

Antenna Measuring System MSK 125



FOREWORD/IMPORTANT INSTRUCTIONS

Dear customer,

many thanks for choosing the Kathrein MSK 125 measuring instrument. Please read the following instructions carefully, so as to familiarise yourself with all the new functions before starting to use your instrument.

Please comply with all the instructions in this operating manual. KATHREIN-Werke KG has done all it can to ensure that the data and descriptions in this operating manual are correct and complete.

We reserve the right to make changes without notice. In particular, this applies to changes made due to technical advancements.

We would be pleased to receive any suggestions for improvements.

All product names and brands used in this operating manual are the property of their respective owners.

VALIDITY OF THIS OPERATING MANUAL

This operating manual is applicable to the MSK 125 measuring instrument, order no.: 21710022 and MSK 125/M4, order no.: 21710023. The following instructions are important for operating the MSK 125 and should be complied with under all circumstances.

GENERAL SAFETY INSTRUCTIONS

The MSK 125 has been developed and manufactured in compliance with all relevant harmonised directives, standards and other technical specifications. The product is state-of-the-art and offers a high level of safety. This degree of safety can however be achieved in operation only if the user complies with all necessary safety regulations.



Electronic equipment must not be disposed of in domestic waste. According to directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of 27th January 2003 on waste electrical and electronic equipment, it must be disposed of professionally. At the end of its service life, take this unit for disposal to an appropriate official collection point.



Spent batteries are special waste!

Do not throw spent batteries into your domestic waste; take them to a collection point for old batteries!

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SAFETY INSTRUCTIONS

This manual was designed for persons with a basic knowledge of electronics. Users who have already worked with similar measuring devices can use a command overview for the necessary commands for each operating step. Additionally, the following examples are designed to provide the individual operating steps.

MEANING OF SYMBOLS



Notes with a caution symbol must be adhered to to avoid damage to the MSK 125.



This symbol indicates notes for measuring functions or refers to chapters that contain more details on a matter.



This symbol is followed by an example of a measuring function that has been explained.

Here a command overview is provided for relevant key combinations for a measuring function.



Device button

SAFETY INSTRUCTIONS



Please follow enclosed safety instructions.

PRODUCT PACKAGE

- 1 German/English operating manual
- 1 AC/DC power unit
- 1 power cable
- 1 BNC measuring cable
- 2 adapters for BNC input – F input (one in the HF input of the MSK 125)
- 1 adapter for BNC input – F connector
- 1 adapter for BNC input – IEC input
- 1 adapter for BNC input – IEC connector
- 1 USB cable
- 1 SD card (1 GB memory card)

FUNCTIONALITY

The MSK 125 is a mobile multi-purpose measuring device intended for analogue TV and Satellite, FM radio and for DVB-C, DVB-S(2) and DVB-T for battery and mains operation. The integrated 6.5 Ah lithium-ion battery and a rechargeable 230 V AC power unit are included in the scope of supply.

A micro controller is responsible for the entire controlling, keypad query and display of frequency and level on the LC display. The receiving frequency is indicated in MHz. The level is measured with a peak and mean value detector and displayed digitally in dB μ V or dBmV. Correction values are determined during the MSK 125 level calibration and stored in an EEPROM. This ensures precise level measuring. Up to 100 measuring device settings can be stored as well.

A second micro controller allows you to store several 1000 measuring results on an SC card or to read the SD card (up to 1GB) via USB.

For transmitter location the display has a bar graph. Additionally, a level-dependent bearing sound facilitates directing an antenna without having to look at the display.

The audio unit with integrated speaker can process and render SAT NF signals, the TV NF signals of B/G, D/K and I, FM sound signals as well as DVB-C, DVB-T and DVB-S(2). NICA and AM sound rendering (standard L) is also possible.

Remote power feed of 5 ... 20 V/max. 600 mA (in 0.1 Volt increments), the superposition of 22 kHz and the possibility of sending DiSEqC™ commands covers all currently known requirements. With DVB-T a 5 V antenna feeding voltage can be received at the RF connector. Also, the MZV 10 preamplifier or similar preamplifiers can be fed remotely.

The integrated, transfective 5.7" TFT colour display with a resolution of 640 x 480 pixels allows for picture evaluation of analogue and digital TV and SAT signals in the dark as well as in sunlight.

A large black and white LC display shows the measurement results with very high contrasts.

FUNCTIONALITY

Function	Operating mode SAT analogue	Operating mode TV analogue	Operating mode FM analogue	Operating mode DVB-S/S2	Operating mode DVB-C	Operating mode DVB-T
Mains and battery operated	*	*	*	*	*	*
Level measurement by means of frequency input	*	*	*	*	*	*
Level measurement by means of channel input						
Level-dependent signal sound	*	*	*	*	*	*
Spectrum analysis	*	*	*	*	*	*
Speaker for audio check	*	*	*	*	*	*
Multi-standard reception (B/G, D/K, I, L, Nicam) Nicam sound reception and L norm	*	*	*	QPSK 8PSK	QAM64, 128,256	COFDM 2k, 8k
Audio carrier setting	*	*				
Audio carrier measurement		*				
LNB remote feed power supply adjustable	*	*	*	*	*	*
LNB remote feed power measurement						
22 kHz switch	*			*	*	*
DiSEqC, Simple DiSEqC™	*	*	*	*	*	*
DVB level measurement				*	*	*
DVB-MER-BER measurement				*	*	*
DVB image display				*	*	*
SCART output and input (CVBS, Audio)	*	*	* (audio only)	*	*	*
Nicam audio, reception and bit error rate measurement		*				
Storing measurement results Storing device settings	*	*	*	*	*	*

OPERATING AND DISPLAY ELEMENTS

Measured values and settings are shown on the LC display.

LC DISPLAY

FR: 210.25 MHz	CABLE
LEV: 65.0 dBuV	A

Based on operating mode and function the LC display displays

- the set channel,
- the set frequency,
- the called function,
- the operating mode,
- the measured level, and
- the measured values.

TFT COLOUR DISPLAY

Based on the operating mode the 5.7" TFT-Display displays the following:

- Spectrum analysis
- TV picture
- Selection of digital programmes transmitted on the channel or transponder
- LNB and DiSEqC™

LED DISPLAY

- Operating voltage (battery operation = red / mains operation = green)
- LNB supply (voltage = green / short circuit = green blinking)
external voltage = red)

OPERATING AND DISPLAY ELEMENTS

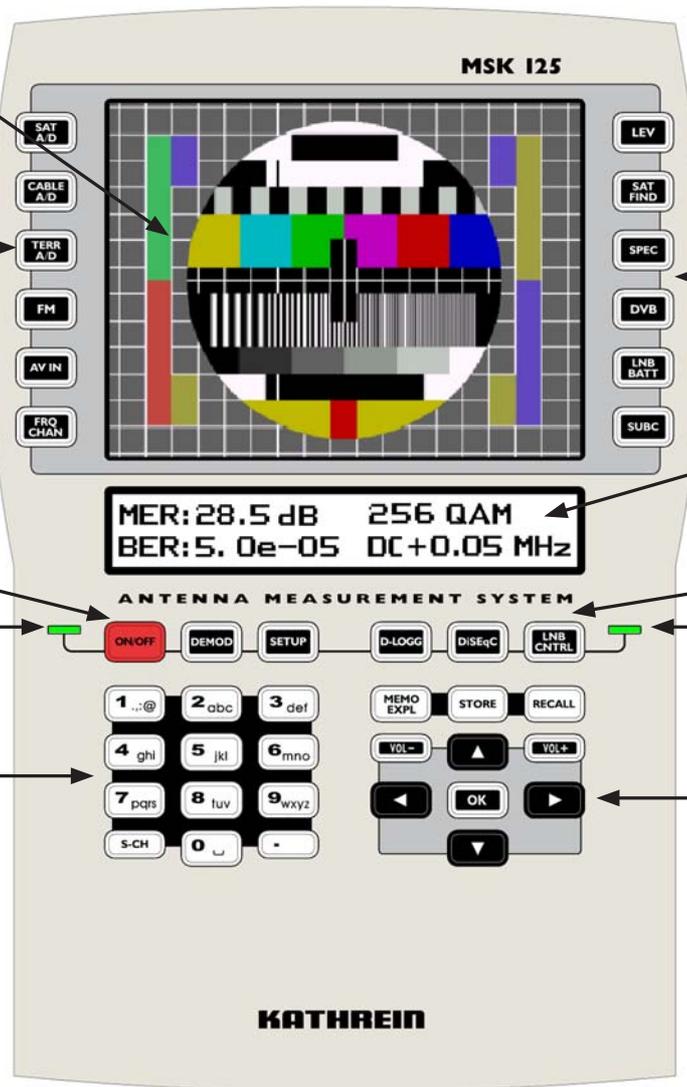
TFT colour display
TV picture/settings

Source selection

On/off button

Indication of
operation mode

Input block



Measurements

LC display
Measurement results

Settings

LNB display

Cursor block

OPERATING AND DISPLAY ELEMENTS

OVERVIEW OF KEYPAD COMMANDS

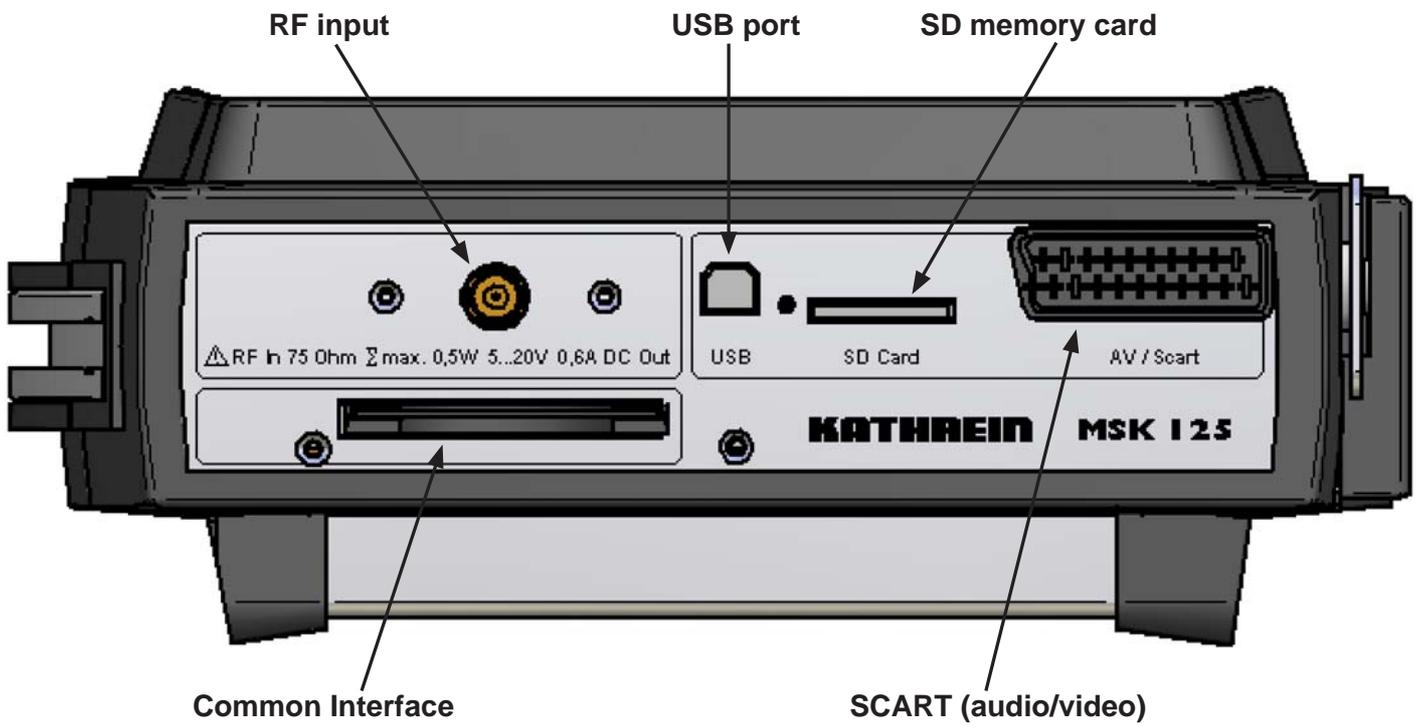
Button	Brief description of the function
	Switching the device on/off
Sources	
	Selection of SAT operation and switch between analogue and digital SAT
	Selection of cable TV operation and switch between analogue cable TV and digital cable TV
	Selection of terrestrial TV operation and switch between analogue terrestrial TV and digital terrestrial TV
	FM radio selection
	Selection of video/audio inputs via SCART
	Change between channel and frequency input
Measurements	
	Switch on level-dependent signal sound with bar graph display
	Independent satellite search
	Spectrum analysis
	DVB measurement; MER, BER, OFFSET, MPEG program selection
	LNB power measurement and lithium-ion charging status display
	(Subcarrier) audio carrier menu, audio carrier measurement
Input block	
	Alphanumeric input
	Decimal point for digit input, DiSEqC™ hexadecimal input
	Special channel call

OPERATING AND DISPLAY ELEMENTS

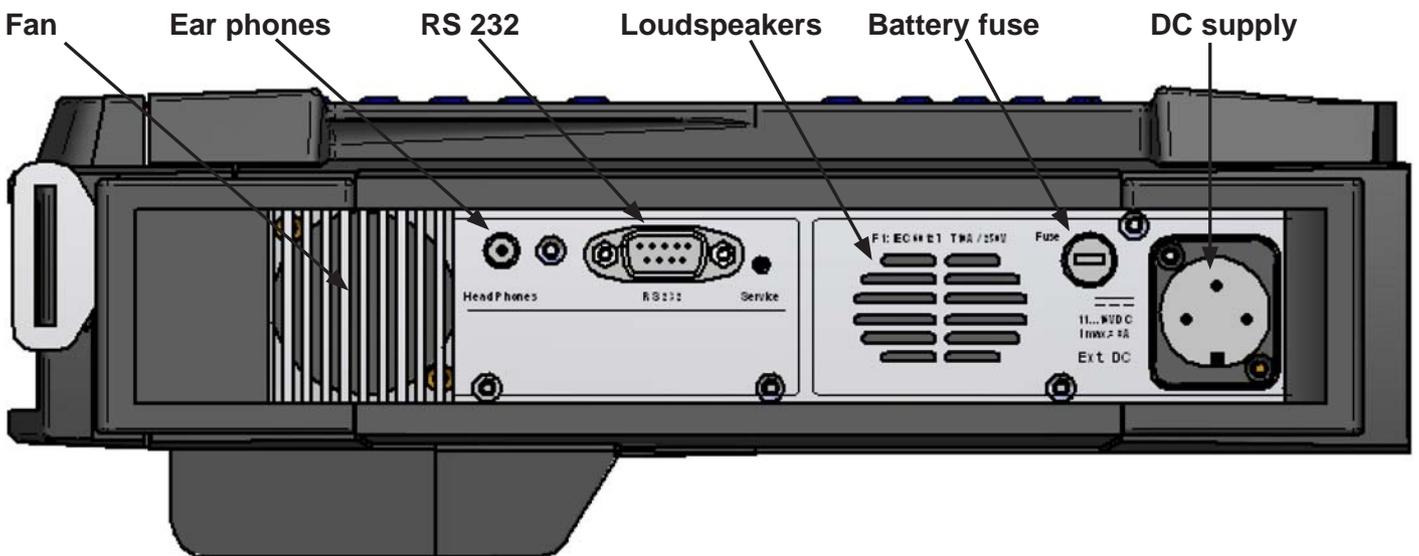
Cursor block	
	Reduce current values (frequency, channel, etc.)
	Increase current values (frequency, channel, etc.)
	Selection up
	Selection down
	Confirm input or selection
	Reduce volume
	Increase volume
	SD card memory management
	Store measurement device settings and measured values
	Recall measurement settings and measured values
Settings	
	Default settings and setting the digital modulation parameters
	Device settings
	Data logger (automatic measuring)
	Launch the DiSEqC™ menu
	LNB and remote power feed menu

CONNECTIONS

FRONT VIEW



SIDE VIEW



CONNECTIONS

RF INPUT SOCKET

Here the reception signal is delivered from the antenna system or cable network (coaxial F socket with BNC adapter).

