

EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration

General Description

The TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration is specifically engineered to provide effective fire protection for an ASRS-A configuration of an Automated Storage and Retrieval System (ASRS).

The sprinkler system for the ASRS-A configuration consists of the following components:

- Addressable heat sensors
- Addressable photoelectric smoke sensors
- Electronic control system
- Electronically controlled sprinklers

The sensors are connected to an electronic control system that continuously analyzes temperature information and monitors for the presence of smoke within the protected area.

In the event 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 development.

Features

- UL Listed components
- Provides focused protection by responding with a grouped sprinkler operation surrounding the fire
- Increases installation flexibility and improves system performance by

allowing heat sensors and sprinklers to be installed for optimal performance

- Delivers rapid response during the incipient stages of fire growth
- Maintains continuous monitoring of integral system components
- Provides ceiling only fire protection for storage arrangements that cannot be protected by traditional ceiling only sprinkler schemes

NOTICE

The TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration 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

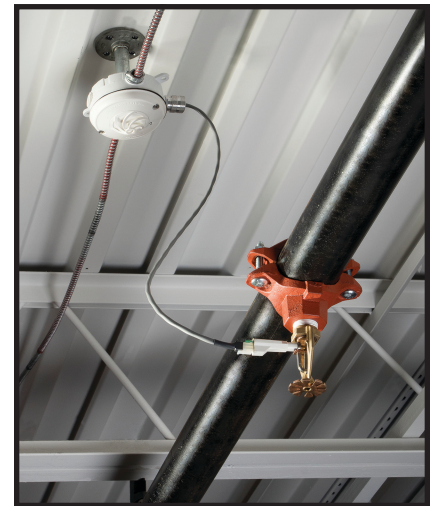
The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Technical Data

Approvals

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

Maximum Working Water Pressure
175 psi (12 bar)



System Components

The TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration is a fully engineered integrated system that requires specific proprietary components for system operation. For a list of the core components, see Table A. For an additional list of recommended components for use with the sprinkler as applicable, see Table B.

Design Criteria

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

Building Construction

The sprinkler system is suitable for use within building construction that can use Early Suppression Fast Response (ESFR) sprinklers based on the requirements of NFPA 13.

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

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
Control Unit	4100-9707AR	EAS-1 Panel (US Version)	579-1385AR EAS-1 Electronically Activated Sprinkler System - Installation and Operating Instructions
	4100-9708AR	EAS-1 Panel (Canadian Version)	
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
Photoelectric Smoke Sensor	4098-9714	AUTOPULSE TrueAlarm Photoelectric Smoke Sensor	T-2016294 AUTOPULSE Multi-Point Peripherals
Standard Sensor Base	4098-9792	AUTOPULSE TrueAlarm Standard Sensor Base	
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	
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 ¹	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	579-1214AR, AUTOPULSE 4100-3113AR IDNet 2 Sprinkler Card, 4100-3111 IDNet Loop Card Installation Instructions
	4100-3111	SIMPLEX IDNet Loop Card ²	
	4100-3109	IDNet 2 Standard Addressable Interface Module	579-1169, Simplex 4100-3109 IDNet 2, 4100-3110 IDNet 2+2 and 4100-3111 IDNet Loop Card Installation Instructions
Algorithm Generator	Not Applicable	Generates custom control equations required to program	EAS-1 ASRS-A Algorithm Generator. Contact Johnson Controls Technical Services for the latest revision

