

EAS-1 Electronically Activated Sprinkler System For Storage Applications

General Description

The TYCO EAS-1 Electronically Activated Sprinkler System is specifically engineered to provide effective protection for highly challenging storage fire hazards.

The TYCO EAS-1 Electronically Activated Sprinkler System features addressable heat sensors connected to an electronic control system that continuously analyzes temperature information within the protected area. In the case of a fire, the system is designed to simultaneously operate a group of sprinklers surrounding the point of fire origin very early in the fire's development. This innovative approach allows the TYCO EAS-1 Electronically Activated Sprinkler System to offer better protection with less water than alternative solutions.

Features

- UL Listed components
- Minimizes costs associated with upgrading dated warehouse fire protection systems by maximizing the use of existing infrastructure
- Provides better protection with less water by locating fire origin and responding with only the appropriate sprinklers
- Increases installation flexibility and improves system performance by

allowing heat sensors and sprinklers to be installed for optimal performance

- Eliminates the need for in-rack sprinklers

NOTICE

The TYCO EAS-1 Electronically Activated Sprinkler System described herein must be installed and maintained in compliance with this document and with 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. Applicable Standards are:

- NFPA 13
- NFPA 20
- NFPA 24
- NFPA 25
- NFPA 72

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.

Technical Data

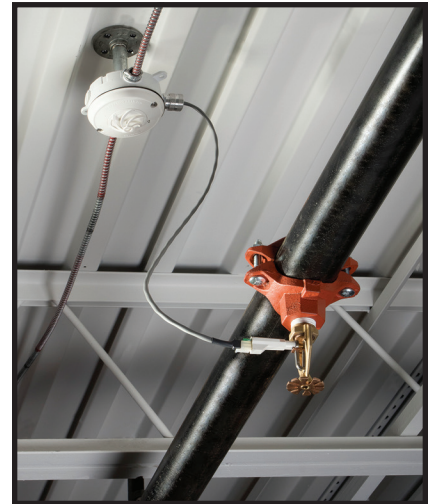
Approvals

All system components integral to the TYCO EAS-1 Electronically Activated Sprinkler System are UL Listed.

Maximum Working Water Pressure
175 psi (12,1 bar)

System Components

The TYCO EAS-1 Electronically Activated Sprinkler System is a fully engineered integrated system which requires the use of specific proprietary components that must be used together to ensure proper functionality. A list of these components can be found in Table A. An additional list of components that are recommended



for use with the TYCO Electronically Activated EAS-1 Sprinkler Systems as applicable can be found in Table B.

Design Criteria

The TYCO EAS-1 Electronically Activated Sprinkler System and algorithm are designed to respond to a single fire originating from a single ignition location.

Building Construction

The TYCO EAS-1 Electronically Activated Sprinkler System is suitable for use within building construction that would permit the use of early suppression fast response (ESFR) sprinklers per the requirements of NFPA 13.

The system is suitable for use in buildings with horizontal ceilings and unobstructed construction.

Hydraulic Design and Water Delivery

Calculate hydraulic design in accordance with Table C. Base the calculation on a minimum 9 sprinkler design area in a 4-4-1 sprinkler arrangement: 4 sprinklers on the 2 most remote branch lines and 1 sprinkler on the next nearest branch line.

System Piping Layout

The system piping layout may be either a grid or a tree configuration.