The remote feeding voltage can be adjusted from $5 V_{DC}$ to $20 V_{DC}$ and can also be switched off. When the LNB voltage is switched on the right control LED illuminates green. If there is a short circuit or overload, this LED flashes green. If there is an external voltage, the LED is red.

Please note that there is

- no voltage level higher than 120 dB μ V,
- no peak voltage > 100 Volt

on the right RF input socket.

Failure to comply with these values can damage the input circuit!



USB PORT

Via the USB port (USB 1.1) inserted SD cards can be read.

SD CARD

The supplied SD memory card is used to store the measuring results. You can use SD cards of up to 1 GB max.

SCART OUTPUT



Via the scart socket on the front side of the MSK 125 the video and audio signals are available for evaluation on an external monitor. The  button allows you to switch to audio/video input.

Erroneous connection switching can damage the device!

COMMON INTERFACE

Slot for a common interface.

EAR PHONES SOCKET

Stereo 3.5 mm jack bush for connection of stereo ear phones

RS 232 INTERFACE

The RS 232 port allows you to perform a software update.

EXTERNAL DC POWER SUPPLY



The MSK 125 can be operated on the mains or by means of its integrated battery. The external voltage supply is provided by the supplied mains and charging unit via the DC socket on the left casing side of the MSK 125.

Use only the mains unit that came with the device.

GETTING STARTED

When you position the device please ensure that there is sufficient ventilation. To avoid overheating, the openings for the fan and the ventilation holes must be clear at all times.

SWITCH ON

- Connect the device with the charger/power unit and to the mains.
- Confirm the  button.
- Set the desired volume using the  or  buttons.

Software V1.0
SN: 000222

For app. 1 second the LC display indicates the current software version and serial number of the MSK 125.

Now feed the RF input with the reception signal from the receiver.

CH: . 48. TERR
LEV: 48.5dBuV D

LC display:

- channel (48)
- source (terrestrial)
- level (A = analogue; D = digital level measurement)

Use the , , ,  and  buttons to select the desired quality.

SWITCHING OFF

Briefly press the  button to store the latest settings and to automatically turn off the device.

Press the button for longer than 5 seconds to turn off the device. If you do so, the most recent settings will get lost.

SETUP MENU

The setup menu allows you to define the basic settings.

SETUP MENU SETTINGS

To call up the Setup menu:

Press the  button.

LNB DC
OFF=1 ON=2

Press the  or  buttons to switch LNB power supply on or off. Press the  button to keep the desired setting.

1. Setup menu

GETTING STARTED

LEVEL
dB μ V=1 dBmV=2

2. Setup menu

LOW LEVEL MUTE
OFF=1 ON=2

3. Setup menu

In the next menu press the **1**..**@** or **2**_{abc} button to define the measurement unit the level is to be indicated. Press **OK** to keep the current setting.

The next menu prompts you to set the mute function using the **1**..**@** or **2**_{abc} button. If you select ON, the MSK 125 is switched to silent as long as the incoming signal on the RF input is below 30 dB μ V. Press the **OK** button to keep the desired setting.

After you have set the low-level mute you automatically exit the third setup menu.

DEFAULT SETUP SETTINGS AT TIME OF SHIPMENT

Parameter	Setting
LNB DC	OFF
LEVEL	dB μ V
LOW LEVEL MUTE	ON

MAINS AND BATTERY OPERATION

The MSK 125 can be operated on the mains or by means of its integrated battery.

MAINS OPERATION



Remove the supplied AC power unit (100 V ... 250 V) from the packaging and connect it to the device and mains. The integrated

lithium-ion battery and the green LED next to the **ON/OFF** button indicate the external power supply.

For mains operation use only the supplied power unit. The power unit is connected to the XLR power supply socket on the left side of the device.

For longer times the devices is not used it should be connected to the mains occasionally (trickle charge)

Note: A 12 V vehicle supply cable can be obtained through our customer service (company ESC, address see page 67) (order no.: 19700841BF).

GETTING STARTED

BATTERY OPERATION

Before operating the device for the first time remove the T 8.0 A fuse from the packaging and place it in the fuse holder. This fuse prevents the device from being switched on accidentally during transportation.

Note



After the fuse has been inserted the charging status display does not function properly until the battery has been fully discharged once.

Battery operation is only possible if the battery is charged sufficiently. Otherwise the MSK 125 cannot be switched on.

Once the battery has fully discharged it must be recharged immediately to avoid damage to the battery.

Charging starts automatically after the device has been connected to the mains. The battery cannot overcharge thanks to a protection switch.

Battery operation is signalled by a red LED next to the  button.

The battery capacity is 6.45 Ah.

Press the  button to check the charging status of the lithium-ion battery.

The LC display indicates the following values:

- LNB or remote feeding voltage: 14.0 V
- LNB or remote feeding amperage: 255 mA
- 22 kHz switch on
- Battery charging status: 80 %
- Bar graph (8 x 10 %)



Press the  button again to exit this operating mode.

SAT

ANALOGUE SATELLITE RECEPTION

In SAT mode the MSK 125 can be adjusted to “Analogue” and “DVB S(2)” reception types.

SAT ANALOGUE/DVB-S(2) SWITCH



Press once = SAT analogue
Press again = DVB-S(2)
Press again = SAT analogue again

FREQUENCY DISPLAY AND ENTRY



To measure the level of a reception signal, you must first enter the desired frequency. The LC display indicates the frequency and the measured level. The frequency can be entered from 920 MHz to 2150 MHz in 100 kHz intervals.

COMMAND OVERVIEW OF SAT FREQUENCY ENTRY



Switch to satellite reception (analogue or digital)



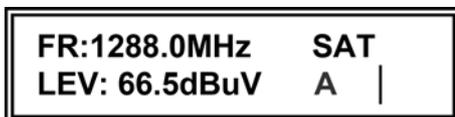
Enter frequency



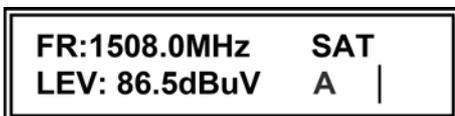
Frequency can be changed in 100 kHz intervals



Confirm entry



Example



LC display:

- Frequency: 1288.0 MHz
- Operating mode: SAT
- Level: 66.5 dB μ V A (A = analogue)

To enter the frequency 1508 MHz:

Press

LC display:

- Frequency: 1508.0 MHz
- Operating mode: SAT
- Level: 86.5 dB μ V (A = analogue)

A “+” or “-” on the display means that the MSK 125 has not been adjusted precisely to the desired carrier. Use the and buttons to refine the frequency for optimum reception. A vertical line on the display indicates optimum frequency adjustment.

Note



Complete your frequency entry by pressing the button. The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed by pressing .

SAT

LNB VOLTAGE AND 22 KHZ CHANGE-OVER

The LNB supply voltage is available at the RF socket. To turn on or

change the LNB voltage, press the  button.

The LNB voltage

- can be switched off = 0V
- can be adjusted from 5 V to 20 V in 0.1 V intervals
- is short-circuit proof (max. amperage 600 mA from 5 to 20 V)

The following voltages can be called up via button command:

Button	LNB voltage
[0]	0 V
[1]	12 V
[2]	14 V
[3]	18 V
[5]	5 V
[8]	22 kHz

For checking purposes the LED right from  button is on when the power supply is turned on.

Press the  button to indicate the power consumption of the connected LNB on the display.

The additionally connectable 22 kHz signal will superimpose the LNB voltage. It is necessary e.g. for the change-over of multi-feed systems or high band/low band LNB's.

Command overview for LNB voltage

	Call the LNB menu
 ... 	Select LNB voltage
 or 	Change LNB voltage in 0.1 V intervals
	22 kHz signal on/off
	Exit the LNB menu

Example



LNB:14,0V
150mA

Calling up 14 V LNB voltage:

Press the   buttons
LC display:

- LNB voltage: 14 V
- Current consumption: 150 mA

SAT

“SAT ANALOGUE” LEVEL MEASUREMENT

After you have set a frequency the level is measured automatically and indicated on the LC display in dB μ V or dBmV (depending on the basic configuration). The input level can be measured in the range of 30 dB μ V to 120 dB μ V (-30 dBmV to 60 dBmV).

FR:1508.0MHz	SAT
LEV: 86.5dBuV	A

Level overflow and underflow

LC display:

- Frequency: 1508.0 MHz
- Operating mode: SAT analogue
- Measured level: 86.5 dB μ V

FR:1508.0MHz	SAT
LEV: __. __dBuV	A

At a level < 30 dB μ V the LC display indicates an underflow. The following details are displayed:

- Frequency: 1508.0 MHz
- Operating mode: SAT analogue
- Level: underflow

FR:1508.0MHz	SAT
LEV: ---. ---dBuV	A

At a level > 120 dB μ V the LC display indicates an overflow. The following details are displayed:

- Frequency: 1508.0 MHz
- Operating mode: SAT analogue
- Level: Overflow

Note



The level of DVB-S(2) signals can only be measured properly with the setting “SAT digital reception”.

SOUND CARRIER FREQUENCY SETTING

Every analogue satellite video signal has multiple audio carrier frequencies assigned. On the MSK 125 you can listen to main and sub-audio carriers you choose. The audio carrier frequency can be adjusted from 5.0 MHz to 8.99 MHz in 10 kHz intervals. At 7.00 MHz the sound carrier bandwidth is automatically switched from “wide” (280 kHz) to “narrow” (150 kHz).

By default the following sound carrier frequencies are stored:

SAT

BUTTON	Frequency in MHz	Bandwidth
SELECT SOUND CARRIER		
[1]	5.80	wide Mono
[2]	6.50	wide Mono
[3]	6.65	wide Mono
[4]	7.02	narrow
[5]	7.20	narrow
[6]	7.38	narrow
[7]	7.56	narrow
[8]	7.74	narrow
[9]	7.92	narrow
[0]	Stereo (select left channel first)	

Command overview for SAT audio carrier frequencies



Launch the audio carrier menu



Select audio carrier



Change audio carrier frequency in 10 kHz intervals



Manually switch audio carrier bandwidth
wide = 280 kHz, narrow = 150 kHz



Exit the audio carrier menu

Example



Call the 7.38 MHz audio carrier



LC display:

- Audio sub-carrier: 7.38 MHz
- Audio carrier bandwidth: Narrow = 150 kHz
- Operating mode: SAT analogue

Note



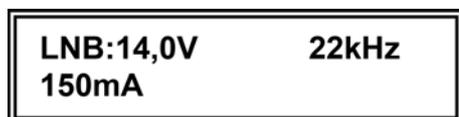
Example



The headphones output now delivers the 7.02 and 7.20 MHz stereo sound.

SAT

Example



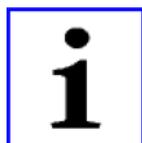
Switching on the 22 kHz signal

Press the button

LC display:

- LNB voltage: 14 V
- Current consumption: 150 mA
- 22 kHz signal switched on

Note



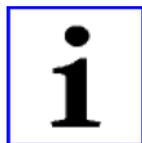
Press the button again to switch off the 22 kHz signal.

Press to exit the LNB menu.

DIGITAL SAT RECEPTION

In SAT mode the MSK 125 can be adjusted to “Analogue” and “DVB S(2)” reception types.

FREQUENCY DISPLAY AND ENTRY



To measure the level of a reception signal, you must first enter the desired frequency. The LC display indicates the frequency and the measured level. The frequency can be entered from 920 MHz to 2150 MHz in 100 kHz intervals.

COMMAND OVERVIEW OF SAT FREQUENCY ENTRY



Switch to satellite reception (analogue or digital)



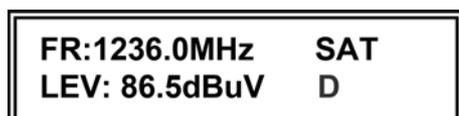
Enter frequency



Frequency can be changed in 100 kHz intervals



Confirm entry



LC display:

- Frequency: 1236.0 MHz
- Operating mode: SAT
- Level: 86.5 dB μ V D (D = digital)

Example



To enter the frequency 1236 MHz:

Press

SAT

FR:1236.0MHz SAT
LEV: 86.5dBuV D

LC display:

- Frequency: 1236.0 MHz
- Operating mode: SAT
- Level: 86.5 dB μ V (D = digital)

Note



Complete your frequency entry by pressing the  button. The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed by pressing .

LNB VOLTAGE AND 22 KHZ CHANGE-OVER

The LNB supply voltage is available at the RF socket. To turn on or change the LNB voltage, press the  button.

The LNB voltage

- can be switched off = 0V
- can be adjusted from 5 V to 20 V in 0.1 V intervals
- is short-circuit proof (max. amperage 600 mA from 5 to 20 V)

The following voltages can be called up via button command:

Button	LNB voltage
[0]	0 V
[1]	12 V
[2]	14 V
[3]	18 V
[5]	5 V
[8]	22 kHz

For checking purposes the LED right from  button is on when the power supply is turned on.

Press the  button to indicate the power consumption of the connected LNB on the display.

The additionally connectable 22 kHz signal will superimpose the LNB voltage. It is necessary e.g. for the change-over of multi-feed systems or high band/low band LNB's.

SAT

Command overview for LNB voltage

	Call the LNB menu
 ... 	Select LNB voltage
 or 	Change LNB voltage in 0.1 V intervals
	22 kHz signal on/off
	Exit the LNB menu

Example



Calling up 14 V LNB voltage:

Press the   buttons

LC display:

- LNB voltage: 14 V
- Current consumption: 150 mA

Note



By pressing the  or  button you can change the LNB voltage in 0.1 V intervals.

Press  to exit the LNB menu.

