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Specifications:

Operating temperature:	$32^{\circ}F(0^{\circ}C)$ to $100^{\circ}F(38^{\circ}C)$,
Storage temperature:	-22°F (-30°C) to 158°F (70°C)
Humidity:	0% to 95% Relative humidity
Air Velocity:	100 ft/min (0.51 m/sec.) - 4000 ft/min (20.32 m/sec).
Footprint dimensions:	L: 10.98 in (279 mm) / W: 6.49 in (165 mm) / D: 3.26 in (83 mm)
Weight:	UG-7-A6O-24V: 0,84kg / UG-7-A6O-120V: 1kg

Electrical	UG-7-A6O-24V	UG-7-A6O-24V	UG-7-A6O-120V			
Power supply voltage:	24Vdc (-5 / +20%) 24Vac (±10%) 50-60Hz 110-120Vac 50-60Hz					
Reset time (by power down):		1 sec. max.				
Power up time:		1 minute				
Sensitivity:		Nominal sensitivity 0.82-1	.05%/ft			
Current requirements						
Max. standby current (no	42mA	82mA	31mA (at 120Vac)			
external equipment attached):						
Max. alarm current:	83mA	145mA	42mA (at 120Vac)			
Link current:	5mA					
Total max auxiliary current	Without linked detectors: 30mA, with linked detectors: 25mA					
output on terminals 2 and 5:						

Contact ratings	
Alarm initiation contacts (SPST)	1.0A @ 24VDC (resistive)
	1.0A @ 120VAC (resistive)
Supervisory contacts (SPST)	1.0A @ 24VDC (resistive)
	1.0A @ 120VAC (resistive)
Alarm auxiliary contacts (DPDT)	10A @ 30VDC (resistive)
	10A @ 250VAC (resistive)
	½ HP @ 240VAC
	¹ / ₄ HP @ 120VAC

PRIOR TO INSTALLING YOUR DUCT DETECTOR

Read this installation manual which provides information on detector placement, wiring, test and maintenance. This manual is also available online at www.calectro.com.

Follow the installation instruction in the installation manual and all applicable local codes including NFPA 72, NFPA 90A, and NEMA Guide for Proper Use of Smoke Detectors in Duct Applications.

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[1] LIMITATIONS OF DUCT SMOKE DETECTORS



The National Fire Protection Association has established that DUCT DETECTORS MUST NOT BE USED AS A SUBSTITUTE FOR OPEN AREA DETECTOR PROTECTION as a means of providing life safety. Nor are they a substitute for early warning in a building's regular fire detection system. Calectro AB supports this position and strongly recommends that the user read NFPA Standards 90A, 72, and 101. UG-7-A6O is listed per UL 268A. This device will not operate without electrical power supplied to it. Fire situations may cause an interruption of power. The system safeguards should be discussed with your local fire protection specialist. This device will not sense smoke unless the ventilation system is operating and the cover is installed. For this detector to function properly, it MUST be installed according to the instructions in this manual. Furthermore, the detector MUST be operated within ALL electrical and environmental specifications listed in this manual. Failure to comply with these requirements may prevent the detector from activating when smoke is present in the air duct.

[2] OVERVIEW OF UG-7-A60 COMPONENTS

Figure 1.



ITEM NO.	DESCRIPTION
1	Test hole plug
2	4 x Delta PT 60x30
3	Cover gasket
4	Cover / label area
5	Smoke detector
6	10 x Delta PT 40x8
7	Smoke detector base
8	Electronics PCB
9	Inner cover
10	Base part
11	Seal gasket
12	O-ring
13	Sampling tube
14	Outer cover
15	End plug
16	Test/Reset button gasket
A1 *	Diverter

* Item A1: Diverter UG-7-DV-T2 for air velocities below 300ft/m. Assembly: Remove the cover (item 4, Figure 1), place the diverter on the air inlet part so it covers half the smoke detector (item 5). Note: Do not use the diverter for application that exceeds 300 f/m.

