

i/i Coupling Module Type iKO02

Order information

Name	Type	Part No.
i/i Coupling Module Type iKO02	iKO02	133 620 02 AX



- **Interface connection of MR90 fixed radio station to LF trunk line**
- **Internal amplifier with low-pass filter and equalizer**
- **Explosion protection category / mode: I M1 EEx ia I**

Usage and Function

The intrinsically safe LF i/i coupling module type iKO02 is used to connect a multiple of MR90 radio base-stations (hotspot stations) as relay stations to a 2-wire LF trunk-line. This line provides the voice communication between control room (e.g. permanently manned operator desk) via base stations to the mobile stations or portable radios of the MR90 system. The radio signals between base stations and mobile stations / portable radios are coupled via a standard MR90 leaky-feeder cable or in case of building up short-range hotspots with antennas.

The electronic of the i/i coupling module is placed on a PCB assembled in SMT technology and built into a sheet-steel housing. The connection to the LF interface NFT01-1 is made by one of the two 6-pole plug terminals on the iKO02. A 4-pole plug terminal provides the connection to the LF trunk-line.

The LF coupling module iKO02 contains an unidirectional amplifier with low-pass filter and line equalizer for a maximum cable length of 15 km (PE-isolated cable, diameter = 0.8 mm). The amplification direction is switched over by an internal LF control logic with speech-detector (LF relay-station -> mobile station or mobile station -> LF relay station).

The built in low-pass filter has a cutoff frequency of 5.5 kHz. It serves to suppress out band noise and to limit speech bandwidth.

The control-logic switches the direction of the LF amplifier, depending on state of speech detector and mute-signal of the base station speech channel RF receiver and determines the activation of the RF transmitter by the "Son" signal.