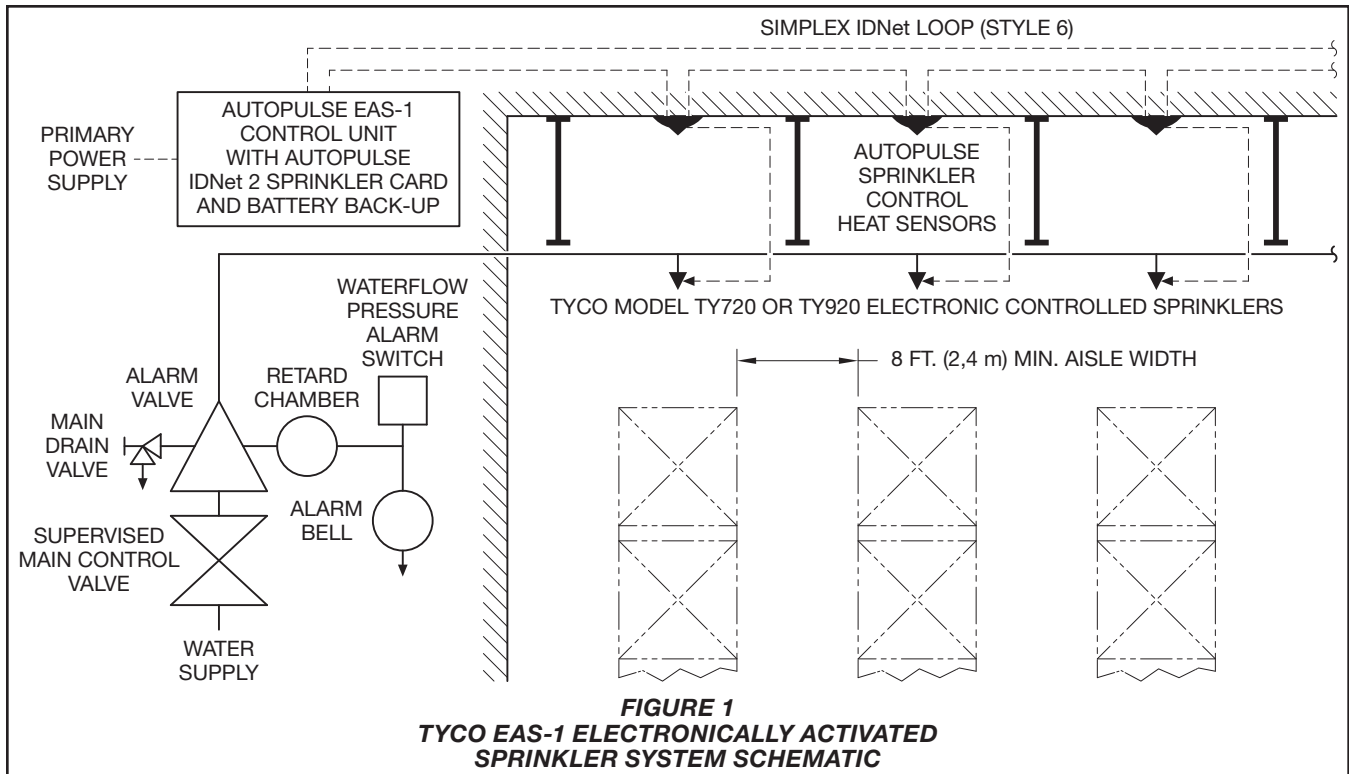
IMPORTANT

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.

Electronically Activated Sprinkler System Components	Part Number	Description	Technical Document Number and Title as Applicable
Model TY720 Electronic Control Pendent Sprinklers	58-461-1-000	TYCO Model TY720 Electronic Control, 16.8 K-factor Pendent Sprinkler - Used to provide protection for storage applications such as warehouses and distribution centers	TFP325
Model TY920 Electronic Control Pendent Sprinklers	58-441-1-000	TYCO Model TY920 Electronic Control, 25.2 K-factor Pendent Sprinkler - Used to provide protection for storage applications such as warehouses and distribution centers	TFP326
Heat Sensors	4098-9748AR	AUTOPULSE Sprinkler Control Heat Sensor	579-1215AR AUTOPULSE Sprinkler Control Heat Sensor Installation Instructions
Cable Assembly	4098-9865AR	AUTOPULSE Sprinkler Control Heat Sensor Cable Assembly	
Control Unit	4100-9707AR (English Version) 4100-9708AR (Canadian French Version)	AUTOPULSE EAS-1 Control Unit	579-1385AR, AUTOPULSE EAS-1 Electronically Activated Sprinkler System - Installation and Operating Instructions 574-852AR, AUTOPULSE EAS-1 Operating Instructions Following an Alarm, Supervisory, or Trouble Condition 579-117AR, AUTOPULSE Back Boxes, Doors and Trim Kits Installation Instructions
Commissioning Device	91-461-1-008	EAS-1 Commissioning Device	See the <i>System Commissioning</i> section of this datasheet
Heat Detector Test Head Kit*	SOLO-461	SOLO-461 Heat Detector Test Head Kit	See the <i>System Commissioning</i> section of this data sheet
IDNet Loop and Sprinkler Cards	4100-3113AR	AUTOPULSE IDNet 2 - Sprinkler Card	597-1214AR, AUTOPULSE 4100-3113AR IDNet 2 Sprinkler Card, 4100-3111 IDNet Loop Card Installation Instructions
	4100-3111	SIMPLEX IDNet Loop Card	
NOTES *The Heat Detector Test Head Kit is manufactured by SDI Fire.			
TABLE A CORE SYSTEM COMPONENTS			

