



RAPID RESPONSE Series LFII Residential Sprinklers 4.9 K-factor Recessed Pendent, Dry Type Wet Pipe and Dry Pipe Systems

General Description

The TYCO RAPID RESPONSE Series LFII Dry Type Residential Recessed Pendent Sprinklers (TY2235) are dry type, decorative, fast response, frangible bulb sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels.

The Series LFII Dry Type Residential Recessed Pendent Sprinklers (TY2235) are typically used for the following situations:

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

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 includ-

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

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.

ing 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 provide flexibility in adjusting sprinklers to the fixed pipe drops. The Recessed Escutcheon provides 1/4 in. (6,4 mm) of recessed adjustment or up to 1/2 in. (12,7 mm) of total adjustment from the flush mounting surface position.

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.

Corrosion-resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise be obtained when exposed to corrosive atmospheres. Although corrosion-resistant coated sprinklers have passed the standard corrosion tests of the applicable Approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

Dry Pipe System Application

The Series LFII Residential Pendent and Recessed Pendent Sprinklers offers a laboratory approved option for designing dry pipe residential sprinkler systems, whereas, most residential sprinklers are laboratory approved for wet systems only.

Through extensive testing, it has been determined that the number of design sprinklers (hydraulic design area) for the Series LFII Residential Recessed Pendent Sprinklers (TY2235) need not be increased over the number of design sprinklers (hydraulic design



area) as specified for wet pipe sprinkler systems, as is accustomed for density/area sprinkler systems designed per NFPA 13.

Consequently, the Series LFII Residential Sprinklers 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.

NOTICE

The Series LFII Dry Type Residential Recessed Pendent Sprinklers (TY2235) described herein must be installed and maintained in compliance with this document and the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Sprinkler Identification Number (SIN)

TY2235

Technical Data

Approvals

UL Listed
Certified to all requirements of NSF/ANSI 61

Note: Sprinklers with a polyester finish are UL Listed as corrosion-resistant sprinklers.

See the Design Criteria section for details on these approvals.

Maximum Working Pressure

175 psi (12,1 bar)

Discharge Coefficient

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

Inlet Thread Connections

1 in. NPT
ISO 7-R1

Sprinkler Temperature Ratings

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

Finishes

Natural Brass, Signal White Polyester Coated, or Chrome Plated

Order Lengths

Minimum: 3-3/4 in. (95,3 mm)
Maximum: 24 in. (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	Beryllium Nickel w/TEFLON
Escutcheon	Carbon Steel

Operation

When the TYCO RAPID RESPONSE Series LFII Dry Type Residential Sprinkler (TY2235) 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 to release the Bulb Seat.

