Consilium

When Safety Matters



When Safety Matters

MIL

MIL-Specs

Fire protection systems for naval vessels



Consilium - a trustworthy supplier

Solid base and long experience

Consilium is a well-known name and a trustworthy supplier of solutions for fire protection equipment for naval applications world-wide.

Having its business started with the development and supply of equipment for the marine industry, Consilium consolidated a wide base of proven solutions for demanding applications.

The habit to cope with formal demands for type approvals and compliances with Rules and Regulations set forth by marine, transportation and offshore supervising Authorities led Consilium to naturally approach the stringent naval requirements and performance standards.

Life time support

A basic point in Consilium philosophy is that newer products would be backwards compatible with existing ones, so as to grant lifetime support to all installations. Integrated Logistic Support data and documentation are available, to allow for the minimum life-cycle cost, planned maintenance, revitalization and disposal of systems.

Designed for harsh environments

Our experience from installations in harsh environments, such as power plants, arctic explorers, rolling stock, oil rigs, cruise and merchant vessels, gives us the confidence to confront ourselves and our products with the naval applications with no doubts about compliances and functionalities.

Naval segment application

Consilium has isolated from its marine product lines a set of components and products that have undergone qualifying tests for naval applications, to be able to deliver systems compliant with two levels of demands: base MIL-rated (CFD500 N) and MIL- extended range (CFASS-2).

The CFD500 N satisfies most needs of the general naval market, offering a broad range of variants at system and field units' level. The high level of standardization allows for flexible Military-Off-The-Shelf solutions, supported by a complete documentation library and optional Integrated Logistic Support (ILS).

CFASS-2 covers the segment of those applications with extreme EMC, shock and vibration levels standing requirements, even above standardized ones. A selected range of products allows realizing custom solutions to be installed on submarines, aircraft carriers and other top combatant units. Documentation and support are tailored for each project, which is run in close synergy with the Customer.

Consilium vaules

At Consilium, we well know that for our Naval Customers the values to protect are:

- The mission
- The assets
- The human lives
- The environment

And we constantly focus on those, when thinking which solution could better fit their project.

We strive to put in place all means in our possibility to mitigate and minimize the effects of the "internal battle" that could arise at any time during a mission; and to maintain such conditions for the whole life of the ship.

Lifetime support

Though the technology development could make certain parts of our original supply obsolete, there will always be a replacement part able to be integrated in the system context, granting Form, Fit, Function, for same or extended performances.

Designed for retrofits

The levels of modularity of system components and field units will always allow for extension and modifications made necessary by changes in the vessel's setup.

As well, it is not unfrequent that existing systems becomes not supportable any longer by their original manufacturers, for different reasons.

We always have solutions for these cases. The relatively smaller volumes taken by our modern products allow for easy mechanical integrations of extensions and of replacement systems, using the original interfaces.

In all this, one of the main targets is to minimize or null the impact on the existing cabling: our systems use communication techniques, among the detectors and loop units, such that any existing cable with two conductors could be re-used with success to build new fire detection circuits out of older installations, thus considerably reducing the retrofit overall costs.

Integration with third-party systems

The naval product lines feature broad capacity of interfacing with external, third-party systems. Serial, LAN and contact interfaces can be set at any control station or at dumb nodes, to allow for connection to both sub-systems controlled by the fire detection system and superior control/monitoring systems that would integrate the fire detection system data into the IPMS, ship-to-shore communication, safety data logging, data and message broadcasting.

Serial and LAN protocols according to de-facto standards are available, custom protocols can be developed for specific applications. The system features handling of true redundancy of the communication channels.

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Modules overview

Control modules



Control-MX-NA



CTRL-RPT-4.3-NA



CFD500 N Repeater panel 4.3-NA

Interface modules



Loop MX-NA



Bus Isolator M-NA



Relay M 8-NA



I/O M 70-NA and I/O M 700-NA



Charger M-NA



RM4-NA



Example of a CFD500 N central unit

Control modules

The control unit is the main part of the system containing all central functionality for detection, alarm, controls and the main operator interface. The control unit communicates with other modules on the redundant bus system.

Control units can be operated directly by an operator via color display or single MMI (Man Machine Interface) or connected and controlled directly by the platform managment system (iPMS). High-speed interfaces such as Ethernet 10/100 Mb/s, RS485, RS422 allow for integration with third party systems. A USB interface enables easy maintenance and service of the complete system.

The following parameters can be configured, as basic:

- Number of detectors and other loop units
- Sensor sensitivity, alarm threshold, rate-of-rise and alarm delay
- Number of operator interfaces and indication units
- Digital output/input functionality
- Explanatory text, which can be assigned to each detector. The text is displayed on the operator interface at alarm or fault. It is also possible to define texts in association with digital inputs and outputs.

A system can run on multiple control units, to form either a multi-central and/or a redundant CPU system, up to a Safe Return To Port (SRTP) configuration for improved fault tolerance, thus highest availability.

Control panel CM 4.3

- Large colour graphical display with full compliance with the European Fire Alarm standard EN 54
- The central unit is delivered either as stand-alone for wall/desk/ceiling mount or installed in the cabinet front door



Control module MX-NA

- DIN-rail mounted control module, easily integrated with other modules
- Small design, perfect for installation in narrow spaces as well as in refurbishment projects
- Offers the same functions of a larger control panel, but without inbuilt display
- Ideal for embedded functions and for building redundancy



Repeater module

Repeater panel CTRL-RPT-4.3-NA

The CTRL-RPT-4.3-NA is a repeater panel with a 4.3" graphical colour display used to indicate system status. The unit is connected to the redundant backbone bus or via Ethernet and can therefore be independently mounted remotely from the central unit.

