SIEMENS

CERBERUS® AlgoRex
Installation guidelines for fire detection systems collective, interactive, AnalogPLUS

Planning and realization

Specific national regulations are not integrated in this document

Fire & Security Products
Siemens Building Technologies Group

Scope

These planning instructions serve to ensure correct planning, installation and commissioning of Fire Detection Systems (FDS). As a general rule, local national installation regulations must be complied with providing they do not impair the reliable operation of the fire detection system. They are not listed here.

Explosion-proof detectors and line network

For detailed information concerning planning, installation and commissioning of systems in explosion-hazard areas see *document e1204, «Fire detection systems in explosion-hazard areas».*

This document is intended for planning engineers in all national sales organizations. Local standard practices, regulations, languages etc that vary from this document must be taken into account and and documented by the national sales organizations.

1 Planning

1.1 Wiring and planning symbols

1.1.1 Symbols

Symbol	Designation	Symbol	Designation
Ø 0,8	Line, with cross-section		Cable loop box (without terminals)
///	Line indicating number of wires		Distribution box
/6	Line indicating larger number of wires		Main distributor
	Shielded line		Fuse

Fig. 1 Wiring symbols

Symbol	Designation	Symbol	Designation
	Fire detector general		Visual, audible alarm device (Model ...)
	Smoke detector		Audible alarm device (Model ...)
	Heat detector		Visual signal transmitter (Model ...)
	Flame detector		Door magnet (Model ...)
	Linear light absorption smoke detector		External control relay Fire control installation
	Manual call point		Signal display panel of actuation of extinguishing (Model ...)
	Automatic alarm transmitter for extinguishing systems		Extinguishing system valve
	Fire detection system control unit (Model ...)		Response indicator
	Signalling, e.g. mimic panel, terminal etc. (Model ...)		Special devices (Model ...)

Fig. 2 Planning symbols (ISO/DIS 6790.2)

1.1.2 Conceptions and abbreviations

CT	Operating terminal
DC1134	Control module
DC1135	Branching module (with max. 4 stub lines per DC1135)
DC1154	Control module
DC1152	Input / output module
EMC	Electromagnetic compatibility
EMI	Electromagnetic influence
FDS	Fire detection system
FDC	Fire detection system control unit
Ex	Explosion hazard area
Extra low voltage	Voltage <50V
Low voltage	Voltage <1000V
SB	Shunt-Zener-Diode barrier

1.2 Basic wiring layout of a fire detection system

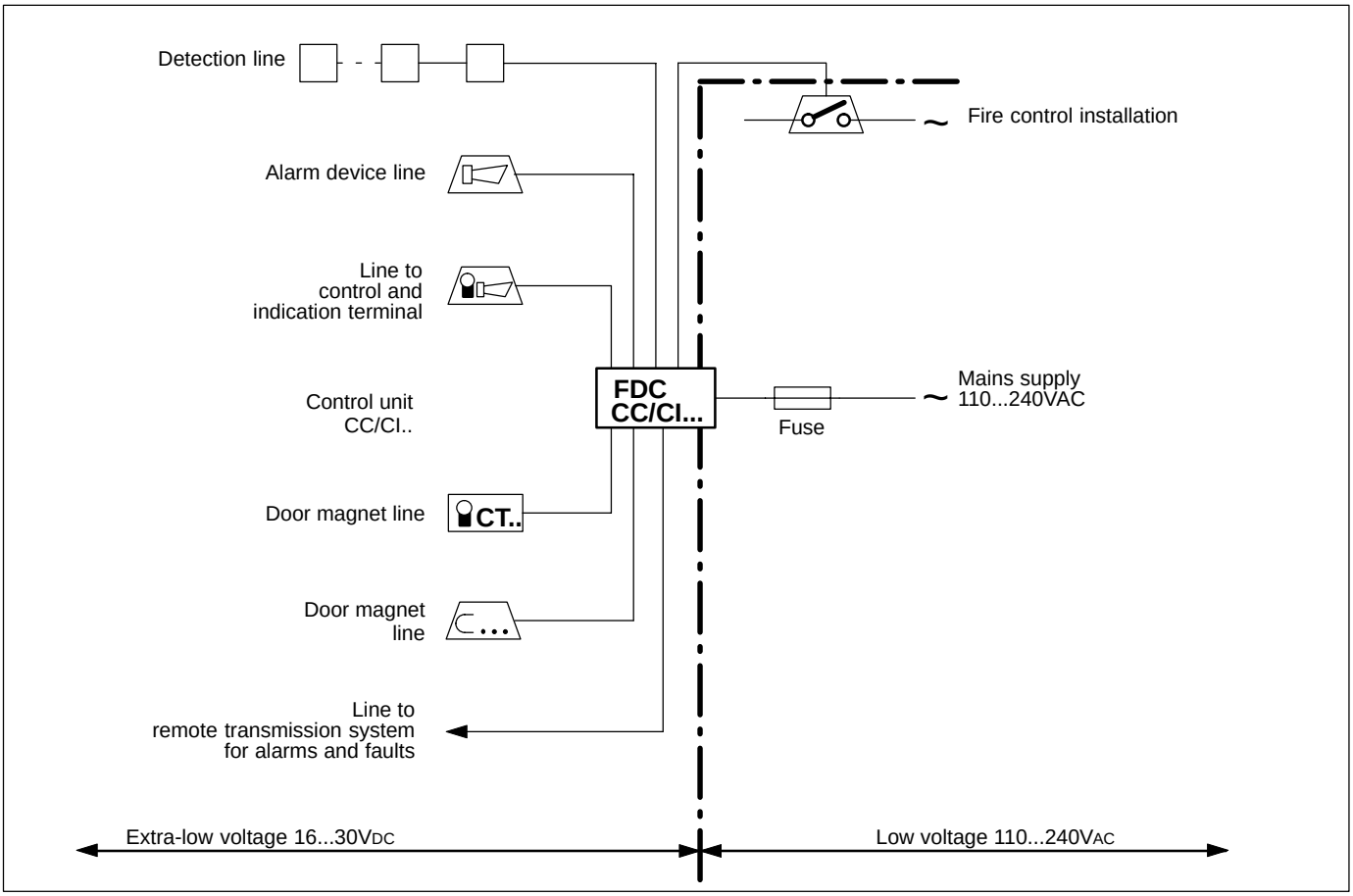

Fig. 3 Basic fire detection system layout

1.3 Fire detection system line network

1.3.1 Separate line network

The fire detection system must be basically operated via a separate line network. The common use of a main cable (e.g. PTT) is not recommended.