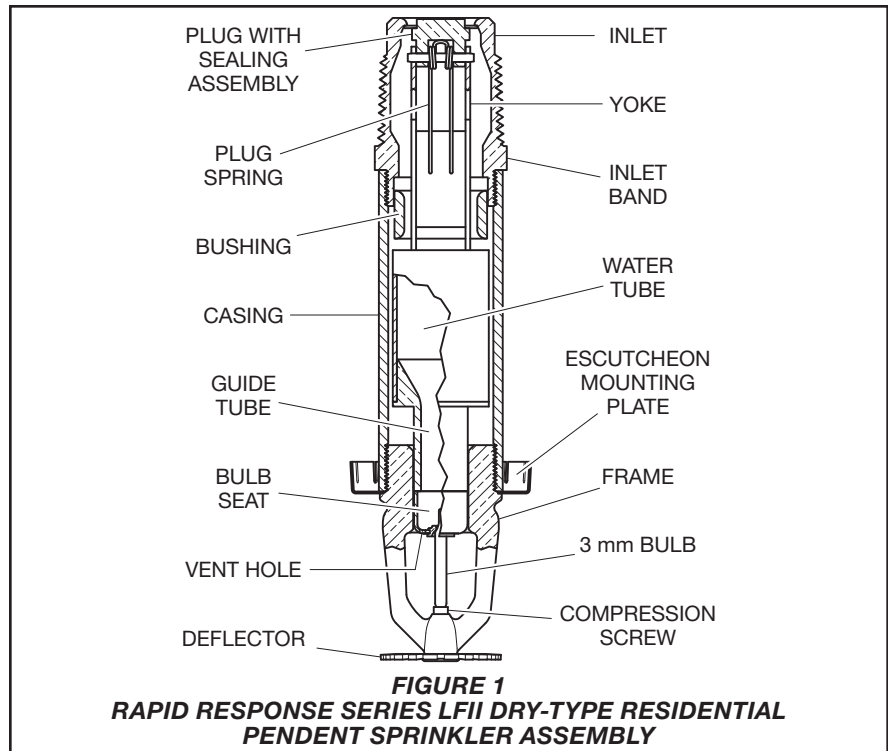


FIGURE 1
RAPID RESPONSE SERIES LFII DRY-TYPE RESIDENTIAL PENDENT SPRINKLER ASSEMBLY

The system's water or air pressure is then able to unseat the Plug with Sealing Assembly. The Plug Spring turns the Plug with Sealing Assembly aside, allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO RAPID RESPONSE Series LFII Dry Type Residential Recessed Pendent Sprinklers (TY2235) are UL Listed for installation in accordance with this section:

Residential Sprinkler Design Guide

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.

System Types

Wet pipe and dry pipe systems may be utilized. Refer to Technical Data Sheet TFP485 for the use of residential sprinklers in residential dry pipe systems.

Ceiling Types

Smooth flat horizontal, or beamed, or sloped, in accordance with the 2013 Edition of NFPA 13D, 13R, or 13 as applicable.

Hydraulic Design (NFPA 13D and 13R)

For systems designed to NFPA 13D or NFPA 13R, the minimum required sprinkler flow rate are given in Tables A or 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. The number of design sprinklers specified in NFPA 13D and 13R for wet pipe systems is to be applied when designing dry pipe systems.

Hydraulic Design (NFPA 13)

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 or B as a function of temperature rating and the maximum allowable coverage area.
- minimum discharge of 0.1 gpm/ft² over the design area comprised of the four most hydraulically demanding sprinklers for the actual coverage areas protected by four sprinklers.

The number of design sprinklers specified in NFPA 13 for wet pipe systems is to be applied when designing dry pipe systems.

Maximum Coverage Area ^(a) ft x ft (m x m)	Maximum Spacing ft (m)	WET PIPE SYSTEM Minimum Flow and Residual Pressure ^(b,c)						
		Ordinary Temp Rating 155°F (68°C)		Intermediate Temp Rating 175°F (79°C)		Deflector to Ceiling	Installation Type	Minimum Spacing ft
		Flow GPM (L/min)	Pressure PSI (bar)	Flow GPM (L/min)	Pressure PSI (bar)			
12 x 12 (3,7 x 3,7)	12 (3,7)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)	Smooth Ceiling: 1-1/4 in. to 1-1/2 in. Beamed Ceiling per NFPA 13D or 13R Installed in Beam: 1-1/4 in. to 1-1/2 in. below bottom of beam	Recessed	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (4,3)	14 (52,9)	8.2 (0,57)	14 (52,9)	8.2 (0,57)			
16 x 16 (4,9 x 4,9)	16 (4,9)	15 (56,8)	9.4 (0,65)	15 (56,8)	9.4 (0,65)			
18 x 18 (5,5 x 5,5)	18 (5,5)	18 (68,1)	13.5 (0,93)	18 (68,1)	13.5 (0,93)			
20 x 20 (6,1 x 6,1)	20 (6,1)	21 (79,5)	18.4 (1,3)	21 (79,5)	18.4 (1,3)			

Notes:

- 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.
- Requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. See Hydraulic Design under the Design Criteria section.
- For NFPA 13 residential applications, the greater of 0.1 gpm/ft² over the design area or the flow in accordance with the criteria in Table A must be used.

