

Scope of This Guide

This guide will help you select TraceTek leak detection products for industrial and environmental applications. It covers sensing cables for a variety of liquids:

- aqueous solutions
- liquid fuels and oils
- organic solvents

This guide includes products for applications (such as double-contained piping) that require special fittings and installation tools. The product information complements TraceTek application guides, which provide design information specific to an application.

For water sensing applications in commercial buildings, refer to Selection Guide H53874. You may obtain other Raychem literature from our Fax-on-Demand service at (800) 329-4494.

Modular Design

TraceTek leak detection is a versatile modular system, with interchangeable components that can be configured in many different ways.

TraceTek cables are available in standard lengths that plug together with no special tools, making them easy to install. Cable is also available in bulk for installation in double containment piping, with kits (sold separately) to install connectors on the cable at access points.

The range of TraceTek alarm modules and modular components allows you to tailor the monitoring approach and layout to the application. The modular system design also makes it easy to add to or modify the layout in the future.

Contents of This Guide

This guide is divided into five sections.

- I. Types of Systems** profiles the types of TraceTek monitoring systems available.
- II. Determining the Monitoring Approach** reviews key considerations when defining the scope of leak detection, and helps you decide on a monitoring approach to fit your application.
- III. Elements of a TraceTek System** describes the basic elements of a TraceTek leak detection system and shows typical system configurations.
- IV. Defining a Complete System** outlines the steps to lay out a complete TraceTek leak detection system.
- V. Product Listings** shows the leak detection products available and provides technical and ordering information.

I. Types of Systems

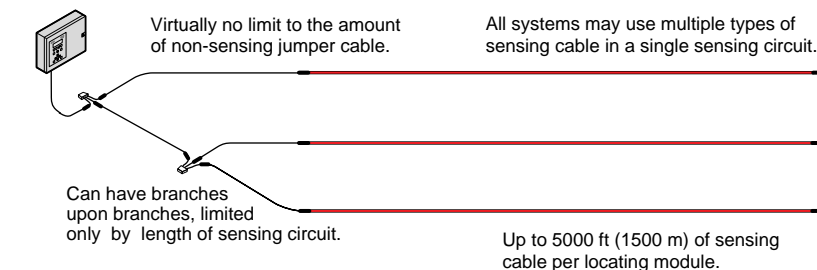
TraceTek leak detection is based on a simple operating principle, which makes several different types of systems possible.

The different types of TraceTek alarm modules all trigger an alarm if liquid contacts sensing cable connected to the module.

However, each type of system has characteristics advantageous for different applications and layouts.

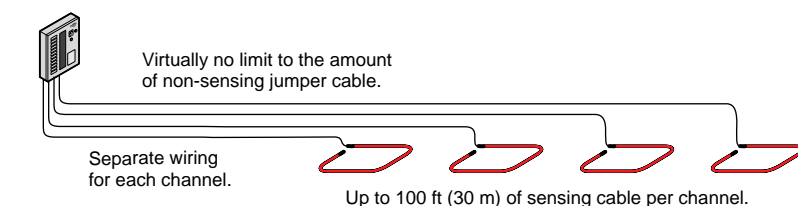
Locating System

- Can monitor one or more large areas or lengths.
- Indicates leak location with its digital display; pinpoints the distance, not just the area.
- Is extremely useful for concealed or inaccessible areas, such as double-contained pipes, covered trenches, and subfloors.
- Integrates separate equipment or areas into a single sensing circuit, thus reducing field-wiring costs significantly.



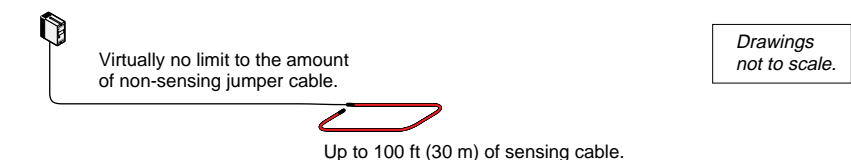
Multiple-Channel Alarm System

- Independently monitors as many as 12 discrete channels; displays status of each channel separately.
- Identifies any channel with a leak, but does not indicate distance to the leak.
- Uses common alarm and relay contacts for all channels.
- Is well suited to tank and sump applications.



Single-Channel Alarm System

- Provides coverage for single small areas.
- Is cost-effective for small installations.
- Provides an independent system for a separate area or operation.
- Is useful for separate alarm annunciation or direct equipment control.



