

## Series LFII Residential Sprinklers Flat-Plate Concealed Pendent 4.9 K-Factor

### General Description

The TYCO RAPID RESPONSE Series LFII Residential Flat-Plate Concealed Pendent Sprinklers (TY2524) are decorative, fast response, fusible solder sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels.

The Cover Plate/Retainer Assembly conceals the sprinkler operating components above the ceiling. The flat profile of the Cover Plate provides the optimum aesthetically appealing sprinkler design. Additionally, the concealed design of the Series LFII Residential Flat-Plate Concealed Pendent Sprinklers provides 1/2 inch (12,8 mm) vertical adjustment. This adjustment provides a measure of flexibility when cutting fixed sprinkler drops.

The Series LFII Residential Flat-Plate Concealed Pendent Sprinklers are intended for use in the following systems:

- wet and dry pipe residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D
- wet and dry pipe residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R
- wet and dry pipe sprinkler systems for the residential portions of any occupancy per NFPA 13.

#### IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

Historically, residential sprinklers, based on their Listing, have been limited to wet pipe sprinkler systems to assure speed of water delivery for a given prescribed design area (number of design sprinklers).

The Listing for the Series LFII Residential Flat-Plate Concealed Pendent Sprinkler now offers the laboratory approved option of designing dry pipe residential sprinkler systems.

For dry systems, as described in U.S. Patent 7,712,543, through extensive testing it has been determined that the number of design sprinklers (hydraulic design area) for the Series LFII Residential Flat-Plate Concealed Sprinklers (TY2524) need not be increased over the number of design sprinklers (hydraulic design area) specified for wet pipe sprinkler systems, as is customary for density/area sprinkler systems designed per NFPA 13, 13D, or 13R.

Consequently, the Series LFII Residential Flat-Plate Concealed Sprinklers (TY2524) offer the features of non-water filled pipe in addition to not having to increase the number of design sprinklers (hydraulic design area) for systems designed to NFPA 13, 13D, or 13R. Non-water filled pipe will permit options for areas sensitive to freezing.

The Series LFII Residential Flat-Plate Concealed Pendent Sprinkler has a 4.9 (70,6) K-factor that provides the required residential flow rates at reduced pressures, enabling smaller pipe sizes and water supply requirements.

This sprinkler has been designed with heat sensitivity and water distribution characteristics proven to help in the control of residential fires and to improve the chance for occupants to escape or be evacuated.

The Series LFII Residential Flat-Plate Concealed Pendent Sprinklers are shipped with a Disposable Protective Cap. The Protective Cap protects the sprinkler during ceiling installation or finish. After ceiling installation is complete, the Protective Cap is removed



and the Cover Plate/Retainer Assembly is installed. Removing the Protective Cap is required for proper sprinkler performance.

#### NOTICE

The Series LFII Residential Flat-Plate Concealed Pendent Sprinklers (TY2524) described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

Owners are responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

### Model/Sprinkler Identification Number (SIN)

TY2524

Maximum Coverage Area <sup>(a)</sup> Ft. x Ft. (m x m)	Maximum Spacing Ft. (m)	WET PIPE SYSTEM <sup>(b)</sup> Minimum Flow and Residual Pressure		
		Horizontal Ceiling <sup>(c, d, e)</sup> (Maximum 2-inch rise for 12-inch run)	Sloped Ceiling <sup>(c, d, e)</sup> (Greater than 2-inch rise up to maximum 4-inch rise for 12-inch run)	Sloped Ceiling <sup>(c, d, e)</sup> (Greater than 4-inch rise up to maximum 8-inch rise for 12-inch run)
		160°F (71°C) Sprinkler	160°F (71°C) Sprinkler	160°F (71°C) Sprinkler
12 x 12 (3,7 x 3,7)	12 (3,7)	13 GPM (49,2 LPM) 7.0 psi (0,48 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)
14 x 14 (4,3 x 4,3)	14 (4,3)	13 GPM (49,2 LPM) 7.0 psi (0,48 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)
16 x 16 (4,9 x 4,9)	16 (4,9)	13 GPM (49,2 LPM) 7.0 psi (0,48 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)
18 x 18 (5,5 x 5,5)	18 (5,5)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)	22 GPM (83,3 LPM) 20.2 psi (1,39 bar)	22 GPM (83,3 LPM) 20.2 psi (1,39 bar)
20 x 20 (6,1 x 6,1)	20 (6,1)	20 GPM (75,7 LPM) 16.7 psi (1,15 bar)	24 GPM (90,8 LPM) 24.0 psi (1,65 bar)	24 GPM (90,8 LPM) 24.0 psi (1,65 bar)