The CTRL-RPT-4.3-NA repeater panel can be run as a stand alone central unit.



Bus Isolator module M-NA

The Bus Isolator M-NA module divides the redundant system backbone bus into electrically isolated segments. Its dual functionality isolates communication and basic backup signals between the distributed system parts creating effective EMC isolation from the surrounding environment.

Bus Isolator M-NA is mandatory when extracting the system backbone bus using separate power sources for the different segments in order to prevent interference caused by ground currents or other equipment.



Interface modules

Loop module M X H-NA

The Loop M X H-NA module includes one addressable detector loop interface handling up to 254 addressable detectors or other loop units. Module activity can easily be monitored on the fault and alarm indicators on the front panel as well as on the display of the control unit. Up to 64 Loop Mx modules can be connected to one central unit. The loop interfaces use FSK modulation which is extremely robust making cable lengths up to 3000 meters possible, with no particular requirements on the cable properties.

The cable with its detectors and other loop units are continuously monitored for possible faults and disturbances providing the highest possible safety. A loop can be driven by one or two modules, depending on the redundancy requirements.



Relay module M 8-NA

The Relay M 8-NA module contains eight individually programmable relays. Each one of these relays provides a potential free change-over-contact capable of a 5A resistive load.

Use the Relay M 8-NA to control units such as sirens, doors, flash light, alarms and HVAC or where general dry contacts are required.



I/O module M 70-NA and M 700-NA

The I/O M 70-NA and I/O M 700-NA modules are two types of I/O modules with eight identical and individually programmable input/output channels. Use the I/O M 70 and I/O M 700 as digital input and output modules for monitoring and control of external devices such as alarm devices, fire barriers, extinguishing and suppression systems, doors and custom-made mimic repeater panels, HVAC etc.

Maximum output current per channel is 70 mA for I/O M 70-NA and 700mA for I/O M 700-NA. It is possible to bridge up to 2100mA. These modules offer different connections monitoring function, dedepending on the context in which they are used.



Charger module M-NA

The Charger M-NA module provides redundant power to the system through the redundant backbone bus and also supervises the external power sources. The Charger M-NA has a built in intelligent battery charger for the system backup battery power sourse handling.

The Charger M-NA is equipped with a supervised high current optically isolated output with a maximum of 8 Ampere. Different levels of redundancy can be built using one or more modules.



Navy cabinet

Cabinet CFD500 N

Unique design, reinforced construction, all-stainless steel, mounted on shock absorbers. It can house different battery sizes (7 and 17 Ah). Pre-drilled for cable glands fitting on top/bottom, easy to configure. Retainment system for all components, for shock standing. The door can house the control panel and optional controls and indicators (Fire Fighting and others).





Addressable loop units

Consilium's detectors and I/O units from the well-established fire alarm product range for rail, marine and industrial applications in harsh environments can be connected to the CFD500 N loop. The communication interface of the loop units is based on Frequency Shift Keying (FSK) modulation, which has proven outstanding performance in harsh electrical environments.

A pre-alarm can be generated, when the smoke detector readout is somewhere in a range of 80 and 100% of the alarm level, for all samples taken within a 25-second period.

Smoke detector EV-P-NA

Salwico EV-P-NA is an analogue addressable smoke detector with an optical chamber. Salwico EV-P-NA is designed to give early warning for the presence of smoke in the supervised area. At the same time the detector offers a high rejection to false alarms. Salwico EV-P is equipped with OMNIVIEW 360° LED indicator giving a clear, full 360° visibility of the red alarm indication.



Dual smoke/heat detector EV-PH-NA

Salwico EV-PH-NA is an analogue addressable combined smoke and heat detector with an optical chamber and heat sensing element. Both smoke and heat alarms of EV-PH-NA can be individually generated. The function of the detector as combined, smoke or heat only, is selected during configuration and the heat alarm threshold, rate-of-rise of temperature and smoke sensitivity can be associated with each individual detector address. At the same time the detector offers a high rejection to false alarms. Salwico EV-PH-NA is equipped with OMNIVIEW 360° LED indicator.



Flame detector AC-IR-3FQ-NA

This IR detector is a triple-frequency infra-red flame detector using the latest manufacturing technology. The detector is made for the detection of smokeless combustible liquid and gas fires, as well as smoke-forming open fire involving carbonaceous materials as contained in wood, plastics, gases, oil products etc.

The detector is using intelligent signal processing and custom algorithms, achieving excellent detection reliability while maintaining the highest immunity to interfering radiation and sunlight.

AC-IR-3FQ-NA is suitable for harsh environments such as engine compartments and other areas with high ingress protection demands. The IR detector is used with an addressable base to connect it to the detector loop.



Heat detector EV-H-NA

Salwico EV-H-NA is an analogue addressable heat detector. Salwico EV-H is designed to give early warning for the presence of heat in the supervised area, and is available in two temperature classes: A1R (fixed 54°C + rate of rise function according to EN54-5) and CS (fixed 84°C). In these naval versions it is possible to adjust the heat alarm threshold and the rate-of-rise of temperature associated with each individual detector address. Salwico EV-PH-NA is equipped with OMNIVIEW 360° LED indicator.



Address unit IC10-WP-NA

The IC10-WP-NA is an address unit for fire detector loops. It has been designed for use in damp spaces. This unit allows for the connection of different types of devices with closing digital function to the fire alarm system, for example high temperature heat detector, heat sensing cables, third-party detectors and/or sprinkler indication. IC10-WP-NA includes one input.



Heat detector HP100 IP67-RA

The HC100-A2-IP67-NA is a conventional heat detector for use with CFD500 N Fire Alarm Systems. It is delivered molded together with its connection adapter, filled with a compound that gives it high resistance against damp and vibrations. The detector cannot be separated from the adapter. The heat sensing element is a thermistor with a fast response to changes in the ambient temperature. Alarm is optically indicated by an LED.