II. Determining the Monitoring Approach

Determining the monitoring approach for leak detection means making three key choices about scope:

- Areas or operations to have separate alarm and/or control
- Types of systems (see Table 1 for details on the different types of TraceTek alarm modules).
- Extent of leak detection coverage

When deciding, consider these important aspects of your application: the geometry, the response required to an alarm, the liquids to be detected, and the risks involved.

Geometry/layout

Application geometry is key in determining the type of alarm module and number of units to use. Aspects of the application layout to consider include size (length or area), separation (the number of separate pipes or areas), and accessibility.

Response

When a leak occurs, consider how your organization must respond. If different groups are responsible for different equipment, systems, or areas, use separate TraceTek alarm modules to make ownership clear.

If you plan to use a TraceTek alarm module for direct equipment control (for example, to close a valve when a leak is detected), select a module with relay logic that will provide the desired operation, and use separate modules to control separate equipment.

Liquids to detect

Different types of TraceTek sensing cables are available to detect different types of liquids, as summarized in Table 2. To select a sensing cable to detect a liquid not mentioned in Table 2 or the product data sheets, call Raychem for assistance. The sensing cables listed are compatible with all of the alarm modules, and multiple types of cables may be used in a single sensing circuit.


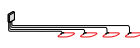

Risks

When deciding on the leak detection coverage for your application, take into account the potential impact of a leak or spill, which could include injury, damage, cleanup costs, downtime, and liability. Also consider the likelihood of leaks or spills, which depends heavily on application specifics, such as the degree of exposure and the nature of the operations (the materials handled, level of activity, maintenance practices).

Hazardous locations

If handling flammables, select TraceTek alarm modules and a system layout that will meet the approval requirements for your hazardous locations.

Table 1. TraceTek Alarm Modules—Summary of Features

Type of System	Locating 	Multiple-channel alarm 	Single-channel alarm 
	TTDM	TTG	TTA-1 TTC-1
Leak detection coverage			
Areas	Number of branches/areas limited only by length of sensing circuit	4 with TTG-4 12 with TTG-12	1 1
Max. sensing cable length	5000 ft (1500 m)	100 ft (30 m) per channel	100 ft (30 m) 100 ft (30 m)
Alarm relays			
Type of Form C relay	DPDT DPDT DPDT	4PDT	4PDT DPDT SPDT
Triggered by	Leak Serv. req'd. Fault	Leak or fault on any channel	Leak or fault Leak Trouble
Communication with host systems	Relays, 4–20 mA analog, and RS-232 or RS-485, Modbus	Relay	Relay Relays
Enclosure rating	NEMA 12	NEMA 13	NEMA 1 NEMA 1
Hazardous location usage*			
Module location	Ordinary areas	Ordinary areas or CID2	Ordinary areas or CID2 Ordinary areas
Sensing cable location	Ordinary areas or CID2. <i>CID1, if protected by approved zener safety barrier.</i>	Ordinary areas, CID2, or CID1	Ordinary areas, CID2, or CID1 Ordinary areas

*See data sheets for details on approvals. CID1 stands for Class I, Division 1, CID2 stands for Class I Division 2 hazardous locations.

Note: For additional information, see page 5 of this guide or refer to the applicable product data sheets for complete detail.

Table 2. TraceTek Sensing Cables

Sensing cable	Liquids detected	Liquids ignored
TT3000	Aqueous solutions and other conductive liquids	Fuels and oils
TT5000	Fuels and oils: gasoline, diesel fuel, jet fuel, heating oil, motor oil, hydraulic fluid, and other hydrocarbons	Water and aqueous solutions
TT5001	Organic solvents: acetone, MEK, NMP, TCA, TCE	Water and aqueous solutions

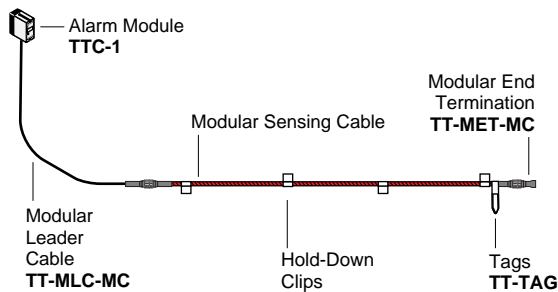
Notes: These sensing cables are compatible with any of the TraceTek alarm modules. Multiple types of cables may be used in a single sensing circuit.

