FIRE AND SECURITY

AUTRO SAFE
Self Verify®

Interactive Fire Alarm System
Release 3

System Specification

AUTRONICA

Protecting life, environment and property...

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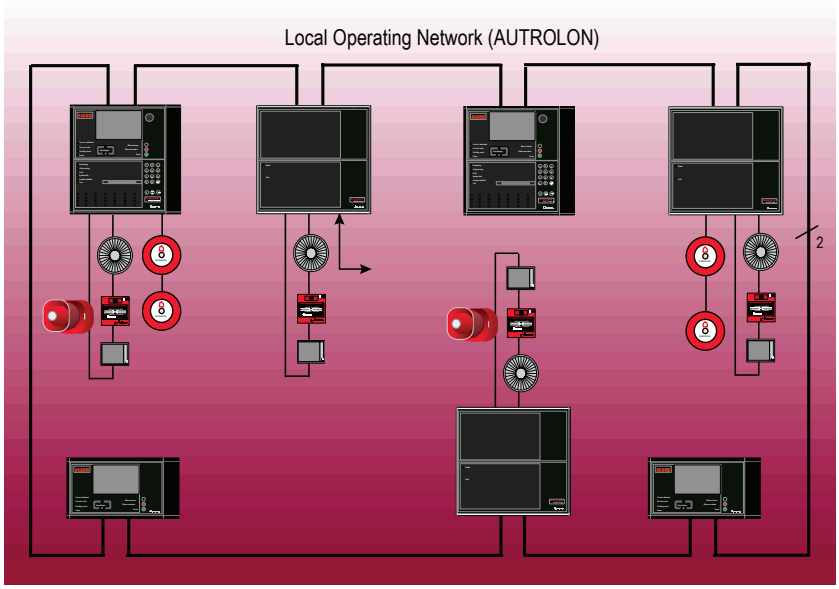
1. System Characteristics

1.1 A System Communicating on a *Local Operating Network (AUTROLON)*

AutroSafe, is a totally distributed fire alarm system, where all system units communicate on a local operating network, called *AUTROLON.* The system complies with C.E.N. EN-54 regulations.

All panels and interfaces will continue to operate even with a single break or short circuit on the AUTROLON.

The system is operated by using one or several operating panels.



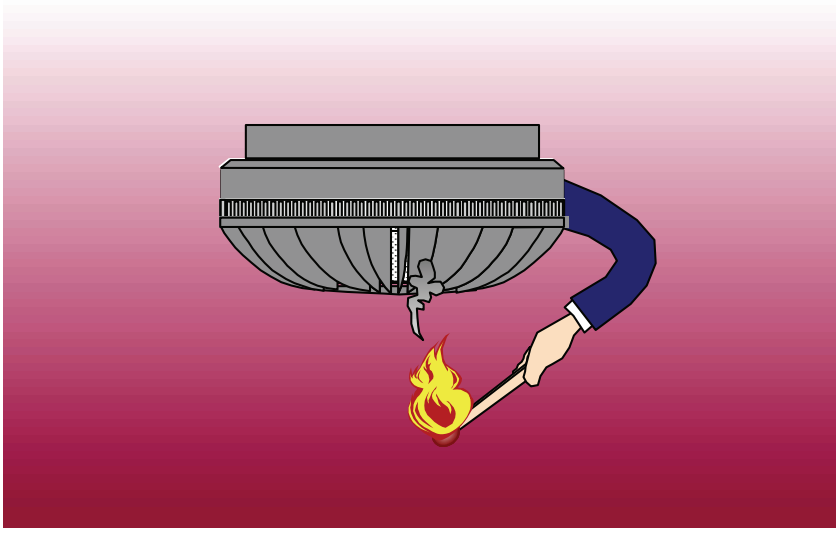
1.2 The *Zone* Concept

All system units are assigned to *zones* during configuration. This allows hierarchical control from the detection to the activation of alarms.

AutroSafe consists of the following three zones: *Detection Zone*, *Alarm Zone* and *Operation Zone*. For further information, see *Chapter 7*, *Zonal Definitions.*

1.3 The *Self-Verifying* Function

AutroSafe features the unique *Self-Verifying Function* which makes the system capable of inspecting and verifying itself every day. Every day the system completely checks all detectors, interfaces, connections and cables - from detector chamber through to the alarm output.



In the event of any irregularities, the display on the operating panel will pinpoint the source of a problem, clearly and concisely.

Up to now, fire alarm systems have depended on careful manual inspections, involving a number of problems. For example, the detectors may be out of reach, the service engineer may not have access to particular areas, the detectors may not have been installed according to drawings etc. Even a manual test is not 100% reliable. Test gas or smoke is rarely used in calibrated quantity, even a faulty detector can eventually react if its chamber is filled with enough smoke.

AutroSafe SelfVerify will solve all maintenance problems. Time-consuming, difficult and costly manual inspections are no longer needed.

AutroSafe SelfVerify not only tests whether a detector is capable of provoking an alarm - it even verifies the *sensitivity* of each individual detector with a calibrated signal. The system ensures that each detector will always respond to the correct alarm level.

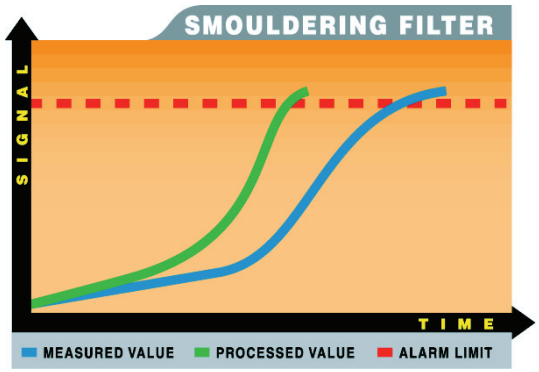
1.4 Interactive Detectors with *Dynamic Filtering (DYFI+)*

The digital filter technology *DYFI* has been greatly improved - and is now called *DYFI+*. False alarms are virtually eliminated, and the system provides the earliest possible warning of a potential fire - before it becomes a problem.

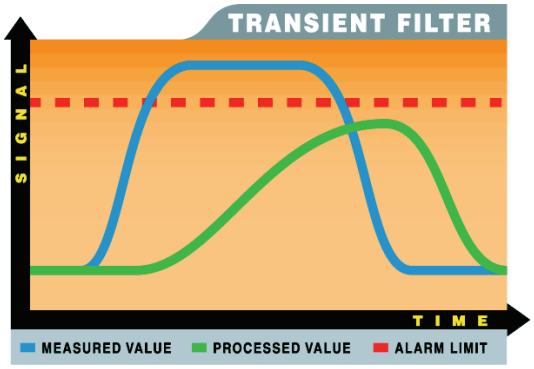
The *DYFI+* digital filtering is now present in each detector. This means that each individual detector processes the detector signals with even greater accuracy than before, and detects temperature and smoke variations faster than ever.

Each detector has three different filter functions:

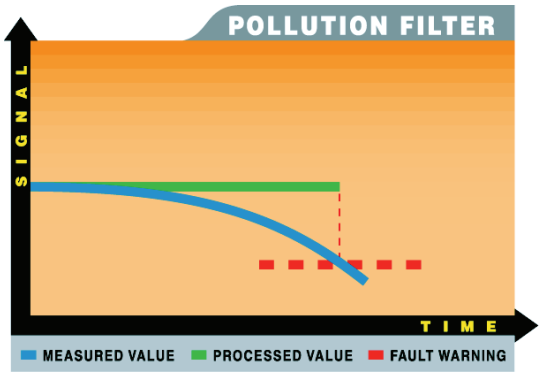
The *smouldering fire filter* provides accurate and quick detection in the event of a smouldering fire, i.e. in a situation where a potential fire with no flames develops during a longer period.



The *transient filter* virtually eliminates false alarms caused by phenomena that are not related to a real fire. Such phenomena can be short pulses caused by, for example, vapour, cigarette smoke etc.



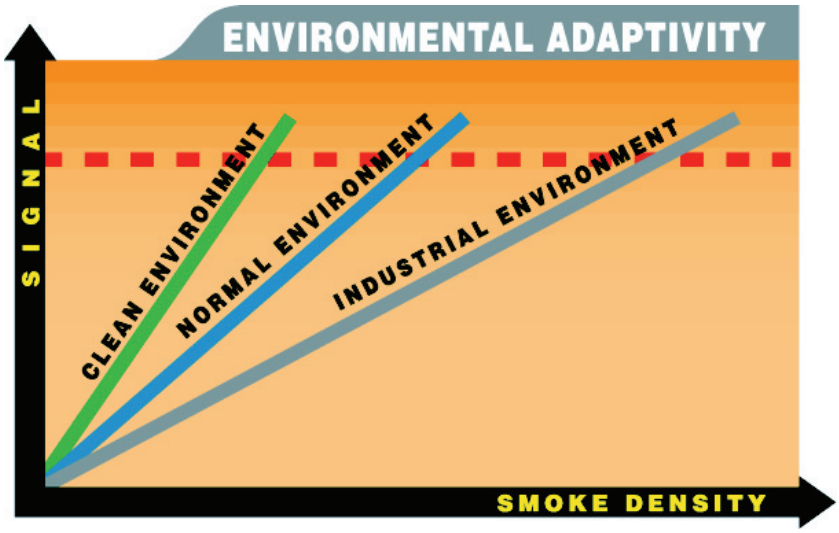
The *pollution filter* maintains the chosen sensitivity throughout the detector's entire lifetime, even with a polluted detector. If the pollution reaches a preset limit, this event will be recorded in the log (*Log Faults*).



1.5 Environmental Adaptivity

The AutroSafe detectors* can be programmed to one of three different *Performance Classes*, with sensitivity settings covering the following environments:

- *clean environments*, for example laboratories, data rooms etc.
- *normal environments*, for example offices and hospitals etc.
- *industrial environments*, for example, factories and warehouses etc.



By choosing a sensitivity setting that suits the environment, it is possible to achieve an accurate and reliable system, providing the optimal detection, whilst virtually eliminating false alarms.

All three different sensitivity settings comply with the C.E.N. regulations EN-54.

** Not yet implemented.*

1.6 The Multisensor

The highly advanced *MultiSensor* has many advantages. In situations where it may be difficult to choose the correct type of detector, the use of this all-round detector will ensure the optimal detection, and eliminate false alarms.

Each MultiSensor detector consists of two sensors, one for thermal and one for optical detection. A small change in the temperature will increase the sensitivity of the optical sensor, achieving the earliest possible detection of a potential fire. Typical applications are, for example, in industrial, maritime and off-shore installations where there is a potential flaming and smouldering fire hazard.

By means of the AutroSafe Configuration Tool the MultiSensor detector can be manually set to one of three different Operation Classes, allowing you to choose the MultiSensor's detection method and calculation.

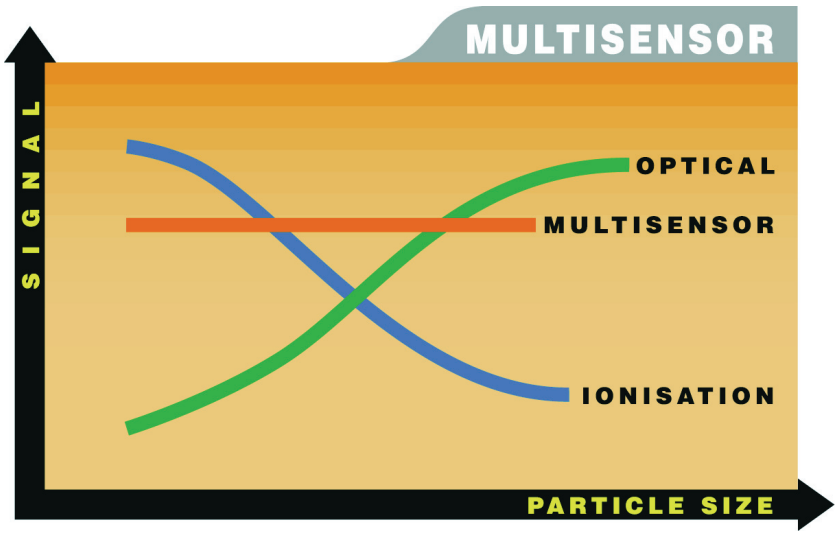
AutroSafe release 3.7.0 introduces the "Change of Operation Class Input (COCI)" that is used to change the Operation Class for MultiSensors also during normal operation.

The Operation Classes are as follows;

- MultiSensor (optical detection with heat enhancement)
- Heat only (thermal detection only) - class A1
- MultiSensor with Heat (a combination of optical detection with heat enhancement *and* Heat class A1)

To avoid unwanted alarms during welding operations in the area covered by the detector, for example, the optical element can be disconnected by using Heat only – class A1.

