

# Desigo® Fire Safety Detectors and Peripherals

Multi-Criteria Fire | CO Detector [with *ASAt*technology™]  
Model FDOOTC441

## Architect & Engineer Specifications

- UL 268 7<sup>th</sup> edition Listed, ULC Listed; FM (#3230, #3210), CSFM (#7272-0067:0258) Approved
- Built-in *ISO*technology™
- Competitive 10-year CO sensor lifetime
- Advanced multi-criteria fire detector that has optical thermal and CO sensors
- Differentiates between deceptive phenomena and an actual fire (nuisance-alarm avoidance)
- Compatible with `H'-series devices on the same loop of Desigo Fire Safety FACPs
- Enhanced detection via forward-and-backward light-scattering technology
- Supervisory feature for temperature and CO-concentration-threshold monitoring
- Complies with NFPA 76 (Telco standard) as `VEWFD' high-sensitivity detector
- UL Listed and FM Approved as a multi-criteria and `VEWFD' fire detector
- Low-temperature warning for sprinkler systems, per NFPA 25
- UL 268A Listed for direct air-duct use (4,000 FPM)
- UL 2075 and NFPA 72 requirements for sensitivity self-monitoring
- Remote sensitivity-measurement capability
- Tri-color detector-status light-emitting diode (LED) with 360 ° view
- Polarity insensitive via *SureWire*™
- Responds to both flaming and smoldering-fire signatures
- Supervisory temperature-monitoring feature
- Automatic environment compensation
- Meets UL, NFPA 72 requirements for sensitivity self-monitoring
- Compatible with:
  - Model DB-11-series mounting bases
  - Model DPU (device programmer / loop tester)
- Restriction of Hazardous Substances (RoHS compliant)

## Product Overview

Model FDOOTC441 is an advanced, multi-criteria fire | CO detector that incorporates a redundant optical / thermal sensor. Additionally, Model FDOOTC441 utilizes *ASAt*technology™ a distinctive forward / backward, light-scattering technology that provides high-tech, unparalleled fire detection to the widest range of fire types allowing the detector to distinguish non-threatening deceptive phenomena.

Each Model FDOOTC441 unit is UL 268 7th edition listed incorporating advanced built-in *ISO*technology™ - True Class-X SLC operation (use is optional) greatly improving system reliability and circuit integrity while providing advanced addressable fault finding.

The unit may be programmed as a high-sensitivity detector, with a 0.2 %/ft Pre-Alarm threshold and 1.0 %/ft Alarm threshold thus meeting the requirements of NFPA 76 Standard *for the Fire Protection of Telecommunications Facilities* as a Very Early Warning Fire Detector (VEWFD).

Each FDOOTC441 detector offers a complete and contemporary solution to meet fire and CO life-safety gas-detection specifications. Multi-Criteria Fire / CO Detector detectors can be field programmed for simultaneous and / or independent functionality, depending upon the precise customer and application requirements.

For example, the detector can simultaneously utilize the optical and heat sensors for enhanced fire detection (multi criteria), as well as provide independent outputs for CO gas life-safety and heat detection. Any combination of the sensors is possible.

Each detector is very versatile, and meets the following fire-industry standards:

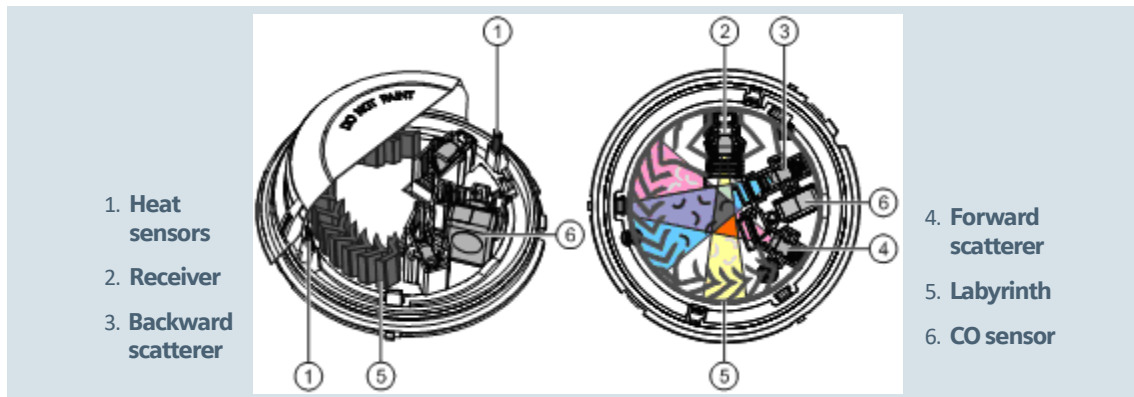
- Multi-criteria fire detector (UL 268 7<sup>th</sup> edition)
- Carbon Monoxide (CO) gas detector (UL 2075)
- Heat detector (UL 521) with five (5) possible field-selectable temperatures; combined with four (4) rate-of-rise options
- Direct, in-duct (plenum) detector (UL 268A)
- Supervisory monitoring for CO levels and temperature ranges
- NFPA 76 (Telco Standard) as VEWFD
- Low-temperature warning signal at 40°F (4.4°C) for sprinkler systems, per NFPA 25 / NFPA 72

For instance, the signals from the detector's sensors are monitored and processed via the *ASA*-patented algorithm technology, which combines the signals into a neural network to create an intelligent, multi-criteria addressable detector.



**Model FDOOTC441**  
Multi-Criteria Fire | CO Detector  
[with *ASAt*technology]





**Model FDOOTC441**

**Forward-and-Backward Light-Scattering Technology (with CO sensor)**

**Product Overview – (continued)**

The encompassing result is an intelligent detector that provides enhanced detection capability to a wide range of products of combustion – while offering unsurpassed rejection to nuisance-alarm sources, including: dust | steam | cooking aerosols and other deceptive phenomena that could cause false alarms. It is known at Siemens as the “No-false-alarm guarantee”.

Since Model FDOOTC441 is a two-wire, addressable device, it is then able to function as a multi-purpose detector – satisfying the revised requirements of UL 268 7<sup>th</sup> edition using smoke, heat and CO gas detection in a singular, aesthetically pleasing package. Comparable to other multi-functional detectors, Model FDOOTC441 also serves as a very cost-effective, viable detection solution that saves on product | installation | maintenance costs. The unit’s value is multiplied with built-in **ISOtechnology** the True Class-X - NFPA 72 compliant SLC isolation feature supporting up to 252 isolation ready devices per loop. When used in mixed mode a maximum of 30 non-isolated devices between isolation devices (wired in polarity-insensitive mode). Each detector fits into one (1) wall-or-ceiling footprint, and only occupies one (1) address on the signal-line circuit (SLC).

A patented forward-and-backward, light-scattering technology, which can distinguish both small and large products of combustion, operates at the core of each Model FDOOTC441 intelligent, addressable CO-with-ASA sensor. Each Model FDOOTC441 detector provides an eco-friendly solution to legacy ionization detectors - eliminating the need for a radioactive source, along with inevitable HAZMAT-disposal requirements. Therefore each detector is capable of detecting both smoldering and flaming fires – all in ecologically efficient manner – and is a valid, RoHS-compliant (Restriction of Hazardous Substances) detection alternative to legacy ionization detectors.

Two (2) thermal sensors, as well as an electromechanical CO sensor, are included, making each Model FDOOTC441 detector a robust, reliable device suitable for the most challenging applications. Additionally, Model FDOOTC441 also works as a carbon-monoxide (CO) life-safety gas detector, compliant with NFPA 72 and UL2075.

**Operation**

**Forward-and-Backward Light-Scattering Technology**

The high-quality, optical-electronic measuring chamber for each Model FDOOTC441 houses the following components:

- Two (2) optical transmitters
- One (1) optical receiver
- Two (2) thermal sensors
- One (1) CO sensor

The transmitters illuminate the smoke particles from different angles: one sensor creates forward scatter, and the other sensor creates backward scatter. The scattered light subsequently reaches the receiver (photodiode) and generates a measurable electric signal. The combination of a forward-and-backward scatter facilitates optimum detection, as well as differentiates between light-and-dark particles / particle size.

