

## Series LFII Dry-Type Residential Sprinklers Recessed Pendent 4.9 K-Factor

### General Description

The TYCO RAPID RESPONSE Series LFII Dry-Type Residential Recessed Pendent Sprinklers are decorative, fast response, frangible bulb sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels. These sprinklers may be used in wet pipe, dry pipe, or preaction systems.

Residential sprinklers listed for dry pipe or preaction systems must undergo special testing at Underwriters Laboratories, Inc., including a 15-second delay while passing all UL1626 test criteria. The sprinklers described in this data sheet have undergone this special UL testing and are therefore listed for the types of residential designs cited below.

Dry-Type Sprinklers are typically used where:

- sprinklers are required on dry pipe systems that are exposed to freezing temperatures; for example, sprinkler drops from unheated portions of buildings.
- sprinklers and/or a portion of the connecting piping are exposed to freezing temperatures; for example, sprinkler drops from wet systems into unheated areas.
- sprinklers are used on systems that are seasonally drained to avoid freezing; for example, vacation areas.

#### 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.

The Series LFII Dry-Type Residential Recessed Pendent Sprinklers are intended for use in residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D; residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R; or, sprinkler systems for the residential portions of any occupancy per NFPA 13.

The Series LFII Dry-Type Residential Recessed Pendent Sprinklers are designed with heat sensitivity and water characteristics proven to help in controlling residential fires and improving the chance for occupants to escape or be evacuated.

The Series LFII Dry-Type Residential Recessed Pendent Sprinklers provide flexibility in adjusting sprinklers to the fixed pipe drops. The Recessed Escutcheon provides 1/4 inch (6,4 mm) of recessed adjustment or up to 1/2 inch (12,7 mm) of total adjustment from the flush mounting surface position.

#### NOTICE

*The Series LFII Dry-Type Residential Recessed Pendent Sprinklers (TY2235) described herein must be installed and maintained in compliance with this document, as well as 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.*

*The Series LFII Dry-Type Residential Recessed Pendent Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.*



### Model/Sprinkler Identification Number (SIN)

TY2235: Recessed Pendent 4.9K

Maximum Coverage Area <sup>(a)</sup> Ft. x Ft. (m x m)	Maximum Spacing Ft. (m)	WET PIPE Minimum Flow <sup>(b)</sup> and Residual Pressure for Horizontal Ceilings (Maximum 2-inch Rise for 12-Inch Run)		DRY PIPE Minimum Flow <sup>(b)</sup> and Residual Pressure for Horizontal Ceilings (Maximum 2-Inch Rise for 12-Inch Run)	
		155°F (68°C) 175°F (79°C)		155°F (68°C)	
12 x 12 (3,7 x 3,7)	12 (3,7)	13 GPM (49,2 LPM) 7.0 psi (0,48 bar)		13 GPM (49,2 LPM) 7.0 psi (0,48 bar)	
14 x 14 (4,3 x 4,3)	14 (4,3)	14 GPM (52,9 LPM) 8.2 psi (0,57 bar)		14 GPM (52,9 LPM) 8.2 psi (0,57 bar)	
16 x 16 (4,9 x 4,9)	16 (4,9)	15 GPM (56,8 LPM) 9.4 psi (0,65 bar)		15 GPM (56,8 LPM) 9.4 psi (0,65 bar)	
18 x 18 (5,5 x 5,5)	18 (5,5)	18 GPM (68,1 LPM) 13.5 psi (0,93 bar)		18 GPM (68,1 LPM) 13.5 psi (0,93 bar)	
20 x 20 (6,1 x 6,1)	20 (6,1)	21 GPM (79,5 LPM) 18.4 psi (1,3 bar)		21 GPM (79,5 LPM) 18.3 psi (1,3 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 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 under the Design Criteria section.

**TABLE A**  
**SERIES LFII RESIDENTIAL DRY-TYPE RECESSED PENDENT SPRINKLERS (TY2235)**  
**UL LISTED NFPA 13D AND NFPA 13R WET AND DRY PIPE HYDRAULIC DESIGN CRITERIA**

## Technical Data

### Approvals

UL Listed

Refer to Table A and Design Criteria.