[3] GENERAL DESCRIPTION

Smoke entering the duct system will be dispersed throughout the whole building. The UG-7-A6O Duct Detectors utilizes the photoelectric sensing method and is designed to sense the existence of smoke in the duct. This design of the housing along with the detector technology is capable of detecting unsafe conditions by sampling the air through the duct, when the smoke is detected, it will emit a signal that will create the urgency for proper action to be taken to turn off circulating fans, blowers and any other auxiliary devices that are connected to the system. The actions taken will enable the management of hazardous smoke through the entire space that is being protected by the duct detection arrangement.

The UG-7-A6O has two versions that operates with 24 VDC/VAC or 120 VAC. The UG-7-A6O-24V for the 24 VDC/VAC and the Model UG-7-A6O-120V for the 120 VAC versions. Alarm and supervisory relay contacts are accessible to interface with control panel, HVAC control, and multiple auxiliary functions including turning off the fan.

[3.1] UG-7-A60 FEATURES:

- High efficient single sampling tube
- Easy to install

[4] DUCT SMOKE DETECTOR KIT CONTENTS

- 1. Detector/power board assembly and covers
- 2. Three metal screws for mounting
- 3. One sampling tube end plug
- 4. Installation manual (this document)

NOTE: Cable glands are not included in the kit.

NOTE: A sampling tube must be ordered to complete the installation. The sampling tube should penetrate approx 90% of the width of the duct. See **Table 4.1** to determine the sampling tube required for different duct widths.

Table 4.1

Sampling tube	Length of sampling tube
ST1	1 ft.
ST2	2 ft.
ST5	5 ft.
ST9	9 ft.

At velocities below 300ft./min the model UG-7-DV-T2 diverter (**Figure 1: Item A1**, ordered separately) needs to be installed for normal operation. For velocities above 300ft./min the model UG-7-T2 diverter is not required for normal operation.

[5] INSTALLATION

Check the air flow direction and velocity. The UG-7-A6O detector is designed to be used in air handling systems with air velocities of 100 to 4000 feet per minute. Duct widths from 6 inches to 9 feet can be accommodated. Follow engineering specifications to ensure that the air velocity in the duct falls within these parameters. The air velocity can be verified by the use of a velocity meter to check the air velocity in the duct.

NOTE: Avoid mounting in places where condensation problems could arise, such as cold attics or outdoors.

[5.1] DETERMINE MOUNTING LOCATION ON THE DUCT

The UG-7-A6O must be installed with the duct air flow direction according to **Figure 2**. The UG-7-A6O can be installed on any side of the duct.

Figure 2

Mounting position

We recommend that the UG-7-A6O is mounted on a distance of approximately 3 times the duct diameter **<u>before</u>** an obstruction such as dampers, filters or bends, and approximately 5 times the diameter <u>after</u> these obstructions as shown in **Figure 3**.

Figure 3

[5.2] MOUNTING OF DETECTOR ON THE DUCT

- Drill a $1\frac{1}{2}$ inch (38 mm) hole where the detector is to be mounted.
- Measure the diameter of the duct.
- The sampling tube should penetrate approximately 90% of the width of the duct. See Section 4 Table 4.1.
- If necessary, shorten the sampling tube and insert the end plug. Figure 5.

NOTE: When installing sampling tubes longer than 2 ft. see Section 5.4

- Insert the sampling tube in the Base Part. Figure 6.
- Secure the sampling tube by fastening the screw. Figure 7.
- Insert the sampling tube in the duct and secure the UG-7-A6O to the duct using the three provided metal screws (Arrows 1,2 and 3). Figure 8.

Figure 5

Do not cut this end

[5.4] INSTALLATION OF SAMPLING TUBE LONGER THAN 2 FT.

Strong vibrations can arise inside a duct due to the air currents. When the diameter of the duct is larger than 2 ft. the sampling tube should penetrate the whole duct. Drill a 2 inches hole in the opposite side of the duct. Mount the rubber gasket HFU204* in the hole. Put on the long plastic end plug HFU640* on the sampling tube. The sampling tube should not protrude more than 1 inch through the duct wall in order to avoid air leakage. **Figure 12.**

* Delivered together with sampling tubes of 5 and 9 ft.