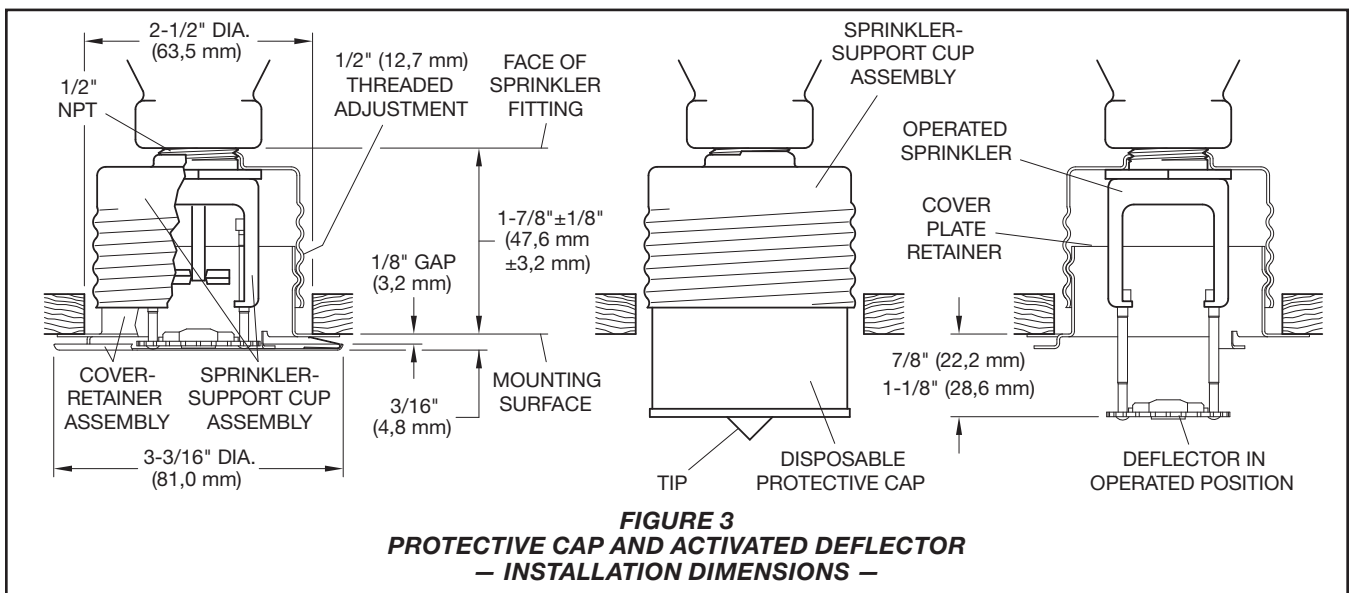
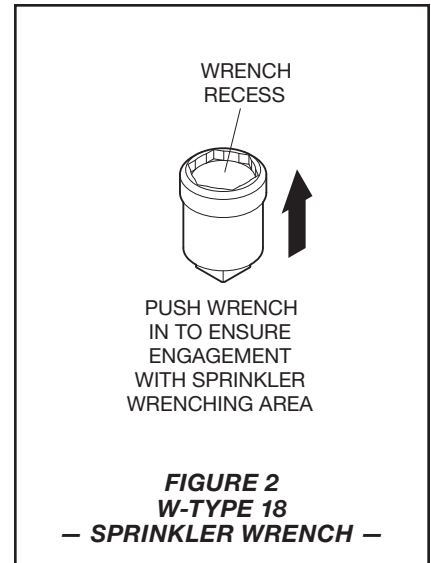
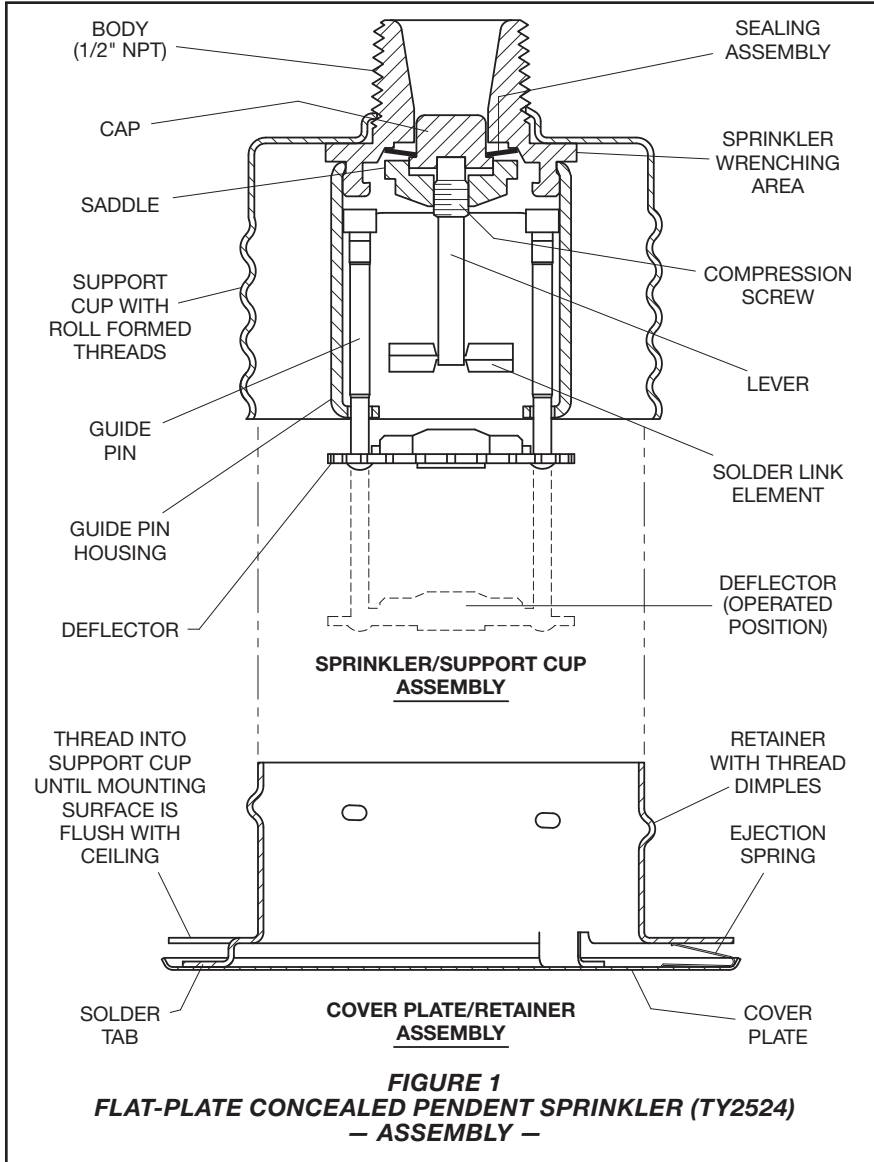
- (a) For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which Hydraulic Design section under the Design Criteria are stated.
- (b) The Minimum Flow requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to "Hydraulic Design" in the Design Criteria section for details.
- (c) For NFPA 13D 2010 applications, Horizontal Ceiling criteria shall be used for certain sloped ceiling configurations up to 8:12 pitch. Refer to TIA 1028R for allowed sloped ceiling limitations when using horizontal ceiling criteria.
- (d) For NFPA 13R applications, Horizontal Ceiling criteria may be used for sloped ceiling configurations up to 8:12 pitch when acceptable to the Local Authority Having Jurisdiction.
- (e) For NFPA 13 residential applications, the greater of 0.1 GPM/Ft.<sup>2</sup> over the design area or the flow in accordance with the criteria in Table A must be used.

