Panasonic



4402

ANALOG MULTI DETECTOR WITH CO

Fire alarm solutions
technical description

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1. INTRODUCTION

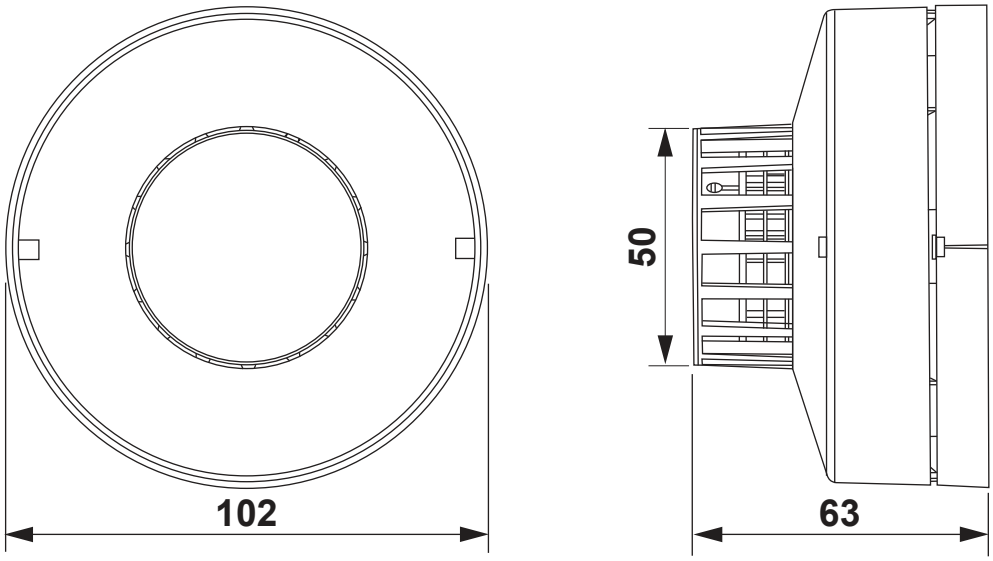
This document describes the Analog multi detector with CO, type number 4402.
The document contains information about the product and instructions on how to mount and connect it.

2. ABBREVIATIONS

CO	Carbon monoxide
IR	Infrared
LED	Light Emitting Diode

3. GENERAL DESCRIPTION

The analog multi detector with CO consists of one photoelectric (optical) smoke detector, one heat detector and one CO sensor within the low profile housing. The heat sensing element is a thermistor and the CO sensor is of chemical type.
The unit is intended for indoor use and in dry premises.



(Measure in mm)

1. LED

3.1. LED

The detector has two red LEDs that are activated (flashing) when the detector is in fire alarm state.
The detector also has a green polling LED.
Via EBLWin, the green polling LED can be set to be blinking (20 ms / 7 s) when the detector is polled or never to blink.

When the detector is in test mode the green polling LED will be turned off, indicating it is in test mode.

3.1.1. ADDRESS SETTING CHECK

The red LEDs will in all modes be blinking every second when the detector is powered and the COM Loop address is not set with the address setting tool, that is as long as the address is “000”.

3.2. IR LED

The smoke detection chamber consists of an IR LED and a photodiode. Reflection of the infrared light is used to detect smoke. The smoke enters the detection chamber through an insect filter and an optical labyrinth. This construction improves the smoke inflow and also causes steam to condense on the outer surface, to prevent nuisance alarms.

4. PLANNING RECOMMENDATIONS FOR 4402

4402 are planned just like optical smoke detectors when it comes to monitoring area. Please follow national regulations.

5. FIRE ALARM

5.1. FIRE JUDGEMENT

Artificial Intelligence uses combined smoke and heat sensing for the fire judgement, as well as smoke + CO. This will secure real fire alarms and minimize the not wanted nuisance alarms, for example due to artificial smoke or oil mist.

The fire judgement is depending on:

- (S) Smoke obscuration %/m
- (T) A fixed temperature °C
- (CO) CO level ppm
- (delta T) Temperature rise °C/168
- (delta S) Smoke rise %/m/60 sec
- (delta CO) CO rise ppm/60sec

5.1.1. ALARM THRESHOLD LEVELS

There are alarm threshold levels (**S**, **T**, **deltaT** and **2S+deltaT**) not only for fire alarm but also for pre-warning and heavy smoke / heat alarm.