Example



Switching on the 22 kHz signal

Press the   button

LC display:

- LNB voltage: 14 V
- Current consumption: 150 mA
- 22 kHz signal switched on

Note



Press the  button again to switch off the 22 kHz signal.

Press  to exit the LNB menu.

SAT

“SAT DVB-S(2)” LEVEL MEASUREMENT

LC display during DVB-S(2) level measurement:

For how to switch from analogue to digital level measurement please see “SAT analogue” / “DVB-S(2) switch”.

FR:1236.0MHz SAT
LEV: 86.5dBuV D

- Frequency: 1236.0 MHz
- Operating mode: SAT digital
- Measured level: 86.5 dB μ V (D = digital)

SETTING DVB-S(2) DEMODULATION PARAMETERS



Press the  button to go to the symbol rate selection.

Note



1=27500 2=24500
3=22000 4=USER

SYMBOL RATE
23450 ks

The LC display indicates the following options:

Press the   buttons to select the desired symbol rate.

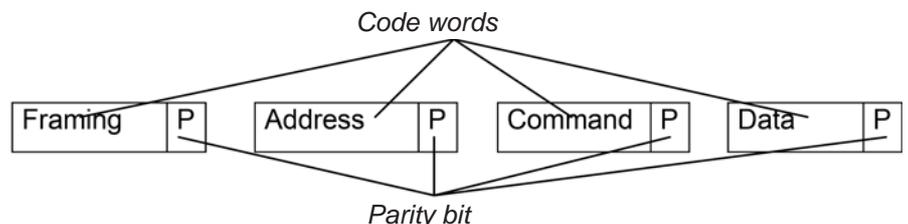
Press the  button to go to the menu for USER entry of the symbol rate. Enter the desired symbol rate and complete your entry

by pressing the  button.

If “0 Ks” is entered as the user symbol rate, the symbol rate is recognised automatically.

DiSEqC™ (DIGITAL SATELLITE EQUIPMENT CONTROL)

The DiSEqC™ system is used to control systems with extended control functions. DiSEqC™ uses a serial, bi-directional transmission process with a master and one or multiple slaves. The data bits are generated with pulse width modulation of the already existent 22 kHz carrier and are superimposed with 600 mV_{SS} of the LNB remote feeding voltage. The digital code words are composed of 8 data bits and one additional parity bit for the recognition of transmission errors. Multiple code words form one DiSEqC™ command. Code words are entered in hex code:



The MSK 125 can send signals based on DiSEqC™1.0 but cannot receive them.

SAT

COMMAND OVERVIEW FOR DISEQC™



If a DiSEqC™ matrix is activated via DiSEqC™ command, it must first be ensured that the analogue LNB control voltage is set to the correct Satellite frequency plane. I.e. if a vertical satellite frequency plane is required, it is essential to set the analogue LNB control voltage to 14 V. Then the correct DiSEqC™ command can be selected and sent.



Call DiSEqC™ menu

The TFT screen provides a selection of the most important DiSEqC™ commands for four satellite positions and their assignment of high band and low band as well as their “horizontal” or “vertical” polarisation.



User entry



Select the desired DiSEqC™ command



More DiSEqC™ or Simple DiSEqC™ commands



Send the selected command string

User entry



Code words are entered in hex code 0 ... 9



Code words are entered in hex code A ... F

Button	Hex code
 	A
 	B
 	S
 	D
 	E
 	F

SAT



Cursor commands for code words: “Framing”, “Address”, “Command” and “Data”



Delete the entire command string to the cursor position



Send the selected command string



Exit DiSEqC™ menu



Example of a user entry:

You wish to check the EXR 22 Kathrein matrix. The command set for the EXR 22 matrix is E0 00 24 (LNB High) and E0 00 20 (LNB Low).

Calling up “DiSEqC™”:

Press the  button

Press the  button to call up the user entry.



SAT-CTRL menu

The data bits of the individual code words can now be entered using

the  to  and   to   buttons.

Press the  button to send off the control command. The symbol “>” indicates that the control command has been sent.



DiSEqC™ menu



DiSEqC™ menu

Note

See the technical appendix for DiSEqC™ command sets for EXR 20, EXR 22 and 9xx series Kathrein matrices.



SAT

COMMAND OVERVIEW FOR FRAMING BYTE

HEX Byte	Description
E0	Master command, one-time transmission
E1	Master command, recurring transmission
E2	Master command, expecting response, first transmission
E3	Master command, expecting response, recurring transmission
E4	Response from Slave, "OK", no errors detected
E5	Response from slave, command not supported by slave
E6	Response from Slave, parity error detected
E7	Response from slave, command not recognised

COMMAND OVERVIEW FOR ADDRESS BYTE

Hex Byte	Description
00	All devices
10	Every LNB, matrix or SMATV
11	LNB
12	LNB with loop-through
14	Matrix (switcher)
15	Matrix (switcher) with loop-through
18	SMATV
20	Every polarizer
21	Maximum turn (full skew) in linear polarisation
22	Stepwise polarizer adjustment
30	Every positioner
31	Polar/Azimuth positioner
32	Elevation positioner
33	Combined positioner
34	LNB positioner
40	Installation help
41	Signal strength adjustment help
60	Reserved for assigned addresses
70	"Intelligent slave interface" for "Proprietary Multi-Master bus"
71	Interface for participants and controlled head end
Fx	OEM expansion

SAT

COMMAND OVERVIEW FOR COMMAND BYTE

The MSK 125 can send commands based on DiSEqC™1.0 but cannot receive them. All commands requiring DiSEqC™2.0 (send and receive) are **greyed out** in the table.

Commands in bold letters are preferred for Kathrein switching matrices.

Hex Byte	Command ID	Description	Number of Data Byte
00	Reset	Reset DiSEqC™ microcontroller	-
01	Clr Reset	Delete reset flag	-
02	Standby	Turn off peripheral power unit	-
03	Power on	Turn on peripheral power unit	-
04	Set Contend	Set the contention flag	-
05	Contend	Response only if contention flag has been set	-
06	Clr Contend	Delete the contention flag	-
07	Address	Response only if contention flag has not been set	-
08	Move C	Change address if contention flag has been set	1
09	Move	Change address if contention flag has not been set	1
10	Status	Read status register flags	-
11	Config	Read configuration flags	-
14	Switch 0	Read switching status flag (committed port)	-
15	Switch 1	Read switching status flag (uncommitted port)	-
16	Switch 2	Expansion option	-
17	Switch 3	Expansion option	-
20	Set LO	Call up low local oscillator frequency	-
21	Set VR	Call up vertical polarisation or clockwise circular polarisation	-
22	Set Pos A	Select satellite position A	-
23	Set S0A	Select switch option A	-
24	Set Hi	Call up high local oscillator frequency	-
25	Set HL	Call up horizontal polarisation or anti-clockwise circular polarisation	-
26	Set Pos B	Select satellite position B	-
27	Set S0B	Select switch option B	-
28	Set S1A	Call up matrix S1 input A (input B not active)	-
29	Set S2A	Call up matrix S2 input A (input B not active)	-
2A	Set S3A	Call up matrix S3 input A (input B not active)	-
2B	Set S4A	Call up matrix S4 input A (input B not active)	-
2C	Set S1B	Call up matrix S1 input B (input A not active)	-
2D	Set S2B	Call up matrix S2 input B (input A not active)	-
2E	Set S3B	Call up matrix S3 input B (input A not active)	-
2F	Set S4B	Call up matrix S4 input B (input A not active)	-
30	Sleep	All bus commands are ignored except for Awake	-
31	Awake	Bus commands are accepted again	-
38	Write N0	Set port group 0	1

SAT

39	Write N1	Set port group 1	1
3A	Write N2	Expansion option	1
3B	Write N3	Expansion option	1
40	Read A0	Read analogue value A0	-
41	Read A1	Read analogue value A1	-
48	Write A0	Set analogue value A0	1
49	Write A1	Set analogue value A1	1
4F	Write A7	Set analogue value A7	1
50	LO string	Read current frequency	-
51	LO now	Read current frequency (table entry number)	-
52	LO Lo	Read Lo frequency (table entry number)	-
53	LO Hi	Read Hi frequency (table entry number)	-
58	Write Freq	Write channel frequency	2 or 3
59	Ch.No.	Set selected channel number (receiver)	2
60	Halt	Stop positioner	-
61	Go E	Move positioner eastward	-
62	Go W	Move positioner westward	-
64	P Status	Read positioner status register	-
65	Read Pos	Read positioner counter	-
6C	Goto	Move positioner motor to "Counter value", Hi, Lo	2
6D	Write Pos	Set positioner counter, Hi, Lo	2

COMMAND OVERVIEW FOR DATA BYTE

An appropriate data byte must only be sent if the command byte requires data bytes. This can be seen in the above command byte table. For more information on which data byte to send to which command byte please refer to the specification of the device used.

Orbit position	Polarisation Switch Position H/V	Switch Position Low Band	Data Byte
1	V	Lo	F0
	V	Hi	F1
	H	Lo	F2
	H	Hi	F3
2	V	Lo	F4
	V	Hi	F5
	H	Lo	F6
	H	Hi	F7
3	V	Lo	F8
	V	Hi	F9
	H	Lo	FA
	H	Hi	FB
4	V	Lo	FC
	V	Hi	FD
	H	Lo	FE
	H	Hi	FF

SAT

LIST OF SINGLE CABLE DISEQC™ COMMAND

System:	Channel:	Satellite:	Transponder:	Channel:	DiSEqC™ command:
UAS 481	1400 MHz	Astra 19.2°	11.836 GHz, Hor. SR 27500	Das Erste	E0 10 5A 0D 99
	1400 MHz	Hotbird 13°	11.604 GHz, Hor. SR 27500	Das Erste	E0 10 5A 09 5F
EXR 501	1400 MHz	Astra 19.2°	11.836 GHz, Hor. SR 27500	Das Erste	E0 10 5A 0D 35
EXR 551			SR 27500		
EXR 552	1400 MHz	Hotbird 13°	11.604 GHz, Hor. SR 27500	Das Erste	E0 10 5A 09 CF
EXR 1581	1400 MHz	Astra 19.2°	11.836 GHz, Hor. SR 27500	Das Erste	E0 10 5A 2D 35
EXR 2581			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor. SR 27500	Das Erste	E0 10 5A 29 CF
EXR 1942	1400 MHz	Astra 19.2°	11.836 GHz, Hor. SR 27500	Das Erste	E0 10 5A 2D 35
EXR 2942			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor. SR 27500	Das Erste	E0 10 5A 39 CF
EXU 908	1400 MHz	Astra 19.2°	11.836 GHz, Hor. SR 27500	Das Erste	E0 10 5A 2D 35
			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor. SR 27500	Das Erste	E0 10 5A 39 CF
			SR 27500		

SIMPLE DISEQC™, TONE BURST

The Simple Tone Burst DiSEqC™ procedure is a simplified form of the DiSEqC™ control. In this Simple DiSEqC™ two switch status are possible: Tone Burst and Data Burst.

COMMAND OVERVIEW FOR “SIMPLE DISEQC™”

	Call DiSEqC™ menu
 	Call up Simple-DiSEqC™ menu
	Tone Burst entry
	Data Burst entry
	Send the selected command string
	Exit DiSEqC™ menu

SAT

DVB-S(2) MER, BER AND OFFSET MEASUREMENT

The modulation error rate (MER), the bit error rate (BER) and the carrier frequency offset (LNB offset) can be measured to rate the digital reception quality.

Note: In this case MER shown on the display has the same meaning as SNR (signal radio ratio).

Use the  button to select between SAT analogue and SAT digital.

Calling up DVB-S(2) measurement:

In SAT digital reception mode press the  button.

LC display:

MER:12.6dB 8PSK 9/10
BER: 1.7e-7 S2+ 0.72MHz

- MER modulation error rate: **12.6 dB**
- Modulation type **8PSK**
- Code rate **9/10**
- BER bit error rate: **1.7e-7**
- Standard = **DVBS2**
- Carrier frequency offset (LNB offset): **+0.72 MHz**

If the quality of the DVB signal is so good that no bit error can be detected, **BER = 0.0e+0** is displayed.

MPEG IMAGE REPRESENTATION IN DVB-S(2)

If you select DVB measurement by pressing , the TFT screen displays the list of programmes that can be received on the digital transport stream.

Use the  or  key to select the desired programme and confirm your selection by pressing .

To select the programme, you can also enter the displayed programme number directly:    .

If the programme can be received free of charge, the picture and sound of the desired programme are decoded and displayed or played back via the integrated speaker.

By pressing  again you can select another programme from the programme list.

Press  to exit digital reception.

SAT

LOCATING SATELLITES

The  function allows you to search for satellites whose transponder frequencies are unknown. The frequency range from 1000 to 2100 MHz is continuously scanned for reception signals. If a reception signal is detected, the reception level is indicated in the display in the form of an increasing or decreasing bar.

The   buttons allow you to set the measurement range to three sensitivity levels.

A bearing sound enables you to monitor the level. The pitch of the bearing sound is proportional to the received signal level. The volume of the bearing sound can be adjusted using

the   volume buttons.

Command overview



Switch to the “frequency-independent satellite search” mode.



Switch the measurement range, the bar graph and the bearing sound:

Level range 1: Large input levels

Level range 2: Medium input levels

Level range 3: Small input levels



Exit this mode

LC display:

- Level range 2: Medium input level
- SAT mode
- Bar graph display with bearing sound



Example



Launching the “Find satellite” function:

- Press the  button.
- Slowly turn the antenna until a level tendency can be seen on the bar display
- Slowly turn the antenna until the bar display reaches its maximum
- If necessary, decrease or increase the sensitivity using the

 and  buttons

- Press the  button to exit this function

SAT

FINDING INDIVIDUAL RECEPTION FREQUENCIES

The  function allows you to adjust the antenna to the maximum reception signal. The display indicates the reception in the form of an increasing or decreasing bar. The   buttons allow you to set the measurement range to three sensitivity levels.

The bearing sound enables you to monitor the level. The pitch of the bearing sound is proportional to the received signal level. The volume of the bearing sound can be adjusted using the

  volume buttons.

Command overview for finding



Switch to "Find" mode.



Switch the measurement range, the bar graph and the bearing sound:

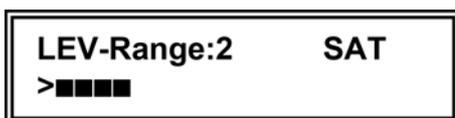
Level range 1: Large input levels

Level range 2: Medium input levels

Level range 3: Small input levels



Exit this mode



Example



Launching the "Find level" function:

- Press the  button
- Slowly turn the antenna until the bar display reaches its maximum
- If necessary, decrease or increase the sensitivity using the

 and  buttons

- Slowly turn the antenna until you have reached the maximum level

Exit "Find level":

Press the  button.

TV MEASUREMENT

ANALOGUE TV CABLE RECEPTION

In CABLE mode the MSK 125 can be set to the “Analogue” and “DVB-C” reception types.