This type of detection creates standardized, responsive behavior, therefore optimizing the differentiation between wanted signals and deceptive phenomena. Additionally, the heat sensors make it possible to detect fires without smoke generation.

The CO sensor enables faster detection of fires with incomplete combustion, as well as fires with the development of high levels of CO. The combination of optical, thermal and CO signals optimizes detection reliability.

Additionally, this scenario generates the following advantages:

- ✓ Early detection of all fire types of fire – whether they generate light-or-dark smoke, or no smoke
- ✓ The fire detector can be operated at a lower sensitivity level, thus achieving a higher immunity against false alarms that may otherwise be caused by cold aerosols (e.g. – by smoking, electrical welding, etc.)

In the case of an open fire, the smoke sensitivity is heightened by a temperature increase – a detection-reliability level that is comparable to a wide-spectrum smoke detector – that can be achieved and maintained.

## Operation – (continued)

### Field-Device Programmer / Test Unit

Model FDOOTC441 is compatible with the Siemens field-device programmer / test unit (Model DPU), which is a compact, portable menu-driven accessory for electronically programming and testing these addressable detectors promptly and reliably. For instance, the field technician selects the accessory's program mode, and enters the desired address.

Model DPU eliminates the need for cumbersome, unreliable mechanical programming methods (e.g. – dials and rotary switches), and reduces installation and service costs by electronically programming and testing the detector prior to installation. When set in 'test' mode, Model DPU will perform a series of diagnostic tests without altering the address or other stored data, allowing technicians to determine if the detector is operating properly.

Each field-device programmer / test unit operates on AC power or rechargeable batteries, providing flexibility and convenience in the programming / testing of fire-safety equipment from practically any location. Additionally, with the use of a Model DPU unit, there is no longer a cause for concern with any vibration, corrosion and other deteriorating conditions that could negatively affect any electro-mechanical-addressing mechanism.

### Field-selectable application profiles

Model FDOOTC441 provides 26 user-friendly, field-selectable application profiles, identified with universally known names (e.g. – hotel | Telco | office | parking garage | dormitory | data center, etc.) Refer to installation manual: **P/N – A6V10324657** for a complete list and description of application profiles.

Due to generic-name classifications, no cross-reference tables are required as the application name resides in the panel's configuration tool. This user-friendly feature – along with the algorithms provided by **ASAtechnology** – provides a reliable, field-configurable detector suitable for an array of applications.

### Field-selectable temperature settings

Model FDOOTC441 provides five (5) field-selectable temperature thresholds, ranging from 135°F to 175°F (57°C to 79°C), with fixed and rate-of-rise options. These ranges provide maximum flexibility to program and to easily adjust the temperature settings that suit multi-application needs with a building or in changing environmental conditions.

Model FDOOTC441 can be configured to provide a low-temperature warning signal at 40°F (4.4°C). Additionally, Model FDOOTC441 occupies only one (1) address on the SLC and provides a CO cell end-of-life warning and fault condition meeting NFPA 72 and UL 2075 requirements. This configuration (along with connection to a compatible Desigo Fire Safety Modular | FireFinder XLS/V | FC/FV20–series FACP) meets NFPA 72 requirements for sprinkler-temperature monitoring, and serves to prevent water freezing inside pipes, relative to water-based suppression systems.

### Ambient supervisory feature for temperature-threshold ranges, relative to Carbon Monoxide (CO)

Another significant characteristic for Model FDOOTC441 CO detectors lies in the supervision of ambient temperatures. A specified, unique warning point at a customized temperature threshold ranging from -4°F to 120°F (-20°C to 49 °C) can be set manually. This feature is practical for monitoring of machinery; special processes, or for environments where maintaining a temperature is critical as an early-warning supervisory signal.