Never use low voltages and extra low voltages in the same main cable.

1.3.2 Design

According to block diagram.

Maintain separation of low voltage and extra low voltage cables.

1.3.3 Wiring material

Basically, standard telephone and extra low voltage installation material can be used.

Twisted cable is preferred and is sometimes essential.

In order to ensure alarm activation in any situation, we recommend cables which are fire-resistant over a longer period.

1.3.4 Existing line networks

These networks can be basically used if capacitances, line and insulation resistances comply with the data specified.

1.3.5 Explosion hazard areas

For explosion-hazard areas, comply with the guidelines according to *document e1204, «Fire detection in explosion-hazard areas»*.

1.3.6 Electromagnetic influence (EMI)

All equipment is largely protected against EMI.

Nevertheless, the following precautions are necessary:

– Maintain the greatest possible distances from thyristor control cables, high voltage lines, lightning protection systems, transmitter cables etc.

1.3.7 «Collective» detection lines

«Collective» detection lines can only be installed as stub lines. According to the type of control unit or regulations, 20...32 fire detectors can be connected per stub line.

New systems: Twisted cable, in exceptional cases with very powerful electromagnetic influence shielded and twisted.

Existing systems: Single and parallel conductors are permissible.

Line resistances and line capacitances see *document e1508 «Connection factors, line resistances and capacitances»*.

Type of cable	Application
Twisted, min. 7 turns	Generally recommended
Shielded, twisted min. 7 turns	Essential in areas where EMI is critical e.g. X-ray rooms, radar systems, transmitter stations, proximity to thyristor controls etc.
Non-twisted	Cable in existing systems can be utilized without difficulty with minimum remaining risk Not recommended for new systems
Shielded/non-twisted	Cable in existing systems can be utilized without difficulty with minimum remaining risk Not recommended for new systems