ANALOGUE CABLE/DVB C SWITCH



Press once = Analogue cable TV
Press again = DVB-C
Press again = Back to analogue cable TV

HF STANDARD SWITCH - ANALOGUE CABLE (DEMOM MENU)

In TV mode the MSK 125 can measure the following standards:

- B/G standard (Germany)
- Standard L
- D/K standard
- Standard I

Command overview:

Calling up the DEMOD menu



Call up menu for standard change-over and demodulator setting.

1=B/G	2=L
3=D/K	4=I



Select standard
After that the Demod menu is exited automatically.



Press  or  to exit the Demod menu without any changes.

Note



If you wish to keep the settings unchanged, press .

Please note that the selected standard remains even after the device is switched off.

TV MEASUREMENT

CHANNEL DISPLAY AND ENTRY

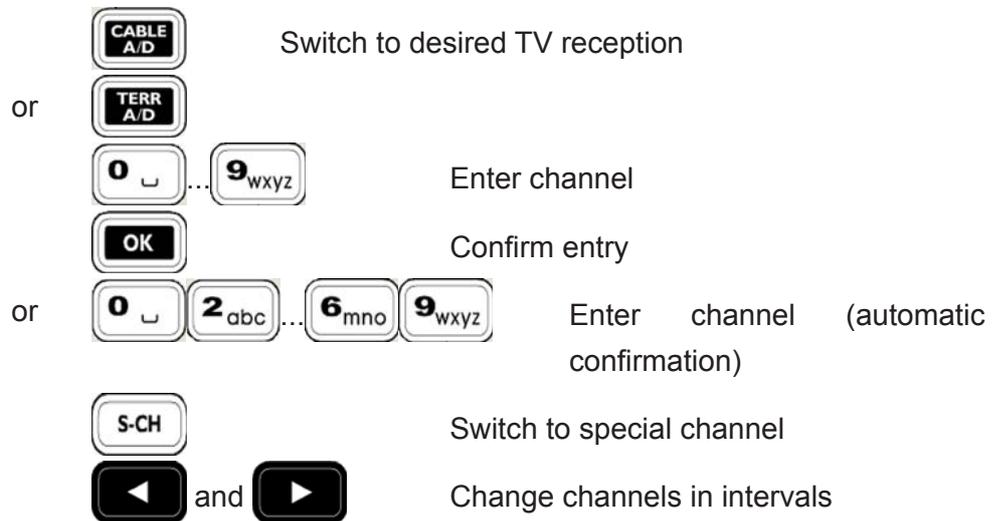
To measure the level of a reception signal, you must first enter the desired channel.

The following channels can be set:

- Band I/III CH 01 to CH 12 in 7 MHz raster
- Band IV/V CH 21 to CH 69 in 8 MHz raster
- Special channel S 01 to S 20 in 7 MHz raster
- Special channel S 21 to S 41 in 8 MHz raster

These details refer to the default Standard B/G only. For information on the other standards please see the technical appendix.

COMMAND OVERVIEW FOR TV CHANNEL ENTRY



Example



To enter channel S 28:

Press **S-CH** **2** **8**.

LC display:

- Special channel: S 28
- Level: 62.5 dB μ V
- Operating mode: Analogue cable TV (A=analogue)

Note



Ensure that the correct standard has been set. The default setting is Standard B/G.

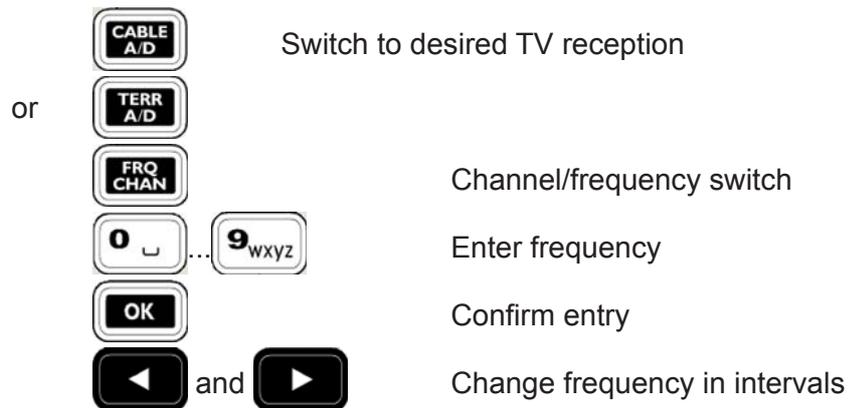
FREQUENCY DISPLAY AND ENTRY

To measure the level of a reception signal, you must first enter the desired video carrier frequency.

The frequency can be entered from 47 MHz to 862 MHz in 50 kHz intervals.

TV MEASUREMENT

COMMAND OVERVIEW FOR TV FREQUENCY ENTRY



Example



To enter the frequency 175.25 MHz:

Press  (calling up the frequency menu)
 Then       
 (frequency entry)

LC display:

- Frequency: 175.25 MHz
- Level: 65.0 dB μ V
- Operating mode: Analogue cable TV



Note



After calling up the frequency menu for the first time you have to enter the digit order for another frequency entry.

The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed by

pressing .



Please note that the points before and after the channel number refer to the precisely set channel:

CH: .10. or CH: S.04.

If you enter the frequency outside the valid channel raster, the channel is displayed without points:

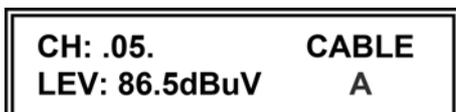
CH: 10 or CH: S 04

“CABLE ANALOGUE” LEVEL MEASUREMENT

After you have set a channel or frequency the level is measured automatically and indicated on the LC display in dB μ V or dBmV (depending on the device configuration). The input level can be measured in the range of 30 dB μ V to 120 dB μ V (-30 dBmV to 60 dBmV).

LC display:

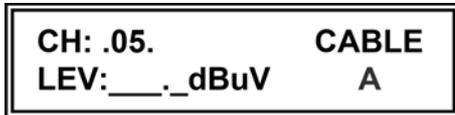
- Channel: CH 05
- Operating mode: Analogue cable TV
- Measured level: 86.5 dB μ V



TV MEASUREMENT

LEVEL OVERFLOW AND UNDERFLOW

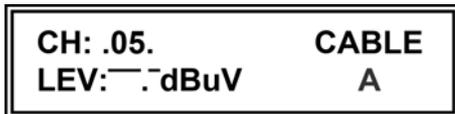
At a level < 30 dB μ V the LC display indicates an underflow.



LC display:

- Channel: CH 05
- Operating mode: Analogue cable TV
- Level: underflow

At a level > 120 dB μ V the LC display indicates an overflow.



LC display:

- Channel: CH 05
- Operating mode: Analogue cable TV
- Level: Overflow

Note



Levels of DVB-C and DVB-T/H signal can only be measured if Digital reception has been set.

AUDIO CARRIER SPACING AND LEVEL

TV stations can transmit on a second audio carrier - FM-modulated (analogue) - or in Nicam format (digital). Depending on the set standard the audio carriers are assigned various frequencies (see table). After channel and frequency entry audio carrier 1 is always set.

Standard	TT1	TT2	Nicam
B/G	5.5 MHz	5.74 MHz	5.85 MHz
D/K	6.5 MHz	6.26 MHz	5.85 MHz
I	6.0 MHz	-----	6.552 MHz
L	AM 6.5 MHz	-----	5.85 MHz

In audio carrier measurement the signal spacing between audio and video carrier in dB is measured first, then the absolute audio carrier level in dB μ V. During the measurement the speaker is mute. After completion of the measurement the modulation of the audio carrier last measured can be heard.

COMMAND OVERVIEW FOR “MEASURE TV AUDIO CARRIER FREQUENCY”



Switch to audio carrier menu



Switch between TT1 and TT2 (see table)
Audio carrier measurement while button is pressed



Switch to Nicam reception

TV MEASUREMENT

Example



SC: 5,50MHz	CABLE
LEV: -13.0dB	A

SC: 5,50MHz	CABLE
LEV: 58,5dBuV	A

To measure audio carrier level spacing and level of TT1:

Press ,

now press  and keep the button pressed.

The LC display indicates the following values for app. 1 second:

- Audio carrier level spacing - frequency: 5.5 MHz
- Audio carrier - video carrier spacing -13 dB
- Operating mode: Analogue cable TV

After app. 1 second the audio carrier level is displayed.

LC display:

- Audio carrier level spacing - frequency: 5.5 MHz
- Audio carrier level: 58.5 dB μ V
- Operating mode: Analogue cable TV

Release the  button.

To measure audio carrier level spacing and level of TT2:

During the audio carrier display press the  button.

To measure audio carrier level spacing and level of Nicam audio carriers:

During the audio carrier display press the  button.

SELECT SOUNDCARRIER

	B/G standard
1 =	5.50 MHz FM
2 =	5.74 MHz FM
3 =	5.85 MHz NICAM
0 =	5.50/5.74 MHz Stereo

To set the headphones output to "Stereo", confirm by pressing the "0" button.



The headphones output now delivers stereo sound.

Example

TV MEASUREMENT

Note



The audio carrier frequency cannot be adjusted. It is switched based on the set standard.

The audio carrier level is only displayed as long as the ,  or  button is pressed.

DIGITAL TV CABLE RECEPTION

In CABLE mode the MSK 125 can be set to the “Analogue” and “DVB-C” reception types.

ANALOGUE CABLE/DVB C SWITCH



Press once
Press again
Press again

= Analogue cable TV
= DVB-C
= Back to analogue cable TV

HF STANDARD SWITCH - ANALOGUE CABLE (DEMOM MENU)

In TV mode the MSK 125 can measure the following standards:

- B/G standard
- Standard L
- D/K standard
- Standard I

Command overview:

Calling up the DEMOD menu



Call up menu for standard change-over and demodulator setting.

1=B/G	2=L
3=D/K	4=I



Select standard
After that the Demod menu is exited automatically.



Press  or  to exit the Demod menu without any changes.

Note



If you wish to keep the settings unchanged, press .

Please note that the selected standard remains even after the device is switched off.

TV MEASUREMENT

CHANNEL DISPLAY AND ENTRY

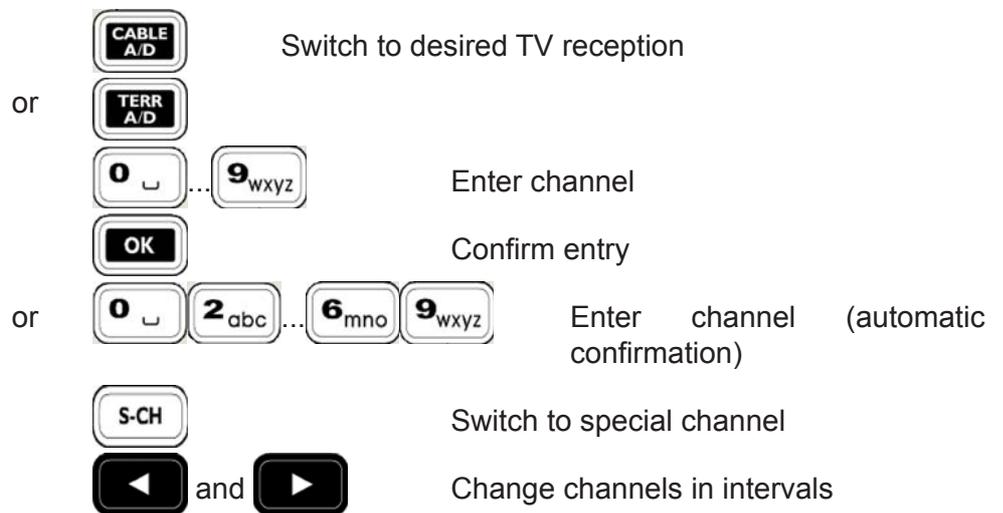
To measure the level of a reception signal, you must first enter the desired channel.

The following channels can be set:

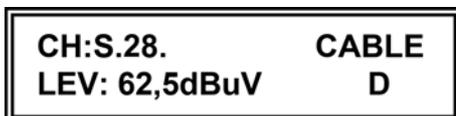
- Band I/III CH 01 to CH 12 in 7 MHz raster
- Band IV/V CH 21 to CH 69 in 8 MHz raster
- Special channel S 01 to S 20 in 7 MHz raster
- Special channel S 21 to S 41 in 8 MHz raster

These details refer to the default Standard B/G only. For information on the other standards please see the technical appendix.

COMMAND OVERVIEW FOR TV CHANNEL ENTRY



Example



To enter channel S 28:

Press **S-CH** **2** **8**.

LC display:

- Special channel: S 28
- Level: 62.5 dB μ V
- Operating mode: Digital cable TV (D=digital)

Note



Ensure that the correct standard has been set. The default setting is Standard B/G.

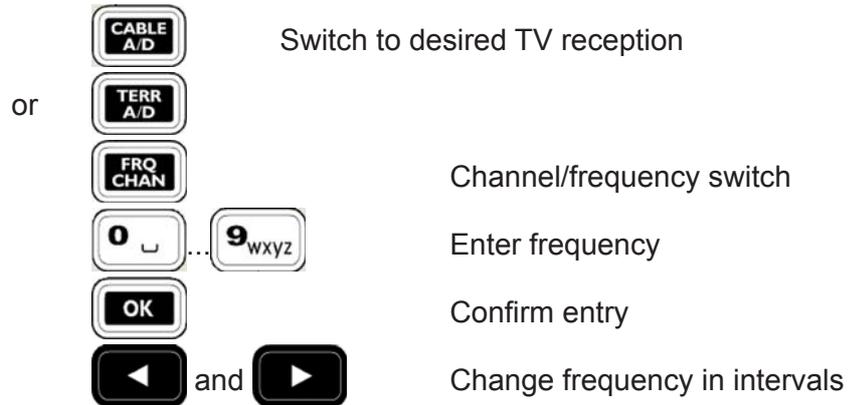
FREQUENCY DISPLAY AND ENTRY

To measure the level of a reception signal, you must first enter the desired video carrier frequency.

The frequency can be entered from 48 MHz to 858 MHz in 50 kHz intervals.

TV MEASUREMENT

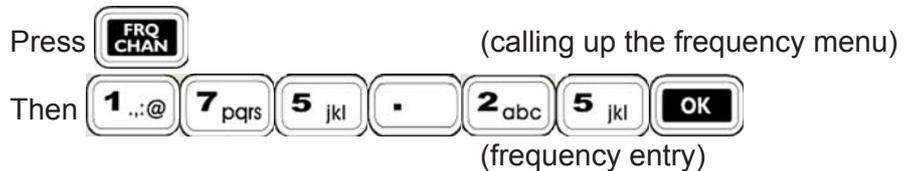
COMMAND OVERVIEW FOR TV FREQUENCY ENTRY



Example



To enter the frequency 175.25 MHz:



LC display:

- Frequency: 175.25 MHz
- Level: 65.0 dBµV
- Operating mode: TV DVB-C

Note



After calling up the frequency menu for the first time you have to enter the digit order for another frequency entry.