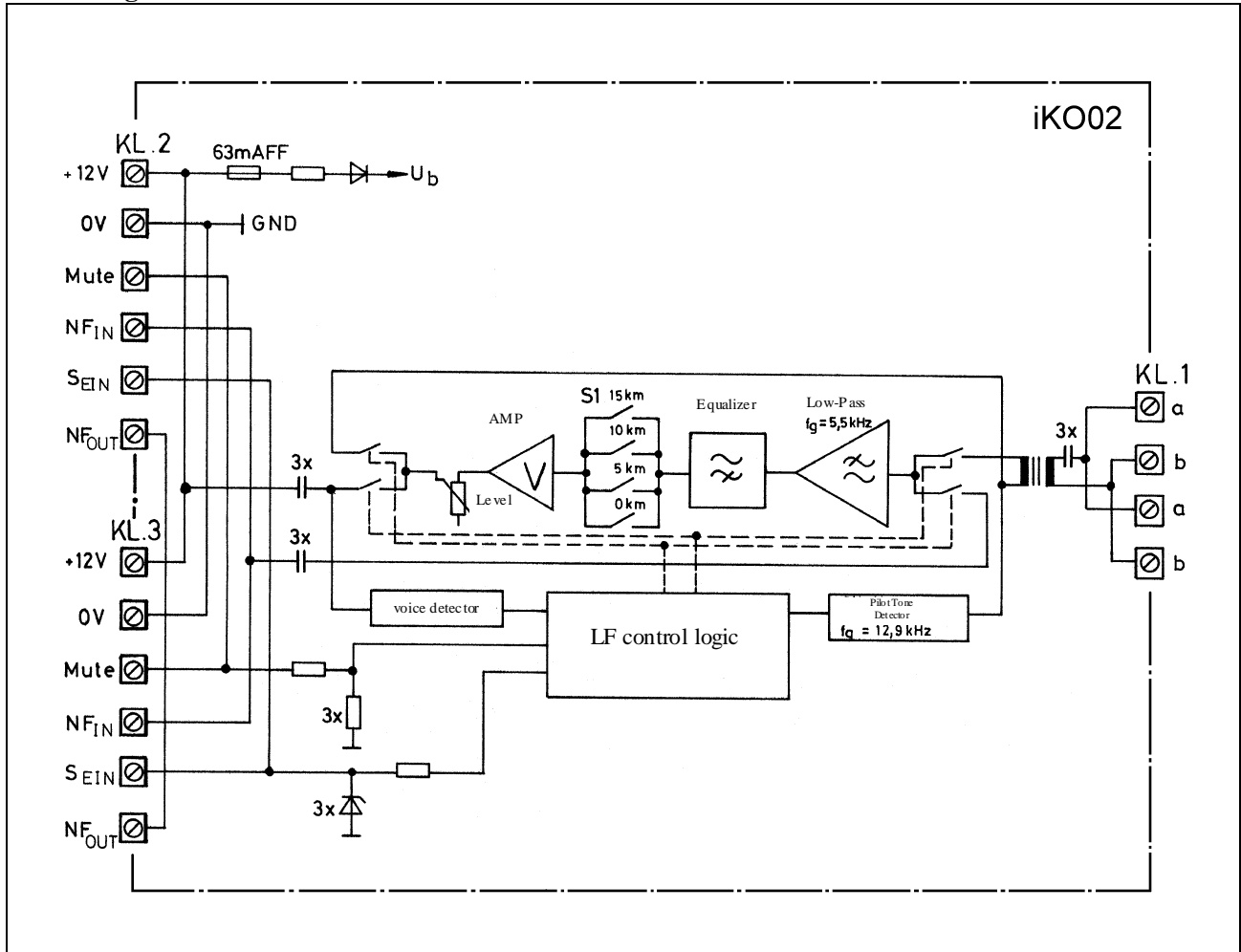
Construction

The PCB of the LF i/i coupling module iKO02 is built into an angled sheet-steel profile. Guide rails fix the PCB to the profile. The module iKO02 is fastened with two captive screws in its bottom to a mounting plate with corresponding drill holes.

The external circuits are connected to plug terminals on the top of the module. A potentiometer available on the top-side of the housings profile adjusts the amplification to compensate the line attenuation. A 4-fold DIP switch is used for the line length equalization setting. As an option a 35 mm DIN mounting rail can be assembled on the top-side of the housing profile.

