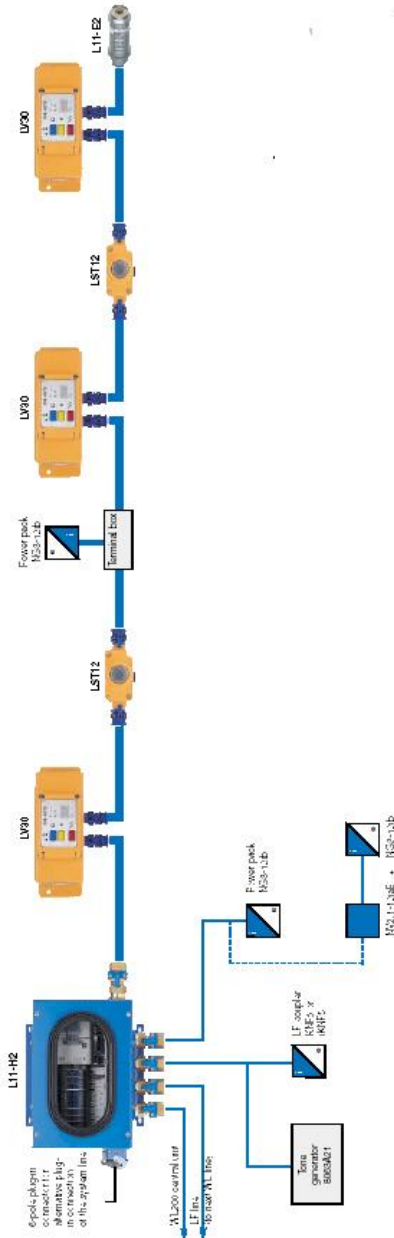


# Intrinsically safe loudspeaker system L111



## Ordering data

Designation	Type	Item no.
Power supply unit	NG3-12ib	371 008 2 x AX
Main station	L11-H2	128 814 41 AX / 41 01 AX
Speaking station	LV30	125 300 5 x AX
Signal button	LST12	128 610 01 AX
End unit	L11-H2	128 813 41 AX / 41 01 AX
e/i Coupler	KNF5	128 805 40 AX
Coupler	iKNF5	128 105 21 AX

- **Cost-efficient loudspeaker system**
- **Line-type configuration**
- **Connection of up to 40 devices to the network possible per each supply section (LV30 / LST12)**
- **Speaking station with 2 loudspeakers**
- **Approved total of up to 6 supply sections**
- **After power supply disconnection, rechargeable battery based operation of category IM1, type of protection EEx ia I**
- **Type of protection: IM2 EEx ib I**

## Description, application and functioning

The loudspeaker system L111 enables a high volume communication and signalling in the hard coal mining industry e.g. for

- belt conveyors
- monorail conveyors
- ropeways
- shuttle cars.

The L111 system is a cost-efficient loudspeaker system. Its design conforms to category / type of protection I M 2 EEx ib I.

The circuits of the loudspeaker system L111 depend on the power supply unit(s) feeding them with power and conform to category I M 2, type of protection EEx ib I.

The intrinsically safe system circuits which remain operable after disconnection of the power supply units (in case of an increased methane content), i.e. the intercom (LF) circuits and their connecting circuit / audio frequency circuit (wires WL1 and WL2 of the trunk cable), which are supplied with power from the rechargeable batteries of the speaking stations, then conform to category I M 1, type of protection EEx ia I.

The audio frequency circuit (a, b) conforms to category I M 1, type of protection EEx ia I.

### Functioning

The intrinsically safe loudspeaker system L111 is configured as a line-type system, with the individual system components connected with each other via the 4-wire system line (e.g. L2YY(Q)Y 2x2x 1.5mm<sup>2</sup>). The main station L11-H2 constitutes the starting point of the system line and supplies all devices connected to this cable with current which is fed by the power supply unit of type NG3-12ib connected to the main station L11-H2. Additionally, the main station L11-H2 serves as connecting point for the cables for controlling the start-up warning and the cables for coupling the L111 system to a WL200 switching system or other WL systems to generate a

communication system with sectional start-up warning.

