

Antenna measuring system MSK 200

Valid from software version V 3.8



FOREWORD/IMPORTANT INSTRUCTIONS

Dear customer,

please follow all the information given in this manual. KATHREIN-Werke KG has made every effort to ensure the information and descriptions are correct and complete.

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

We are always grateful to receive your comments and suggestions for improvement.

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All product names and trademarks in this manual are the property of the respective companies.

At <http://www.kathrein.de> → "Service" → "Software and Downloads" you can register for the information service for the meter and you will also find the latest software to download for your device.

VALIDITY OF MANUAL

This manual applies to the measuring system:

MSK 200/S2 (75 Ω)	Order no. 21710024	MSK 200/S2 (50 Ω)	Order no. 21710025
MSK 200/M4 (75 Ω)	Order no. 21710026	MSK 200/M4 (50 Ω)	Order no. 21710027
MSK 200/ME (75 Ω)	Order no. 21710034	MSK 200/ME (50 Ω)	Order no. 21710035

The following notes are important for operating the MSK 200 and must be observed under all circumstances. The functions of the MSK 200 described in these operating instructions are not available for every device version due to the different hardware versions of the device.

GENERAL SAFETY NOTES

The MSK 200 was developed and produced in compliance with the relevant harmonised guidelines, standards and additional technical specifications. The product is state-of-the-art and ensures the maximum level of safety. However, this safety level can only be reached in practice if all of the necessary measures are taken.



Electronic equipment is not domestic waste - in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 concerning used electrical and electronic appliances, it must be disposed of properly.

At the end of its service life, take this device for disposal at a designated public collection point.



Spent batteries are special waste!

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

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SAFETY INSTRUCTIONS

It is imperative the safety instructions enclosed with the device are followed.



This sheet contains important information about the operation, installation location and connection of the device. Read these instructions carefully before setting up the device.

METER PROPERTIES/SCOPE OF SUPPLY

The MSK 200 is a latest generation meter in a compact form which leaves nothing to be desired when it comes to testing antenna and cable systems, even including professional head-ends. The device is suitable for use in the lab and for monitoring head-ends with remote control, as well as for acceptance measurements on antenna and distribution systems.

SCOPE OF SUPPLY

MSK 200/S2 (75 Ω)	Order no. 21710024
MSK 200/M4 (75 Ω)	Order no. 21710026
MSK 200/ME (75 Ω)	Order no. 21710034

MSK 200/S2 (50 Ω)	Order no. 21710025
MSK 200/M4 (50 Ω)	Order no. 21710027
MSK 200/ME (50 Ω)	Order no. 21710035

- 1 antenna measuring system MSK 200 (75 Ω)
- 1 AC power unit
- Transport case
- 1 measuring cable - BNC plug - BNC plug
- 1 adapter - 1.6/5.6 plug - BNC socket
- 1 adapter - BNC socket - F socket
- 1 adapter - BNC socket - F-type connector (m)
- 1 adapter - BNC socket - IEC connector (f)
- 1 adapter - BNC socket - IEC connector (m)
- 1 carrying strap
- 1 fuse T 8.0 A

- 1 antenna measuring system MSK 200 (50 Ω)
- 1 AC power unit
- Transport case
- 1 carrying strap
- 1 fuse T 8.0 A

SET UP

INITIAL SET UP

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 on the rear of the device.



After fitting the fuse, the device must be operated/charged for approx. two hours on the mains. Then the device must be operated on the battery and the battery fully discharged at least once (until the device switches itself off). Only after complete charging and subsequent discharging of the device can the battery charge state indication be correctly displayed by the device.

The removal of this fuse prevents the device switching on unintentionally during transport.



Important!

Please remove this fuse again on renewed shipping of the device!

Now remove the AC power unit (100V...250V) supplied from the packaging and connect it to the device and mains. The integrated lithium-ion rechargeable battery and the green light emitting diode indicate the external supply of power. You can check the charge state of the rechargeable battery by pressing the "Test" button.



Note!

See also "Charge state indication" and "DC supply socket" in the chapter "Interfaces"!

SETTING UP THE DEVICE



When setting up the device pay attention to adequate ventilation of the device!

To avoid a build up of heat, the openings for the fan and the ventilation holes must always be clear. Set up the device as shown in the figure.