### 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>)

### Inlet Thread Connection

1-inch NPT

### Sprinkler Temperature Ratings

- 155°F (68°C)
- 175°F (79°C) for wet pipe systems only

### Finishes

- Sprinkler:  
White Polyester-Coated, Chrome-Plated, or Natural Brass
- Recessed Escutcheon:  
White, Chrome or Brass

### Order Lengths

Minimum: 3-3/4 inches (95,3 mm)

Maximum: 24 inches (609,6 mm)

### Physical Characteristics

Inlet	Brass
Plug	Brass
Yoke	Stainless Steel
Casing	Galvanized Steel
Insert	Bronze
Bulb Seat	Stainless Steel
Bulb	Glass
Compression Screw	Brass
Deflector	Brass
Frame	Brass
Guide Tube	Brass
Water Tube	Stainless Steel
Bushing	Brass
Plug Spring	Stainless Steel
Sealing Assembly	Nickel with Teflon*
Escutcheon	Carbon Steel

### Patents

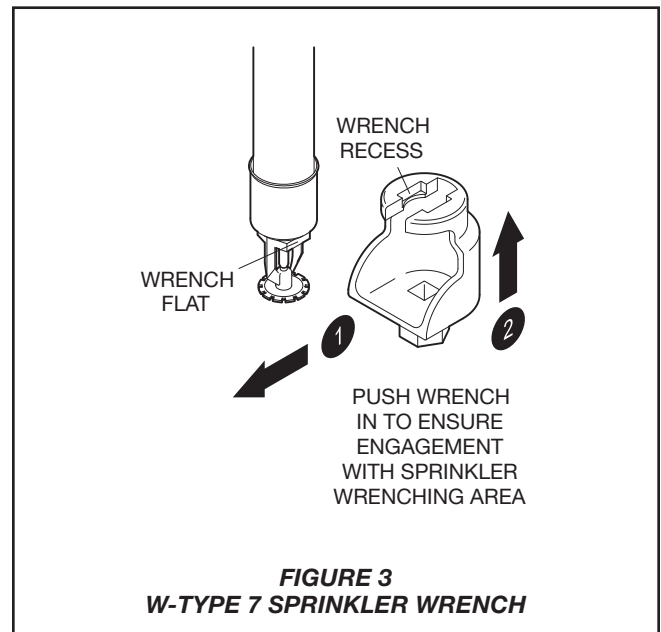
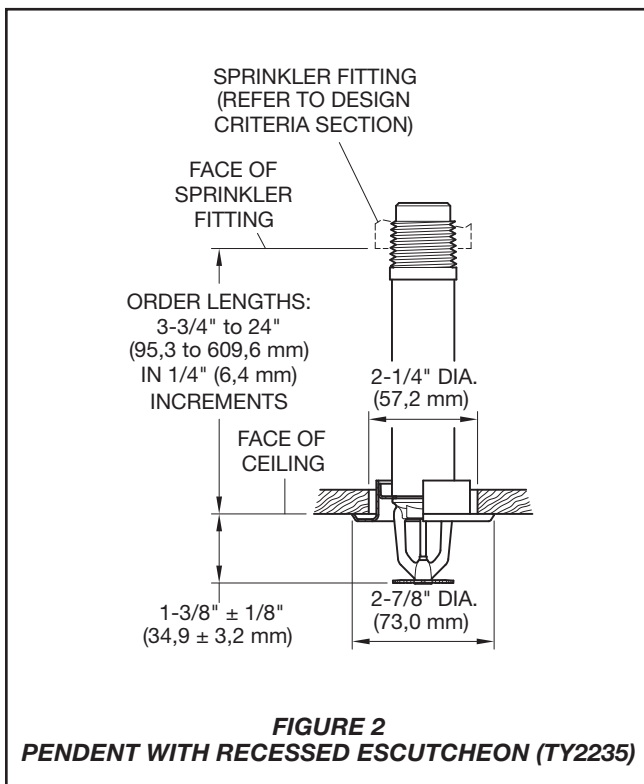
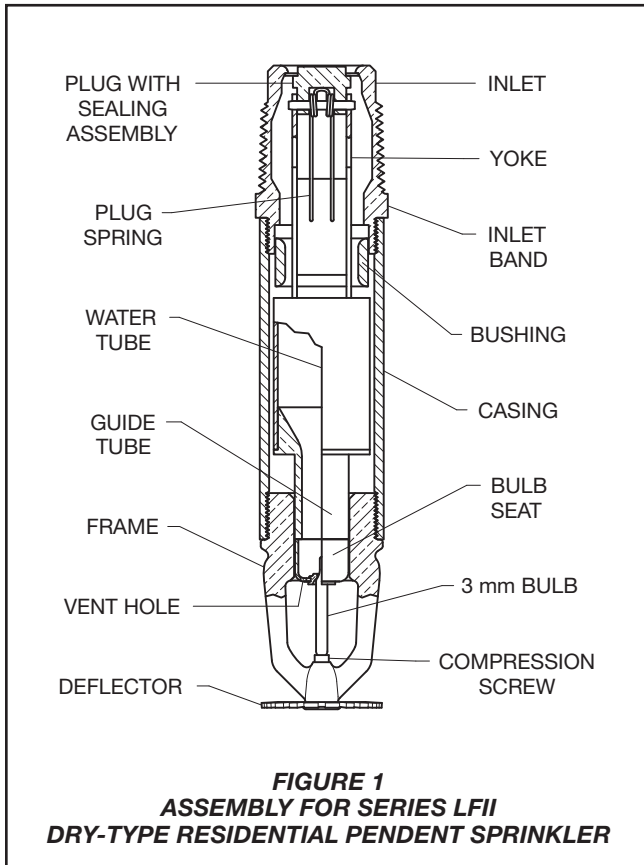
U.S.A. Patent No. 5,188,185  
Other patents pending