Electronically Activated Sprinkler System Components	Part Number	Description	Technical Document Number and Title as Applicable
Supervised Main Control Valve	Refer to Technical Document	TYCO BFV-300 Grooved Butterfly Valve or Equivalent	TFP1511
		TYCO BFV-300 Wafer Butterfly Valve or Equivalent	TFP1516
Alarm Valve	Refer to Technical Document	AV-1-300 Alarm Check Valve with trim or Equivalent	TFP910
Retard Chamber	52-211-1-002	RC-1 Retard Chamber or Equivalent	TFP920
Waterflow Pressure Alarm Switch	Refer to Technical Document	Potter PS10-2 Pressure Switch or Equivalent	5400929, Potter PS10 Pressure Switch Data Sheet
Alarm Bell	Refer to Technical Document	WMA-1 Water Motor Alarm or Equivalent	TFP922
TABLE B RECOMMENDED SYSTEM COMPONENTS			



Electronic Sprinklers

Only TYCO Model TY720 or TY920 Electronic Control Pendant Sprinklers listed in Table A are approved to be installed as part of the TYCO EAS-1 Electronically Activated Sprinkler System. TYCO Model TY720 or TY920 Sprinklers shall be installed in accordance with the NFPA requirements for ESFR sprinklers with the same K-Factor and deflector orientation, except as modified in this technical data sheet or the specific TYCO Electronic Control Sprinkler installation instructions.

Deflector Distance

The minimum deflector distance from the ceiling shall be in accordance with the NFPA requirements for ESFR sprinklers with the same K-Factor and deflector orientation. For example, the minimum deflector distance from the ceiling surface for both TYCO Model TY720 Sprinkler with a K-Factor of 16.8 gpm/psi^{1/2} (241,9 lpm/bar^{1/2}) and TYCO Model TY920 Sprinkler with a K-factor of 25.2 gpm/psi^{1/2} (362,9 lpm/bar^{1/2}) shall be 6 in. (152 mm).

The maximum deflector distance from the ceiling can deviate from NFPA requirements for ESFR sprinklers. The sprinkler may be located a maximum of 3 ft (914 mm) below its associated heat sensor. This allows for the sprinkler to be installed below obstructions. Each sprinkler and heat sensor must be located per the installation criteria in Figure 2.

TYCO EAS-1 ELECTRONICALLY ACTIVATED SPRINKLER SYSTEM PROTECTION FOR HAZARDS UP TO AND INCLUDING EXPOSED AND EXPANDED GROUP A PLASTICS

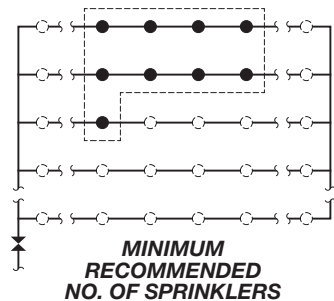
GENERAL GUIDELINES:

When TYCO Model TY720 or TY920 Sprinklers, paired with AUTOPULSE Sprinkler Control Heat Sensors, are installed to provide ceiling-only protection of storage occupancies, including single, double, palletized, and solid piled storage, up to and including exposed, expanded, Group A plastics commodities as defined by NFPA 13 (no open top containers or solid shelves), the installation criteria is as follows:

- a maximum coverage area of 100 ft² (9,3 m²) per sprinkler
- a minimum coverage area of 64 ft² (5,9 m²) per sprinkler
- a water supply duration of 60 minutes minimum is required

