AUTRO SAFE
Self Verify®

Integrated Fire & Gas Detection System (IFG)

Design Guidelines
AutroSafe IFG

AUTRONICA

Protecting life, environment and property...

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1. Document Purpose

The purpose of this document is to give a brief and general description of Autronica Fire and Security's AutroSafe SelfVerify™ Integrated Fire & Gas (IFG) detection system. The documents is developed and intended for use as a general design guideline, provided that it is used in conjunction with the reference documents.

2. Brief Introduction

The AutroSafe Self Verify™ Integrated Fire and Gas detection system described in key words is as follows:

- Both the Fire Detectors as well as the Gas Detectors are connected to the same panel or system.

- All detectors are interactive addressable devices with intelligent communication (excluding those connected via a 4-20mA interface).

- Field devices have a built-in calibrated self-test to verify and confirm their ability to perform correctly. This can be considered as supplemental to – and can be used instead of – manual testing and inspection routines. Refer to Section 3.4.

- Flame and Gas Detectors can be connected to the AutroSafe Panel by using a 2-wire loop structure (PowerLoop). The PowerLoop provides both power to, as well as interactive communication with the detectors. Another option is to use an RS-485 multi-drop communication with detectors, which allows a large number of detectors to be connected to the same RS-485 loop driver. **Studies have shown that the Fire & Gas Detection Control System's cable requirement can be reduced with 30-60% by utilizing these concepts as opposed to conventional systems.**

- AutroSafe SelfVerify™ IFG is a modular and distributed system providing maximum flexibility. The AUTROLON communication facilitates the possibility to link cause and effect across panels within the same AUTROLON ring. In other words, any detector connected to any panel can activate any output associated to any panel. Each panel can have up to 10 custom AutroSafe I/O modules. Within the limitations of the system, the system designer can freely select the type and number of modules to be used.

- There are a number of versatile communication options available:
  - Physical: Ethernet, RS-232, RS-422, RS-485, AI_Com loop, AutroFieldBus, PowerLoop and either hardwired or fibre-optic basedAUTROLON.
  - Protocol: Modbus RTU Slave or Master, ProfiBus DP or ProfiSafe, ESPA 4.4.4. and AutroCom (Autronica's proprietary protocol).

The figure below shows an example of a typical AutroSafe Integrated Fire & Gas system:
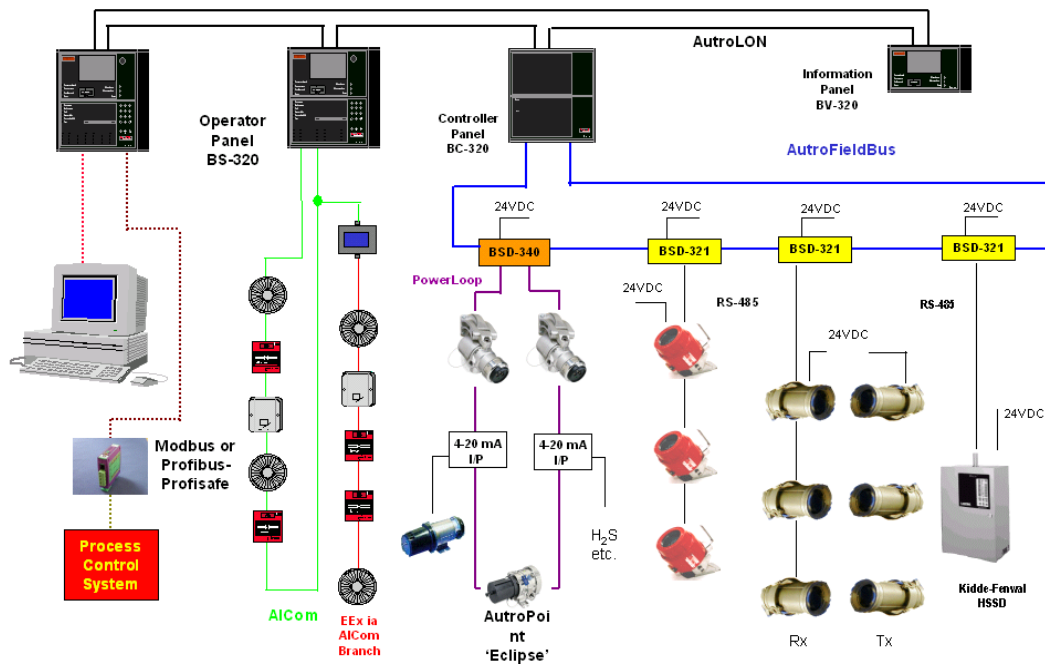
Figur 1: AutroSafe Integrated Fire & Gas System

- Fully integrated PowerLoop detectors are connected to the two-wire PowerLoop, no additional interfaces are required.

- Any 4-20mA devices can be connected to the system's PowerLoop by means of the BN-342 4-20mA interface. No additional power supply is required, the PowerLoop will supply both the BN-342 module as well as the 4-20mA detector attached to it.

- CCTV Flame Detection Cameras are fully integrated – On alarm the built-in sophisticated AutroSafe video switching ensures immediate presentation of live video on the system's man-machine interface.

- Advanced Open Path Gas Detectors connected on RS-485 multi-drop loops provides the highest level of detection performance. Including, but not limited to false alarm immunity, logging and trending of analogue detector readings.

- Aspirating smoke detectors connected on multi-drop RS485 provide intelligent communication into the AutroSafe system. Including, but not limited to false alarm immunity, logging and trending of analogue detector readings.

- The smoke- and heat detectors on the AI_Com loop employ the *DYFI* + technology, a dynamic filtering system which virtually eliminates false alarms and provides the earliest possible warning of a potential fire. A single pair of wires that provides both power to – as well as interactive communication with – the detectors, connects detectors, manual call points and interfaces. The AI_Com loop also features the SelfVerify function, testing the detectors to the calibrated set point every 24hours.

- Automatic addressing of detectors – No switch settings required.

For a detailed general description of the AutroSafe SelfVerify™ Integrated Fire and Gas System, please refer to Section 3.

3. General Description

3.1 SIL2 approved AutroSafe SelfVerify™ Integrated Fire & Gas System

Reference is made to Section 2, typical topology, integrated Fire and Gas system.

Addressable Flame and Gas Detectors, as well as Smoke, Heat and other Fire detectors together with Manual Call Points are all connected to the AutroSafe system that continuously monitors the field equipment for any type of fault. Most of the detectors also support the SelfVerify™ function, which is a calibrated self-test, controlling the functionalities of each detectors.

A maximum of 127 points, of which 99 can be addressable SelfVerify™ Smoke detectors, Heat detectors, Manual Call Points or Extinguishing Release Buttons can be connected to one AI_Com loop of the AutroSafe IFG panel. Each panel has a total capacity of 6 loops/512 points (EN-54/2 limitation). Intrinsically Safe detectors can be connected to the AI_Com loop via galvanic isolators. A maximum of 20 detectors can be connected per isolator.

Up to a maximum of 15 addressable Gas and/or Flame detectors can be connected to each PowerLoop, depending on power load and cable length/specifications. Each AutroSafe IFG panel can support one AutroFieldBus ring, which is capable of handling up to 31 PowerLoop drivers.

Detectors with a 4-20mA signal transferral can be connected to the PowerLoop by means of the BN-342 interface unit.

The AutroSafe IFG system facilitates utilization of the SelfVerify™ functionality. The SelfVerify™ technology allow the system to "look after itself" by performing a calibrated self-test of all SelfVerify™ detectors and panels every 24hours, thus improving system availability, whilst reducing maintenance and testing requirements to a minimum.

By combining connection of Flame and Gas detectors onto the same 2-wire PowerLoop, less cabling will be required for the system installation, thus a significant reduction in installation cost. A proportional cable weight reduction comes as a bonus.

With the SelfVerify™ functionality, high reliability and reduced maintenance requirements, the AutroSafe IFG system offers a highly competitive Life Cycle Cost.

All Smoke detectors, Heat detectors and Manual Call Points are available in safe area, Zone 0, Zone 1 and Zone 2 versions.

3.2 Key Features and Cost reduction

- All detectors are addressable and include in-built short circuit, open circuit and ground fault monitoring and protection.

- Less cabling. A potential saving of 30-60% on Flame and Gas detection loops cable requirements.

- No need for direct-wired (point-to-point) analogue inputs.

- Significant reduction in the cabinet space requirement compared to traditional systems.

- Life cycle cost reduced due to the SelfVerify™ technology. The SelfVerify™ functionality is available for all integrated Autronica Fire and Gas detectors. A calibrated self-test, which reduces maintenance requirements and maintenance costs to a minimum is automatically performed every 24 hours.

- Scalable and modular system allows for flexibility. Panels may be added to – or removed from – the AutroSafe network at any time.

- AutroSafe addressable system is the world's first IEC61508 SIL2 approved system holding TÜV certification. (I.S.A. S84 equivalent). It is the only addressable system in the world that has been approved and certified according to this standard.

- An IEC61508 SIL2 compliant communication link is available for providing F&GDCS status to other systems.

- All Autronica AI_Com addressable detectors employ the dynamic filtering system *DYFI +*, which virtually eliminates false alarms and provides the earliest possible warning of a potential fire.