The analog multi detector with CO has the following fire alarm threshold levels:

S [%/m]	T [degrees]	ΔT [deg./168sec]	2S+ΔT
3.5	57	18	12

The temperature threshold levels alone will activate the fire alarm but the thresholds levels for smoke also require a rise of CO. A combination of smoke and CO rise will activate the fire alarm if:

- The smoke rise is ≥ 2.5%/m/60sec, CO rise is ≥2ppm/60sec, and the CO level is ≥ 5ppm
- The smoke rise is < 2.5%/m/60sec and the CO rise is ≥2ppm/180sec

5.1.2. ALARM DELAY TIME

The alarm delay time is based on the cause of alarm and the temporary temperature and/or smoke obscuration changes just before and after the alarm threshold level was passed. The delay time before can be shortened up to 50 % (for example from 20 to 10 seconds), or the delay time can be extended in order to reduce nuisance alarms.

The detector has a counter that will start to count when the alarm threshold level is exceeded. The counter starts at 0 and cannot be negative. When the counter value reaches 9 the delay time starts.

SMOKE

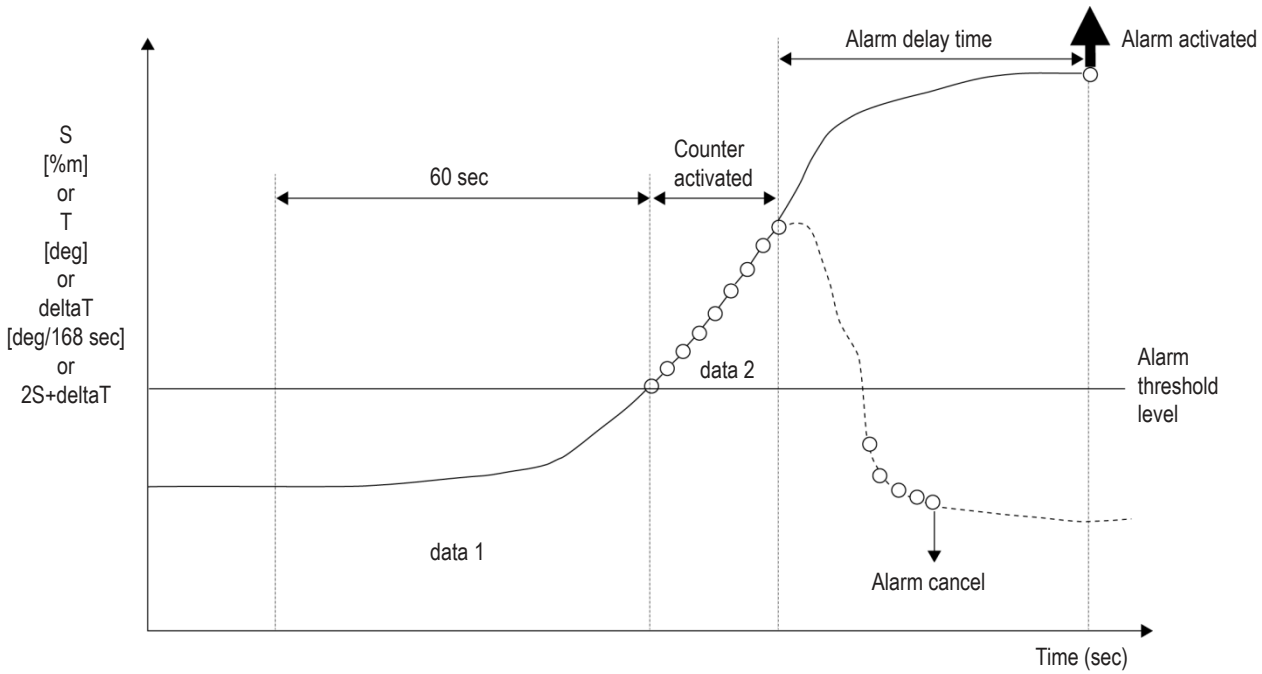
When the smoke obscuration value S exceeds the alarm threshold level the counter value increases by 1 every second.
When S falls below the alarm threshold level the counter value decreases by 2 every second.

TEMPERATURE

When the temperature value T exceeds the alarm threshold level the counter value increases by 3 every second.
When the temperature rise deltaT exceeds the alarm threshold level the counter value increases by 3 every second.
When T or deltaT falls below the alarm threshold level the counter value decreases by 2 every second.

SMOKE AND TEMPERATURE

When **2S+deltaT** exceed the alarm threshold level the counter value increases by 1 every second.
When **2S+deltaT** falls below the alarm threshold level the counter value decreases by 2 every second.



Maximum alarm delay time is 60 seconds.

