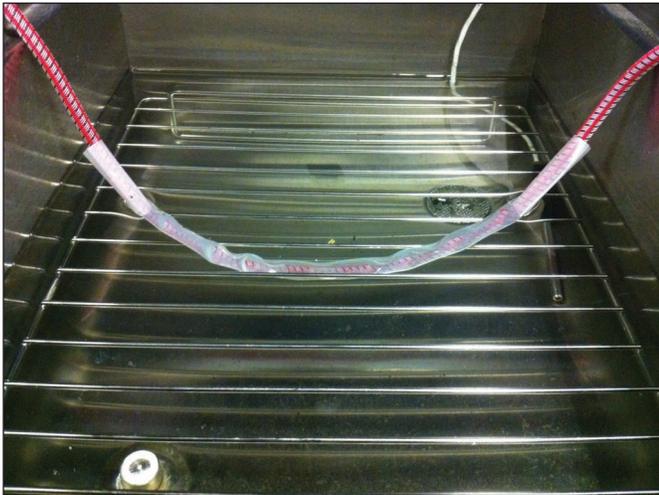


**RAYCHEM**  
TraceTek

# Leak Detection

## Instructions for Testing of Sensing Cable Response



**WARNING:**

This procedure involves handling hazardous chemicals. Be sure to follow your organization's procedures for handling and disposal of potentially hazardous chemicals.

**INTRODUCTION:**

These instructions provide a method for testing the response of nVent RAYCHEM TraceTek sensor cables to a chemical of interest. They will allow the user to determine whether a particular sensor cable will detect a chemical and how long it takes for that detection to occur. As temperature plays a role in response times (generally faster at higher temperatures and slower at low temperatures) the method provides for temperature control to ensure consistent results. Followed properly, the test method will provide usable response time data to help determine the suitability of the sensor cable.

Whether any TraceTek cable is suitable for detecting the chemical of interest under the user defined conditions is a decision solely up to the user.

Some basic TraceTek components are required to perform the test. They are discussed below, along with their part numbers for ease of ordering.

The user needs to provide a number of other materials to perform the test, including a safe chemical test station and proper protective equipment for test personnel.

**1. TRACETEK PARTS REQUIRED FOR TESTING:**

- a. One nVent RAYCHEM TraceTek TTSIM-1A unit with desired power rating. See below for part number choices.

| TTSIM-1A Options                   | Part Number |
|------------------------------------|-------------|
| TTSIM-1A, 24 VAC Input Power       | P000000046  |
| TTSIM-1A-120, 120 VAC Input Power  | P000000047  |
| TTSIM-1A-230, 230 VAC Input Power  | P000000048  |
| TTSIM-1A-12VDC, 12 VDC Input Power | P000000899  |
| TTSIM-1A-24VDC, 24 VDC Input Power | P000000906  |

- b. One end termination nVent RAYCHEM TraceTek (571293-000).
- c. One nVent RAYCHEM TraceTek (133332-000) modular leader cable.
- d. Three or more pieces of the same type of sensing cable to be tested. See below for part number choices.

| Sensor Cable Options                  | Part Number |
|---------------------------------------|-------------|
| TT3000: Aqueous Fluid Sensing Cable   | 262789-000  |
| TT5000: Hydrocarbon Sensing Cable     | 743599-000  |
| TT5001: Organic Solvent Sensing Cable | 135133-000  |
| TT7000: Strong Acid Sensing Cable     | P000000820  |

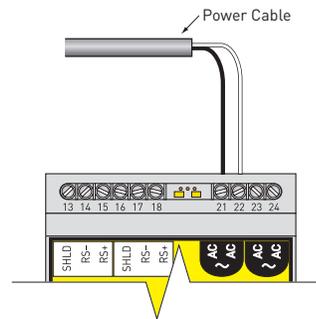
## 2. USER PROVIDED MATERIALS REQUIRED FOR TESTING:

- Kynar (or other Chemical resistant flexible tubing (Kynar recommended)—preferably see thru, one length for each cable being tested, approximately 1.25 cm diameter, and approximately 40 cm long.
- Temperature controlled water bath (recommended, but not required), able to maintain the desired test temperature setpoint. If a water bath is not available, use a tray of appropriate material and volume to contain any spilled chemicals used in test.
- Small screwdriver (to connect Leader Cable wires to TTSIM-1A).
- Digital thermometer (to check water bath or air temperature).
- Fluid to be tested, preferably in small squirt bottle, approximately 50ml.
- Fume hood to protect personnel from exposure to chemical vapors.
- Safety garments (gloves, eye protection, etc) per your organization's guidelines.
- Disposal facilities for used chemicals and sensing cables.
- Electrical power supply appropriate for the TTSIM-1A model.
- Datalogging device (recommended, but not required) to monitor time when Leak Alarm relay turns ON.

## 3. LEAK DETECTION TEST SET UP:

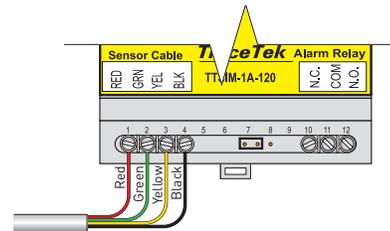
### Step 1: Power Connections

- With power supply OFF, connect power wiring to TTSIM-1A as shown. Only one set of power wire connections are required, at terminal locations 21 and 22. No Communication Cable connections are required for this test.



### Step 2: Leader Cable Connections

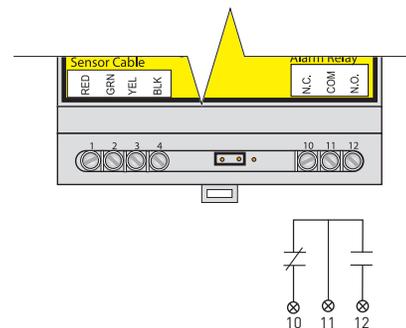
- Attach red/green/yellow/black wire ends of the nVent RAYCHEM TraceTek in front modular Leader Cable to the TTSIM-1A at the proper locations as shown.



### Step 3: Connections for Alarm Relay (if used)

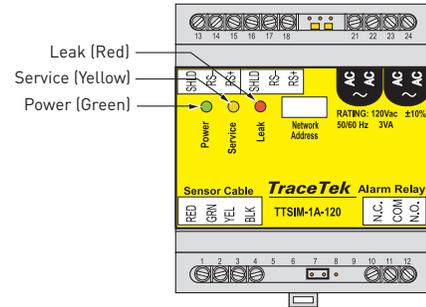
If a data logging device is used to record the leak response time, it can be wired to the internal contactor of the TTSIM-1A. The table below displays the contactor positions under Alarm and No Alarm conditions. Connect the data logger to terminals 10 and 11 or 11 and 12 depending on the input requirements of the data logging equipment.

| Programmed Alarm State | Alarm Condition | Status at Terminals |        |
|------------------------|-----------------|---------------------|--------|
|                        |                 | 10-11               | 11-12  |
| On (default)           | No alarms       | closed              | open   |
|                        | Alarm           | open                | closed |
|                        | Loss of power   | closed              | open   |



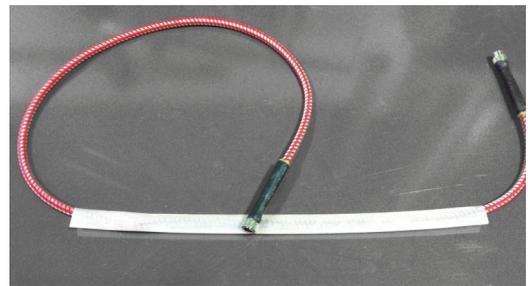
#### Step 4: Verify Successful Power Up

- c. Turn power ON. Verify the TTSIM-1A powers up successfully and the Green Power LED is lit.  
The green Power LED will be ON and blink once every 5 seconds when the TTSIM-1A is powered and functioning correctly.
- d. After several minutes, the Service (Yellow) LED should turn ON.  
This indicates that there is no sensing cable and end termination (nVent RAYCHEM TraceTek in front) connected to the TTSIM-1A.