Figure 12

[6] FIELD WIRING INSTALLATION GUIDELINES

All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction. Appropriate wire gauges should be used. Color-Code the conductors used to connect smoke detectors to control panels and accessory devices to avoid wiring problems. Improper connections can prevent a system from operating and responding properly in the event of a fire condition. A minimum 18 gauge wire must be used for signal wiring (when interconnecting detectors or between detectors and auxiliary devices).

[6.1] CONDUIT ENTRIES AND WIRING

The UG-7-A6O is factory prepared with one conduit opening. In case more than one opening is needed, carefully remove the round plastic wall in the selected entry and insert a conduit connector. If the factory prepared opening is not used, it must be properly sealed. **Figure 14a**.

Remove the four screws and lift of the cover according to **Figure 14b** in order to be able to make the wiring. Place the cover back on the housing, and tighten the four screws – for proper mounting, please use torque: 1.8-1.9 Nm.

[6.2] DETECTOR LINKING

UG-7-A6O has linking function that allows interconnection between maximum 100 units. All linked detectors operate independently from each other. The linking function is to be seen as an extra prevention feature that could close dampers or stop fans further away in the ventilation system, before the smoke has reached the places were the linked detectors are installed. Maximum 200 yards cable length between each detector. The detector link circuit must be a loop. This means that the last linked detector must be connected with the first detector. Linking function: When one of the linked UG-7-A6O goes into smoke alarm, all other detectors AUX relays are activated. The smoke alarm can only be reset on the UG-7-A6O that initiated the smoke alarm. This also resets the AUX relays on all linked detectors in the loop. To test the linking function: press and hold the Test/Reset button (or short circuit between terminals 6 and 1) for more than 10 seconds on one of the linked detectors. For wiring information, see Figure 16.

NOTE: Disconnect the power when installing the detector linking function.

Consult Figure 16 and Table 8.1 for more information.

1	G
J	D

Table 6.1

1	GND / Detector Link out-	Common ground for detector link out, +18V AUX and Test/Reset
2	Detector link out + 18Vdc at	Detector link out: 18Vdc out for AUX relay triggering of linked UG-7-
	smoke alarm, max load: 25-	A6O detectors, and/or smoke alarm indication to external accessories.
	30mA	Max load: without linked detectors: 30mA, with linked detectors: 25mA.
3	Detector link in -	Detector link in -
4	Detector link in +	Detector link in +
5	+ 18V AUX, max load:	18Vdc output: operation indication. Without linked detectors: 30mA,
	25-30mA	with linked detectors: 25mA max load.
6	External Reset/Test input	Short circuit to terminal 1 (GND) Test/Reset alarm.
7	Supervisory relay (NC)	Indicates contaminated detector, removed detector or power failure.
8	Supervisory relay (Common)	Indicates contaminated detector, removed detector or power failure.
9	Alarm relay (NO)	Smoke alarm relay.
10	Alarm relay (Common)	Smoke alarm relay.
11	Auxiliary relay 1 (NO)	Auxiliary relay 1: smoke alarm, power failure, Test/Reset and linked
		detectors.
12	Auxiliary relay 1 (Common)	Auxiliary relay 1: smoke alarm, power failure, Test/Reset and linked
		detectors.
13	Auxiliary relay 1 (NC)	Auxiliary relay 1: smoke alarm, power failure, Test/Reset and linked

		detectors.
14	Auxiliary relay 2 (NO)	Auxiliary relay 2: smoke alarm, power failure, Test/Reset and linked
		detectors.
15	Auxiliary relay 2 (Common)	Auxiliary relay 2: smoke alarm, power failure, Test/Reset and linked
		detectors.
16	Auxiliary relay 2 (NC)	Auxiliary relay 2: smoke alarm, power failure, Test/Reset and linked
		detectors.
17	Power supply	24Vac/dc for UG-7-A6O-24V version.
		120Vac for UG-7-A6O-120V version
18	Power supply	24Vac/dc for UG-7-A6O-24V version.
		120Vac for UG-7-A6O-120V version

Figure 16

NOTE 1: 24V Power Inputs accept a non-polarized 24VDC or 24VAC 50-60Hz (UG-7-A6O-24V version). Connect power source to appropriate terminals of each detector. Power supply must not be connected to GND (terminal 1).