Optionally, Model FDOOTC441 also provides supervision of the carbon-monoxide (CO) level selected by the customer. The CO supervision is provided in addition to the normal UL2075 and NFPA 72 alarm levels, and is user-customized for special applications. The range for configuration of each Model FDOOTC441 device to a compatible Siemens FACP is 30 – 600 parts-per-million (PPM).

### CO Detection

In addition to the multi-criteria functionality, each Model FDOOTC441 detector provides an independent CO life-safety signal that meets the requirements of NFPA 72 and UL2075 and meets CO-sensitivity limits under UL2034 Standard. Additionally, Model FDOOTC441 detectors functions from a reliable electrochemical CO cell, transmitting CO concentration on an independent signal separate from the fire-detection signals to the FACP.

This method is especially useful for any building that uses fossil-burning fuel sources, due to the potential of increased CO intoxication risk. Some application examples include: hotel | heating rooms | indoor parking lots and automotive workshops | combustion power plants | chemical labs | production sites.

### Self-monitoring for smoke-sensor sensitivity

Model FDOOTC441 provides an automatic self-monitoring sensitivity check that complies with the NFPA 72 sensitivity requirements. When connected with a compatible FACP, it provides automatic, dynamic sensitivity verification within the agency-listed-and-approved limits. Besides checking for sensor integrity and automatic environmental compensation, Model FDOOTC441 provides a display and report of sensitivity in percent-per-foot (or percent-per-meter) at the FACP.

## Operation – (continued)

### Profile Overview

Each Model FDOOTC441 intelligent detector contains one (1) tri-color LED indicator, capable of flashing any one (1) of three (3) distinct colors: **GREEN**, **YELLOW**, or **RED**. During each flash interval, the microprocessor-based detector monitors the following:

- Smoke in its sensing chamber
- Smoke sensitivity is within the range indicated on the nameplate label
- Internal sensors and electronics

Based on the results of the monitoring, the LED indicator flashes the following:

FLASH COLOR	CONDITION	FLASH INTERVAL [in seconds]
<b>GREEN*</b> :	Normal supervisory operation. Smoke sensitivity is within rated limits.	10
<b>YELLOW:</b>	Detector is in trouble and needs replacement.	4
<b>RED:</b>	<i>Alarm</i> condition	1
<b>NO FLASH:</b>	Detector is not powered.	—

\* denotes LED can be turned OFF

Please follow the corresponding description of the panel used.

A quick visual inspection of the detector can be done at any time since the appropriate color is displayed via the LED indicator found on the detector's faceplate.

## Installation

All Model FDOOTC441 intelligent, addressable detectors use a surface-mounting base (Model DB-11 or DB-11E), which mounts on a 4-inch (10.2 cm.) octagonal, square or single-gang electrical back box. The base utilizes screw-clamp contacts for electrical connections and self-wiping contacts for increased reliability.

The Model DB-11 detector base can be used with the optional Siemens Model LK-11 detector locking kit, which contains 50 detector locks and an installation tool to prevent unauthorized removal of the detector head. Model DB-11 has decorative plugs to cover the outer mounting-screw holes.

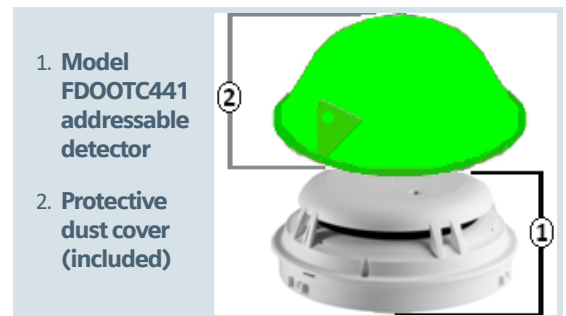
Model FDOOTC441 may be installed on the same initiating circuit with the Siemens Model 'H'-series detectors [when used with Desigo Fire Safety Modular | FireFinder XLS/V | FC/FV20-series FACPs] –

- HFP-11, HFPT-11
- Model 'XTRI'-series interfaces
- Model 'HTRI'-series interfaces
- Model HCP output-control detection devices
- Model 'HMS'-series manual stations
- Model 'HZM'-series of addressable, conventional zone modules