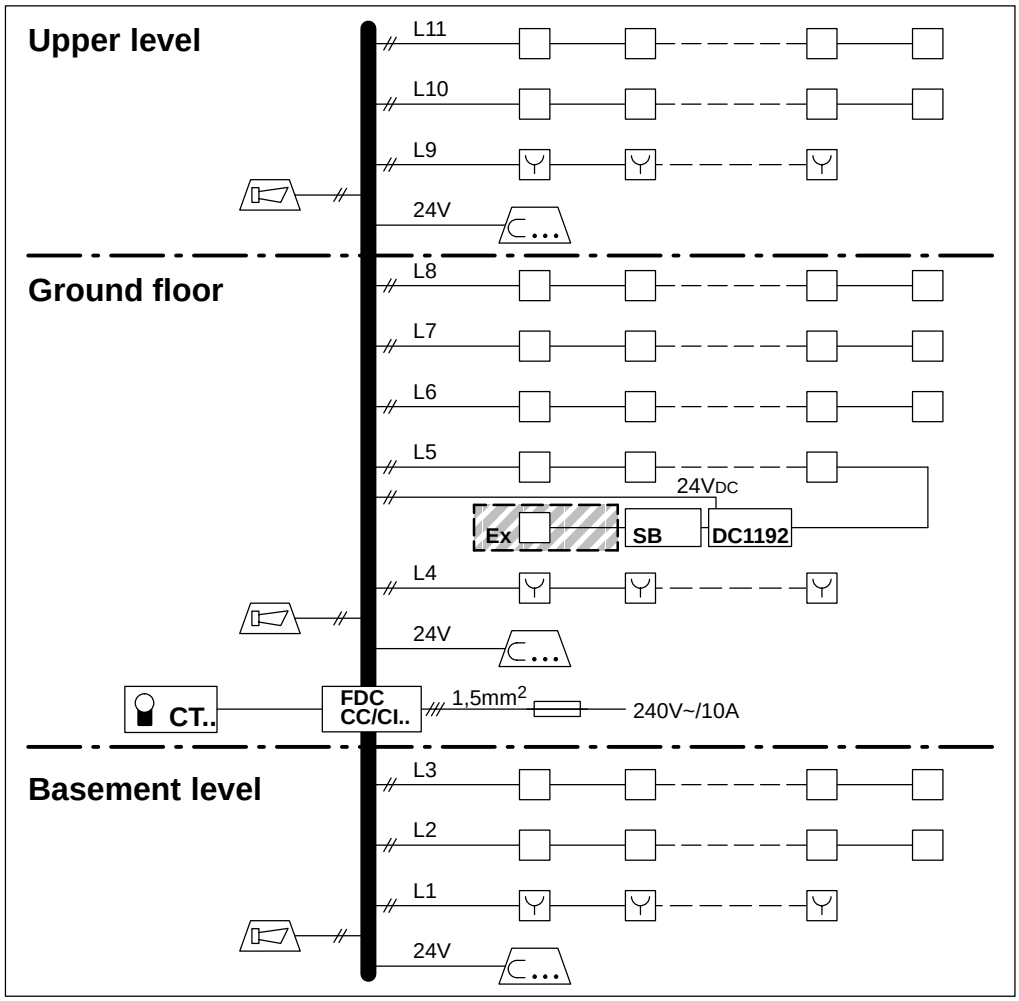

Fig. 4 Block diagram «collective» detection system

Ground floor

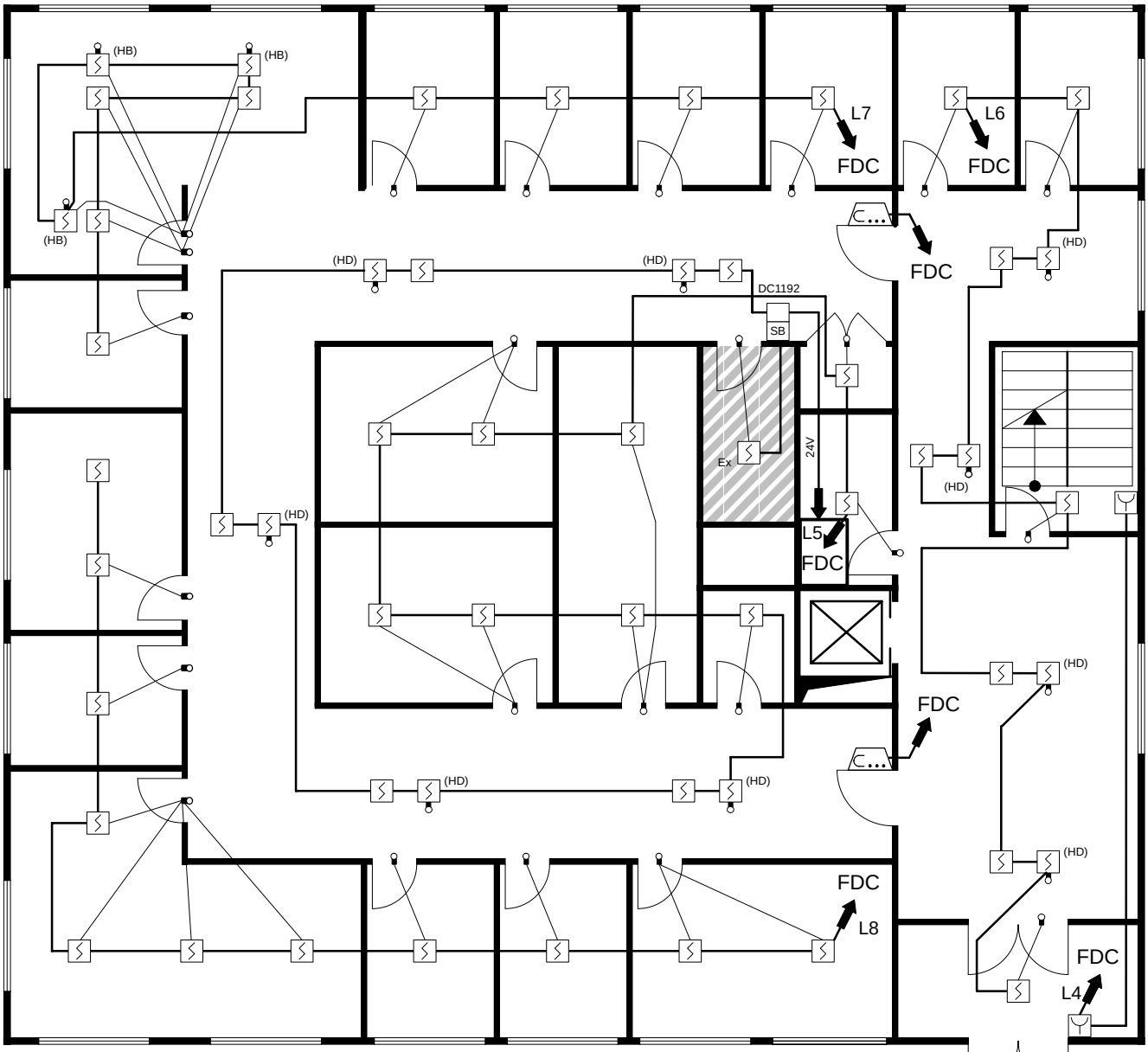

Fig. 5 Collective wiring

1.3.8 AnalogPLUS® detection lines

AnalogPLUS® detection lines can be installed as stub or loop lines. A maximum of 128 fire detectors may be connected to a loop line and a maximum of 32 fire detectors may be connected to a stub line. A DC1135 T-branch module is required for branch lines from the loop. Up to 20 fire detectors can be connected to the DC1135 per stub line.

New systems: Twisted cable. With very powerful EMI shielded and twisted.

Existing systems: Single and parallel conductors are permissible.

For line resistances and line capacitances see *document e1508, «Connection factors, line resistances, capacitances».*

Type of cable	Application
Twisted, min. 7 turns	Generally recommended
Shielded, twisted min. 7 turns	Essential in areas where EMI is critical e.g. X-ray rooms, radar systems, transmitter stations, proximity to thyristor controls etc.
Non-twisted	Utilization of cable from existing systems with minimum remaining EMI risk from adjacent areas Not recommended for new systems
Shielded/non-twisted	Utilization of cable from existing systems existing systems with minimum remaining risk in areas where EMI is critical Not recommended for new systems