The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed by

pressing .



Please note that the points before and after the channel number refer to the precisely set channel:

CH: .10. or CH: S.04.

If you enter the frequency outside the valid channel raster, the channel is displayed without points:

CH: 10 or CH: S 04

SETTING DVB-C DEMODULATION PARAMETERS

 Press the  button to go to the demodulation selection:

For QAM64 demodulation press .

TV MEASUREMENT

1=QAM64 2=QAM128
3=DOC64 4=QAM256

If you do not wish to change the modulation type, press 

- 1 = QAM 64 demodulation
- 2 = QAM 128 demodulation
- 3 = DOCSIS QAM 64 demodulation
- 4 = QAM 256 demodulation

After selecting the modulation type you are automatically directed to the symbol rate entry.

1=6900 2=6111
3=6875 4=USER

Select the appropriate symbol rate by pressing  to .

LC display:

- 1 = 6900 kS
- 2 = 6111 kS
- 3 = 6875 kS
- 4 = USER

SYMBOL RATE
6300 ks

Press the  button to go to the menu for USER entry of the symbol rate.

Enter the desired symbol rate and complete your entry by pressing

the  button.

After selecting the symbol rate you are automatically directed to the HF standard switch.

LEVEL MEASUREMENT OF “DVB-C”/“DVB-T/H” SIGNALS

ANALOGUE CABLE/DVB C SWITCH



Press once
Press again

= Analogue cable TV
= DVB-C

CH:S. 54. CABLE
Level: 62.5 dBuV D

- Channel: Special channel 54
- Operating mode: TV DVB-C
- Measured level: 62.5 dB μ V

DVB-C/DVB-T/H MER, BER AND OFFSET MEASUREMENT



The modulation error rate (MER), the bit error rate (BER) and the carrier frequency offset can be measured to rate the digital reception quality.

To call up DVB-C/DVB-T/H measurement:

In CABLE digital or Terrestrial digital reception mode press the



button.

LC display for DVB-C signals:

- MER modulation error rate: 28.5 dB
- Modulation = 256 QAM
- BER bit error rate: 1.7e-7
- Standard = DVB-C
- Carrier frequency offset: +0.10 MHz

MER:28.5dB QAM256
BER: 1.7e-7 DC +0.10MHz

TV MEASUREMENT

MPEG IMAGE REPRESENTATION IN DVB-C

If you select DVB measurement by pressing , the TFT screen displays the list of programmes that can be received on the digital transport stream.

Use the  or  key to select the desired programme and confirm your selection by pressing .

To select the programme, you can also enter the displayed programme number directly.



If the programme can be received free of charge, the picture and sound of the desired programme are decoded and displayed or played back via the integrated speaker.

By pressing  again, you can select another programme from the programme list.

Press  to exit digital reception.

During the image display the Viterbi BER is displayed:

LC display for DVB-C signals:

MER modulation error rate: 28.5 dB

Modulation = 256 QAM

VBER Viterbi bit error rate: 1.7e-7

Standard = DVB-C

Carrier frequency offset: +0.10 MHz

MER:28.5dB QAM256
BER: 1.7e-7 DC +0.10MHz

TV MEASUREMENT

ANALOGUE TERRESTRIAL TV RECEPTION

In TERR mode the MSK 125 can be set to the “Analogue” and “DVB-T/H” reception types.

ANALOGUE TERRESTRIAL/DVB T/H SWITCH



Press once = Analogue terrestrial TV
Press again = DVB-T/H
Press again = Back to analogue terrestrial TV

HF STANDARD SWITCH - TERRESTRIAL

1=B/G	2=L
3=D/K	4=I



Call up the standard switch menu.



Select standard
After that the DEMODO menu is exited automatically.



Press or to exit the DEMODO menu without any changes.

SET CHANNEL BANDWIDTH

1=6 MHz	2=7 MHz
3=8 MHz	



Press the button to go to the bandwidth selection for DVB-T/H:

- 1 = 6 MHz demodulation bandwidth
- 2 = 7 MHz demodulation bandwidth
- 3 = 8 MHz demodulation bandwidth

Note



Select the required HF bandwidth by using the digit buttons
 ... or exit the entry without any changes by pressing .

After selecting the demodulation bandwidth you are automatically directed to the HF standard switch.

HF STANDARD SWITCH

1=B/G	2=L
3=D/K	4=I



Select standard

After that the DEMODO menu is exited automatically.

Note



If you wish to keep the settings unchanged, press . Please note that the selected standard remains even after the device is switched off.

Press the button to exit the menu at any time.

The HF standard switch is for setting the channel bandwidth.

TV MEASUREMENT

CHANNEL DISPLAY AND ENTRY

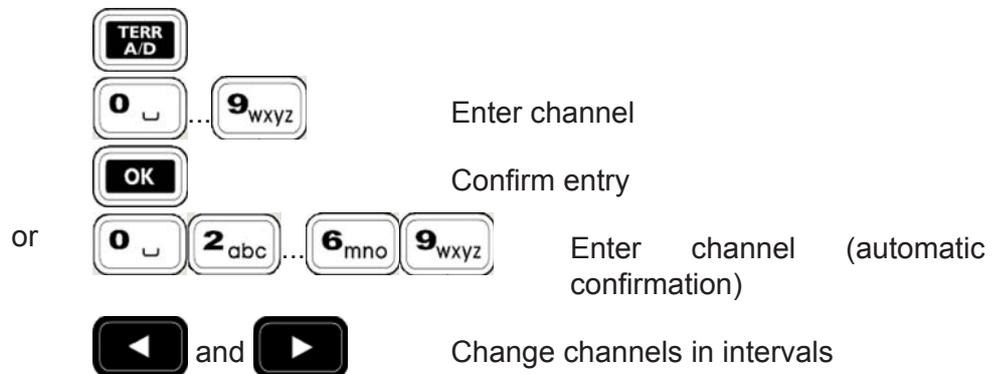
To measure the level of a reception signal, you must first enter the desired channel.

The following channels can be set:

- Band I/III CH 01 to CH 12 in 7 MHz raster
- Band IV/V CH 21 to CH 69 in 8 MHz raster
- Special channel S 01 to S 20 in 7 MHz raster
- Special channel S 21 to S 41 in 8 MHz raster

These details refer to the default Standard B/G only. For information on the other standards please see the technical appendix.

COMMAND OVERVIEW FOR TV CHANNEL ENTRY



Example



Note



To enter channel 28:

Press **2** abc **8** tuv .

LC display:

- Channel: 28
- Level: 61.0 dB μ V
- Operating mode: Analogue terrestrial TV (A = analog)

Ensure that the correct standard has been set. The default setting is Standard B/G.

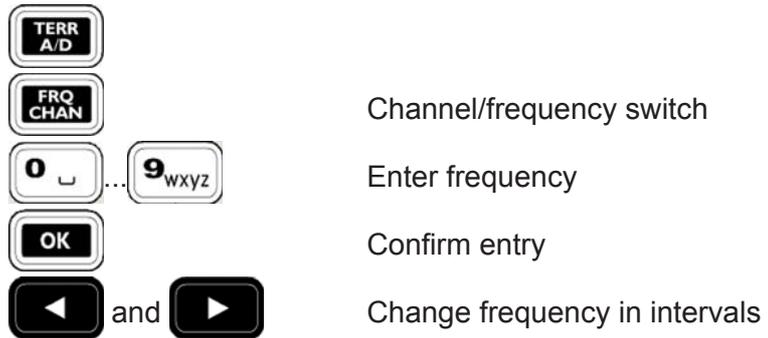
FREQUENCY DISPLAY AND ENTRY

To measure the level of a reception signal, you must first enter the desired video carrier frequency.

The frequency can be entered from 48 MHz to 858 MHz in 50 kHz intervals.

TV MEASUREMENT

COMMAND OVERVIEW FOR TV FREQUENCY ENTRY



Channel/frequency switch

Enter frequency

Confirm entry

Change frequency in intervals

Example



To enter the frequency 175.25 MHz:

Press (calling up the frequency menu)

Then
(frequency entry)



LC display:

- Frequency: 175.25 MHz
- Level: 65.0 dB μ V
- Operating mode: Analogue terrestrial TV

Note



After calling up the frequency menu for the first time you have to enter the digit order for another frequency entry.

The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed

by pressing .



Please note that the points before and after the channel number refer to the precisely set channel:

CH: .10. or CH: S.04.

If you enter the frequency outside the valid channel raster, the channel is displayed without points:

CH: 10 or CH: S 04

TV MEASUREMENT

DIGITAL TERRESTRIAL TV RECEPTION

In TERR mode the MSK 125 can be set to the “Analogue” and “DVB-T/H” reception types.

ANALOGUE TERRESTRIAL/DVB T/H SWITCH



Press once = Analogue terrestrial TV
Press again = DVB-T/H
Press again = Back to analogue terrestrial TV

HF STANDARD SWITCH - TERRESTRIAL

1=B/G	2=L
3=D/K	4=I



Call up the standard switch menu.



Select standard
After that the Demod menu is exited automatically.



Press or to exit the Demod menu without any changes.

SETTING DVB-T/H DEMODULATION PARAMETERS

1=6 MHz	2=7 MHz
3=8 MHz	



Press the button to go to the bandwidth selection for DVB-T/H:

- 1 = 6 MHz demodulation bandwidth
- 2 = 7 MHz demodulation bandwidth
- 3 = 8 MHz demodulation bandwidth

Note



Select the required HF bandwidth by using the digit buttons
... or exit the entry without any changes by pressing .

The MSK 125 sets all other parameters for DVB-T/H demodulation automatically.

After selecting the demodulation bandwidth you are automatically directed to the HF standard switch.

HF STANDARD SWITCH - DVB-T

1=B/G	2=L
3=D/K	4=I



Select standard
After that the DEMOD menu is exited automatically.

Note



If you wish to keep the settings unchanged, press . Please note that the selected standard remains even after the device is switched off.

Press the button to exit the menu at any time.

The HF standard switch is for setting the channel bandwidth.

TV MEASUREMENT

CHANNEL DISPLAY AND ENTRY

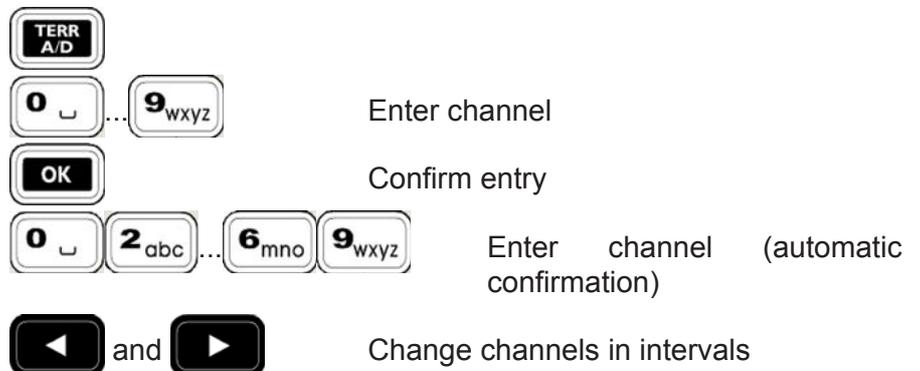
To measure the level of a reception signal, you must first enter the desired channel.

The following channels can be set:

- Band I/III CH 01 to CH 12 in 7 MHz raster
- Band IV/V CH 21 to CH 69 in 8 MHz raster
- Special channel S 01 to S 20 in 7 MHz raster
- Special channel S 21 to S 41 in 8 MHz raster

These details refer to the default Standard B/G only. For information on the other standards please see the technical appendix.

COMMAND OVERVIEW FOR TV CHANNEL ENTRY



Example



Note



To enter channel 28:

Press **2 abc** **8 tuv**.

LC display:

- Channel: 28
- Level: 61.0 dB μ V
- Operating mode: Digital terrestrial TV (D = digital)

Ensure that the correct standard has been set. The default setting is Standard B/G.

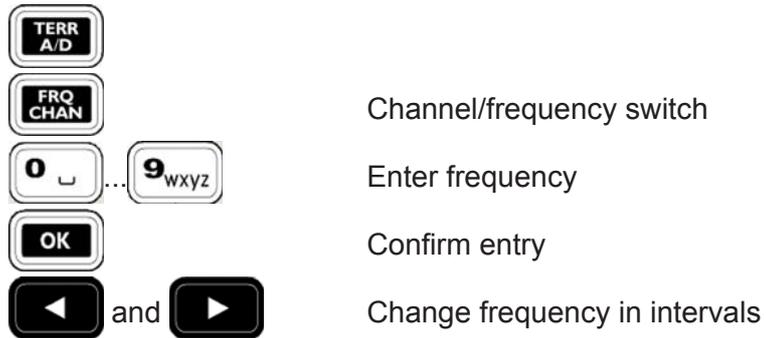
FREQUENCY DISPLAY AND ENTRY

To measure the level of a reception signal, you must first enter the desired video carrier frequency.

The frequency can be entered from 48 MHz to 858 MHz in 50 kHz intervals.

TV MEASUREMENT

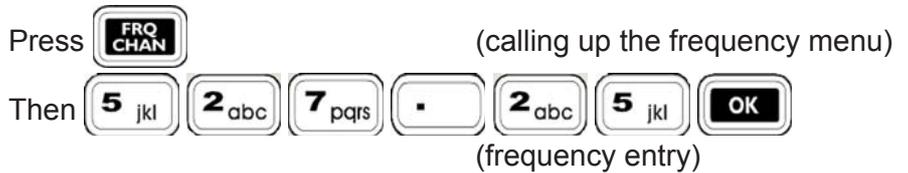
COMMAND OVERVIEW FOR TV FREQUENCY ENTRY



Example



To enter the frequency 527.25 MHz:



LC display:

- Frequency: 527.25 MHz (corresponds to K 28)
- Level: 61.0 dB μ V
- Operating mode: Digital terrestrial TV

Note



After calling up the frequency menu for the first time you have to enter the digit order for another frequency entry.

The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed by

pressing **OK**.



Please note that the points before and after the channel number refer to the precisely set channel:

CH: .10. or CH: S.04.

If you enter the frequency outside the valid channel raster, the channel is displayed without points:

CH: 10 or CH: S 04

DVB-C/DVB-T/H MER, BER AND OFFSET MEASUREMENT

The modulation error rate (MER), the bit error rate (BER) and the carrier frequency offset can be measured to rate the digital reception quality.



To call up DVB-C/DVB-T/H measurement:

In CABLE digital or Terrestrial digital reception mode press the

DVB button.