## Operation

When the TYCO Series LFII Dry-Type Residential Sprinkler is in service, water is prevented from entering the assembly by the Plug with Sealing Assembly (Figure 1) in the Inlet of the Sprinkler.

The glass Bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb then release the Bulb Seat. System water or air pressure then unseats the Plug with Sealing Assembly. The Plug Spring turns the Plug with Sealing Assembly aside, allowing the sprinkler to activate and flow water.

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## Design Criteria

The TYCO Series LFII Dry-Type Residential Recessed Pendent Sprinklers (TY2235) are UL Listed for installation in accordance with the criteria listed in this section.

When conditions exist that are outside the scope of the criteria provided in this section, refer to the technical data sheet entitled *Residential Sprinkler Design Guide (TFP490)* for the manufacturer's recommendations that may be acceptable to the local authority having jurisdiction.

This section describes the following design characteristics:

- System Types
- Water Delivery
- Hydraulic Design
- Obstruction to Water Distribution
- Operational Sensitivity
- Sprinkler Spacing
- Sprinkler Fitting
- Prevention of Branch Line Freezing

### System Types

Wet pipe, dry pipe, and preaction systems may be utilized.

### Water Delivery

For dry pipe and preaction systems, water delivery to the most remote sprinkler for a residential hazard shall not exceed 15 seconds as defined in Section 8.3.4.3 of the 2010 edition of NFPA 13D or Section 7.2.3.6.3 of the 2010 edition of NFPA 13.

Using the TYCO SPRINKFDT Water Delivery Calculation Program can help determine whether required delivery times will likely be achieved prior to performing the actual installation.

As an alternative to using a UL Listed water delivery calculation program and method, as referenced in NFPA 13D or NFPA 13, using an inspector's test connection is required to provide flow equivalent to the smallest orifice sprinkler, wherein the test orifice is located on the end of the pipe supplying the most remote sprinkler.

### Hydraulic Design

Table A lists the minimum required sprinkler flow rate for systems designed to NFPA 13D or NFPA 13R 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.

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

- flow rates listed in Table A for NFPA 13D and 13R as a function of temperature rating and the maximum allowable coverage area.
- 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 protected by four sprinklers.

Examples of sprinkler designs follow:

- *Example 1* — Protection is planned for a corridor that is 8 feet wide. Consequently, the actual coverage area under consideration is 8 ft. x 20 ft. Using the Series LFII Dry-Type Residential Sprinkler, the flow rate listed in Table A for a 20 ft. x 20 ft. coverage area is 21 GPM. However, based on a minimum discharge of 0.1 GPM/sq. ft., the expected flow rate is 16 GPM (8 ft. x 20 ft = 160 sq.ft.). For this example, a minimum flow rate of 21 GPM for this sprinkler design is required.
- *Example 2* — Protection is planned for a long, narrow room that is 12 feet wide. Consequently, the actual coverage area under consideration is 12 ft. x 20 ft. Using the Series LFII Dry-Type Residential Sprinkler, the flow rate listed in Table A for a 20 ft. x 20 ft. coverage area is 21 GPM. However, based on a minimum discharge of 0.1 GPM/sq. ft., the expected flow rate is 24 GPM (12 ft. x 20 ft = 240 sq.ft.). For this example, a minimum flow rate of 24 GPM for this sprinkler design is required.

### 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

The sprinkler must be located relative to the mounting surface as shown in Figure 3.

### Sprinkler Spacing

The minimum spacing between sprinklers is 8 feet (2,4 m). The maximum spacing between sprinklers cannot exceed the length of the hydraulically-calculated coverage area (refer to Table A); 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.

### Sprinkler Fittings

Install the 1-inch NPT Series LFII Dry-Type Residential Recessed Pendent Sprinklers in the 1-inch NPT outlet or run of one of the following fittings:

- malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150).
- cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125).