Manual call point MCP-A-NA

MCP-A-NA is an addressable manual call point offering ingress protection. The unit provides the required system functionality for crew-activated emergency alert. An LED on the front of the call point indicates the fire alarm activation. The MCP-A-NA provides optional built-in double sided short-circuit isolator.



Short circuit isolator connection adapter SPB-ADAPT-SCI-NA

SPB-ADAPT-SCI-NA is a double isolating short-circuit isolator and connection adapter for addressable detectors. A pair of short-circuit isolators electrically isolates a short circuit occurring on the loop giving full availability and function to the unaffected portions of the loop despite the short circuit. The reaction to the short circuit is indicated on the unit and on the control panel.

Short-circuit isolators are mandatory for redundant loop configurations.



Hazardous area units

Isolator barrier NS-ISOLATOR-A-NA and NS-ISOLATOR -C-NA

The NS-ISOLATOR-NA barrier is located in a non-hazardous area (safe area) and forms the interface to IS detectors and other IS line units. The NS-ISOLATOR-NA exists in two versions, to handle either analogue addressable or conventional IS units.

NS-ISOLATOR-NA does not need a separate power supply. It is powered directly from the fire alarm panel via the loop/section cables, no extra cables are needed to connect hazardous area sections.



Heat detector HC100-A2-IP67-NA-IS

The HC100-A2-IP67-NA-IS is a conventional heat detector for use with CFD500 N Fire Alarm Systems after an NS-ISOLATOR-C-NA barrier. It is delivered molded together with its connection adapter, filled with a compound that gives it high resistance against damp and vibrations. The detector cannot be separated from the adapter. The heat sensing element is a thermistor with a fast response to changes in the ambient temperature. Alarm is optically indicated by an LED.



Combined smoke/heat detector NS-AOHS-IS-NA

NS-AOHS-IS-NA is an intrinsically safe analogue addressable multi-sensor detector for CFD500 N. It has two separate analogue sensor elements, one optical for smoke detection and one thermistor element for heat detection.
Alarm condition is indicated on the detector via a red LED. NS-AOHS-IS-NA is connected to the detector loop via the NS-ISOLATOR-A-NA.



Manual call point ACP-IS-NA

ACP-IS-NA is an intrinsically safe addressable manual call point that can be connected to the CFD500 N detector loop via NS-ISOLATOR-A-Na. By breaking the glass the fire aralm is activated. The call point can also be tested with a special key, included in the delivery. A red LED on the front of the call point indicates the fire alarm.



Accessories

Flash light FL-02-NA

The FL-02-NA has a unique lens design that distributes the light in a cylindrical shape that optimises light dispersal; it achieves the required illumination specified by EN 54-23 - 0.4lux/m^2 over the entire room area. High efficient LED technology gives extreme low current consumption, maximizing the number of devices on the alarm circuit.



Sounder ES-02-NA

The ES-02-NA is the CFD500 N conventional sounder, although it finds uses in much wider applications such as security, general signaling and process alarms. It features low power consumption along with wide operating voltage and selection of tones.



Cable glands

A selection of cable glands is available for the loop units and the cabinets, to adapt to existing standards. Available models are watertight, with electrical continuity for EMC protection, EMC and watertight.



Salwico CFASS-2 Fire Detection System

Consilium is proud to present the new Navy CCP-based Fire Detection System developed to fulfil the requirements of the most demanding Navies, for the protection of their missions, assets and crew in the harshest environmental conditions.

This unit is the replacement of the CFASS so far supplied for submarines. The name of the unit is CFASS-2.

CFASS-2 is designed to be compliant with the highest naval standards, such as:

- Shock to MIL-S-901D Heavyweight and NATO STANAG 4141/4549
- Vibration to MIL-STD-167A
- EMC/EMI to VG95373 and MIL-STD-461F with RS103 increased by 2.5 times the "normal" levels
- Fully non-magnetic construction
- IP65 for the control cabinet
- Electrical interface by MIL-DTL-38999 Series III – IP 68 circular connectors