NOTE 2: 120VAC Power Inputs accept 110-120VAC 50-60Hz (UG-7-A6O-120V). Connect power source to appropriate terminals of each detector. See specifications for additional power supply information.

NOTE 3: Auxiliary contacts shown in standby position. Contacts switch during alarm as indicated by arrows. Auxiliary contacts are not to be used for connection to the control panel. See specifications for contact ratings.

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NOTE 4: Supervisory contacts indicates: removed, contaminated or power failure. Contacts shown in standby position. Open contacts indicate a trouble condition. See specifications for contact ratings.

NOTE 5: Alarm Initiation contacts shown in standby position. Closed contacts indicate an alarm condition. See specifications for contact rating.

NOTE 6: The detector link circuit must be a loop. This means that the last linked detector must be connected with the first detector. Maximum 100 detectors in a link. Maximum cable length: 200 yards between each detector. Disconnect the power when installing the detector linking function. Polarity must be maintained between all linked detectors to obtain normal operation of the linking function.

[7] MEASUREMENT TESTS

[7.1] METHOD 1: AEROSOL SPRAY FOR AIR FLOW SPEED: 100-275 FPM

This test is aimed toward a system that operates between 100-275 FPM. Additional modifications will be required for a system that operates at higher air velocities that exceeds 275 FPM. This will require drilling an approximately ¼ inch (6.35mm) hole about 3 feet (0.914m) upstream from the duct detector. Measure the air movement through the hole with a velocity meter while the air handler is on, the air velocity should be a minimum of 100 FPM Introduce aerosol smoke into the duct through the ¼ inch (6.35mm) hole by following the instruction on the smoke detector tester and wait approximately 2-3 minutes for the detector to alarm. The detector alarm indicates that air is moving into the detector.

With the air handler on, push the Reset Button (repeatedly if necessary) until the UG-7-A6O remains in Standby condition. This also indicates that the aerosol smoke is ventilated from the detector chamber. Once this operation is completed, the ¼ inch (6.35mm) hole must be sealed off by applying duct tape.

NOTE: Aerosol smoke can be purchased from Home Safeguard Industries at homesafeguard.com, model HO-25S Smoke Detector Tester. Proper use of the canned smoke agent will place the smoke detector in alarm mode. Refer to the manufacture's details and instructions for the proper use of the canned smoke agent.

[7.2] METHOD 2: LOW VELOCITY 100-500 FPM:

This test is intended for low-flow systems (100-500 FPM).

With the air handler on, measure the air velocity with an anemometer. The air speed must be100 FPM or greater. Then use the Dwyer Transmitter (series 607) by following the details provided in figure 16B. The pressure differential across the inlet port and outlet ports of the sampling tube shall be verified to be more than 0.01 inches of water. Measure the pressure difference between the inlet port and outlet ports on the sampling tube with a Dwyer Series 607 Differential Pressure Transmitter. To verify sufficient sampling of ducted air, turn the air handler on. Connect the leads of the meter to either side of the 1K Ω resistor. Allow unit to warm up for 15 seconds. With both HIGH and LOW pressure ports open to ambient air, measure and record the voltage drop across the 1K Ω resistor (measurement A), typical reading is approximately 4V. Use flexible tubing to connect the HIGH side of the transmitter to the inlet port of the sampling tube and the LOW side of the transmitter to the outlet ports of the sampling tube. Measure and record the voltage drop across the 1K Ω resistor (measurement B). Subtract the voltage recorded in measurement A from the voltage recorded in measurement B. The results should be greater than 0.15 volts, and then this indicates that there is enough air flow through the duct smoke detector for proper operation.

[7.3] METHOD 3: AIR VELOCITY GREATER THAN 500 FPM:

First, verify the air speed is greater than 500 feet per minute by using the measurement method described in method 1 above. With the air handler turned on, use a manometer to measure the differential pressure across the inlet port and outlet ports of the sampling tube, this measurement shall be verified to be between 0.0028 to 1.49 inches of water. Please ensure that the end of the tube is completely sealed by use of a plug, or a duct tape in order to obtain proper measurements.