For dry pipe systems, only use the side outlet of maximum 2-1/2 inch size reducing tees when locating the Series LFII Dry-Type Residential Recessed Pendent Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 6 to assure complete drainage from above the Series LFII Sprinklers and the branch line.

Do not install the Series LFII Dry-Type Residential Recessed Pendent Sprinklers into elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow, potentially damaging the Inlet seal.

Typically, the end sprinkler fitting on a branch line is plugged as shown in Figure 6.

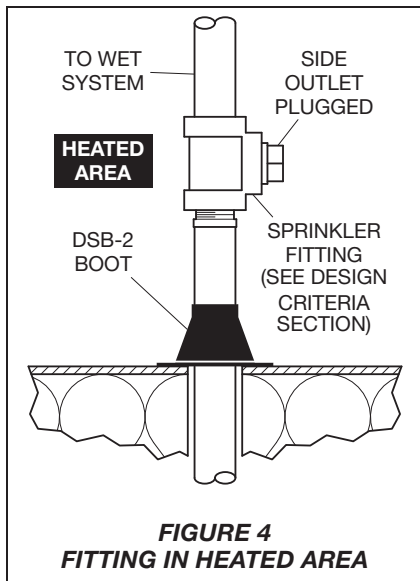
The Series LFII Dry-Type Sprinklers can also be installed in the 1-inch NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 for this arrangement is limited to wet pipe systems.

Only use the configuration in Figure 4 where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the Series LFII Sprinkler has the minimum exposure length per Figure 6. Refer to the Exposure Length section and Table B.

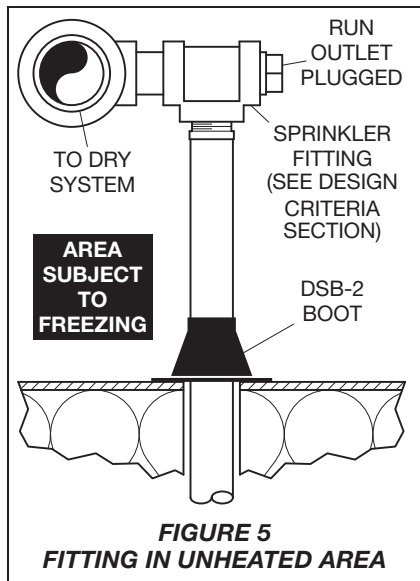
For wet pipe system installations of the 1-inch NPT Series LFII Dry-Type Residential Recessed Pendent Sprinklers connected to CPVC piping, use only the following TYCO CPVC fittings:

- 1" x 1" x 1" NPT Sprinkler Head Adapter Tee (P/N 80249)
- 1" x 1" NPT Female Adapter (P/N 80145)

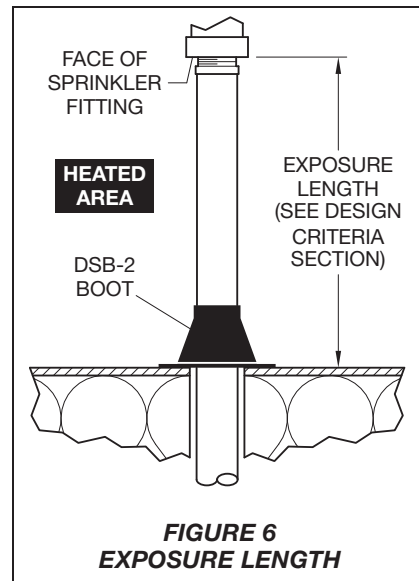
For residential dry pipe systems subject to freezing, use the of 1" x 1" x 1" NPT CPVC Sprinkler Head Adapter Tee (P/N 80259).



**FIGURE 4**  
**FITTING IN HEATED AREA**



**FIGURE 5**  
**FITTING IN UNHEATED AREA**



**FIGURE 6**  
**EXPOSURE LENGTH**

**NOTICE**

Do not install the Series LFII Dry-Type Residential Recessed Pendent Sprinklers into any other type fitting without first consulting the Technical Services Department. Failure to use the appropriate fitting may result in the following:

- failure of the sprinkler to operate properly due to formation of ice over the Inlet Plug or binding of the Inlet Plug.
- insufficient engagement of the inlet pipe threads with consequent leakage.

**Drainage**

Branch, cross, and feed-main piping connected to Series LFII Dry-Type Residential Recessed Pendent Sprinklers and subject to freezing temperatures must be pitched to allow proper drainage, in accordance with the minimum requirements of the National Fire Protection Association for dry pipe sprinkler systems.