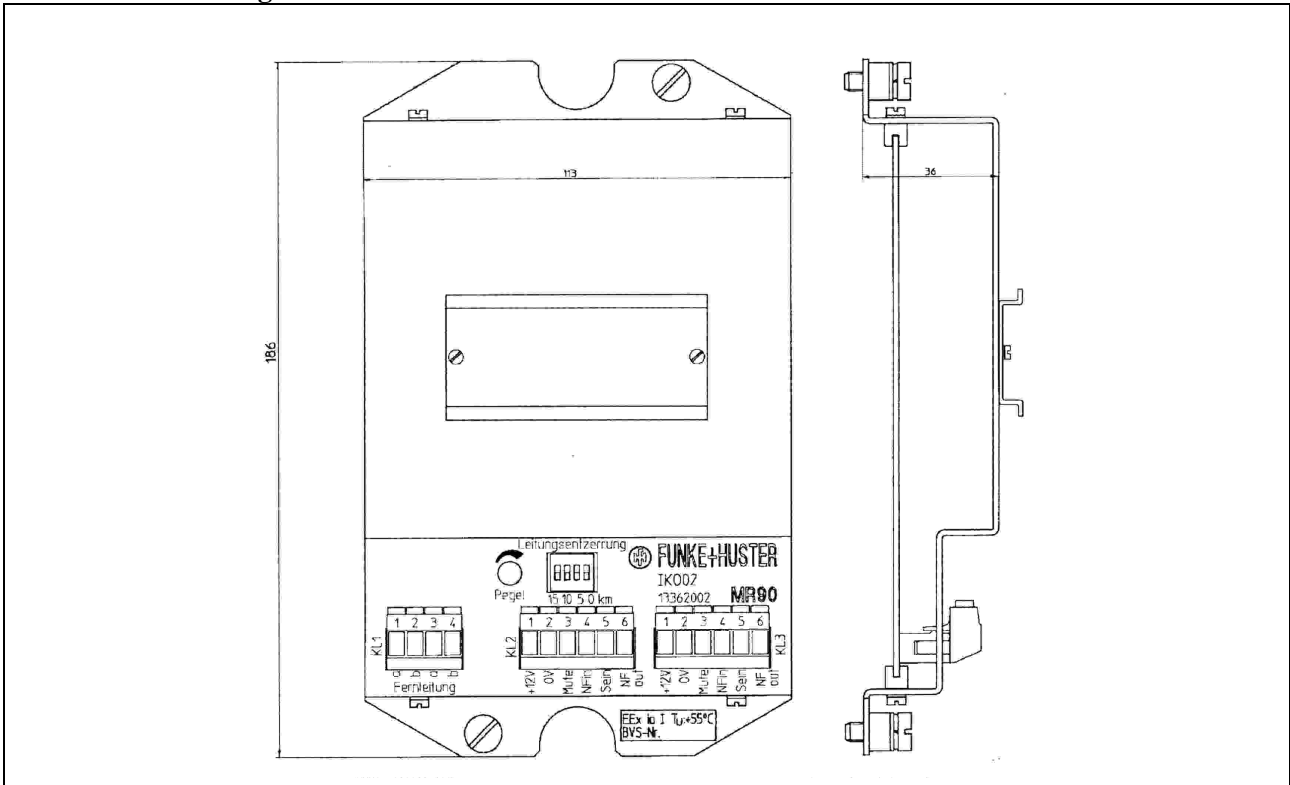
i/i Coupling Module Type iKO02

Block Diagram



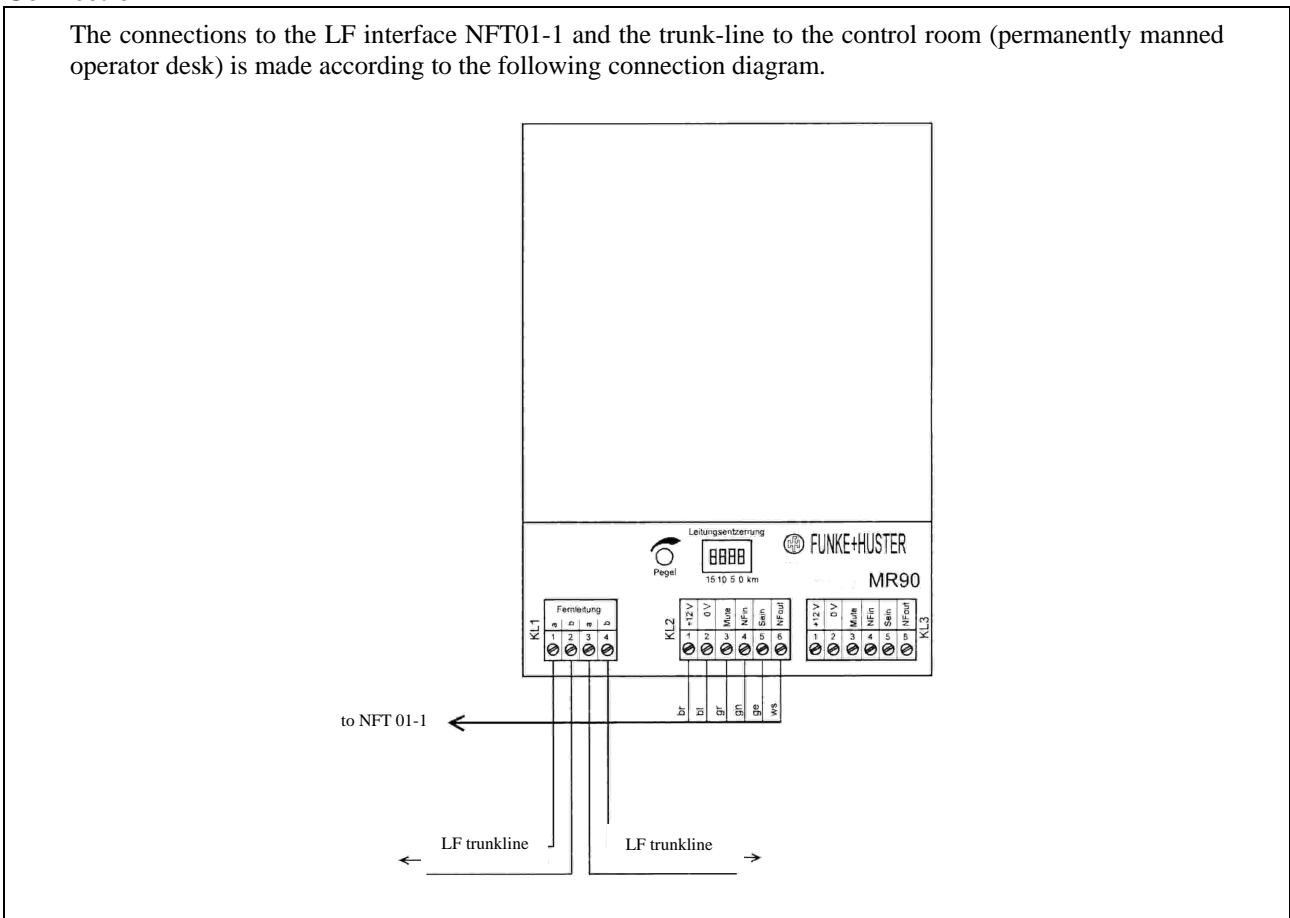
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Dimensional drawing



