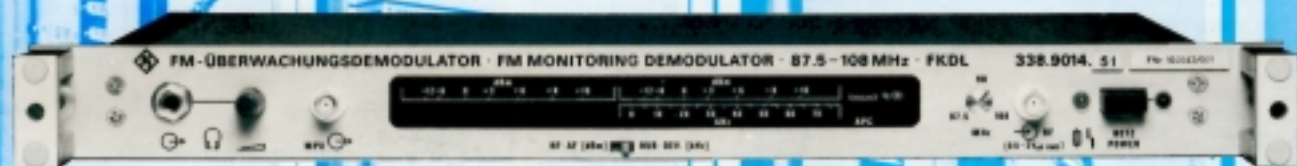




ROHDE & SCHWARZ

FKDL

FM MONITORING DEMODULATOR FKDL



- Test outputs for multiplex, L, R and mono signals
- L and R signal-level or peak-deviation indication by two LED arrays
- Headphones output for checking the modulation via built-in stereodecoder
- LEDs indicating RF input level, mono/stereo operation and transmitter tuning (carrier midpoint)

FM MONITORING DEMODULATOR FKDL

Characteristics The FM Monitoring Demodulator FKDL, continuously tunable from 87.5 to 108 MHz, is used for monitoring carrier signals modulated with mono or stereo signals in accordance with the relevant CCIR recommendation. It is connected to the transmitter output via directional couplers or voltage dividers and delivers demodulated mono, multiplex, L and R signals for the usual performance checks on FM transmitters.

When a precision stereodecoder (e. g. MSDC 2 of R&S) is connected to the MPX signal output, quality parameters of FM stereo transmitters can be measured. A modified FKDL (specifications on request) is available for **monitoring FM European paging transmitters.**

Inputs The RF input signal is applied either at the front or the rear panel.

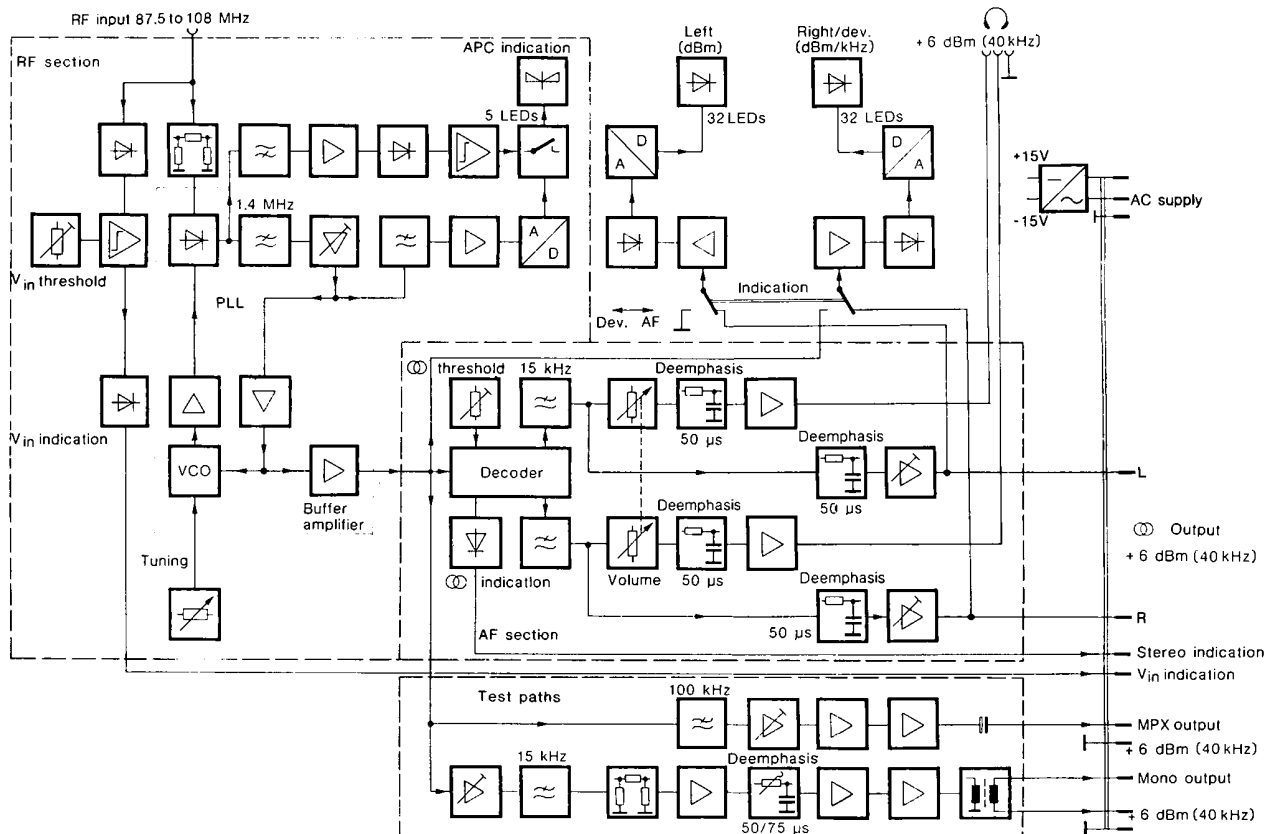
Indication Analog display of the AF voltages of the L and R channels is provided by an LED array for each channel (32 diodes per array). One of the LED arrays can be switched over at the front panel to indicate the frequency deviation of the transmitter. Additional LEDs signal stereo mode selection, sufficient carrier level and tuning to the carrier midpoint.