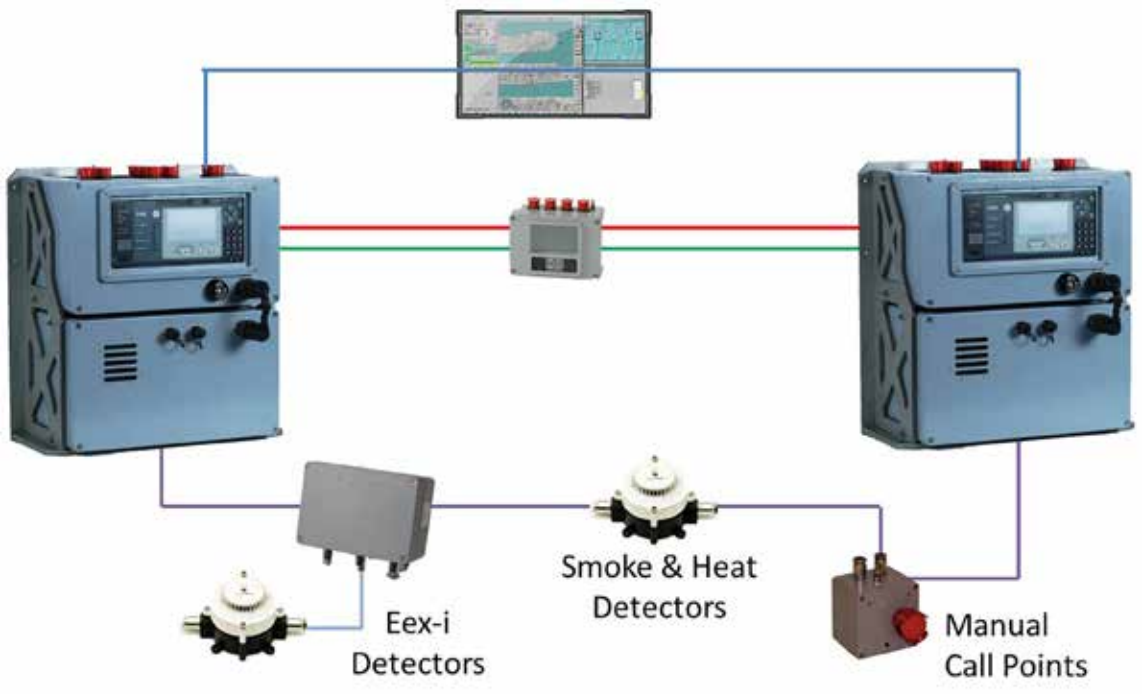






CFASS-2 Loop units and system configuration

Consilium CFASS-2 features a dedicated range of highly selected loop units, adapted to stand the exceptional environmental conditions specified for the particular applications where such system is required. As every project is quite unique, Consilium invites interested customers to contact any Consilium office worldwide, to be introduced to the central naval project department for a joint analysis of the demands and a proposal that could exactly fit the customers' needs.



Laser aspiration detector

The Consilium LASP detectors are very early warning smoke detectors. The LASP provides the earliest warning of a potential fire and buys the user time to investigate, intervene and potentially avoid disruption in addition to the damage, downtime and cost of a suppression release.

The detector works by continually drawing air into sampling holes in a pipe network. The air is filtered and passed into a detection chamber where light scattering technology detects the presence of very small amounts of smoke. Detector status information is communicated on the detector display and via relays.

LASP systems can be installed and used together with other type of Consilium detectors to give a full protection of the vessel.

The ultrasonic flow sensing used in the detector provides a direct reading of the sampling pipe flow rate.



LASP-250/500

Fire extinguishing controls

Both the CFD500 N and the CFASS-2 systems have the capacity to control and monitor the fire suppression and mitigation systems protecting the areas where fire detectors are installed. Manual and automatic activations can be handled with the same level of safety that the Fire Detection System features, with the advantage of a consistent and solid unique control and monitoring system, without needs to build dedicated interfaces and protocols among sub-systems from different sources.

The Salwico technology offers the flexibility of PLC-based solutions for firefighting control, with all the benefits in terms of redundancy, I/O monitoring and software consistency that are typical of a safety system. The scope of supply from Consilium can include the fire-fighting subsystem or part of it, or be a joint-venture with Customer selected brands.

Aerosols

When activated, the aerosol fire extinguisher sets off a chemical reaction whereby nitrogen, water and potassium connections are build. The aerosol released from the extinguisher fights and extinguishes fire not by suffocation (depletion of oxygen) nor by cooling, but by stopping the chemical combustion reaction at molecular level (by binding free radicals) without depleting the oxygen content.

Benefits of aerosols

- They are more effective and more efficient than all other conventional agents.
- The extinguishing agent is in non-pressurized, stainless steel containers.
- The extinguishing agent is environment friendly.
- The extinguishing agent is non-corrosive; it does not damage other objects.
- Not harmful for people, animals or plants when used in the correct concentration.
- They require a negligible level of maintenance compared to any other conventional system.



Activated aerosol

High pressure sprinkler

The high pressure water mist system controls, suppresses and extinguishes fires by discharging a fine water mist at high speed. The water mist is created by the system when it activates: it pushes fresh water at high pressure through specially designed, patented sprinklers and spray heads. The water mist is discharged at high speed by high-pressure pumps or accumulators. Water mist uses three mechanisms to fight fire: cooling, radiant heat blocking and local oxygen inerting.

Traditional sprinkler systems use wetting as their main mechanism, and therefore they use very large amounts of water. A high pressure solution uses water much more efficiently: it uses up to 90% less water than traditional sprinkler systems for the same application with equivalent or better performance.



Gas extinguishing

Gas fire extinguishing suppresses a fire by inhibiting the chain reaction of combustible and combustive, typically by reducing the volumetric concentration of oxygen. Some gaseous agents have also a cooling effect, thus decreasing the overall energy of the reaction. The gas fire extinguishing works well in confined volumes, as the partial pressure of the extinguishing agent can be properly determined and maintained as long as needed to suppress the fire, without turning harmful to people who might be present in the affected space.



Deluge/low-pressure sprinkler

Low-pressure sprinklers have the capacity to wet surfaces, thus reducing surface temperature and suffocating the fire with the production of vapor. These systems use large amount of sea water, which would lead to stability, corrosion and out-of-service issues. Yet the most diffused solution, due to its initial economy.

Deluge systems could use water to create smoke barriers and for wall cooling or water-based foam for total flooding solutions.



Fire protection concept for retrofit

Refurbishment of naval vessels is a big industry. The life length of the ships can be extended by implementing the right level of upgrade using equipment and solutions that meet the new and coming operation requirements.

New directives, standards and experience, define requirements that in some cases lead to new design solutions as well as the use of new technical equipment that fulfils the required performances integration and maintainability solutions.

The CFD500 N and CFASS-2 with their modular system concept offer the flexibility needed when refitting an existing fire detection system. In many cases it can e.g. be possible to use existing cabling in the ship while adding or upgrading the fire detection and suppression solutions on-board. The small dimensions of the central unit as well as that of the detectors make it possible to fit the equipment in small voids as there is normally very limited space available onboard.

The possibility to add distributed I/O interfaces allows for an optimal usage of existing cabling, minimizing any new installation work.