OPTIONS FOR SETTING UP



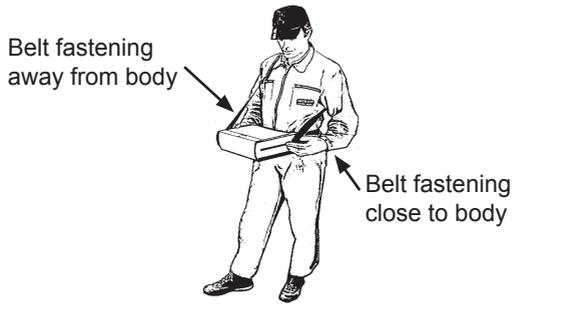
SET UP

USING THE DEVICE ON THE STRAP



When the device is used on the strap, also pay attention to adequate ventilation of the device!

To avoid a build up of heat, the openings for the fan and the ventilation holes must always be clear.

For right-handers	For left-handers
Reach with the right hand through the belt and also slide your head through the belt!	Reach with the left hand through the belt and also slide your head through the belt!
	
	



Important!
To prevent neck injuries, you should not hang the device around your neck, you should follow the instructions given above.

You can move the softkeys from right to left by pressing the following sequence of keys "EXTEND", "SETUP", "LOOK'N FEEL", "BAR LAYOUT"!

BASIC INFORMATION ON OPERATION

THE HELP FUNCTION

The help function for the MSK 200 is very innovative. All the help files are always available as they have been saved in the MSK 200. To open this help, simply press the **HELP** button. The related help for the specific menu is opened.

CHANGING THE LANGUAGE FOR THE HELP FUNCTION

To change the language for the help, proceed as follows:

EXTEND → “**SETUP**” → “**HELP LANG**” → select required language



Note:

Press the following combination of buttons to open the help on the various signal sources and possible methods of measuring:

HELP → **INHALT** → “**OPERATION**”

KEYBOARD OPERATION

- EXTEND** SETTINGS: SETUP, PRINT, PREFERENCES, (RF-)SETTINGS
- ON/OFF** SWITCH ON AND OFF the device and switch the device to standby. Forced shut down of the device by pressing the button longer than 5 seconds, open the desktop
- DISPLAY** SWITCH ON/OFF the SOFT KEYS, zoom the graphic display
- SOURCE** SOURCE SELECTION: SAT analogue, SAT digital, CATV analogue, CATV digital, TV analogue, TV digital, FM radio, AV menu
- COPY** SAVE and PRINT data as well as save and open device settings
- ANALYSE** METER SELECTION: spectrum analyser, oscilloscope, constellation analyser, DiSEqC™, MPEG data, picture display
- VOL.+** Increase VOLUME
- VOL.-** Reduce VOLUME
- CHAN +** CHANGE PROGRAMME or CHANNEL +
- CHAN -** CHANGE PROGRAMME or CHANNEL -

BASIC INFORMATION ON OPERATION

FUNCTION

SECOND FUNCTION on the touch-screen

HELP

HELP

TOUCHSCREEN OPERATION



Tap on the touchscreen buttons to select the respective task.



This type of button opens a further menu.

Sources selection (SOURCE)



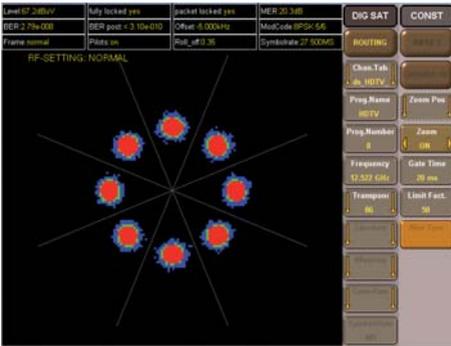
Measurement selection (ANALYZE)



If the “SOURCE” button is pressed, the source selection buttons appear, which can be used to select the signal path.

When the “ANALYZE” button is pressed, the measurement selection buttons appear, which can be used to select the desired measurement or measurement process.

BASIC INFORMATION ON OPERATION



This type of button leads to a selection of various settings (e.g. selection of a channel).



This type of button enables letters and numbers to be entered (e.g. programme name entry).



Using this button you can enter numbers (e.g. programme number entry).