Outputs A low-impedance output on the rear panel of the FKDL delivers the mono signal for monitoring and measuring purposes. The multiplex signal is available at two parallel, low-impedance outputs on the front and rear panel. A headphones output with volume control for L and R signals is fitted on the front panel.

Construction The FM Monitoring Demodulator FKDL comes as a 44-mm high 19" rackmount with a power supply of its own. The connectors are fitted on the front and rear panel.

Operation The RF section of the FM Monitoring Demodulator includes a variable-frequency oscillator whose frequency can be modulated and which is synchronized to the frequency of the transmitter to be measured. A 5-LED array indicates the tuning with respect to carrier midpoint. The AC component of the correction voltage is proportional to the AF modulation voltage of the received signal and used after peak-rectification for indication of the FM deviation. The stereo decoder module working on the time-division-multiplex principle decodes the multiplex signal. The AF levels of the right and the left channel are indicated on LED arrays after A/D conversion. The stereo decoder module automatically switches over to mono operation if the pilot tone is absent.

Block diagram



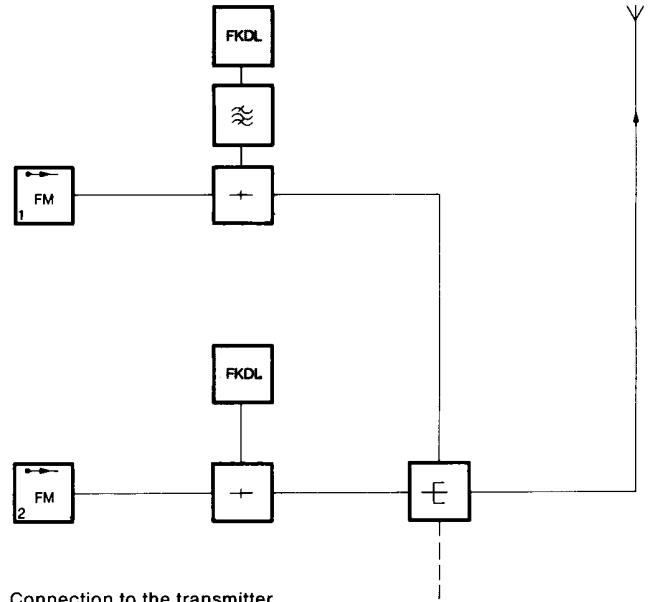
AF MODULATION MEASUREMENT

Connection to the transmitter

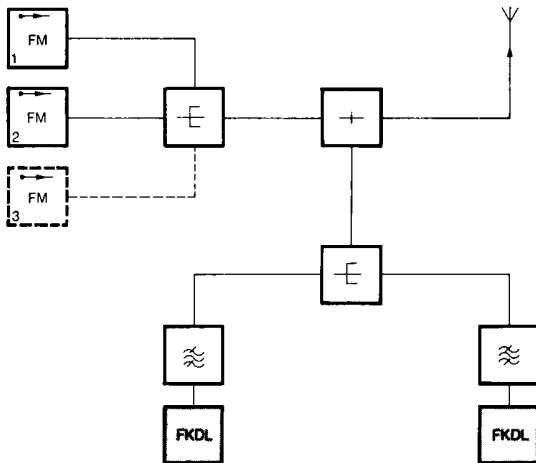
The FM Monitoring Demodulator FKDL is assigned to one transmitter (see Fig. to the right) and accommodated in the transmitter rack. The signal is coupled out either from a test output of the transmitter or from the transmitter output via an output probe.