- The smoke detector can be offered in a high sensitivity version that is normally used for "early warning" smoke detection.

- Automatic addressing of detectors – No manual switch setting is required.

3.3 Distributed system Topology

The AutroSafe SelfVerify™ IFG is a distributed system where panels can be situated in local equipment- or instrument rooms close to the detectors. The system is linked together by use of the AUTROLON network.

3.3.1 AUTROLON

AUTROLON rings are formed between panels for data exchanging throughout the system. This solution provides I/O status availability at any panel connected to the AutroLON ring. The top-level DCS or MMI communication link can therefore be connected to any panel in an AUTROLON ring.

The maximum number of panels attached to an AUTROLON ring is 32. The AUTROLON ring is based on a monitored closed loop structure and is capable of self-repairing itself in case of a wire-break or short-circuit occurrence.

3.3.2 AutroFieldBus

AutroFieldBus is used to connect the BSD-321 and BSD-340 modules interfacing Flame detectors, Aspirating Smoke detectors and Gas detectors to the AutroSafe Panel. An AutroFieldBus interface card, type EAU-341, is mounted in the Fire Alarm Panel and communicates with the BSD-340 and/or the BSD-321 modules via AutroFieldBus.

The BSD-321 module provides an RS-485 multi-drop communication link to allow communication with Open Path Gas Detectors, High Sensitivity Aspiration Smoke Detectors and CCTV Flame Detection Cameras.

Point Gas Detectors, Flame Detectors and 4-20mA interfaced detectors can be connected to the PowerLoop driver, BSD-340, via a 2-wire loop. The PowerLoop can be used as a communication loop only by external power supplying all detectors attached. This will allow for more detectors to be attached to the PowerLoop, since the load will not be the restricting factor.

The BSD-340 PowerLoop module and the BSD-321RS-485 loop module can be powered locally. The EAU-341 AutroFieldBus driver must be located in safe-area, but the BSD-321 and the BSD-340 modules can be placed out in the field, in close proximity to the detectors, thus further reducing cable requirements.

3.4 SelfVerify™

All Autronica detectors that are supplied for use in the AutroSafe Integrated Fire and Gas detection system have got the unique SelfVerify™ test function. This calibrated self-test is performed every 24 hours.

Up to this point, Fire and Gas alarm systems have been depended on careful manual inspections, involving a number of potential problems. For example, the detector may be mounted out of reach. The maintenance personnel may not have access to particular areas etc.

Furthermore, a manual test is not 100% reliable. Test gas/smoke is rarely applied to the detector in the manufacture's recommended amount, and even a faulty detector may eventually give an alarm if its detection chamber is filled with enough test gas/smoke. Leaving detectors inhibited after inspection, adds another safety risk into the manual testing procedures.

AutroSafe SelfVerify™ will solve most maintenance problems. Time-consuming, difficult and costly manual tests are no longer needed. AutroSafe SelfVerify™ not only tests whether a detector is capable of processing 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. The alarm initiated by the SelfVerify™ function is routed through the AutroSafe system, testing that the complete system is able to give an alarm. Of course stopping short, prior to actually activating any outputs.

3.5 Response Time

The AutroSafe IFG systems response time for the first alarm entering the system is ≤ 2 seconds, for all type of detectors.

The maximum response time from first alarm entering the system until it is processed and reported via AutroCom is ≤ 2 seconds.

3.6 Configuration/special tools

Configuration files for AutroSafe are produced by means of the AutroSafe Configuration Tool. This is a special software package that runs on any modern PC with Windows 98/2000/NT/XP. Refer to the AutroSafe Configuration Help System integrated into the AutroSafe Configuration Tool for details.

Special tools, which simplify configuration, FAT and commissioning are also available:

- AS-2000 SW – Loop Diagnostics Tool, reads loop topology. Data generated by AS-2000 can be used in the AutroSafe Configuration Tool directly. The tool also provides easy diagnostics, fault finding and testing facilities during commissioning and maintenance.

This tool can be used with any Al_Com type of detection loop.

- Loop Simulator SW – Can simulate all detection loops connected to a panel and it provides an efficient way of performing a FAT.

For further details, refer to the handbooks for the special tools.

3.7 AutroSafe Fire and Gas Panels

A wide selection of Fire and Gas panels, Operator panels and Display panels are available. All panels, except the BS-310G, are prepared for AUTROLON communication.

BS-310G	• Standalone Fire and Gas Panel with full operation facilities. • Battery capacity 24V/12Ah • Internal 3A power supply • Maximum number of installed I/O modules - 3. • With no battery installed, maximum number of I/O modules - 6 • Panel addresses: NA, stand-alone
BS-320G	• AUTROLON connected or stand alone Fire and Gas Panel with full operation facilities • Battery capacity 24V/12Ah • Internal 3A power supply • Maximum number of installed I/O modules - 3 • With no battery installed, maximum number of I/O modules - 6 • Panel addresses: Hex. 01-20
BS-330G	• AUTROLON connected operator panel – all operation facilities available • No space for power supply, battery or I/O modules • Has to be powered from a Fire Alarm Panel or Controller • Panel addresses: Hex. 41 -60
BC-320G	• AUTROLON connected Controller w/o operation facilities • Battery capacity 24V/12Ah • Internal 3A power supply • Maximum installed I/O modules - 3 • With no battery installed, maximum number of I/O modules - 6 • Panel addresses: Hex. 21-40 •
BU-320G	• AUTROLON connected Repeater panel. Provides Silence sounders and Reset operator buttons • Powered from external 24Vdc. • No space for I/O modules. • Panel addresses: Hex. 61 – A0
BV-320G	• AUTROLON connected Information Panel, no operator buttons • Powered from external 24Vdc. • No space for I/O modules. • Panel addresses: Hex. A1 – E0

3.8 Communication to other systems

3.8.1 Modbus Protocol Communication for C&E data to Control system

AutroSafe can support single or dual Modbus Modicon RTU interfacing communication with Control Systems. AutroSafe can act as both Modbus Slave or Modbus Master and the options for connection are two-wire RS-232, four wire RS-422 or two-wire RS485 (+ signal ground). The Modbus interface provides status information from the Fire & Gas Detection Control System to other control- or presentation systems.

AutroSafe System status is also transferred. Available commands are Silence sounders, Reset, set digital output and set time and date. For further details, refer to the installation and commissioning handbook for the Modbus interface.

3.8.2 ProfiBus/ProfiSafe Protocol Communication for C&E data to Control system

Single or dual ProfiBus DP/ProfiSafe communication interfaces are also available. The dual ProfiSafe communication system is an IEC61508 SIL2 approved link, which provides detector status messages for Cause & Effect actions to for example the Emergency Shut Down (ESD) System. A single ProfiSafe link has a capacity of 472 points allowing for 2 status bits per detector. This is a system restriction set in the ProfiSafe standard, which means that maintenance data, event data etc. must be provided to the operator station by a separate communication link. Further details will be given on request.

3.8.3 AutroSafe AutroCom Protocol

AutroCom is an Autronica proprietary protocol for AutroSafe, which is designed to allow the AutroSafe Panel to communicate with external systems directly. The AutroCom protocol can be transferred on many physical layers, including but not limited to RS-232, RS-422, RS-485 or Ethernet. The control system supplier must implement this protocol to be able to read it. An AutroCom implementation gives the most extensive functionality in communication performance between AutroSafe and other systems. However, in most projects the Modbus or ProfiBus alternatives will provide sufficient functionality.

3.8.4 ESPA 4.4.4. Protocol

ESPA 4.4.4 is available by means of a protocol interface. It is mostly used for communication with pager systems, corridor display systems and for mobile phone SMS messaging systems.