[8] DETECTOR CONDITION INDICATION

Detector condition is indicated by the detector LED, and the corresponding LEDs on the power board. The power board has four separate LEDs to indicate the status of the detector. Refer to **Table 8.1** for more details.

Table 8.1								
Status	Description Detector Power board LED				D	Status of relays		
		LED: red	num	ber			-	
			1 Green	2 Yellow	3 Yellow	4 Red	Terminals open	Terminals closed
Standby	Detector in normal operation						9-10 11-12	7-8 12-13
			241				14-15	15-16
Maintenance	Fixed LED 3: detector is						7-8	12-13
	removed						9-10	15-16
	<u>Flashing LED 3</u> :		, v ,		r v i		11-12	
	detector is contaminated						14-15	
Alarm	Detector detects smoke	4				Δ.	12-13	7-8
			٩Ö₽	dÖr			15-16	9-10
			, v ,	~ v ·		~ V `		11-12
TT 11							7.0	14-15
Irouble	Power failure						/-8	11-12
							9-10	14-15
		•					12-13	
							13-10	
Linked alarm	AUX relays are in alarm						9-10	7-8
from other	mode due to smoke		A A				12-13	11-12
UG-7-A60	alarm from linked UG-7-	-	A A				15-16	14-15
	A6O						-	-

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[9] CONFIRMATION OF OPERATION

[9.1] POWERING THE UNIT

Apply power to terminals 17 and 18: 24 VAC/DC for UG-7-A6O-24V version. 120 VAC for UG-7-A6O-120V version.

[9.2] PERFORM DETECTOR CHECK

Verify that the UG-7-A6O is installed according to this manual and that it is in Standby Status according to **Table 8.1**.

[9.3] SENSITIVITY VERIFICATION

The UG-7-A6O indicates that the smoke detector is contaminated and should be replaced. The indications are: Flashing the amber LED number 3 and opening of the relay contact terminals 7 and 8.

[9.4] DETECTOR CLEANING PROCEDURES

Notify the local and responsible authorities that maintenance is being conducted on the smoke detector system, and that the system will be out of service until maintenance is completed. Disable the zone or system that is under maintenance to avoid unwanted alarms and/or the possibility fire department unnecessary dispatch.

[9.4.1] RELAY TEST – EXCEPT SMOKE ALARM RELAY

Reset/Test Button - Press and hold the test button located on the side of the power board cover. This will deactivate all relays except the Smoke Alarm Relay. Consult **Table 9.1** for more information.

External Reset/Test input shorted (Terminals 1 and 6). This will deactivate all relays except the Smoke Alarm Relay. Consult **Table 9.1** for more information.

Verify the execution of all intended auxiliary functions (i.e. fan shutdown, damper control, etc.).

Action	Description	Detector LED	Power board LED number				Status of relays	
			1 Green	2 _{Yellow}	3 Yellow	4 _{Red}	Terminals open	Terminals closed
Pressed Reset/Test Button or short Terminals 1 and 6	Test of all LED/relays except Smoke Alarm LED/relay		$\mathbb{A}_{q}^{\mathbb{A}}$	${\rm Add}_{\rm Add}$			7-8 9-10 12-13 15-16	11-12 14-15

[9.4.2] SMOKE RESPONSE AND ALARM RELAY TEST

To test the Smoke Alarm Relay and LEDs, open the test hole by lifting the test hole plug. **Figure 19.** Spray aerosol smoke* through the test hole. Wait approximately 20 seconds for the detector to alarm. If the air speed in the duct is high, it may be required to repeat the test due to high dilution of the aerosol smoke. **NOTE:** Verify that the Test Hole Plug is replaced after the test.

Consult Table 8.1 (Alarm status) for more details.

* Aerosol smoke can be purchased from Home Safeguard Industries at homesafeguard.com, model HO-25S Smoke Detector Tester. Proper use of the canned smoke agent will place the smoke detector in alarm mode. Refer to the manufacture's details and instructions for the proper use of the canned smoke agent.