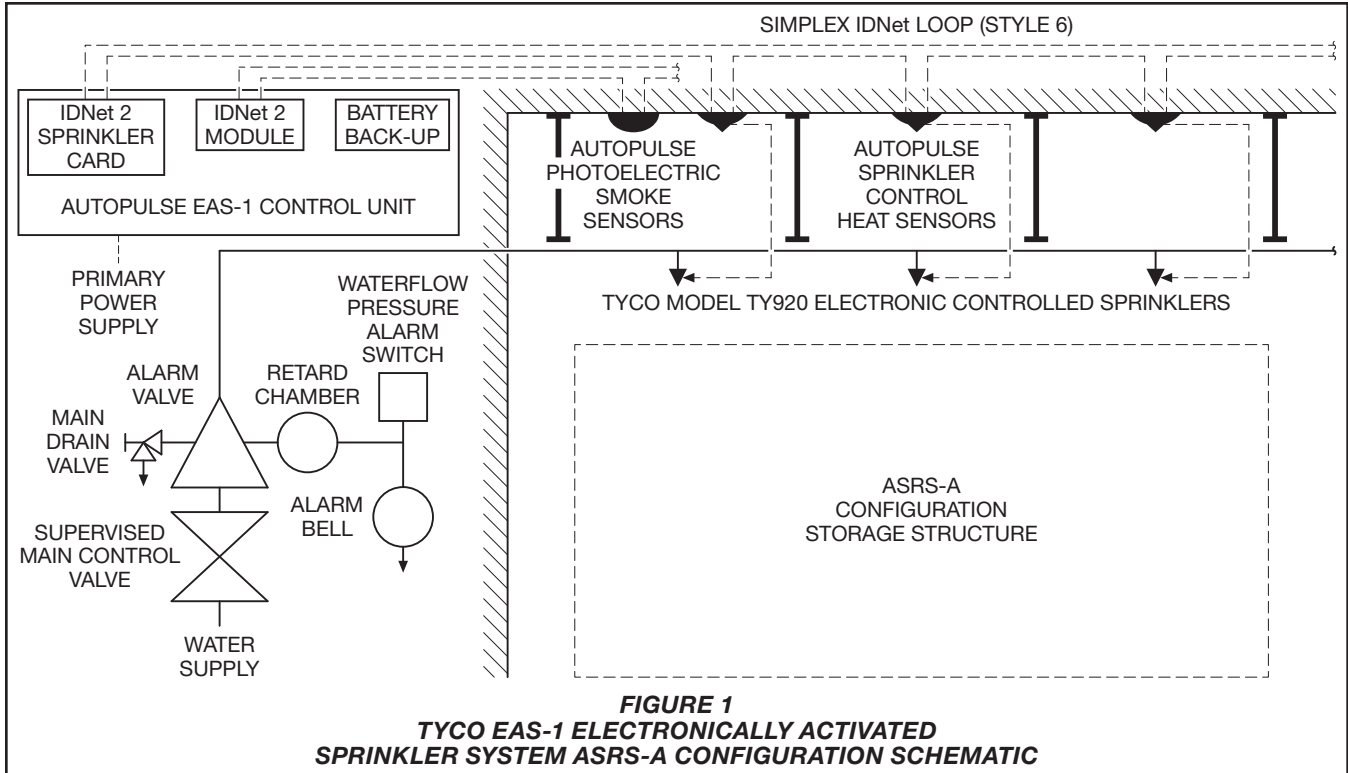
NOTES

1. The Heat Detector Test Head Kit is manufactured by SDI Fire.
2. The SIMPLEX IDNet Loop Card can be mounted on top of either of the following components:
 - AUTOPULSE IDNet 2 - Sprinkler Card
 - IDNet 2 Standard Addressable Interface Module

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



TYCO EAS-1 ELECTRONICALLY ACTIVATED SPRINKLER SYSTEM PROTECTION ASRS-A CONFIGURATION

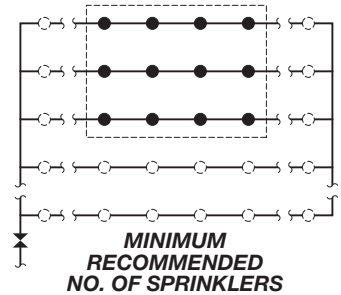
GENERAL GUIDELINES:

When TYCO Model TY920 Sprinklers, paired with AUTOPULSE Sprinkler Control Heat Sensors, are installed to provide ceiling-only protection of storage occupancies containing ASRS-A configuration storage structures comprised of polypropylene plastic bins, up to and including cartoned unexpanded group A plastic commodity in tightly packed vertical and horizontal racking primarily constructed from hollow aluminum components, the installation criteria is as follows:

- Maximum coverage area of 100 ft² (9,3 m²) per sprinkler
- Minimum coverage area of 64 ft² (5,9 m²) per sprinkler

The sprinkler spacing criteria is as follows:

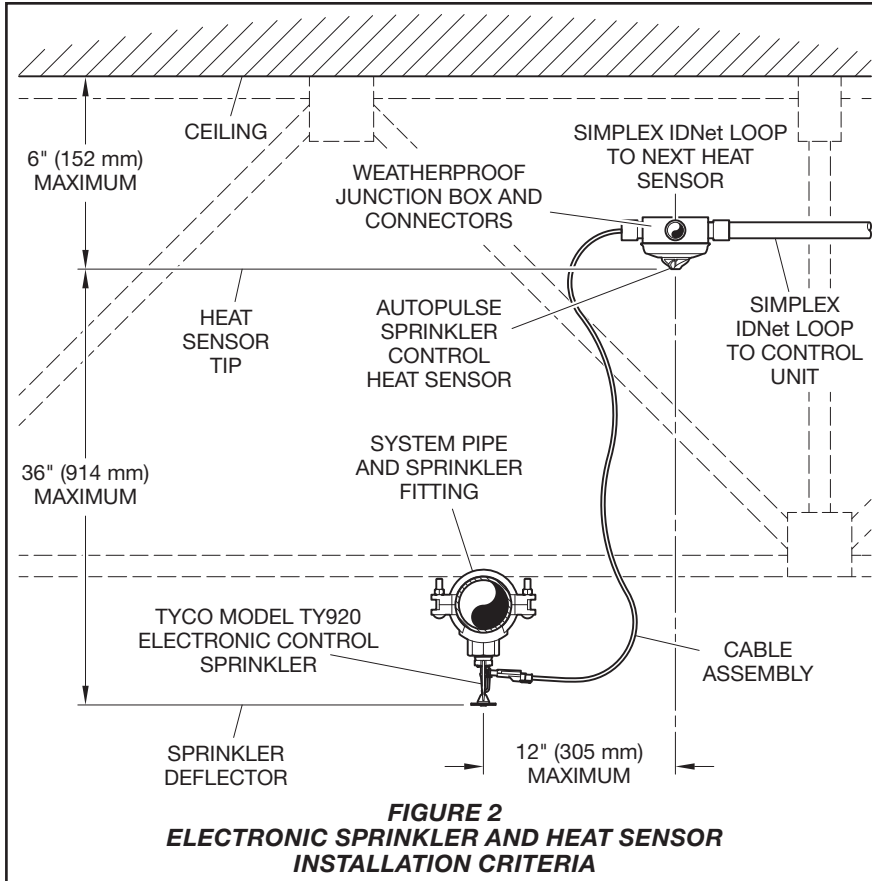
- Maximum spacing shall be 10 ft (3.0 m) regardless of ceiling height
- Maximum spacing shall be 10 ft (3.05 m) for buildings having a ceiling height greater than 30 ft (9,14 m)
- 8 ft (2,4 m) minimum spacing for all construction types



Maximum Ceiling Height ft (m)	Maximum Storage Height ft (m)	Maximum Ceiling to Storage Clearance ft (m)	Minimum Ceiling to Storage Clearance ft (m)	Minimum Deflector to Top of Storage Distance ft (m)	Design Pressure psi (bar)	Hose Stream Allowance gpm (Lpm)	Water Duration ^a min.	Minimum Recommended Number Of Sprinklers
45 (13,7)	29.5 (9,0)	15.5 (4,7)	5 (1,5)	3 (0,9)	60 (3,6)	250	120	12 Sprinklers in 4-4-4 arrangement: 4 on 3 most remote branch lines

NOTES:
a. During full scale fire testing, fire extinguishment was achieved after 120 minutes of sprinkler operation.

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



Hydraulic Design and Water Delivery

Calculate the hydraulic design in accordance with Table C. Base the calculation on a minimum 12 sprinkler design area in a 4-4-4 sprinkler arrangement on the most remote branch lines.

System Piping Layout

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

Electronic Sprinklers

Only TYCO Model TY920 Electronic Control Pendant Sprinklers listed in Table A are approved or installation as part of the TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration. The sprinklers must 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 the TYCO Model

TY920 Sprinkler with a K-Factor of 25.2 gpm/psi^{1/2} (362,9 Lpm/bar^{1/2}) must 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.

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 ASRS-A Configuration can support up to 268 sensor-sprinkler pairs. For installations larger than 268 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 6 in. (152,4 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

Smoke Sensors

The AUTOPULSE Photoelectric smoke 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 6 in. (152,4 mm). Photoelectric smoke sensors must be spaced at a maximum of 30 ft (9,1 m) apart from each other and within the protected area of the sprinkler system.

