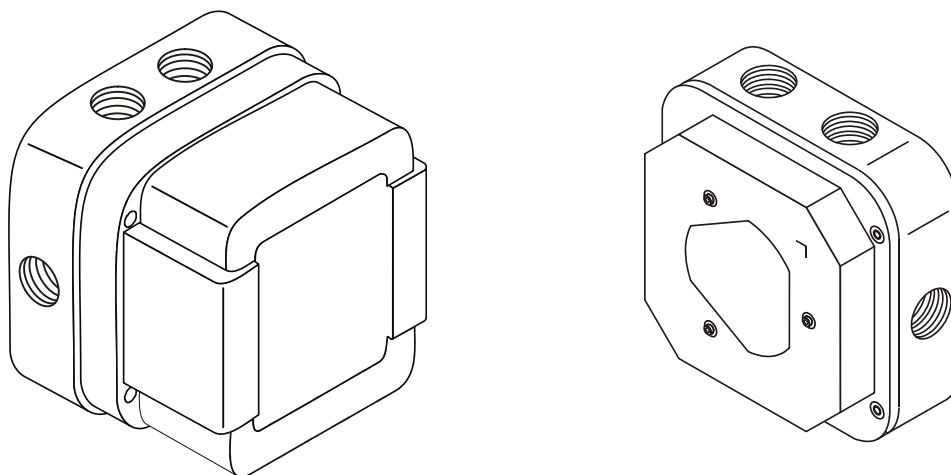


SIEMENS



FDL241-9

Linear smoke detector

Mounting

Commissioning

Imprint

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1 About this document

Goal and purpose

This document contains all the information you will need to install and commission the linear smoke detector FDL241-9.

Prerequisites:

- The installation locations for the detector and reflector are defined according to the planning information.
- The supply network is produced, connected and checked in line with the country-specific installation guidelines.
- Installation should be performed by a specialist in compliance with safety regulations.

For more information, please refer to document 007016.



In accordance with EN 62471, 'Photobiological Safety of Lamps and Lamp Systems', the linear smoke detector falls into the 'Exempt Group'.

Applicable documents

Document ID	Title
007016	Technical manual Linear smoke detector FDL241-9
007017	Data sheet ASA Linear smoke detector FDL241-9

2 Structure and function

2.1 Overview

The linear smoke detector FDL241-9 detects fires according to the principle of light attenuation by smoke. The linear smoke detector works together with a reflector, which is installed opposite the detector.

Properties

- Communication via FDnet/C-NET detector line or collective detector line
- Signal processing with ASAtechnology (ASA = Advanced Signal Analysis)
- Detection distance 5...100 m¹
- Three sensitivity levels

¹ The detection distance of 10...100 m meets the requirements of standard EN 54-12.



In accordance with EN 62471, 'Photobiological Safety of Lamps and Lamp Systems', the linear smoke detector falls into the 'Exempt Group'.

2.2 Function

The linear smoke detector consists of a transmitter and a receiver and works according to the principle of light attenuation by smoke. The transmitter transmits to the reflector a highly focused, pulse-shaped infrared ray. If no smoke is present, a large part of the infrared ray reaches the reflector and is returned to the receiver. The incoming light generates an electric signal on the receiver's photo diode.

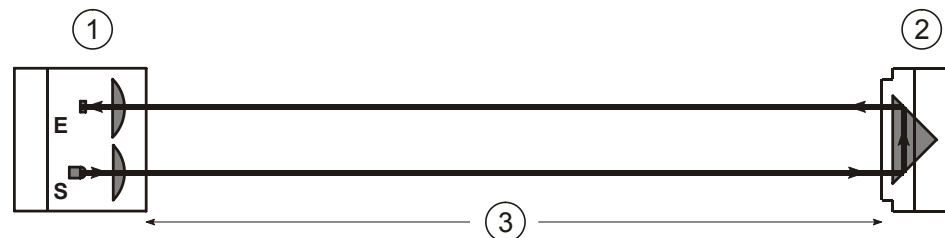


Figure 1: Function of the linear smoke detector without smoke

- | | |
|--|---------------|
| 1 Detector | E Receiver |
| 2 Reflector | S Transmitter |
| 3 Measuring section 5...100 m ¹ | |

¹ The detection distance of 10...100 m meets the requirements of standard EN 54-12.

When smoke is present, part of the infrared ray is absorbed when it encounters the smoke particles, while another part is scattered by smoke particles. The rest reaches the reflector and is returned to the receiver. The infrared ray is attenuated further. Only a small part of the infrared ray initially transmitted reaches the receiver, and the electrical signal becomes weaker.

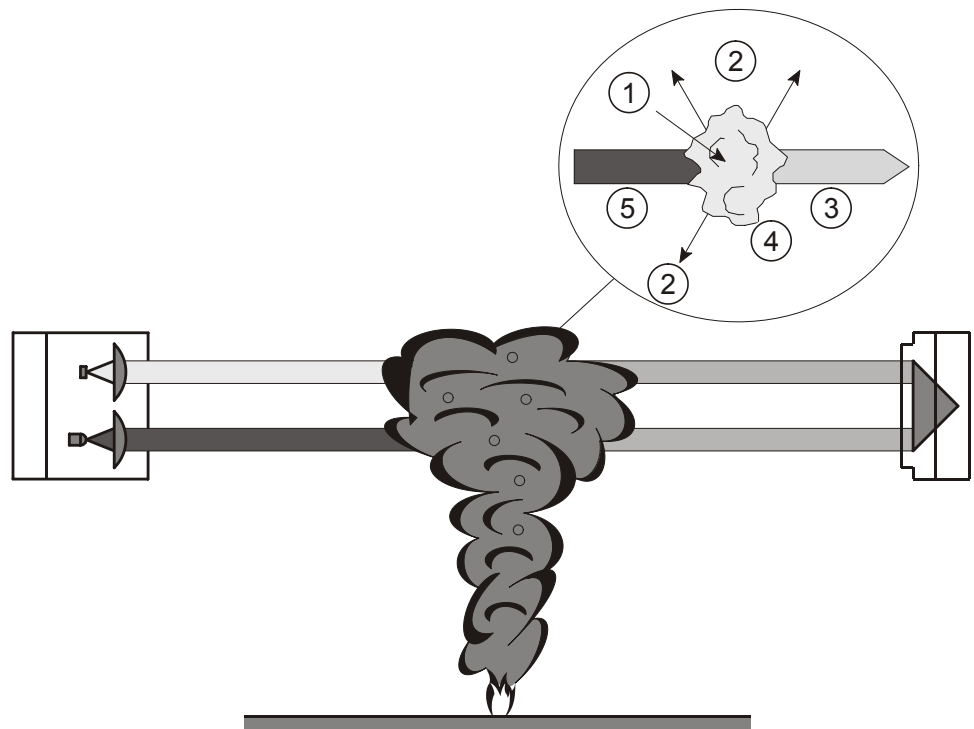


Figure 2: Function of the linear smoke detector with smoke

- | | |
|---------------------------|------------------|
| 1 Absorption | 4 Smoke particle |
| 2 Scattering | 5 Infrared ray |
| 3 Attenuated infrared ray | |

The linear smoke detector measures the distance, which enables an exact alignment of the smoke detector to the reflector when the detector is commissioned.

Due to distance measuring, the smoke detector recognizes when the measuring section is crossed by a reflecting object. In this case, the smoke detector sends a fault signal to the control panel.

2.2.1 Infrared ray

Setup of the infrared ray

The infrared ray is scattered, giving it a conical shape. The radiation energy decreases outwards. The infrared ray is divided into the following three ranges:

- Effective range (1): The effective range is the connection between the transmitter, reflector and receiver.
- Core range (2): In the core, enough radiation energy is present to operate the system.
- Scattering range (3): The radiation energy in the scattering range is insufficient and does not ensure the functionality of the system.