If the cause of an alarm is **T** or **deltaT** the alarm delay time will be 9 seconds.
The alarm delay time function will be cancelled after 18 seconds if one of the following conditions is true:
S (%/m) > fire threshold level (S) x 2 or **T** (°C) > fire threshold level (T) or **deltaT** (°C/168 sec.) > fire threshold level (deltaT).

Alarm delay time (seconds)				
S Data 1 (%/m)		T	deltaT	2S+deltaT
data 1 < 0.3	45	9	9	data2´/ data2
0.3 ≤ data 1 < 0.4	30			
0.4 ≤ data 1 < 1.4	18			
1.4 ≤ data 1	9			

data1 = The average smoke obscuration value for 60 seconds before the alarm threshold level was passed.
data2 = The sum of the difference between the smoke obscuration value and the alarm threshold level every second during the counter period.

5.2. ANALOG DATA OUTPUT

The smoke obscuration value (%/m), the temperature (°C), and the CO value can be shown via the CIE. A new value is calculated every second. The smoke obscuration value is an average value for the last four seconds.

5.3. SENSITIVITY COMPENSATION

In order to maintain a constant sensitivity regardless of the contamination of the detector, a Contamination Compensation Factor (CCF) is subtracted from the momentary smoke obscuration values before evaluated in the alarm algorithms.
The CCF is calculated during a 36 hours period as follows:
During 13 minutes, all the momentary smoke obscuration values are saved and an average value is calculated. The CCF will be changed directly if the average value is lower than the actual CCF, else no change.
This is valid for 18 hours. Then the CCF will be changed also if the average value is higher than the actual CCF. (It will normally be higher because of contamination.)
After another 18 hours the CCF will be changed if the average value is lower or higher than the actual CCF and it will be saved in the detector's EEPROM.
A new 18 + 18 = 36 hours period starts with an average value calculation every 13th minute.

5.3.1. SERVICE SIGNAL

A service signal will be activated when the detectors CCF value is 2%/m and the detector has to be replaced. A service signal will also be activated 72 months after the CO sensor´s production date.

6. SELF DIAGNOSIS OF INTERNAL DEVICES

The detectors perform an internal check of some vital functions and components (for example the IRLED). A separate fault message will be shown in the CIE.

6.1. TEST MODE

For information about how to set the detector in test mode, see Planning Instructions or Operating Instructions.
When the detector is set in test mode, smoke will activate the fire alarm without CO. This allows the detector to be tested without using CO. It is possible to use test aerosol equipment for testing. For example “SOLO” or “Testifire”.

“Testifire” has support for testing both smoke, heat and CO all at the same time, which makes it possible to test the 4402 without running in test mode. Since 4402 also triggers ONLY heat, it can also be tested with a heat tester.

7. SET THE COM LOOP ADDRESS

Each COM loop unit has to have a unique COM loop address (001-253). The address is set with the Address Setting Tool (4414).

The COM loop address and mode settings have to be done before the unit is connected to the COM loop.

8. SET THE MODE

The mode is set with the Address Setting Tool (4414) according to the table below.

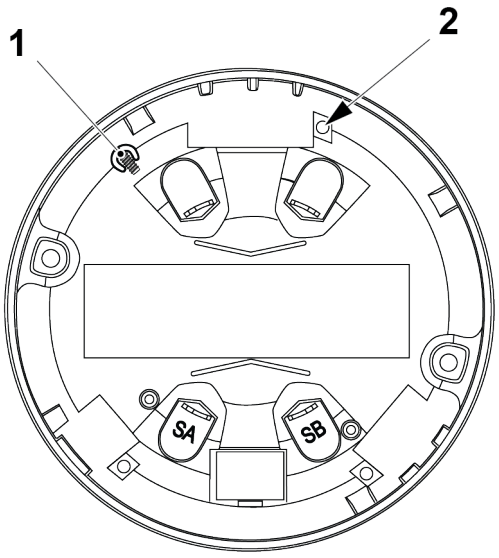
8.1. COMPATIBILITY TABLE

	Advanced mode	NORMAL mode	2330 mode	2312 mode
EBL512 G3	V ≥ 3.0	All versions	Not used	Not used
EBLOne	V ≥ 3.3	All versions	Not used	Not used
EBL128	Not used	All versions	Not used	Not used
EBL512	Not used	Not used	Not used	Not used
Configured as:	-	-	-	-
Isolator in use:	Yes	-	-	-

9. MOUNTING

The detector is plugged in an analog base.

Place the detector in the base with the detector's "Mark" in the same position as the "Mark" on the base and turn the detector clock-wise.