Fire protection examples

Block diagram

The block diagrams show different kinds of configuration, describing a ship with four compartments. Each compartment is equipped with smoke/heat detectors and distributed I/O units in typical installations.

Central unit CFD500 N is used in all examples but CFASS-2 can of course be used in the same way or in combination. Communication with the ship control and monitoring system can be done over RS485, RS422, digital I/O or Ethernet in all examples. Please note that the setups below are just examples as the concept promotes customer specified system design. The modules can be used in several other ways to control and monitor other systems onboard.

The backbone bus is used for communication between modules and stretched central segments. It includes redundant RS485 channels, redundant 24 VDC power line and the X-Fire signal.

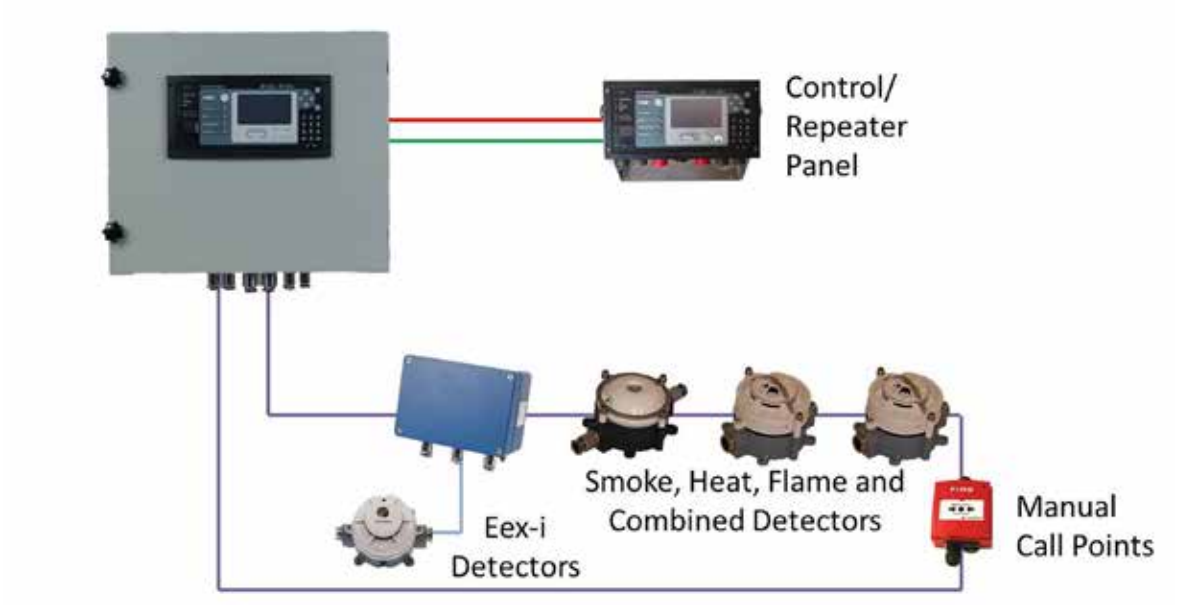
X-Fire is a signal in the backbone bus used for transmitting the central alarm status. The signal is only used when a module in a managed mode loses communication with its control unit. X-Fire is used to ensure that the fire detection system can deliver an alarm signal even if the system processors are down.

Example 1

Standard

The first example shows a system solution with one central unit in the complete ship located in the wheelhouse.

The closed loop ensures that all detectors can be accessed even if one cable segment has been damaged.

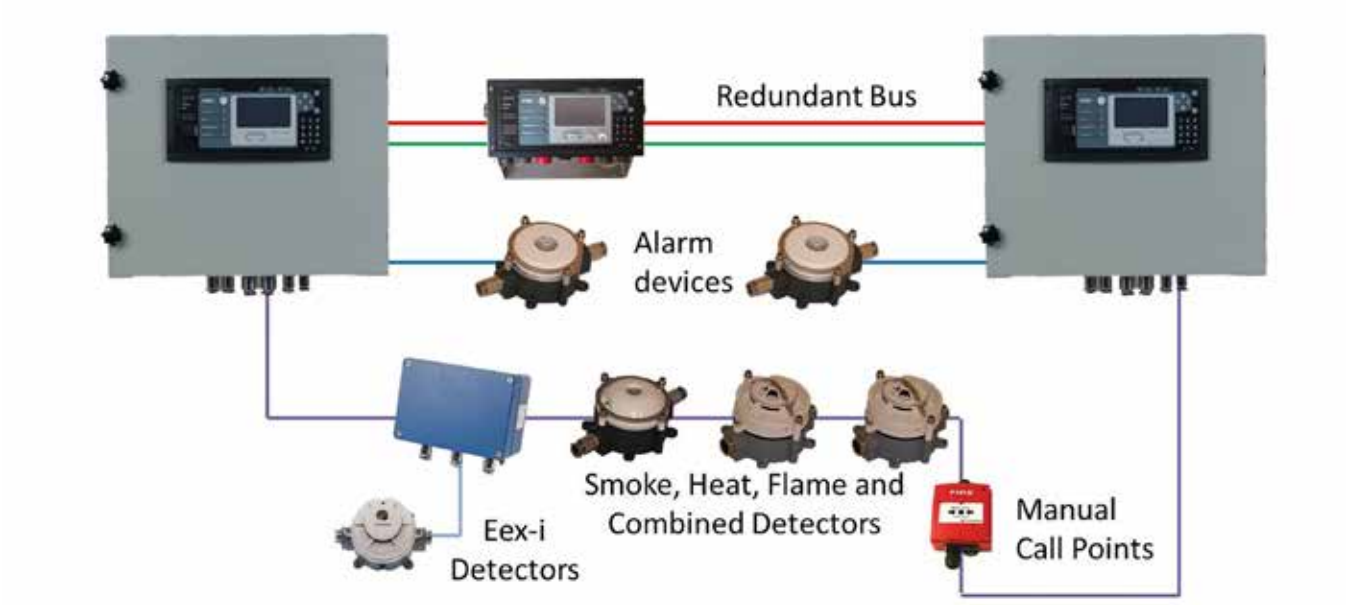


Example 2

Redundancy / Safe Return To Port

The redundancy system consists of two central units sharing several common loops. Both central units are activated, sharing information. If one central unit is lost, the other will take over the whole system.