3.9 Detection loops

3.9.1 Power Loop (BSD-340)

PowerLoop is a **two-wire** addressable loop used to interface IR Flame Detectors and point Gas Detectors to the AutroSafe IFG Panel via the AutroFieldBus. Up to 15 devices may be connected in one addressable loop, depending on the power consumption of the field devices and the cable topology.
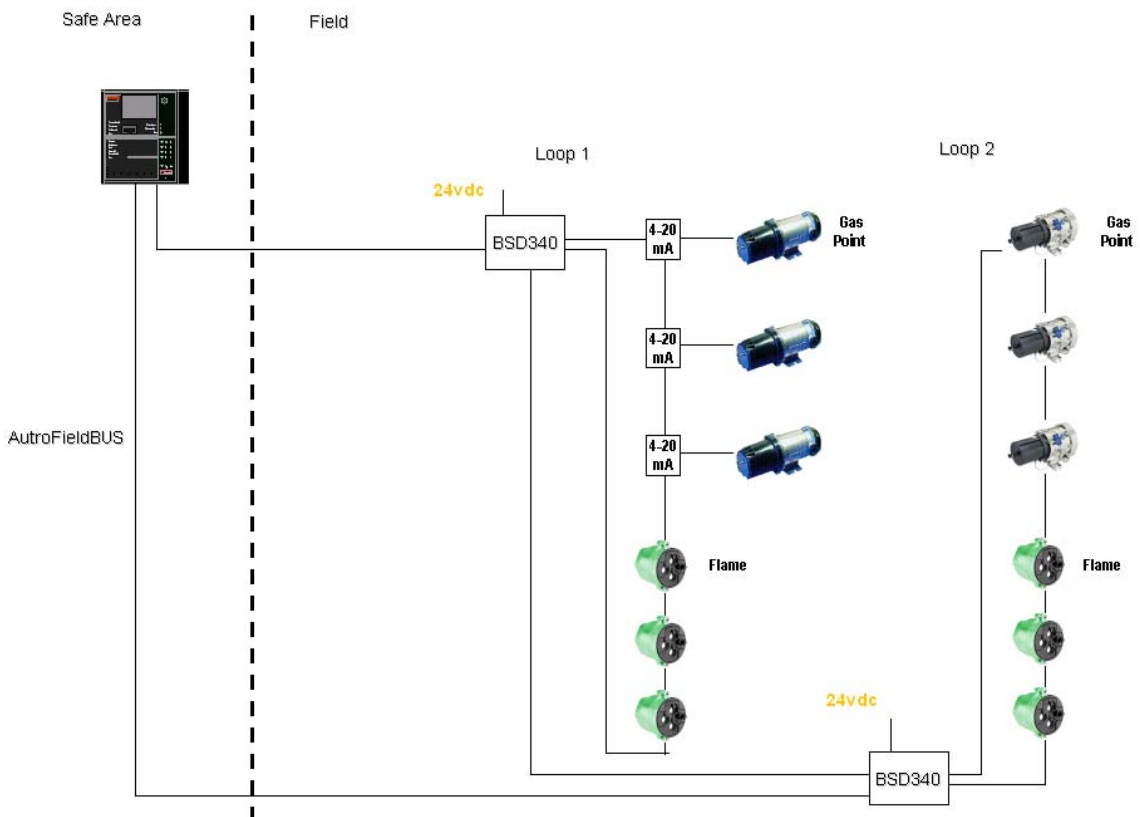
Figur 2: IFG System utilizing PowerLoop

 PowerLoop can source a total of 100W (30VDC) to the devices attached to the loop. It is possible to connect up to 15 field devices to one PowerLoop: The number and placement of the detectors connected to each loop has to be calculated during the design phase as this depends on the power consumption of the connected units, loop length and dimensions of the cable. The diagram shows a selection of direct interfaced detectors and 4-20mA interface units connected to the BSD-340 PowerLoop driver. A maximum of 31 PowerLoop modules can be connected to one AutroSafe Panel via an AutroFieldBus driver type EAU-341. A combination of BSD-340 and BSD-321 modules can be connected in one AutroFieldBus ring to the same EAU-341 AutroFieldBus driver.

3.9.2 RS-485 multi-drop Loop (BSD-321)

A variety of detectors can connect to the system via the RS-485 converter BSD-321, such as Open Path gas Detectors, CCTV Flame Detectors and High Sensitivity Aspirating Smoke Detector (the AnaLASER). A maximum of 16 detectors can be connected to each BSD-321 loop driver. A maximum of 31 RS-485 loop modules can be connected to an AutroSafe Panel in an AutroFieldBus ring, via an EAU-341 AutroFieldBus Driver. The detectors must be powered separately, however, it is possible to reduce the cable requirement by providing a common power supply bus for several detectors. Proprietary protocols, which allow specified detectors to communicate with the system via RS-485, have been developed and are implemented in the BSD-321 module.

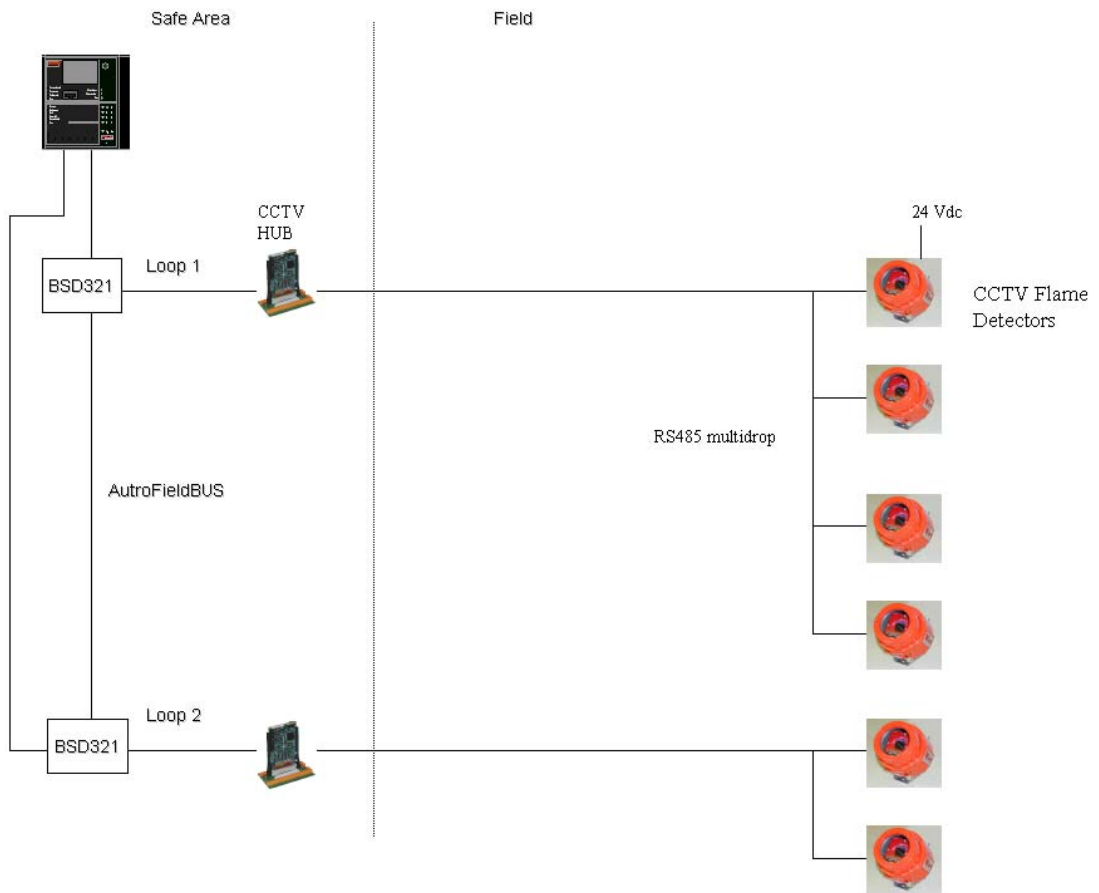(For detailed connections, refer to Appendix C)
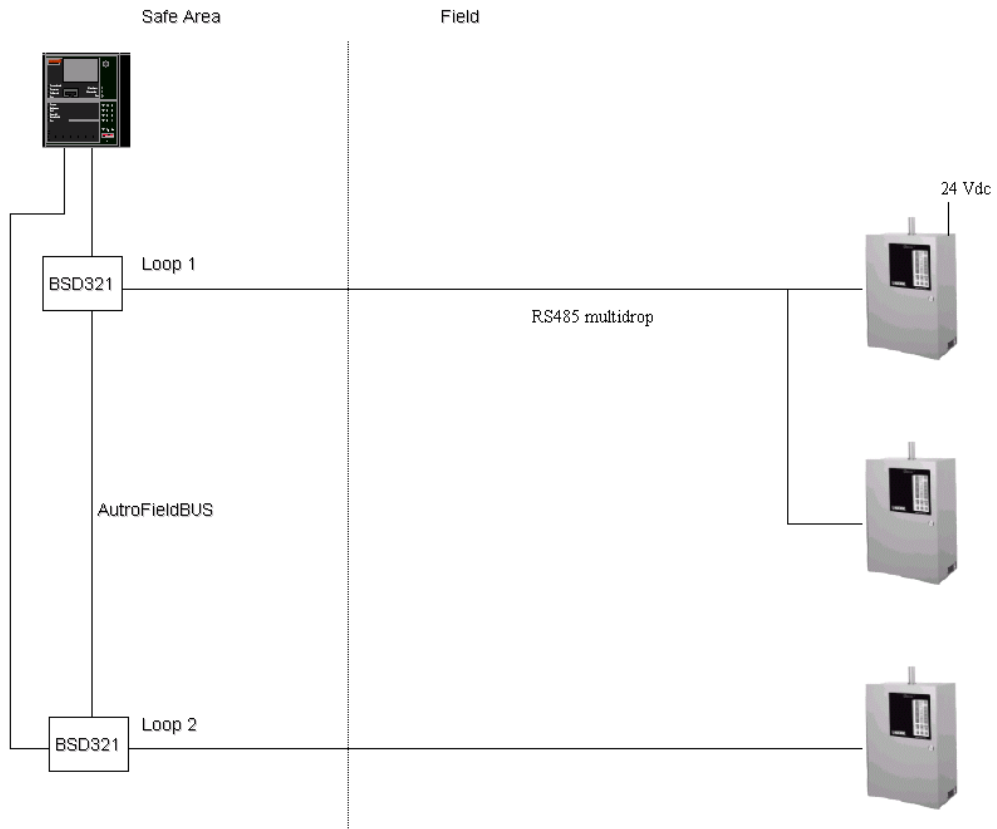
3.9.2.1 Open Path Gas Detectors
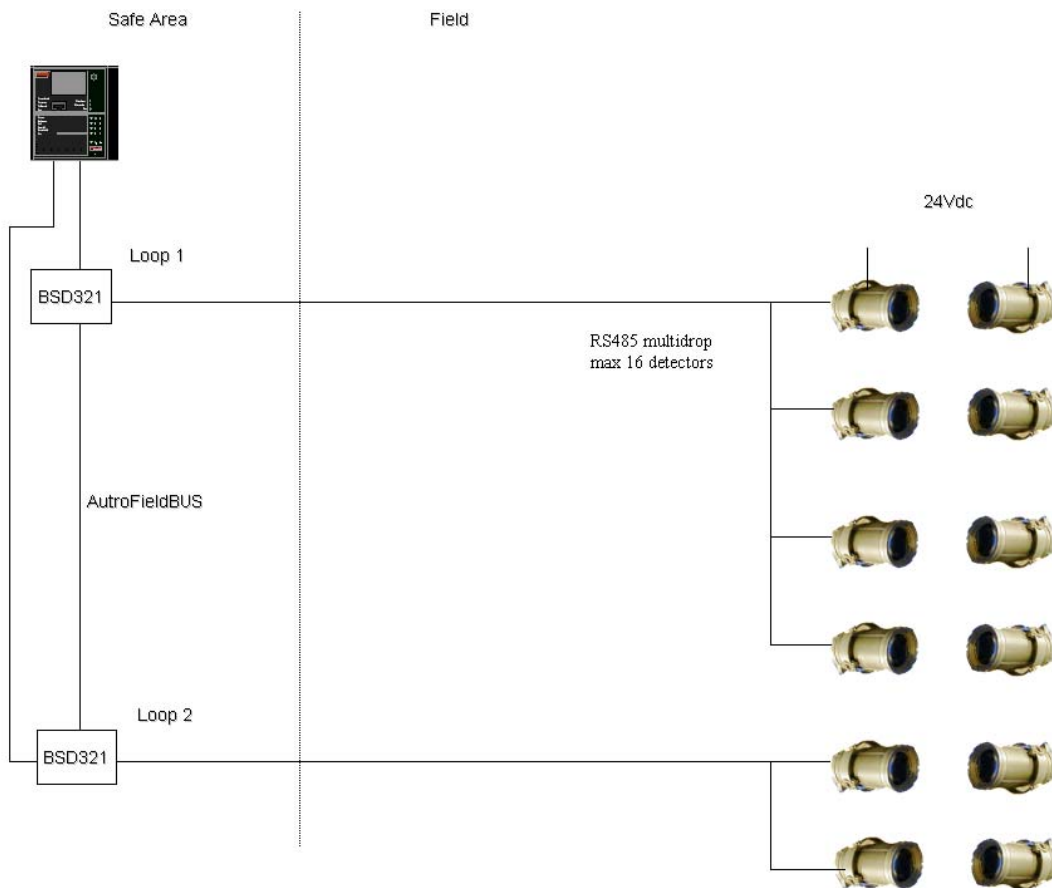
Figur 3: Open Path Gas Detectors connected to the AutroSafe IFG System