The sprinkler spacing criteria is:

- maximum spacing shall be 12 ft (3.66 m) for buildings having a ceiling height less than 30 ft (9,14 m)
- maximum spacing shall be 10 ft (3.05 m) for buildings having a ceiling height greater than 30 ft (9,14 m)
- 8 ft (2,4 m) minimum spacing for all construction types



CEILING HEIGHT ft (m)	STORAGE HEIGHT ft (m)	MINIMUM AISLE SPACING ft (m)	DESIGN PRESSURE psi (bar)	MINIMUM RECOMMENDED NO. OF SPRINKLERS
35 (10,7)	30 (9,1)	8 (2,4)	52 (3,6)	9 Sprinklers in 4-4-1 arrangement: 4 on 2 most remote branch lines, 1 on next nearest branch line

TABLE C
TYCO EAS-1 ELECTRONICALLY ACTIVATED SPRINKLER SYSTEM DESIGN CRITERIA

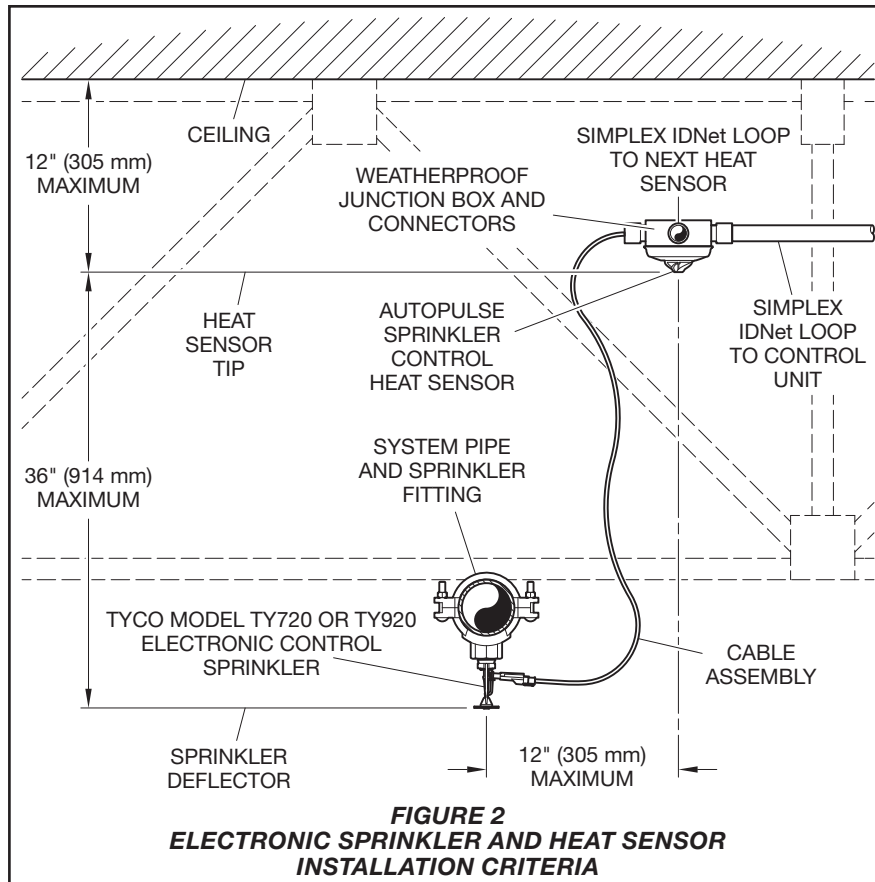


FIGURE 2
ELECTRONIC SPRINKLER AND HEAT SENSOR
INSTALLATION CRITERIA

Control Unit

The AUTOPULSE EAS-1 Control Unit utilizes a NEMA Type 1 (for example, general purpose) enclosure.

The control unit must be installed in a location with the following environmental conditions:

- operating temperature range of 32°F to 120°F (0°C to 49°C)
- maximum operating humidity of 93%RH, non-condensing at 90°F (32°C)

A single AUTOPULSE EAS-1 Control Unit can support up to 3,000 sensor-sprinkler pairs. For installations larger than 3,000 sensor-sprinkler pairs, multiple control units are required. Walls, partitions, or draft curtains must be used to separate sensor-sprinkler pairs connected to different control units.