Therefore no information will be lost, meeting the requirements for running capability. This system configuration requires the use of Salwico backbone bus for internal communication.

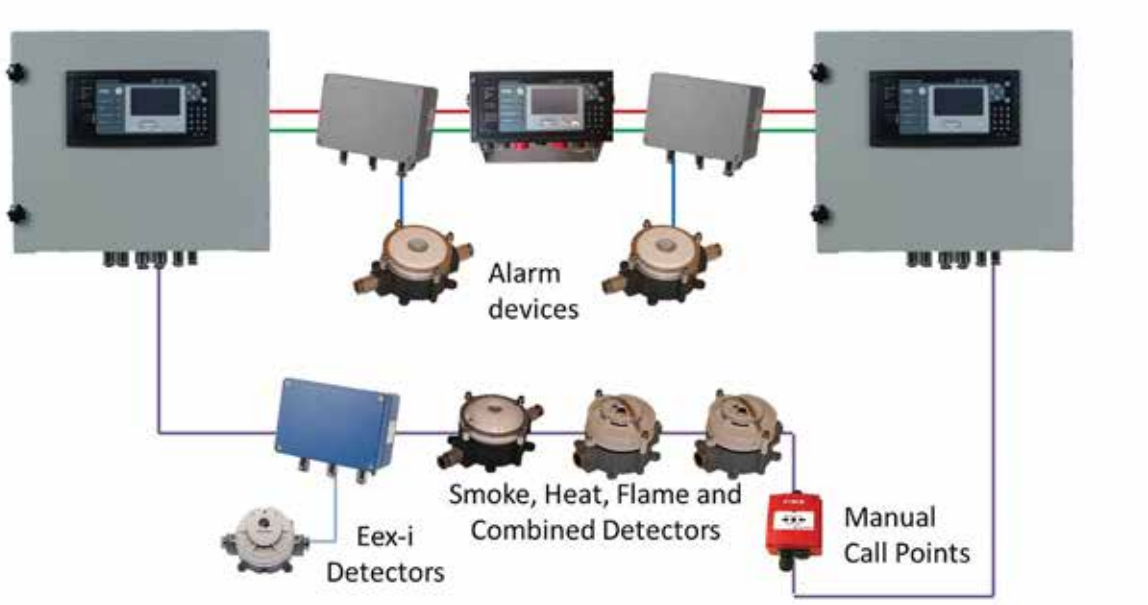


Example 3

Stretched system

This set up takes advantage of the Salwico backbone bus, enabling stretching the system through the vessel and using communication modules locally in each compartment. In the example one I/O 700 module is used in each compartment.

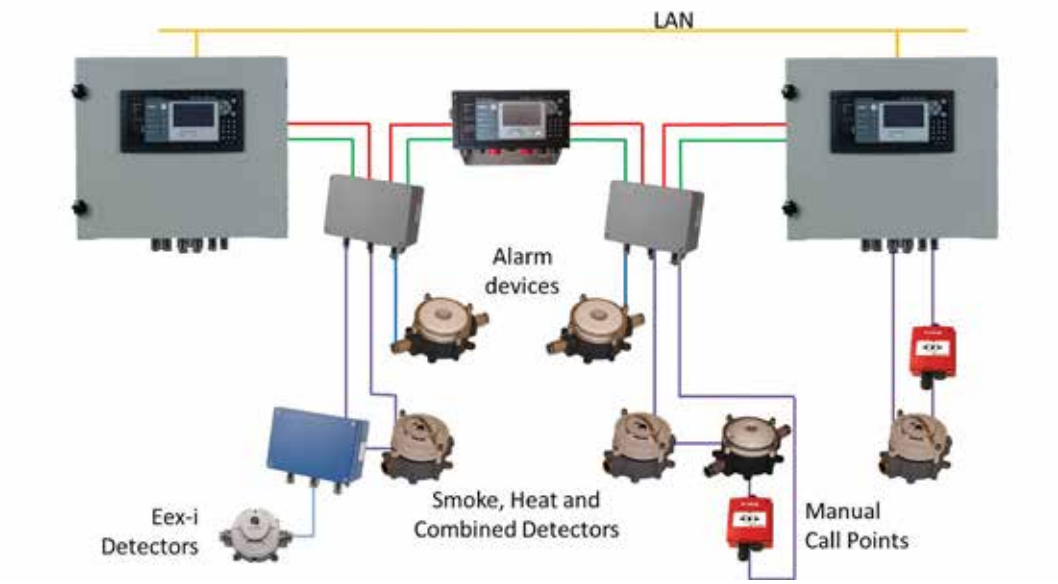
These modules are used to control and monitor external functions such as fire doors, exit lights, extinguishing systems, shut down HVAC system etc.