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

Maximum Coverage Area ^(a) ft x ft (m x m)	Maximum Spacing ft (m)	DRY PIPE SYSTEM Minimum Flow and Residual Pressure ^(b,c)					
		Ordinary Temp Rating 155°F (68°C)		Deflector to Ceiling	Installation Type	Minimum Spacing ft	
		Flow GPM (L/min)	Pressure PSI (bar)				
12 x 12 (3,7 x 3,7)	12 (3,7)	13 (49,2)	7.0 (0,48)	Smooth Ceiling: 1-1/4 in. to 1-1/2 in. Beamed Ceiling per NFPA 13D or 13R Installed in Beam: 1-1/4 in. to 1-1/2 in. below bottom of beam	Recessed	8 (2,4)	
14 x 14 (4,3 x 4,3)	14 (4,3)	14 (52,9)	8.2 (0,57)				
16 x 16 (4,9 x 4,9)	16 (4,9)	15 (56,8)	9.4 (0,65)				
18 x 18 (5,5 x 5,5)	18 (5,5)	18 (68,1)	13.5 (0,93)				
20 x 20 (6,1 x 6,1)	20 (6,1)	21 (79,5)	18.3 (1,3)				

Notes:

- 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.
- Requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. See Hydraulic Design under the Design Criteria section.
- For NFPA 13 residential applications, the greater of 0.1 gpm/ft² over the design area or the flow in accordance with the criteria in Table B must be used.

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

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area ^(a)		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length, Inches (mm) ^(b)		
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 C
MINIMUM RECOMMENDED LENGTHS OF EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS

Dry Pipe System Water Delivery

When using the Series LFII Residential Sprinklers (TY2235) in dry pipe sprinkler systems, the time for water delivery must not exceed 15 seconds for the most remote operating sprinkler.

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 2.

Sprinkler Spacing

The minimum spacing between sprinklers is 8 ft (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 ft for a 12 ft x 12 ft coverage area or 20 ft for a 20 ft x 20 ft coverage area.)

Sprinkler Fittings

The following fittings may be used:

- The 1 in. NPT outlet or run of a malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150)

- The 1 in. NPT outlet or run of a 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 in. 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 5 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.

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. See the Exposure Length section and Table C.

- The 1 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee in wet pipe systems only
- The 1 in. NPT CPVC outlet of a 1 in. x 1 in. x 1in. NPT Sprinkler Head Adapter Tee (P/N 80249) in wet pipe systems only

- The 1 in. NPT CPVC outlet of a 1 in. x 1 in. NPT Female Adapter (P/N 80145) in wet pipe systems only
- The 1 in. NPT outlet of a 1 in. x 1 in. x 1 in. NPT CPVC Sprinkler Head Adapter Tee (P/N 80259) in either wet or dry pipe systems