As the MultiSensor has a characteristic similar to ionisation smoke detectors, there is no longer any reason to use ionisation smoke detectors. Due to contamination from radioactive isotopes, destruction and storage of ionisation smoke detectors are prohibited in many countries. By choosing the MultiSensor detector, such problems are eliminated.



1.7 Automatic Addressing of Detectors

During production, each detector is given a unique *Production Number* which stays with the detector for its entire lifetime. This production number includes the type of unit, plus a manufacturer code and serial number.

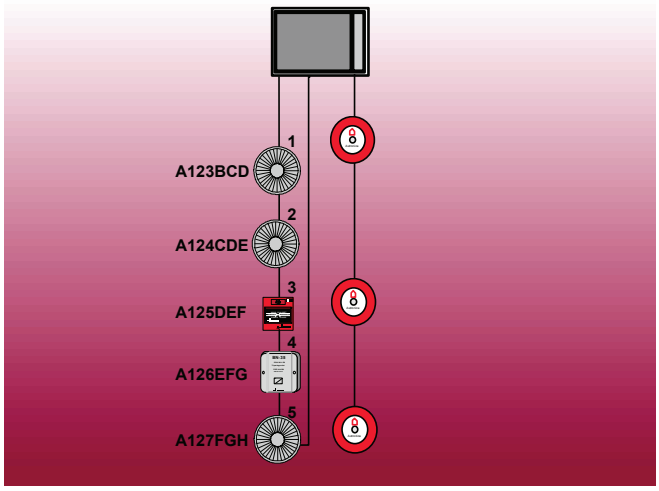
Full system configuration of the AutroSafe system is carried out from a service computer. The system provides a user-friendly graphic presentation on screen, allowing you to easily configure the system topology and enter system parameters.

The *addressing* of the loop units can be performed in two different ways. The procedure to be used will depend on whether the *installation* (the cable layout and positioning of units) *is known or unknown*.

In situations where the *installation is known*, the loop topology can easily be organized by using garaphical remedies in the configuration program. In addition, a system specific *Tag Name* is assigned to each Loop Unit location.

In situations where the *installation is unknown*, it is still possible to easily configure the system, simply by assigning the *Production Number* to each *Tag Name*, manually or by use of auxiliary equipment, for example, a bar code reader.

When powering up the system, each detector will automatically register its position within the individual loop. Customer specified information (text) may be entered for each detector.



All changes in the detection loops will immediately be registered by the system. The detectors in the loop will be renumbered sequencially according to the changes, but the detectors will keep their individual settings and data.

When a detector is replaced, the new detector will automatically adopt the original detector's parameter settings and data.

1.8 Monitoring and Security on the Detection Loop

The *Loop Driver Module* functions as a modem for data exchange between the control system and the detection loop.

In addition to its main function, the Loop Driver Module provides two important monitoring and security features; a *built-in short-circuit isolator* and the *Fail_Safe function*.

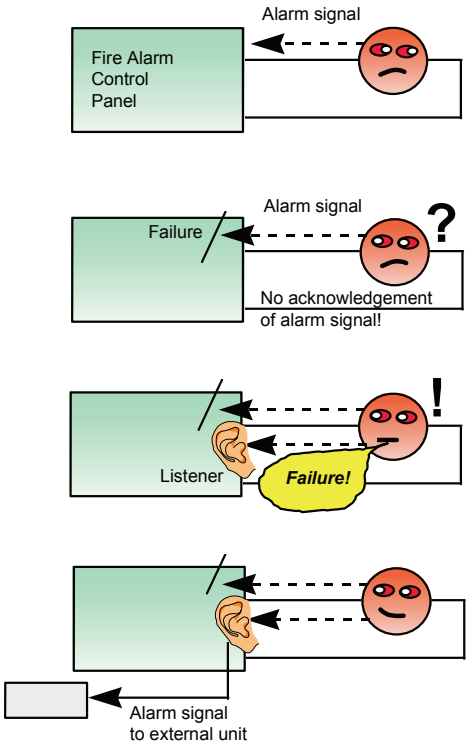
1.8.1 Built-in Short-circuit Isolator

The loop resistance on the detection loop is continously monitored to register a possible break or short-circuit on the detection loop. Each individual detector has a built-in *short-circuit isolator*.

In the event of a short-circuit in the detector cable, the short-circuit location will be isolated as the short-circuit isolator will be activated in the detectors on either side.

1.8.2 Fail_Safe Function

Each Loop Driver Module includes the *Fail_Safe function.* The function ensures that alarms are routed to an external unit in case of a failure (hardware / software failure on a Fire Alarm Control Panel / Controller or an internal communication failure).



When a detector enters an alarm condition, it transmits an alarm signal to the Fire Alarm Control Panel.

If the detector does not receive an acknowledgement to this alarm signal in case of a failure, it will send a message "telling" that there is a failure.

The message is detected by a separate *listener* within the Fire Alarm Control Panel which then activates a separate control output (F/S). This control output will then send the alarm signal to an external unit.

2. System Design

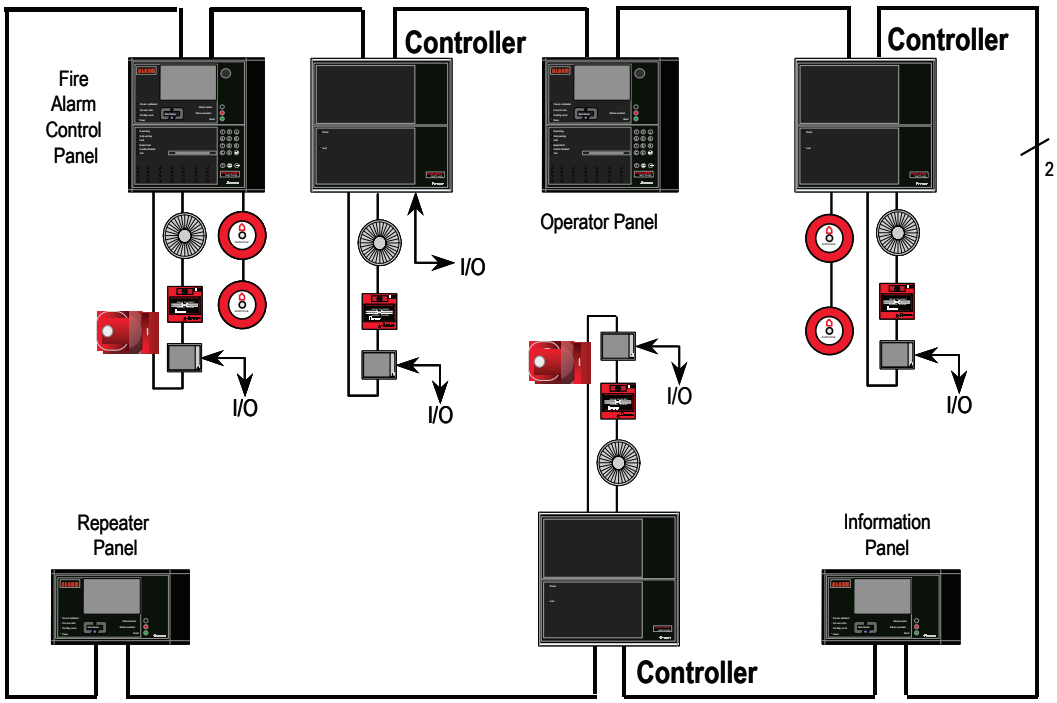
2.1 Example of a Complete System

The illustration below shows an example of a complete system where all system units are communicating on a local operating network *(AUTROLON)*. For compliance with C.E.N. regulations (EN-54), and for optimum safety, the AUTROLON must be installed as a *ring loop*.

A maximum number of 32 system units can be connected to each AUTROLON ring.

The recommended cable type on the AUTROLON is Category 4 or 5 cable, for example, ABB art. no 10892 30 "CAT.5 UTP 4x2/0.5mm^2 DATAKAB.

AUTROLON - Ring Loop

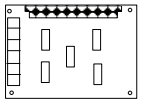
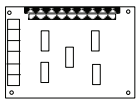
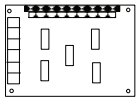
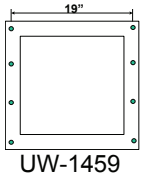
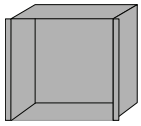


2.2 Definitions

- A *System Unit* is defined as a unit that is directly connected to the local operating network; *AUTROLON*.
- A *Loop Unit* is defined as either a *Point*, an *I/O-unit* or an *Electronic Sounder* that is connected to a detection loop.
- A *Point* is defined as either a *detector* or a *manual call point*.

2.3 System Units on the AUTROLON

System Units on AUTROLON		Main Function	Description
Fire Alarm Control Panel	 BS-310 / 320	BS-310 / 320 is a complete fire alarm control panel with full operating capabilities. The panel serves as a operating panel for one or several defined *operation* zones. All alarm handling and system features can be controlled and monitored from the panel.	The panel can accommodate up to a maximum of 12 modules. The system offers Loop Driver Modules (maximum 6) for detection loops and several types of I/O modules for monitored outputs, open collector outputs, galvanic isolated inputs and monitored inputs. With a LON interface the control panel can communicate with other system units on the local operating network, AUTROLON. This interface is standard in BS-320, and not included in BS-310. The operator panel is menu operated on a 16 lines display with 40 characters per line. A built-in printer is available. The unit has a 220 VAC / 3A power module for battery charging and a built-in emergency battery.
Operator Panel	 BS-330	The Operator Panel serves as a operating panel for one or several defined *operation* zones. All alarm handling and system features can be controlled and monitored from this panel.	The panel communicates with Controllers and the entire system via the AUTROLON local operating network. The operator panel is menu operated on a 16 lines display with 40 characters per line. A built-in printer is available. External 24V supply is required.
Controller	 BC-320	The Controller serves as a connection unit for Loop Driver Modules, I/O modules and power supply.	The unit can accommodate up to a maximum of 12 modules. The system offers Loop Driver Modules (maximum 6) for detection loops and several types of I/O modules for monitored outputs, open collector outputs, galvanic isolated inputs and monitored inputs. The unit has a 220 VAC / 3A power module for battery charging and a built-in emergency battery.
Repeater Panel	 BU-320	The panel allows you to operate alarms related to the relevant *operation* zone.	The panel is used to silence sounders and to reset alarms within a defined operation zone. The whole system can be reset from this panel, provided that the panel's relation to the operation zone is defined this way. The display has space for 16 lines at 40 characters per line and shows detailed information on alarms. External 24 VDC Power is required.
Information Panel	 BV-320	The panel serves as an indication device only. It provides information related to the defined *operation* zone(s).	The panel offers buttons for scrolling through events and a button for silencing the internal buzzer. The display has space for 16 lines with 40 characters per line and shows detailed information on events. External 24 VDC Power is required.

System Units on AUTROLON		Main Function	Description
Battery Cabinet	 SY-310	The battery cabinet provides charging voltage for 24VDC batteries.	The cabinet accomodates up to two batteries with a maximum capacity of 24 VDC / 24 Ah. It includes fuses and terminal blocks for cable connection. To obtain capacities greater than 24 VDC / 24 Ah, several batteries can be placed in an additional cabinet.
LON Interface	 EAU-310/B	The LON interface is used for communication between the system units on the local operating network, AUTROLON.	The interface is standard in BS-320, and not included in BS-310.
Serial Port Communication Board	 EAU-321	Used as a RS-232 communication port for interfacing AutroSafe to other systems with the AutroCom Protocol.	The board is used in Fire Alarm Control Panel BS-320 or the Controller.
Ethernet Communication Board	 EAU-330	Used as a interface to AutroMaster 5000. Multiple AUTROLON rings can be connected to AutroMaster 5000.	The board is used in Fire Alarm Control Panel BS-320 or the Controller BC-320.
19'' Rack Mounting Plate	 UW-1459	Mounting plate used for rack mounting of Fire Alarm Control Panel (BS310/320) in a 19'' rack.	
Empty Cabinet for BS-310/320, BC-320 or SY-310	 UE-1522	Used for flush mounting in wall.	
Printer for BS-310/320/330	BUP-310		

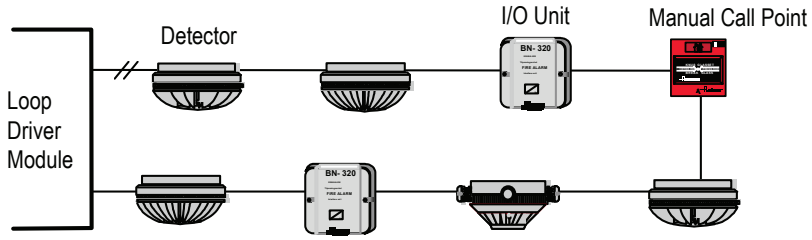
2.4 Detection Loops

The detection loop is connected directly to the Loop Driver Module. A maximum of 6 Loop Driver Modules can be installed in one Controller or Fire Alarm Control Panel.