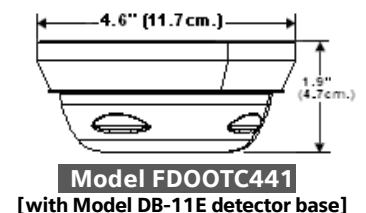
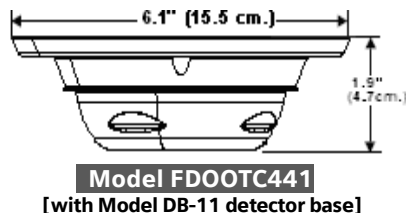
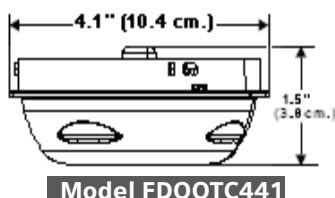
Each detector, which is shipped with a protective dust cover, consists of the following:

- Dust-resistant photoelectric chamber
- Solid-state, non-mechanical thermal sensor
- CO sensor
- Microprocessor-based electronics with a low-profile plastic housing

All Model FDOOTC441 intelligent detectors are approved for operation with the Underwriters' Laboratories-specified temperature range of 32° to 120° (0° to 49°C) – depending on heat-detector configuration (see: installation manual P/N – **A6V10324657** for further details).



## Mounting Diagrams | Dimensions



## Application Data

Installation of Model FDOOTC441 intelligent, addressable detector requires a two-wire circuit. In many retrofit cases, existing wiring may be used. 'T-tapping' is only allowed for Style 4 (Class B) wiring. Model FDOOTC441 is polarity insensitive, thus reducing installation and debugging times. Model FDOOTC441 detectors can be applied within the maximum 30-foot center spacing (900 sq. ft. areas,) as referenced in NFPA 72. This application guideline is based on ideal conditions – specifically, smooth ceiling surfaces, minimal air movement, and no physical obstructions between potential fire sources and the actual detector. Do not mount detectors in close proximity to ventilation or heating and air conditioning outlets. Exposed joists or beamed ceilings may also affect safe spacing limitations for detectors.

Should questions arise regarding detector placement, observe NFPA 72 guidelines. Good fire-protection-system engineering and common sense dictate how and when fire detectors are installed and used. Contact your local Siemens – Fire Safety distributor or sales office whenever you need assistance applying Model FDOOTC441 in unusual applications. Be sure to follow NFPA guidelines and UL Listed / ULC Listed installation instructions – included with every Siemens – Fire Safety detector – and local codes as for all fire protection equipment.

Technical Data	
OPERATING TEMPERATURE:	+32° – +120°F (0° – +49°C)
HEAT DETECTOR RANGE:	+135° – +175°F (+57° – +79°C)
PROGRAMMABLE SUPERVISORY TEMPERATURE WARNING:	-4° – +120°F (-20° – +49°C) (available with compatible FACPs)
PROGRAMMABLE SUPERVISORY CO-GAS WARNING:	30 – 600 ppm (available with compatible FACPs)
DETECTOR SENSITIVITY RANGE:	UL Listed: 0.88 to 3.35% / ft. NFPA 76 (Telco) VEWFD: 0.2% / feet Pre-Alarm; 1.0% / feet Alarm
AIR VELOCITY:	0 – 4,000 feet-per-minute (fpm) Open Area: Direct-in-duct: 0 – 4,000 fpm
AIR PRESSURE:	No effect
ACTIVE, STANDBY CURRENT:	0.75 mA
APPLICATION PROFILES:	26 (field-configurable)
CO CONCENTRATION RESPONSE TIMES	70±5 PPM in 60 – 240 min. 150±5 PPM in 10 – 50 min. 400±10 PPM in 4 – 15 min. <b>NOTE:</b> meets UL2075 Standard, and has been tested to the sensitivity limits defined in UL2034 Standard. Additionally complies with NFPA 72 code
RELATIVE HUMIDITY:	0 – 95% (non-condensing)