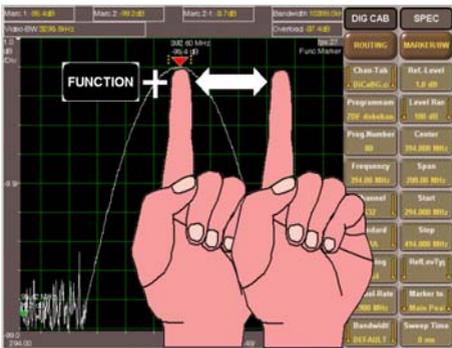


Tap on the screen to set the markers directly or to shift them.

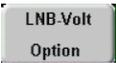
BASIC INFORMATION ON OPERATION



To open the zoom window, hold your finger longer on the marker; you can then shift it to the desired position.



Press the “FUNCTION” button, tap on the screen and drag the section of the image using your finger (e.g. for the scope the delay time, for the spectrum analyser the centre frequency).



This type of button indicates an option that is not currently available on this unit.



This type of button indicates a function that is currently active in the unit.



Tap on this type of button to switch between two operating modes (e.g. 22 KHz signal ON/OFF).



Press this button to run a function directly, e.g. here to print out the contents of the screen.

OPERATION

SELECTION OF THE SIGNAL SOURCE AND THE MEASUREMENT

The most important buttons on the MSK 200 are the **SOURCE** and the **ANALYSE** button. After pressing the **SOURCE** button the source, that is the channel to be measured, can be defined. After pressing the **ANALYSE** button the required measurement can be selected and made. On the MSK 200's display the **ANALYSE** menu is always at the edge of the screen, the **SOURCE** menu beside it. The two are to be considered and operated as independent of each other.

SELECTION OF THE SIGNAL SOURCE

By pressing the **SOURCE** hard key you can open the selection of the signal source.

The following sources can be selected:

DIG CABL	Digital cable TV
DIG SAT	Digital satellite TV
DIG TERR	Digital terrestrial TV
ANA CABL	Analogue cable TV
ANA SAT	Analogue satellite TV
ANA TERR	Analogue terrestrial TV
FM RADIO	Analogue radio (FM)
AV/TS INP	Audio/video or transport stream input

Note: Not all signal sources can be selected for each measurement. For this reason, it is recommended to open the spectrum analyser prior to changing the source (see chapter "Selection of the measurement").

Provided you have already selected a source, the related help file is opened by pressing the **HELP** button.

OPERATION

SELECTION OF THE CHANNEL TO BE MEASURED

Now the required measuring channel can be selected:

In principle there are various ways you can select the channel

1. Selection of a programme using the programme names

- 1.1. Select the required channel table using the "Chan.Tab" button.
- 1.2. The required programme name can be entered in the "Prog.Name" field (here the programme name is automatically completed).

2. Selection of the programme via the channel number

- 2.1. Select the required channel table using the "Chan.Tab" button.
- 2.2. The number for the required programme position can be entered using "Prog.Number".

3. Selection of a programme using the channel

- 3.1. Select the required channel table using the "Chan.Tab" button.
- 3.2. The required channel can be selected in the "Channel" selection.

4. Selection of a programme using the frequency

- 4.1 Select the required channel table using the "Chan.Tab" button.
- 4.2 The required frequency is entered in the "Frequency" field.
- 4.3 The frequency entry is automatically corrected to the correct video carrier frequency or channel mid-frequency. You can fine tune the frequency using the "<" and ">" buttons.

If the "Couple Chan" function on the "EXTEND" menu is set to "TO STAND.", all further settings (Standard, Mapping, Symbol Rate etc.) are made automatically.

If you want to set these parameters individually, you must set the "Couple Chan" function on the "EXTEND" menu to "NOT COUP.".

SELECTION OF THE MEASUREMENT

To make a measurement after completing the setting of the channel, the related measuring instrument can be opened using the **ANALYSE** hard key and subsequent selection via the onscreen menu.

The following measurements and measuring instruments can be selected:

MORE...	Sub-menu for settings DiSEqC™, SCIF, etc.
SPECTRUM	Spectrum analyser
CONST.	Constellation analyser
IMPULS	Pulse / reflection measurement (only for DVB-T)
SIDATA	Read MPEG stream, MPEG monitor
SCOPE	Storage oscilloscope
SUMMARY	Summary measurement, simultaneous measurement of RF level, S/N, MER, BER, HUM and video voltage
TV PICT.	TV picture, videotext
AV/TS OUT	Setting for the various outputs (ASI, TS parallel, video)

OPERATION

You will also find information on the different measuring methods in the onboard help. In the normal case, optimum parameter presets are saved in the MSK 200 for each measurement. However, you can also make many settings to suit the related measurement. These are displayed on the related menu.