III. Elements of a TraceTek System

A Basic System

Every TraceTek leak detection system has these basic parts:

- An alarm module
- Leader and/or jumper cables (nonsensing cable between module and areas monitored)
- Sensing cable
- End termination
- Accessories such as tags, hold-down clips, and installation tools.



A Locating System

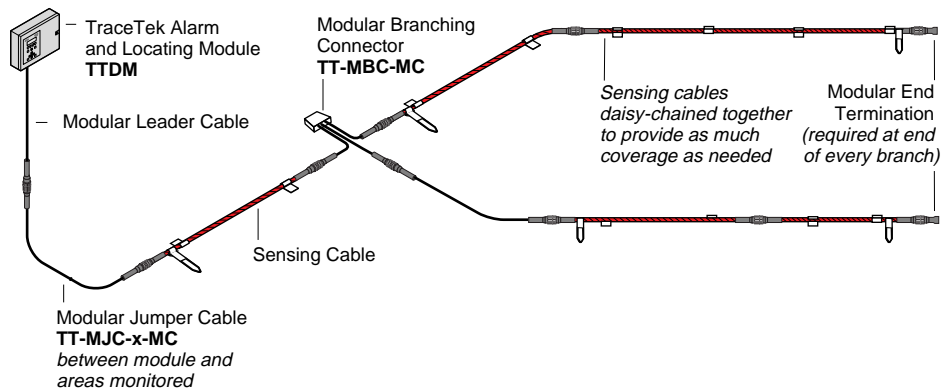
A TraceTek locating system often includes additional circuit components:

- Branching connectors
- Weighted lengths

These components make it possible for a locating system to monitor one or more large areas or lengths.

A locating system has one more essential element:

- A graphic map

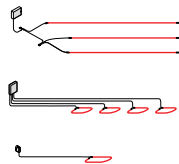


IV. Defining a Complete System

To define a complete TraceTek system, follow the steps below.

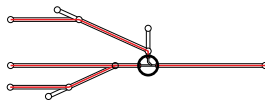
1. Type of module and sensing cable

Determine the type of module and sensing cable(s) as explained in Section II.



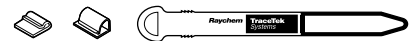
3. Sensing cable layout

Define the sensing cable layout to provide the desired coverage.



6. Accessories

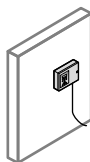
Select the necessary accessories (hold-down clips, tags).



2. Location of module

Decide where the module will be located. Consider:

- Alarm annunciation
- Personnel access
- Proximity to the area monitored
- Environment suitable for the module
- Supply of power
- Connections to host systems



4. Jumper cable arrangement

Determine the means to make connections between sensing cable and alarm module (see Figure 1 on the next page for three possible arrangements).

5. Circuit components

Select circuit components as required by the layout (see Figures 2 and 3). These may include:

- Branching connectors
- Feedthrough fittings
- Jumper cables
- Weighted lengths
- Tank kit

7. Connector kits

For double-contained piping and other applications requiring the use of bulk cable, select connector kits for the cables used (see Figure 4).

8. Tools

Select tools for installation and testing. Tools are required for installation of connector kits and for installation in double-contained piping (see Figures 5 and 6).