The detection loop must be wired as a *loop*. This installation method provides optimum safety. The cable for the detection loop must be in accordance with local/national regulations.

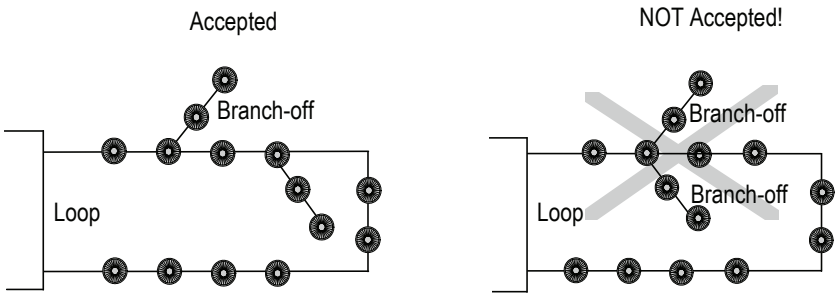
Note that all types and series of AutroSafe detectors, manual call points and I/O units can be connected to the same detection loop.

Detectors, manual call points and input/output signals are freely programmable during system configuration.



Branch-off
For optimum safety and as a general rule, the detection loop must be wired as a *loop*. If necessary, a *branch-off* can be connected to a detection loop if the existing cable layout requires this, but this is *not* recommended, as the safety will be reduced. To ensure a correct addressing of the detectors on a branch-off when configuring the system, *there can not be more than one branch-off per detector.*

For safety reasons, the number of detectors on each branch-off must be kept to a *minimum* (a maximum of 32 detectors on each branch-off), as the detectors on a branch-off will not operate in case of a break og shortcuit on the branch-off.



2.5 Loop Units on the Detection Loop

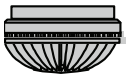
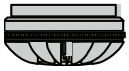
The AutroSafe System offers a wide range of fire alarm detectors, manual call points and input/output units, with or without the *Self-Verifying Function* (SV-function).

The system offers the choice of the following three main series:

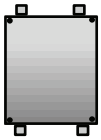
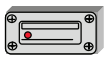
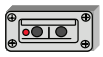
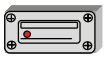
- *Series 200*, standard interactive addressable units.
- *Series 300* with SelfVerify, interactive addressable units.
- *Series 500* with SelfVerify, interactive addressable units designed for use in heavy-duty applications and hazardous areas.

The system also offers *Ex ia-approved* versions intended for high-risk applications. These units are marked with the suffix /Ex. Smoke detector *series S* comprise special *high sensitive* smoke detectors

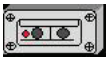
Both input and input/output units are also available with the SV-function. Input units can also be delivered in series 500 and 500/Ex.

Detectors on the Detection Loop		Application / Main Function	Description
MultiSensors	 BH-220 BH-320 BH-520 BH-520/Ex	Typical applications are, for example, in industrial, maritime and off-shore installations where there is a potential flaming and smouldering fire hazard. For detection of smoke and rising temperature.	Combines scattered light measurement in the detector chamber with temperature measurement by means of a thermistor. Comprises a built-in alarm indicator (LED). Short circuit isolator in each detector*. Protection degree IP-44D.
Optical Smoke Detectors	 BH-200 BH-300 BH-500 BH-500/Ex	For detection of combustion gases mainly consisting of visible (large) particles.	Measurement of scattered infra red light in a measuring chamber. Short circuit isolator in each detector*. Built-in thermistor for registrating of temperature where the detector is installed. Comprises a built-in alarm indicator (LED). Protection degree IP-44D.
Heat Detectors	 BD-200 BD-300 BD-500 BD-500/Ex	Used in areas where smoke detectors can not be used due to possible false/unwanted alarm problems.	Grade 1 detectors. Comprises a built-in alarm indicator (LED). Short circuit isolator in each detector*. Series 200, 300, 500: IP-44D
High Sensitive Smoke Detectors	 Series S	High sensitive smoke detectors (S-variants).	The system offers these S-variants in series 500, 520 and Ex-approved versions. Short circuit isolator in each detector*. Protection degree IP-44D.
A conduit box (BWP-100) for watertight cable entry is available.			

* Each individual detector has a built-in *short-circuit isolator*. In the event of a short-circuit in the detector cable, the short-circuit location will be isolated as the short-circuit isolator will be activated in the detectors on either side.

Other units on the Detection Loop		Application / Main Function	Description
Loop Interface Unit for AutroSense	 BNX-5	The plug-in unit is used for interfacing the aspirating detector AutroSense 100 or AutroSense Quadra.	Each slave detector interfaced with AutroSense 100 requires 1 BNX-5. AutroSense Quadra requires 1 BNX-5 per pipe.
Loop Interface Unit for AutroBeam 100	 BN-40A/3	The unit is used for interfacing the AutroBeam 100 detector.	The unit requires separate 24V DC supply. Conforms to IP-54 / IP-67.
Disable Input Unit with push buttons	 BW-200	The unit is used to disable one or a number of detection zones.	The disablement time is configurable (AutroSafe Configuration Tool). A Disablement button is used to activate the disablement. An Enablement button is used to enable the disbled detection zones during the disablement time, i.e. before the disablement time automatically expires. Provided with an indicator.
Disable Input Unit with timer input	 BW-201	The unit is used to disable one or a number of detection zones.	An external timer controls the disablement time for the selected detection zones. Provided with an indicator.
Day/Night Control Unit with push buttons	 BW-202	The unit is used for external Day/Night control.	A Day Mode button is used to put the system in Day Mode i.e. delaying Alarm Zones etc. A Nigth Mode button set the Operation Zone back to 'Immediate Actioning' Provided with an indicator.
Day/Night Control Unit with timer input	 BW-203	The unit is used for external Day/Night control.	An external timer controls the Day/Night Mode time for the operation zone. Provided with an indicator.
Monitoring Input Unit	 BN-201	Interface unit for fault monitoring of external units by the AutroSafe system	The unit consists of 1 monitored input. Can give a spesific fault message at activation. Up to 4 different configurations of input contacts. Conforms to IP-54 / IP-67
Fire Alarm Interface Input Unit	 BN-300	The unit with SV is used for interfacing different types of signal switches to an AutroSafe detection loop.	The unit consists of 1 monitored input. *Input*: Monitored, for on/off functions, for example, connection and indication of alarm switches. Conforms to IP-54 / IP-67.
Relay Output Unit	 BN-310	The unit is used for configurable FPE outputs	The unit consists of a potential free changeover contact. Contact rating: 1A / 30V. Conforms to IP-54 / IP-67.

Other units on the Detection Loop		Application / Main Function	Description
Loop Interface Input/ Output Unit	 BN-320	The unit with SV is mounted on the detection loop to control, monitor or identify external equipment. Typical applications are: • Interface for AutroFlame • Interface for AutroBeam 25	The I/O unit consists of 2 (two) inputs and 1 (one) output. *Inputs*: Used for interfacing the alarm and fault relays. *Output*: Monitored relay output for alarm devices. Each unit has its own address. NOTE! Must be configured according to which detector type to be interfaced. Conforms to IP-54 / IP-67.
Door Control Unit	 BN-320/2	The unit is used for control and monitoring of fire doors.	The Door Control Unit is connected directly to the detection loop. The unit has 2 monitored inputs monitoring the door's position (open / closed), plus 1 output with a potential free changeover contact controlling the power to a door magnet. The door magnet must be powered from an external 24V DC power supply. An open circuit (loss of 2k on the inputs) gives fault warning. Conforms to IP-54 / IP-67.
Standard Control Unit	 BN-320/4	Typical applications are monitoring and/or control of various external equipment, such as control of : • fire dampers • ventilation valves • fans • lifts • fire and smoke hatches.	The Standard Control Unit is connected directly to the detection loop. External equipment must have separate power supply. The unit has 2 monitored inputs, plus 1 output with a potential free changeover contact. *Input A* is used for confirming activation (manual or automatic). *Input B* is used for reporting fault conditions (power fault and/or unit fault). An open circuit (loss of 2k on the inputs) gives fault warning. Conforms to IP-54 / IP-67.
Sprinkler Control Unit	 BN-320/5	• The unit is used for monitoring and control of sprinkler systems.	The Sprinkler Control Unit is connected directly to the detection loop. The unit has 1 monitored input monitoring the flow switch. An open circuit (loss of 2k on the inputs) gives fault warning. Stable signal on input for time 1 gives prealarm. Stable signal on input for time 2 gives fire alarm. Time 1 and 2 are configurable by means of the AutroSafe Configuration Tool (0-127 seconds). Conforms to IP-54 / IP-67

Other units on the Detection Loop		Application / Main Function	Description
Remote Alarm Control Unit	 BU-200	The Remote Alarm Control Unit is used for remote / local alarm handling from predefined areas / zones. The main purpose of the unit is to facilitate alarm handling without disturbance of people and unnecessary calls to rescue services, e.g. the fire brigade. The unit can send acknowledgement and reset to the Control Panel (BS-310/320/330).	The Fire Alarm Control Panel BS-310/320 or Operator Panel BS-330 can control one or several units. The Remote Alarm Unit is connected to the detection loop. Each loop unit can be connected to one Operation Zone. An Operation Zone can have one or more units, but requires separate 24V DC power. The maximum number of units used in a detection loop is 4.
Socket Sounder	 BBR-110	Detector base with addressable sounder intended for use with AutroSafe detectors.	Powered from the detection loop. Has a 86-decibel sound output at 1 meter. With BSD-310 up to 20 sounders can be used on one detection loop with 99 points. With BSD-311 a maximum of 40 sounders with a total of 99 loopunits can be used. Conforms to IP-42.
Electronic Sounder	 BBR-200	Electronic Sounder with address / interface board inside. Connected directly to the detection loop. Requires no separate power supply.	Powered from the detection loop. No external power supply required. Current consumption: 5 mA at 24 VDC. The maximum number of electronic sounders on a detection loop depends on the configuration of the detection loop. Conforms to IP-42.
Manual Call Point	 BF-300	Manual Call Point used to manually initiate alarms.	Series 300: Manual Call Points with LED indication and SV-function. Conforms to IP-44.
Manual Call Point	 BF-300M	Manual Call Point used to manually initiate alarms. Designed specially for maritime application and installation with open cabling.	Series 300: Manual Call Points with LED indication and SV-function. Conforms to IP-44. Delivered with a *metal* surface mounting box with epoxy powder coating. Four 20 mm square cable entry holes are provided.
Manual Call Point	 BF-500/Ex	Manual Call Point used to manually initiate alarms. Ex-approved for use in hazardous areas.	Manual Call Point with SV-function, but without LED. Conforms to IP-44.
Manual Call Point	 BF-501	Manual Call Point used to manually initiate alarms. For outdoor use.	Manual Call Point with SV-function, but without LED. Conforms to IP-66 and IP-67. Two 20 mm square cable entry holes are provided.
Manual Call Point	 BF-501/Ex	Manual Call Point used to manually initiate alarms. Ex-approved for use in hazardous areas. For outdoor use.	Same function as series 500, but with protection grade IP-66 and IP-67. Two 20 square mm cable entry holes are provided. Without LED.

Other units on the Detection Loop		Application / Main Function	Description
Ex-Barrier Unit	 BZ-500	The unit serves as an interface for Ex-approved detectors connected to and powered from the detection loop. Detectors will be mounted as a branch-off from this unit on the loop.	External 24 V DC regulated supply (22-27V). Up to 20 Loop Units. Galvanic isolated. Classification: EXia IIC.

2.6 Capacity on the Detection Loop

There can be a maximum of 127 loop units per detection loop. A maximum of 99 of these loop units can be used for *points*, i.e. *detectors/manual call points.* The remaining loop units can be used for *input and output control signals*, for example, fire door control and monitoring. Reducing the number of detectors will allow the use of more I/O units.

The limitations of loop units on the detection loop are for safety reasons; *to always ensure sufficient capacity for activation of electronic sounders and control functions.*

The table below shows the current consumption for loop units in *normal status* and in *alarm status.* A detector with active LED indication will also draw current on the detection loop. In a configuration where it is required that several LEDs must be activated simultaneously, the number of detectors on the loop must be reduced.