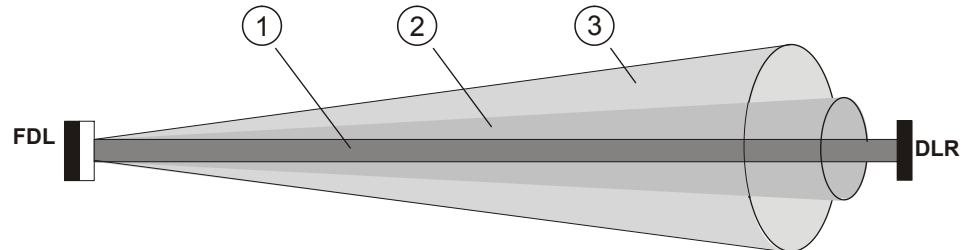


Figure 3: Setup of the infrared ray

- | | |
|-------------------|--------------------|
| 1 Effective range | 3 Scattering range |
| 2 Core range | |

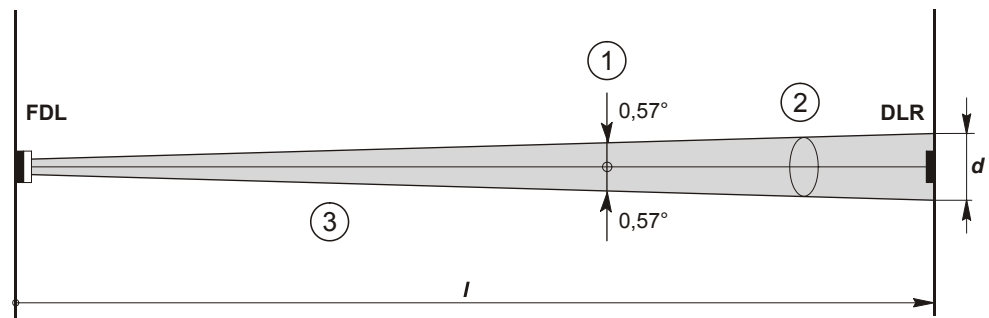


Figure 4: Diameter of the core

- | | |
|------------------------|--|
| 1 Opening angle | d Diameter of the core range depending on the detection distance |
| 2 Diameter of the core | l Detection distance |
| 3 Infrared ray | |

Example of calculating the diameter of the core range depending on the detection distance:

Known: Detection distance $l = 100$ m

Wanted: Diameter d of the core

$$d = \frac{2}{100} \times l = \frac{2}{100} \times 100 \text{ m} = 2 \text{ m}$$

Adjustment options for the infrared ray

The infrared ray can be adjusted horizontally by a maximum of 10° in either direction and vertically by a maximum of 5° in either direction. This adjustment range can be used for an optimum positioning of the devices. In the case of detection distances greater than 50 m, position the detector and reflector as close to opposite one another as possible. This makes adjustment easier.

One turn of the knurled screw moves the infrared ray by approx. 0.8 m per 100 m distance.

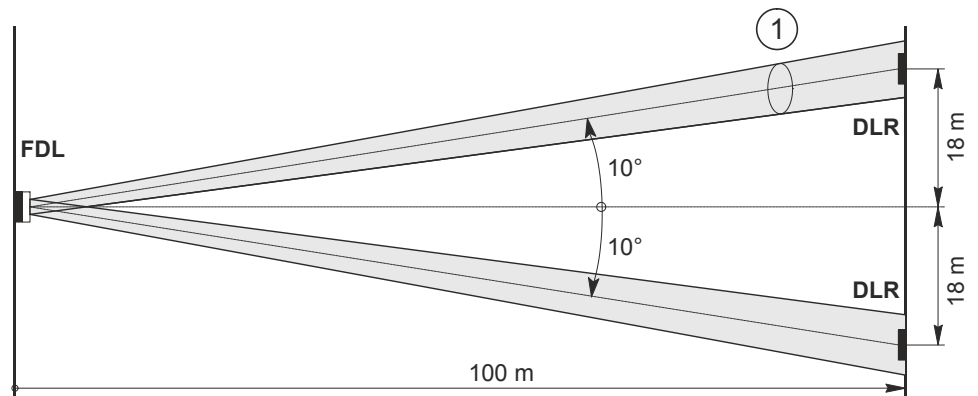


Figure 5: Horizontal adjustment range

1 Diameter of the core

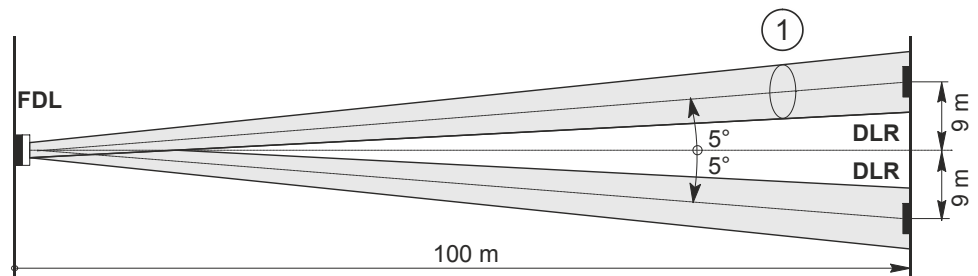


Figure 6: Vertical adjustment range

1 Diameter of the core

2.3 Reflectors

Retro-reflectors reflect rays of light that reach them in parallel. The reflector does not necessarily have to be installed at a right angle to the ray of light. Vibrations and distortions on the mounting surface do not interfere with this. Interfering light is also reflected in parallel and does not therefore reach the receiver.

The reflectors must be installed at a maximum inclination angle of 20° in all directions.

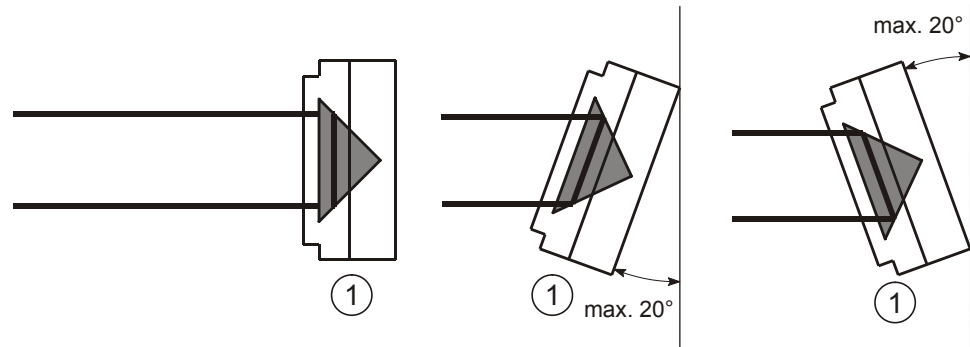


Figure 7: Reflectors with various inclinations

1 Reflector

Reflector for long distance (prism) DLR1191

The reflector for long distance consists of a prism and a housing. The retro-reflecting prism has the shape of an even pyramid, the lateral surfaces of which are made up from isosceles, right-angled triangles. Light rays coming in through the base surface are completely reflected thrice by the lateral surfaces and are then scattered back through the base.

The reflector for long distance is fitted with a heating unit and can therefore be used in environments with a danger of moisture condensation. The heating unit must be connected to a 24 V supply.

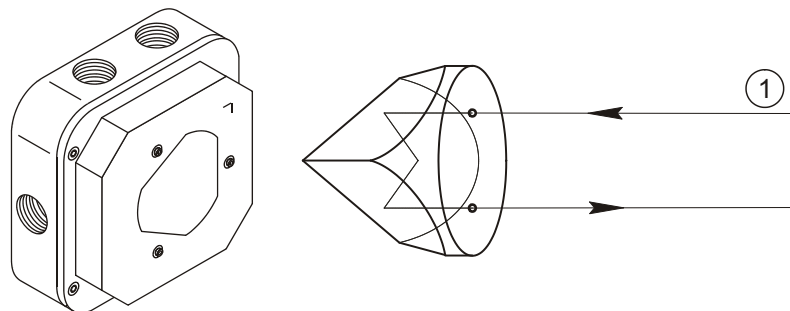


Figure 8: Reflector and principle of the reflector

1 Ray of light

Reflector for middle distance (foil) DLR1192 and reflector for short distance (foil) DLR1193

The reflectors for middle distance and for short distance consist of a film with micro-prismatic elements, which are formed in a transparent, synthetic resin. sealed and mounted on a plastic base. The foil basically works in the same way as the prism.

3 Mounting / Installation

Prerequisites

- The installation locations for the detector and reflector are defined according to the planning information.
- The supply network is produced, connected and checked in line with the country-specific installation guidelines.

Sequence

1. Switch detector over to collective operation (optional)
2. Installing the detector base
3. Electrical connection
4. Installing the reflector for long distance (prism)
5. Installing the reflectors for middle distance and short distance (foil)

Information on the individual steps can be found in the following chapters.

The detector is only installed on the detector base during commissioning.

3.1 Switching detector over to collective operation

When supplied, the detector is set for operation on an FDnet/C-NET detector line. When operating a collective detector line, the control panel normally switches the detector to collective operation automatically.

Some collective control panels do not however automatically switch from FDnet/C-NET operation to collective operation. In these cases, you must switch the detector over manually. If you are not certain whether the detector is switched over automatically, switch it manually to collective operation before installing.

The detector always switches automatically from collective operation to FDnet/C-NET operation.

Procedure



Note the positive and negative poles.

- ▷ The detector base must not be connected to the detector line.
1. Connect the detector base to a DC 12 V to 28 V source of DC voltage, e.g. a battery, according to the connection diagram shown below. Use a screwdriver to remove the load from the springs in the socket strip so you can slide in the wire.
 2. Insert the detector unit into the detector base.
 3. Wait around 15 seconds and then remove the detector unit and source of DC voltage.
- ⇒ The detector is switched over to collective operation and can be connected to a collective detector line.