TV MEASUREMENT

MER:32.0dB QAM64
BER6.4e-8 DC-0.1 MHz

LC display for DVB-C signals:

- MER modulation error rate: 32.0 dB
- Modulation = 64 QAM
- BER bit error rate: 6.4e-8
- Standard = DVB-C
- Carrier frequency offset: -0.10 MHz

MER:24.8dB QAM16 2/3
CBER6.4e-8 DT-0.1 MHz

LC display for DVB-T signals:

- MER modulation error rate: 24.8 dB
- Modulation = 16 QAM
- CBER bit error rate: 6.4e-8
- Standard = DVB-T
- Carrier frequency offset: -0.10 MHz

MPEG IMAGE REPRESENTATION IN DVB-T

If you select DVB measurement by pressing , the TFT screen displays the list of programmes that can be received on the digital transport stream.

Use the  or  key to select the desired programme and confirm your selection by pressing .

To select the programme, you can also enter the displayed programme number directly.

  ..@ ... .

If the programme can be received free of charge, the picture and sound of the desired programme are decoded and displayed or played back via the integrated speaker.

By pressing  again you can select another programme from the programme list.

Press  to exit digital reception.

During the image display the Viterbi BER is displayed:

LC display for DVB-T/H signals:

MER modulation error rate: 24.8 dB

Modulation = 64 QAM

VBER Viterbi bit error rate: 6.4e-8

Standard = DVB-T/H

Carrier frequency offset: -0.10 MHz

MER:24.8dB QAM 64
VBER6.4e-8 DT-0.1 MHz

TV MEASUREMENT

FINDING INDIVIDUAL RECEPTION FREQUENCIES

The  function allows you to adjust the antenna to the maximum reception signal. The display indicates the reception in the form of an increasing or decreasing bar. The   buttons allow you to set the measurement range to three sensitivity levels. The bearing sound enables you to monitor the level. The pitch of the bearing sound is proportional to the received signal level. The volume of the bearing sound can be adjusted using the   volume buttons.

Command overview for finding



Switch to “Find” mode



Switch the measurement range, the bar graph and the bearing sound:

Level range 1: Large input levels

Level range 2: Medium input levels

Level range 3: Small input levels



Exit this mode

LC display:

- Level range 2: Input level
- Operating mode: Terrestrial TV
- Bar graph display



Example



Launching the “Find level” function:

Press the  button.

Turn the antenna until the bar display reaches its maximum.

If necessary, decrease or increase the sensitivity using the



Turn the antenna until you have reached the maximum level.

To exit “Find level”:

Press the  button.

TV MEASUREMENT

NICAM AUDIO BIT ERROR RATE MEASUREMENT

For better evaluation of the Nicam signal audio quality the bit error rate (BER) can be measured.

Example



SC: 5.85 MHz	CABLE
BER=2.145E-05	A

To call bit error rate measurement:

Press the  button

Press the  button

If the quality of the DVB signal is so good that no bit error can be detected, **BER=0.000** is displayed.

If the Nicam signal is too bad or no signal is received, the display indicates "**Overflow**".

FM MEASUREMENT

FM SWITCH

Press the  button.

FREQUENCY DISPLAY AND ENTRY

To measure the level of an FM signal, you must first enter the desired frequency.

The frequency can be entered from 47 MHz to 862 MHz in 50 kHz intervals.

COMMAND OVERVIEW FOR FM FREQUENCY ENTRY

	Switch to FM reception
 ... 	Enter frequency
	Confirm entry
 and 	Change frequency in 50 kHz intervals

Example



To enter the frequency 99.25 MHz

Press  (launching the FM menu)

Then      
(frequency entry)

FR: 99.25	FM
LEV: 65.0dBuV	A

LC display:

- Frequency: 99.25 MHz
- Level: 65.0 dB μ V
- Operating mode: FM

Note



After calling up the FM menu for the first time you have to enter the digit order for another frequency entry.

The most recent frequency setting remains even after you switch the MSK 125 off if it has been entered with digits and confirmed

by pressing .

LEVEL MEASUREMENT

After you have set a frequency the level is measured automatically and displayed in dB μ V on the LC display. The input level can be measured in the range of 30 dB μ V to 120 dB μ V.

LC display:

- Frequency: 104.8 MHz
- Operating mode: FM
- Measured level: 86.5 dB μ V

Fr: 104.80MHz	FM
LEV: 86.5dBuV	A

FM MEASUREMENT

LEVEL OVERFLOW AND UNDERFLOW

FR:104.80MHz FM
LEV: ___._dBuV A |

FR:104,80MHz FM
LEV: _____.dBuV A |

At a level < 30 dB μ V the display indicates an underflow.

LC display:

- Frequency: 104.8 MHz
- Operating mode: FM
- Level: underflow

At a level > 120 dB μ V the LC display indicates an overflow.

LC display:

- Frequency: 104.8 MHz
- Operating mode: TV
- Level: Overflow

FINDING INDIVIDUAL RECEPTION FREQUENCIES

The  function allows you to adjust the antenna to the maximum reception signal. The display indicates the reception in the

form of an increasing or decreasing bar. The   buttons allow you to set the measurement range to three sensitivity levels.

The bearing sound enables you to monitor the level. The pitch of the bearing sound is proportional to the received signal level.

The volume of the bearing sound can be adjusted using the

  volume buttons.

COMMAND OVERVIEW FOR “FIND”



Switch to “Find” mode



Switch the measurement range, the bar graph and the bearing sound:

Level range 1: Large input levels

Level range 2: Medium input levels

Level range 3: Small input levels



Exit this mode

LEV-RANGE:2 FM
>■■■■■

LC display:

- Level range 2: Medium input level
- Operating mode: FM
- Bar graph display

Example



Launching the “Find level” function: Press the  button. Turn the antenna until the bar display reaches its maximum. If necessary, decrease or increase the sensitivity using the

  buttons. Turn the antenna until you have reached the maximum level.

To exit “Find level”: Press the  button.

SPECTRUM MEASUREMENT

For evaluation of a receiver the frequency spectrum in the “**Satellite**”, “**Cable**”, “**Terrestrial**” and “**FM**” modes can be displayed on the screen.

Spectrum measurement is launched from the individual modes (Sat, Cab;e, Terr, or FM).

Command for spectrum measurement .

Exit the measuring job. Press  or  again.

If you exit spectrum analysis using the  button, the original reception frequency settings are kept. If you change the cursor position and exit spectrum analysis using , the new cursor frequency is accepted as the new reception frequency.

To measure certain level minimums or maximums, you can move a cursor on the level curve using the  and  buttons. The frequency and the measured value are indicated in the top line of the screen. The measuring range is displayed on the ordinate in dB μ V on the left side of the screen. The level measurement range is set automatically.

Note

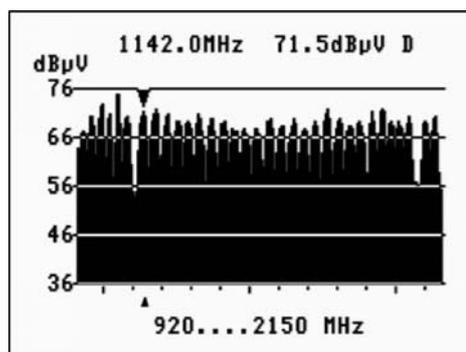


In spectrum analysis the level peak value is always measured.

SAT SPECTRUM

In SAT mode (see corresponding chapter) the whole **Sat spectrum of each set satellite frequency plane of 920 ... 2150 MHz** can be displayed.

SAT-Full



TV SPECTRUM

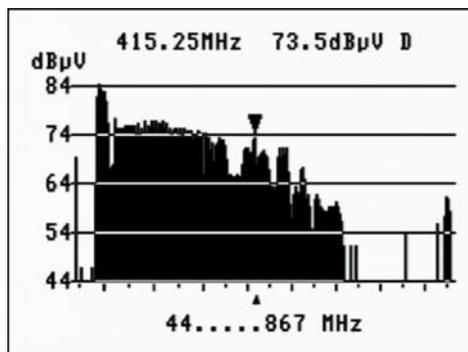
The TV spectrum is divided up into four modes (see corresponding chapter), which can be selected using the , ,  and  buttons, see screenshot and description on the next page:

SPECTRUM MEASUREMENT

SELECT TV SPECTRUM
1 = FULL SPAN
2 = VHF
3 = UHF
4 = NARROW

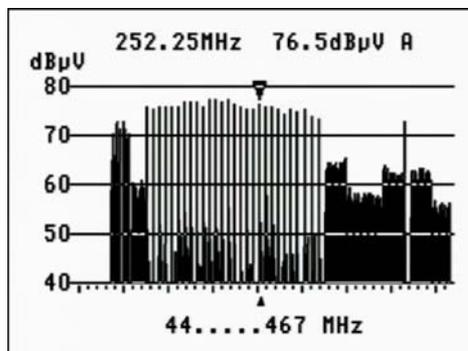
TV-Full

1 .: @ FULL SPAN = entire TV range (48 ... 858 MHz)



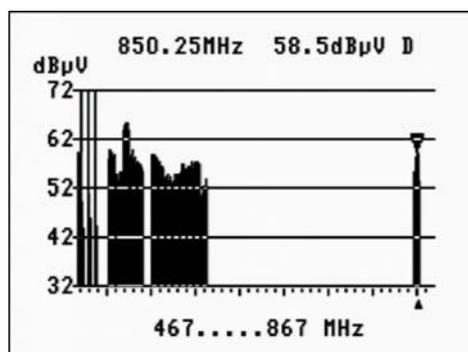
VHF

2 abc VHF (48 ... 467 MHz)



UHF

3 def UHF (467 ... 858 MHz)



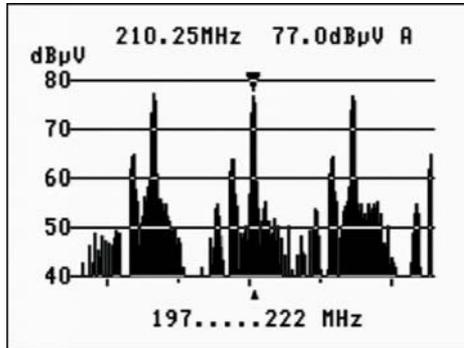
SPECTRUM MEASUREMENT

The displayed centre frequency is the previously set reception channel.

TV-Narrow

4 ghi

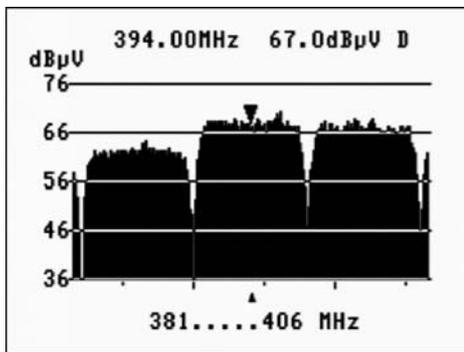
NARROW (197 ... 222 MHz) ANALOGUE



TV-Narrow

4 ghi

NARROW (381 ... 406 MHz) DIGITAL

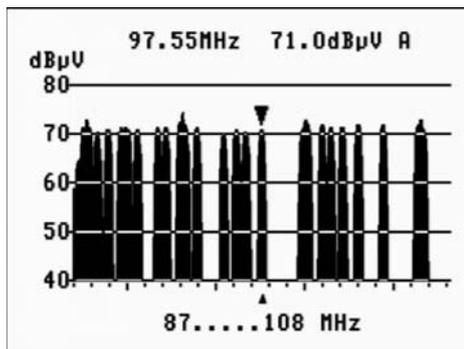


FM SPECTRUM

The displayed centre frequency is the previously set receiving frequency.

FM CCIR

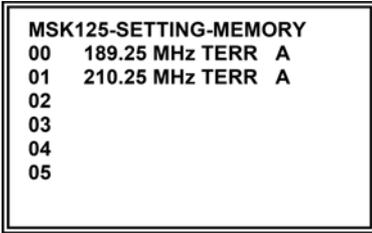
Select and measure the “FM spectrum” as described above. It reaches from 87 ... 108 MHz.



STORING DEVICE SETTINGS

STORING DEVICE SETTINGS

TFT display



LC display



First select the measuring job!



Indicates the stored settings on the TFT display and opens the entry field to define a storage place on the LC display.



Use the Up and Down buttons to go a page up or down in the screen content.



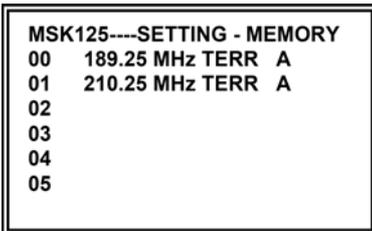
From 00 to 99 every measurement can be stored individually.



Complete - the setting has been stored.

STORING DEVICE SETTINGS

TFT display



LC display



Indicates the stored settings on the TFT display and opens the entry field of the storage place where the setting is to be retrieved.



Use the Up and Down buttons to go a page up or down in the screen content.

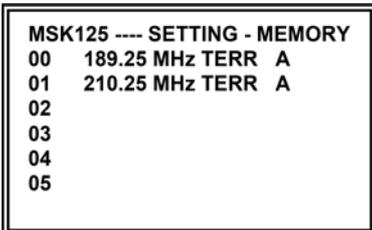


Enter storage place 00 ... 99. From 00 to 99 every storage place can be called up.

The setting is applied.

DELETING DEVICE SETTINGS

TFT display



LC display



Indicates the stored settings on the TFT display and opens the entry field of the storage place where the setting is to be deleted.



Use the Up and Down buttons to go a page up or down in the screen content.



Enter the **point** before the storage number: Enter storage place .00 to 99. From 00 to 99 any storage place can be deleted, or if you enter 00 ... 99, the entire memory will be deleted.

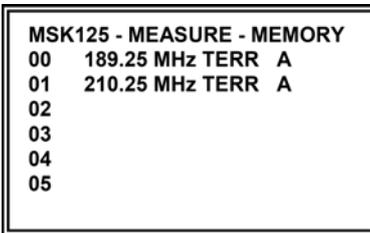


Complete - the storage place is deleted.

STORING MEASUREMENT RESULTS

STORING MEASUREMENT RESULTS IN THE DEVICE MEMORY

TFT display



LC display



Note

First select the measuring job and perform the measurement!



The Memory Explorer command displays the stored measuring results on the TFT display.



Use the Up and Down buttons to go a page up or down in the screen content.



Opens the entry field on the LC display to determine a storage place for the new measurement result.



Enter storage place 00 ... 99.

From 00 to 99 every measurement can be stored individually.



Complete - the measurement results have been stored in the device.

Up to 10 spectrum images can be stored. You can select any storage place (storage number) of your choice. If you try to store more than 10 spectrum images, the following message will be displayed:

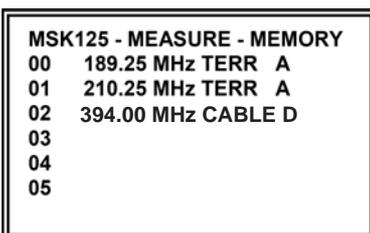
Spectrum Memory Full!

Only 10 Spec. Possible

You then need to delete at least 1 spectrum storage place (see next page).