Loop Unit	Current Consumption in Normal Status	Current Consumption in Alarm Status
Detector, Manual Call Point and I/O Unit	0,3mA	0,3mA
Electronic Sounder (BBR-200)	0,3mA	5mA

The maximum number of activated LEDs is 6 when using Loop Driver Module BSD-310, and 18 when using the Loop Driver Module high-power version BSD-311.

The table below is an *example,* showing different numbers of loop units in different combinations, plus the maximum number of activated LED indications for each combination*. Other combinations within the given limits are possible.

Loop Units	Number of Detectors / Manual Call Points		Number of I/O Units		Number of Electronic Sounders (BBR-200)		Maximum Number of Activated LED Indications	
	BSD-310	BSD-311	BSD-310	BSD-311	BSD-310	BSD-311	BSD-310	BSD-311
Detectors *only*	99	99	0	0	0	0	6	18
Detectors + I/O Units	99	80	28	19	0	0	3	18
Detectors + I/O Units + electronic sounders	99	80	15	0	4	19	1	11
	99	71	10	28	4	0	2	18
	99	65	5	22	5	12	1	14
	74	65	47	15	2	4	2	18
	74	65	20	10	7	5	1	18
	74	65	6	20	9	10	1	15
	50	65	50	34	5	0	2	18
	50	50	20	43	9	6	2	16
	30	35	30	50	9	10	4	15

* The *Loop Calculator Tool* can be used to calculate the amount of Loop Units allowed to be put on a Detection Loop.

2.7 Module Capacity in the Fire Alarm Control Panel and Controller

Each Fire Alarm Control Panel or Controller provides an internal *Power Module,* BSS-310 and *Communication Module*, BSL-310. In addition to these 2 mandatory modules, each system unit can accommodate up to a maximum of 12 *optional* modules. Refer to the next chapter.

The limitation of 12 modules is due to the total capacity in one system unit. Maximum 6 of these modules can be *Loop Driver Modules,* due to traffic capacity and power consumption.

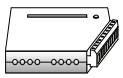
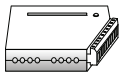
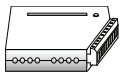
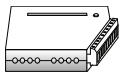
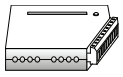
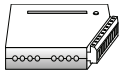
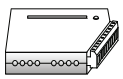
The maximum number of modules in a cabinet also depends on whether batteries are installed or not, as the batteries will give less space for modules.

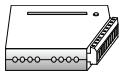
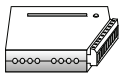
If batteries are installed, the maximum number of *optional* modules is 3, in addition to the mandatory Power Module and Communication Module. In this case, there can be for example 1 Loop Driver Module and 2 I/O modules.

2.8 Modules in the Fire Alarm Control Panel / Controller

The *Fire Alarm Control Panel* and the *Controller* can be equipped with the same modules. All outputs are freely programmable from all detectors, manual call points and input signals.

All modules have the same dimensions and are easily plugged onto each other on a standard mounting rail inside the unit.

Modules in the Fire Alarm Control Panel / Controller		Main Function	Description
Loop Driver Module	 BSD-310 / BSD-311	Each Loop Driver Module provides 1 detection loop with 127 loop units.	There can be a maximum of 6 Loop Driver Modules in each *unit* (i.e. in each Fire Alarm Control Panel or Controller). The maximum number of detectors and manual call points that can be connected to these 6 modules are 512 (refer to EN-54). The cable impedance for the *standard* module BSD-310 is; R_{max}=50Ω total and C_{max}=0,5μF. The cable impedance for the *high-power* version BSD-311 is; R_{max}=20Ω total and C_{max}=0,5μF.
Output Module, monitored	 BSB-310	Each module provides 4 monitored output circuits (sounder output circuits). May be used for Fire Alarm Devices (FAD), Fire Alarm Routing Equipment (FARE), Fire Protection Equipment (FPE) and other fault outputs.	Each alarm circuit has its own freely programmable address and signal frequencies. The standard signal frequency is 2 Hz. Protection fuse: 1,1 A on each output. The outputs can be used for alarm sounders, for example. BBR-4 BBR-23/24
Output Module	 BSJ-310	The module can be used for relay or LED operation. Each module provides 8 open collector non-monitored outputs.	The module can be used for relay or LED operation. Maximum load: 100 mA per output.
Input Module, monitored	 BSE-310	Each module provides 4 monitored inputs.	Monitor resistance: 2 kΩ Alarm resistance: 500Ω - 1kΩ May be used for Digital Input Devices (contacts) and other controlling inputs.
Input Module	 BSE-320	Each module provides 8 non-monitored and galvanic isolated inputs.	May be used for Digital Input Devices (contacts) and other controlling inputs.
Communi-cation Module	 BSL-310	The module serves as an interface for the common internal communication line between the I/O modules. Always mounted in the Fire Alarm Control Panel and Controller.	RS-232 interface with hand-shake. Galvanic isolated from the internal circuitry. Built-in battery monitoring. Control outputs for activation of charger/battery.
Power Module	 BSS-310	The module provides 24V and 5V to the I/O modules. Always mounted in the Fire Alarm Control Panel and Controller.	Two green indicators; Right green indicator - the presence of 24V Left green indicator - the presence of 5V

Modules in the Fire Alarm Control Panel / Controller		Main Function	Description
Conventional Loop Interface	 BNB-330 (BN-330*)	BNB-330 is a modular interface unit designed to monitor conventional fire detectors of the current increase type and to convey their status to the AutroSafe fire panel. **Variant*: The BN-330 unit consists of a BNB-330 module mounted on a DIN-rail inside a PCM-box.	The conventional detectors are connected to a two-wire sub loop. The sub loop is monitored for broken line by an end-of line unit BNY-330. As default a short circuit of the sub loop will give a fault warning, but the unit may be configured to give an alarm instead. The module version BNB-330 is to be mounted on a DIN-rail onto other internal modules inside the Fire Alarm Control Panel / Controller, where 24VDC power is supplied. *The BN-330 unit requires separate 24VDC. Conforms to IP-67.
AUTROLON Booster	 BSL-325	The AUTROLON Booster BSL-325 is used to boost the data signals on the AutroSafe local operating network; AUTROLON (distributed systems). The booster ensures reliable communication in cases where larger distances between panels are necessary. By using AUTROLON Boosters the total cable length can be greatly increased. *Limitations:* • Maximum 1000 metres between any two Boosters. • Maximum 8 panels between any two Boosters. • Maximum 6 Boosters per AUTROLON ring. • Maximum 32 panels per AUTROLON ring. • Maximum length 2,8 km (the total AUTROLON ring with Boosters).	In cases when it is necessary to boost the data signals on the AUTROLON, a minimum of 2 Boosters must be used in one AUTROLON ring to maintain AUTROLON loop redundancy. Boosters are required if the AUTROLON cable is more than 1km in length. Boosters must be evenly spread round the AUTROLON ring. If the I/O module is mounted on the standard mounting rail inside the Fire Alarm Control Panel / Controller it is powered with 24 VDC from the I/O module stack. If the I/O module is not mounted on the standard mounting rail, external 24 VDC Power must be supplied to the screw terminals. The booster can also be used in cases when different cable types* (AUTROLON cables) are used in a distibuted system. *NOTE: The use of different cable types is not recommended. If, however, a mix of different cable types is required, the cable types can be “isolated” from each other by the use of the AUTROLON Booster. In this way each cable can be terminated properly and the signal will be amplifed before it is transferred from one cable to the other.

3. Cable Specifications

3.1 Overview

The table below gives the wire dimension in *square* millimeters or AWG (American Wire Gauge) for various cable lengths. Please refer to national/local standards for your country. Data may change. Please check with manufacturer.

	Maximum resistance / capacitance	Wire Dimensions (examples)		Maximum cable length	Remarks
	(Ω / µF)	(mm^2)	(AWG)	(m)	
Detection Loop	50 Ω (both conductors) / 0,5µF	2 x 0,75 2 x 1,5 2 x 2,5	18 15 13	1000 m 2000 m 3300 m	The maximum resistance on the total cable length (+ and - conductors) is 50 Ω.
Alarm Sounder Circuits	- -	2 x 1,5 2 x 0,78	15 18	- -	-
Battery	- - -	2 x 2,5 2 x 4,0 2 x 6,0	13 11 9	10 m 18 m 25 m	-
Mains	-	2 x 1,5	15	-	-
AUTROLON Ring	Capacitance pr. 1km cable Capacitance < 200 nF Capacitance < 100 nF For all cables: maximum attenuation < 9 dB and characteristic impedance 100 ohm.			Maximum cable length < 600 m < 1000 m	

3.2 The AUTROLON Cable Requirements

When dealing with specification of the AUTROLON cable, the important issues are the characteristic impedance and the attenuation of the signal at approximately 100 KHz. These parameters become more important the longer the cable is.

The parameters are defined by the geometry of the cable. Proper characteristic impedance is best obtained by a cable with twisted pairs. For short communication paths (less than approximately 600m) the characteristic impedance is not that important, and attenuation is low enough for most cables. However, the twisting improves the cable's ability to withstand external interference, and a twisted cable should be preferred when the cable runs in the vicinity of power cables, power devices as generators, transformers etc.

In high-current environments (power plants, electrical machinery etc.) it is recommended that shielded cable is used. In this case, the shielding of the cable should only be connected at one end to avoid

ground loops. If high-frequency noise is expected (>10MHz), then both ends should be connected. This may be present close to radio transmitting equipment or similar.

The characteristic impedance is (at 100KHz:) 100 ohm +/- 15 ohm. Note that the characteristic impedance has nothing to do with the resistance of the cable. It is a property related to high-frequency transmission, regardless of its length. Typical examples are antenna cable (300 ohm), video cable (75 ohm).

Attenuation is defined by the wire to wire capacitance mostly, as long as the wire is at least 0.5mm2. The total attenuation of the cable length must not exceed 9 dB. If attenuation is not specified, normally the capacitance is defined. The capacitance should not exceed the specified value in order to achieve the total communication length.

3.2.1 Example of Cable Lengths

Short length cables (< 600 m)
The LON cable length is limited to 600m. Capacitance per 1000m must be less than 200nF.

Medium length cables (< 1000 m)
The LON cable length is limited to 1000m. Capacitance per 1000m must be less than 100nF.
Belden 8471 cable, 1 x 2 x 1.20 mm2 108nF/Km
Pirelli FP200 Gold 2core 1.5mm2, Capacitance 72nF/Km, Attenuation 3.4dB/Km (Due to the low attenuation you may use this for cable lengths up to 1200 m)
PFSK Cable, 1.5mm2 wires, capacitance 105nF/Km. (NOTE: These are not revolved).
ABB art no 10 892 30 “CAT.5 UTP 4x2/0.5mm“ Category 5 cable for high-speed communication, 3.5dB attenuation / Km
ABB FLFR cable, 2 x 2 x 0.5mm2 Capacity 50nF/km, Attenuation 4dB/Km @100KHz.

Cable length > 1000 m
AUTROLON Boosters are required if the AUTROLON cable is more than 1km in length. Boosters must be evenly spread round the AUTROLON ring.

NOTE:
The maximum length for a total AUTROLON ring with Boosters is 2,8 km.

Limitations:

- Maximum 1000 metres between any two Boosters.
- Maximum 8 panels between any two Boosters.
- Maximum 6 Boosters per AUTROLON ring.
- Maximum 32 panels per AUTROLON ring.
- Maximum length 2,8 km (the total AUTROLON ring with Boosters).

The booster can also be used in cases when different cable types* (AUTROLON cables) are used in a distributed system.

*NOTE: The use of different cable types is not recommended. If, however, a mix of different cable types is required, the cable types can be “isolated” from each other by the use of the AUTROLON Booster. In this way each cable can be terminated properly and the signal will be amplifed before it is transferred from one cable to the other.