3.9.2.2 CCTV Flame Detectors

*Figur 4: CCTV Flame Detectors connected to the AutroSafe IFG System*

3.9.2.3 High Sensitivity Aspirating Smoke Detectors (AnaLaser)

Figur 5: HSSD Aspirating Detectors connected to the AutroSafe IFG System

3.9.3 AI_Com Detection loop (BSD-310/BSD-311)

Smoke and Heat detectors, Manual Call Points, Extinguisher Release Buttons and addressable interface units are connected to either BSD-310 or BSD-311 loop modules. The BSD-311 is a high power AI_Com loop driver that can be used instead of the BSD-310 if the detectors and loop sounders draw more than 140mA from the driver. Loop sounders are not shown in below diagram.
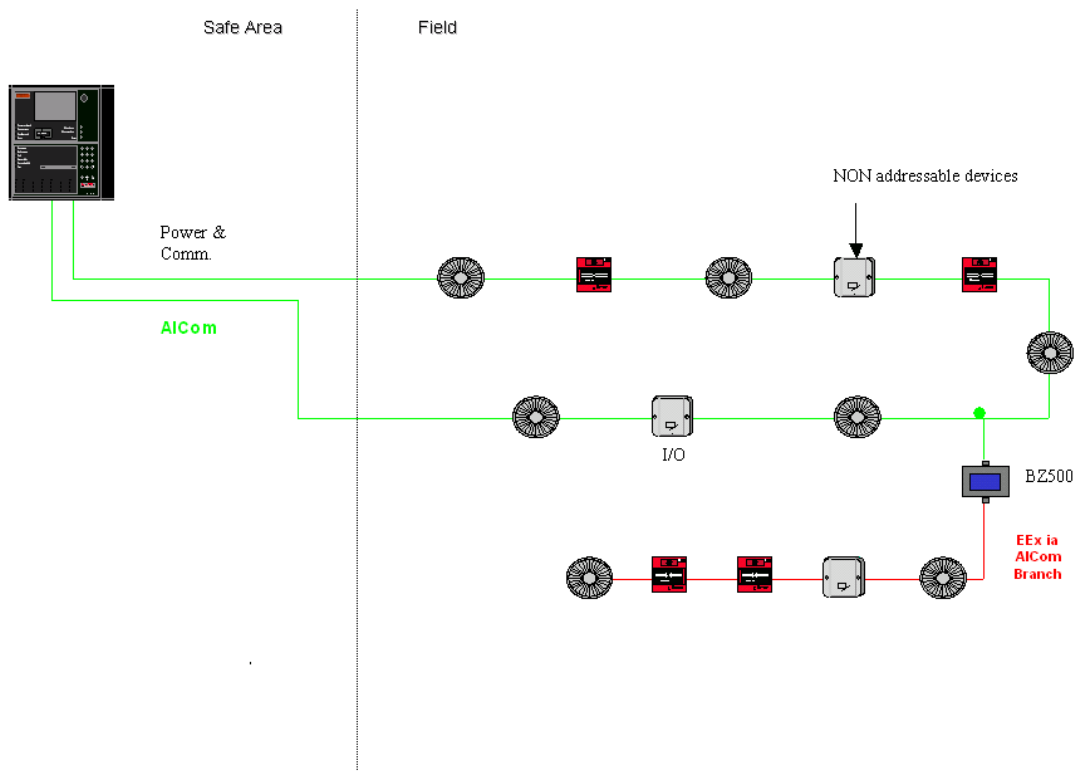
Figur 6: AI-Com loop devices attached to the AutroSafe IFG System

The fully automatic AI_Com loop communication between the detectors and the AutroSafe Panel is interactive. Except for the safety polling every 40 seconds, there is no communication between the detectors unless they have got some status change to report. This redundancy in the loop communication capacity is significant in terms of response time and processing time, which are reduced to a minimum.

A special **fail-safe** function will be activated if the loop driver does not respond to an alarm message from a detector. The detector will repeat its alarm message five times and if the loop driver fails to respond, the detector will start sending a toggle-signal. A separate fail-safe circuit within the loop driver detects this signal, which in turn activates a fail-safe hardware output on the loop driver module.

All detectors have a built-in processor that takes care of the Dynamic Filtering Process (DYFI+). These advanced filter functions perform the following tasks:

- **Compensates for dirt and pollution** in a Smoke detector chamber and maintains the correct level sensitivity. This results in increased reliability and extends service intervals.

- **Increases sensitivity to slowly developing fires** – Ensures the earliest possible alarm in case of a smouldering fire.

- **Transients or spikes in a measured Smoke detector chamber signal are suppressed**. These are phenomena that can cause false alarms on other systems. This provides increased reliability.