Approvals   Standards	
FACTORY MUTUAL (FM)	3210, 3220
CALIFORNIA STATE FIRE MARSHAL (CSFM)	7272-0067:0260
UNDERWITERS LABORATORIOS (UL   ULC)	UL268   UL2034
	UL268A   UL2075
	UL521   ULC-S529   ULC-S530
	NFPA 25 NFPA 72 NFPA 76

Thermal Ratings	
FIELD-SELECTABLE TEMPERATURE PROFILES	
FIXED TEMPERATURE:	135°F (57.2°C)
	145°F (62.8°C)
	155°F (68.3°C)
	165°F (73.9°C)
FIXED TEMPERATURE + RATE-OF-RISE: (R-O-R)	135°F (57.2°C) + R-o-R, 15°F (-9.4°C)
	175°F (79.4°C) + R-o-R, 15°F (-9.4°C)
	135°F (57.2°C) + R-o-R, 20°F (-6.6°C)
	175°F (79.4°C) + R-o-R, 20°F (-6.6°C)
FIELD-SELECTABLE ALARM-THRESHOLD PROFILES	
THRESHOLD:	2.5% / feet
	3.0% / feet
THRESHOLD, VERIFIED:	2.5% / feet
	3.0% / feet

Panel Compatibilities		
MODEL OR TYPE	DATA SHEET	PANEL
XLS	<b>6300</b>	FireFinder® (fire)
XLSV	<b>6340</b>	FireFinder (fire w/ voice)
DESIGO MODULAR	<b>7300</b>	Desigo Modular (overview)
FC2005	<b>6813</b>	Desigo Fire Safety 50-point addressable
FC2025	<b>6815</b>	Desigo Fire Safety 252-pt. addressable (fire)
FC2050		Desigo Fire Safety 504-pt. addressable (fire)
FV2025	<b>6821</b>	Desigo Fire Safety 252-point addressable (fire w/ Intelligent Voice Communication [IVC])
FV2050		Desigo 504-pt. addressable (fire w/ Intelligent Voice Communication [IVC])

Details for Ordering		
MODEL OR TYPE	PART NUMBER	PRODUCT
FDOOTC441	S54320-F8-A1	Multi-Criteria Fire   CO Detector with <b>ASA</b> technology™
Compatible Devices:		
MODEL OR TYPE	PART NUMBER	PRODUCT
ABHW-4B	S54320-F13-A1	Buzzer Version Audible Base (standard 3,000 Hz tone)
ABHW-4BZ	S54320-F13-A2	Audible Base
ABHW-4S	S54320-F14-A1	Sleeping Room Version, 520 Hz Low Frequency Audible Base
ABHW-4SZ	S54320-F14-A2	Audible Base
DB-11	500-094151	Detector Mounting Base
DB-11E	500-094151E	Detector Base, small
DB2-HR	S54370-F12-A1	Detector Mounting Base with Relay
RL-HC	500-033230	Remote Alarm Indicator: 4" (10.2 cm) octagon-box mount, <b>red</b>
RL-HW	500-033310	Remote Alarm Indicator: single-gang box mount, <b>red</b>
LK-11	500-695350	Base Locking Kit
See: <a href="http://www.STI-USA.com">www.STI-USA.com</a> for further details on ordering Model STI-9604		
<b>In Canada order:</b>		
MODEL OR TYPE	PART NUMBER	PRODUCT
DB-11C	500-095687	Detector Mounting Base, ULC Listed

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**NOTICE** – The information contained in this data-sheet document is intended only as a summary, and is subject to change without notice. The product(s) described here has/have a specific instruction sheet(s) that cover various technical, limitation and liability information.

Copies of install-type, instruction sheets – as well as the *General Product Warning and Limitations* document, which also contains important data, are provided with the product, and are available from the Manufacturer.

Data contained in the aforesaid type of documentation should be consulted with a fire-safety professional before specifying or using the product.

Any further questions or assistance concerning particular problems that might arise, relative to the proper functioning of the equipment, please contact the Manufacturer.

**SIEMENS**

## Desigo® Fire Safety

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