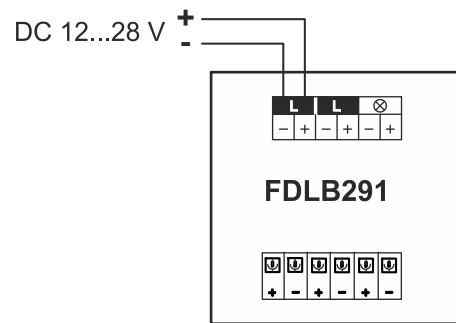


Figure 9: Connection diagram for the source of DC voltage

3.2 Installing the detector base



⚠ WARNING

Danger of falling

Bodily injury

- When installing, use a secured ladder or work platform.



⚠ CAUTION

Using the device in a damp and/or corrosive environment

Device function is impaired.

- Use the M20 x 1.5 metal cable gland in damp and/or corrosive environments.

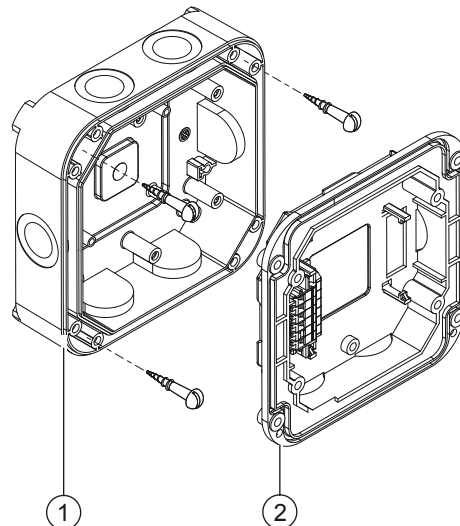


Figure 10: Mounting and electrical connection

1 Detector base

2 Carrier for connection terminals

1. Break open the plastic parts in the detector base (1) at the openings you require for cable entry. Note the arrows in the detector base indicating which side should be at the top.
2. If necessary screw the M20 x 1.5 metal cable gland into the openings.
3. Install the detector base on a stable, vibration-free surface with two screws.

4. Guide the cables from the detector line and external alarm indicator into the detector base. You will also need a 24 V supply if you are using the detector heating unit DLH1191A.
 5. Mount the carrier (2) for the connection terminals by inserting two screws into the detector base. The arrows in the carrier indicate which side should be at the top.
 6. If you are using the detector heating unit DLH1191A, insert the terminal block supplied with the detector heating unit into the carrier (2).
- ⇒ The detector base is installed.

3.3 Electrical connection



- Specialist electrical engineering knowledge is required for installation.
 - Only an expert is permitted to carry out installation work.
- Incorrect installation can take safety devices out of operation unbeknown to a layperson.

The electrical connection depends on the following factors:

- Connection to an FDnet/C-NET detector line or collective detector line
- Use of unshielded cables or shielded cables

The general process is described below. The connection diagrams and more information on the various connection variants can be found in the following chapters.

Note the following with regard to the electrical connection:



⚠ CAUTION

Using the device in a damp and/or corrosive environment

Device function is impaired.

- Use the M20 x 1.5 metal cable gland in damp and/or corrosive environments.



Note the positive and negative poles.

Only connect one wire per terminal. This is the only way to ensure the connection is failure-free for the entire service life of the device.

- Wherever possible use twisted, unshielded cables. Shielded cables are only required in special cases, such as strong high-frequency fields. This also applies to connecting the external alarm indicators.
- Only use cables with a conductor cross-section of 0.2...1.5 mm².

General procedure

- ▷ The detector base and the carrier for connection terminals are mounted.
1. Connect the wires as shown in the corresponding connection diagram. Use a screwdriver to remove the load from the springs in the socket strip so you can slide in the wire.
 2. If you are using the detector heating unit, connect the wires of the 24 V supply according to the connection diagram shown below.

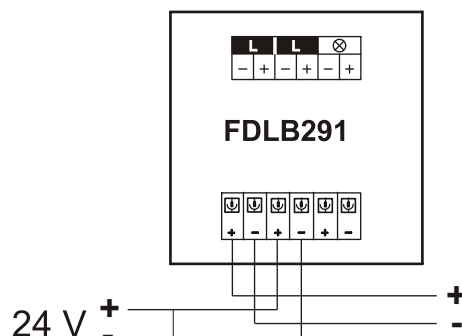


Figure 11: Connection diagram for the detector heating unit

3.3.1 Connection to an addressed detector line

The following applies to FDnet/C-NET detector lines:

- Loops, stubs and T-branches are possible.
- You may only connect external alarm indicators to **one** detector.
- Permissible cables for detectors with more than one external alarm indicator according to the collective connection diagram may be migrated to the FDnet/ C-NET without any changes.
- Note document 001508 for installation (calculation of the capacity layer).

3.3.1.1 Use of unshielded cables

The connection is established from base to base using twisted or non-twisted wire pairs.

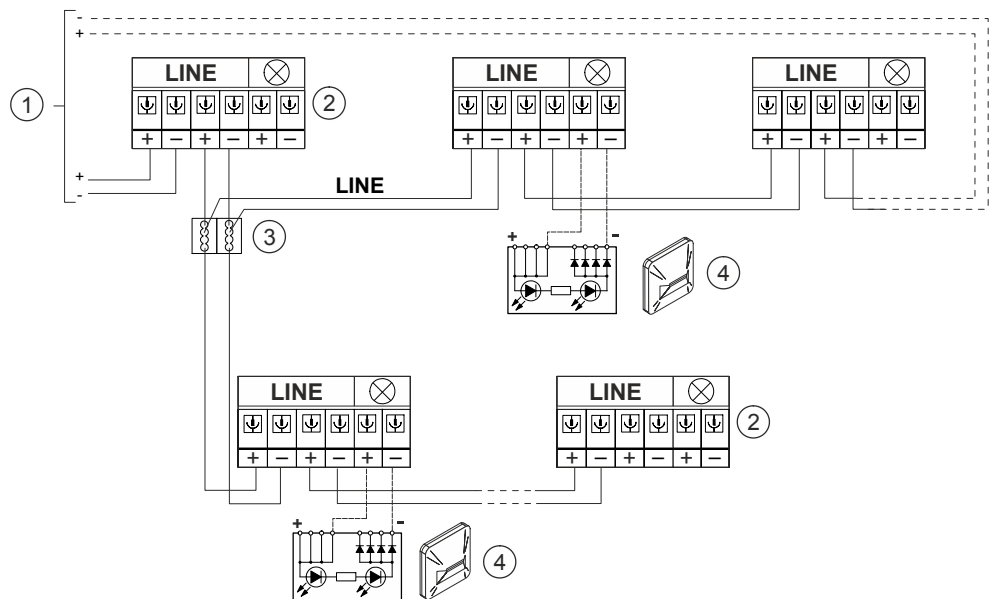


Figure 12: Connection diagram for addressed detector line with and without external alarm indicators (without shielded cables)

- 1 Control panel
- 2 Detector

- 3 Auxiliary terminals DBZ1190-xx
- 4 External alarm indicator

3.3.1.2 Use of shielded cables

The detector line shielding must be connected through in the detector base with auxiliary terminals DBZ1190-xx.

There are two ways of connecting external alarm indicators:

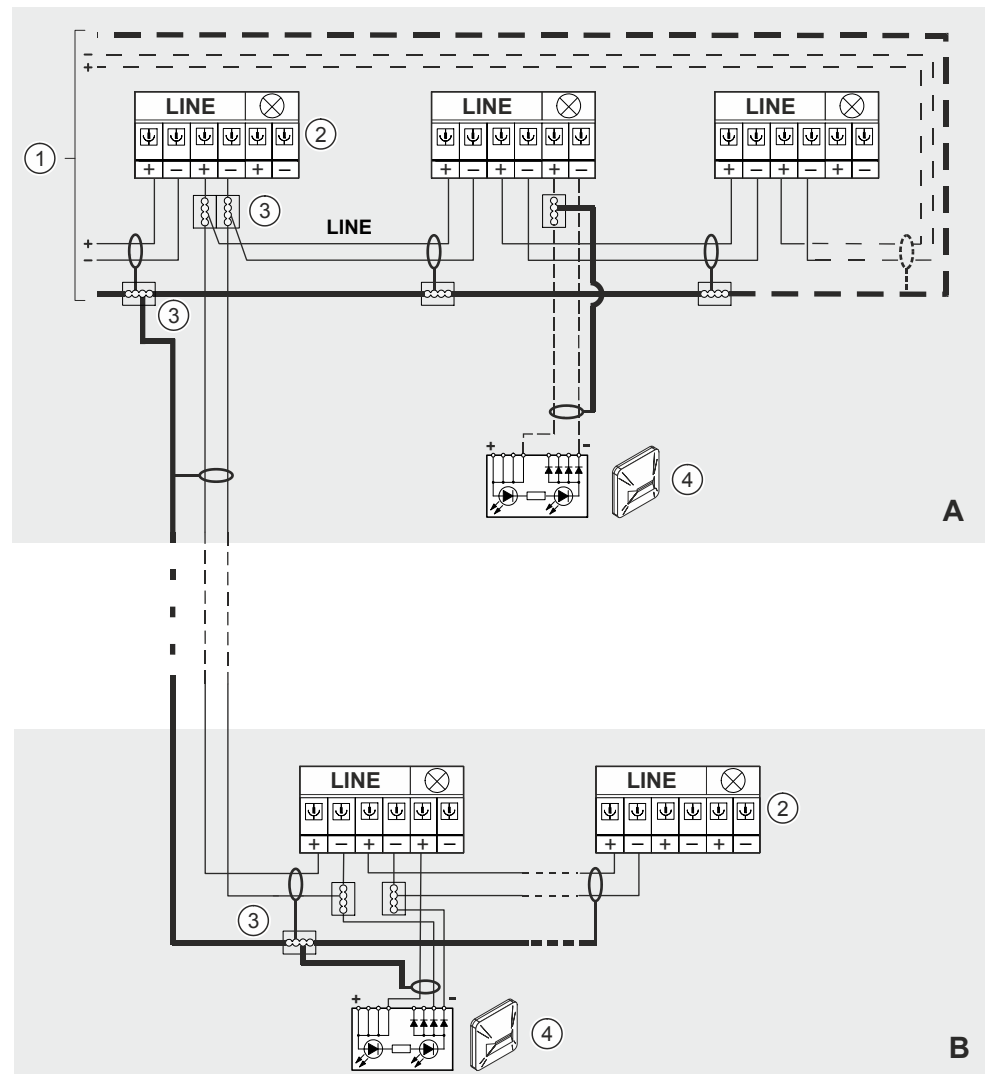


Figure 13: Connection diagram for addressed detector line with and without external alarm indicators (with shielded cables)

- | | |
|-----------------|----------------------------------|
| 1 Control panel | 3 Auxiliary terminals DBZ1190-xx |
| 2 Detector | 4 External alarm indicator |

Variant A

1. Connect the positive pole of the external alarm indicator to the positive pole for the external alarm indicator on the detector.
2. Connect the negative pole of the external alarm indicator to the negative pole for the external alarm indicator on the detector.
3. Connect the shielding of the connection cable between the external alarm indicator and detector on the detector side to the positive pole for the external alarm indicator via an auxiliary terminal DBZ1190-xx.

Variant B

1. Connect the positive pole of the external alarm indicator to the positive pole for the external alarm indicator on the detector.
2. Leave the negative pole for the external alarm indicator on the detector unoccupied.

3. Connect each of the two negative poles of the external alarm indicator separately to both negative poles of the detector line.



The two negative connections of the external alarm indicator are decoupled externally in the alarm indicator by diodes.

4. Connect the shielding of the detector line with the shielding of the connection cable to the external alarm indicator with an auxiliary terminal DBZ1190-xx.

3.3.2 Connection to a collective detector line

Connect a control panel-specific end-of-line to the end of the collective detector line.

3.3.2.1 Use of unshielded cables

The connection is established from base to base using twisted or non-twisted wire pairs.

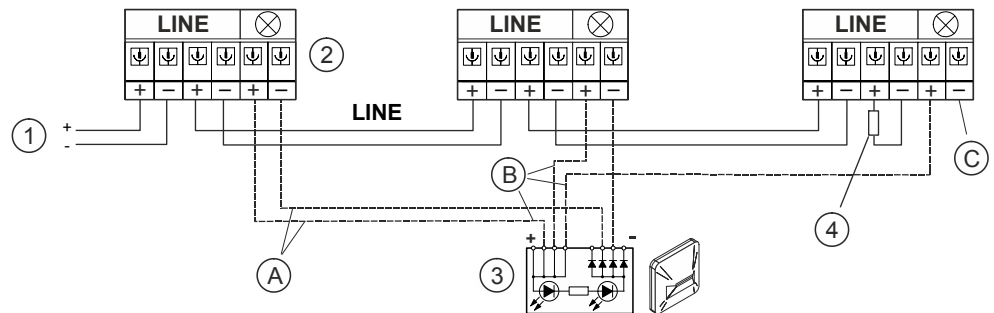


Figure 14: Connection diagram for collective detector line with and without external alarm indicators (without shielded cables)

- | | |
|-----------------|--|
| 1 Control panel | 3 External alarm indicator |
| 2 Detector | 4 End-of-line depending on control panel |

Standard circuitry

With standard circuitry, the external alarm indicator is connected to the positive and negative poles of each detector.

Wire-saving cabling

!	NOTICE
	Cabling for new sites Wire-saving cabling in external alarm indicators is prohibited for new sites.

With wire-saving cabling, the external alarm indicator is connected as follows:

- The external alarm indicator must be connected to the positive and negative poles of at least one detector (A).
- The external alarm indicator must be connected to the positive pole of every other detector (B).
- The external alarm indicator need not be connected to the negative pole of every other detector (C).

3.3.2.2 Use of shielded cables

The detector line shielding must be connected through in the detector base with auxiliary terminals DBZ1190-xx.

There are two ways of connecting external alarm indicators:

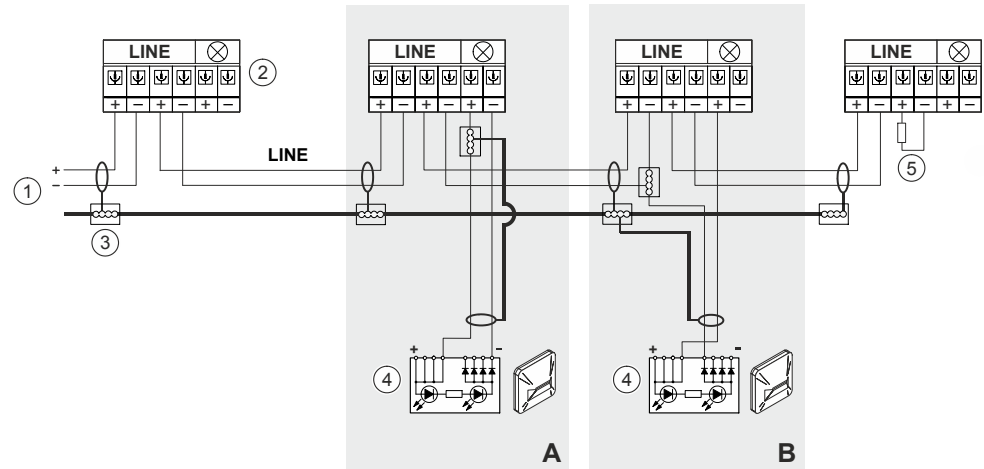


Figure 15: Connection diagram for collective detector line with and without external alarm indicators (with shielded cables)

- | | |
|----------------------------------|--|
| 1 Control panel | 4 External alarm indicator |
| 2 Detector | 5 End-of-line depending on control panel |
| 3 Auxiliary terminals DBZ1190-xx | |


Variant A

1. Connect the positive pole of the external alarm indicator to the positive pole for the external alarm indicator on the detector.
2. Connect the negative pole of the external alarm indicator to the negative pole for the external alarm indicator on the detector.
3. Connect the shielding of the connection cable between the external alarm indicator and detector on the detector side to the positive pole for the external alarm indicator via an auxiliary terminal DBZ1190-xx.

Variant B

1. Connect the positive pole of the external alarm indicator to the positive pole for the external alarm indicator on the detector.
2. Leave the negative pole for the external alarm indicator on the detector unoccupied.
3. Connect the negative pole of the external alarm indicator with the negative pole on the input side of the detector line on the detector via an auxiliary terminal DBZ1190-xx.
4. Connect the shielding of the detector line with the shielding of the connection cable to the external alarm indicator via an auxiliary terminal DBZ1190-xx.

3.4 Installing the reflector for long distance (prism)

	▲ WARNING
	Danger of falling Bodily injury <ul style="list-style-type: none"> • When installing, use a secured ladder or work platform.

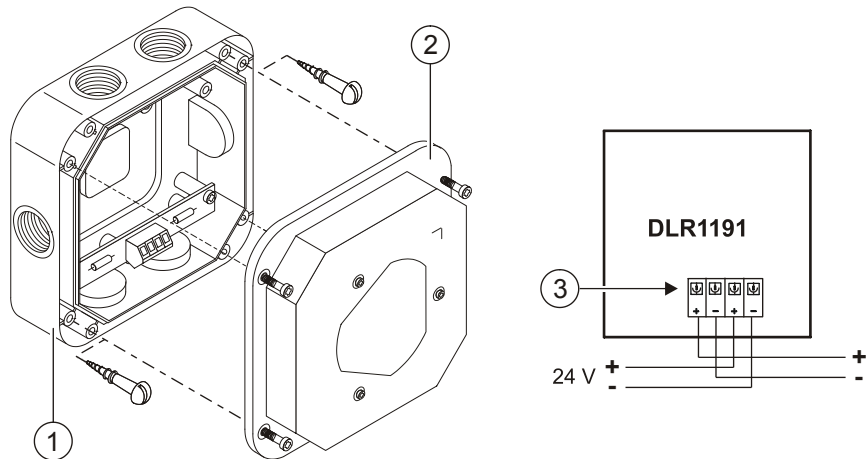


Figure 16: Installing the reflector

- 1 Base
- 2 Prism unit

- 3 Terminals for heating

Mounting without heating unit

▷ The mounting location of the reflector is defined according to the planning information.