The main station L11-H2 monitors the WL line for an open circuit and generates the required acoustic signals for "faulted WL line" and "start-up warning" which are passed on the system line to the existing speaking stations where they are emitted at high volume.

The end unit L11-E2 forms the end of the system line. The following devices can be looped in at a position at choice between main station L11-H2 and end unit L11-E2:

- LV 30 speaking stations with two loudspeakers
- LST 12 signal button to emit the signal tone (1980 Hz / -6 dB).

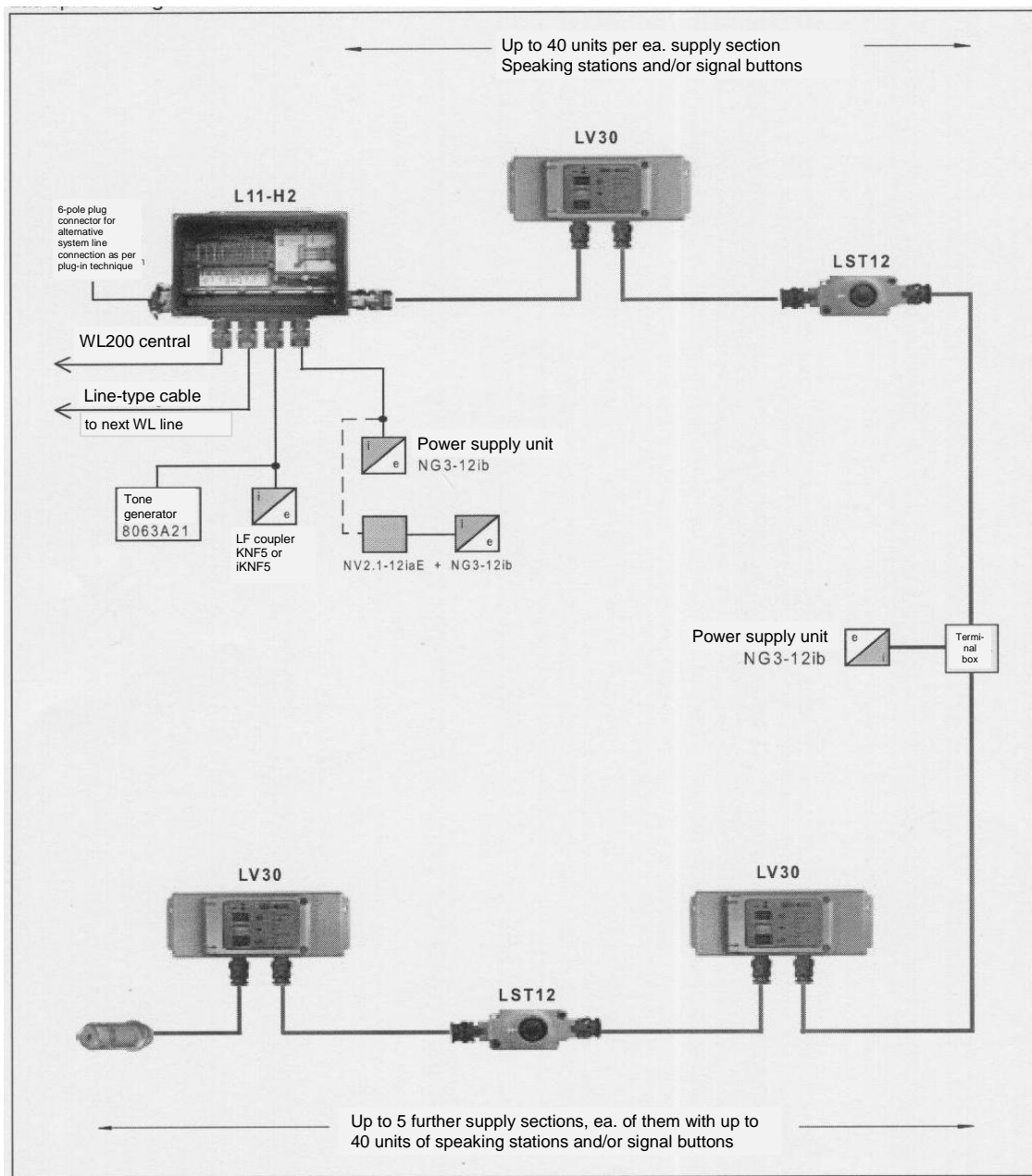
Maximally 40 units of type LV30 and/or LST12 can be looped into one supply section of the system line, and maximally 6 supply sections are approved. The DC wires of the system line between the supply sections

must not be connected with each other.