Connection

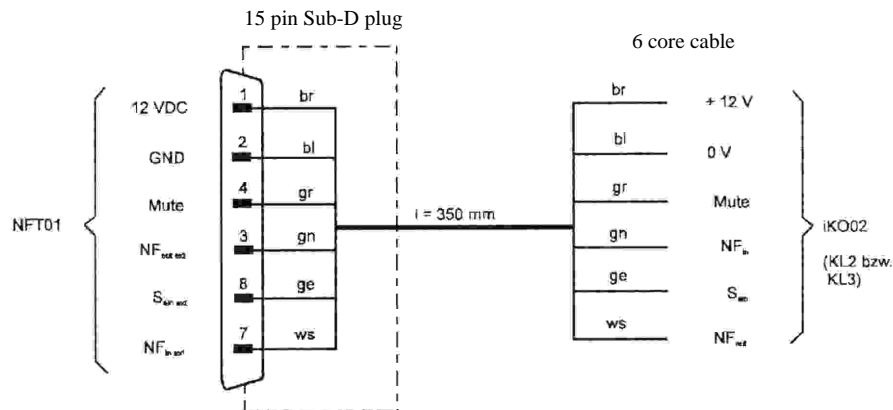
The connections to the LF interface NFT01-1 and the trunk-line to the control room (permanently manned operator desk) is made according to the following connection diagram.



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Connection of the coupling module iKO02

The connection of the LF interface NFT01 to the coupling module iKO02 is made with 6-wire cable which is enclosed in bulk with the coupler on delivery. On the iKO02 side of the cable are single wires to connect to the iKO02 terminals KL2 or KL3. A 15-pole D-Sub plug is fitted on the NFT01-1 side.



Maintenance

The iKO02 doesn't contain any parts to be maintained.

Setup / adjustment of iKO02

The line equalization compensates the increasing attenuation of the trunk-line for higher frequencies. The line equalization is set with four DIP switches for the stepping of 0 km, 5 km, 10 km and 15 km line length. Only one switch at a time may be closed. With the potentiometer "Level" a linear amplification of 1...3 can be adjusted. With this, the basic loss of the trunk-line can be compensated.

Conditions for a safe usage

This component must be built into a housing that ensures a minimum protection of IP 54 in accordance with EN 60529.

The internal wiring must be carried out in accordance with section 6.4.11 of EN 50020:2002.

The installation of the component must ensure that the air gap between bare parts of the intrinsically safe circuits and bare parts of the housing is 3 mm in minimum.

Contacts of the outer intrinsically safe circuits must be placed in a way that all bare parts have a minimum distance of 50 mm from contacts or bare conductors of not intrinsically safe circuits.

The component is intended for operation in an ambient temperature range of -20°C to $+55^{\circ} \text{C}$.