Figure 1. Jumper Cable Arrangements

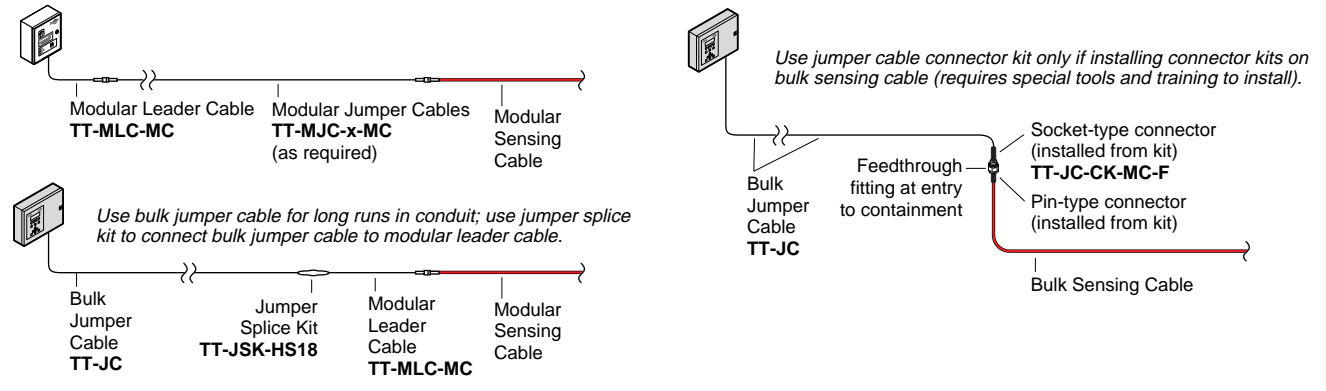


Figure 2. Circuit Components—branches and feedthroughs

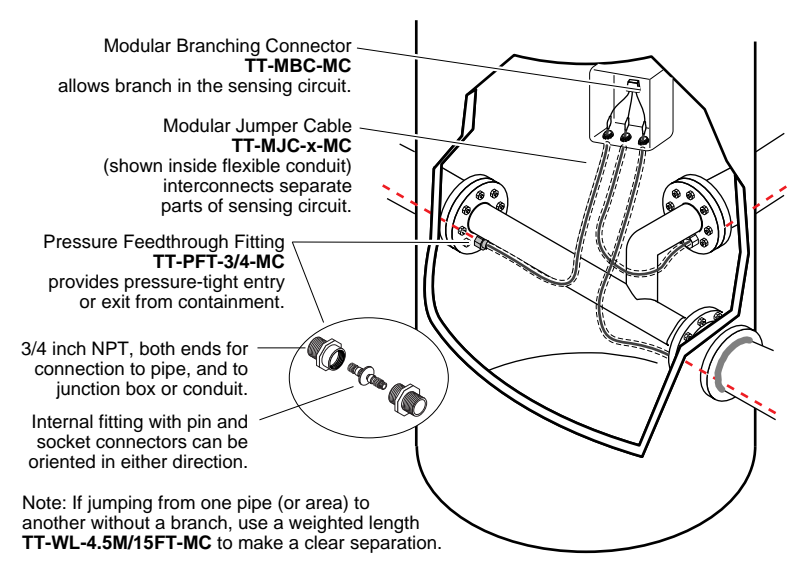


Figure 3. Circuit Components—tank kit

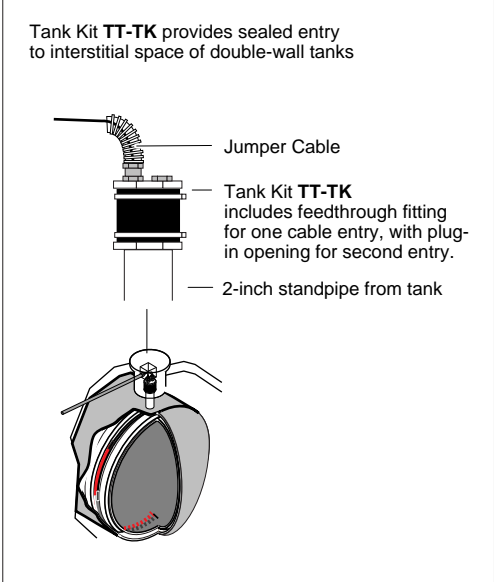


Figure 4. Connector Kits

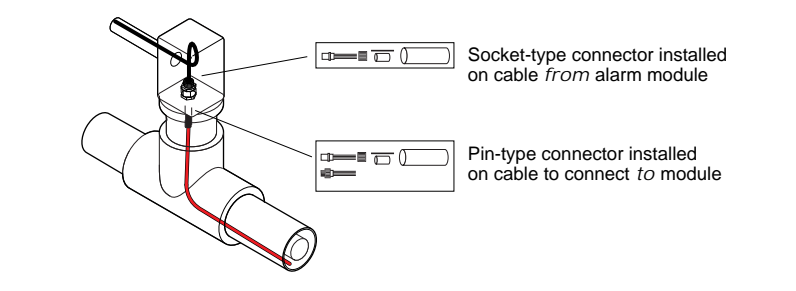


Figure 5. Tools for Connector Kits

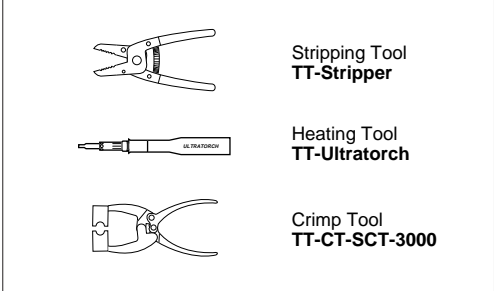
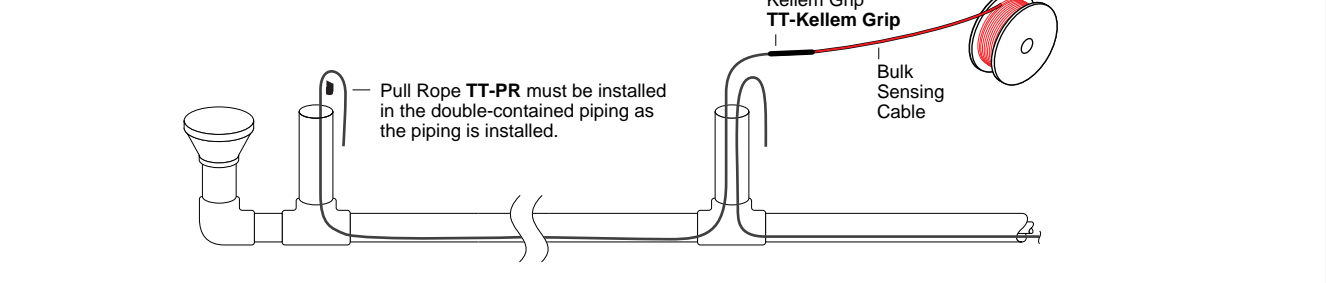
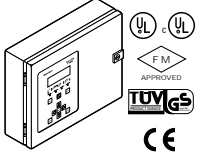
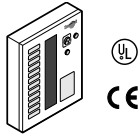

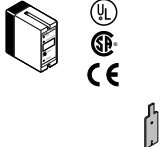



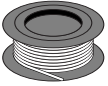



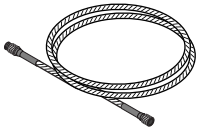


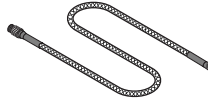
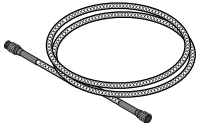

Figure 6. Installation in Double-Contained Piping











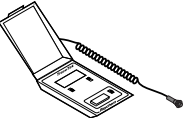


V. TraceTek Products for Industrial and Environmental Applications

Product	Catalog No.	Selection	Description
Alarm Modules			
TTDM Alarm and Locating Module 	TTDM-1 TTDM-2 TTDM-24	115 Vac supply 230 Vac supply 24 V supply <i>For details on approvals see data sheet.</i>	Alarm and locating module; indicates liquid location with digital display. Monitors up to 5000 ft (1500 m) of sensing cable. Metal enclosure, NEMA 12. Data logging. Outputs: Audible alarm, 4 LEDs, backlit LCD 3 DPDT Form C relays (leak, service, and fault) 4–20 mA analog output Serial port configurable for RS-232 or RS-485
TTG Alarm Module 	TTG-4 TTG-12	with 4 channels with 12 channels (115 or 240 Vac supply for both models)	Nonlocating multiple-channel alarm module. Monitors up to 100 ft (30 m) of sensing cable per channel. Metal enclosure, NEMA 13. Outputs: Audible alarm, 3 LEDs per channel 4PDT Form C relay (leak or fault in any channel)