If the FKDL is connected to transmitters feeding the antenna via diplexers, filters suppressing the intermodulation products may be required to ensure undisturbed operation.

Besides the FKDL, type FKD with a maximum of 4 Demodulators FKD-E accommodated in a 19" Adapter Frame FKD-B, which contains also the power supply unit, is available for **central monitoring purposes** (see Data Sheet 343 201). Except for the power supply unit, FKDL and FKD-E differ only in their mechanical construction.



Connection to the transmitter



Connection after transmitter combining filter

If several transmitters are connected to one antenna via a diplexer, the signals may be measured after the diplexer. The test signal is coupled out from the feeder via a 3-dB directional coupler (see Fig. to the left) or via a 4-way power distributor (see Fig. below). Thus not the transmitter signals proper are monitored but the output signal of the diplexer, including any signal distortions caused by the diplexer. For demodulation the carrier signals for a particular FKDL must be selected by means of a filter (see also page 4).

Connection after the diplexer; signal selection by means of a 3-dB directional coupler (above) or a 4-way power distributor (below)

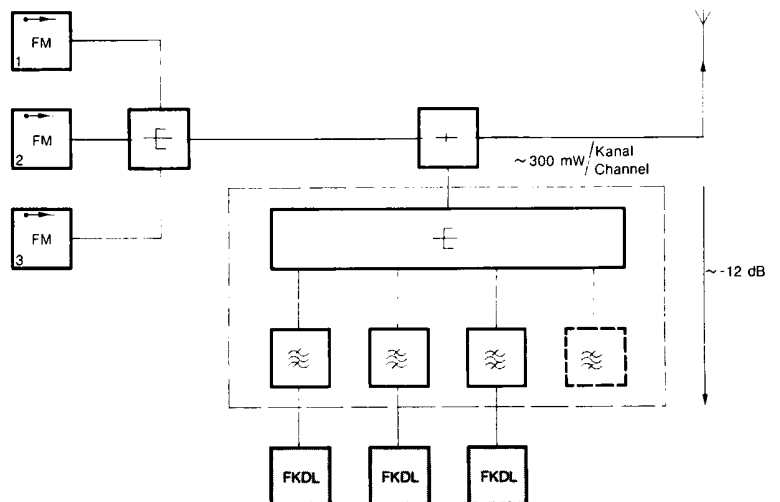
Decoupling devices

The **output probe** is used for coupling out carrier signals before or after the diplexer.

The **selective devices** for coupling out carrier signals consist either of a 4-way power distributor and four filters (Fig. at the right) or of 3-dB directional couplers and filters (Fig. above).

The **4-way power distributor** consists of series-connected 3-dB couplers for distributing the carrier signals.

The **3-dB directional coupler** serves for distributing the decoupled carrier signals to the selective filters.



AF MODULATION MEASUREMENT

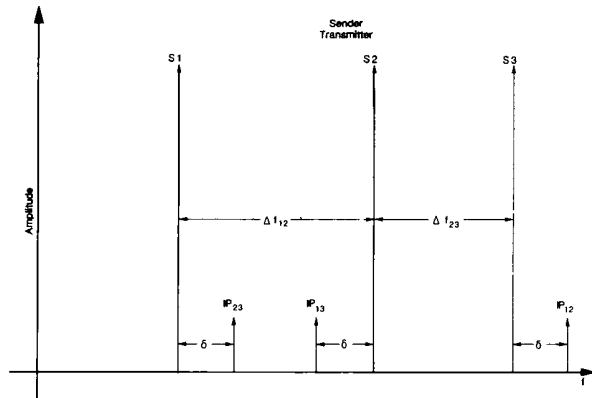
Selective filters

High selectivity by means of multi-section filters is required if the intermodulation products of S1 and S2 produced in the transmitter output stages and in the input mixer of the FKDL interfere with the carrier S3 to be measured (frequency spacing $|\Delta f_{12} - \Delta f_{23}| \leq 300$ kHz); see block diagram with power distributor on page 3.

Simple selective filter circuits (single-circuit filters such as Bandpass Filter FKD-B) will be sufficient if the intermodulation products (see Fig. to the right) do not interfere with the carrier to be measured. This is the case with transmitter signals of the following frequencies:

- Frequency spacing $\Delta f > 1.2$ MHz,
- Difference $\delta = |\Delta f_{12} - \Delta f_{23}| \geq 300$ kHz.

The PLL demodulator will not be influenced by these interfering signals.