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

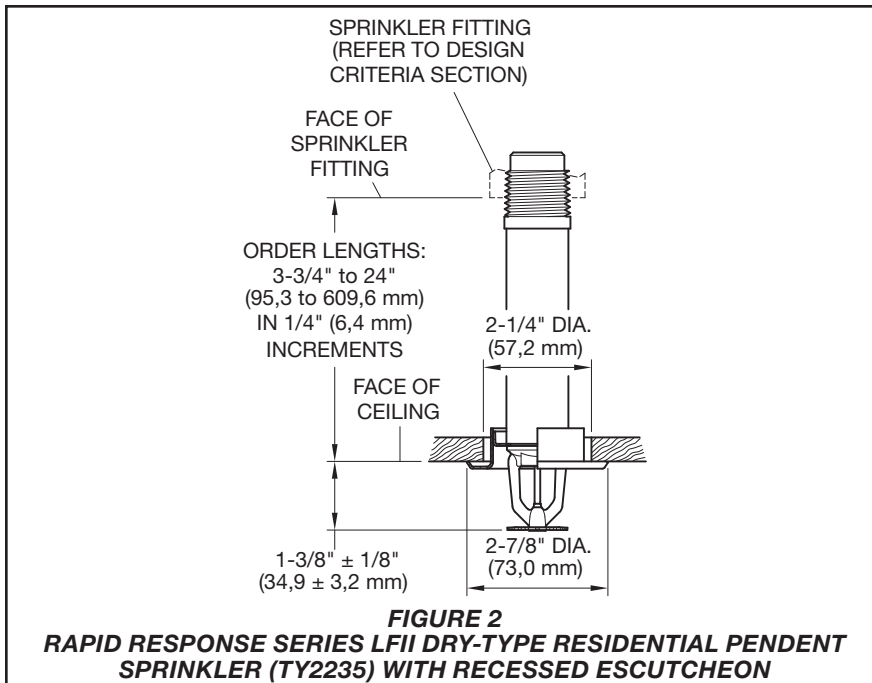
Branch, cross, and feed-main piping connected to Series LFII Dry Type Residential Recessed Pendent Sprinklers and subject to freezing temperatures must be pitched to allow proper drainage, in accordance with the minimum requirements of the NATIONAL FIRE PROTECTION ASSOCIATION for dry pipe sprinkler systems.

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 C 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. See 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 RAPID RESPONSE Series LFII Dry Type Residential Recessed Pendent Sprinklers must be installed in accordance with this section:

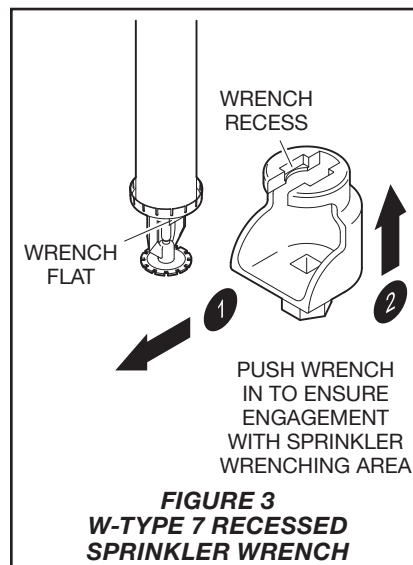
General Instructions

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, see 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 in. (1,6 mm).

A leak-tight 1 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 to 30 lb-ft (26,8 to 40,2 N·m). 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 Sprin-

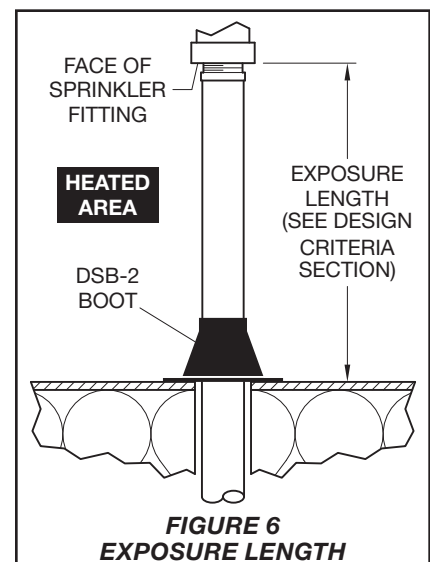
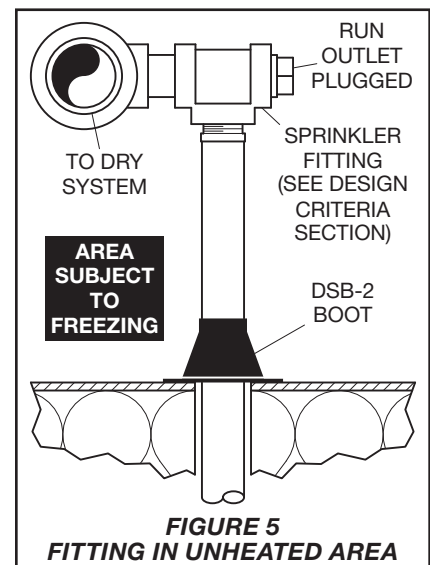
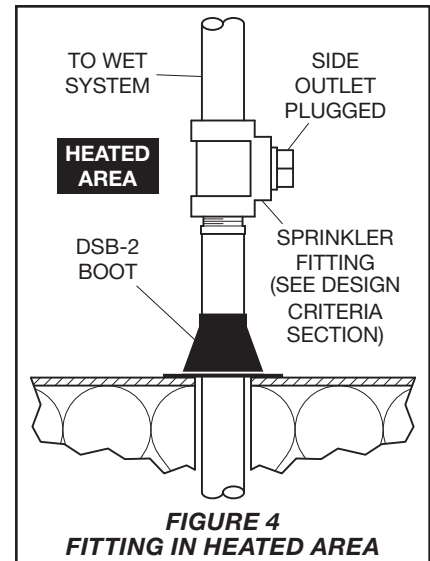