Additional settings can be opened for some measuring procedures:

- **SPECTRUM:** **MARKER** or **SETTING**
- **CONST.:** **IMPULS** or **CARRIER SEL** (only for "DIG TER.") MER via carrier
- **SCOPE:** **TRIGGER, MARKER**

OVERVIEW OF FUNCTIONS

OPERATION

Mains	External AC power unit	100...240 V
Battery	Internal Li-ion rechargeable battery	12 V/6.5 Ah
External battery supply	Vehicle	11 V...16 VDC

OPERATION

Keypad	12 hard keys	On/Off, Help, Prog.+, Prog.-, Analyze, Source, OSD/Off, Vol.+, Vol.-, Copy, Function, Extend
External keyboard	ASCII keyboard (PS2)	For the entry of ASCII characters
Touch	Infrared touch	Intuitive operation and ASCII character entry

REMOTE CONTROL

Ethernet				
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PICTURE DISPLAY

Analogue video	TV-CATV	TV terrestrial	Satellite	SCART/video
Digital video free-to-air	DVB-C J83 B	DVB-T ATSC	DVB-S DVB-S2	TS parallel/ASI
Digital video encrypted	DVB-C J83 B CI/CA	DVB-T ATSC CI/CA	DVB-S CI/CA	TS parallel/ASI CI/CA

SIGNALLING

DISPLAY	Position	Green signal	Red signal
Operation/stand-by	Front (via ON/OFF button)	With mains or ext. DC operation	Rechargeable battery operation
LNB supply	Front (via EXTEND button)	Power supply is switched on, flashing on overload, greater than 0.6 A	External power is applied

Note!



You can change to the stand-by mode by briefly pressing the ON/OFF button and then selecting the "Suspend-Mode" or by closing the display cover!

DISPLAY	Position	Green signal	Yellow signals
Rechargeable battery charge state	Rear of device	Green = Charging	5 x 20 % each = Charge state

OVERVIEW OF FUNCTIONS

RECEPTION RANGES

TV (CATV/terrestrial)	5...900 MHz
Satellite	900....3100 MHz
FM	87.5...108 MHz
Spectrum analysis	5...3100 MHz

DEMODULATION

Digital CATV	J83 A/C (DVB-C) 16, 32, 64, 128, 256 QAM	J83 B 64 QAM	DOCSIS 64, 256 QAM
Analogue CATV	PAL, NICAM B/G, I, D/K, L/L', M/N	NTSC, NICAM B/G, I, D/K, L/L', M/N	SECAM, NICAM B/G, I, D/K, L/L', M/N
Digital Terrestrial	COFDM (DVB-T) 2k, 8k; 4, 16, 64 QAM; 6, 7, 8 MHz	ATSC 8 VSB	
Analogue Terrestrial	PAL, NICAM B/G, I, D/K, L/L', M/N	NTSC, NICAM B/G, I, D/K, L/L', M/N	SECAM, NICAM B/G, I, D/K, L/L', M/N
Digital Satellite	DVB-S(2), QPSK, 8PSK		
Analogue Satellite	PAL	NTSC	SECAM
Radio	FM		

POSSIBLE MEASURING METHODS

Spectrum analyser	Level measurement, video-audio carrier, level of digital signals, C/N	Frequency measurement, frequency spacing	
Constellation analyser	Constellation, 4, 16, 32, 64, 128, 256 QAM, COFDM	MER, BER, frequency offset	Echo display MER via carrier (DVB-T)
NICAM-BER	BER measurement with analogue TV demodulation		
Storage oscilloscope	Audio, amplitude, swing, frequency	Video, line store, amplitude, S/N weighted, S/N not weighted	DiSEqC™, oscillation/settling, 22 kHz carrier, modulation
MPEG monitor with MPEG-2/4	SID, PMT, PCR, programme name, service type, programme status, CA info, elementary current, video/audio		
DiSEqC monitor	DiSEqC™2.0 transmitter and receiver	UFO® <i>micro</i> -DiSEqC™	
LNB multimeter	Voltages 0...30 V DC	Current 0...600 mA DC	Remote feed current and voltage