#### 4. TRACETEK SENSING CABLE SETUP:

- a. Place sensing cable sample inside the chemically resistant flexible tube. See example photo.
- b. Attach the end termination (TT-MET-MC) to the sensing cable.
- c. Connect the female metal connector at the end of the leader cable to the male metal connector on the TraceTek sensing cable.
- d. Verify that the Service (Yellow) LED on the TTSIM-1A turns OFF when the sensor cable is connected to the leader cable.



#### 5. WORKSTATION SETUP:

- a. Apply safety garments/personal protective gear to prevent accidental exposure to chemicals used in the test.
- b. Move the TraceTek System and Sensor Cable inside the fume hood.
- c. Position water bath or container in the fume hood area.

**Note:** If no water bath is used, make sure a tray of appropriate material and volume is present underneath the tubing to contain any spilled chemicals used in testing process. Make sure to create a downward curve in the tubing so that test fluid is kept in contact with sensing cable, and cannot leak out.

- d. Center the tube over the water bath with the sensing cable extending out of the tube. Position the tube center with a downward curve under the water surface at a bend radius of approximately 0.5 meter as shown in the example photo. The tube ends must be positioned above the water surface so no water can leak into, or chemical leak out of, the tube.



- e. Verify fume hood exhaust is working and capable of preventing personnel exposure to chemical vapors.
- f. If you are using a water bath to control temperature for this test, prepare to place the tube with sensing cable in the water bath. No water should get inside the tube to wet the sensing cable, since the tube interior will contain the chemical used to wet the sensing cable.  
Any water inside the tube will cause false leak detection if an nVent RAYCHEM TraceTek cable is being used. If the nVent RAYCHEM TraceTek TT5001 or TT7000 are being tested, water in the tube will not cause a false detection but may affect the results by diluting the test fluid.
- g. Allow approximately 10 minutes for the sensing cable temperature to equilibrate with the water bath temperature. Verify the water bath is at the desired temperature for test.

## 6. RESPONSE TIME TEST:

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- a. Apply personnel safety garments/protective gear to prevent accidental exposure to chemicals.
- b. Squirt ~10ml of test fluid into the open end of the flexible tube, enough to wet 10 to 15 cm of the sensing cable. Make sure the sensing cable and the surrounding test fluid remains positioned below the water surface during the test.
- c. Start your timing equipment (stopwatch, data logger, etc.) to monitor the time required for the sensing cable to trigger a leak alarm on TTSIM-1A.
- d. When the leak alarm is displayed on the red LED, record the elapsed time. The Red LED indicates the cable has reported that a leak exists. This would be the point at which the TraceTek System would create a leak alarm.
- e. Response times can range from several minutes to several hours. Maximum allowable response times need to be defined by what is acceptable in your particular application. Whether any TraceTek cable is suitable is a decision solely made by the user.

## 7. RESPONSE TIME TEST CLEANUP:

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- a. After the test is complete, remove the end termination from the sensing cable. Set the end termination (TT-MET-MC) aside for future use.
- b. Disconnect the sensor cable from the leader cable and set the leader cable aside for future use.
- c. Carefully dispose of the test fluid and the sensing cable per your organization's safety guidelines. Lift the sensor cable and tubing out of the water bath, keeping the tube ends up so that no test fluid spills out the open end. If appropriate, tilt the tubing so that test fluid drains into desired collection vessel. If appropriate, remove the sensing cable from the Kynar tube and dispose of both items properly. Do not reuse any sensing cable, test fluids or tubing.

## 8. REPEAT THIS RESPONSE TIME TEST PROCESS (STEPS 3 TO 8) FOR THE REMAINING SENSING CABLES WITH THE SAME TEST FLUID.

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