The max. length of the system line of one supply section is reached, when an 8 V supply voltage is obtained or failed to be obtained at the end; this length strongly depends on the number of the integrated devices which are supplied through this system line. Each speaking station has an integrated rechargeable battery which is constantly charged via the system line. On the one hand, this rechargeable battery enables a high volume at a low current consumption from the system line and, on the other hand, it enables a temporary emergency operation of the L111 system in case of a mains failure or disconnection.

If e.g. the mains voltage is disconnected due to an increased methane content, all speaking stations will remain operable by means of their integrated rechargeable battery certified for degree of protection EEx ia I.

System overview



**Technical data L111**

Designation	<b>Intrinsically safe loudspeaker system</b>
Type	<b>L111</b>
<b>Electrical parameters</b>	
<b>Power supply type NG3-12ib</b>	
Non-intrinsically safe supply circuit	
Max. input voltage $U_m$	240 V <sub>AC</sub> (frequency = 60 Hz, tolerance +20% -30%)
Max. input voltage $U_m$	230/127/100/42/36/24 V <sub>AC</sub> (frequency = 50 Hz, tolerance +20% -30%)
<b>e/i Coupler of type KNF5</b>	
Non-intrinsically safe supply circuit (connecting cable)	
Max. input voltage $U_m$	250 V <sub>AC</sub>
Max. input power	100 mW
<b>Coupler of type iKNF5</b>	
Non-intrinsically safe supply circuit (Connections no.: 1a1 – 1b1 or 2a1 – 2b1)	
Per ea. circuit	
Max. input voltage $U_m$	250 V <sub>AC</sub>
Max. input power	100 mW
<b>Main station of type L11-H2</b>	
Potential-free optocoupler circuits (terminals no.: 1 – 2, 3 – 4, 5 – 6)	
Per ea. pair of terminals	
Max. input voltage $U_i$	13.5 V
Max. internal capacitance $C_i$	negligible
Max. internal inductance $L_i$	negligible
Potential-free relay contact circuits (terminals no.: 21 to 24, 25 to 28)	
Per ea. terminal block	
Max. input voltage $U_i$	28 V
Max. input current $I_i$	200 mA
Max. input power $P_i$	3 W
Max. internal capacitance $C_i$	negligible
Max. internal inductance $L_i$	negligible
Output circuit to connect potential-free optocoupler circuits or potential-free relay contacts of other approved intrinsically safe devices and accessories (Terminals no.: 7 to 12)	
Max. output voltage $U_0$	12 V
Max. output current $I_0$	10 mA
Ambient temperature range	-20 °C < $T_a$ < +40 °C
Test and approval:	
- type of protection	IM 2 SYST EEx ib I
- approval no.	BVS 04 ATEX E 146 X

## Technical data L111



### Marking

The marking of the system is located on the main device of the operating equipment which is the main station enclosure or the first speaking station LV30 of the first supply section, and it comprises the following data:

Company:

FHF Bergbautechnik GmbH  
42551 Velbert Germany

Type:

L111  
 I M 2 SYST EEx ib I  
 0158  
 BVS 04 ATEX E 146 X

## Option

Design of speaking stations LV30, end unit L11-E2 and system lines as pluggable components (6-pole plug connectors), thus offering:

- simple and rapid assembly of the system lines
- short downtimes due to quick exchange of devices.

The main station L11-H2 is equipped for a fixed connection of the system line as well as for plug-in connections.

As shown in attached system diagrams UP8050A111-3-I (3) and UP8050A111-4-I (3), the loudspeaker system of type L111 enables two configuration levels.