Figure 19

Table 0.1

Test hole plug

Warning:

Use aerosol smoke detector tester with care and by following the manufacturer's recommendations, the aerosol ingredients vary from one manufacturer to another. If the spray is misapplied or excessively applied, it may affect the operation of the duct smoke detector.

[9.4.3] SENSITIVITY TEST

Please use the following test set method to ensure that the detector's sensitivity is within the limits specified below:

- 1. Notify the local and responsible authorities that maintenance is being conducted on the smoke detector system, and that the system will be out of service until maintenance is completed. Disable the zone or system that is under maintenance to avoid unwanted alarms and/or the possibility fire department unnecessary dispatch.
- Use the Truetester portable smoke detector sensitivity measuring device (model number: Truetest 801). This tester is available at: System Distributors LLC, 1345 Campus Parkway, Monmouth Shores Corp Park, Neptune, New Jersey, NJ 07753-6815, Tel: 00 1 7327 519266.
- 3. Disconnect the power.
- 4. Remove the four screws and the cover as described in Section 6.1 Figure 14b.
- 5. *1) Remove the detector head by turning it counter clockwise and lift the detector head.
- 6. Use the UB-6 smoke detector base. This can be ordered from Calectro AB. Please see contact information in this Installation manual.
- 7. Install two 9V batteries in the UB-6 base according to Figure 20.
- 8. Mount the detector head in the UB-6 base.
- 9. Perform the "Fast ramp" sensitivity test with the Trutest device according to the Trutester User Manual.
- 10. The sensitivity range is 3.36 to 4.42%/ft.
- 11. Replace the detector head in the UG-7-A6O by rotating it clockwise into place. ^{*2}) Replace the Detector Cover.
- 12. Replace the four screws by using torque of 1.8-1.9 Nm.
- 13. Restore system power.
- 14. Verify smoke detector functions according to Section 9.
- 15. Notify the local and responsible authorities testing has been completed and the smoke detector system is back in operation.
- *1) Remove the diverter if installed. *2) Replace the diverter if installed. See Figure 1.1

Figure 20

Sensitivity range is 3.36%/ft to 4.42 %/ft.

[10] DETECTOR REPLACEMENT/CLEANING

IMPORTANT: Test and Maintain this detector frequently (minimum once a year) by following NFPA72 Requirements and guidelines

[10.1] DETECTOR CLEANING PROCEDURES

Notify the local and responsible authorities that maintenance is being conducted on the smoke detector system, and that the system will be out of service until maintenance is completed. Disable the zone or system that is under maintenance to avoid unwanted alarms and/or the possibility fire department unnecessary dispatch.

[10.2] DETECTOR CLEANING

If the detector needs to be cleaned do the following:

- 1. Disconnect the power.
- 2. Remove the four screws and the cover as described in Section 6.1 Figure 14b.
- 3. *1) Remove the detector head by turning it counter clockwise and lift the detector head.
- 4. Vacuum the detector head. If necessary, use compressed air to remove dust.
- 5. Replace the detector head by rotating it clockwise into place.
- 6. $*^2$) Replace the Detector Cover.
- 7. Replace the four screws by using torque of 1.8-1.9 Nm.
- 8. Restore system power.
- 9. Verify smoke detector functions according to Section 9.
- 10. Notify the local and responsible authorities testing has been completed and the smoke detector system is back in operation.
- *1) Remove the diverter if installed. *2) Replace the diverter if installed. See Figure 1.1

[10.3] DETECTOR REPLACEMENT

If the detector needs to be replaced do the following:

- 1. Disconnect the power.
- 2. Remove the four screws and the cover as described in Section 6.1 Figure 14b.
- 3. *1) Remove the detector head by turning it counter clockwise and lift the detector head.
- 4. Install a new detector head by rotating it clockwise into place.
- 5. *²) Replace the Detector Cover.
- 6. Replace the four screws by using torque of 1.8-1.9 Nm.
- 7. Restore system power.
- 8. Verify smoke detector functions according to Section 9.
- 9. Notify the local and responsible authorities testing has been completed and the smoke detector system is back in operation.
- *1) Remove the diverter if installed. *2) Replace the diverter if installed. See Figure 1.1