1. Install the base (1) with two screws on a level surface.
2. Install the prism unit (2) on the base with four screws.

⇒ The reflector is installed.

Mounting with heating unit



Note the positive and negative poles.

Only connect one wire per terminal. This is the only way to ensure the connection is failure-free for the entire service life of the device.

▷ The mounting location of the reflector is defined according to the planning information.

▷ You need a 24 V supply for the heating. Only use cables with a conductor cross-section of 0.2...1.5 mm².

1. Break open the plastic parts in the base (1) at the openings you require for cable entry.
2. If necessary screw the M20 x 1.5 metal cable gland into the openings.
3. Install the base with two screws on a level surface.
4. Insert the cable for the 24 V supply into the base.

5. Connect the wires to the terminals for the heating unit (3) according to the connection diagram.
6. Install the prism unit (2) on the base with four screws.

3.5 Installing the reflectors for middle distance and short distance (foil)



⚠ WARNING

Danger of falling

Bodily injury

- When installing, use a secured ladder or work platform.

- ▷ The installation location of the reflector is defined according to the planning information.
- Install the reflector with one screw on a level surface. The diameter of the hole is 4 mm.

4 Commissioning

Sequence

1. Set parameter set
2. Install detector unit
3. Install detector heating unit (optional)
4. Insert filter in detector (optional)
5. Commissioning the adjustment device
6. Checking the signal level and distance
7. Preliminary setting of the detector optics (optional)
8. Fine-tuning of the detector optics
9. Initializing the detector
10. Testing detectors

The types are described in the following chapters.

4.1 Set parameter set

Setting the parameter set depends on the detector line.

FDnet/C-NET detector line

The parameter set is set using control panel.

The procedure for setting the parameter set via the control panel is described in the control panel documentation.

Collective detector line

The parameters are set with the DIP switches in the detector unit.

- Use DIP switches (1) to set the required parameter set (see table below).

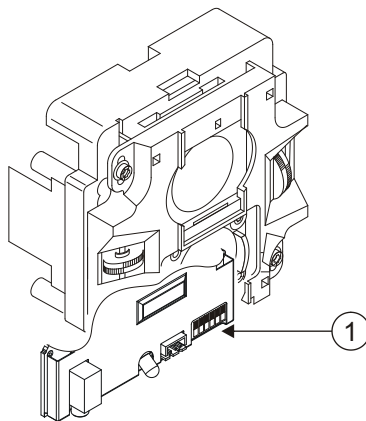


Figure 17: Detector unit with DIP switches

Parameter set			DIP switch					
No.	Name	Alarm for n % attenuation	1	2	3	4	5	6
01	Standard with open line	65 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02	Standard with British Standard Alarm	65 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
03	Sensitive with open line	50 %	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Parameter set			DIP switch					
No.	Name	Alarm for n % attenuation	1	2	3	4	5	6
04	Sensitive with British Standard Alarm	50 %	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF
05	Very sensitive with open line	30 %	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF
06	Very sensitive with British Standard Alarm	40 %	<input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF	<input type="checkbox"/> OFF

Table 1: Set parameter set



Parameter set 2 meets the requirements of standard EN 54-12.

4.2 Installing the detector unit



⚠ WARNING

Danger of falling

Bodily injury

- When installing, use a secured ladder or work platform.

- ▷ The carrier for connection terminals is mounted in the detector base.
1. Insert the detector unit (1) into the base (2) along with the carrier for the connection terminals with the LED pointing downwards.
 2. Fasten the detector unit with four screws (3). Ensure that the screws are tightened.

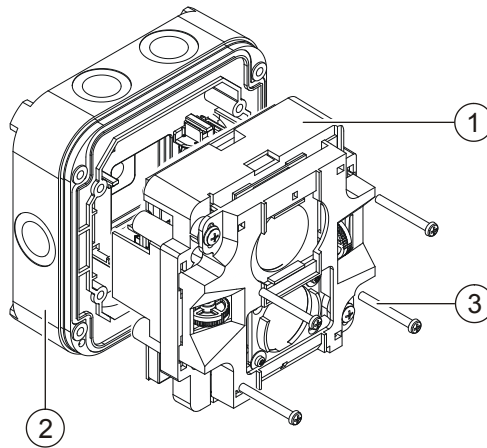


Figure 18: Installing the detector unit

1 Detector unit

3 Screws

2 Detector base with carrier for connection terminals

4.3 Installing the detector heating unit (optional)

You must install the detector heating unit DLH1191A if there is a danger of moisture condensation. To do this, you need a 24 V supply.

1. Insert the detector heating unit in the detector.
2. Connect the detector heating unit to the printed circuit board.

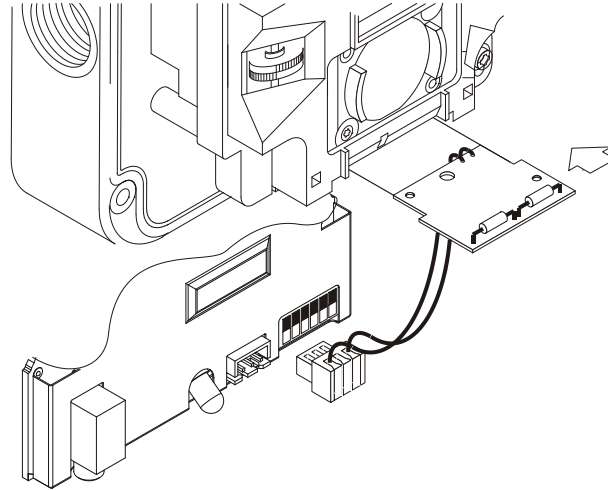


Figure 19: Installation of the detector heating unit

4.4 Inserting the filter in detector (optional)

For short detection distances and strong extraneous light, you may have to use a filter.

1. Select the filter according to the planning information:
 - Short distance filter DLF1191-AA
 - Short distance filter DLF1191-AB
 - Extraneous light filter DLF1191-AC
2. Insert the filter (1) in the detector.

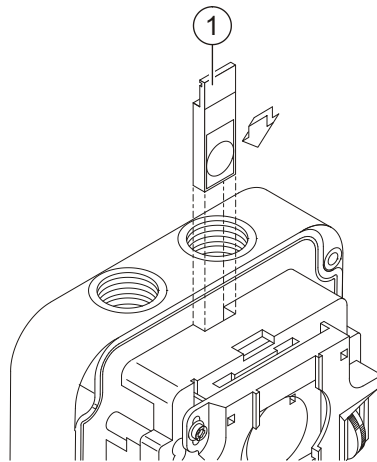


Figure 20: Inserting the filter

4.5 Commissioning the adjustment device

Securing the adjustment device to the detector

1. From the adjustment set, take the chain with the two cable grippers and the snap hook.
 2. Screw one cable gripper into a free opening for the cable entry (1) on the detector base. Cable grippers are available in two different sizes:
 - PG16
 - M20 x 1.5
 3. Secure the snap hook on the suspension chain of the adjustment device (3).
- ⇒ The adjustment device hangs on the detector. You therefore have your hands free to undertake commissioning work.

Connecting the adjustment device

▷ The detector line is switched on.

1. Connect the adjustment device (3) electrically to the detector. To do so, use the MC link cable included in the scope of supply and the connecting sockets (2) on the detector and on the adjustment device.
2. Switch on the adjustment device with the button on the right (4). With the same button, it is possible to switch between 'Adjust' and 'Initialization'.

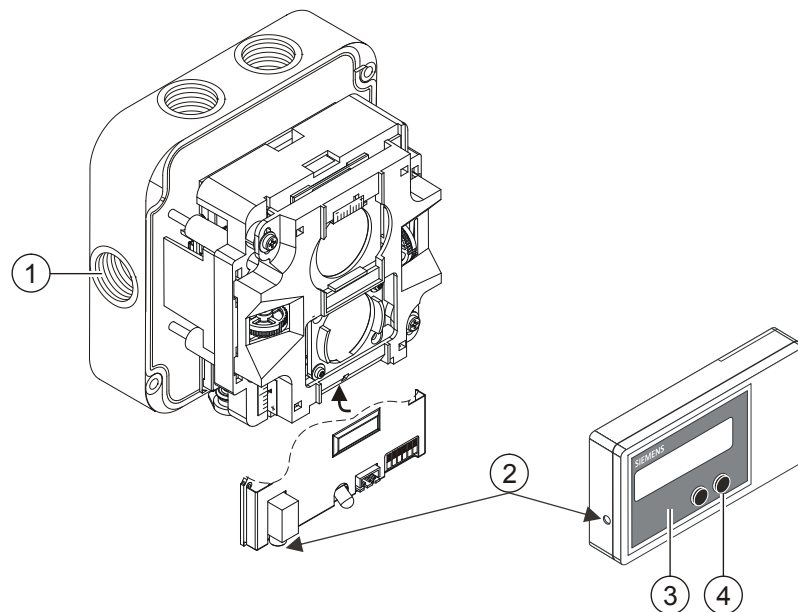


Figure 21: Detector with adjustment device

- | | |
|---------------------------|---------------------|
| 1 Opening for cable entry | 3 Adjustment device |
| 2 Bushes | 4 Button |

Indication on the adjustment device

The indication before the initialization differs from that after initialization. The indication is described in the table below.