TTA Alarm Module 	TTA-1	115 or 240 Vac supply	Nonlocating single-channel alarm module. Monitors up to 100 ft (30 m) of sensing cable. Metal enclosure, NEMA 1. Outputs: Audible alarm, 3 LEDs 4PDT Form C relay (leak or fault)
TTC Alarm Module 	TTC-1 TT-DRC	24 V supply Din Rail Clip	Nonlocating single-channel alarm module. Monitors up to 100 ft (30 m) of sensing cable. Plastic enclosure, NEMA 1. Outputs: 3 LEDs DPDT Form C relay (leak) SPDT Form C relay (fault) Mounting clip for attachment to DIN rail in electrical panel.
External or Remote Alarm 	TTE-XAL	External Audible Alarm	95 dB alarm triggered by relay closure; requires 24 V supply.
Jumper Cables			
Modular Leader Cable 	TT-MLC-MC	Modular Leader Cable (with metal connector) Length: 12 ft (3.5 m)	Cable with one end prepared for connection to terminals in module (or for splicing to bulk jumper cable), and with socket-type metal connector at other end. Includes connector oversleeve.
Modular Jumper Cable 	TT-MJC-x-MC TT-MJC-1M/3FT-MC TT-MJC-3M/10FT-MC TT-MJC-7.5M/25FT-MC TT-MJC-15M/50FT-MC TT-MJC-30M/100FT-MC	Modular Jumper Cable 1 m 3 ft 3 m 10 ft 7.5 m 25 ft 15 m 50 ft 30 m 100 ft	Jumper cable in modular lengths with pin-type metal connector at one end, socket-type metal connector at other end. Includes connector oversleeve (heat-shrinkable tube) to protect connector after installation.
Bulk Jumper Cable 	TT-JC-76M/250FT TT-JC	250 ft reel Reel: 1000 ft min. 2000 ft max.	Jumper cable in bulk on reel. Cable has four color-coded 18 AWG conductors. Connectors not included.
Jumper Splice Kit 	TT-JSK-HS18	Jumper Splice Kit	Splice kit for jumper cable; contains parts for 5 splices. Includes 20 crimps and 5 heat-shrinkable tubes. For use with 18 AWG jumper wire.