Heat Sensors

The AUTOPULSE Sprinkler Control Heat Sensors may be mounted directly on the ceiling. If not mounted on the ceiling the maximum distance from the sensor to the ceiling surface shall be 12 in. (305 mm).

The heat sensor and sprinkler to which it is connected can be located up to a maximum distance of:

- 12 in. (305 mm) laterally from each other
- 3 ft (914 mm) vertically from each other

Sensor Wiring

The sensor wiring circuit configuration is shown in the schematic in the *AUTOPULSE Sprinkler Control Heat Sensor Installation Instructions* (AUTOPULSE document number 579-1215AR).

Johnson Controls recommends Style 6 wiring with mechanical protection.

Battery Back-Up

The duration of battery back-up is determined by the requirements of the authority having jurisdiction. Johnson Controls recommends a minimum of 48 hours of battery backup. For information about battery backup calculations, refer to the *SIMPLEX ES-PS Installation Instructions* (SIMPLEX document number 579-1288).

Operation

The TYCO EAS-1 Electronically Activated Sprinkler System for storage applications is designed to provide connected sprinkler fire protection for warehouses and distribution centers.

Standby Operation

When the system is set for service, the system piping is pressurized and the AUTOPULSE EAS-1 Control Unit is in a normal standby state.

In standby state, the control unit monitors the following information:

- environmental conditions
- status of the heat sensors and associated circuit integrity
- status of the sprinkler and related circuit integrity

The control unit analyzes if the conditions are in the normal range, and verifies the sensors and sprinklers are ready for operation. If the temperatures are in the normal range and all sensors and sprinklers are ready for operation, the system is reported as normal.

If the temperatures are outside the normal range, or any of the heat sensors or sprinklers are not operational, the control unit indicates a fault or trouble condition. This information can be provided to the building fire alarm system to provide notification to building occupants, the fire department, and/or central station monitoring as required.

Automatic Operation

In the event of a fire, the heat sensors provide information to the control unit about the fire. The software program in the control unit analyzes information from multiple heat sensors and determines if the resulting information indicates a fire condition. As the fire continues to grow, the software confirms the fire's signature and determines which sprinklers should be operated to optimally address the fire. The control unit then operates all of the necessary sprinklers simultaneously to suppress the fire. Water flows through the system piping to the opened sprinklers.

Installation

The TYCO EAS-1 Electronically Activated Sprinkler System must be installed in accordance with this section.

NOTE: Except as noted below, all components must be installed in accordance with their applicable technical data sheet or installation manual.

NOTE: Except as noted below, all installation criteria provided in NFPA 13 and NFPA 72 applies.

Control Unit

Installation instructions for the AUTOPULSE EAS-1 control unit are provided in the *AUTOPULSE EAS-1 Electronically Activated Sprinkler System - Installation and Operating Instructions* (AUTOPULSE document number 579-1385AR).

Sprinklers

Installation instructions for the Model TY720 Electronic Control Pendant Sprinkler are provided in Technical Data Sheet TFP325.

Installation instructions for the Model TY920 Electronic Control Pendant Sprinkler are provided in Technical Data Sheet TFP326.

Heat Sensor

Installation instructions for the heat sensor, including mounting and wiring requirements, are located in the *AUTOPULSE Sprinkler Control Heat Sensor Installation Instructions* (AUTOPULSE document number 579-1215AR). These instructions contain information about mounting and wiring the sensor.

System Commissioning

Before placing the TYCO EAS-1 Electronically Activated Sprinkler System in set condition, it must be commissioned. As a consequence of the electronic control system, testing and commissioning without activating sprinklers must be conducted using EAS-1 Commissioning Devices and heating devices such as the SOLO-461 Heat Detector Test Head Kit.

NOTE: Once beginning the phase during which a rapid temperature increase is applied, complete each test within five minutes. After five minutes, supervisory signals indicating rapid temperature increase are automatically cleared from the sprinkler release queue on the AUTOPULSE EAS-1 Control Unit.