Indication location	Example	Meaning
Top left	555	Signal level before initialization The signal level must be between 255 and 1195 for initialization. Otherwise initialization is not possible.
	100 %	Standardized signal value as % of the current compensation value During initialization, the signal level is equalized to the compensation value 100 %.
Bottom left	50 m	Distance in meters between detector and reflector
Top right	Adjust	Detector not yet initialized
Bottom right	OK	Last initialization successfully completed

Indication before initialization:

555	Adjust
50m	

Indication after initialization:

100%	
50m	OK

4.6 Checking the signal level and distance

▷ The detector line is switched on.

1. Loosen the two safety screws (3).
2. Make sure that the vertical scale (7) and the horizontal scale (1) are centered (factory setting). Otherwise the scales must be re-adjusted with the knurled screws:
 - the vertical scale (7) with the knurled screw (8)
 - the horizontal scale (1) with the knurled screw (2).
3. Set the 'Adjust' menu with the button (4) on the adjustment device.
4. Read the indicators for the signal level and the distance from the adjustment device:
 - If the signal level is over 100 and the distance indication matches the detection distance, continue fine-tuning the detector optics.
 - If the signal level is below 100 and/or the distance indicator does not match the detection distance, continue with preliminary setting of the detector optics.

Possible reasons for the signal level and distance indication deviating:

- The detector and the reflector are not positioned on the same horizontal or vertical axis.
- The detector is not mounted on an even surface.

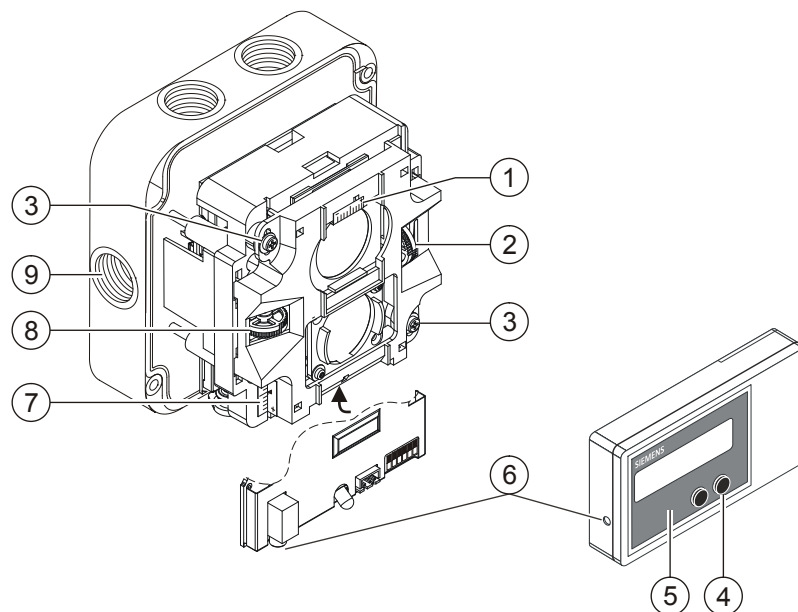


Figure 22: Checking the signal level and distance

- | | |
|---|---|
| 1 Horizontal scale | 6 Bushes |
| 2 Knurled screw for horizontal adjustment | 7 Vertical scale |
| 3 Safety screws | 8 Knurled screw for vertical adjustment |
| 4 Button | 9 Opening for cable entry |
| 5 Adjustment device | |

Example: Signal level and distance indication in the 'Adjust' menu:

555	Adjust
50m	

See also

- 📄 Preliminary setting of the detector optics (optional) [→ 29]
- 📄 Fine-tuning of the detector optics [→ 30]

4.7 Preliminary setting of the detector optics (optional)

Preliminary setting of the detector optics must only be undertaken when the signal level was below 100 and/or the distance indication was incorrect.

- ▷ The detector line is switched on.
 - ▷ The adjustment device is connected to the detector and must be set to 'Adjust'.
 - ▷ The signal level is below 100 and/or the distance indication does not match the detection distance.
1. Mount the sighting system on the detector. The mirror (1) and the front sight (2) must be free from clearance.
 2. Ensure that the two safety screws (5) are loosened.
 3. Use the knurled screws to align the detector optics with the reflector (3):
 - Knurled screw (6) for vertical adjustment
 - Knurled screw (4) for horizontal adjustment
 - The reflector (3) and the front sight (2) must be on the axis of the circular mark on the mirror.
 4. Simultaneously check the signal level and the distance indication on the adjustment device.
 - ⇒ Following successful alignment of the detector optics, the signal level must be over 100 and the distance indication match the detection distance with an accuracy of 10 %.
 5. Remove the sighting system.

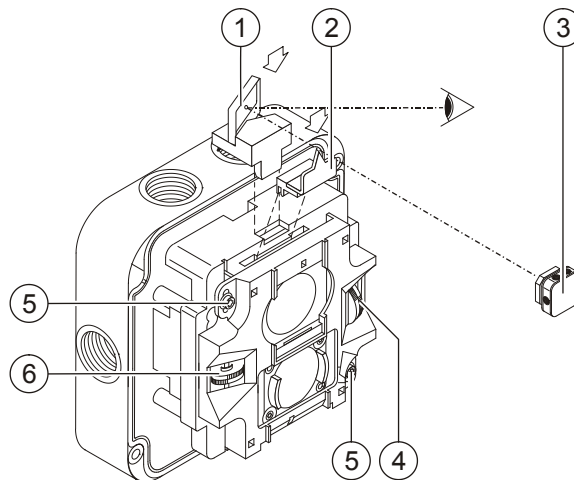


Figure 23: Preliminary setting

- | | |
|-------------|---|
| 1 Mirror | 4 Knurled screw for horizontal adjustment |
| 2 Notch | 5 Safety screws |
| 3 Reflector | 6 Knurled screw for vertical adjustment |

4.8 Fine-tuning of the detector optics

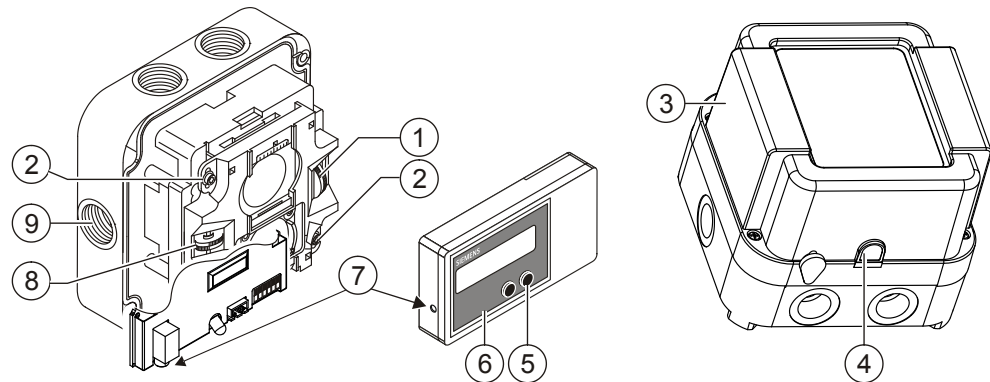
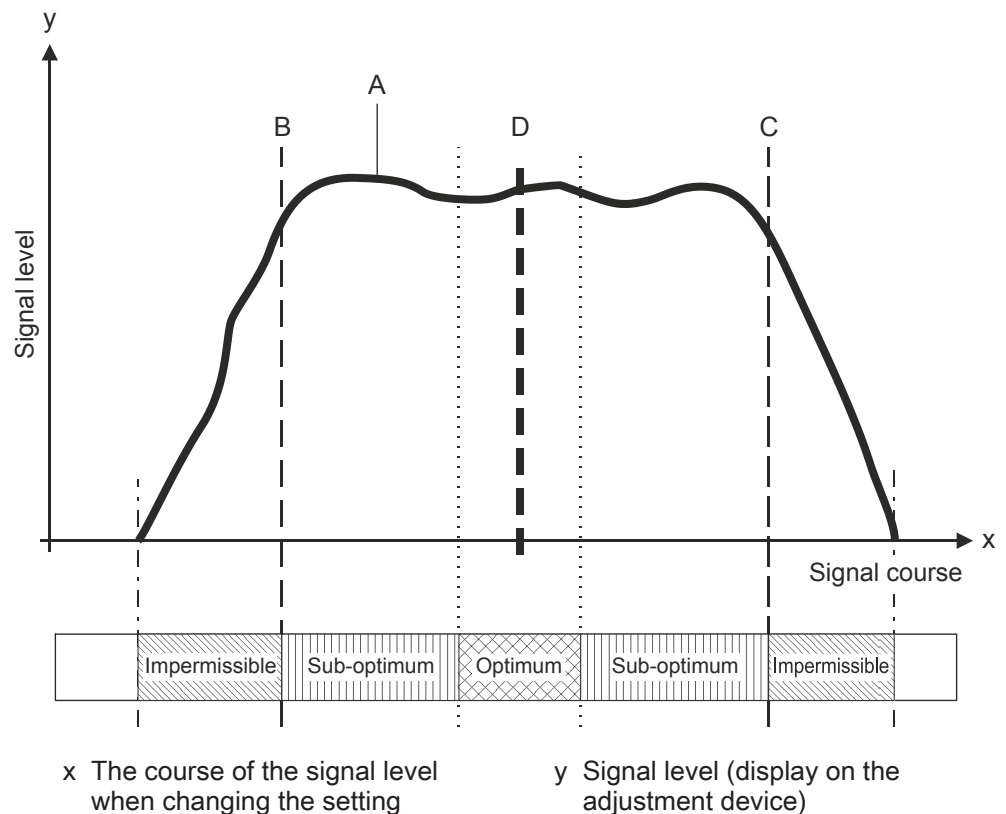