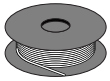
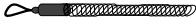
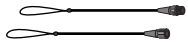

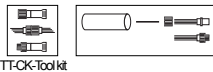
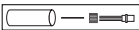

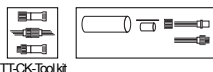

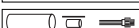

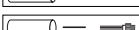




TraceTek Products for Industrial and Environmental Applications

Product	Catalog No.	Selection	Description
Sensing Cables			
For conductive liquids			
TT3000 Modular Sensing Cable 	TT3000-x-MC	Modular Sensing Cable	TT3000 sensing cable for conductive liquids in modular lengths with pin-type metal connector at one end, and socket-type metal connector at other end. Includes connector oversleeve (heat-shrinkable tube) to protect connector after installation.
	TT3000-0.3M/1FT-MC	0.3 m 1 ft	
	TT3000-1.5M/5FT-MC	1.5 m 5 ft	
	TT3000-3M/10FT-MC	3 m 10 ft	
	TT3000-4.5M/15FT-MC	4.5 m 15 ft	
	TT3000-7.5M/25FT-MC	7.5 m 25 ft	
	TT3000-15M/50FT-MC	15 m 50 ft	
TT3000 Sensing Cable with End Termination 	TT3000-1.5M/5FT-HSE-MC	Terminated Sensing Cable Cable length: 5 ft (1.5 m)	TT3000 sensing cable for conductive liquids in fixed length with pin-type metal connector at one end; includes connector oversleeve. Factory-installed heat-shrink end termination. Note: Cannot add to system at end of cable.
	TT3000-SC	Bulk Sensing Cable Cable length per reel: 250 ft (75 m) min. 1000 ft (300 m) max.	TT3000 sensing cable for conductive liquids Sensing cable in bulk on reel, connectors not included. <i>Connector kits are required and must be purchased separately.</i>
For liquid hydrocarbons			
TT5000 Modular Sensing Cable 	TT5000-x-MC	Modular Sensing Cable	TT5000 hydrocarbon sensing cable in modular lengths with pin-type metal connector at one end, socket-type metal connector at other end. Includes connector oversleeve (heat-shrinkable tube) to protect connector after installation.
	TT5000-0.3M/1FT-MC	0.3 m 1 ft	
	TT5000-1.5M/5FT-MC	1.5 m 5 ft	
	TT5000-3M/10FT-MC	3 m 10 ft	
	TT5000-4.5M/15FT-MC	4.5 m 15 ft	
	TT5000-7.5M/25FT-MC	7.5 m 25 ft	
	TT5000-15M/50FT-MC	15 m 50 ft	
TT5000 Sensing Cable with End Termination 	TT5000-1.5M/5FT-HSE-MC	Terminated Sensing Cable Cable length: 5 ft (1.5 m)	TT5000 hydrocarbon sensing cable in fixed length with pin-type metal connector at one end; includes connector oversleeve. Factory-installed heat-shrink end termination. Note: Cannot add to system at end of cable
	TT5000-SC	Bulk Sensing Cable Cable length per reel: 100 ft (30 m) min. 425 ft (130 m) max.	TT5000 hydrocarbon sensing cable in bulk on reel. Includes package of four bulk cable sealer tubes to seal end of cable before installation. <i>Connector kits are required and must be purchased separately.</i>
For organic solvents			
TT5001 Modular Sensing Cable 	TT5001-x-MC	Modular Sensing Cable	TT5001 sensing cable for organic solvents in modular lengths with pin-type metal connector at one end, and socket-type metal connector at other end. Includes connector oversleeve (heat-shrinkable tube) to protect connector after installation.
	TT5001-0.3M/1FT-MC	0.3 m 1 ft	
	TT5001-1.5M/5FT-MC	1.5 m 5 ft	
	TT5001-3M/10FT-MC	3 m 10 ft	
	TT5001-7.5M/25FT-MC	7.5 m 25 ft	
	TT5001-15M/50FT-MC	15 m 50 ft	
TT5001 Sensing Cable with End Termination 	TT5001-1.5M/5FT-HSE-MC	Terminated Sensing Cable Cable length: 5 ft (1.5 m)	TT5001 sensing cable for organic solvents in fixed length with pin-type metal connector at one end; includes connector oversleeve. Factory-installed heat-shrink end termination. Note: Cannot add to system at end of cable.