3.9.4 AI_Com Loop, Hazardous Area BSD-310/ BZ-500

A number of barriers may be located in safe area with branch-off loops.
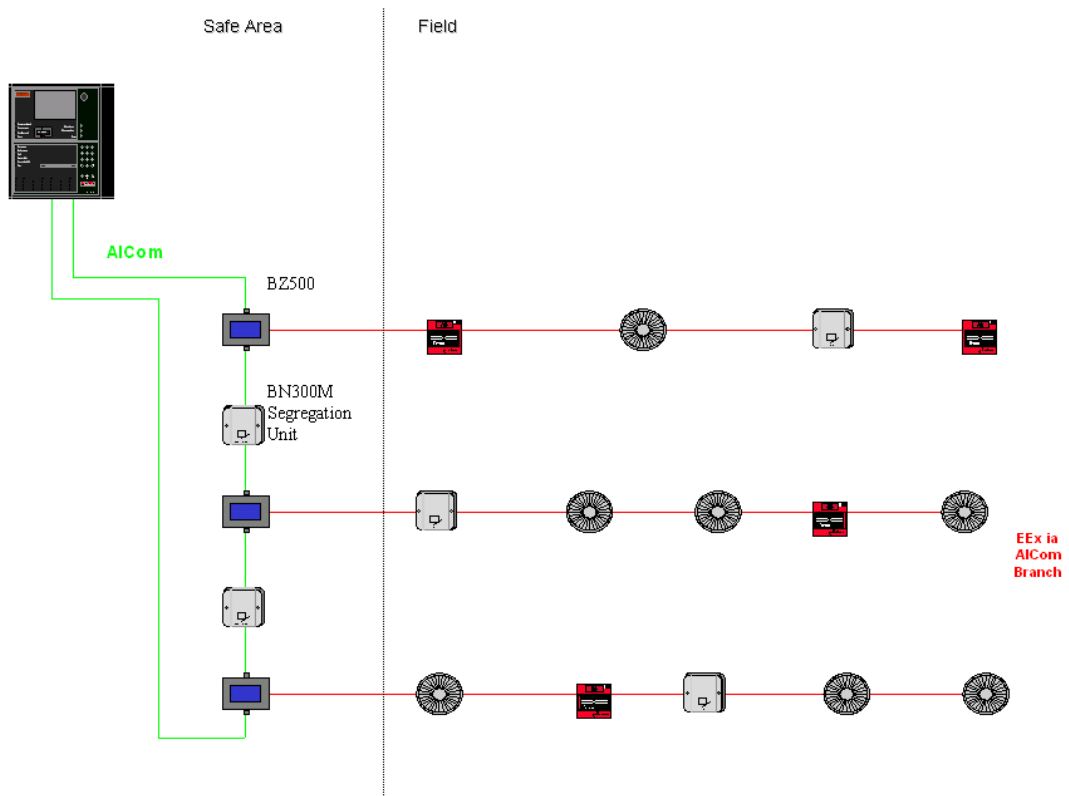
Figur 7: Al_Com loop with barriers connected to the AutroSafe IFG System

BZ-500 units can also be field-mounted. A combination of IS and non-IS detectors can be connected to the same BSD-310 loop driver module. BZ-500 Galvanic Isolators must be located in the safe area. When BZ-500 units are used in an AutroSafe IFG panel, there must be a separate addressable unit between each Isolator (segregation unit).

3.10 Detectors and Field devices

3.10.1 Flame & Gas Detectors

Flame Detectors and IR point Gas Detectors etc. connect to PowerLoop modules, type BSD-340, each of which are capable of handling up to a maximum of 15 detectors on each PowerLoop, depending on the power consumption of the field equipment and the loop topology. The two-wire PowerLoop provides intelligent communication and DC power to the detectors.

AutroPath/Spectrex SafEye Open Path Gas Detectors, Micropack CCTV Flame Detector and Kidde-Fenwal High Sensitivity Smoke Detector (Analaser) can be connected to an RS-485 loop module, type BSD-321.

3.10.1.1 Flame Detectors

AutroFlame X33/1-PL Flame Detectors are fully integrated by means of a built-in intelligent interface featuring the OI™ function (Optical Integrity test). The detector can also provide maintenance data to the AutroSafe IFG panel. In addition, the AutroSafe IFG System can incorporate Micropack CCTV Flame detectors by means of a built-in intelligent interface. This solution includes self-diagnostic feature.

3.10.1.2 IR Point HC Gas Detectors

The AutroPoint Eclipse IR point Gas Detector is fully integrated by means of built-in intelligent interface featuring a self-test function. The detector can transmit analogue information and can also provide maintenance data.

3.10.1.3 Open Path HC Gas Detectors

AutroPath Open Path Gas Detectors are fully integrated by means of built-in intelligent interface featuring a self-test function. The detector can transmit analogue information and can also provide maintenance data.

3.10.1.4 Duct mounted HC Gas Detectors

The AutroPoint Eclipse IR point gas duct mounted detector is fully integrated by means of built-in intelligent interface featuring a self-test function. The detector can transmit analogue information and can also provide maintenance data.

3.10.1.5 HCN Gas Detectors

Polytron HCN 2XP TOX Gas Detectors are connected to the PowerLoop by means of a 4-20mA interface unit, type BN-342. The SelfVerify™ function is not available for this detector. External power is not required, as the detector will be directly supplied from the loop via the BN-342 interface unit.

3.10.1.6 H_2S, CO, O_2, NH_3, Detectors

Polytron TX Gas Detectors are connected to the PowerLoop by means of a 4-20mA interface unit, type BN-342. The SelfVerify™ function is not available for this detector. External power is not required, as the detector will be directly supplied from the loop via the BN-342 interface unit.

3.10.1.7 Other 4-20 mA units

Any 4-20mA process transmitter unit can be connected to the AutroSafe PowerLoop via an BN-342 unit. However, devices connected by means of a 4-20mA interface will not have the ability to use the SelfVerify™ feature. Intelligent detectors with internal self-diagnostics will however be able to provide a general fault signal via the 4-20mA signal transferal in case of a malfunction.

3.10.2 Smoke, Heat Detectors and Manual Devices

3.10.2.1 Detection loops and associated detectors for safe areas

Interactive SelfVerify™ detectors are connected to BSD-310 AI_Com loop drivers.

3.10.2.2 Detection loops and associated detectors for hazardous areas

Detectors in hazardous areas must be connected to a BSD-310 AI_Com loop driver modules via a Galvanic Isolator, type BZ-500. Ex rated detectors are available for Zone 0 and Zone 1. Exn-rated detectors are available for Zone 2, if required.

3.11 Outputs

3.11.1 Programmable Digital Outputs in Panel (BSJ-310 Module)

Discrete open collector outputs can be used for hardwired signals. BSJ-310 modules, which fit in any AutroSafe BS-320G or BC320G panel, can be used for this purpose. In addition 24V DC relays can be supplied for each output, which will provide volt-free contacts if required. Each BSJ-310 module has eight open collector outputs. Any detector within an AUTROLON ring can control any output within the same AUTROLON ring.

Delayed action and voting can be programmed for these outputs. For example such outputs can be used for the following:-
• Digital signals to the Control System (inputs)
• Digital outputs in general, for example, for shut-down signals to fire dampers, HVAC, release of extinguishing systems and signals to mimic panels etc.

3.11.2 Programmable EOLR Monitored 24VDC Outputs (BSB-310)

End-of-line resistor monitored 24V DC outputs can be used to drive horns, sirens, bells, beacon and strobes etc. The BSB-310 module, which fits in any BS-320G or BC320G panel, provides four 1A automatic fused outputs. Maximum load per module is 3A in total. Any detector within an AUTROLON ring can control any output within the same AUTROLON ring. The BSB-310 outputs are specially designed for sounders and bells, thus programming facilities include a variety of options like;
• SOLAS function (Safety Of Life At Sea)
• Delayed action
• Voting
• Digital output, monitored

3.11.3 Programmable Field mounted I/O units

A variety of field mounted I/O units is available for connection to the AI_Com detection loop. Some of them are shown in figure 3.8.3. In this example the BN-221/01 is used for fire suppression system control and monitoring. The BN-221/02 controls the horns and strobes. The BN-221/01 units provides field mounted contact rated for up to 7A. All BN-221 I/O's are EOLR monitored and they require 24VDC power supply.

Some of the field mounted I/O units available are:

Part No.	Inputs	Outputs	Purpose	Powered by
BN-221/01	2	1	Extinguishing control unit, two open- and short-circuitmonitored inputs, one monitored relay output	AI_Com detection loop
BN-221/02	2	1	One 7A rated fully monitored relay output	External
BN-300	1		Interfacing conventional detectors with dry contact output, dry contact interface in general. (Displayed as alarm on Panel)	AI_Com detection loop
BN-310		1	1 changeover dry contact, for example, for door release, fire damper, sprinkler control etc.	AI_Com detection loop
BN-320/x	2	1	I/O unit for sprinkler control, door control, open path smoke detector interface, general I/O control etc.	AI_Com detection loop
BN-201	1		Fault monitoring, external equipment (displayed as fault on panel)	AI_Com detection loop

Figur 8: Al_Com loop with field mounted I/O

3.12 AutroOS Application/Description

AutroOS is a *remote* monitoring and control system that enables full operation of the AutroSafe Integrated Fire and Gas system. All alarms, faults, inhibits, overrides and outputs can be monitored and controlled from AutroOS.

If the connection between the AutroSafe Integrated Fire and Gas system and AutroOS should go down, the AutroSafe system will operate as normal as it can function as a fully autonomous system.

AutroOS employs a flexible design. One or several AutroOS operator stations can be connected to one or several Autronica AutroDbServers via an Ethernet network. Each AutroOS operator station can operate the complete Fire and Gas system.

One or several AutroSafe systems can be tied into a *physical* AutroDbServer via Ethernet. Each AutroSafe system communicates with a *logical* AutroDbServer application, and there can be one or several *logical* AutroDbServers residing on a single *physical* AutroDbServer.

AutroOS also supports different levels of layout screens, from a complete overview of the installation, to a partial overview and then to detailed layouts of the process areas. The system supports automatic navigation to predefined layout screens depending upon incoming alarms or faults, as well as automatic navigation to the layout screen, which contains the actual alarm or fault.

AutroOS troubleshooting and maintenance involves minimal disturbance of normal operation and includes the following features:

- By trending Open Path Gas Detectors, their alignment can be monitored or they can provide an early indication of contamination of the optics.

- By starting the video pop-up window and switching between the CCTV Flame Detection Cameras, the system also checks the communication between the CCTV Flame Detection Cameras and the AutroOS.