Technical Data iKO02

Name Type	i/i Coupling Module iKO02
Characteristic values	
Power supply circuit (Plug-in terminal block 12 V (KL2.1, KL3.1), 0 V (KL2.1, KL3.2))	
Maximum input voltage U_i	15 V _{DC}
The maximum internal capacity C_i	negligible
The maximum internal inductivity L_i	negligible
Signal Input-Output (Plug-in terminal block LF-in (KL2.4, KL3.4), NF-out (KL2.6, KL3.6))	
Maximum input voltage U_i	8 V _{DC}
Maximum inner capacity C_i	1.2 μ F
The maximum internal inductivity L_i	negligible
Maximum output voltage U_0	LF level + 6 dBm on 600 Ω
The maximum external capacity C_0	can be determined only in common with the connected devices and components
The maximum external inductivity L_0	can be determined only in common with the connected devices and components
Control signal Inputs - Outputs (Plug-in terminal block S_{on} (KL2.5, KL3.5))	
Maximum input voltage U_i	6.6 V _{DC}
The maximum internal capacity C_i	negligible
The maximum internal inductivity L_i	negligible
Maximum output voltage U_0	6.6 V _{DC}
Maximum output current I_0	1.5 mA
The maximum external capacity C_0	can be determined only in common with the connected devices and components
The maximum external inductivity L_0	can be determined only in common with the connected devices and components
Mute (Plug-in terminal block KL2.3, KL3.3)	
Maximum input voltage U_i	8 V _{DC}
Maximum input current I_i	8 mA
The maximum internal capacity C_i	negligible
The maximum internal inductivity L_i	negligible
Trunk-line connector (Plug-in terminal block KL1.1, KL1.3 and KL1.2, KL1.4)	
Maximum LF level	800 mV on 600 Ω
Maximum output current I_0	1.4 mA
Maximum inner capacity C_i	4 μ F
The maximum internal capacity C_i	negligible
The maximum external capacity C_0	can be determined only in common with the connected devices and components
The maximum external inductivity L_0	can be determined only in common with the connected devices and components
General Technical Data	
Power supply	$U_N = 12$ V _{DC}
Current consumption	approx. 10 mA
Trunk-line input/output	DC-free
Input impedance	≥ 6 k Ω
Transmit level	-6 dB to 600 Ω (transformer isolated)
Operation Mode	continuous
Operation mounting position	any
Operation conditions	preferred operation in hazardous firedamp areas
Ambient temperature range	
- Operation	- 20 to + 55 $^{\circ}$ C
- Storage and transport	- 25 to + 70 $^{\circ}$ C
Weight	approx. 0.5 kg
Dimensions	see dimensional drawing

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Technical Data iKO02

Explosion protection category / mode
Certificate number



I M1 EEx ia I
BVS 03 ATEX E 258 U

Labelling

Company

FHF Bergbautechnik
D-42551 Velbert

Type

iKO02
 I M1 EEx ia I
BVS 03 ATEX E 258 U
 0158
-20°C ≤ T_a ≤ + 55°C
F. No.: Test: (short sign, month/year)

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Warning and Safety Advice

<p>This explosion-proof component, realized in safety-class group I, is designed for operation in hazardous areas. Please pay particular attention to the following warning and safety instructions:</p>
<p>Any interconnection with other electric equipment must be separately certified.</p>
<p>The equipment must be connected and installed in accordance with the prescribed installation instructions by a trained specialist, taking the specified protection class into account.</p>
<p>This component must be connected and operated only with the specified voltage. Possible polarity signs must be observed.</p>
<p>For operation of the component in commercial facilities the local accident prevention regulations for electrical plants and operating supplies have to be observed.</p>
<p>The component may be operated only under the specified ambient conditions. Unfavourable ambient conditions may damage the component and may possibly result into danger for the users life. Unfavourable ambient conditions could be:</p> <ul style="list-style-type: none">- Air humidity too high (>75% rel., condensing)- Moisture, dust (observe type of protection)- inflammable gases, vapours, solvents, not covered by the protection class- Ambient temperature too high (> +55°C)- Ambient temperature too low (< -20°C).
<p>The ambient temperature for the component may not fall outside the specified range during operation.</p>
<p>Keep only the specified operating modes.</p>
<p>The component is intended for use in hazardous firedamp pit areas.</p>
<p>The component may not be single-operated in hazardous areas.</p>
<p>Defective parts may be replaced only by original spare parts.</p>
<p>Mounting and applying of additional parts is forbidden.</p>
<p>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 equipment.</p>
<p>The explosion protection is not guaranteed at nonobservance of the above mentioned points. In this case the device may be dangerous for the operator and may cause an explosion in hazardous atmospheres.</p>

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