4. Power Distribution

4.1 Introduction

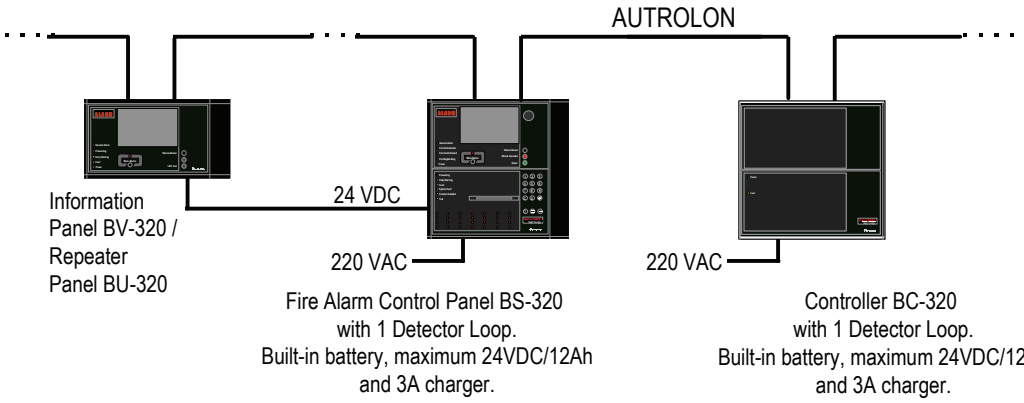
This chapter describes the following alternatives:

- Decentralized distribution, maximum capacity 24V DC / 12 Ah
- Decentralized distribution, maximum capacity 24V DC / 24 Ah

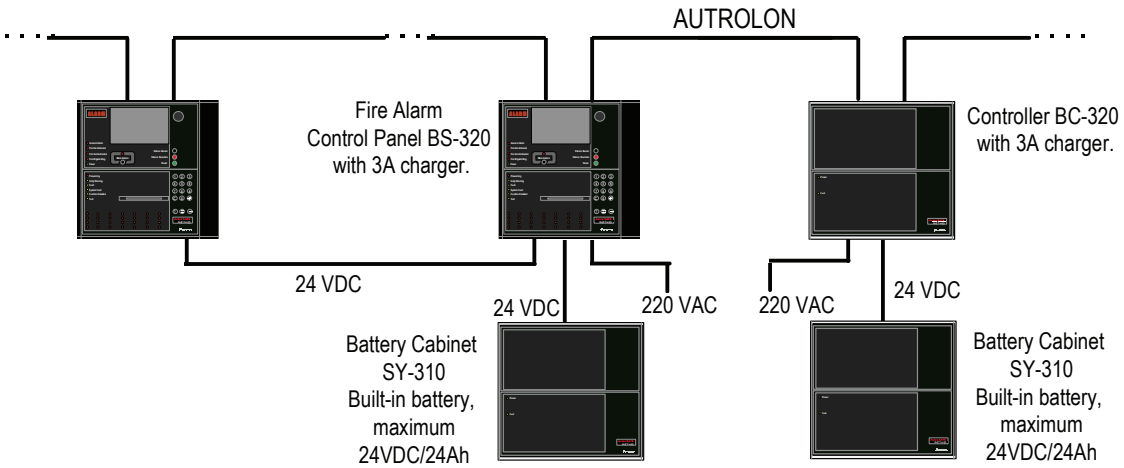
The alternatives show the use of 220V AC.

Each built-in battery has a separate unit which monitors the battery.

4.2 Decentralized Power Distribution, Maximum Capacity 24V DC / 12 Ah

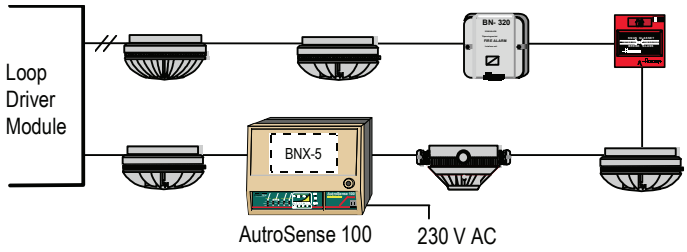


4.3 Decentralized Power Distribution, Maximum Capacity 24V DC / 24 Ah

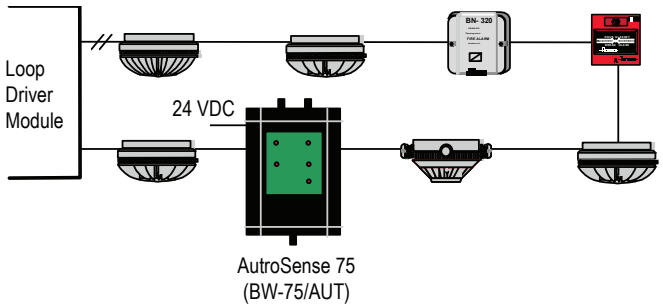


5. Connection of Special Detectors, Monitoring and Control

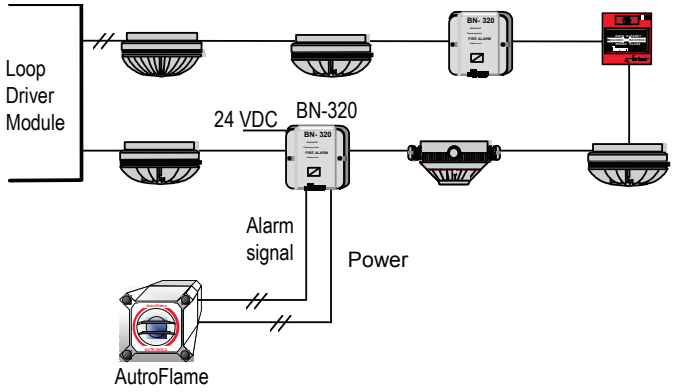
5.1 AutroSense 100 Aspirating Detector



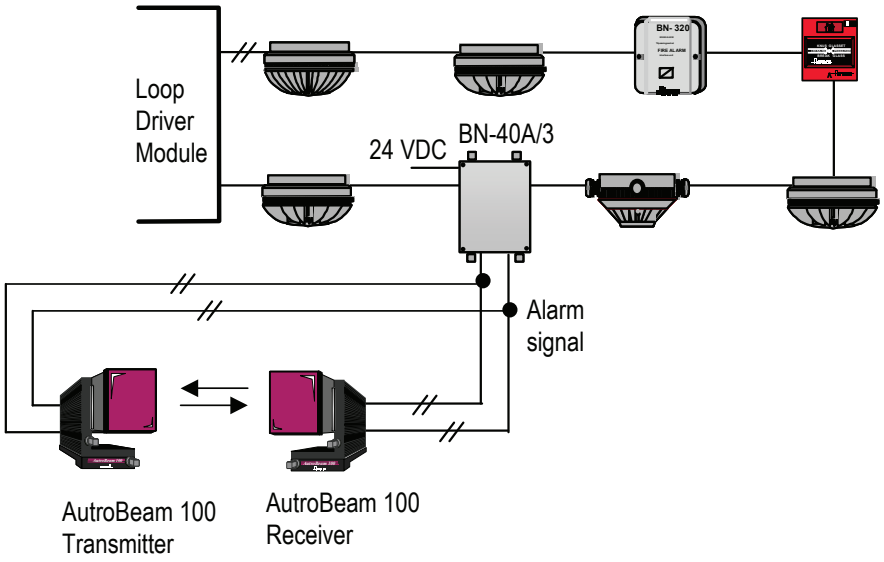
5.2 AutroSense 75 Aspirating Detector



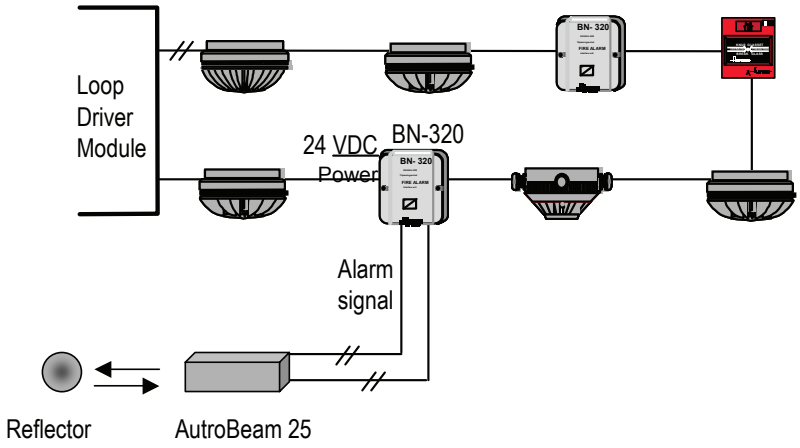
5.3 Flame Detection with AutroFlame



5.4 Line Detection with AutroBeam 100

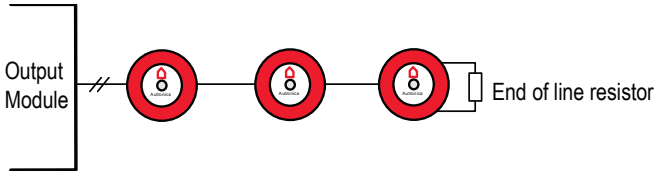


5.5 Line Detection with AutroBeam 25



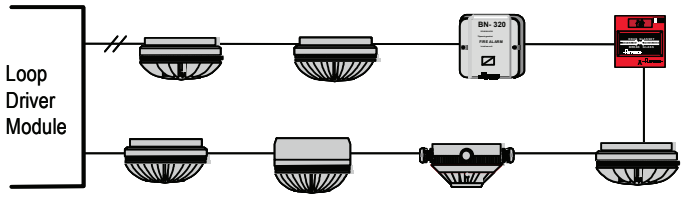
5.6 Sounder Output Circuits from Fire Alarm Control Panel / Controller

The Output Module (BSB-310), located in the Fire Alarm Control Panel or Controller, provides monitored outputs for sounder circuits using different types of alarm bells and sounders. The maximum load per circuit is 1A.



5.7 Addressable Socket Sounder (BBR-110)

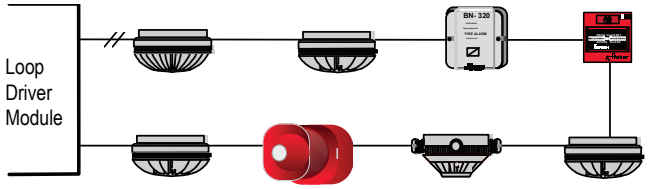
The Socket Sounder (BBR-110) is a combined detector base and addressable sounder. The unit is powered from the detection loop. No external power supply is required.



Socket Sounder
BBR-110

5.8 Programmable Electronic Sounders on the Detection Loop (BBR-200)

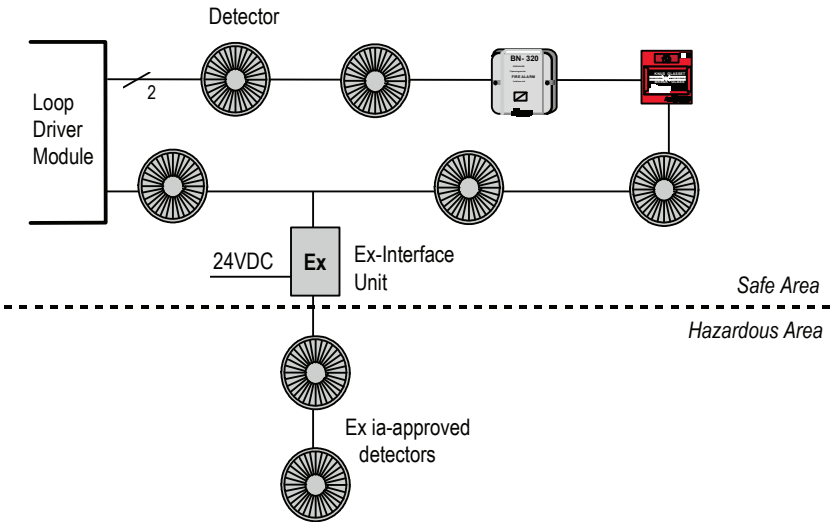
The Electronic Sounder (BBR-200) has its own address / interface board and can be connected directly to a detection loop. The unit is powered from the detection loop. No external power supply is required.



Electronic Sounder
w/address/interface board
BBR-200

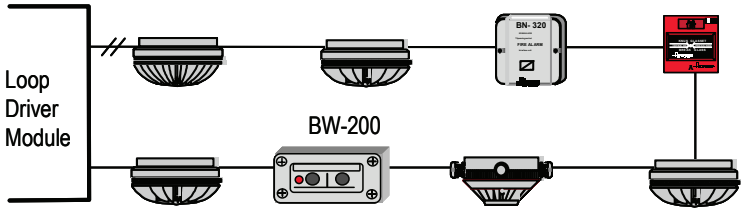
5.9 Connection of Ex ia-Approved Detectors (BZ-500)

Ex ia-approved detectors can be connected to the system. The *Ex-Interface Unit* is used to separate the safe area from the hazardous (Ex) area.



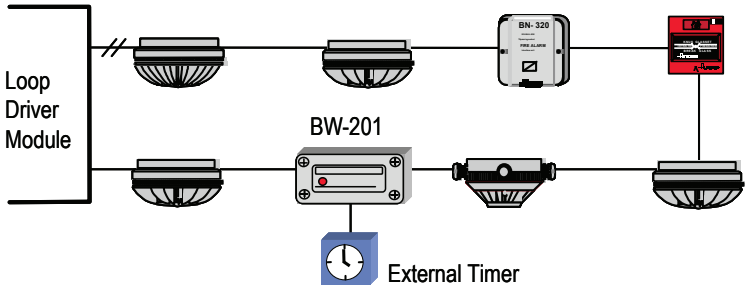
5.10 Disable Input Unit with Pushbuttons (BW-200)

The Disable unit is used to disable one or a number of detection zones. The unit is connected to and powered from the detection loop. The disablement time is configurable (AutroSafe Configuration Tool).



