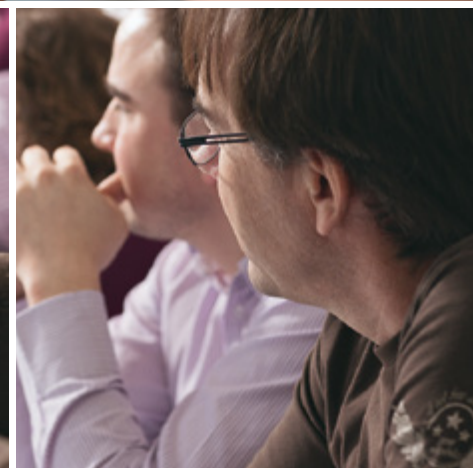
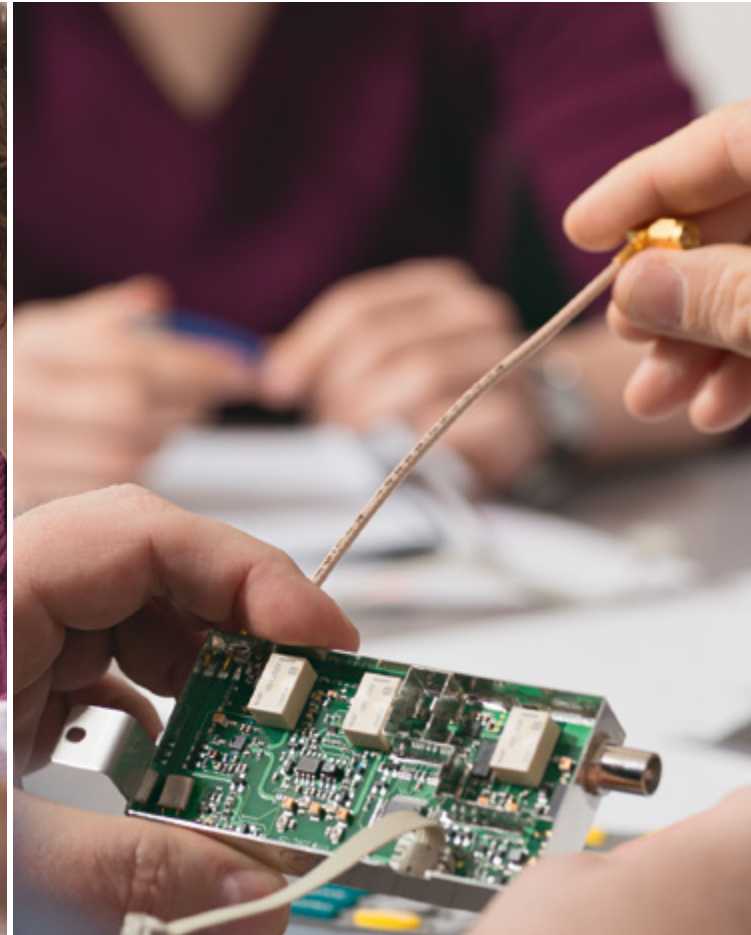