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) and *AUTOPULSE Multi-point Peripherals* (AUTOPULSE document number 579-1215AR).

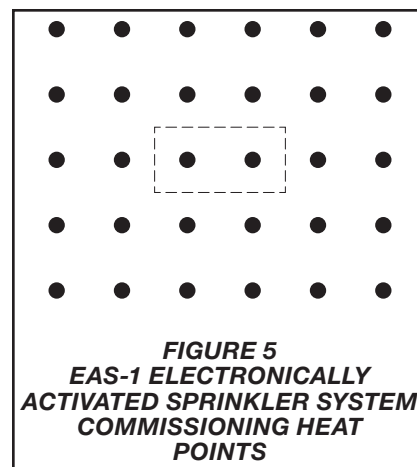
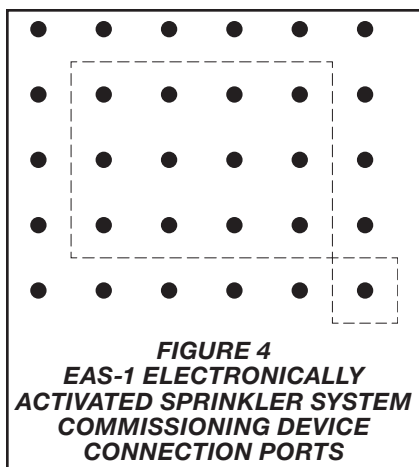
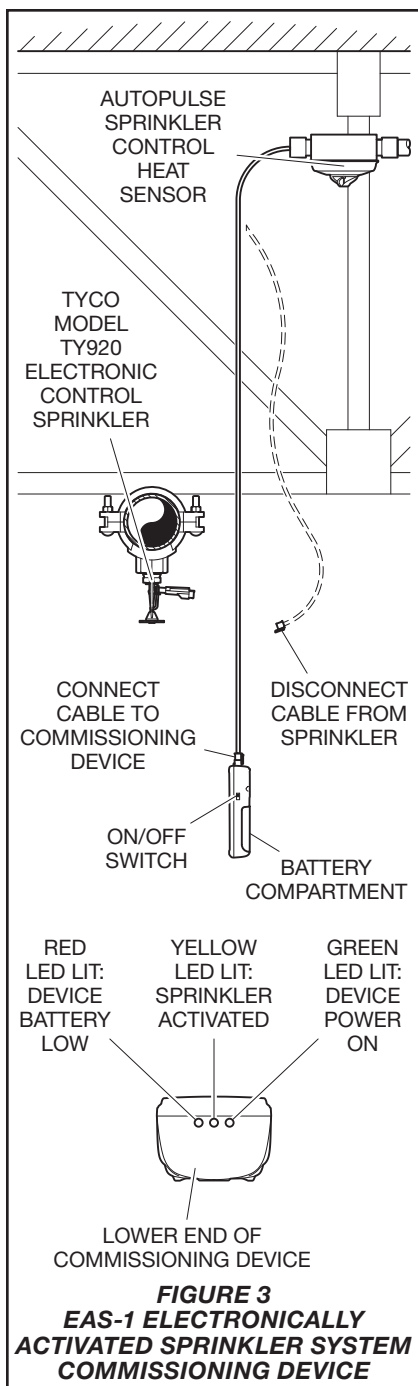
Two separate circuit loops are required for smoke sensors and heat sensors—the smoke and heat sensors must not be in the same loop. The circuit loops must be connected as follows:

- Smoke detector circuit must be connected to the 4100-3109 IDNet 2 Standard Addressable Interface Module
- Heat Sensor circuit must be connected to the 4100-3113AR AUTOPULSE IDNet 2 - Sprinkler Card

For optimal performance, use 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 (AHJ). 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 ASRS-A Configuration is designed to provide connected sprinkler fire protection for buildings containing automated storage and retrieval systems.

Standby Operation

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

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

- environmental conditions
- status of the heat sensors, smoke 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. The control unit reports a system status based on the conditions and status of the connected devices.

System Status

The system status can be as follows:

- NORMAL
- SUPERVISORY
- TROUBLE
- ALARM

The conditions for each status are as follows:

NORMAL

- Temperatures are within the normal range
- Abnormal smoke conditions are not present
- All sensors and sprinklers are ready for operation

SUPERVISORY

- Temperatures are outside the normal range

TROUBLE

- Missing or malfunctioning devices

ALARM

- Smoke is present

The system status 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 and smoke sensors provide information to the control unit about the fire. The software program in the control unit analyzes information from multiple heat sensors and smoke 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

Install the TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration in accordance with this section.

