

RF Transmitter Type HFS..

Order information

Name	Type	Part No.
RF Transmitter 27 MHz	HFS27	133 010 01 AX
RF Transmitter 35 MHz	HFS35	133 010 02 AX



- **RF transmitter for hazardous areas**
- **It is used for wireless radio connections in MR90 systems in underground pit area**
- **Explosion protection category / mode: I M1 EEx ia I**

Description

The RF transmitter type HFS.. is part of the intrinsically safe underground radio system MR90 and is used for frequency modulation with the LF signal input.

The HFS27 is a frequency modulated RF transmitter with a transmitter frequency range of 26,5 to 27,5 MHz. There are 21 transmit channels selectable. The channel spacing is 50 kHz. It is used for the mobile station of the MR90 radio system.

The HFS35 also is a frequency modulated RF transmitter.

Both transmitters are in principle equal in mechanical and electrical construction. The transmitter circuit is redesigned merely for an operation in the 35 MHz band. Here are also 21 transmit channels selectable with a channel spacing of 50 kHz. The HFS35 is used for the base station.

The RF transmitters are clip-on modules, which for themselves have no independent function.

An electric connection to the corresponding LF Interface NFT01 or the data radio modem MOD02 is made by a 8-wire connection cable which has to be plugged on the 8-pole pin contact strip of the HFS.. transmitter. The module is powered via this strip.

Also the LF signal is transmitted and the "Transmitter-ON signal" ("S_{ein}") are supplied over it.

Through a limiting amplifier and a low-pass filter the LF signal is led to a voltage-controlled oscillator.

A oscillator signal derived from a quartz is connected to a PLL circuit over a scaler chain set to a divisor according to the selected channel.

Depending on the PLL lock-in frequency and the "SEIN" signal on the interface, a post-connected frequency-doubler and the output driver are activated.

Two transmitter band-pass filters suppress spurious signals outside the transmit band. The output signal is available at the coax-socket (ST-HF1) for a connection to the antenna-interface (AANT01) or the leaky-feeder-interface (ASK01).

Beside the 8-pole pin strip exists a 2-pole pin strip, on which the signal "TX" (TTL-level) is emitted if the RF transmitter is active.

For energy saving reasons in a pure speech radio mobile station, the TX signal can be used to activate the output amplifier in the antenna-interface only when the microphone key is pressed.

This makes a longer operation time out of the vehicles battery possible.

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Zur Stromersparnis kann in einer reinen Sprechfunk-Mobilstation das TX-Signal dazu verwendet werden, den Ausgangsverstärker in der Antennenanpassung erst dann einzuschalten, wenn die Mikrofontaste betätigt wird.