**TABLE A**  
**SERIES LFII RESIDENTIAL FLAT-PLATE CONCEALED PENDENT SPRINKLER (TY2524)**  
**NFPA 13, 13D AND 13R HYDRAULIC DESIGN CRITERIA**  
**– WET PIPE SYSTEMS –**

Maximum Coverage Area <sup>(a)</sup> Ft. x Ft. (m x m)	Maximum Spacing Ft. (m)	DRY PIPE SYSTEM <sup>(b)</sup> Minimum Flow and Residual Pressure	
		Horizontal Ceiling Minimum Flow and Residual Pressure <sup>(c)</sup> (Maximum 2-Inch Rise for 12-Inch Run)	
		160°F (71°C) Sprinkler	
12 x 12 (3,7 x 3,7)	12 (3,7)	15 GPM (56,8 LPM) 9.4 psi (0,65 bar)	
14 x 14 (4,3 x 4,3)	14 (4,3)	15 GPM (56,8 LPM) 9.4 psi (0,65 bar)	
16 x 16 (4,9 x 4,9)	16 (4,9)	16 GPM (60,6 LPM) 10,7 psi (0,74 bar)	
18 x 18 (5,5 x 5,5)	18 (5,5)	17 GPM (64,3 LPM) 12.0 psi (0,83 bar)	
20 x 20 (6,1 x 6,1)	20 (6,1)	21 GPM (79,5 LPM) 18,4 psi (1,27 bar)	

- (a) For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which Hydraulic Design section under the Design Criteria are stated.
- (b) The Minimum Flow requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to "Hydraulic Design" in the Design Criteria section for details.
- (c) For NFPA 13D 2010 applications, Horizontal Ceiling criteria shall be used for certain sloped ceiling configurations up to 8:12 pitch. Refer to TIA 1028R for allowed sloped ceiling limitations when using horizontal ceiling criteria.

**TABLE B**  
**SERIES LFII RESIDENTIAL FLAT-PLATE CONCEALED PENDENT SPRINKLER (TY2524)**  
**NFPA 13D AND NFPA 13R HYDRAULIC DESIGN CRITERIA**  
**– DRY PIPE SYSTEMS –**



## Technical Data

### Approvals

UL and C-UL Listed  
NSF-61 Certified

The Series LFII Residential Flat-Plate Concealed Pendent Sprinklers are only listed with the Series LFII Concealed Cover Plates having a factory-applied finish.

### Maximum Working Pressure

175 psi (12,1 bar)

### Discharge Coefficient

$K=4.9 \text{ GPM/psi}^{1/2}$  (70,6 LPM/bar<sup>1/2</sup>)

### Temperature Rating

Sprinkler: 160°F (71°C)  
Cover Plate: 139°F (59°C)

### Vertical Adjustment

1/2 inch (12,7 mm)

### Finishes

Refer to the Ordering Procedure section.

### Physical Characteristics

- Cover Plate/Retainer Assembly:  
Cover Plate . . . . . Copper  
Ejection Spring . . . . . Stainless Steel  
Retainer . . . . . Brass
- Sprinkler/Support Cup Assembly:  
Body . . . . . Brass  
Cap . . . . . Bronze  
Saddle . . . . . Brass  
Sealing Assembly . . . . . Beryllium  
Nickel w/ Teflon<sup>1</sup>  
Soldered Link Halves . . . . . Nickel  
Lever . . . . . Bronze  
Compression Screw . . . . . Brass  
Deflector . . . . . Bronze  
Guide Pin Housing. . . . . Bronze  
Guide Pins . . . . . Bronze  
Support Cup . . . . . Steel

## Operation

When exposed to heat from a fire, the Cover Plate, which is normally soldered to the Retainer at three points, falls away to expose the Sprinkler/Support Cup Assembly. At this point, the Deflector, supported by the Guide Pins, drops down to its operated position.

The Solder Link Element of the Sprinkler/Support Cup Assembly is comprised of two link halves that are soldered together with a thin layer of solder. When the rated temperature is reached, the solder melts and the two link halves separate, allowing the sprinkler to activate and flow water.

## Design Criteria

The TYCO RAPID RESPONSE Series LFII Residential Flat-Plate Concealed Pendent Sprinklers (TY2524) are UL and C-UL Listed for installation in accordance with the following criteria.

### NOTICE

*When conditions exist that are outside the scope of the provided criteria, refer to the Residential Sprinkler Design Guide TFP490 for the manufacturer's recommendations that may be acceptable to the Authority Having Jurisdiction.*

*The Series LFII Residential Flat-Plate Concealed Pendent Sprinklers must not be used in applications where the air pressure above the ceiling is greater than that below. Down drafts through the Support Cup can delay sprinkler operation in a fire situation.*

### System Type

Per the UL Listing, wet pipe and dry pipe systems may be utilized. Per the C-UL Listing, only wet pipe systems may be utilized.

- For dry systems not using CPVC, corrosion-resistant or internally galvanized pipe shall be utilized with the sprinklers described in this data sheet
- For dry systems, pendent sprinklers shall be installed on return bends, where the sprinklers, return bends, and branch line piping (that is, potential areas for trapped water) are in areas at or above 40°F (4°C)

Refer to technical data sheet TFP485 about the use of Residential Sprinklers in residential dry pipe systems.