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

Note: Except as noted in this section, all installation criteria provided in NFPA 13 and NFPA 72 applies.

Control Unit

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

Sprinkler

Installation instructions for the Model TY920 Electronic Control Pendant Sprinkler are in technical data sheet TFP326.

Heat Sensor

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

Smoke Sensor

For information about the smoke sensor mounting instructions and wiring requirements, refer to the Installation Reference section of *AUTOPULSE Multi-Point Peripherals* (document number T-2016294).

System Commissioning

Before placing the TYCO EAS-1 Electronically Activated Sprinkler System ASRS-A Configuration in set condition, the system must be commissioned. Commissioning should be performed after all troubles are cleared from the EAS-1 Control Unit and the system is reporting a normal status as indicated on the Control Unit display.

The system commissioning procedure should be performed at least once per system before a system is considered active. As a consequence of the electronic control system, testing and commissioning without activating sprinklers must be conducted using EAS-1 Commissioning Devices, heating devices such as the SOLO-461 Heat Detector Test Head Kit, and a UL and ULC Listed smoke detector tester.

The EAS-1 Commissioning Device has the following features:

- Cable assembly connection port identical to that of the TYCO Model 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

Test Procedure

Complete the following test procedure successfully to commission the sprinkler system.

Step 1. Disconnect the Cable Assembly from a 6 x 5 grid of TYCO Model TY920 Sprinklers.

Note: If a 6 x 5 grid of sprinklers is not available, contact Johnson Controls Technical Services.

Step 2. Connect the inner 12 Cable Assemblies to ports of 12 EAS-1 Commissioning Devices as shown in Figure 4; and connect a single cable assembly from the outer perimeter of the

6 x 5 test array to the port of a single EAS-1 Commissioning Device. Set the On/Off Switch on each commissioning device to the On position, observing the Green LED on each is lit, and allow the devices to hang freely.

Step 3. Use a UL and ULC listed smoke detector tester on a single smoke sensor to prompt the EAS-1 Control Unit to report a fire alarm condition. Once the EAS-1 Control Unit reports a supervisory signal from the tested smoke sensor, proceed to the next step.

Step 4. Use heating devices to simultaneously apply a rapid temperature increase of at least 20°F/minute rate of rise to the inner two sprinkler control heat sensors within the 6 x 5 test array as shown in Figure 5.

Note: If the inner two sprinkler control heat sensors cannot be accessed simultaneously, consult the Johnson Controls Technical Services Department.

Step 5. Confirm the Yellow LED is lit on the EAS-1 Commissioning Devices connected to all 12 of the inner sprinkler control heat sensors, indicating simulated sprinkler operation.

Step 6. Confirm the Yellow LED is not lit on the EAS-1 Commissioning Devices connected to the sprinkler control heat sensor on the perimeter of the 6 x 5 test array.

Note: Only 12 of the 13 EAS-1 Commissioning Devices should indicate simulated sprinkler operation for a typical system. Only 12 out of the 13 Commissioning Devices should be observed with a Yellow LED lit indicating sprinkler operation.

Step 7. Reset the control unit by performing a warm-start, and verify all solid red LEDs on the heat sensors return to a blinking state and that a fire alarm condition is no longer present on the control unit.

Step 8. To complete the test, unplug the commissioning devices, and plug the cable assemblies back into their corresponding TYCO Model TY920 Sprinklers. 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 ASRS-A Configuration 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 TY920 Electronic Control Pendent 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 such as 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 1% 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 TY920 Electronic Control Pendent Sprinkler or an equivalent electrical load. A minimum of

10 samples or 1% of the total installed quantity, whichever is greater, must be tested. For information related to heat sensor testing please contact the Technical Services Department.

Smoke Sensor

Smoke sensors shall be tested in accordance with NFPA 72, the National Fire Alarm Code, and any other requirements of the local authority having jurisdiction.

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 and smoke sensor status reports containing current smoke sensor sensitivity levels from the control unit on a quarterly basis. Reports should be analyzed to make sure there does not appear to be any 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 ASRS-A Configuration. 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.