(Measure in mm)

1. Locking screw
2. Locking screw hole (prepared for drilling through detector body)

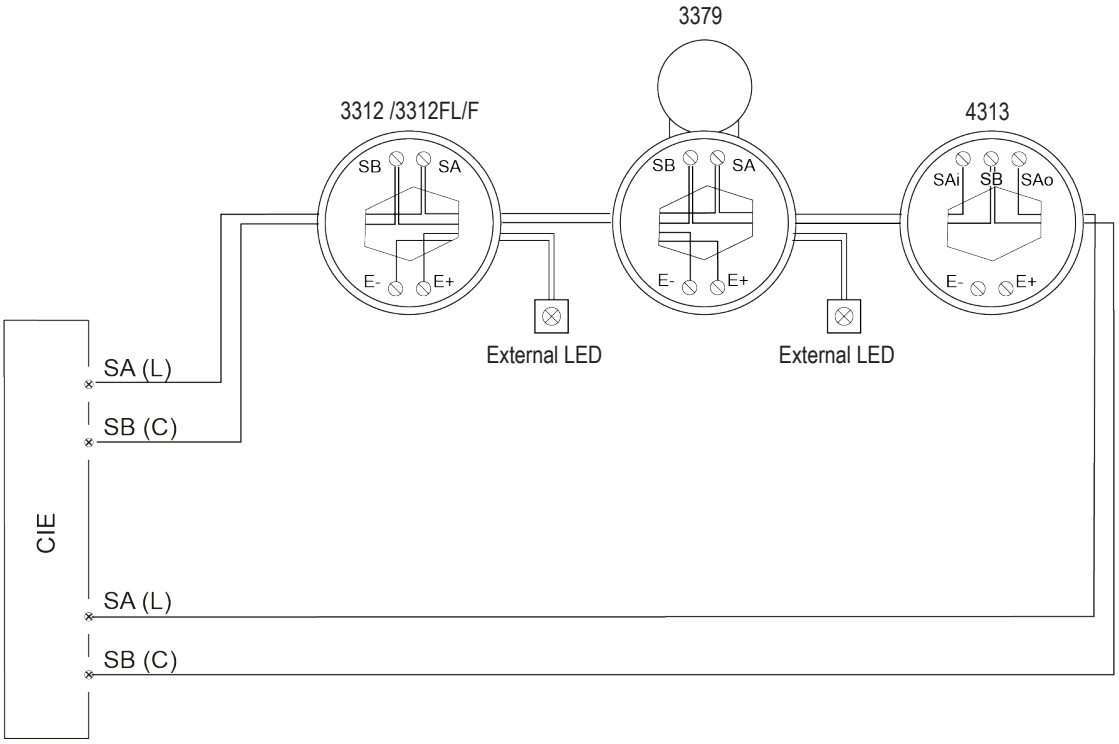
9.1. LOCKING SCREW

The detector is prepared for mechanical locking with analog base 3312x / 4313 / 3379. One hexagon socket screw is attached (1.5 mm Hex key to be used). The locking screw hole (2.5-2.7 mm) has to be drilled.

10. INSTALLATION AND WIRING

The detector is plugged in an analog base 3312x / 4313 / 3379. The COM Loop and external LED are connected to the analog base.

Screen wire termination is not provided.



	3312F / 3312FL	3312 / 4313 / 3379
Wire size (Min)	Ø 0,6 mm (0,3 mm²)	Ø 0,6 mm (0,3 mm²)
Wire size (Max)	Ø 1,2 mm (1,13 mm²)	Ø 1,6 mm (2 mm²)

11. TECHNICAL DATA

All current consumptions are valid by nominal voltage and by 25 °C.

Voltage: Allowed Normal	 12 – 30V DC 24V DC
Current: Quiescent Active (incl. internal LED) Active (incl. external LED)	 0.3 mA (+0.025 if green polling LED is used) 1.3 mA 1.8 mA
Address range	001-253
Address setting	With address setting tool
Short circuit isolator	No
Internal battery	No
Material	Polycarbonate Alloy
Ambient temperature: Operating Storage	 -10 to +50 °C -25 to +75 °C
Ambient humidity	Maximum 95 % RH (Non condensing)
Ingress protection rating	IP41
Size: Ø x H	 102 x 63 mm
Weight:	131 g
Colour	Grey (N8, Munsell colour code)

12. APPROVALS

Applicable directive/ Approval	Applicable standards	Notified body
EMC	EN61000-6-3 (Emission) EN50130-4 (Immunity)	Self declaration VdS
RoHS	EN IEC 63000	Self declaration

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