### NOTICE

*When corrosion-resistant or internally galvanized pipe and fittings with a potable water supply are utilized, return bends need not be installed. However, any portion of the piping that has the potential to trap water must be maintained at or above 40°F (4°C) unless provision to drain such areas is provided and maintained dry.*

### Water Delivery

When using the Series LFII Residential Flat-Plate Concealed Pendent Sprinklers (TY2524) in dry pipe sprinkler systems, the requirements for "Dry System Water Delivery" per Section 8.3.4.3 of the 2010 edition of NFPA 13D apply. For a residential hazard, in no case shall the time of water delivery exceed 15 seconds for the most remote operating sprinkler.

### Hydraulic Design (NFPA 13D and 13R)

The minimum required sprinkler flow rate for systems designed to NFPA 13D or NFPA 13R are given in Tables A and B as a function of temperature rating and the maximum allowable coverage areas. The sprinkler flow rate is the minimum required discharge from each of the total number of "design sprinklers" as specified in NFPA 13D or NFPA 13R.

### NOTICE

*The number of "design sprinklers" specified in NFPA 13D and 13R for wet pipe systems is to be applied when designing dry pipe systems. There is no need to increase the design area, as is the case for density/area systems, in accordance with U.S. Patent 7,712,543. Refer to technical data sheet TFP485 for details.*

### Hydraulic Design (NFPA 13)

For systems designed to NFPA 13, the number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in Tables A and B for NFPA 13D and 13R as a function of temperature rating and the maximum allowable coverage area.
- A minimum discharge of 0.1 GPM/sq. ft. over the "design area" comprised of the four most hydraulically demanding sprinklers for the actual coverage areas being protected by the four sprinklers.

### NOTICE

*The number of "design sprinklers" specified in NFPA 13 for wet pipe systems is to be applied when designing dry pipe systems. There is no need to increase the design area, as is the case for density/area systems, in accordance with U.S. Patent 7,712,543. Refer to technical data sheet TFP485 for details.*

### Obstruction to Water Distribution.

Sprinklers are to be located in accordance with the obstruction rules of NFPA 13D, 13R, and 13 as applicable for residential sprinklers as well as with the obstruction criteria described within the TYCO technical data sheet TFP490.

### Operational Sensitivity

Install sprinklers relative to the ceiling mounting surface as shown in Figure 3.

<sup>1</sup> Registered trademark of DuPont



## Sprinkler Spacing

The minimum spacing between sprinklers is 8 feet (2,4 m).

The maximum spacing between sprinklers cannot exceed the length of the coverage area (Table A) being hydraulically calculated; for example, a maximum of 12 feet for a 12 ft. x 12 ft. coverage area or 20 feet for a 20 ft. x 20 ft. coverage area.

## Installation

The TYCO RAPID RESPONSE Series LFII Residential Flat-Plate Concealed Pendent Sprinklers must be installed in accordance with the following instructions.

### NOTICE

*Damage to the Solder Link Element during installation can be avoided by handling the sprinkler by the Support Cup only; that is, do not apply pressure to the Solder Link Element (Figure 1).*

*Obtain a leak-tight 1/2 inch NPT sprinkler joint by applying a minimum-to-maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque can distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.*

*Do not attempt to compensate for insufficient adjustment in the Cover Plate/Retainer Assembly by under- or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.*

1. Install pendent sprinklers in the pendent position, with the centerline of the sprinkler perpendicular to the mounting surface.
2. Remove the Protective Cap.
3. With pipe-thread sealant applied to the pipe threads, and using the W-Type 18 Wrench shown in Figure 2, install and tighten the Sprinkler/Support Cup Assembly into the fitting. The W-Type 18 Wrench accepts a 1/2 inch ratchet drive.
4. Replace the Protective Cap by pushing it upwards until it bottoms out against the Support Cup. The Protective Cap helps prevent damage to the Deflector and Guide Pins during ceiling installation and/or during application of the finish coating of the ceiling.

### NOTICE

*As long as the protective Cap remains in place, the system is considered "Out Of Service".*

5. After the ceiling has been completed with the 2-1/2 inch (63 mm) diameter hole and in preparation for installing the Cover Plate/Retainer Assembly, remove and discard the Protective Cap, and verify that the Deflector moves up and down freely.

If the Sprinkler has been damaged and the Deflector does not move up and down freely, replace the entire Sprinkler assembly. Do not attempt to modify or repair a damaged sprinkler.