Figure 24: Fine-tuning with the adjustment device

- | | |
|---|---|
| 1 Knurled screw for horizontal adjustment | 6 Adjustment device |
| 2 Safety screws | 7 Bushes |
| 3 Hood | 8 Knurled screw for vertical adjustment |
| 4 Alarm indicator | 9 Opening for cable entry |
| 5 Button | |

When you change the setting, the course of the signal is trapezoidal (see figure below). For optimum setting of the detector optics, the setting must be in the middle of the trapezoid (point D). If the detector optics is not optimally set, e.g. between points B and A, problems and faults may occur during operation, e.g. greater susceptibility to mechanical changes.



To optimally set the detector optics, proceed as follows:

- ▷ The detector line is switched on.

- ▷ The adjustment device is connected to the detector and must be set to 'Adjust'.
- ▷ The two safety screws (2) are loosened.
- 1. Turn the knurled screws (1, 8) until the standardized signal value on the adjustment device is as high and constant as possible (point A in the figure above).
- 2. Turn the knurled screws back until the standardized signal value decreases considerably (point B).
- 3. Note point B. Count e.g. the number of knurled screw turns or mark the scale.
- 4. Turn the knurled screws forwards again until the standardized signal value is as high and constant as possible. Continue turning until the standardized signal value decreases considerably (point C).
- 5. Note point C. Count e.g. the number of knurled screw turns or mark the scale.
- 6. Turn the knurled screws back until you reach the middle between points B and C (point D).
 - ⇒ The detector optics are optimally set.
 - ⇒ The detector indication matches the detection distance with an accuracy of 10 %.
- 7. Carefully tighten the two safety screws (2). The values indicated on the adjustment device must not change significantly.
- 8. Pull the MC-Link cable from the detector.
- 9. Fix the hood (3) on the detector with four screws. The alarm indicator (4) must point downwards.

4. Activate the initialization procedure by pressing the button (3). The detection distance must not be interrupted during initialization!

⇒ During initialization, the following is displayed on the adjustment device:

Initialization
.....

⇒ Following successful initialization, 100 % ±3 % and the effective detection distance is displayed on the adjustment device. Example:

100%
50m **OK**

5. Copy the standardized signal value onto the two labels.

100%
50m **OK**

FDL241-9; commissioning & adjustment data (values displayed on adjustment device)					
date & action	values	distance [m]	signal-value [-]	deviate-signal [%]	covered-reflector value [%]
		50	1133	100	

⇒ The detector is initialized.

Troubleshooting during initialization

- If the standardized signal value is not within 100 % ±3 % or if the detection indication displayed deviates by more than 10 % from the effective detection distance, repeat the initialization process from step 4.
- If initialization fails, the following is displayed:

Initialization
failed

Remedy the error and repeat the initialization process. Possible causes for failed initialization:

Signal	Possible cause
Not stable	Moving obstacle
Too high	Strong reflection
Too low	<ul style="list-style-type: none"> • Detection distance too large • Reflector too small • Reflector aligned incorrectly • Reflector covered

4.10 Testing detectors

Undertake a performance check following initialization.

Checking the detection distance

- ▷ The detector is connected to the adjustment device.
- 1. Cover the reflector completely, using an appropriate object.
 - ⇒ The standardized signal value on the adjustment device must be $<5\%$; the distance display is frozen.
- 2. Enter the read-in standardized signal value on the two labels.

2%		OK		
50m				

FDL241-9; commissioning & adjustment data (values displayed on adjustment device)				
values date & action	distance [m]	signal- value [-]	deviate- signal [%]	covered- reflector value [%]
	50	1133	100	2

- 3. Stick a label on the hood, at the top or side. The other label is intended for system documentation.

Activating the test alarm

- 1. On the control panel, switch off the remote transmission of alarms. To do this set the 'Detector test' operating mode on the control panel.
- 2. Hold the alarm test filter TF04 in front of the hood, such that it covers the detector optics.
 - ⇒ The detector activates an alarm after around 10 seconds.
- 3. Pull the MC-Link cable from the detector and remove the adjustment device.
- 4. Re-insert the end plug in the hood.
- 5. On the control panel, switch the remote transmission of alarms back on.
 - ⇒ The detector is ready for operation.

If the alarm doesn't sound:

- Check whether the standardized signal value is attenuated enough to reach the alarm threshold. Otherwise rotate the alarm test filter a little or turn it round.

5 Specifications

5.1 Technical data

You will find information on approvals, CE marking, and the relevant EU directives for this device (these devices) in the following document(s); see 'Applicable documents' chapter:

- Document 007017

Addressed detector line (FDnet/C-NET)

Detector line	Operating voltage	DC 12...33 V
	Operating current (quiescent)	0.8 mA
	Maximum current connection factor	4
	Quiescent current connection factor	4
	Address connection factor	1
	Separator connection factor	1
	Protocol	FDnet/C-NET
	Compatibility	See 'List of compatibility'

Line separator

Line voltage:	
• Nominal	DC 32 V (= V_{nom})
• Minimum	DC 12 V (= V_{min})
• Maximum	DC 33 V (= V_{max})
Voltage at which the line separator opens:	
• Minimum	DC 7.5 V (= $V_{SO min}$)
• Maximum	DC 10.5 V (= $V_{SO max}$)
Permanent current when switches are closed	Max. 1.5 A (= $I_{C max}$)
Switching current (e.g., in the event of a short-circuit)	Max. 2 A (= $I_{S max}$)
Leakage current when switches are open	Max. 1 mA (= $I_{L max}$)
Serial impedance when switches are closed	Max. 0.4 Ω (= $Z_{C max}$)
The line separator is closed via an actuation signal from the control panel. Required line voltage: DC 12...33 V (normal range)	

Collective detector line

Detector line	Operating voltage	DC 14...28 V
	Operating current (quiescent)	0.7 mA
	Making current	Max. 1.5 mA
	Connection factor	10
	Alarm voltage at alarm current:	
	• 1...15 mA	DC 5...10 V
	• 35 mA	DC 18...22 V
	• 50 mA	DC 26...28 V
Alarm current at operating voltage DC 5...28 V	4...50 mA	

Reset voltage	DC 2...4 V
Reset time at reset voltage DC 2 V	1...2 s
Protocol	Collective (with and without current limitation)
Compatibility	See 'List of compatibility'

Addressed detector line and collective detector line

External alarm indicators	Number of external alarm indicators that can be connected	2
	Voltage	DC 6...17 V
	Current	9...15 mA
	Length of line	Max. 30 m with unshielded cables (recommended) or if the shielding on the detector is connected to the positive pole for the external alarm indicator
		Max. 5 m, if the shielding is connected to earth
		Flashing interval times on FDnet/C-NET detector line:
	• Bright	15 ms
	• Dark	1 s
	Flashing interval times on collective detector line	Control panel-specific
Device characteristics	Infrared transmitter:	
	• Wavelength	950 nm
	• Pulse frequency	4 Hz
	Compensation (if the ray attenuates)	2.3 %/h
	Compensation speed	
	Alarm integration	6...16 s
	Detection distance:	
	• Without filter	10...100 m
	• With short distance filter DLF1191-AA	8...12 m ¹
	• With short distance filter DLF1191-AB	5...10 m ¹
• Maximum angle misalignment	0.4°	

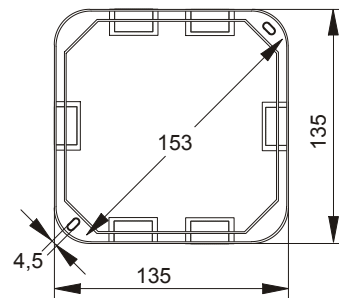
¹ The detection distance of 10...100 m meets the requirements of standard EN 54-12.