MEASURED VALUE MEMORY

Internal memory	Data logging
Printer	

TECHNICAL APPENDIX

DESIGN

- Handy portable signal meter
- High resolution 10.4" TFT colour display for display of analogue and digital TV picture signals and for display of graphics
- Digital video and audio display in MPEG-2 and MPEG-4
- Backlighting - as a result display is also easy to see in bright sunlight (typ. 600 cd/m²)
- Easy to operate using 12 hard keys and infra-red touch screen for menu navigation
- The touch screen controls can be displayed as required for left and right-handers
- Alphanumeric keypad screen for entering text and numbers
- Adjustable carrying strap on the device

FUNCTIONS

- MER measurement for all digital modulation types
- BER measurement
- Spectrum analyser with freely selectable start and stop frequencies as well as entry of centre frequency and span
- Simultaneous spectrum and picture analysis
- Storage oscilloscope
- Constellation analyser for all DVB standards
- MPEG-2, MPEG-4*) and analogue TV monitor
- Demodulation of analogue signals: AM (CATV, terr.), FM (Sat, radio)
- Demodulation of digital signals: DVB-C, DVB-T, DVB-S and DVB-S2
- Demodulation of digital USA standards (J83B, DOCSIS, ATSC)
- Video measurement options for video amplitude with line selection, S/N measurement and hum measurement
- Videotext decoder
- S/N measurement: typ. 57 dB
- Display of SID, PMT-PID, PCR-PID, CA info, elementary current PID, service type, (NIT in preparation)
- Transmitter selection for DVB-C, DVB-S, DVB-T and analogue via frequency input, channel input and user lists
- Can be remotely controlled (together with MZS 200; not included in the scope of delivery)
- PC user interface integrated for data processing and office tasks
- Measured value detection
- Return path measurements
- Result magnitude indication with indication of the numerical value
- Measurement units: dB μ V, dBm

*) Only on devices with MPEG-4 option (MSK 200/M4 or MSK 200/ME)

VARIANTS

- MSK 200/S2 - 21710024 (75 Ohm) or 21710025 (50 Ohm):
functionality as described above
- MSK 200/M4 - 21710026 (75 Ohm) or 21710027 (50 Ohm):
same as MSK 200/S2; plus MPEG-4 decoder for the display of HD pictures and HDMI interface
- MSK 200/ME - 21710034 (75 Ohm) or 21710035 (50 Ohm):
same as MSK 200/M4; plus external reference option for the improvement of the oscillator accuracy incl. BNC socket for the connection of the external reference oscillators

TECHNICAL APPENDIX

Type	CE	MSK 200/S2	MSK 200/M4	MSK 200/ME
Part no.		21710024 (75 Ohm) 21710025 (50 Ohm)	21710026 (75 Ohm) 21710027 (50 Ohm)	21710034 (75 Ohm) 21710035 (50 Ohm)
Spectrum analyser				
Frequency range	MHz	5-3100		
Resolution bandwidth (-3 dB)	kHz MHz	1, 3, 10, 30, 100, 300 1, 3		
Resolution bandwidth (-6 dB)	kHz	9, 25, 50, 120, 200		
Video bandwidths	MHz	0.00001-3		
Phase noise at 10-kHz carrier spacing	dBc	< -90 (1 Hz), typ. -95 (1 Hz)		
Phase noise at 100-kHz carrier spacing	dBc	<-100 (1 dB), typ. -110 (1 Hz)		
Dynamic (RBW: 100 kHz)	dB	Type 70		
Level measuring range	dB μ V	30-130 / -128 (50 Ohm)		
Total input power max.	W	0.5		
Measurement accuracy	dB	< 1.5		
Measurement detector	dB	Max peak, min peak, auto peak, sample, RMS		
Return loss (5-dB pre-attenuation)	dB	> 16 (VSWR: 1.35)		
Refresh rate	Pic./s	Max. 10		
Reference level	dB μ V	30-130		
Display range	dB	100, 70, 50, 30, 20, 10		
Screen resolution	Pixels	Max. 800 x 600/nominal 501 x 401		
FM radio receiver				
Frequency range	MHz	87.5-108		
Channel bandwidth	kHz	300		
De-emphasis	μ s	50/75		
Analogue TV receiver				
Frequency range	MHz	5-900		
Standards		B/G, I, D/K, L/L', M/N		
Colour standards		PAL, SECAM, NTSC		
Audio standards		IRT-A2, NICAM, BTSC, EIA-J		
Nicam bit error rate		0.1E-8...1.5E-2		
Channel bandwidth	MHz	6/7/8		
Frequency increment	kHz	50		
Video IF bandwidth		According to standard		
Audio IF bandwidth		According to standard		
Audio de-emphasis	μ s	50/75		
Video output voltage/impedance	Vpp/Ohm	1/75 \pm 1 dB		
Hum measurement	dB	> 50		
S/N measurement (evaluated according to CCIR Rec. 567)	dB	> 55/typ. 57		
Analogue satellite receiver				
Frequency range	MHz	900-3100		
Standard		FM according to CCIR Rec. 405		
Colour standards		PAL, SECAM, NTSC		