Non-interfering intermodulation products (see text)

SPECIFICATIONS

RF input

Frequency range	87.5 to 108 MHz (tunable)
Input level	$1 V_{rms} \pm 3$ dB
Input impedance	50 Ω
Return loss	≥ 20 dB
Spurious signals $\geq \pm 1$ MHz off carrier frequency (see also text above)	≥ 30 dB down referred to carrier

AF outputs¹⁾

Multiplex signal output²⁾	$\leq 30 \Omega$ (unbalanced)
Output level (EMF) at ± 40 kHz deviation $f_{mod} = 500$ Hz	+ 6 dBm ± 0.5 dB into 600 Ω
Frequency response flatness	
30 Hz to 53 kHz	$\leq \pm 0.3$ dB
53 to 100 kHz	$\leq \pm 1$ dB
Harmonic distortion at ± 75 kHz	$\leq 0.5\%$, typ. 0.3% (30 Hz to 15 kHz)
Crosstalk ³⁾ without deemphasis	
40 to 100 Hz	≥ 40 dB down
100 Hz to 15 kHz	≥ 46 dB down
S/N ratio ³⁾ with deemphasis, referred to nominal output level	
unweighted	≥ 64 dB, typical 68 dB
weighted to CCIR 468-2	≥ 66 dB, typical 70 dB

Mono signal output⁴⁾

Output level at ± 40 kHz deviation $f_{mod} = 500$ Hz	+ 6 dBm ± 0.5 dB into 600 Ω
Frequency response flatness referred to 50- μ s deemphasis	$\leq \pm 0.5$ dB
Harmonic distortion at ± 75 kHz deviation, $f_{mod} = 40$ Hz to 5 kHz	$\leq 0.3\%$
S/N ratio ³⁾ with deemphasis, referred to nominal output level	
unweighted	≥ 68 dB, typical 72 dB
weighted to CCIR 468-2	≥ 68 dB, typical 72 dB
Suppression of pilot tone, referred to nominal output level	≥ 72 dB

Monitoring outputs

Stereodecoder outputs⁵⁾	for L and R signal; $Z_{out} \leq 30 \Omega$ (unbalanced)
Output EMF with ± 40 kHz deviation, $f_{mod} = 500$ kHz	+ 6 dBm ± 1 dB into 600 Ω
Frequency-response flatness 40 Hz to 15 kHz	$\leq \pm 1.5$ dB (deemphasis 50 μ s)
Harmonic distortion at ± 75 kHz deviation	
$f_{mod} = 40$ Hz to 5 kHz	$\leq 0.25\%$
Crosstalk between R and L channels	typ. 40 dB down (100 Hz to 5 kHz)
S/N ratio ³⁾ referred to nominal output level	
unweighted	≥ 66 dB, typical 68 dB
weighted to CCIR 468-2	≥ 64 dB, typical 70 dB
Suppression of pilot tone, referred to nominal output level	≥ 50 dB, typical 60 dB

Headphones output	max. +12 dBm (adjustable); on front panel; $Z_{out} \leq 30 \Omega$ For all other data see stereodecoder outputs
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Deviation indication	0 to 77.5 kHz (peak-voltage indication)
Resolution	2.5 kHz (32 LEDs)
Indication error	$\leq \pm 5\%$ of f.s.d. ¹⁾

AF level indication	-12 to +12 dBm
Display	LED array (2 x 32 LEDs, L/R channel, scale length 80 mm)

Additional displays (LEDs)	RF input level, stereo operation, tuning to carrier midpoint
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General data

Rated temperature range	+5 to +40 °C
Operating temperature range	0 to +45 °C
Storage temperature range	-20 to +70 °C
Power supply	110/120/220/240 V +10/-15%, 47 to 63 Hz (16 VA)
Dimensions (W x H x D), weight	
19" rackmount	483 mm x 44 mm x 384 mm, 3.3 kg
19" bench model	492 mm x 74 mm x 392 mm, 5 kg
Colour	grey, RAL 7001
Engravings	German/English

Ordering information

Order designation	► FM Monitoring Demodulator FKDL
19" rackmount	338.9014.51
19" bench model	338.9014.52

Recommended extras

Bandpass Filter FKD-B for 4 transmitter frequencies	343.3210.50
Junction Panel FKDL-Z for rack insertion	338.9614.00

¹⁾ Additional error after channel change, without recalibration (on front panel), max. ± 0.3 dB or $\pm 3\%$.

²⁾ Two parallel, unbalanced outputs: BNC socket on front panel and 30-pole Tuchel-type connector at the rear.

³⁾ Measured to DIN 45405 via stereodecoder, e. g. MSDC 2 of R&S.

⁴⁾ DC-voltage-free output via 30-pole Tuchel-type connector at the rear.