- By activating a strobe from the AutroOS screen, a large section of the system is checked. The ON status signal on the screen is based on a feedback from the AutroSafe, not on the command from AutroOS.

- The Historic Event screen will provide time stamped information of all events that has taken place, including Operator Acknowledgements.

AutroOS Features
- Monitors and controls AutroSafe Integrated Fire and Gas alarm systems.
- Presents customised layouts of installations with flexible use of field animated device symbols.
- Automatically displays live video images from CCTV Flame Detection Camera in alarm
- Automatic video recording.
- A trend facility is available to monitor the performance of Detectors.
- Separate system windows for maintenance and troubleshooting purposes.
- Separate Active Alarms and Historic Event windows for overview and troubleshooting.
- Easy to expand the system.

3.13 Power Supply – General Requirements

Each AutroSafe IFG PowerLoop driver module, BSD-340, requires a local 24VDC supply. Each PowerLoop is capable of providing up to 30V/3,3A (100W) to the loop and associated field devices. The supply provided via PowerLoop to the field devices is galvanically isolated from the associated AutroFieldBus structure.

Special attention must therefore be paid to power distribution and design.

Power supply for AutroSafe BC-320/BS-320G panels is 230AC, (110VAC optional) and/or 24VDC

BV-320 panels must be powered with 24VDC from either BS-320G/BC-320 or from an external source.

4. Appendices

4.1 Appendix A, Cable Recommendations

4.1.1 General

All cable specifications according to relevant rules/regulations and project specifications.
Cables must comply with the individual requirements defined in the relevant Autronica manual/datasheet.

4.1.2 General Recommendations:

- Recommendation; All cables should be equipped with screen.
- Multi-core cables with overall screen may be used.
- PowerLoop must be equipped with screen and screen must be kept continuous.
- Communication wiring must be CAT5 type cable with screen.

For further details, General Handbook – System Description Chapter 3.2

Addressable Smoke and Heat Detectors, Manual Call Points.

Maximum Loop Resistance: 50 ohm.
Minimum CSA 1,0 mm² (recommended).

Addressable Flame and Gas Detectors.

Maximum loop resistance will depend on load.
Cable to be CSA 2.5 mm² - also dependent on load

4.2 Appendix B, Reference documents

Handbook	Item Number
System Description, AutroSafe Integrated Fire & Gas System	P-ASAFEIFG/XE
System Specification, AutroSafe System	P-ASAFE/XE
Installation Handbook, Fire Alarm Control Panel (BS-310/320) / Controller (BC-320)	P-ASAFE-FA/DE
Commissioning Handbook	P-ASAFE/EE
User Guide, Loop Diagnostic Tool, AS-2000	P-ASAFE-AS/FE
Modbus manual	
Other Documents	
Profibus/ProfiSafe data sheet	
AutroOs data sheet	
ModBus data sheet	
SPIR list	
TÜV certificate for SIL2	

4.3 Appendix C, Typical Connection Diagrams
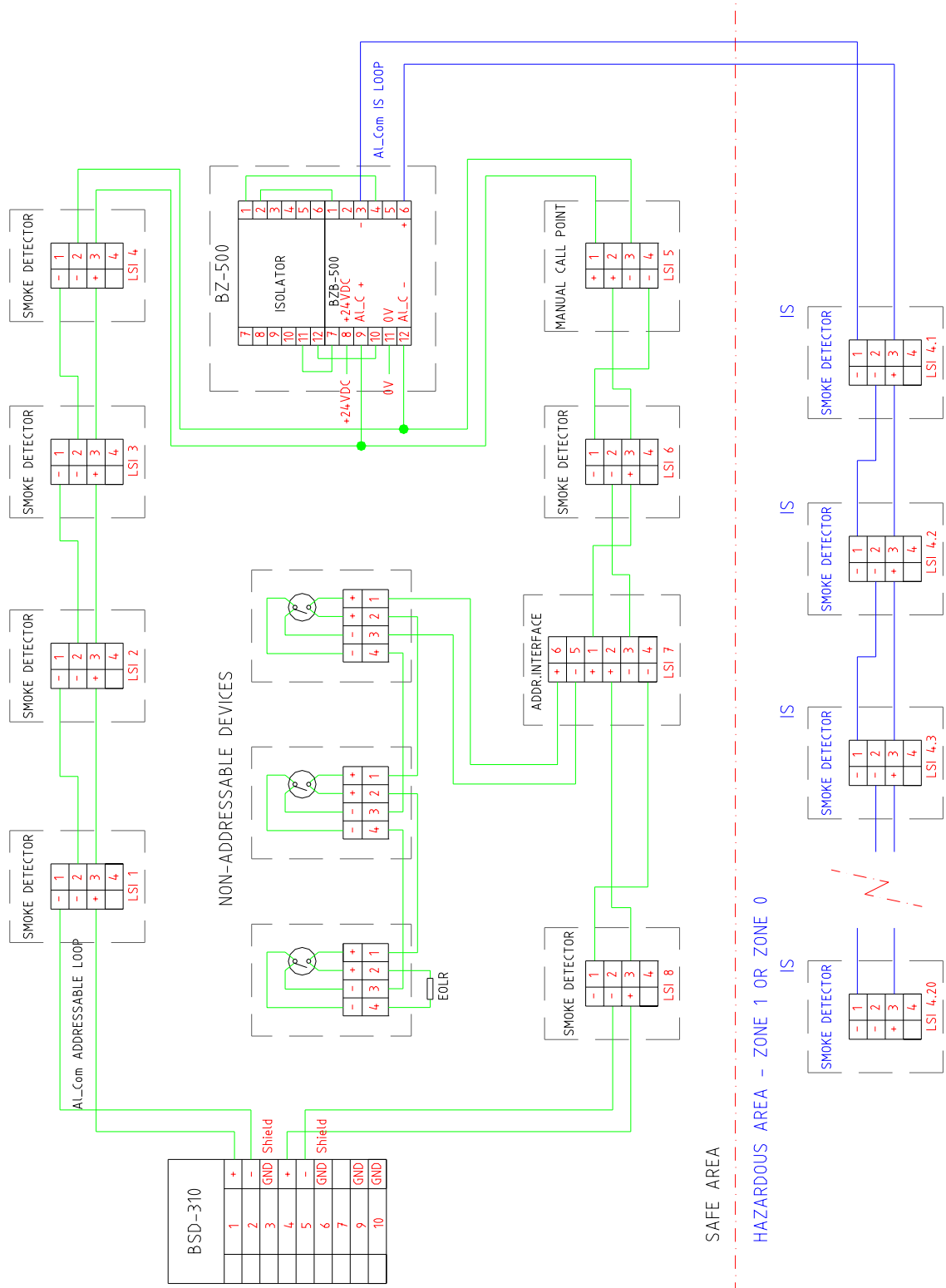
4.3.1 AI-Com Fire Detection loop, BSD-310, Safe Area
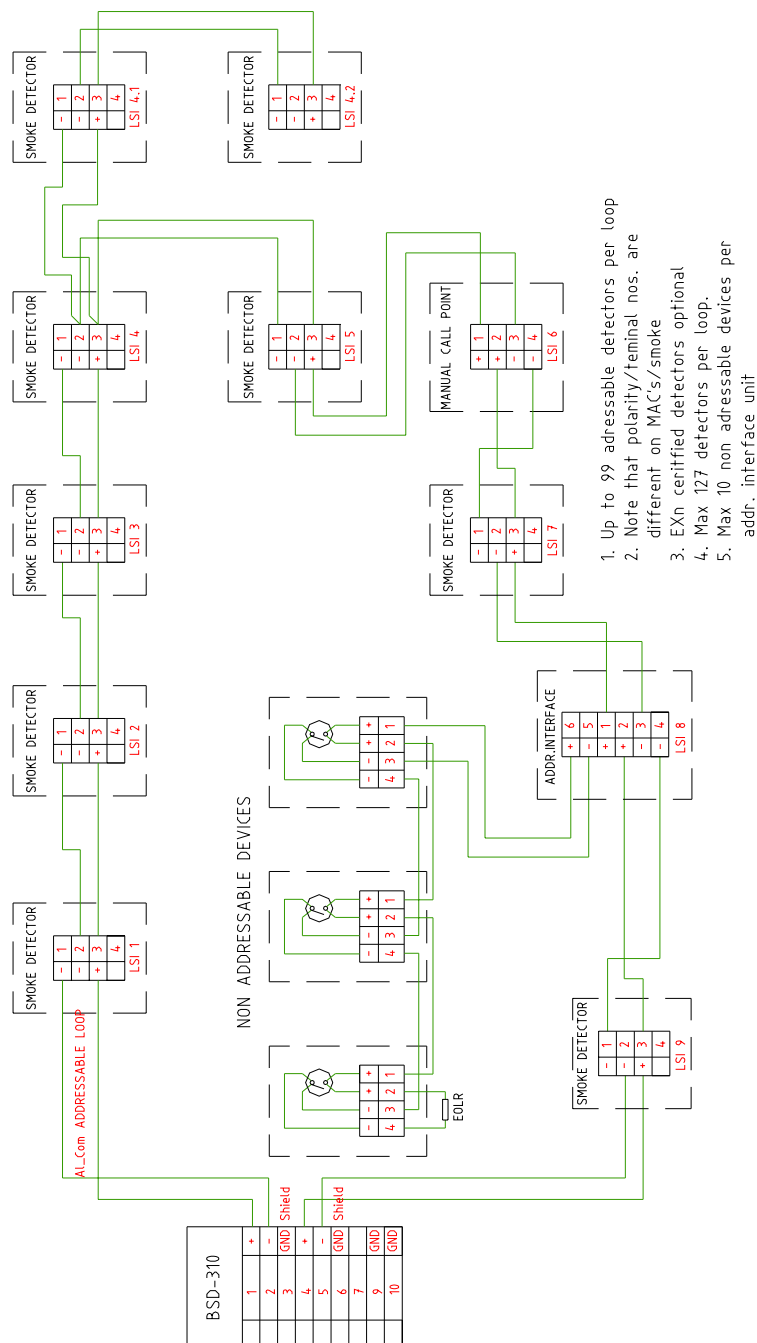
Figur 9: Typical Connection Diagram - Al-Com Fire Detection loop, BSD-310, Safe Area

4.3.2 AI-Com Fire Detection loop, BSD-310, Mixed Safe & Hazardous Area

The Figure below shows a flexible solution with a combined loop covering both safe and hazardous area.