TECHNICAL APPENDIX

Type		MSK 200/S2	MSK 200/M4	MSK 200/ME
Part no.		21710024 (75 Ohm) 21710025 (50 Ohm)	21710026 (75 Ohm) 21710027 (50 Ohm)	21710034 (75 Ohm) 21710035 (50 Ohm)
Audio standards	µs	De-emphasis: 50 µs/Panda-Wegener: 75		
Frequency increment	kHz	200		
Video IF bandwidth	MHz	27/36		
Audio IF bandwidth	kHz	130/380		
Video output voltage/impedance	Vpp/Ohm	1/75 ± 3 dB		
Hum measurement	dB	> 50		
S/N measurement (evaluated according to CCIR Rec. 567)	dB	> 55/typ. 60		
Analogue input				
Composite colour/video input voltage	Vpp/Ohm	1/75		
S/N measurement (evaluated according to CCIR Rec. 567)	dB	Typ. up to 80		
Digital CATV receiver (J83 A, B, C)				
Frequency range	MHz	108-900		
Modulation process		16 QAM, 32 QAM, 64 QAM, 128 QAM, 256 QAM		
Symbol rates	MSymb/s	2.0-6.999		
Frequency increment	kHz	50		
Video output voltage/impedance	Vpp/Ohm	1/75 ± 1 dB		
IF bandwidths	MHz	1, 5, 6, 7, 8, 12		
MER measurement	dB	Type 40		
BER		1E-2...1E-8		
Channel bandwidths	MHz	6/7/8		
Digital terrestrial TV reception (DVB-T, ATSC)				
Frequency range	MHz	45-900		
Modulation process		QPSK, 4QAM, 16 QAM, 64 QAM, 8 VSB		
Symbol rate		According to standard		
Frequency increment	kHz	50		
Video output voltage/impedance	Vpp/Ohm	1/75 ± 1 dB		
IF bandwidths	MHz	1, 5, 6, 7, 8, 12		
MER measurement	dB	Type 38		
BER (before Reed-Solomon)		1E-2...1E-8		
FFT parameters		2k/8k		
Digital satellite receiver DVB-S(2)				
Frequency range	MHz	900-3100		
Modulation process		QPSK, 8PSK		
Symbol rates	MSymb/s (DVB-S) MSymb/s (DVB-S2)	2-45 2-30		
Frequency increment	kHz	200		
IF bandwidths	MHz	8, 18, 27, 36, 54		
Video output voltage/impedance	Vpp/Ohm	1/75 ± 1 dB		
MER measurement	dB	Type 20		

TECHNICAL APPENDIX

Type		MSK 200/S2	MSK 200/M4	MSK 200/ME
Part no.		21710024 (75 Ohm) 21710025 (50 Ohm)	21710026 (75 Ohm) 21710027 (50 Ohm)	21710034 (75 Ohm) 21710035 (50 Ohm)
BER		1E-2...1E-8		
SNR	dB	> 14		
CNR	dB	max. 20		
CodeRate (FEC) DVB-S	QPSK	1/2, 2/3, 3/4, 5/6, 7/8		
CodeRate (FEC) DVB-S2	QPSK 8PSK	1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10		
Constellation analysis				
DVB-C		16 QAM, 32 QAM, 64 QAM, 128 QAM, 256 QAM		
DVB-T		QPSK, 16 QAM, 64 QAM		
DVB-T individual carrier selection	2k system 8k system	0-1704 0-6816		
DVB-S(2)		QPSK, 8PSK		
ATSC		8 VSB		
Storage oscilloscope				
Resolution	Bit	12		
Scanning rate	MHz	27 / 54		
Memory depth	Picture	1		
Frequency accuracy				
TCXO	ppm	+/- 4		
OCXO	ppm			+/- 0.1
Remote feeding				
Switching voltage/max. current	V/mA	5-20/600		
Control signals	kHz	22, tone burst, DiSeqC™2.0		
Power supply				
Mains (power supply unit)	V/Hz/W	100-265/50-400/85		
Lithium/ion rechargeable battery	V/Ah	11.1/6.45		
Operating time with rechargeable battery (depending on operating mode)	h	1-3		
DC external	V	10.8-16.0		
Connections				
RF input standard (impedance)	Ohm	1.6/5.6 (75 Ohm) adapter to BNC pre-assembled, N socket (50 Ohm)		
Composite colour input/output/RGB output		Scart socket		
Video input/output		2 x BNC socket		
Transport stream input/output		2 x Sub D socket (25-pin)		
ASI input/output		2 x BNC socket		
MPEG-4 (HDTV) output		HDMI	HDMI	
Common Interface/card reader		1/1		
PCMCIA insert		1		
Module interface		Sub D socket (25-pin)		
Network connector		1 x Ethernet		