The EAS-1 Commissioning Device features:

- Cable assembly connection port identical to that of the TYCO Model TY720 or TY920 Sprinkler
- Battery compartment accommodating two AA size batteries
- On/Off Switch allowing conservation of battery power when the device is not in use
- Three LED status lights located at the end opposite to the connection port
- Green LED lights when the device On/Off switch is placed in the On position, indicating the device is ready to begin testing
- Red LED lights to indicate low battery power
- Yellow LED lights for approximately two minutes during testing to indicate sprinkler control heat sensor activation

Successfully complete both test procedures described in this section to commission the TYCO EAS-1 Electronically Activated Sprinkler System.

Fixed Temperature Test Procedure

Step 1. Disconnect the Cable Assembly from 10 TYCO Model TY720 or TY920 Sprinklers.

Step 2. Connect the Cable Assemblies to ports of 10 EAS-1 Commissioning Devices, placing the On/Off Switch on each in the On position, observing the Green LED on each is lit, and allow the devices to freely hang.

Step 3. Being careful not to exceed the preset fixed temperature threshold for the system, use heating devices to sequentially apply a rapid temperature increase, at least 20°F/minute rate of rise, to 6 sprinkler control heat sensors within the test group of 10.

Step 4. Confirm the AUTOPULSE EAS-1 Control Unit indicates six supervisory signals due to the rapid temperature increase at the six sprinkler control heat sensors.

Step 5. Continue to apply heat to one of the original six sprinkler control heat sensors until it reaches its preset fixed temperature threshold.

Step 6. Confirm the Yellow LED is lit on the EAS-1 Commissioning Devices connected to all six of the original sprinkler control heat sensors, indicating simulated sprinkler operation.

Step 7. Use heating devices to apply a rapid temperature increase, at least 20°F/minute rate of rise, to the remaining four sprinkler control heat sensors within the test group of 10.

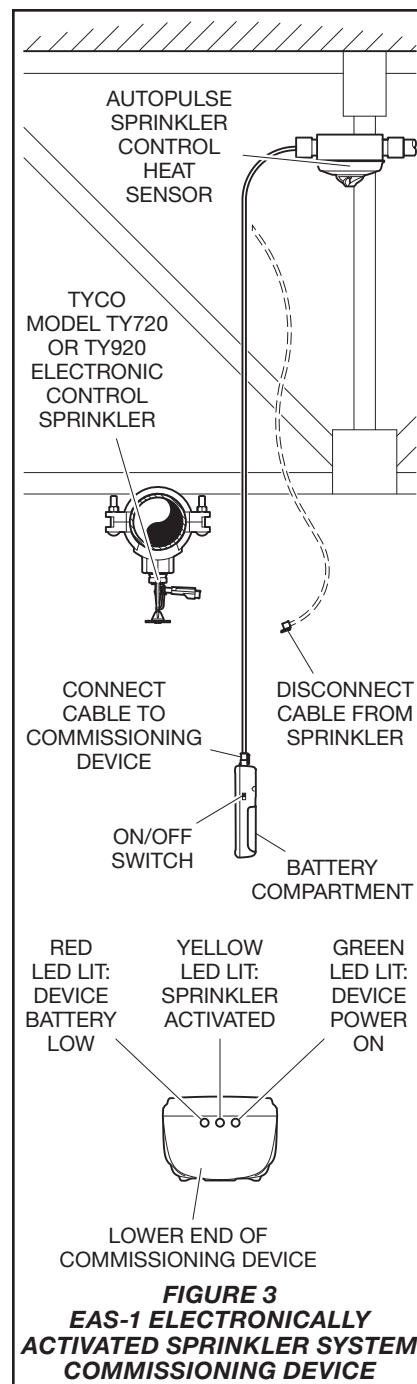


FIGURE 3
EAS-1 ELECTRONICALLY
ACTIVATED SPRINKLER SYSTEM
COMMISSIONING DEVICE

Step 8. Confirm the Yellow LED is lit on the EAS-1 Commissioning Devices connected to at least three of the four remaining sprinkler control heat sensors.