### Configuration level 1:

Each supply section of the loudspeaker system comprises the following devices:

- one power supply unit of type NG3-12ib DMT 02 ATEX E 041 X
- max. 40 speaking stations of type LV30 DMT 02 ATEX E 097
- and/or signal button of type LST12 BVS PP 02.1063 EG

### Configuration level 2:

The 1st supply section of the loudspeaker system comprises the following devices:

- one power supply unit of type NG3-12ib DMT 02 ATEX E 041 X
  - one main station of type L11-H2 DMT 02 ATEX E 209
  - max. 40 speaking stations of type LV30 DMT 02 ATEX E 097
  - and/or signal button of type LST12 BVS PP 02.1063 EG
  - one NF coupler of type KNF5 DMT 02 ATEX E 171 X
  - or one NF coupler (single channel) of type iKNF5 DMT 02 ATEX E 174 U
  - plus another main station of type L11-H2 DMT 02 ATEX E 209
- as components of a system according to a separate certification.

For each section of the next five supply sections:

- one power supply unit of type NG3-12ib DMT 02 ATEX E 041
- max. 40 speaking stations of type LV30 DMT 02 ATEX E 097
- and/or signal button of type LST12 DMT 02 ATEX E 097

and at the end of the complete installation:

- one end unit of type L11-E2 BVS PP 01.1096 EG

as well as peripheral equipment according to the regulations of installation plus potential-free relay contacts and potential-free optocoupler circuits of other certified and approved intrinsically safe systems.

**Connecting cables**

As shown in the system diagrams UP8050A111-3-I (3) and UP8050A111-4-I (3), all cable sections L1 to L5 of configuration levels 1 and 2 have to feature the following cable parameters:

$C \leq 180 \text{ nF / km}$  and  $L \leq 1.2 \text{ mH / km}$  and loop resistance  $R \geq 22 \text{ } \Omega/\text{km}$ . The cables must be separate cables according to type C or part of a multicore cable according to type A or B as per prEN50394-1:2002.

Cable section	max. length	Type as per prEN50394-1:2002
L1	20 m	A or B
L2	20 km	A or B
L3	at choice	A or B
L4	100 m	A or B
L5	20 m	A or B

**Advice on cable types A, B and C as per EN50394-1:2004 (quote from the standard):**

*"7.2 Assessment of systems having multicore cables containing one or more circuits*

*Cable faults to be taken into consideration will depend upon the type of multicore cable used. (see Annex A for details of the types of cable, and Table 1 for summary of requirements). The following subclauses detail the cable faults to be considered for each type of cable.*

*7.2.1 Type A cable*

*No failures between circuits shall be taken into consideration if each circuit is enclosed in an individual conducting screen.*

*7.2.2 Type B cable*

*No failures between circuits shall be taken into consideration if no circuit contained within the cable has a peak voltage exceeding 60 V.*

*7.2.3 Type C cable*

*In addition to the application of 4.1 or 4.2, it is necessary to take into consideration up to two connections between conductors and, simultaneously, up to four open circuits of conductors. In the case of identical circuits, failures shall not be taken into consideration provided that each circuit passing through the cable has a safety of four times that required by 4.1 or 4.2."*

For further information refer to the complete issue of the standard EN50394-1:2004.

### Operating temperature range

The operating temperature range of the loudspeaker system of type L111 corresponds to  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ .

Due to the charging operation of the rechargeable batteries integrated into the station, the operating temperature range of the speaking station of type LV30 is limited to  $0^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ .

### Requirements / Conditions for the safe application

#### Power supply type NG3-12ib

The power supply unit has to be screwed into an inlet opening of an enclosure of protection type "increased safety". When cables can come into contact with metallic parts, they either have to be protected mechanically or have to be fixed to protect them against damage. All cable wires have to be connected to appropriate terminals or have to be isolated according to the regulations of installation.

The permissible temperature at the place of installation is  $+60^{\circ}\text{C}$ .

#### e/i Coupler of type KNF5

The device has to be screwed into an inlet opening of an enclosure of protection type "increased safety". When cables can come into contact with metallic parts, they either have to be protected mechanically or have to be fixed to protect them against damage. All cable wires have to be connected to appropriate terminals or have to be isolated according to the regulations of installation.