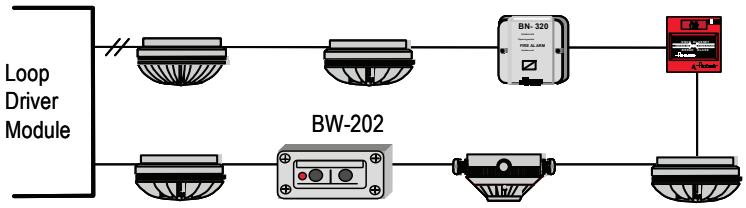
5.11 Disable Input Unit with Timer Input (BW-201)

The Disable unit is used to disable one or a number of detection zones. The unit is connected to and powered from the detection loop. An external timer controls the disablement time.



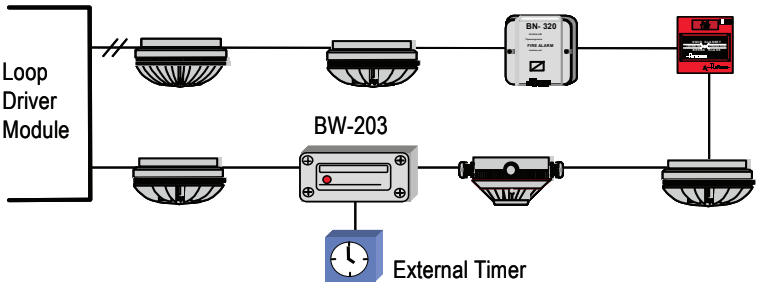
5.12 Day/Night Control Unit with Pushbuttons (BW-202)

The Day/Night Control Unit is used for remote operation of the Disable/Enable 'Immediate Output Action' commands. The unit is connected to and powered from the detection loop. Two pushbuttons are used for putting the system in Day Mode or Night Mode.



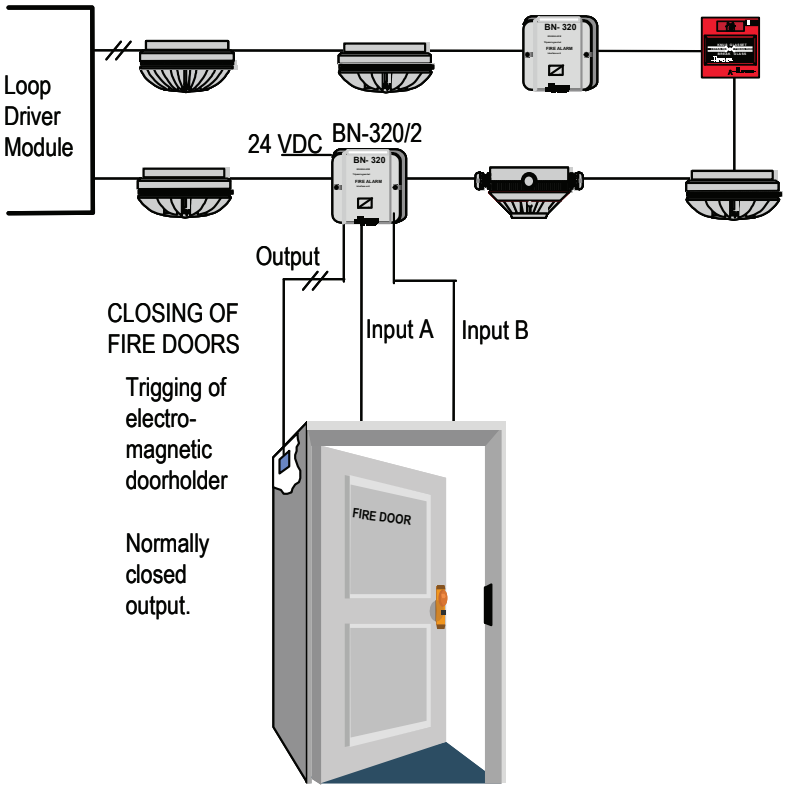
5.13 Day/Night Control Unit with Timer Input (BW-203)

The Day/Night Control Unit is used for remote operation of the Disable/Enable 'Immediate Output Action' commands. The unit is connected to and powered from the detection loop. An external timer controls the monitored input.



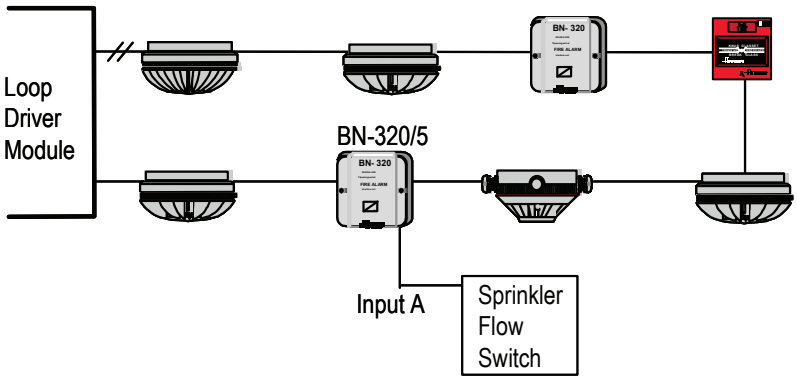
5.14 Door Control Unit (BN-320/2)

The Door Control unit controls and monitors fire doors. The unit is connected to the detection loop, and powered from an external 24V DC power supply.



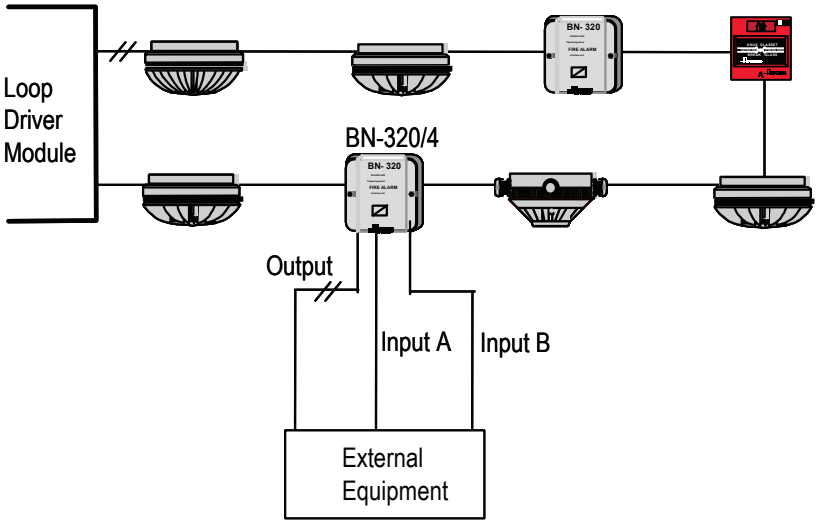
5.15 Sprinkler Control Unit (BN-320/5)

The Sprinkler Control Unit is used for monitoring and control of sprinkler systems The unit is connected to and powered from the detection loop.



5.16 Standard Control Unit (BN-320/4)

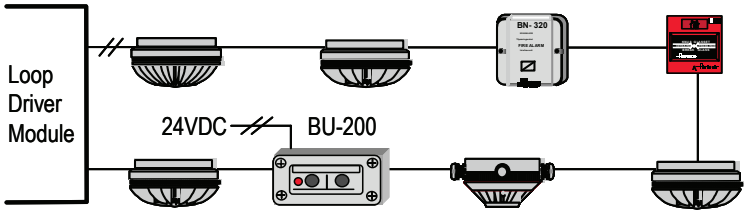
The Standard Control Unit monitors and/or controls various external equipment such as control of fire dampers, ventilation valves, fans, lifts, plus fire and smoke hatches. The unit is connected to and powered from the detection loop. External equipment must have separate power supply.



5.17 Remote Alarm Control Unit (BU-200)

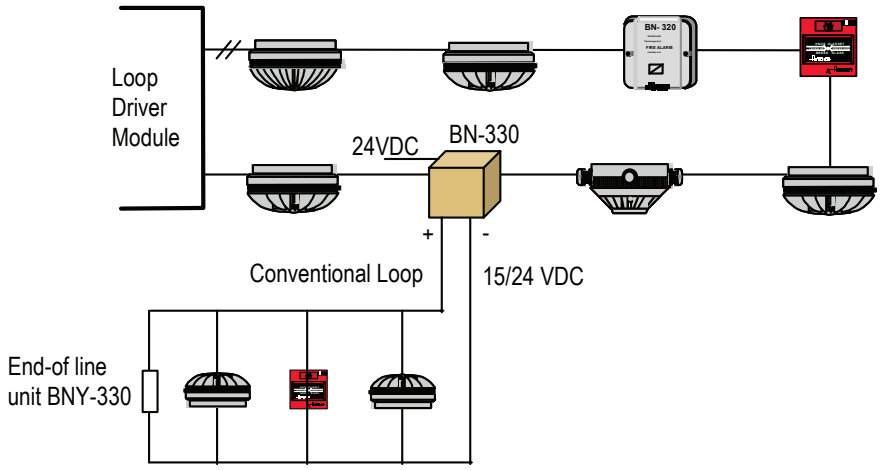
The Remote Alarm Control Unit is used for remote / local alarm handling from predefined areas / zones. The main purpose of the unit is to facilitate alarm handling without disturbance of people and unnecessary calls to rescue services, for example, the fire brigade.

The unit can send acknowledgement and reset to the Control Panel (BS-310/320/330). The Remote Alarm Unit is connected to the detection loop. Each loop unit can be connected to one Operation Zone. An Operation Zone can have one or more units, but requires separate 24V DC power.

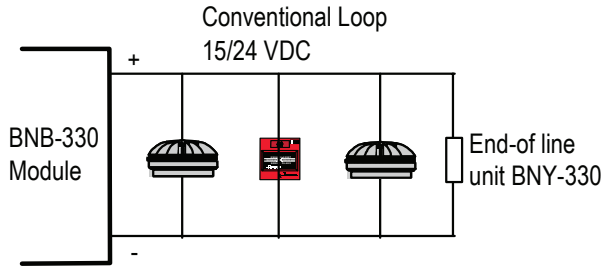


5.18 Interface Unit for Conventional Loops (BN-330)

The *Interface Unit for Conventional Loops BN-330* consists of a BNB-330 module* mounted on a DIN-rail inside a PCM-box. The conventional detectors are connected to a two-wire sub loop. The sub loop is monitored for broken line by an end-of line unit BNY-330. The interface unit must have a separate 24V supply.



** Variant:*
The internal *Conventional Loop Interface Module BNB-330* is mounted on a DIN-rail onto other internal modules inside the Fire Alarm Control Panel / Controller where it is powered with 24VDC.



6. Larger Distributed Systems

6.1 AUTROLON Rings with Cable Lengths >1km

The maximum length of the AUTROLON ring *without* AUTROLON Boosters is 1km.

AUTROLON Boosters (BSL-325) are required if the AUTROLON cable is more than 1km in length.

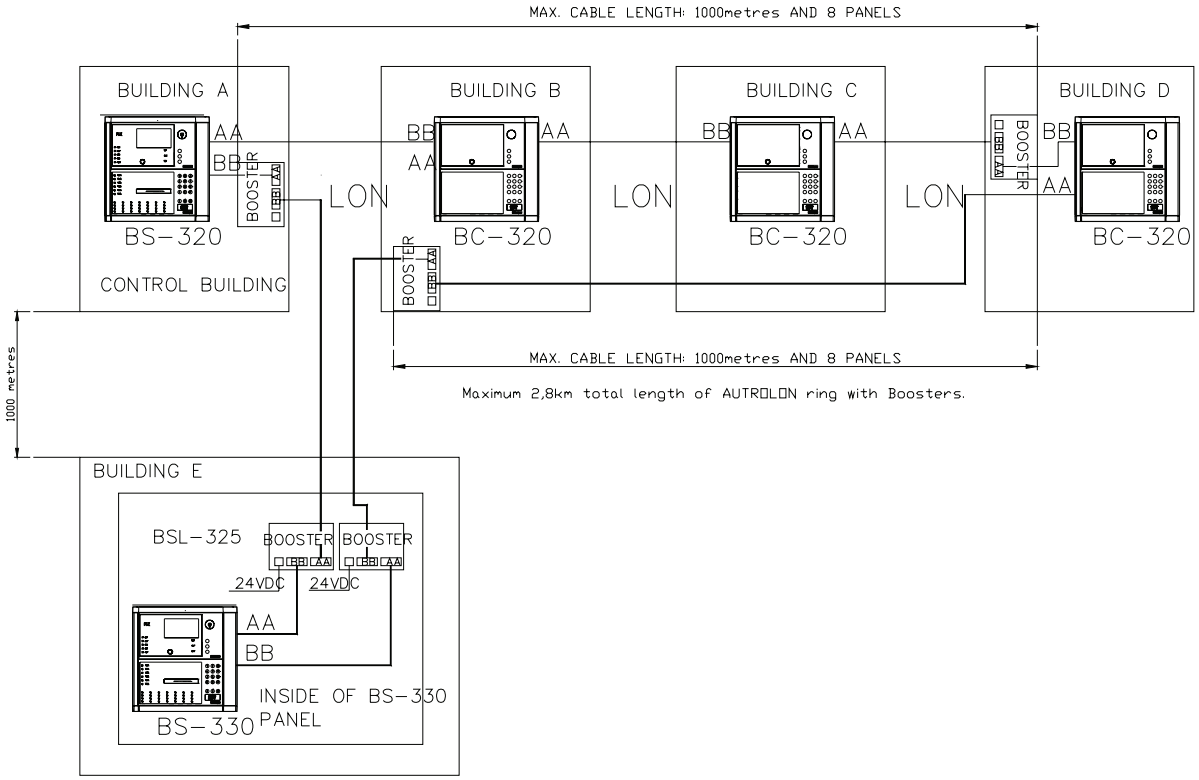
The maximum length of a total AUTROLON ring with Boosters is 2,8 km.