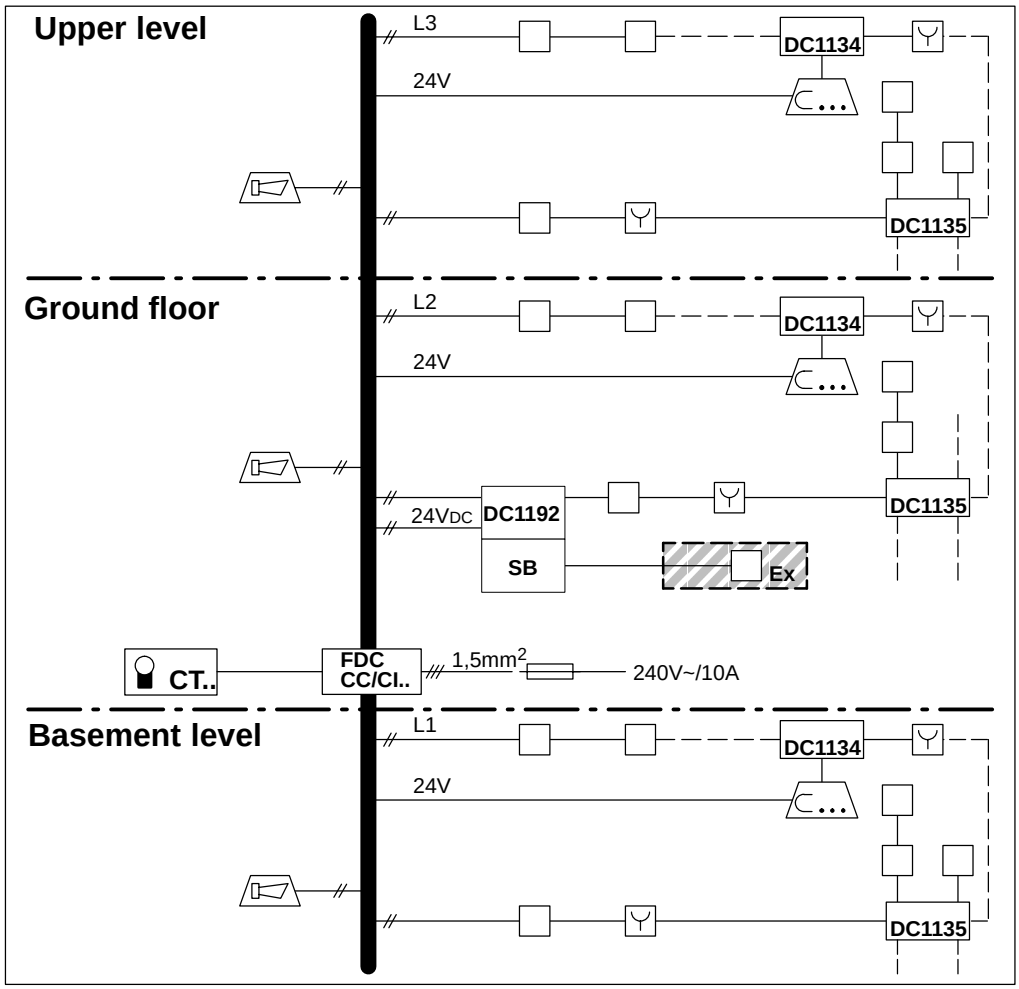

Fig. 6 Block diagram detection system AnalogPLUS®

Ground floor

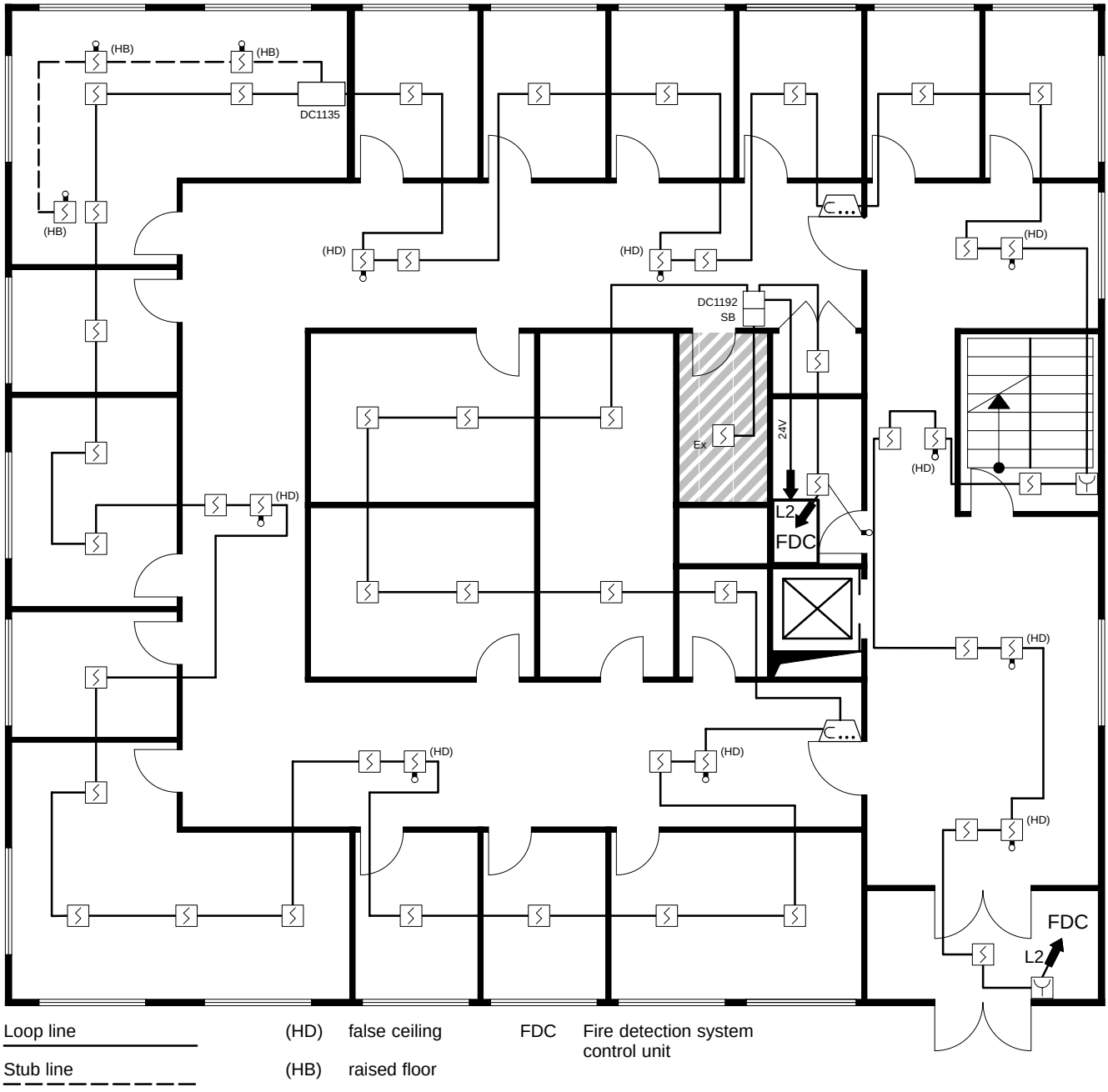

Fig. 7 AnalogPLUS® wiring

1.3.9 «Interactive» detection lines

«Interactive» detection lines can be installed as stub or loop lines. According to equipment configuration, a maximum of 100 or 128 fire detectors can be connected to a loop line and a maximum of 32 fire detectors can be connected to a stub line (regulations). Branch lines can be connected to the detector bus direct.