RECOVERING MEASUREMENT RESULTS FROM THE DEVICE MEMORY

TFT display



LC display



The Memory Explorer command displays the stored measuring results on the TFT display.



Use the Up and Down buttons to go a page up or down in the screen content.



Opens the entry field on the LC display for entry of the storage place where the measurement results are to be retrieved.



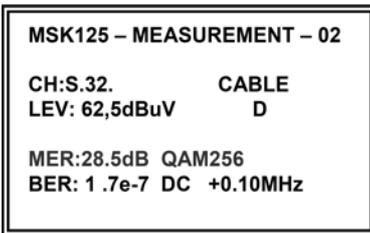
Enter storage place 00 ... 99.

From 00 to 99 any storage place can be called up.

The measurement results are indicated on the TFT display (example: measurement result no.: 02).

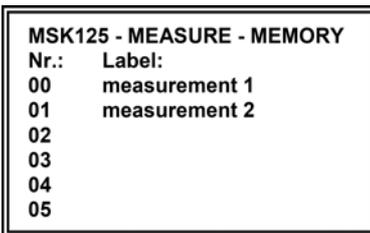
STORING MEASUREMENT RESULTS

TFT display



DELETING MEASUREMENT RESULTS FROM THE DEVICE MEMORY

TFT display



The Memory Explorer command displays the stored measuring results on the TFT display.



Indicates the stored settings on the TFT display and opens the entry field of the storage place where the measurement results are to be deleted.



Use the Up and Down buttons to go a page up or down in the screen content.

LC display



Enter the **point** before the storage number: Enter storage place .00 to .99. From 00 to 99 any storage place can be deleted, or if you enter 00 ... 99, the entire memory will be deleted.

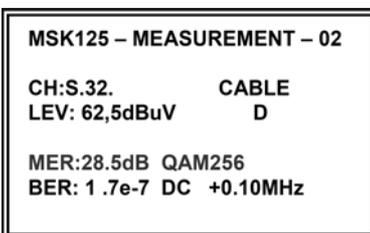


Complete - the storage place is deleted.

STORING MEASUREMENT RESULTS ON THE SD CARD

First get the measurement result stored in the device onto the TFT display as described above under "Recovering measurement results". Here storage place "2":

TFT display



Storage place "02" is displayed.



Press the button

LC display



The LC display reads "from 02 - █"

If you press again without entering another storage place, the measurement results of storage "02" will be stored on the SD card (memory card) under a serial number.

STORING MEASUREMENT RESULTS

LC display

from 02 - 15

If you wish to copy a complete storage range to the SD card, enter the last storage place

before you press  for the second time, e.g.: "from 02 - 15".

LC display

STORED TO SD-CARD



The storage places "02" to "15" are stored on the SD card under a serial number. The LC display confirms the storing with the message "**STORED TO SD-CARD**".

Note



You can either transfer the measurement results on the SD card to a PC via USB connection or read, manage and print out the SD card directly on your PC!

The required conversion program is available on our web site. Please go to "<http://www.kathrein.de>", then to "Service", "Software and Downloads", "Measuring-Instrument", "MSK 125".

DATA LOGGER

The Data Logger setting allows you to execute the stored measurement device settings in a row and store the corresponding measurement results.

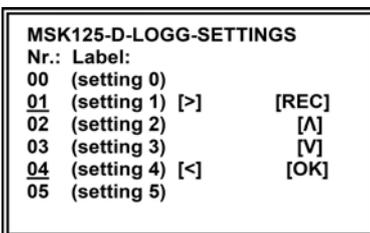
For automatic measuring the stored device settings are used. Up to 100 (00 ... 99) different measurement series can be stored.

Note



Before using the "DATA LOGGER" function you must store the required device settings in the "**Store device settings**" menu.

TFT display



The  (Data Logger) button launches the automeasure function.



Use the Up and Down buttons to go a page up or down in the screen content.

LC display



The LC display displays the message "Press MEMO EXPL for measurement results".

During a measurement process you can use a maximum of 10 spectrum settings.

If you try to run more than 10 spectrum settings, the following message will be displayed:

**Spectrum Memory Full!
Only 10 Spec. Possible!**

At this point the Data Logger stops its measurement.

ENTERING THE START AND STOP LINE FOR AUTOMATIC MEASURING

ENTERING THE START LINE FOR AUTOMATIC MEASURING



Use the  button and the two-digit setting storage number to select the start line where automatic measuring is to start.

DATA LOGGER

ENTERING THE STOP LINE FOR AUTOMATIC MEASURING



Use the  button and the two-digit setting storage number to select the stop line where automatic measuring is to stop.

STARTING AND INTERRUPTING AUTOMATIC MEASURING



Use the cursor button  to start automatic measuring.

Automatic measuring stops at the stop line. The measurement results are stored in the measured value storage.



Use the cursor button  to interrupt automatic measuring.

RECOVERING MEASUREMENT RESULTS FROM THE DEVICE MEMORY

TFT display

MSK125 – MEASURE - MEMORY	
Nr.:	Label:
00	measurement 0
01	measurement 1
02	measurement 2
03	measurement 3



The Memory Explorer command displays the stored measuring results on the TFT display.



Use the Up and Down buttons to go a page up or down in the screen content.

LC display

RECALL: █ _



Opens the entry field on the LC display for entry of the storage place where the measurement results are to be retrieved.

TFT display

MSK125 – MEASUREMENT – 02	
CH:S.32.	CABLE
LEV: 62,5dBuV	D
MER:28.5dB 256QAM	
BER: 1.7e-7 DC +0.10MHz	



Enter storage place 00 ... 99.

The measurement results are indicated on the TFT display (example: measurement result no.: 02).

DATA LOGGER

STORING THE DATA LOGGER MEASUREMENT RESULTS ON THE SD CARD

See: Storing measurement results on the SD card.

Example



```
MSK125-D-LOGG-SETTINGS
Nr.: Label:
00 (setting 0)
01 (setting 1) [>] [REC]
02 (setting 2) [^]
03 (setting 3) [V]
04 (setting 4) [<] [OK]
05 (setting 5)
```

```
MSK125 - MEASURE - MEMORY
Nr.: Label:
00 measurement 0
01 measurement 1
02 measurement 2
03 measurement 3
04 measurement 4
05 measurement 5
```

```
MSK125 - MEASUREMENT - 01
CH:S.32. CABLE
LEV: 62,5dBuV D
MER:28.5dB QAM256
BER: 1.7e-7 DC +0.10MHz
```

```
STORED TO SD-CARD
```



Call up Data Logger



Select start line



Select stop line



Start automeasure

After completion of the process:



Launch measured value storage



Get first measurement result from the storage



Store measurement results on SD card

from 01- 0 4 ghi Select start line

Message:

The measurement results have been written into a file (automatic file number) on the SD card.

MAINTENANCE

The device maintenance is basically limited to outside cleaning.

DEVICE CALIBRATION

The caliber interval depends on the use and load and should be between one and two years. Calibration can be done by Kathrein customer service. For address see next page.

OUTSIDE CLEANING

For outside cleaning a soft cloth, non-linting duster or paint brush is recommended. For strong contamination spirit or mild soapsuds can be used as well. Never use any dissolvers like nitro-cellulose combination thinner, acetone, etc., as these may damage the plastic parts and labels.

INSIDE CLEANING



Caution!

Since inside cleaning requires opening the device, such activity must be done by authorized personnel only. The device should be dust-cleaned inside in regular intervals, app. every one to two years, to ensure optimum ventilation. Cleaning intervals are based on the daily operating time and the dust volume in operating rooms. For inside cleaning remove the back wall or the control part. Dust deposits can be removed using a brush or grease-free compressed air.

FUNCTIONAL TEST

We recommend to check the specified required data in appropriate time intervals. For data and tolerances please see the Technical Specification.

REQUIRED MEASUREMENT TOOLS

- TV/SAT signal generator to check level accuracy and analogue measurements and demodulations.
- DVB signal generator to check level accuracy and digital measurements and demodulations.

CHANGING THE BATTERY



- Screw off handle
- Remove plastic sub-shell
- Remove metal battery cover at bottom of device
- Remove battery
- Unplug battery
- Insert the new battery, connect it and reassemble the device in the reverse order
- Note disposal instruction on page 2.

STORAGE

The storage temperature range of the device is -20 °C ... +85 °C.
Please keep the device clear of dust and humidity.

CUSTOMER SERVICE

For service or to order replacement parts please contact:

ESC GmbH
Bahnhofstraße 108
83224 Grassau, Germany

Tel.: +49 8641 9545-0
Fax: +49 8641 9545-35

E-mail: service@esc-kathrein.de

www.esc-kathrein.de

TECHNICAL CUSTOMER SUPPORT

If, despite studying this operating manual, you still have questions about getting started with the unit or using it correctly, or if unexpected problems occur, please contact the Kathrein Technical Support:

Phone: +49 8031 184-700

FEATURES

- Level measurement of analogue and digital TV signals (TV, Sat, FM, DVB-S(2), DVB-C, DVB-T, DVB-H (2k, 8k mode))
- Image representation of analogue and digital TV signals
- BER/MER measurement and display
- 5.7"-TFT colour display, transfective (640 x 480 pixels)
- Two-line 22-character LCD
- Spectrum analysis
- Sat Finder function
- Acoustic signal tone for antenna alignment
- Level indication in dB μ V or optionally dBmV
- Automatic measuring range selection
- Direct frequency and channel input
- Measurement and display of remote feed current
- Sound carrier measurement (TV)
- Audio carrier and BER measurement
- Sound control by built-in speaker
- Stereo head phone socket
- DiSEqC™1.0 control signal
- Memory for signal meter settings
- Memory for measured values (SD card), reading via USB possible
- Data Logger function
- Interface for software updates
- Scart socket, bidirectional, (CVBS, Audio)
- Mains or battery operation possible
- Included in delivery: Power unit, power cable, BNC measurement cable with adapters (2 x BNC socket - F socket, 1 x BNC socket - F connector, 1 x BNC socket - IEC socket, 1 x BNC socket - IEC connector)
- A 12 V vehicle supply cable can be obtained through our customer service (company ESC, address see page 67) (order no.: 19700841BF).

TECHNICAL DATA

Type		MSK 125
Order no.		21710022
RF component		
Frequency range	MHz	Sat: 920 ... 2150, TV: 47 ... 862, FM: 87 ... 108
Frequency tuning (steps)	kHz	Sat: 100 , TV/FM: 50
TV standards (channel raster)	MHz	Standard: B, 7 Standard: D/G/I/K, 8
DVB standards		DVB-S(2): QPSK, 8PSK DVB-C: 64 QAM, 128 QAM, 256 QAM, DOC 64 QAM (only MER and offset) DVB-T/H: COFDM, 2k, 8k; QPSK, 16 QAM, 64 QAM
Return loss	dB	≥ 10
Analogue operating mode		
Colour standards		PAL and SECAM in colour
Audio		FM, NICAM and AM sound
Audio IF bandwidth	kHz	SAT: 230/150 TV/FM: 230
Sound de-emphasis	µs	SAT: 50 TV/FM: 50
Sound reprocessing	SAT TV AM TV FM	FM sound reprocessing 5.0 MHz ... 8.99 MHz in 10 kHz intervals FM + Nicam in quasi parallel sound procedure in parallel sound procedure (only Std. L) Standard B/G TT1 = 5.5 MHz, TT2 = 5.74 MHz Standard B/G TT1 = 6.5 MHz, TT2 = 6.26 MHz Standard I TT1 = 6.0 MHz Standard L AM 6.5 MHz, Nicam = 5.85 MHz Standard B/G Nicam = 5.85 MHz Standard I = Nicam 6.552 MHz FM sound reprocessing 47 MHz ... 862 MHz
Audio carrier measurement	TV	Standard B/G 5.5 MHz, 5.74 MHz, 5.85 MHz Standard D/K 6.5 MHz, 6.26 MHz Standard I 6.0 MHz, 6.552 MHz Standard L 6.5 MHz, 5.85 MHz
Nicam decoder Audio carrier level spacing	TV	5.58 MHz at Std. B/G, D/K, L 6.552 MHz at Std. I
Nicam BER	TV	0 -4 x 10 ⁻²
Digital mode		
Digital image decoding		MPEG2 (MPEG4 in preparation)
DVB-S/S2 modulation type		QPSK, 8PSK
DVB-C modulation type		64QAM, DOC64QAM (only MER and offset), 128 QAM, QAM 256
DVB-T/H modulation type		OFDM, 2k, 8k; QPSK, 16 QAM, 64 QAM
DVB-S MER and -S2 MER		to 20 dB
DVB-C MER		to 32 dB
DVB-T/H MER		to 32 dB
DVB-S/S2 CBER		0 -2.8 x 10 ⁻²
DVB-C CBER		0 - 2.8 x 10 ⁻² (at QAM 256: ca. 1 x 10 ⁻⁶ - 2.8 x 10 ⁻²)
DVB-T CBER and VBER		0 -2.8 x 10 ⁻²
DVB-S/S2 carrier offset measurement		
DVB-C carrier offset measurement		
DVB-T/H carrier offset measurement		

TECHNICAL DATA

Level measuring component		
Measuring range	dB μ V	30 ... 120
Measurement accuracy	dB	± 2
Measurement bandwidth		SAT: 6 MHz SAT-DVB: 6 MHz TV: 250 kHz TV-DVB: 6 MHz FM: 250 kHz
Detector		SAT: Mean value display TV: Peak value display FM: Mean value display
BER/MER/carrier offset measurement		DVB-S(2)/-C/-T/-H
Display		
TV monitor		TFT 5.7" colour display, 640 x 480 pixels, transfective
LCD Display		Alphanumeric (131 x 22 pixels), illuminated, transfective
Sat Finder (acoustic)		Level-dependent beep
Supply voltages		
Power supply	V/Ah	11.1/6.45 Li-ion battery
Mains supply	V AC	100 ... 240 (via external AC/DC power unit)
Auto-operation	DC	Optionally via 12 Volt vehicle supply cable (BN: 19700841BF)
Remote feed voltage	V	0, 5 ... 20
Remote feed current	mA	Max. 600
LNB control	kHz	22, DiSEqC™1.0, Simple DiSEqC™
Connections		
RF input/impedance	-/ Ω	F coaxial socket (with BNC adapter)/75
AV input/output		SCART (CVBS, audio)
Head phones socket	mm	3.5 jack
USB port		Type 2 socket
Memory card		SD (1 GB max.)
Serial interface		RS 232, Sub-D, 9-pole
CI interface		PCMCIA
DC voltage supply		DC-XLR socket
General		
Dimensions (L x W x H):	mm	297 x 258 x 100
Weight	kg	Approx. 3.8
Safety standards		CE marking Protection class I (AC/DC power unit)
Temperature range	°C	Operation: +5 to +45 Storage: -20 to +85

TECHNICAL APPENDIX

SIGNAL-TO-NOISE RATIO

To determine the carrier-to-noise-ratio (C/N) for analogue transponders, the following values must be known:

- Ambient noise level (adjust parabolic antenna so that no satellite signal is received)
- max. reception signal
- Bandwidth correction

The following formula applies:

C/N = reception signal level - ambient noise level - bandwidth correction

$$\text{Bandwidth correction value} = 10 \log \frac{(\text{MSK 125 measurement bandwidth}) 6 \text{ MHz}}{\text{RF bandwidth reception signal}}$$

Bandwidth correction value = 6.37 dB for 26 MHz bandwidth (Astra)

Bandwidth correction value = 7.78 dB for 36 MHz (Eutelsat, Intelsat, Kopernikus)

Example



Reception signal level	+75.5 dB	with satellite signal
Ambient noise level	<u>-55.0 dB</u>	without satellite signal
Carrier-to-noise (C/N) ratio	+20.5 dB	
Bandwidth correction	-6.4 dB	for 26 MHz bandwidth
C/N of receiver	<u>+14.1 dB</u>	

Note



For exact C/N determination it is essential that the RF bandwidth of the reception signal is considered.