#### Coupler of type iKNF5

This component can either be installed outside the hazardous area or protected by installation in an enclosure of a recognised type of protection (e.g. flame-proof enclosure).

The internal wiring has to comply with the requirements pursuant to section 6.4.11 of EN 50020.

The component does not feature any external connecting parts.

#### Speaking station of type LV30

The device is designed for application in an operating temperature range of  $0^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ .

When connected to the supply voltages and supplied by at least one or several feeding power supply units of type NG3-12ib, the loudspeaker system of type L111 meets the requirement profile of category I M 2, protection type EEx ib I.

**The operator of the system shall ensure the disconnection of all feeding points when interconnecting all units to one system for an operation for which category I M1 is required.**

**After disconnection of the power supply units, all intrinsically safe circuits of this system conform to category I M 1, protection type EEx ia I.**

The couplers of type iKNF5 and of type KNF5 may not be installed in areas for which category I M1 is required, but only in areas where category I M2 will suffice.

The coupler iKNF5 can either be installed outside the hazardous area or protected by installation in an enclosure of a recognised type of protection (e.g. flame-proof enclosure).

### Disposal

The disposal of the packaging material and of used parts must be realised in compliance with the regulations of the country in which the device is installed.

**User information, Warn and Safety Notes**

The following warn and safety notes must be observed particularly:
Defective parts may be replaced only by original spare parts.
The interconnection has to be implemented as shown in general arrangement drawing and system diagram.
Make sure that the housing is not damaged. Devices with a damaged housing may not be operated and must be disconnected immediately.
For operation of the component in commercial facilities the local accident prevention regulations for electrical plants and operating supplies have to be observed.
The ambient temperature for the device may not fall outside the specified range for operation, storage and shipping
Defective parts may be replaced only by original spare parts.
Mounting and applying of additional parts is forbidden.
Corrective maintenance may be executed only by the manufacturer or by a person appointed by the manufacturer concluded with a renewed routine test of the device.
<b>The explosion protection is not guaranteed at non observance of the above mentioned points.</b>

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Declaration of Conformity

# EG - KONFORMITÄTSERKLÄRUNG

## EC - DECLARATION OF CONFORMITY

**Wir erklären in alleiniger Verantwortung, dass das Produkt auf das sich diese Erklärung bezieht mit der/den folgenden Norm(en) oder normativen Dokumenten übereinstimmt:**

Herewith we declare bearing sole responsibility that the product referred in this declaration is in conformity with the following standards or normative documents and regulations of the directive:

<b>Bezeichnung des Erzeugnisses</b> Name of product	<b>Lautsprecheranlage</b> Loudspeaker system
<b>Geräte- oder Typenbezeichnung</b> Equipmenttype or mark of equipment	<b>L111</b>
<b>Bestimmung der Richtlinie</b> Provisions of the directive	<b>Nr. und Ausgabedatum der Norm(en)</b> No. and date of issue of the standard(s)
<b>94/9/EG: Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen</b> 94/9/EC: Equipment and protective systems intended for use in potentially explosive atmospheres	General requirements EN 60079-0:2009 Intrinsic safety „i“ EN 60079-11:2007 Group I Category M1 EN 50303:2000 Intrinsically safe systems EN 50394-1:2004
<b>EG Baumusterprüfbescheinigung</b> EC-type-examination certificate	<b>BVS 04 ATEX E 146 X</b>
<b>Benannte Stelle für die Bescheinigung</b> Notified body of the certificate <i>Kennnummer/Inspection number</i>	<b>0158</b>
<b>Hersteller / Anschrift</b> Manufacturer / Factory address <i>Fabricante</i>	FHF Bergbautechnik GmbH & Co. KG Eintrachtstr. 95 D – 42551 Velbert


**Geschäftsführer:**  
Managing director:

Velbert  
.....  
(Ort / place)

14. 10. 11  
.....  
(Datum / date)

Dr. Opitz, Hans-Peter

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(name, prename)

  
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(Unterschrift / signature)