kler. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install pendent sprinklers only in the pendent position with the deflector parallel to the ceiling.

Step 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.

Step 3. Wrench-tighten the sprinkler using a pipe wrench on the Inlet Band or the Casing (Figure 1) or using the W-Type 7 Sprinkler Wrench on the Wrench Flat (Figure 3). Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.



P/N ¹ 63 — XXX — X — XXX		TEMPERATURE RATING		SPRINKLER FINISH	ESCUTCHEON FINISH	ORDER LENGTH (EXAMPLES)				
10	PENDENT WITH RECESSED ESCUTCHEON	SIN	TY2235	1	155°F (68°C)	2	NATURAL BRASS	BRASS PLATED	055	5.50 in.
				2	175°F (79°C) ²	4	SIGNAL WHITE (RAL9003) POLYESTER ³	SIGNAL WHITE (RAL9003) POLYESTER	082	8.25 in.
				9			CHROME PLATED	CHROME PLATED	180	18.00 in.
									187	18.75 in.
									240	24.00 in.

Notes:
 1. Use Prefix "I" for ISO 7-R 1 Inlet Thread Connection (e.g., I-63-101-9-180)
 2. Wet pipe system only
 3. UL Listed as corrosion-resistant

TABLE D
RAPID RESPONSE SERIES LFII DRY-TYPE RESIDENTIAL RECESSED PENDENT SPRINKLERS (TY2235)
PART NUMBER SELECTION

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.

Care and Maintenance

The TYCO RAPID RESPONSE Series LFII Dry Type Residential Recessed Pendent Sprinklers (TY2235) must be maintained and serviced in accordance with this section:

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.

The owner must assure that the sprinklers are not used for hanging any objects and that the sprinklers are only cleaned by means of gently dusting with a feather duster; otherwise, non-operation in the event of a fire or inadvertent operation may result.

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.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers - before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. See the Installation section for additional information.

The owner is responsible 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 product manufacturer with 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.

Ordering Procedure

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

Pendent Sprinkler with Recessed Escutcheon

Note: Unless otherwise indicated, see Table D.

Specify: Series LFII Dry Type Residential Recessed Pendent Sprinkler, SIN TY2235, Recessed Escutcheon, 4.9 K-factor, Temperature Rating (specify), Sprinkler Finish (specify), Escutcheon Finish (specify), Order Length (specify value per Figure 2), Inlet Thread Size (1 in. NPT or ISO 7-R 1), P/N (specify)

Separately Ordered Sprinkler Wrench

Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

Separately Ordered Escutcheon

Specify: Style 20 Recessed Escutcheon with (specify*) finish, P/N (specify*)

*Refer to Technical Data Sheet TFP770