New systems: Twisted cable, minimum 7 turns per metre.

With powerful EMI: Twisted cable, minimum 10 turns per metre.

With extremely powerful EMI: Shielded and twisted cable

Existing systems: Takeover of existing wiring possible, with certain remaining risk that a part would have to be replaced.

Line resistances and line capacitances see *document e1508, «Connection factors, line resistances, capacitances»*.

Type of cable	Application
Twisted, min. 7 turns	Essential in areas where EMI is not critical e.g. offices, hotels, homes, museums, computer rooms etc.
Twisted, min. 10 turns (generally preferred cable)	Essential in areas where EMI is critical e.g. X-ray rooms, radar systems, transmitter stations, proximity to thyristor controls etc.
Shielded, twisted min. 10 turns	Essential in areas where EMI is extremely critical e.g. in the vicinity of thyristor controls, high voltage etc.
Non-twisted	Utilization of cable from existing systems with minimum remaining EMI risk, if necessary with written protection for critical parts Not recommended for new systems
Shielded/non-twisted	Utilization of cable from existing systems with minimum remaining EMI risk, if necessary with written protection for critical parts Not recommended for new systems

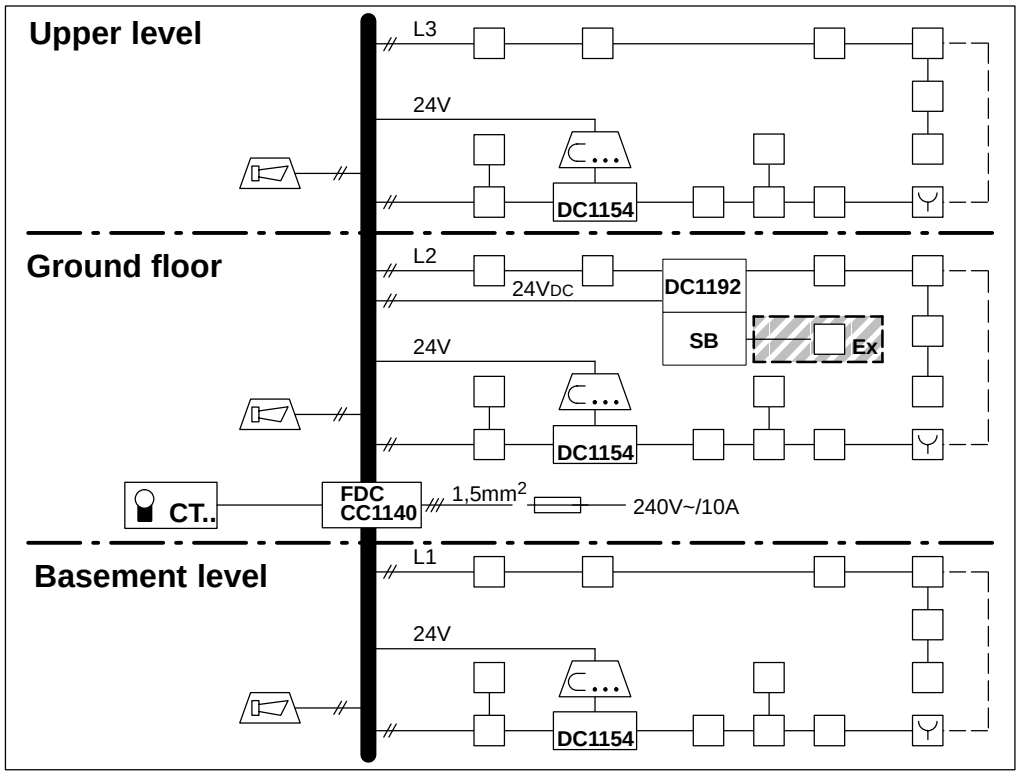

Fig. 8 Block diagram «interactive» detection system

Ground floor

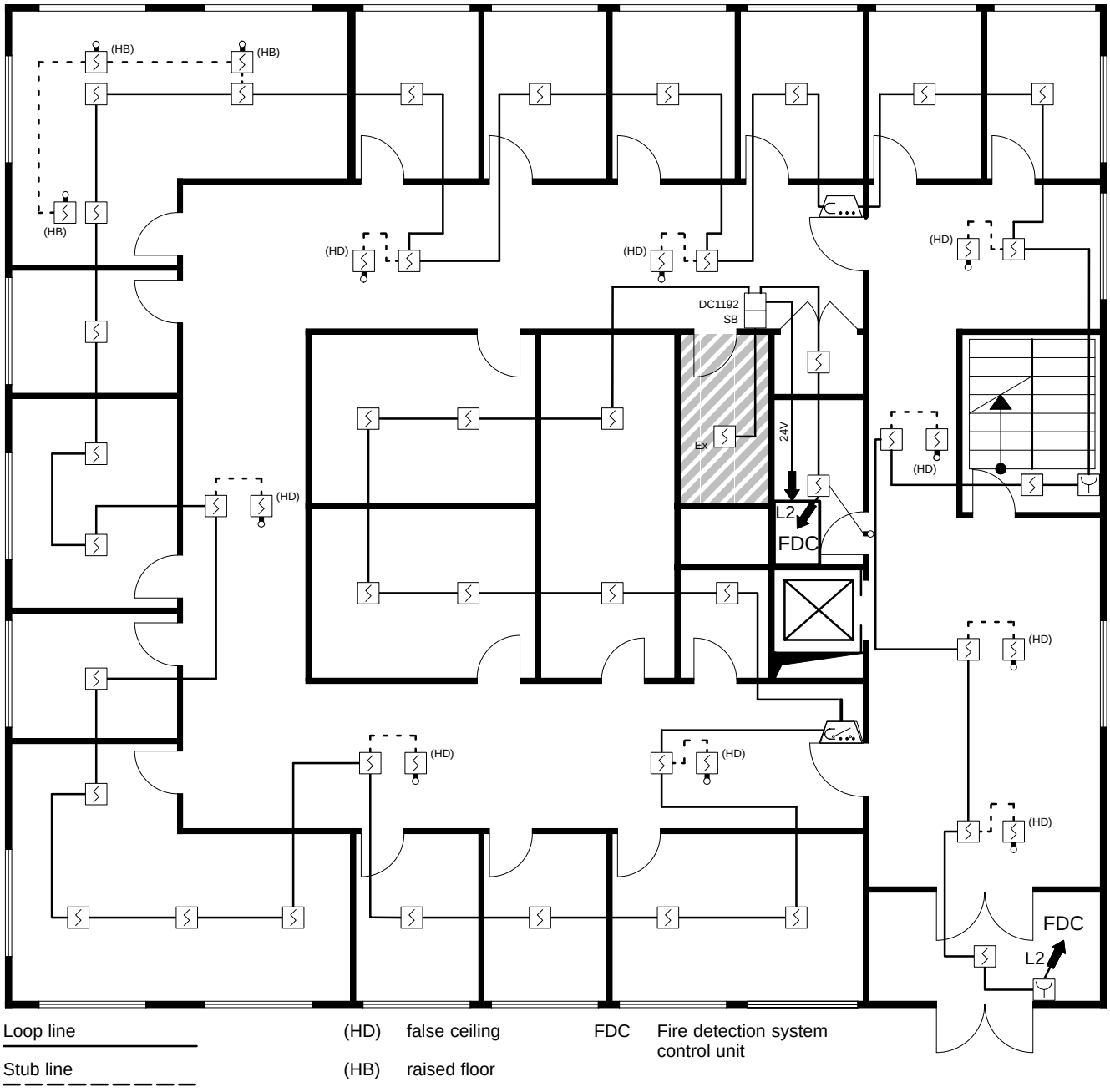

Fig. 9 Interactive wiring

1.3.10 Alarm devices

Twisted cables, note max. permissible voltage drop: Approximately max. 10%.

1.3.11 Terminals

Separately installed terminals to the control unit according to control unit specifications.

1.3.12 Mains / fire control installations with low voltage

Standard installation cable, as required by country concerned.

Cable fed into equipment as well as internal wiring must be in compliance with the installation documents for the equipment (cable separation).

1.3.13 Interfaces to non Cerberus systems

Remote transmission equipment or danger management systems mounted separately from the control unit must be wired according to the corresponding manufacturer's instructions.

1.3.14 Standards

In general, the standard IEC 950 also applies
(International Electrical Commission)

2 Installation

2.1 General

