH2 to CHM2, CH3 to CHM3)
- 1.3. Configure Switches on TE82905 for **each** channel (1, 2, and 3); as follows: Switch 1 DOWN, Switch 2 UP, and Switch 3 UP as shown below.

NOTE: EACH CHANNEL HAS 3 SWITCHES.



2. Display and Keypad Test

- 2.1. Power on TCM II.
- 2.2. Once the TCM II has completed powering up. Press "MENU" key on TCM II control panel.
- 2.3. Press "5" key to enter Display and keypad test.
- 2.4. Press "1" key to Test keypad.
 - 2.4.1. Pressing a key once will show a dark circle inside a square corresponding to the key pressed.
 - 2.4.2. Press each key once until all the squares have dark circles in them.
 - 2.4.3. Press "Enter" a second time to exit and complete the test.
- 2.5. Check Pass or Fail on PM Record.
- 2.6. Press "2" to Test Display.
 - 2.6.1. Watch the display as it fills up with all dark pixels and then erases the pixels.
 - 2.6.2. Look for missing Pixels (White spots), when all the dark pixels are turned on and Pixels stuck on (Dark Spots), when all the pixels are erased.
 - 2.6.3. If no missing or stuck on Pixels are observed, Display test passed.
- 2.7. Check Pass or Fail on PM Record.
- 2.8. Press the "Home" Key.

3. Temperature Accuracy Test

- 3.1. Record the 3 Temperature readings from TCM II for each channel on PM Record.
- 3.2. Check Pass if Temperature reading is between 100°C and 104°C.

4. Temperature Variation Test

- 4.1. Using recorded temperatures on PM Record from previous step, calculate the variation.
 - 4.1.1. Mark on the PM Record the Highest reading and the Lowest reading.
 - 4.1.2. Subtract the two readings and record the result.
- 4.2. Check Pass on PM Record if result is < or = to 0.5°C.

5. Heater Functional Verification Test

- 5.1. Change "Set Point" to 150.0 for each channel and observe that LED's blinks per channel.
 - 5.1.1. Key in "1" "5" "0" and press "Enter" Key. CHN 1, LED will Blink.
 - 5.1.2. Key in "1" "5" "0" and press "Enter" Key. CHN 1 and CHN 2, LED's will be blinking.
 - 5.1.3. Key in "1" "5" "0" and press "Enter" Key. CHN 1, CHN 2, and CHN3, LED's will be blinking.
- 5.2. Check Pass on PM Record for each LED that is blinking.
- 5.3. Power off TCM II.

6. Complete Preventive Maintenance

- 6.1. If all Tests Pass and the PM Record is complete, fill out a Preventive Maintenance sticker and affix the sticker to the TCM II.

WATERS CORPORATION TCM II PREVENTIVE MAINTENANCE RECORD

Date:	Performed By:	
Equipment I.D.	Location:	
Due Date:	Interval (Months):	Next Due Date:

Test Equipment Used	Serial Number/Identification Number	Calibration/PM Date
TE82905		

SECTION 2: DISPLAY AND KEYPAD	RESULT
Step 2.5: Keypad Test	PASS ☐ FAIL ☐ SEE NOTE ☐
Step 2.7: Display Test	PASS ☐ FAIL ☐ SEE NOTE ☐

SECTION 3: TEMP. ACCURACY	RESULT	RESULT
Step 3.1: Channel 1 (100°C - 104°C)	Measurement: _____ °C	PASS ☐ FAIL ☐ SEE NOTE ☐
Step 3.1: Channel 2 (100°C - 104°C)	Measurement: _____ °C	PASS ☐ FAIL ☐ SEE NOTE ☐
Step 3.1: Channel 3 (100°C - 104°C)	Measurement: _____ °C	PASS ☐ FAIL ☐ SEE NOTE ☐

SECTION 4: TEMP. VARIATION	RESULT	RESULT
Step 4.1: Subtract the Lowest Measurement from the Highest Measurement to solve for Variation Result.	Highest Measurement: _____ °C Lowest Measurement: _____ °C Result (< or = 0.5°C): _____ °C	PASS ☐ FAIL ☐ SEE NOTE ☐

SECTION 5: Heater Functional Verification Test	RESULT
Step 5.1.1: Channel 1 LED Blinks	PASS ☐ FAIL ☐ SEE NOTE ☐
Step 5.1.2: Channel 2 LED Blinks	PASS ☐ FAIL ☐ SEE NOTE ☐
Step 5.1.3: Channel 3 LED Blinks	PASS ☐ FAIL ☐ SEE NOTE ☐

NOTES