TraceTek Products for Industrial and Environmental Applications

Product	Catalog No.	Selection	Description
TraceTek Components			
End Termination 	TT-MET-MC	Modular End Termination (with metal connector)	Terminates sensing circuit; has pin-type metal connector. Required at end of sensing circuit and ends of all branches.
Branching Connector 	TT-MBC-MC	Modular Branching Connector (with metal connectors)	Allows a "T" or branch in the sensing circuit. Has pin-type connector to connect to cable from alarm module, two socket-type connectors to connect branches. Wires the branches in series and adds a simulated length of 15 ft on each branch to make clear division between areas.
Weighted Length 	TT-WL-4.5M/15FT-MC	Weighted Length (with plastic connectors)	Simulates 15 ft (4.5 m) of sensing cable. Makes a clear division between separate areas in a locating system.
Pressure Feedthrough 	TT-PFT-3/4-MC TT-PFT-3/4-SS/MC	Brass fittings Stainless steel fittings	Provides pressure-tight entry to containment; 3/4-inch NPT both ends; rated for 150 psi (10 bar) at room temperature. Has pin and socket connectors to connect TraceTek cables.
Tank Kit 	TT-TK	Tank Kit	For entry to interstitial space of double-wall tanks with 2-inch NPT fitting. Provides sealed entry for connections to sensing cables. Kit includes one TT-PFT-3/4-MC and one 3/4-inch PVC plug; for second entry, order a second TT-PFT-3/4-MC (not included in kit).
Accessories			
Hold-Down Clips 	TT-HDC-1/4/200-N/A TT-HDC-1/4	No adhesive (200/bag) Adhesive-backed (50/bag)	Hold-down clips to attach TT3000 sensing cable to flat surfaces. Pressure sensitive adhesive bonds to clean surfaces. <i>Use a clip for each 4 ft (1.3 m) of sensing cable.</i>
	TT-HDC-1/2-NA-50	No adhesive (50/bag)	Hold-down clips to attach TT5000 series sensing cables to flat surfaces.
Tags 	TT-TAG	TraceTek Tags (50/bag)	High-visibility yellow tags to identify TraceTek sensing cable and record mapped distance. Package contains a permanent marker. Tag attaches to sensing cable by closing on itself (like a cable tie). <i>Use a tag on each length of cable and at mapping points.</i>
Connector Protection 	TT-COS	Connector Oversleeve (10/bag)	Heat-shrinkable tubing to cover metal connectors after installation. Note: all TraceTek products with metal connectors include a heat-shrinkable tube for each connector; TT-COS makes extra connector oversleeves available for maintenance and other purposes.
Tools			
Portable Test Box 	TT-PTB-1000	Portable Test Box	Battery-operated device to test TraceTek sensing cables. Allows testing of an individual length or up to 2000 ft (or 1000 m) of sensing cable. Useful for installation and maintenance of extensive systems. PTB has plastic socket connector on flexible cord. Test box kit includes adaptors (plastic-to-metal and plastic-to-alligator clip) and modular end terminations.
Adaptor 	TT-Adaptor-Kit	Adaptor Kit	Optional kit useful for testing systems with metal connectors. Includes several adaptors with metal connectors: Y adaptor, socket-to-socket adaptor, pin-to-pin adaptor, and end termination with socket connector.
	TT-Adaptor-Y	Y Adaptor	Adaptor for connecting PTB to metal connectors; has both pin-type and socket-type metal connectors.
Crimp Tool 	AD-1522-1	Crimp Tool	Tool sized to properly crimp connectors in TT-JSK-HS18 jumper splice kit