2.1.1 Responsibility

The planning engineer is responsible for the correct installation of the fire detection system. He is responsible for positioning equipment correctly and preparing the necessary documentation.

The electrician is responsible for the line network and the wiring up of the equipment as well as the permanent mounting of devices.

2.1.2 Storage of equipment on site

The installer is responsible for the storage and safety of equipment.

Store equipment in a dry, clean room.

Leave equipment in its original packing until required for use.

Only insert fire detectors, control unit modules etc. when commissioning the system.

2.1.3 Installation documentation

The following installation documentation must be provided by the planner for correct installation:

- Ground plans with equipment locations drawn in and/or
- Lists of equipment indicating the location of equipment
- Block diagrams with the architecture of the supply network.
- Connection diagram for equipment, intermediate distribution frame, control unit and terminal
- Information on the use of special cables, explosion-hazard applications etc.

2.1.4 Marking of equipment

If required, two different designation plates are available for the marking of detectors. They are attached under the detector base after installation.

As component parts of a fire detection system, terminal boxes, distributor boxes, looping-in boxes must be marked accordingly.

2.2 Installing the equipment

2.2.1 Mounting

Equipment must be solidly mounted.

When detectors are inserted, detector bases are subject to pushing, pulling and shearing stress and must be mounted accordingly. There must be at least 50cm free space beneath the detector for test purposes.

Detector bases must lie flat on the ceiling (do not mount on bumps or hollows, concrete ridges etc.).

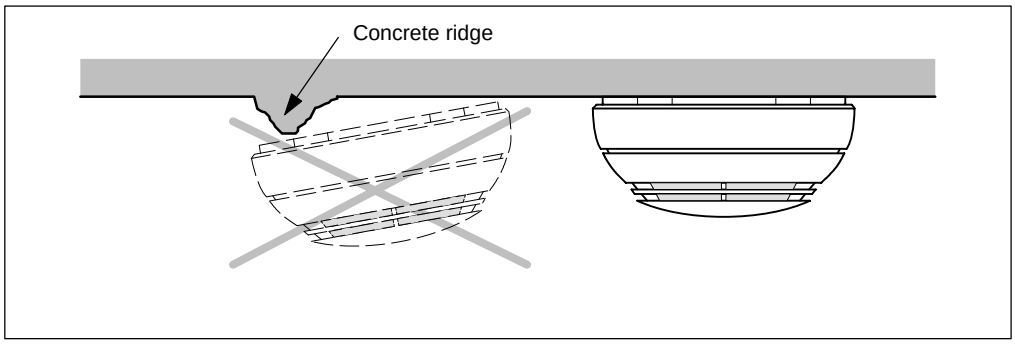

Fig. 10 Detector base mounted on concrete ridge
= distorted detector base = system fault

Fire detectors must be easily accessible for regular servicing.

The response indicator in the base must be easily visible from the alarm investigation route.

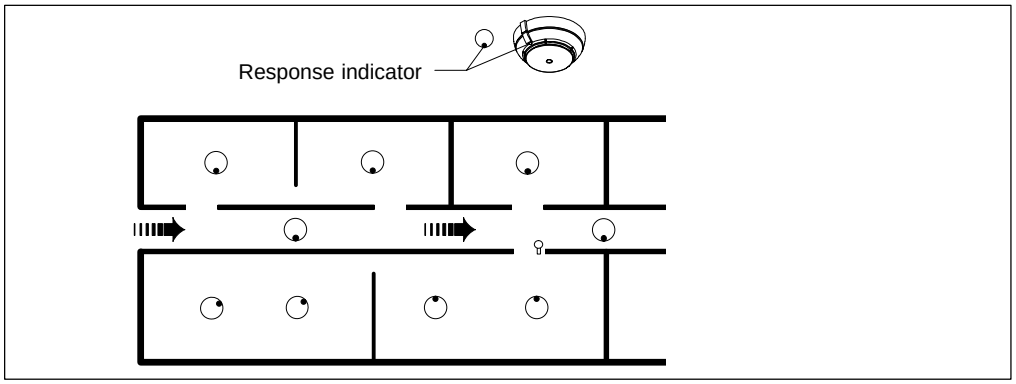

Fig. 11 Response indicator clearly visible

See product packing sheets, for further details.