6.2 Limitations when using AUTROLON Boosters

The maximum length of a total AUTROLON ring with Boosters is 2,8 km. Boosters must be evenly spread round the AUTROLON ring.

- Maximum 1000 metres between any two Boosters.
- Maximum 8 panels between any two Boosters.
- Maximum 6 Boosters per AUTROLON ring.
- Maximum 32 panels per AUTROLON ring.
- Maximum length 2,8 km (the total AUTROLON ring with Boosters).

6.3 Example of a Distributed System with Boosters



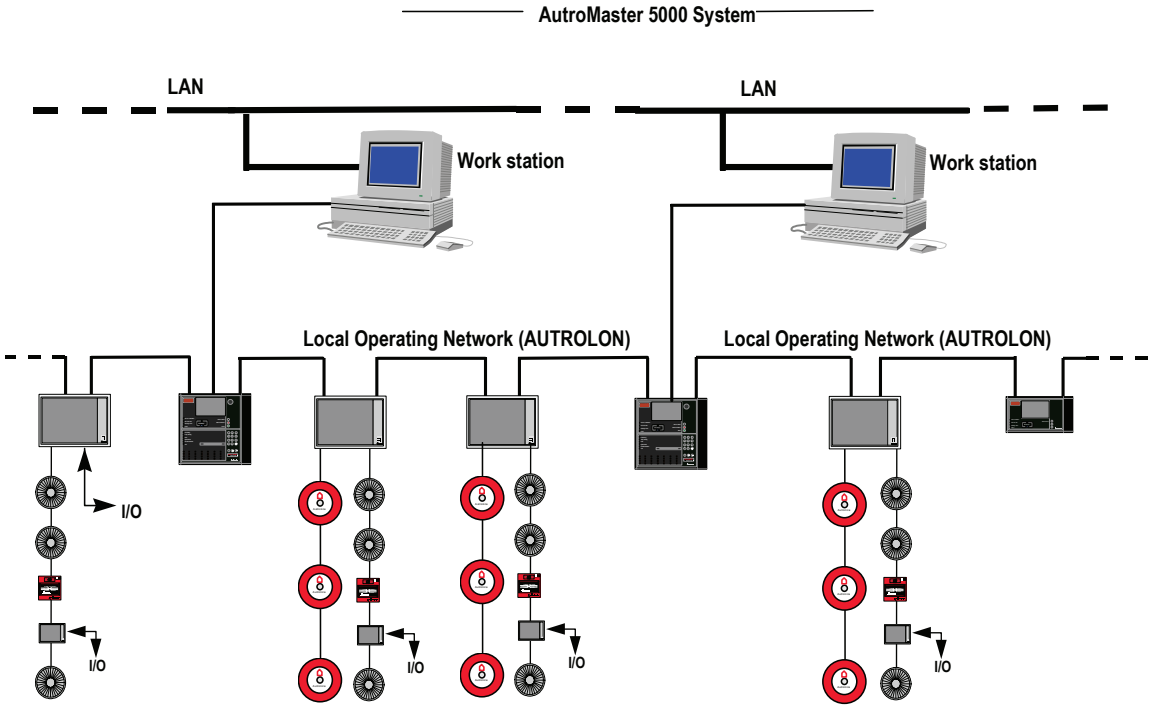
7. Systems with AutroMaster 5000 Colour Graphic System

7.1 Interfacing AutroMaster 5000

The example shows part of a larger AutroSafe system connected to an AutroMaster 5000 Colour Graphic System on the top level. The Local Operating Network (AUTROLON) is installed as a ring loop.

A high-level bus based ethernet, *LAN*, can be used between the different work stations in the AutroMaster 5000 system. The AUTROLON is connected to the workstations. The operator panels can be installed in different buildings, operation zones, etc.

With AutroMaster 5000 on top level, it will be possible to operate the whole fire alarm system from one or several work stations, depending on the system configuration.



7.2 Applications with Several AUTROLON Rings

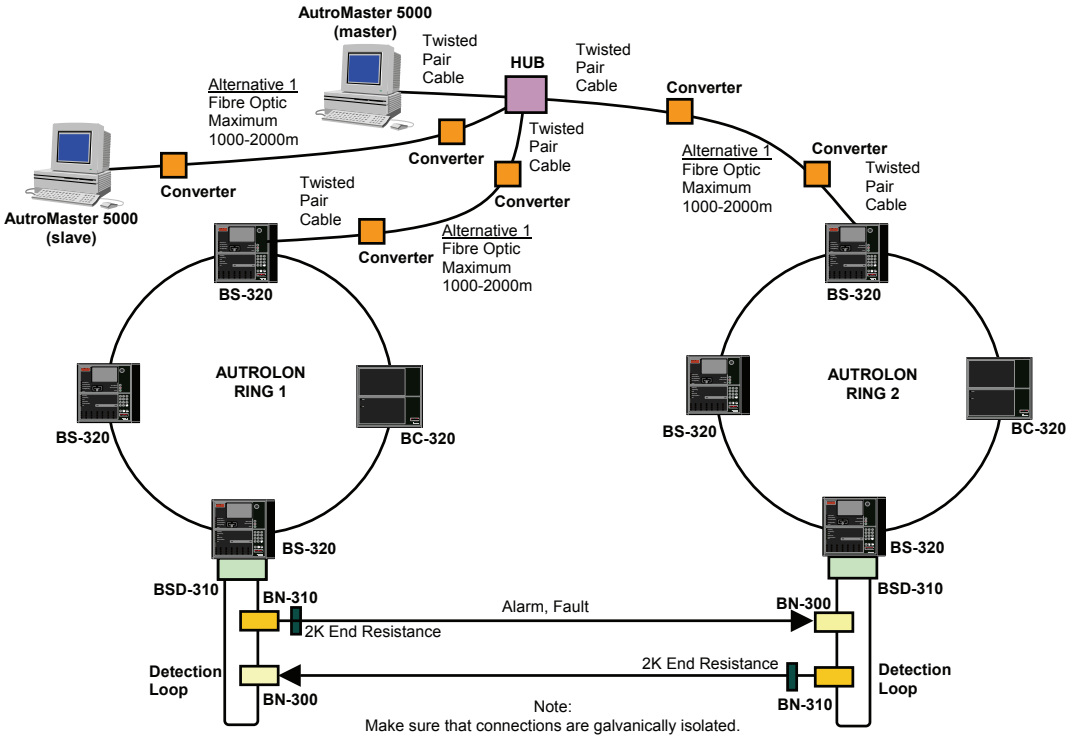
7.2.1 General

AutroMaster 5000 is used as the top level system. AutroMaster 5000 enables a two-way communication with both AUTROLON rings and monitors the entire system.

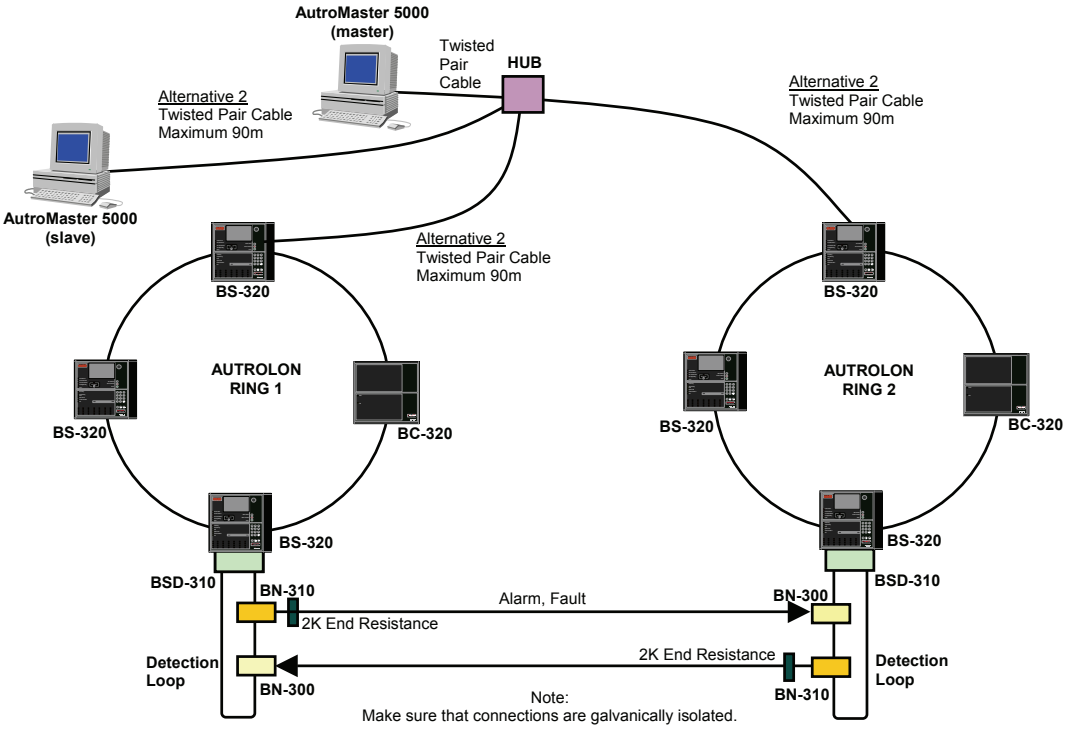
NOTE:
The communication is not possible *through* AUTROLON rings by use of AutroMaster 5000. *The connection from the panels on each AUTROLON ring is done via TP or optical fibre and a HUB to AutroMaster 5000.*

AutroMaster 5000 provides a custom-tailored and fully dynamic presentation of the premises. On the computer screen it is possible to see events on the detection loops for all AUTROLON rings. In the event of an alarm, the precise alarm location will be identified.

7.2.2 Application with Fibre Optic Cabling



7.2.3 Application with Twisted Pair Cabling

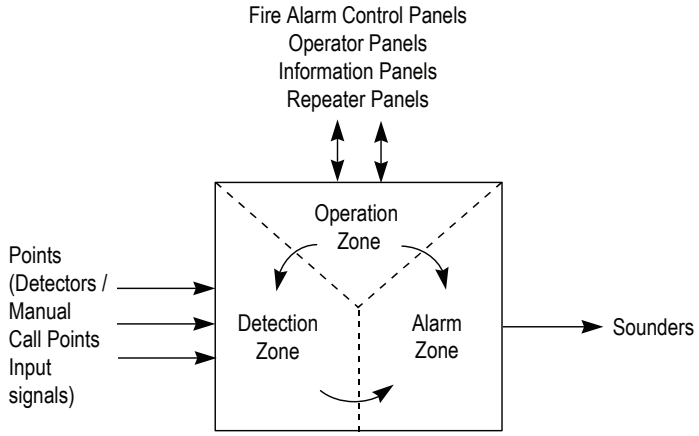


8. Zonal Definitions

8.1 General

To describe the functional hierarchy of the system we use the term "zone". Assigning system components to zones enables hierarchical control from detection to activation of alarm. This hierarchy consists of the following zones:

- Detection Zone (DZ)
- Alarm Zone (AZ)
- Operation Zone (OZ)



8.2 Detection Zone

A *Detection Zone (DZ)* is defined as a zone with one or more *points* (detectors or manual call-points) that logically belong together, determined by geographical/functional parameters (for example, the sales department on the second floor).