TraceTek Products for Industrial and Environmental Applications

Product	Catalog No.	Selection	Description
Tools for Installation in DC Piping			
Pull Rope 	TT-PR	Must be installed in double-containment piping as that piping is installed. Pull Rope Length: 500 ft (150 m)	Pull rope for installation of sensing cable in double containment piping. 1/4-inch polypropylene rope is optimum size for strength and profile. Hollow braid facilitates low-profile eye splice.
For Bulk Cables 	TT-Kellem Grip	Kellem Grip	For installation of bulk sensing cable. Braided mesh grips sensing cable; pull rope attaches to metal loop.
For Modular Cable 	TT-CPT	Cable Pulling Tools	For installation of modular sensing cables in double-containment piping. Attaches to metal connector on TraceTek sensing cable. Set of two tools: one for pin-type, one for socket-type connector.
Sealer for End of Bulk Cable 	TT-BCS	Bulk Cable Sealer (4/bag)	Heat-shrinkable tubes to seal end of TT5000 bulk cable before installation in double-containment piping. Note: A TT-BCS is included with each bulk reel of TT5000 sensing cable.
Connector Kits for Bulk Cable			
		<i>Person installing connector kits must be trained by factory representative.</i>	
Kits for TT3000 Bulk Sensing Cable 	TT3000-CK-MC-M/F	Kit for 5 mated pairs	Kit to install metal connectors on TT3000 bulk sensing cable. Contains parts for five mated pairs of connectors; includes TT-CK-Tool Kit. <i>Requires TT-CT-SCT-3000 crimp tool.</i> Kits to install one metal connector on TT3000 sensing cable; require TT-CK-Tool Kit and TT-CT-SCT-3000 crimp tool.
	TT3000-CK-MC-M	Kit for 1 pin-type	
	TT3000-CK-MC-F	Kit for 1 socket-type	
Kits for TT5000 Bulk Sensing Cable 	TT5000-CK-MC-M/F	Kit for 5 mated pairs	Kit to install metal connectors on TT5000 bulk sensing cable. Contains parts for five mated pairs of connectors; includes TT-CK-Tool Kit. Kits to install one metal connector on TT5000 sensing cable; require TT-CK-Tool Kit.
	TT5000-CK-MC-M	Kit for 1 pin-type	
	TT5000-CK-MC-F	Kit for 1 socket-type	
Kits for Bulk Jumper Cable 	TT-JC-CK-MC-M	Kit for 1 pin-type	Kits to install one metal connector on bulk jumper cable; require TT-CK-Tool Kit and TT-CT-SCT-3000 crimp tool.
	TT-JC-CK-MC-F	Kit for 1 socket-type	
Tools for Installation of Connector Kits			
Stripping Tool 	TT-Stripper	Greenlee Stripper #1917	Strips wires from 16 AWG to 26 AWG, as required for connector kits for TT3000 and TT5000 bulk sensing cables.
Crimp Tool 	TT-CT-SCT-3000	Crimp Tool for SCT tubing	Ensures SCT tubing bonds to cable. Required for all TT3000 and TT-JC connector kits.
Heating Tool 	TT-Ultratorch	Ultratorch	Ultratorch 200 flameless heating tool; operates on butane gas. Useful with all connector kits.
Connector Tool Kit 	TT-CK-Tool Kit	Connector Tool Kit	Tool kit for use with single connector kits. Contains tools required for testing completed connectors: TT-FET-MC and TT-MET-MC end terminations, as well as pin and socket test tools.



The TraceTek Products Group is part of the Raychem Chemelex Division. The Chemelex Division is ISO 9001 certified.

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