6. Screw on the Cover Plate/Retainer Assembly until its flange contacts the ceiling.

Do not continue to screw on the Cover Plate/Retainer Assembly such that it lifts a ceiling panel out of its normal position.

If the Cover Plate/Retainer Assembly cannot be engaged with the Mounting Cup or the Cover Plate/Retainer Assembly cannot be engaged sufficiently to contact the ceiling, the Sprinkler Fitting must be repositioned.

## Care and Maintenance

The TYCO RAPID RESPONSE Series LFII Residential Flat-Plate Concealed Pendent Sprinkler (TY2524) must be maintained and serviced in accordance with the following instructions.

### NOTICE

*Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection system from the proper authorities and notify all personnel who may be affected by this action.*

When properly installed, there is a nominal 1/8 inch (3,2 mm) air gap between the lip of the Cover Plate and the ceiling, as shown in Figure 3. This air gap is necessary for proper operation of the sprinkler by allowing heat flow from a fire to pass below and above the Cover Plate to help assure appropriate release of the Cover Plate in a fire situation. If the ceiling needs repainting after sprinkler installation, exercise care to ensure that the new paint does NOT seal off any of the air gap. Failure to do so may impair sprinkler operation.

Absence of a Cover Plate can delay the sprinkler operation in a fire situation.

Do not pull the Cover Plate relative to the Retainer. Separation may result.

Exercise care to avoid damage to sprinklers before, during, and after installation. Never paint, plate, coat, or otherwise alter automatic sprinklers after they leave the factory.

Never repaint factory-painted Cover Plates. When necessary, replace cover plates with factory-painted units. Non-factory applied paint can adversely delay or prevent sprinkler operation in the event of a fire and is not permitted by NFPA.

Replace sprinklers that:

- were damaged by dropping, striking, wrench twisting, wrench slippage, or the like.
- were modified or over-heated.
- are leaking or exhibiting visible signs of corrosion.

Responsibility lies with owners for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (for example, NFPA 25), in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or sprinkler manufacturer regarding any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

## Limited Warranty

Products manufactured by Tyco Fire Suppression & Building Products (TFSBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFSBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFSBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFSBP to be defective shall be either repaired or replaced, at TFSBP's sole option. TFSBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFSBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFSBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFSBP was informed about the possibility of such damages, and in no event shall TFSBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

## Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product description and Part Number (P/N).

**Sprinkler/Support Cup Assembly**  
Specify Series LFI Residential Flat-Plate Concealed Pendent Sprinkler (TY2524), K=4.9 (70,6), without Cover Plate/Retainer Assembly, P/N 51-114-1-160.

**Cover Plate/Retainer Assembly**  
Specify Cover Plate/Retainer Assembly with finish (below) for the Series LFI Residential Flat-Plate Concealed Pendent Sprinkler (TY2524), K=4.9 (70,6), P/N (below):

Off White ..... P/N 56-201-0-135  
Pure White\*  
(RAL9010) ..... P/N 56-201-3-135  
Signal White\*\*  
(RAL9003) ..... P/N 56-201-4-135  
Standard White (Grey White)  
(RAL9002) ..... P/N 56-201-5-135  
Custom ..... P/N 56-201-X-135

\* Eastern Hemisphere sales only  
\*\* Previously known as Bright White

**Note:** All Custom Cover Plates are painted using Sherwin Williams Interior Latex Paint. Contact TYCO Customer Service with any questions related to custom orders.

### Optional Cover Plate/Retainer Assembly for Horizontal (Flat) Ceiling Applications Only

Specify Cover Plate/Retainer Assembly with finish (below) for the Series LFI Residential Flat-Plate Concealed Pendent Sprinkler (TY2524), K=4.9 (70,6), P/N (below):

Off White ..... P/N 56-122-0-135  
Pure White\*  
(RAL9010) ..... P/N 56-122-3-135  
Signal White\*\*  
(RAL9003) ..... P/N 56-122-4-135  
Custom ..... P/N 56-122-X-135

\* Eastern Hemisphere sales only  
\*\* Previously known as Bright White

**Note:** All Custom Cover Plates are painted using Sherwin Williams Interior Latex Paint. Contact TYCO Customer Service with any questions related to custom orders.

**Sprinkler Wrench**  
Specify W-Type 18 Sprinkler Wrench, P/N 56-000-1-265.