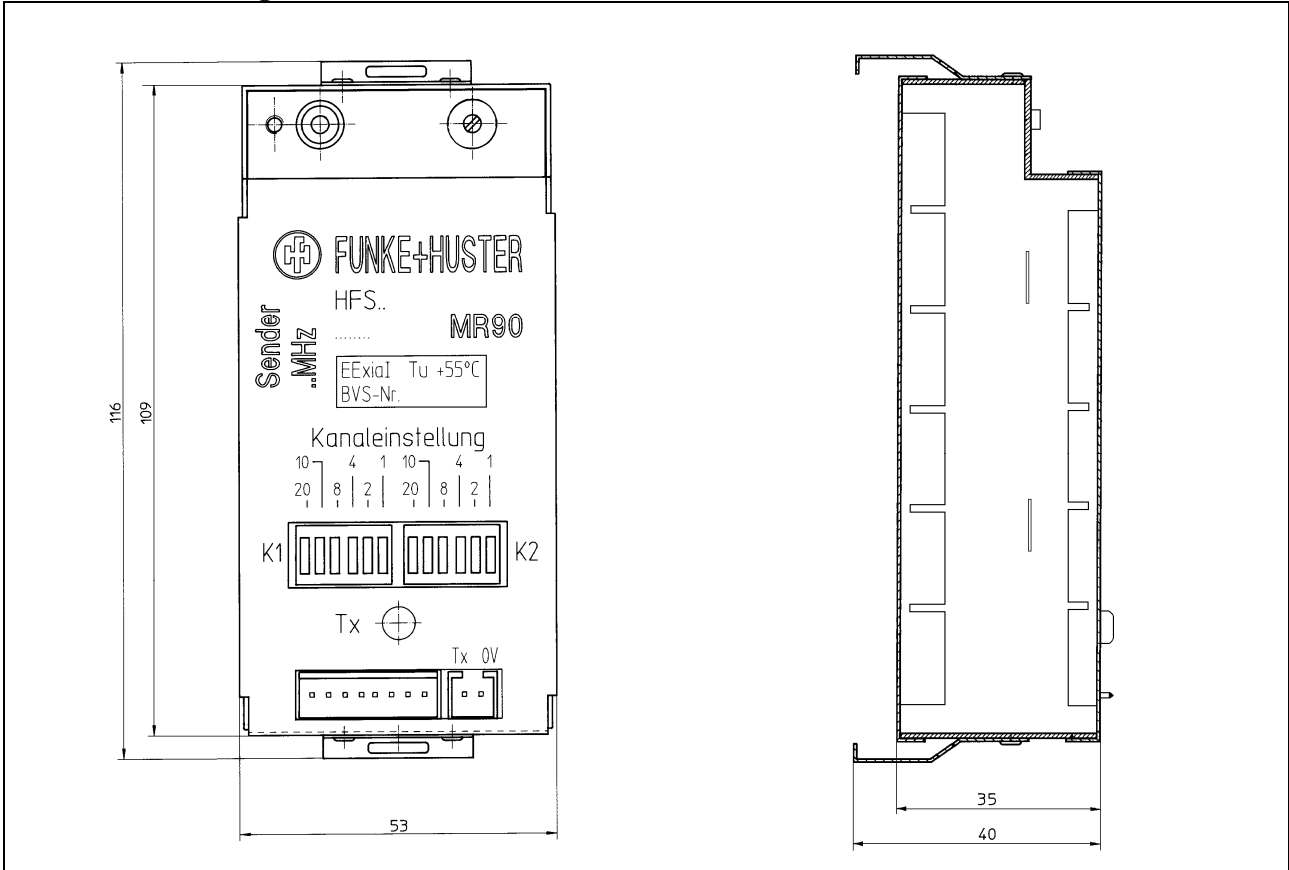
Damit wird eine längere Betriebsdauer aus der Fahrzeugbatterie ermöglicht.

Construction

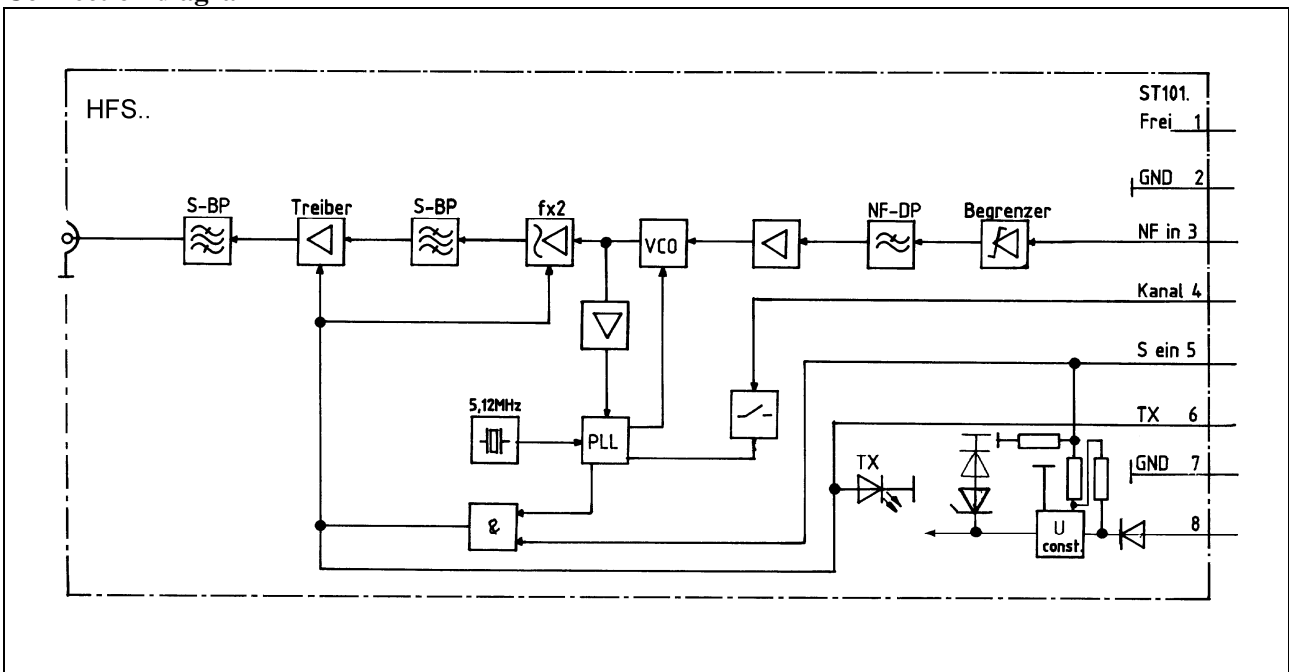
The module has a tin plate housing. The electronics inside is placed on two