Detector heating unit DLH1191A	Operating voltage	DC 20...30 V
	Operating current	30...50 mA
	Resistance	600 Ω
Heating unit in reflector for long distance (prism) DLR1191	Operating voltage	DC 20...30 V
	Operating current	30...50 mA
	Resistance	600 Ω

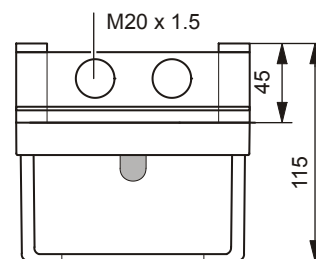
Connections	<p>Detector line, detector heating unit and external alarm indicator:</p> <ul style="list-style-type: none"> • Design • Conductor cross section <p>MC link</p>	<p>Socket strip</p> <p>0.2...1.5 mm²</p> <p>Plug-type connection (3.5 mm jack)</p>
Ambient conditions	<p>Operating temperature</p> <p>Operating temperature checked in accordance with EN 54-12</p> <p>Storage temperature</p> <p>Air humidity</p> <p>Protection categories (EN 60529)</p> <p>Electromagnetic compatibility:</p> <ul style="list-style-type: none"> • 1 MHz...1 GHz • 1 GHz...2 GHz 	<p>-25...+60 °C</p> <p>-10...+55 °C</p> <p>-30...+75 °C</p> <p>≤95 % rel.</p> <p>IP65</p> <p>50 V/m</p> <p>30 V/m</p>
Mechanical data	<p>Dimensions (L x W x H)</p> <p>Material:</p> <ul style="list-style-type: none"> • Detector base • Hood <p>Color</p>	<p>135 x 135 x 115 mm</p> <p>ABS/PC-Blend</p> <p>ABS/PC-Blend</p> <p>~RAL 9010 pure white</p>
Standards	<p>European standards</p>	<ul style="list-style-type: none"> • EN 54-12 • EN 54-17 • EN 62471

5.2 Dimensions

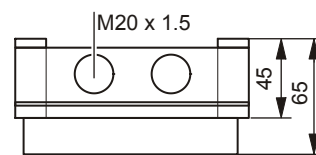
Base for linear smoke detector FDLB291



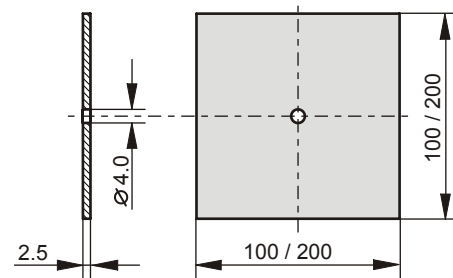
Base for linear smoke detector FDLB291 with linear smoke detector FDL241-9



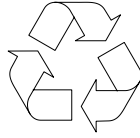
Reflector for long distance (prism) DLR1191



Reflector for middle distance (foil) DLR1192 and reflector for short distance (foil) DLR1193



5.3 Environmental compatibility and disposal



This equipment is manufactured using materials and procedures which comply with current environmental protection standards as best as possible. More specifically, the following measures have been undertaken:

- Use of reusable materials
- Use of halogen-free plastics
- Electronic parts and synthetic materials can be separated

Larger plastic parts are labeled according to ISO 11469 and ISO 1043. The plastics can be separated and recycled on this basis.

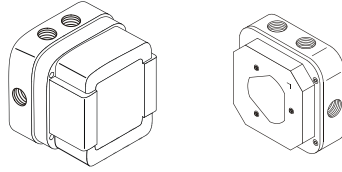


The device is considered an electronic device for disposal in accordance with the European Guidelines and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

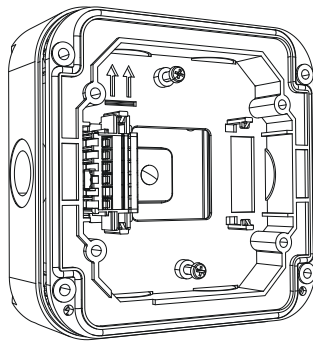
6 Details for ordering

6.1 Linear smoke detector FDL241-9



- For detecting fire according to the principle of light attenuation by smoke.
- Order number: A5Q00002298

6.2 Base for linear smoke detector FDLB291

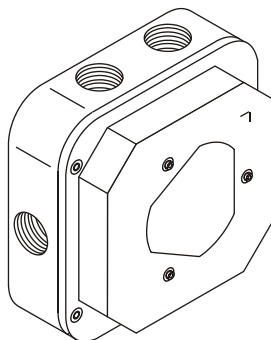


- For installing the linear smoke detector
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: A5Q00003941

See also


-  Installing the detector base [→ 12]

6.3 Reflector for long distance (prism) DLR1191

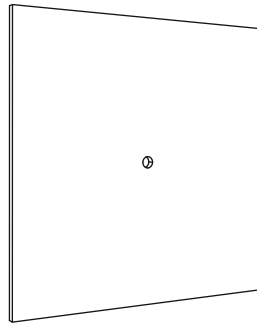


- For reflecting the infrared ray of the linear smoke detector
- Prism-shaped
- Reflection distance: 20...100 m
- With a built-in heating unit
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4787710001

See also

-  Installing the reflector for long distance (prism) [→ 19]

6.4 Reflector for middle distance (foil) DLR1192

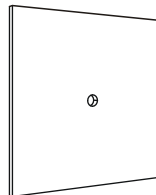


- For reflecting the infrared ray of the linear smoke detector
- Micro-prismatic film
- Reflection distance: 30...65 m
- Dimensions: 200 x 200 x 2.5 mm
- Hole diameter: 4 mm
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4788490001

See also

- 📄 Installing the reflectors for middle distance and short distance (foil) [→ 20]

6.5 Reflector for short distance (foil) DLR1193

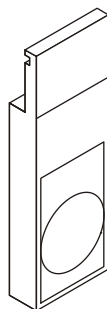


- For reflecting the infrared ray of the linear smoke detector
- Micro-prismatic film
- Reflection distance: 10...30 m
- Dimensions: 100 x 100 x 2.5 mm
- Hole diameter: 4 mm
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4787840001

See also

- 📄 Installing the reflectors for middle distance and short distance (foil) [→ 20]

6.6 Short distance filter DLF1191-AA



- For toning down the infrared ray over short distances
- Distance: 7...10 m
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4933030001

6.7 Short distance filter DLF1191-AB



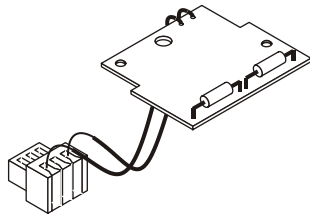
- For toning down the infrared ray over short distances
- Distance: 5...8 m
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4933160001

6.8 Extraneous light filter DLF1191-AC




- For filtering extraneous light during a high level of extraneous light
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:5221480001

6.9 Detector heating unit DLH1191A

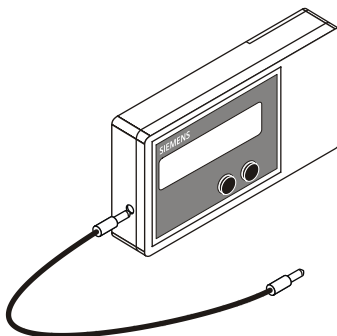


- For applications where there is danger of moisture condensation or icing
- Incl. terminal block for the connection
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:4787970001

See also

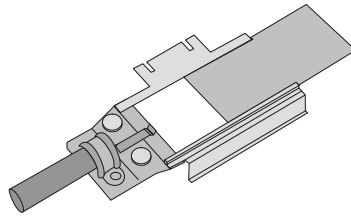
-  Installing the detector heating unit (optional) [→ 24]

6.10 Adjustment kit FDLU291



- For commissioning the linear smoke detector
- Components: Adjustment device, alarm test filter, visor, magnet, spiral cable, MC link cable, 9 V battery, suspension fixture with cable gripper and chain, case
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: A5Q00004905

6.11 Detector tester for linear smoke detector RE10



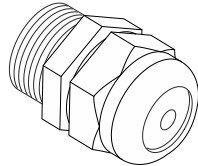
- For undertaking a performance check on the linear smoke detector
- Compatible with:
 - Linear smoke detector FDL241-9
- Order number: BPZ:3685190001

6.12 Alarm test filter TF04



- Alarm test filter for detector tester for linear smoke detector RE10
- Absorption: 77 %
- Dimensions: Approx. 170 x 85 mm
- Compatible with:
 - Linear smoke detector FDL241-9
 - Detector tester for linear smoke detector RE10
 - Adjustment kit FDLU291
- Order number: BPZ:4931090001

6.13 M20 x 1.5 metal cable gland



- For introducing a cable into a housing
- For cable diameters of 3.5...5.5 mm
- Temperature range: -40...+100 °C
- Allows for increased IP protection
- Compatible with:
 - M20 x 1.5 metal counter nut
 - Housing FDMH231-S-R
 - Housing FDMH292-x
 - Housing FDMH293-x
 - Housing FDMH297-R
 - Housing FDCH221
 - Manual call point FDM243H
 - Air sampling smoke detection kit FDBZ290
 - Base deep (wall mounting) FDB227-x
- Order number: A5Q00004478

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