Figur 10: Typical Connection Diagram - Al_Com Mixed Safe & Hazardous Area
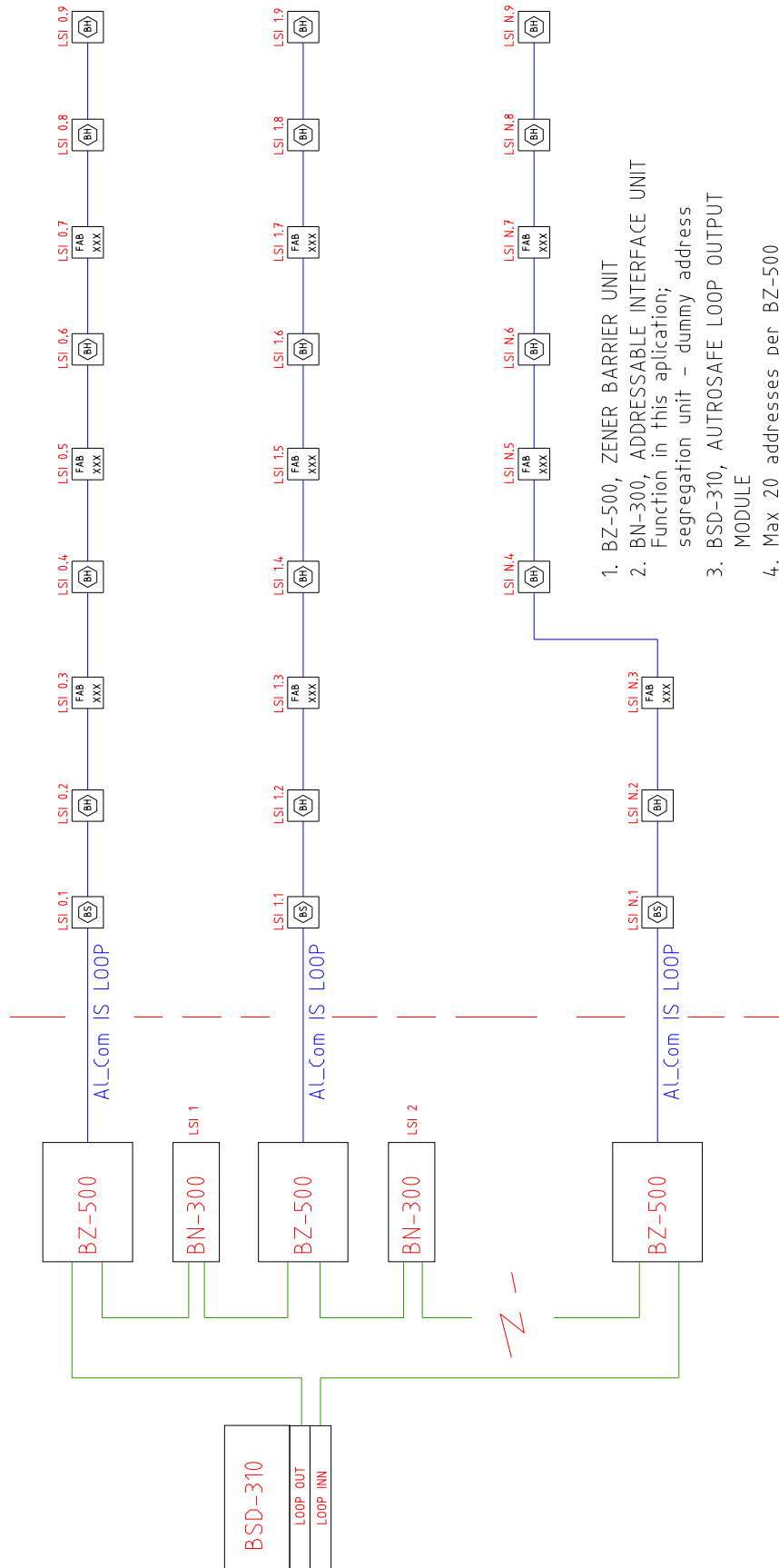
4.3.3 AI-Com Fire Detection loop, BDS-310, Hazardous Area