**Exposure Length**

When using Series LFII Dry-Type Residential Recessed Pendent Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use Table B to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. Refer to Figure 6 for an example.

**Clearance Space**

When connecting an area subject to freezing and an area containing a wet pipe sprinkler system, the clearance space around the sprinkler barrel of Dry-Type Residential Recessed Pendent Sprinklers must be sealed, in accordance with the National Fire Protection Association. Due to temperature differences between two areas, the potential for the formation of condensation in the sprinkler and subsequent ice build-up is increased. If this condensation is not controlled, ice build-up can occur that might damage the dry-type sprinkler and/or prevent proper operation in a fire situation.

Use of the Model DSB-2 Dry Sprinkler Boot, described in technical data sheet TFP591 and shown in Figures 4 through 6, can provide the recommended seal.

**Installation**

The TYCO Series LFII Dry-Type Residential Recessed Pendent Sprinklers must be installed in accordance with the following instructions.

**NOTICE**

The Series LFII Dry-Type Residential Recessed Pendent Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section. For other important requirements regarding piping design and sealing of the clearance space around the Sprinkler Casing, refer to the Design Criteria section.

Do not install any bulb type sprinkler if the Bulb is cracked or there is a loss of liquid from the Bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch

(1,6 mm).

Obtain a leak-tight 1-inch NPT sprinkler joint by applying a minimum-to-maximum torque of 20 to 30 ft.-lbs. (26,8 to 40,2 Nm). Higher levels of torque can distort the sprinkler Inlet or Frame with consequent leakage or impairment of the sprinkler.

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

1. Install pendent sprinklers only in the pendent position with the deflector parallel to the ceiling.
2. With a non-hardening pipe-thread sealant such as Teflon tape applied to the inlet threads, hand-tighten the sprinkler into the sprinkler fitting.
3. Wrench-tighten the sprinkler using a pipe wrench on the Inlet Band or the Casing (refer to Figure 1) or using the W-Type 7 Sprinkler Wrench on the Wrench Flat (refer to Figure 3). Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.

**Note:** If sprinkler removal is necessary, remove the sprinkler using the same wrenching method noted above. Sprinkler removal is easier when a non-hardening sealant was used and torque guidelines were followed. After removal, inspect the sprinkler for damage.

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area <sup>(a)</sup>		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length, Inches (mm) <sup>(b)</sup>		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)

**Notes:**  
 (a) For protected area temperatures that occur between values listed above, use the next cooler temperature.  
 (b) These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).

**TABLE B**  
**MINIMUM RECOMMENDED LENGTHS OF EXPOSED SPRINKLER BARRELS**  
**IN WET PIPE SYSTEMS**

## Care and Maintenance

The TYCO Series LFII Dry-Type Residential Recessed Pendent Sprinklers (TY2235) must be maintained and serviced in accordance with the following instructions. Otherwise, inadvertent sprinkler operation or non-operation in the event of a fire can result.

### 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 systems from the proper authorities and notify all personnel who may be affected by this action.*

Absence of a Recessed Escutcheon Plate to cover a clearance hole can delay sprinkler operation in a fire situation.

A Vent Hole is provided in the Bulb Seat (Figure 1) to indicate if the Series LFII Dry-Type Residential Sprinkler is remaining dry. Evidence of leakage from the Vent Hole indicates potential leakage past the Plug with Sealing Assembly and the need to remove the sprinkler to determine the cause of leakage (for example, an improper installation or an ice plug). Close the fire protection system control valve and drain the system before removing the sprinkler.

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.

Replace sprinklers that:

- were modified or over-heated.
- were damaged by dropping, striking, wrench twisting, wrench slippage, or the like.
- are leaking or exhibiting visible signs of corrosion.
- were exposed to corrosive products of combustion but have not operated, if you cannot easily remove combustion by-products with a cloth.
- have a cracked Bulb or have lost liquid from the Bulb. Refer to the Installation section in this data sheet.

Responsibility lies with the owner 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 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 name and Part Number (P/N). Refer to the Price List for a complete listing of P/Ns.

### Pendent Sprinkler with Recessed Escutcheon

Specify the following information:

- Series LFI Dry-Type Residential Sprinkler (TY2235),
- with Recessed Escutcheon,
- 4.9 K-Factor,
- Temperature Rating of: 155°F (68°C) or 175°F (79°C) wet pipe systems only,
- Sprinkler Finish (value from Table C),
- Recessed Escutcheon Finish (value from Table C),
- Order Length (value from Figure 2), and
- P/N (from Table C).

### Separately Ordered Sprinkler Wrench

Specify W-Type 7 Sprinkler Wrench (Figure 2), P/N 56-850-4-001.