printed circuit boards. It is mainly fabricated in SMD technology. At the front-sides of the modules there are two clips to fasten the transmitter on the corresponding LF interface module NFT01 or data radio modem MOD02.

Dimensional drawing



Connection diagram



Technical Data



Name Type	RF Transmitter HFS27 or HFS35	
Elektrical Characteristics / Parameters		
Power supply circuit (Pin contact strip U2 (ST101.8) and GND (ST101.2 = ST101.7))		
Max. input voltage U_i	15 V _{DC}	
Max. input current I_i	107 mA	
Max. internal capacity C_i	negligible	
Max. internal inductivity L_i	negligible	
RF transmitter inputs/outputs only Type HFS27 and Type HFS35		
Pin contact strip	LF-IN	(ST101.3),
	CHANNEL	(ST101.4),
	S ein	(ST101.5),
	TX	(ST101.6 = ST104.2)
Control signals ST101.4, ST101.5, ST101.6 = ST104.2		
Max. output voltage U_0	7.7 V _{DC}	
Max. output current I_0	7.7 mA	
Max. external capacity C_0	can be determined only in common with the connected devices and components	
Max. external inductivity L_0	can be determined only in common with the connected devices and components	
Max. internal capacity C_i	negligible	
Max. internal inductivity L_i	negligible	
Signal voltage output/input ST101.3		
LF level	-6 dBm on 600 Ω	
LF frequency range	300 Hz to 3400 Hz	
Max. output voltage U_0	7.7 V _{DC}	
Max. output current I_0	107 mA	
Max. external capacity C_0	can be determined only in common with the connected devices and components	
Max. external inductivity L_0	can be determined only in common with the connected devices and components	
Max. input voltage U_i	7.7 V _{DC}	
Max. internal capacity C_i	negligible	
Max. internal inductivity L_i	negligible	
Transmitter output Type HFS27 and Type HFS35 (ST-HF1)		
Max. output voltage U_0	7.7 V _{DC}	
Max. output voltage	710 mV _{AC}	
Max. output current I_0	107 mA	
Max. external capacity C_0	can be determined only in common with the connected devices and components	
Max. external inductivity L_0	can be determined only in common with the connected devices and components	
Max. input voltage U_i	7.7 V _{DC}	
Max. internal capacity C_i	negligible	
Max. internal inductivity L_i	negligible	
Additional Technical Data		
Transmit frequency range	26.5 MHz to 27.5 MHz	(HFS27)
	34.5 MHz to 35.5 MHz	(HFS35)
Channel count	21	
Channel spacing (Frequency pattern)	50 kHz	
Channel setting	with 6-pole DIP switches K1 and K2 (K2 setting activated with signal "Channel", pin 4 St101)	
Modulation	Frequency Modulation	

Technical Data

RF output	+ 8 dBm on 50 Ω
LF input	- 6 dB on 600 Ω
LF Frequency range	300 Hz to 3.4 kHz
Power Supply	$U_n = 12V, I_n = 26 \text{ mA}$
Operating mode	100% duty-cycle / Continuous operation
Operation position	any position
Weight	approx. 0.2 kg
Dimensions	see dimensional drawing
Temperature range	
- Operation	- 20 to + 55°C
- Storage and Shipping	- 25 to + 70°C
Testing and Certification	
Explosion protection category / mode	IM1 EEx ia I
Certification No.	BVS 03 ATEX E 117 U

Identification

The RF transmitter HFS27 or HFS35 is labelled as follows:

Company	FHF Bergbautechnik D-42551 Velbert
Type	HFS**  IM1 EEx ia I BVS 03 ATEX E 117 U  0158 F. Nr.... Testing (short sign, month/year) $20^\circ\text{C} \leq T_a \leq + 55^\circ\text{C}$