TECHNICAL APPENDIX

Type		MSK 200/S2	MSK 200/M4	MSK 200/ME
Part no.		21710024 (75 Ohm) 21710025 (50 Ohm)	21710026 (75 Ohm) 21710027 (50 Ohm)	21710034 (75 Ohm) 21710035 (50 Ohm)
USB port		2		
External keyboard		PS-2		
External mouse		USB		
Printer connection		IR/USB		
Headphone connector	mm	Stereo jack 3.5		
Modem interface (serial)		RS 232/mini DIN, 9-pin (socket)		
External reference				BNC socket
DC supply 11-16 V		XLR socket		
General Information				
Monitor		10.4"; TFT; 800 x 600 pixels with backlighting		
Touch screen		Infra-red		
Temperature range	°C	+5 to +45		
Dimensions (W x H x D)	mm	374 x 294 x 124		
Weight	kg	Approx. 8		



The figure shows the MSK 200/M4 21710026 with 75-Ω BNC socket.

Depending on the version of the MSK 200, some of the connections shown here are optional.

MAINTENANCE

Maintenance is basically confined to cleaning the outside of the device.

DEVICE CALIBRATION

The calibration interval is dependent on use and operational demands, and should be between 1 and 2 years. Calibration can be done by Kathrein customer service, see next page.

OUTSIDE CLEANING

A soft cloth, lint-free duster or paint brush is recommended for cleaning the outside of the device. In case of heavier soiling it is also possible to use alcohol or a mild soap solution. Under no circumstances is it allowed to use solvents such as thinners, acetone, etc., as otherwise plastic parts and markings may be damaged.

INTERIOR CLEANING



Important

As it is necessary to open the device to clean the interior, this work should only be undertaken by authorised service personnel! The device should be freed of dust deposits inside at regular intervals, app. every 1 to 2 years, to ensure optimum ventilation. The cleaning interval is based on the length of time the device is operated each day and the amount of dust in the premises. It is necessary to remove the back panel or the control panel for cleaning. Dust deposits can be removed using a brush or grease-free compressed air.

FUNCTION TEST

It is advisable to check the specified nominal data at appropriate intervals. For data and tolerances please see the technical specifications.

REQUIRED MEASURING EQUIPMENT

- TV/SAT signal generator for checking the level accuracy as well as the analogue measurements and demodulation.
- DVB signal generator for checking the level accuracy as well as the digital measurements and demodulation.

STORAGE

The storage temperature range of the device is -40 ... +70°C.
The device must be protected against dust and moisture during storage.

SERVICE

CUSTOMER SERVICE

www.esc-Kathrein.de
ESC Elektronik Service Chiemgau GmbH
Bahnhofstr. 108
83224 Grassau, Germany
E-Mail: service@esc-kathrein.de

KATHREIN CUSTOMER HOTLINE

If, despite studying this operating manual, you still have questions about getting started with the device or using it correctly, or if unexpected problems occur, please contact the Kathrein customer hotline.

Tel: 08031/184-700

FOR YOUR NOTES

Internet: <http://www.kathrein.de>

KATHREIN-Werke KG • Anton-Kathrein-Straße 1 - 3
P.O. Box 100 444 • 83004 Rosenheim • GERMANY

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936.3727/-/0310/ZWT - Technical data subject to change.