2.2.2 Cable entry

Cables must be fed tightly through the rubber membrane in the base in order to prevent condensation and air penetrating to the base/detector. Air «rinsing» arises due to differences in pressure in different rooms caused by air conditioning and ventilation systems. Pressure compensation also arises through the cable conduit which to some extent causes powerful air currents behind the base. This prevents smoke from properly entering the detector.

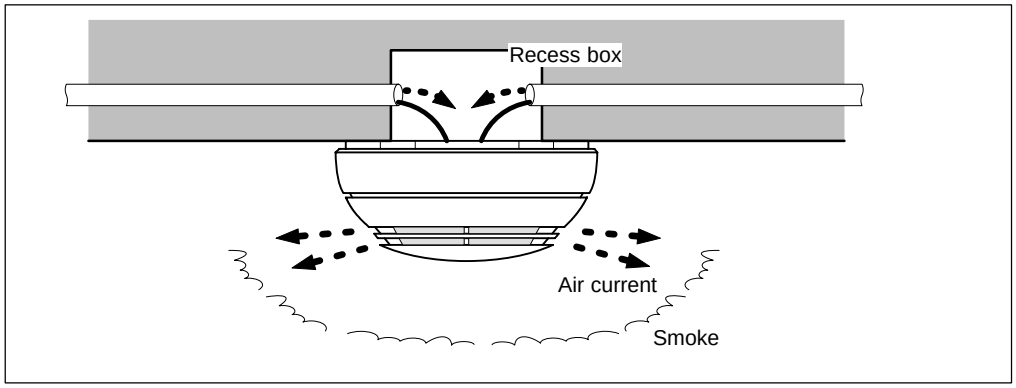

Fig. 12 Smoke is prevented from properly entering the detector if the rubber membrane is not mounted air-tight.

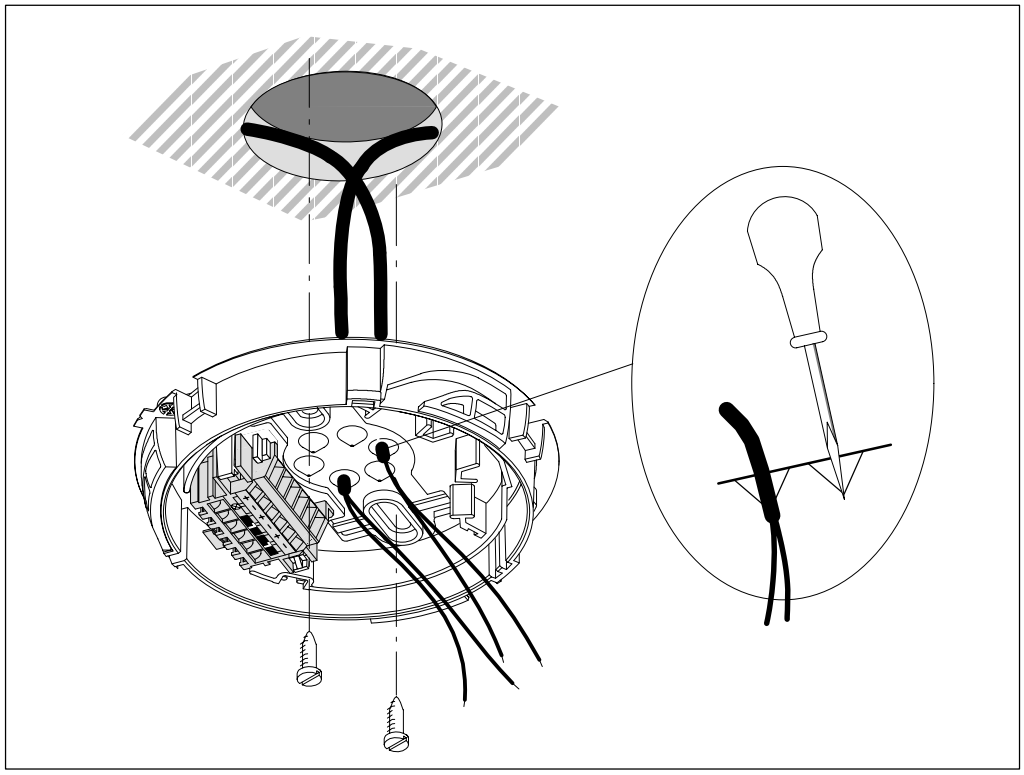

Fig. 13 Making the rubber membrane air-tight

Important:
Push the cable through the rubber membrane, or make holes with an awl. Do not cut holes or slits!

2.2.3 Wiring for damp environments

Equipment which is mounted in damp rooms must be provided with special cable entries (screwed cable glands). Suitable adapter bases are available for this purpose.