NOTE: Only nine of the 10 EAS-1 Commissioning Devices should indicate simulated sprinkler operation for a typical system. If the system is designed to operate a maximum of nine sprinklers, only nine out of the 10 Commissioning Devices should be observed with a Yellow LED lit indicating sprinkler operation.

Step 9. Reset the control unit by performing a warm-start, and verify all solid red LEDs on the heat sensors return to a blinking state. Confirm the control panel is in a normal state and is free of error and supervisory conditions.

Rate of Rise Test Procedure

Step 1. Disconnect the Cable Assemblies from 10 TYCO Model TY720 or TY920 Sprinklers.

Step 2. Connect the Cable Assemblies to ports of 10 EAS-1 Commissioning Devices, placing the On/Off Switch on each in the On position, observing the Green LED on each is lit, and allow the devices to freely hang.

Step 3. Being careful not to exceed the preset fixed temperature threshold for the system, use heating devices to sequentially apply a rapid temperature increase, at least 20°F/minute rate of rise, to nine sprinkler control heat sensors within the test group of 10.

Step 4. Confirm the AUTOPULSE EAS-1 Control Unit indicates nine supervisory signals due to the rapid temperature increase at the nine sprinkler control heat sensors.

Step 5. Confirm the Yellow LED is lit on the EAS-1 Commissioning Devices connected to all nine of the original sprinkler control heat sensors, indicating simulated sprinkler operation.

Step 6. Use a heating device to apply heat to the single remaining sprinkler control heat sensor within the test group of 10.

Step 7. If the system is designed to operate a maximum of nine sprinklers, confirm the Yellow LED is not lit on the EAS-1 Commissioning Device connected to the single remaining sprinkler control heat sensor.

NOTE: Only nine of the 10 EAS-1 Commissioning Devices should indicate simulated sprinkler operation for a typical system. If the system is designed to operate a maximum of nine sprinklers, only nine of the 10 EAS-1 Commissioning Devices should indicate sprinkler operation.

Step 8. Reset the control unit by performing a warm-start, and verify all solid red LEDs on the heat sensors return to a blinking state. Confirm the control panel is in a normal state and is free of error and supervisory conditions.

Step 9. To complete the test, the commissioning devices must be removed to guarantee the non-occurrence of

system false sprinkler activations. Unplug the commissioning devices, and plug the cable assembly back into its corresponding TYCO Model TY720 or TY920 Sprinkler. Turn the switch on the commissioning device to the OFF position to save battery life.

Care and Maintenance

The TYCO EAS-1 Electronically Activated Sprinkler System 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, permission to shut down the affected fire protection system must be obtained from the proper authorities. Notify all personnel who may be affected by this action.

The owner must ensure 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.

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

TYCO Model TY720 or TY920 Electronic Control Pendant 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.

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 sprinkler manufacturer regarding any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Sprinkler

Submit 10 samples or one per cent of the total number of installed sprinklers, whichever is greater, to UL for testing five years after manufacturing, then again at 10 years and followed by annual testing after the 10th year.

Heat Sensor

Test the heat sensor releasing circuitry five years after manufacturing, then again at 10 years, followed by annual testing after the 10th year. During testing, the releasing circuit must be loaded with a TYCO Model TY720 or TY920 Electronic Control Pendant Sprinkler or an equivalent electrical load. A minimum of 10 samples or one per cent of the total installed quantity, whichever is greater, must be tested. For information related to heat sensor testing please contact the Technical Services Department.

Control Unit

The system should be inspected, tested and maintained in accordance with NFPA 72 National Fire Alarm Code and any other requirements of the local authority having jurisdiction. In addition, Johnson Controls recommends attaining peak and average temperature reports from the control unit on a quarterly basis. Reports should be analyzed to make sure there does not appear to be any temperature anomalies.

Training

Training provided by Johnson Controls is mandatory prior to bidding, designing, procurement of components, installation, and maintaining of the TYCO EAS-1 Electronically Activated Sprinkler System. These systems are unique in their intent and design. All parties involved must thoroughly understand the limitations and capabilities of such systems.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local business manager or sales person to request a quote.