A point can only be assigned to one Detection Zone, and can only refer to one specific location in the system (for example, a specific office on the second floor in a building).

The Detection Zone will be the trigger to generate outputs to the Alarm Zone.

8.3 Alarm Zone

An *Alarm Zone (AZ)* is activated by one or several Detection Zones.

Example:
An alarm from one of the devices in DZ3 will activate sounders in AZ1.

Within the same alarm zone, alarm sounders give the same audible signal.

Geographically associated alarm zones can be defined as *neighbour* zones, such that these can operate outputs for alarm zones adjacent to the incident.

8.4 Operation Zone

An *Operation Zone (OZ)* defines the Operator Panel's scope.

The Operation Zone can cover one floor or one building, and is designed to restrict the operators' sphere of influence on the system as a whole. At least one Fire Alarm Control Panel / Operator Panel should have the overall control of the system.

Operation zones on higher levels may encompass several other operation zones.

Input / Output units (for example, Door Control Units, Sprinkler Control Units etc.) can be controlled from an Operation Zone.
An Operation Zone given these properties and necessary parameter settings is referred to as a *Control Operation Zone*.

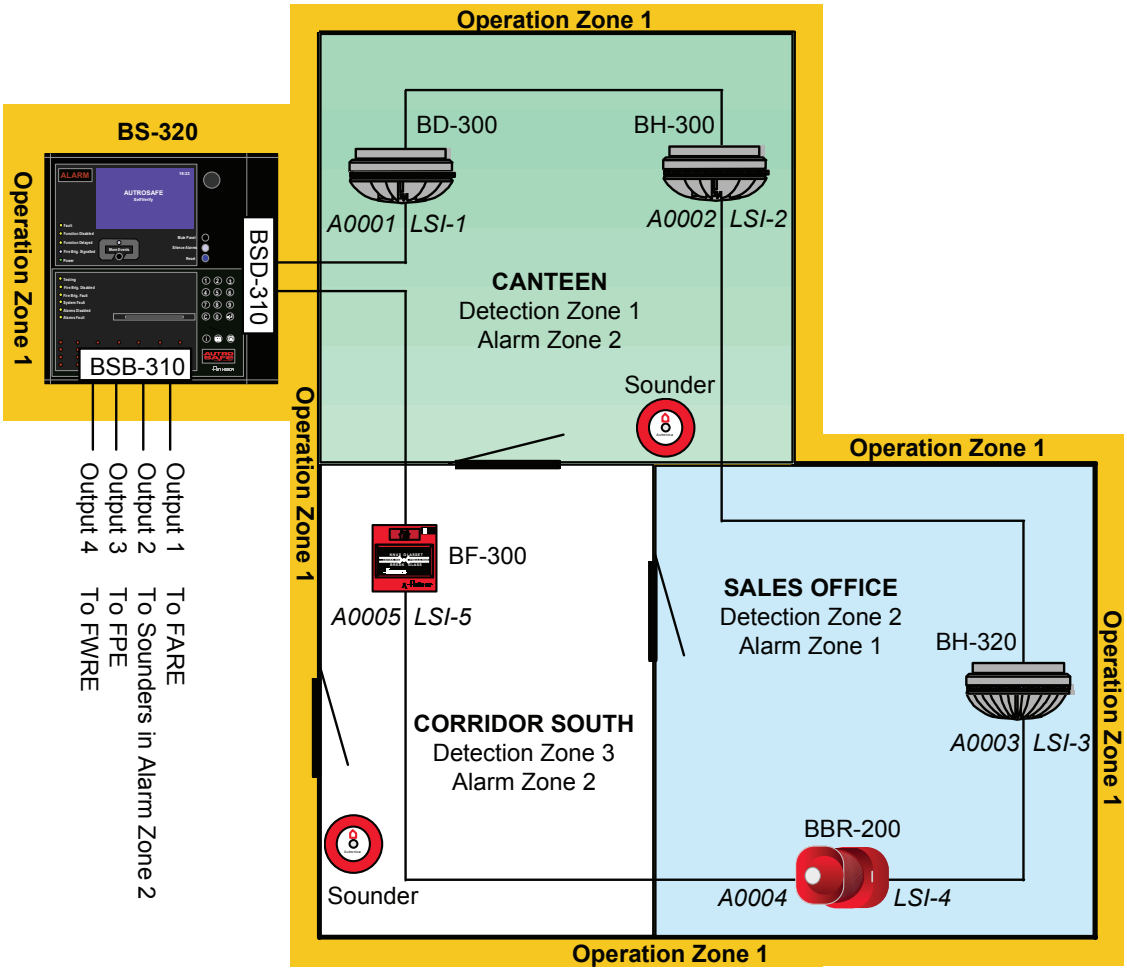
Different day / night operation for different areas (i.e. detection zones) requires the use of several Operation Zones / sub-operation zones with different Day / Night Operation. An Operation Zone given these properties and necessary parameter settings is referred to as a *Day / Night Operation Zone*.

9. Configuration Examples

9.1 Simple Configuration Example

9.1.1 Illustration

The simple *configuration example* is based on the *AutroSafe Demo Board* configuration, and it looks like this:



9.1.2 Description

The building is divided into three sections, the CANTEEN, the SALES OFFICE and the CORRIDOR SOUTH, each section defined as a *Detection Zone* (1, 2 and 3).

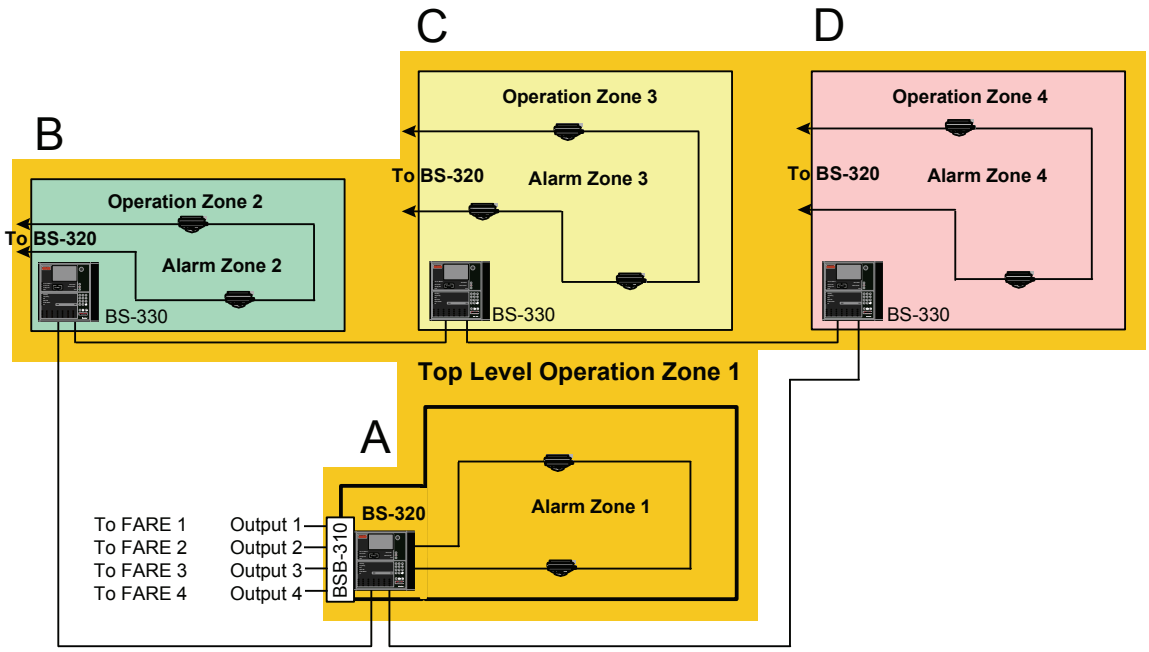
The system is divided into two *Alarm Zones* (1 and 2). The Electronic Sounder in Alarm Zone 1 is triggered when alarms are activated in Detection Zone 2, and the sounders (Fire Alarm Devices) in Alarm Zone 2 are triggered when alarms are activated in Detection Zone 1 and 3.

One *Operation Zone* defines the scope of the Fire Alarm Control Panel BS-320, including all Detection Zones, Alarm Zones, plus Fire Alarm Routing Equipment and Fire Warning Routing Equipment.

The BS-320 provides one Loop Driver BSD-310. All *Loop Units* are connected to this loop. The BS-320 also provides one Output Module BSB-310 with monitored outputs for Fire Alarm Routing Equipment (FARE), Fire Alarm Devices (FAD), Fire Protection Equipment (FPE) and Fault Warning Routing Equipment (FWRE).

9.2 Configuration Example with Several Operation Zones

The illustration below shows an *example* of a configuration with 4 operation zones, where Operation Zone 1 is on the top level encompassing the other operation zones (2, 3 and 4). The example shows 4 buildings. Building A is the main administration building with a Fire Alarm Control Panel.



The table below describes how the system is configured, and what is achieved.

Configuration	What is achieved
Operation Zones The Fire Alarm Control Panel in building A serves as an operating panel for all operation zones. The panel's defined *Operation Zone 1* is on the top level, encompassing *Operation Zone 2, 3 and* 4.	This configuration allows the Fire Alarm Control Panel to operate, control and monitor the entire building complex. Information is selectively routed. In the event of a fire alarm in building B, for example, detailed information (information on the detection zone/detector) will be shown only on the panel's display in building B and in the main administration building. Remote information on the fire alarm location, i.e. building B, will be shown on the panel's display in building C and D. The buzzer will be activated on the panels in building A and B in the event of an alarm.
Fire Alarm Routing Equipment (FARE) The Output Module (BSB-310) in the Fire Alarm Control Panel is configured as follows: Each Operation Zone (1-4) has a dedicated output.	A fire alarm in, for example, Operation Zone 3 will trigger output 3 on the output module. In this way, the fire brigade will be able to know exactly in which building the fire has occured, in this case, building C.
Alarm Zones Each building is defined as an Alarm Zone. The Detection Zones in each building are connected to each building's Alarm Zone, and in addition to the main administration building's Alarm Zone. In addition, the following Neighbour Zones are defined: C is defined as a neighbour zone to B. B and D are defined as neighbour zones to C. C is defined as a neighbour zone to D.	A fire alarm from a detector in building B, for example, will activate all sounders (default 0,5 second ON / 0,5 second OFF) in this building, plus in the main administration building. Simultaneously, a neighbour alert signal (default 0,5 second ON / 3,5 seconds OFF) on all sounders will be heard in building C.

9.3 Standard Versions

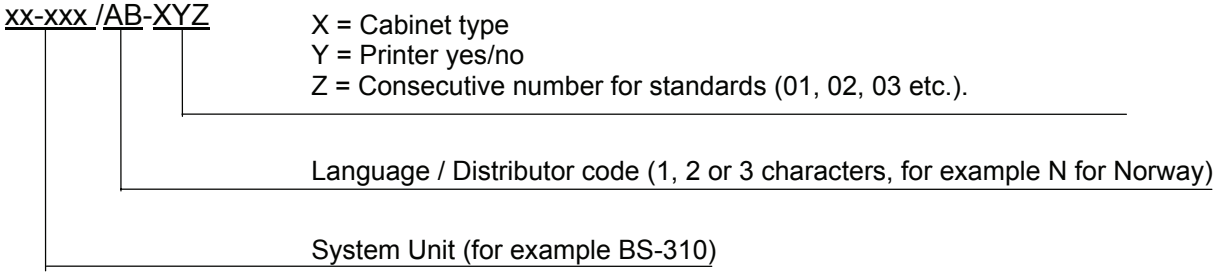
9.4 Introduction

Autronica Fire and Security offers 3 different standard versions of the Fire Alarm Control Panel BS-310 (stand-alone panel without LON interface), the BS-320 with LON interface, plus the Controller BC-320:

- a standard version with no room for batteries; including:
  - 2 Loop Driver Modules
  - 1 Output Module, monitored (BSB-310)
- a standard version with no room for batteries, including:
  - 4 Loop Driver Modules
  - 1 Output Module, monitored (BSB-310)
- a standard version with room for 2x12V/12Ah batteries (batteries must be ordered separately), including:
  - 1 Loop Driver Module
  - 1 Output Module, monitored (BSB-310)

In addition, a separate Battery Cabinet SY-310 is available. This cabinet has room for 2x12V/24Ah batteries. The batteries must be ordered separately.

9.5 Code Number Description



10. Reader's Comments

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AutroSafe Interactive Fire Alarm System, Release 3,
Ref. No.: *P-ASAFE/XE Rev. H, 2007-06-26*

Your information on any inaccuracies or omissions (with page reference):

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Suggestions for improvements

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