TECHNICAL APPENDIX

DISEQC™ COMMANDS FOR KATHREIN MATRICES

COMMAND SET FOR KATHREIN MATRICES

Range	POS. A (satellite 1)			
	Low band		High band	
	Vert.	Horiz.	Vert.	Horiz.
DiSeqC™ command	E0 00 38 F0	E0 00 38 F2	E0 00 38 F1	E0 00 38 F3

Range	POS. B (satellite 2)			
	Low band		High band	
	Vert.	Horiz.	Vert.	Horiz.
DiSeqC™ command	E0 00 38 F4	E0 00 38 F6	E0 00 38 F5	E0 00 38 F7

COMMAND SET FOR EXR 20 KATHREIN MATRIX

Range	EXR 20	
	POS. A	POS. B
DiSeqC™ command	E0 00 22	E0 00 26

COMMAND SET FOR EXR 22 KATHREIN MATRIX

Range	EXR 22	
	High band	Low band
DiSeqC™ command	E0 00 24	E0 00 20

LIST OF SINGLE CABLE DISEQC™ COMMAND

System:	Channel:	Satellite:	Transponder:	Channel:	DiSeqC™ command:
UAS 481	1400 MHz	Astra 19.2°	11.836 GHz, Hor.	Das Erste	E0 10 5A 0D 99
			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor.	Das Erste	E0 10 5A 09 5F
			SR 27500		
EXR 501	1400 MHz	Astra 19.2°	11.836 GHz, Hor.	Das Erste	E0 10 5A 0D 35
EXR 551			SR 27500		
EXR 552	1400 MHz	Hotbird 13°	11.604 GHz, Hor.	Das Erste	E0 10 5A 09 CF
			SR 27500		
EXR 1581	1400 MHz	Astra 19.2°	11.836 GHz, Hor.	Das Erste	E0 10 5A 2D 35
EXR 2581			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor.	Das Erste	E0 10 5A 29 CF
			SR 27500		
EXR 1942	1400 MHz	Astra 19.2°	11.836 GHz, Hor.	Das Erste	E0 10 5A 2D 35
EXR 2942			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor.	Das Erste	E0 10 5A 39 CF
			SR 27500		
EXU 908	1400 MHz	Astra 19.2°	11.836 GHz, Hor.	Das Erste	E0 10 5A 2D 35
			SR 27500		
	1400 MHz	Hotbird 13°	11.604 GHz, Hor.	Das Erste	E0 10 5A 39 CF
			SR 27500		

TECHNICAL APPENDIX

CHANNEL TABLES

CHANNEL UND FREQUENCY TABLE, STANDARD B/G (FREQUENCY IN MHZ)

VHF-CCIR			UHF-CCIR			UHF-CCIR		
Pilot frequency	01	80.15	21	21	471.25	46	46	671.25
E2	02	48.25	22	22	479.25	47	47	679.25
E3	03	55.25	23	23	487.25	48	48	687.25
E4	04	62.25	24	24	495.25	49	49	695.25
E5	05	175.25	25	25	503.25	50	50	703.25
E6	06	182.25	26	26	511.25	51	51	711.25
E7	07	189.25	27	27	519.25	52	52	719.25
E8	08	196.25	28	28	527.25	53	53	727.25
E9	09	203.25	29	29	535.25	54	54	735.25
E10	10	210.25	30	30	543.25	55	55	743.25
E11	11	217.25	31	31	551.25	56	56	751.25
E12	12	224.25	32	32	559.25	57	57	759.25
A	13	53.75	33	33	567.25	58	58	767.25
B	14	62.25	34	34	575.25	59	59	775.25
S	15	82.25	35	35	583.25	60	60	783.25
D	16	175.25	36	36	591.25	61	61	791.25
E	17	183.75	37	37	599.25	62	62	799.25
F	18	192.25	38	38	607.25	63	63	807.25
G	19	201.25	39	39	615.25	64	64	815.25
H	20	210.25	40	40	623.25	65	65	823.25
			41	41	631.25	66	66	831.25
			42	42	639.25	67	67	839.25
			43	43	647.25	68	68	847.25
			44	44	655.25	69	69	855.25
			45	45	663.25			
USB/OSB			ESB					
S021	S021	105.25	S21	S21	303.25			
S02	S02	112.25	S22	S22	311.25			
S03	S03	119.25	S23	S23	319.25			
S04	S04	126.25	S24	S24	327.25			
S05	S05	133.25	S25	S25	335.25			
S06	S06	140.25	S26	S26	343.25			
S07	S07	147.25	S27	S27	351.25			
S08	S08	154.25	S28	S28	359.25			
S09	S09	161.25	S29	S29	367.25			
S10	S10	168.25	S30	S30	375.25			
S11	S11	231.25	S31	S31	383.25			
S12	S12	238.25	S32	S32	391.25			
S13	S13	245.25	S33	S33	399.25			
S14	S14	252.25	S34	S34	407.25			
S15	S15	259.25	S35	S35	415.25			
S16	S16	266.25	S36	S36	423.25			
S17	S17	273.25	S37	S37	431.25			
S18	S18	280.25	S38	S38	439.25			
S19	S19	287.25	S39	S39	447.25			
S20	S20	294.25	S40	S40	455.25			
				S41	463.25			

Channel raster 7 MHz in VHF and USB/OSB - 8 MHz in UHF and SB
 The table shows channel, display of the MSK 125 and frequency

TECHNICAL APPENDIX

CHANNEL UND FREQUENCY TABLE, STANDARD L (FREQUENCY IN MHZ)

VHF			UHF			UHF		
	01	80.75	21	21	471.25	46	46	671.25
*LB	02	55.75	22	22	479.25	47	47	679.25
*LC	03	60.50	23	23	487.25	48	48	687.25
*LC1	04	63.75	24	24	495.25	49	49	695.25
L1	05	176.00	25	25	503.25	50	50	703.25
L2	06	184.00	26	26	511.25	51	51	711.25
L3	07	192.00	27	27	519.25	52	52	719.25
L4	08	200.00	28	28	527.25	53	53	727.25
L5	09	208.00	29	29	535.25	54	54	735.25
L6	10	216.00	30	30	543.25	55	55	743.25
	11	308.75	31	31	551.25	56	56	751.25
	12	441.75	32	32	559.25	57	57	759.25
	13	861.75	33	33	567.25	58	58	767.25
K _{1,4}	14	175.25	34	34	575.25	59	59	775.25
K _{1,5}	15	183.25	35	35	583.25	60	60	783.25
K _{1,6}	16	191.25	36	36	591.25	61	61	791.25
K _{1,7}	17	199.25	37	37	599.25	62	62	799.25
K _{1,8}	18	207.25	38	38	607.25	63	63	807.25
K _{1,9}	19	215.25	39	39	615.25	64	64	815.25
	20	223.25	40	40	623.25	65	65	823.25
			41	41	631.25	66	66	831.25
			42	42	639.25	67	67	839.25
			43	43	647.25	68	68	847.25
			44	44	655.25	69	69	855.25
			45	45	663.25			
			Special channels					
			S021	S021	120.00	S21	S21	280.00
			S02	S02	128.00	S22	S22	288.00
			S03	S03	136.00	S23	S23	303.25
			S04	S04	144.00	S24	S24	315.25
			S05	S05	152.00	S25	S25	327.25
			S06	S06	160.00	S26	S26	339.25
			S07	S07	168.00	S27	S27	351.25
			S08	S08	176.00	S28	S28	363.25
			S09	S09	184.00	S29	S29	375.25
			S10	S10	192.00	S30	S30	387.25
			S11	S11	200.00	S31	S31	399.25
			S12	S12	208.00	S32	S32	411.25
			S13	S13	216.00	S33	S33	423.25
			S14	S14	224.00	S34	S34	435.25
			S15	S15	232.00	S35	S35	447.25
			S16	S16	240.00	S36	S36	459.25
			S17	S17	248.00			
			S18	S18	256.00			
			S19	S19	264.00			
			S20	S20	272.00			

Channels marked with a * do not allow video and audio evaluation or audio carrier level measurement. The table shows channel, display of the MSK 125 and frequency.

TECHNICAL APPENDIX

CHANNEL UND FREQUENCY TABLE, D/K STANDARD (FREQUENCY IN MHZ)

VHF			UHF			UHF		
R-I	01	49.75	21	21	471.25	46	46	671.25
R-II	02	59.75	22	22	479.25	47	47	679.25
R-III	03	77.25	23	23	487.25	48	48	687.25
R-IV	04	85.25	24	24	495.25	49	49	695.25
R-V	05	93.52	25	25	503.25	50	50	703.25
R-VI	06	175.25	26	26	511.25	51	51	711.25
R-VII	07	183.25	27	27	519.25	52	52	719.25
R-	08	191.25	28	28	527.25	53	53	727.25
R-IX	09	199.25	29	29	535.25	54	54	735.25
R-X	10	207.25	30	30	543.25	55	55	743.25
R-XI	11	215.25	31	31	551.25	56	56	751.25
R-XII	12	223.25	32	32	559.25	57	57	759.25
	13	50.00	33	33	567.25	58	58	767.25
	14	60.00	34	34	575.25	59	59	775.25
	15	70.00	35	35	583.25	60	60	783.25
	16	75.00	36	36	591.25	61	61	791.25
	17	80.00	37	37	599.25	62	62	799.25
	18	90.00	38	38	607.25	63	63	807.25
	19	175.00	39	39	615.25	64	64	815.25
	20	200.00	40	40	623.25	65	65	823.25
			41	41	631.25	66	66	831.25
			42	42	639.25	67	67	839.25
			43	43	647.25	68	68	847.25
			44	44	655.25	69	69	855.25
			45	45	663.25			
Special channels								
			S021	S021	111.25	S21	S21	311.25
			S02	S02	119.25	S22	S22	319.25
			S03	S03	127.25	S23	S23	327.25
			S04	S04	135.25	S24	S24	335.25
			S05	S05	143.25	S25	S25	343.25
			S06	S06	151.75	S26	S26	351.25
			S07	S07	159.25	S27	S27	359.25
			S08	S08	167.25	S28	S28	367.25
			S09	S09	100.25	S29	S29	375.25
			S10	S10	105.25	S30	S30	383.25
			S11	S11	231.25	S31	S31	391.25
			S12	S12	239.25	S32	S32	399.25
			S13	S13	247.25	S33	S33	407.25
			S14	S14	255.25	S34	S34	415.25
			S15	S15	263.25	S35	S35	423.25
			S16	S16	271.25	S36	S36	431.25
			S17	S17	279.25	S37	S37	439.25
			S18	S18	287.25	S38	S38	447.25
			S19	S19	295.25	S39	S39	455.25
			S20	S20	303.25	S40	S40	463.25

The table shows channel, display of the MSK 125 and frequency.

TECHNICAL APPENDIX

CHANNEL UND FREQUENCY TABLE, I STANDARD (FREQUENCY IN MHZ)

VHF			UHF			UHF		
IA	01	45.75	21	21	471.25	46	46	671.25
IB	02	53.75	22	22	479.25	47	47	679.25
IC	03	61.75	23	23	487.25	48	48	687.25
ID	04	175.25	24	24	495.25	49	49	695.25
IE	05	183.25	25	25	503.25	50	50	703.25
IF	06	191.25	26	26	511.25	51	51	711.25
IG	07	199.25	27	27	519.25	52	52	719.25
IH	08	207.25	28	28	527.25	53	53	727.25
IJ	09	215.25	29	29	535.25	54	54	735.25
	10	223.25	30	30	543.25	55	55	743.25
	11	231.25	31	31	551.25	56	56	751.25
	12	239.25	32	32	559.25	57	57	759.25
	13	247.45	33	33	567.25	58	58	767.25
	14	50.00	34	34	575.25	59	59	775.25
	15	60.00	35	35	583.25	60	60	783.25
	16	70.00	36	36	591.25	61	61	791.25
	17	75.00	37	37	599.25	62	62	799.25
	18	80.00	38	38	607.25	63	63	807.25
	19	90.00	39	39	615.25	64	64	815.25
	20	175.00	40	40	623.25	65	65	823.25
			41	41	631.25	66	66	831.25
			42	42	639.25	67	67	839.25
			43	43	647.25	68	68	847.25
			44	44	655.25	69	69	855.25
			45	45	663.25			
Special channels								
			S021	S021	111.25	S21	S21	311.25
			S02	S02	119.25	S22	S22	319.25
			S03	S03	127.25	S23	S23	327.25
			S04	S04	135.25	S24	S24	335.25
			S05	S05	143.25	S25	S25	343.25
			S06	S06	151.75	S26	S26	351.25
			S07	S07	159.25	S27	S27	359.25
			S08	S08	167.25	S28	S28	367.25
			S09	S09	100.25	S29	S29	375.25
			S10	S10	105.25	S30	S30	383.25
			S11	S11	231.25	S31	S31	391.25
			S12	S12	239.25	S32	S32	399.25
			S13	S13	247.25	S33	S33	407.25
			S14	S14	255.25	S34	S34	415.25
			S15	S15	263.25	S35	S35	423.25
			S16	S16	271.25	S36	S36	431.25
			S17	S17	279.25	S37	S37	439.25
			S18	S18	287.25	S38	S38	447.25
			S19	S19	295.25	S39	S39	455.25
			S20	S20	303.25	S40	S40	463.25

The table shows channel, display of the MSK 125 and frequency.

CALCULATION OF SAT IF FREQUENCY USING THE MSK 125

This is done as follows:

IF = reception frequency - oscillation frequency

The oscillation frequency is made up as follows:

9750 MHz oscillator frequency is used for a reception frequency between 10700 MHz and 11700 MHz.
10600 MHz is used for a reception frequency between 11700 MHz and 12750 MHz.

Hence the values for ARD - Das Erste are:

IF = reception frequency - oscillation frequency

IF = 11836 MHz - 10600 MHz

IF = 1236 MHz

NOTES

NOTES

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936.3474/A/0409/ZWT - Technical data subject to change.