Example 4
Flexible system

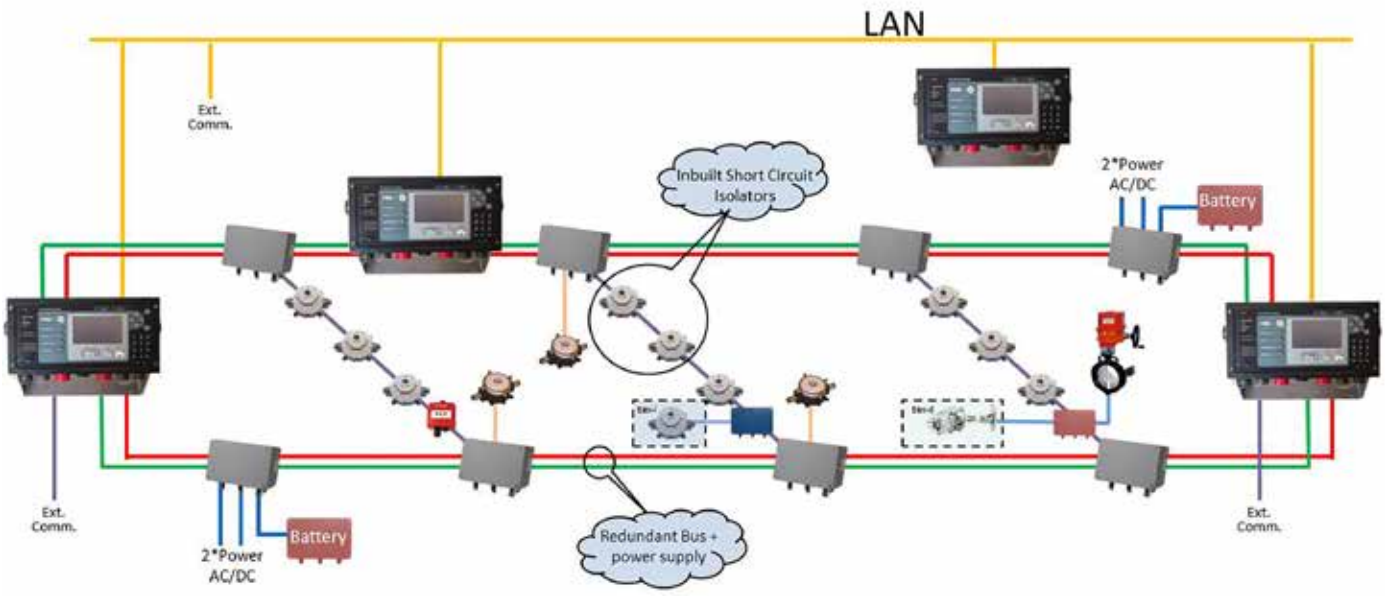
Each compartment has its own fire detection loops and alarming devices, locally driven by loop and I/O modules.

Every compartment is run by its own Control Module (either with or without Man Machine Interface).



Example 5
Multi system / Safe Return To Port (SRTP)

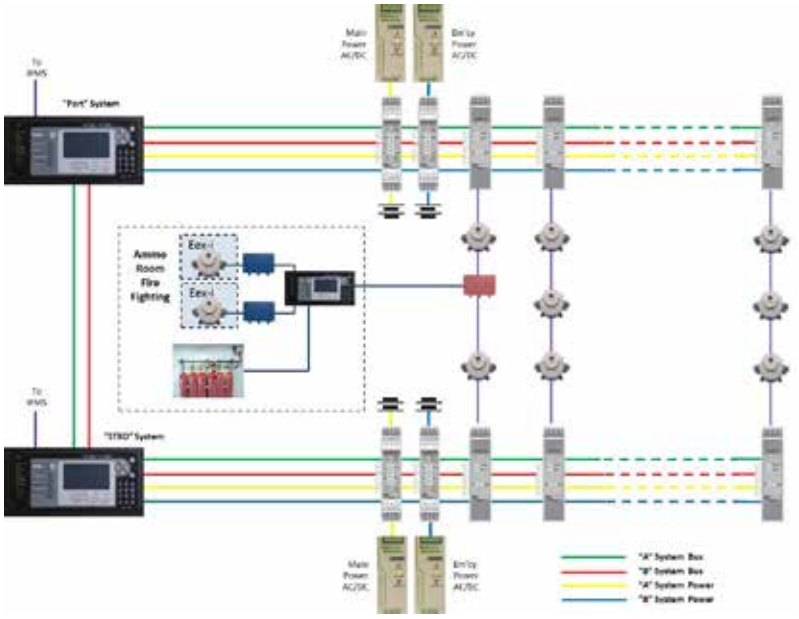
Each compartment has its own independent fire detection system and all systems communicate to each other via the system buses and/or the LAN, as automatic communication routing is native within the system.



Example 6

SRTP with independent fire suppression

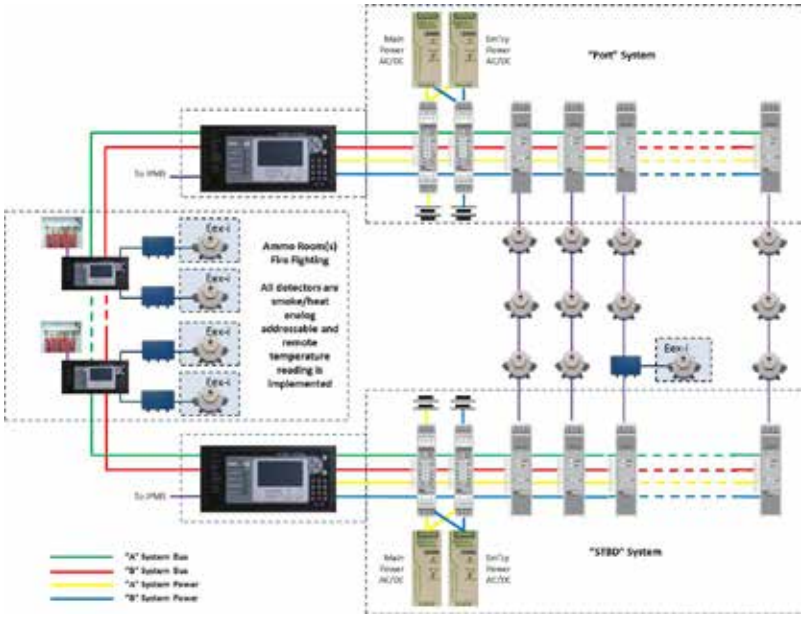
Each compartment has its own independent fire detection system. Each control panel communicates with the IPMS directly. Ammunition rooms system(s) work as independent clusters, providing local monitoring and activation, whilst remote alarming to the main Fire Detection System is via I/O modules. Ammunition room(s) does not benefit from the SRTP implementation due to reduced interface level. The system will also monitor the status of water, gas, pressure etc.