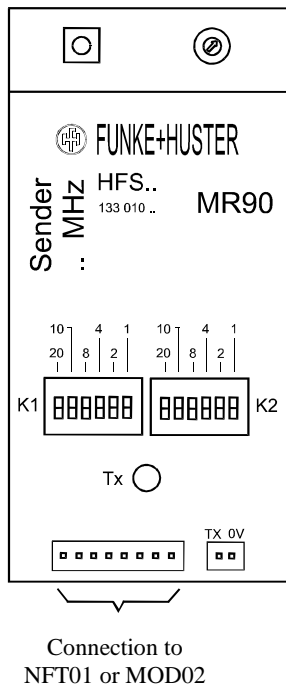
Assembly and Disassembly

The assembly is done by clipping the HFS27 or HFS35 modules on other devices, i.e. on the LF interface NFT01 or on the data radio modem MOD02. For this the clips on the front-sides must be bended e.g. by a screw-driver into the lock-position on the module carrier. The disassembly is done in the reverse way.

Installation

For installation the plug with the 8-wire connection cable coming from the modules NFT01 or MOD02 must be plugged onto the corresponding pin strip of the transmitter. Due to a different pole count a reverse-connection is impossible.

The mechanical coding of the plug-in strip allows a connection only in the right order.



Frequency Setting HFE**									
1 = Switch in „On“ Position									
K1	20	10	8	4	2	1	Channel	f/MHz	f/MHz
K2	0	0	0	0	0	0	0	26,50	34,50
						1	1	26,55	34,55
					1		2	26,60	34,60
				1	1		3	26,65	34,65
			1				4	26,70	34,70
			1	1			5	26,75	34,75
			1	1			6	26,80	34,80
			1	1	1		7	26,85	34,85
		1					8	26,90	34,90
		1				1	9	26,95	34,95
	1						10	27,00	35,00
	1					1	11	27,05	35,05
	1			1			12	27,10	35,10
	1			1	1		13	27,15	35,15
	1	1					14	27,20	35,20
	1	1			1		15	27,25	35,25
	1	1	1				16	27,30	35,30
	1	1	1	1			17	27,35	35,35
	1	1					18	27,40	35,40
	1	1				1	19	27,45	35,45
	1	0	0	0	0	0	20	27,50	35,50

Device Setup

With the plug-in of the connection cable the device is ready for operation. The transmit channel must be set according to the table above. The selection of the transmit channel is made with a 6-pole DIP switch (K1). A second 6-pole DIP switch (K2) is available for the selection of a second channel frequency. The transmitter can be switched over to this frequency via the interface (signal "Channel", pin 4 of ST101).

Maintenance

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

Special conditions for a safe usage

The RF transmitter HFS** must be installed into a housing that ensures a minimum ingress protection of IP54 acc. to EN 60529.

This component is intended for an operation in a ambient temperature range of -20° C to +55° C.

The internal wiring must comply to the conditions of section 6.4.11 of EN 50020.

Warn and Safety Advice

<p>This explosion-proof intrinsically safe equipment 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 especially certified.</p>
<p>The component 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.</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>Unfavourable ambient conditions may damage the device and may possibly result into danger for the users life. Unfavorable 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>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.</p>
<p>The explosion protection is not guaranteed at nonobservance of the above mentioned points.</p>

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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:

Bezeichnung Erzeugnis / Komponente Name of product or component	HF-Empfänger HF-Sender HF-receiver HF-transmitter
Geräte- oder Typenbezeichnung Equipment type or mark of equipment	HFE27, HFE35; HFS27, HFS35
Bestimmung der Richtlinie Provisions of the directive	Nr. und Ausgabedatum der Norm(en) No. and date of issue of the standard(s)
94/9/EG: Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen 94/9/EC: Equipment and protective systems intended for use in potentially explosive atmospheres	EN 50014:1997+A1+A2 General requirements EN 50020:1994 Intrinsic safety „i“ EN 50303:2000 Equipment Group I Category MI
EG-Baumusterprüfbescheinigung EC-Type-Examination Certificate	BVS 03 ATEX E 117 U
Benannte Stelle für die Bescheinigung Notified body of the certificate <i>Kennummer / Inspection number</i>	DEKRA EXAM GmbH 0158
Hersteller / Anschrift Manufacturer / Factory address	FHF Bergbautechnik GmbH & Co. KG Eintrachtstr. 95 D – 42551 Velbert

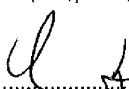
Geschäftsführer:
Managing director:

Velbert
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(Ort / place)

11. 2. 2011
.....
(Datum / date)

Dr. Opitz, Hans-Peter

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(name, prename)


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(Unterschrift / signature)

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