Example:

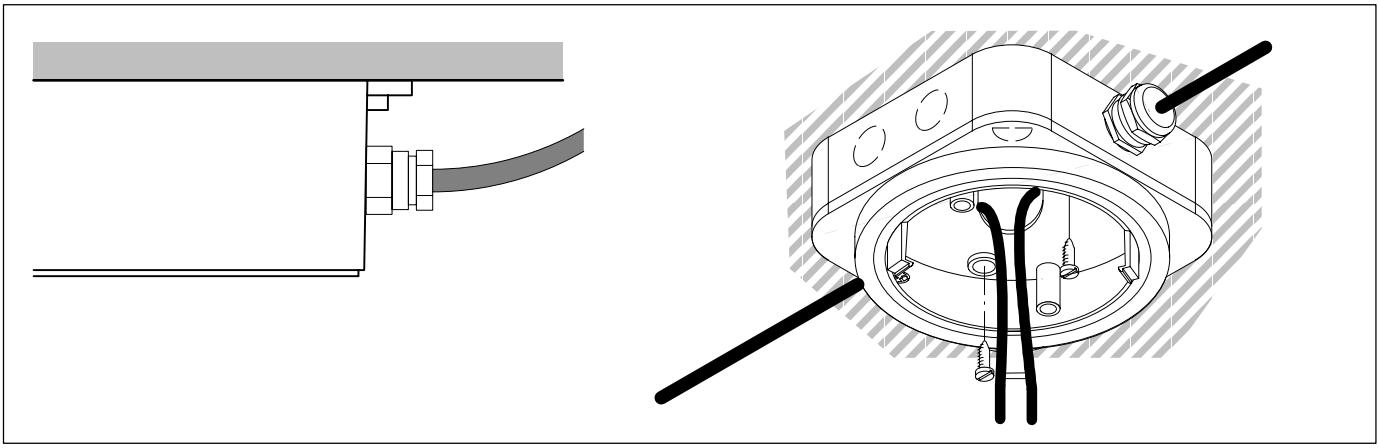

Fig. 14 Water-tight cable entry using adapter base and screwed cable gland

2.2.4 Line terminal

The DS11 base contains spring terminals. To ensure good contact, only one wire must be connected per terminal. Auxiliary terminals are available for multiple connections. (see connection diagram on product enclosure sheet.)

2.2.5 Earth connection

The control unit and terminal with power supply must be earthed according to local regulations.

The other equipment in a normal fire detection system does not require an earth connection.

Shielded cables must be earthed in a star-pattern at one point (control unit). Shielding must be through-connected in all equipment using insulated auxiliary terminals. Shielding must not come into contact with any external earth potential or metal parts of the equipment.

Equipment for explosion-hazard areas must be installed and earthed according to *document e1204, «Fire detection in explosion-hazard areas».*

2.3 Wiring check

2.3.1 Test equipment

No electronic elements should be connected to the line when a system is being wired. The line can then be tested with a universal instrument with ohmmeter or with a buzzer.

However, as this procedure cannot detect double reversed polarity, the ***DZB1191 base tester*** has been produced.

2.3.2 Wiring check

The following procedure using the DZB1191 base tester is recommended:

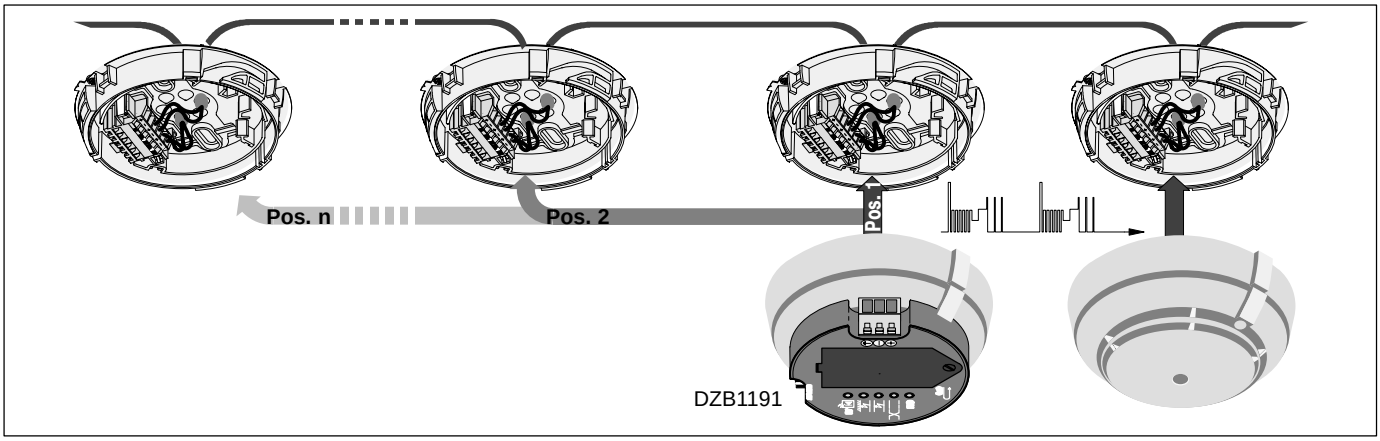

Fig. 15 Wiring check using DZB1191 base tester

- After installing the first base insert any detector.
- Wire up the second base. Insert base tester. The base tester checks the line up to the inserted detector. Remove base tester.
- Wire up the third base. Insert base tester. Again the line is checked up to the inserted detector etc.
- After wiring is completed connect the end of the line at the control unit to the DZB1191. The line is measured from the control unit to the first detector.
- If present, connect the return wire and test.
- If all measurements are OK, the detection line is in order.
- Remove the detector from the first base.

See *document x1088 «Operating instructions DZB1191»* for further details.

It is also possible to install all bases and then test all bases using the same procedure.

If the detectors are inserted directly in the bases when the wiring is installed, the DZ1195 line test set is also available for the final check. For details, see *document x1643, «Operating instructions DZ1195»*.

Please note that all bases must be tested in order to ensure that no fault is present.

Commissioning a fire detection system with faults results in time-consuming trouble-shooting work.

2.3.3 Handing over the system

The installer is obliged to hand over to the commissioning engineer a correctly installed and tested supply network.

Any deficiencies are normally eliminated and the work charged to the installer.

3 Commissioning

Commissioning marks the conclusion of the installation activities of a fire detection system.

The commissioning procedure is indicated in the corresponding control unit /terminal documentation.

4 System documentation

A complete, up-to-date set of documents must be provided for each correctly installed system with corresponding system disk.

For subsequent extensions, the resistance and capacitance values for the detection lines must be recorded in system documentation.

5 Acceptance test and handing over the system to the customer

The acceptance procedure varies from country to country. It can be done by an acceptance inspector or by the customer himself.

The system is handed over to the customer who is given thorough training based on comprehensive operating instructions.

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