Example 7

SRTP with fully integrated fire suppression

This example is the same as example 6, but here all ammunition room(s) and other dedicated detection and suppression systems are fully integrated within the main fire detection system. All functions are integrated, all control panels and control modules are redundant to each other or in groups. no detection function nor activation would run in single-CPU mode.



Life time commitment - 24/7!

Consilium is a well established company within the marine industry, with a long experience of developing innovative and high quality products. When choosing Consilium you will get a type-approved product together with a life-time commitment from an advisory partner, providing first class support and excellent service fulfilling your specific needs.



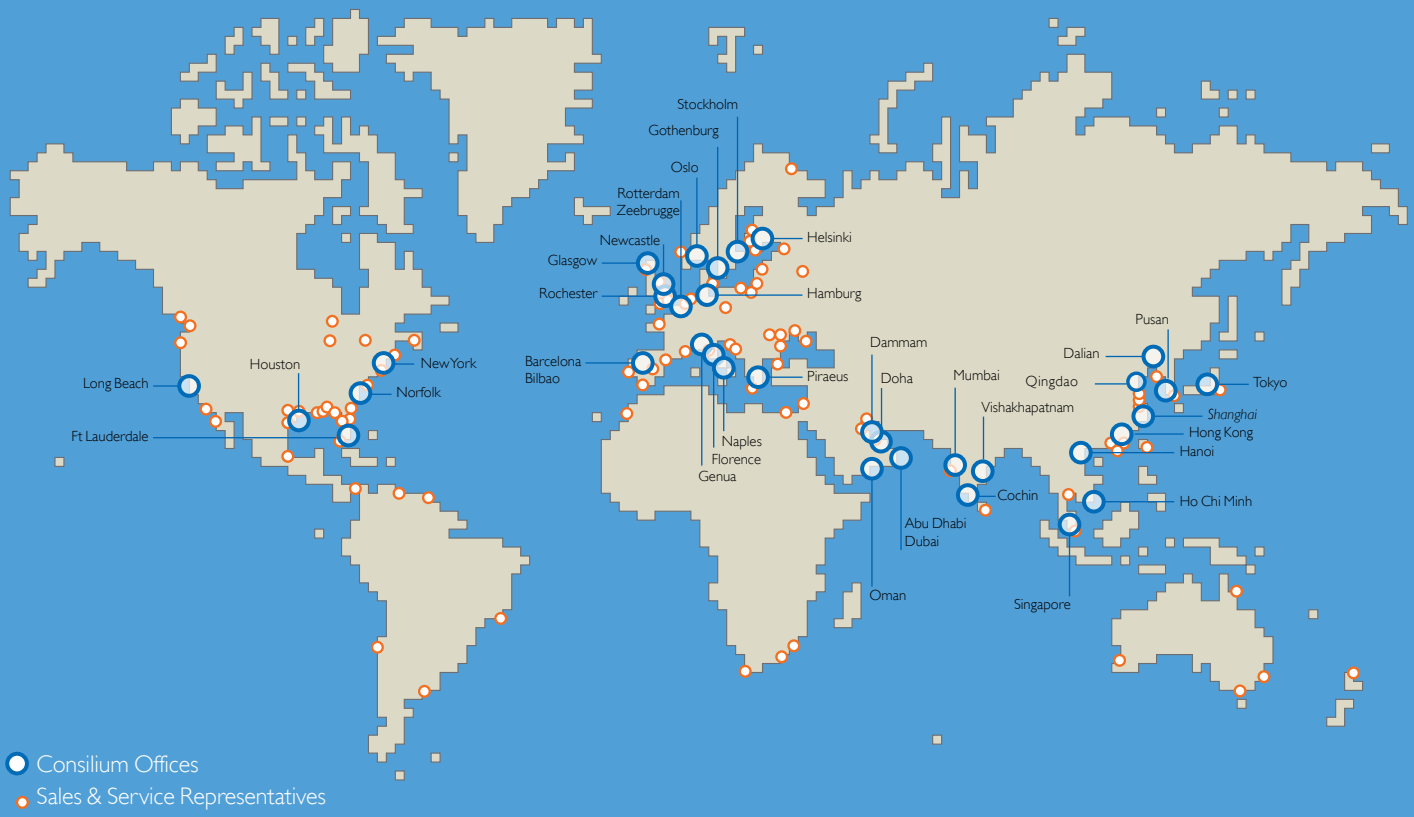
Consilium - protecting mission integrity, human lives, assets and the environment. When Safety Matters!

We know the importance of making every valuable minute count, providing the accurate spares and service at the right time, in order to ensure the safety and efficiency of your shipping!

Benefit from Consilium's long experience, skilled and devoted engineers and preventive maintenance by letting us be your advisory partner, taking full responsibility 24/7.



You find us worldwide



Consilium

Consilium Marine & Safety AB
P.O. Box 8763
SE-402 76 Gothenburg, Sweden

+46 (0)31-710 77 00
got.sales@consilium.se
www.consilium.se

B013.1409.1