The figure below shows a proposed connection diagram with the BZ-500 IS Isolators mounted in the panel. Due to the automatic addressing feature within the AI_Com loop, only one branch-off from the same point in the loop is allowed. A convenient way of designing a detector layout in compliance with the above requirements is to use the rail-mounted BN-300M addressable interface unit as a dummy address between the IS Isolators. Note that field mounted barriers is the most commonly used solution.
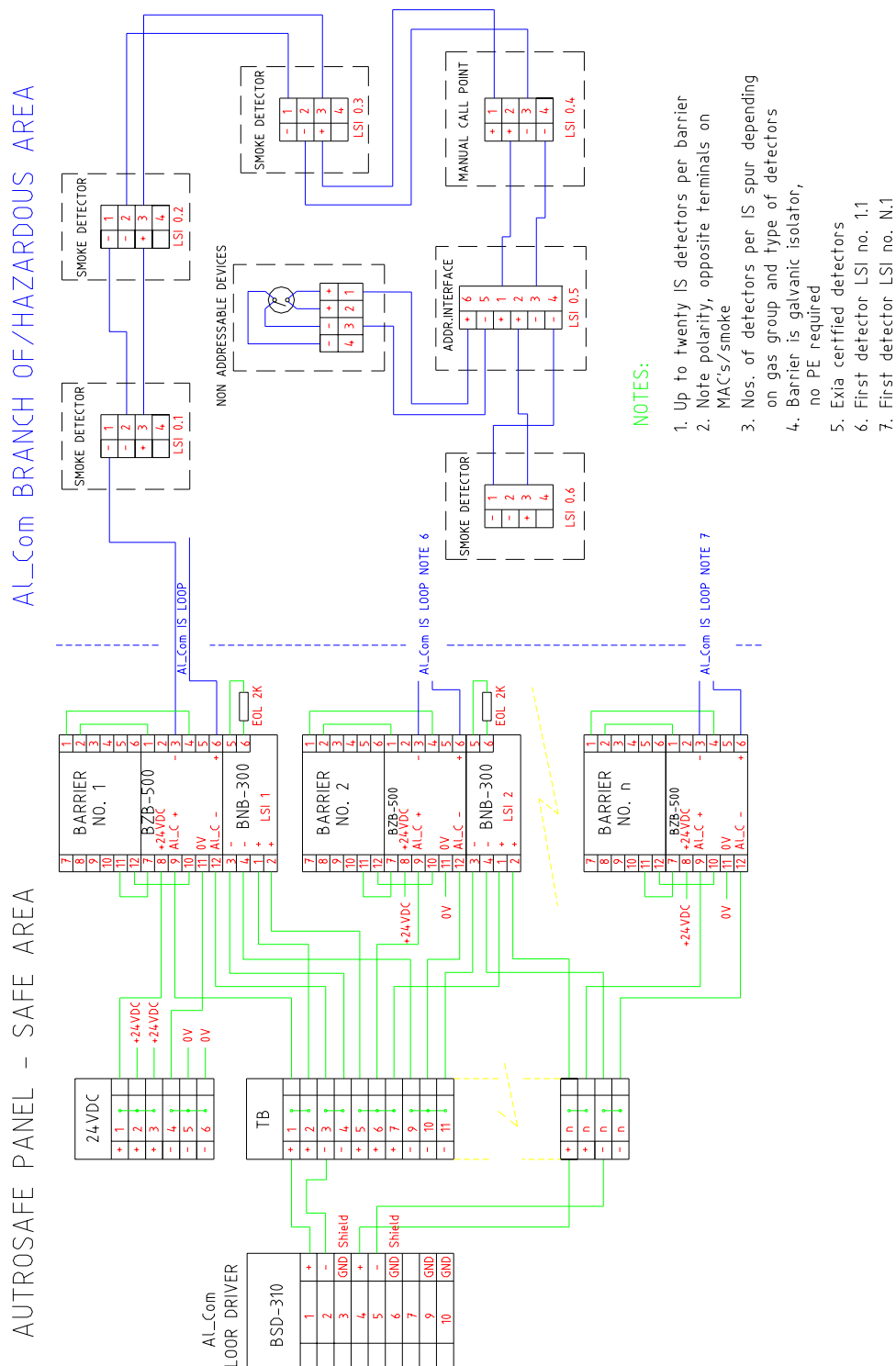
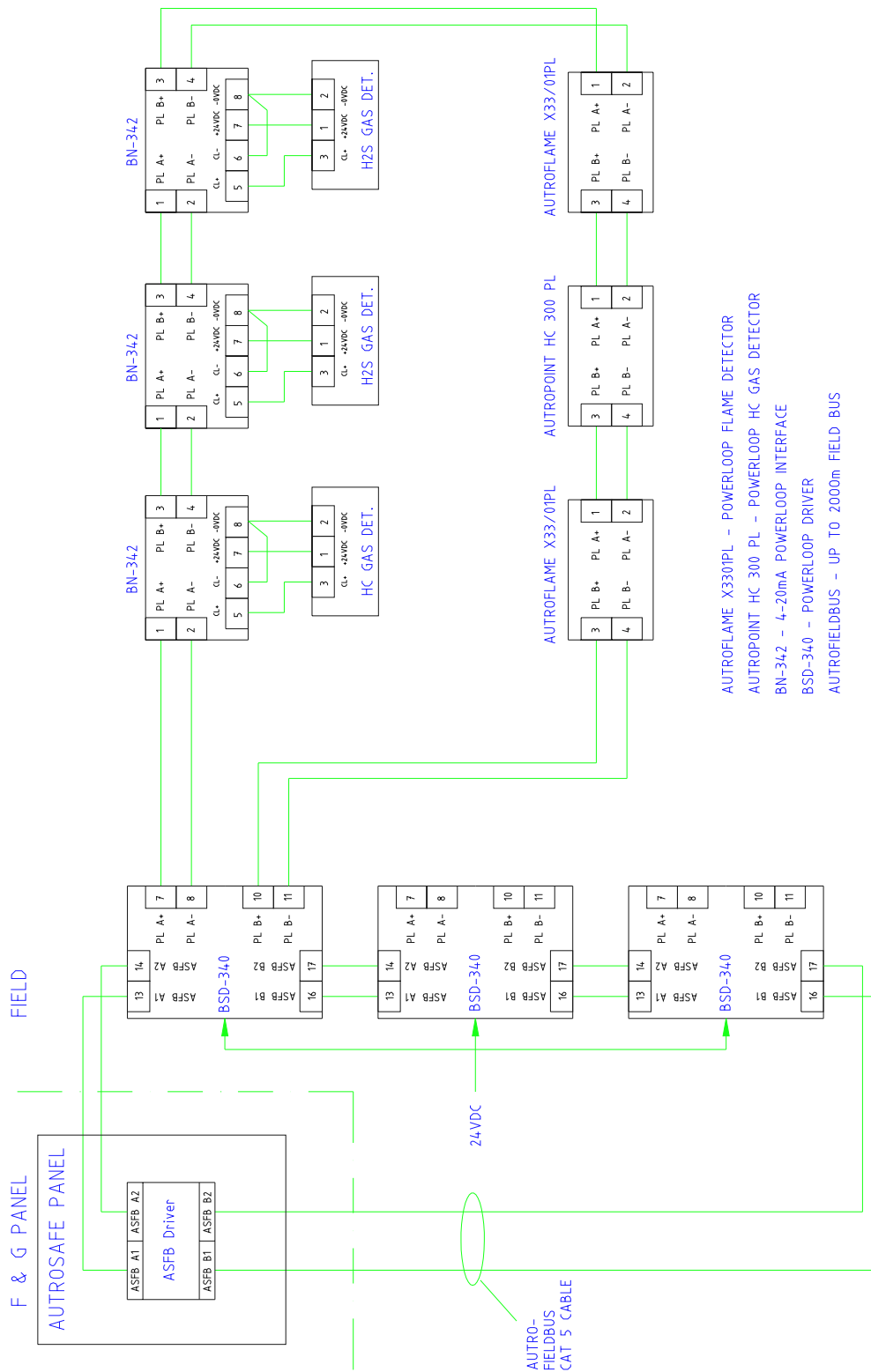*Figur 11: Typical Connection Diagram - Al_Com Hazard*

Figur 12: One Line Diagram - Al_Com Hazard

4.3.4 PowerLoop, BSD-340, Flame & Gas Detection loop

AUTROFLAME X3301PL – POWERLOOP FLAME DETECTOR
AUTROPOINT HC 300 PL – POWERLOOP HC GAS DETECTOR
BN-342 – 4-20mA POWERLOOP INTERFACE
BSD-340 – POWERLOOP DRIVER
AUTROFIELDBUS – UP TO 2000m FIELD BUS

Figur 13:Typical Connection Diagram – PowerLoop

4.3.5 RS-485 Loop, BSD-321, Open Path Gas Detector etc.
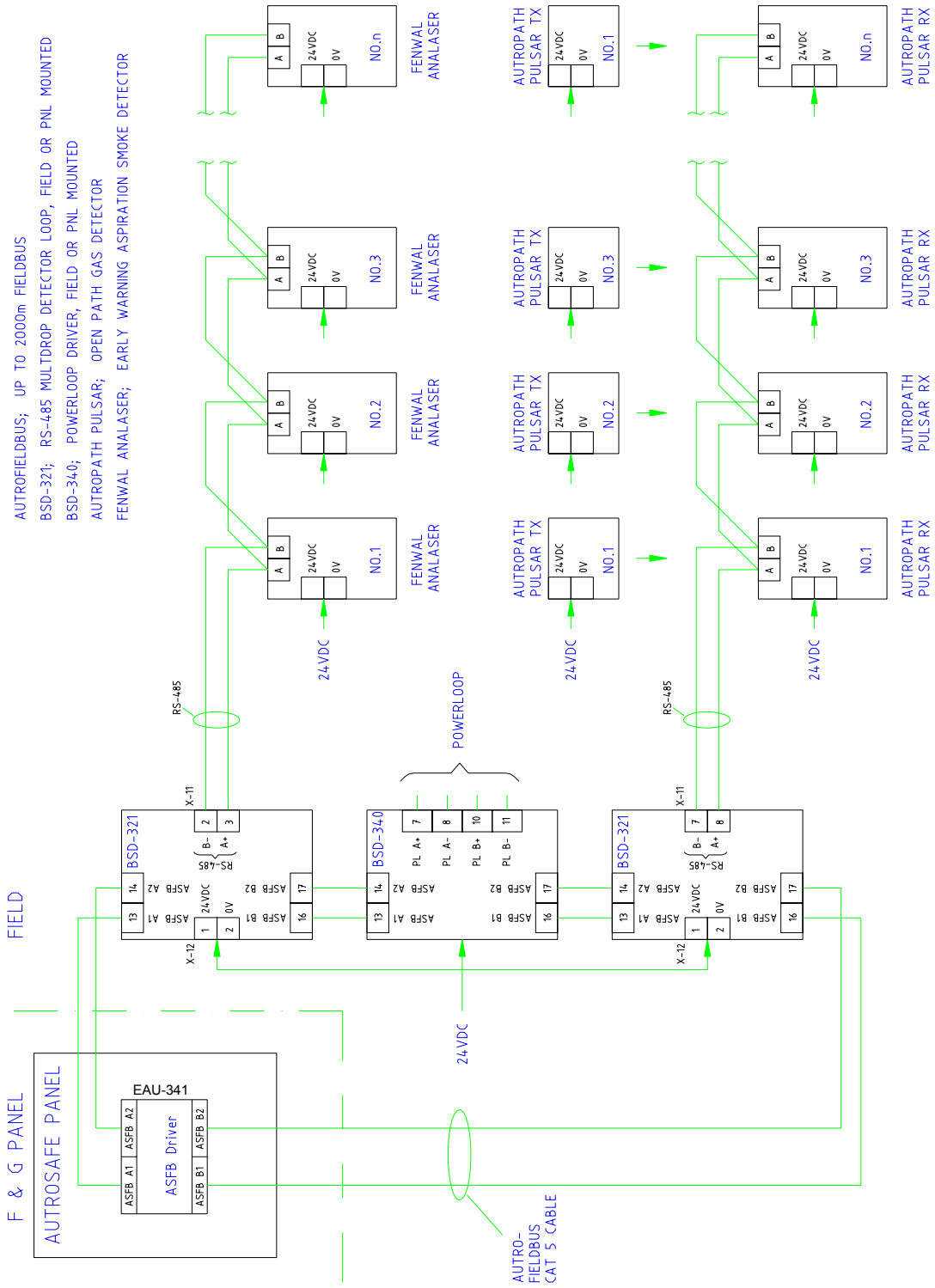
Figur 14:Typical Connection Diagram – RS-485 Loop

5. Reader's Comments

Please help us to improve the quality of our documentation by returning your comments on this manual:

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Ref. No.: *116-P-ASIFGGUIDELINE/XE Rev A; 2005-10-26*

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