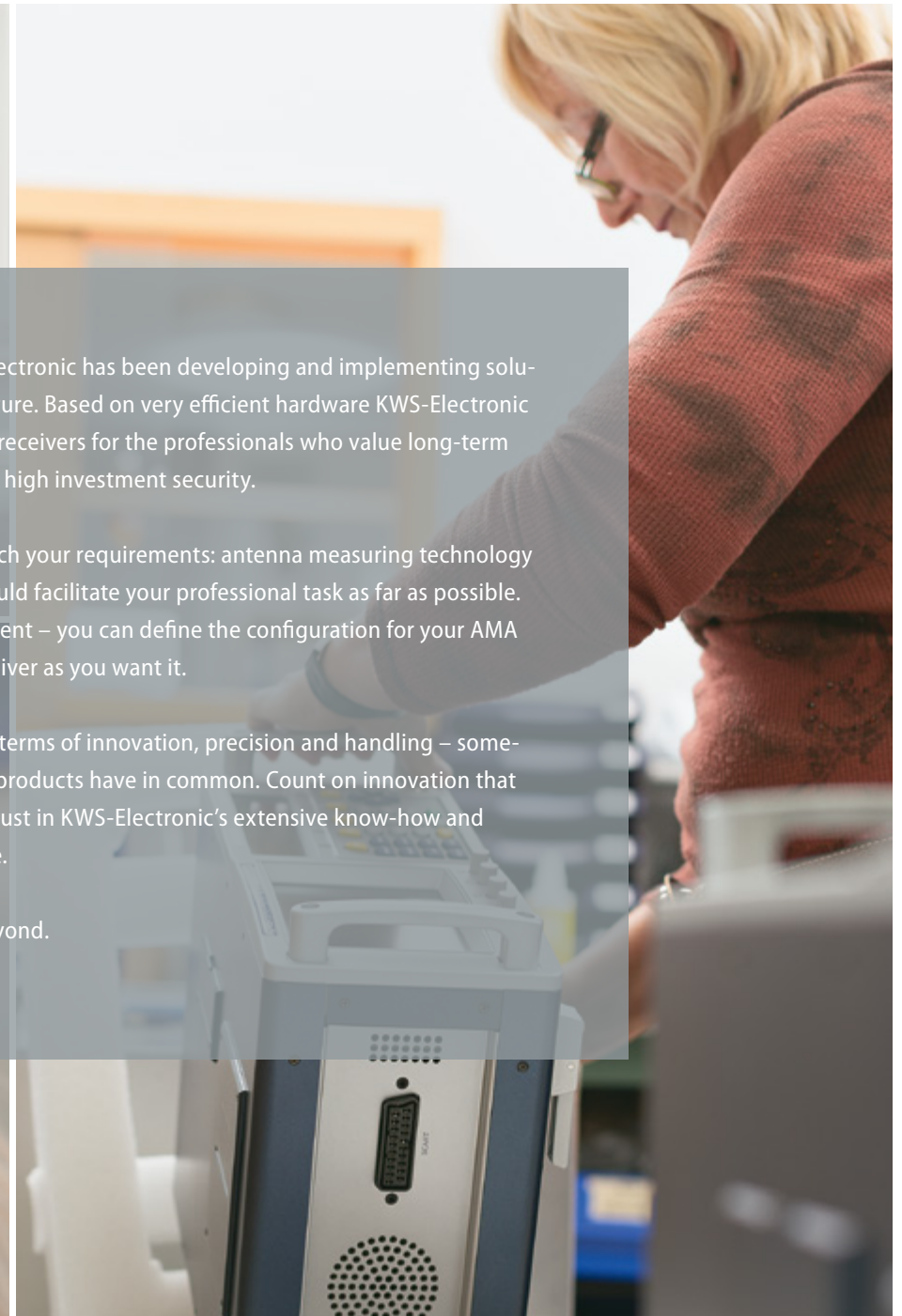
KWS ELECTRONIC

HIGH FREQUENCY TEST EQUIPMENT

PRODUCT LINE F







For over 40 years KWS-Electronic has been developing and implementing solutions that point to the future. Based on very efficient hardware KWS-Electronic offers retrofit measuring receivers for the professionals who value long-term value retention as well as high investment security.

We offer concepts to match your requirements: antenna measuring technology from KWS-Electronic should facilitate your professional task as far as possible. Flexible to your requirement – you can define the configuration for your AMA or VAROS measuring receiver as you want it.

New standards are set in terms of innovation, precision and handling – something all KWS-Electronic products have in common. Count on innovation that pays off and place your trust in KWS-Electronic's extensive know-how and many years of experience.

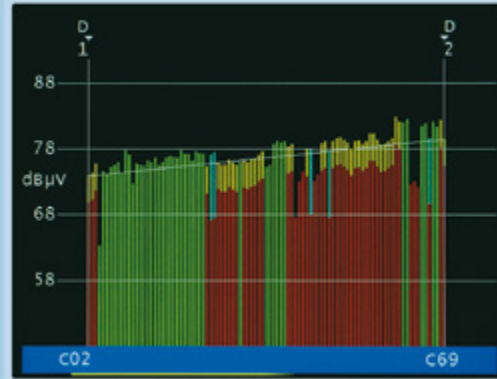
Today, tomorrow, and beyond.

VAROS TECHNOLOGIE



Dimensions in mm: 206 w × 297 h × 84 d
Weight 2.5 kg

The technical data sheets and device-specific downloads are available from our homepage www.kws-electronic.de.



LOCK DVBC 256QAM 6900 MER=33.4dB

TV S36 D FIB 1310nm 3.9dBm
ONI= 2.3% 79.2dBµV
PE= 0 /00:00:39 BER=3.81e-5

Video: Total 7

- 1 BR Sud HD
- 2 BR Nord HD
- 3 NDR FS NDS HD
- 4 NDR FS MV HD
- 5 NDR FS HH HD
- 6 NDR FS SH HD
- 7 PHOENIX HD

CHANNEL FREQUENCY ANA/DIG >>> 2.FUNCTION





The innovative
cable TV handheld device:

VAROS 107

Cable TV measuring receiver

- High resolution luminous 5.7" colour TFT
- Frequency range from 5–867 MHz
- Analogue: FM, TV (RF level measurement), EMI measurement
- Digital: DVB-C, DOCSIS (RF level/BER/MER/Constellation diagram/Packet errors/Noise Margin)
- MPEG 4 decoder for SD and HD picture display with CI slot and DVI out
- NIT evaluation and LCN display
- DOCSIS analyser (DOCSIS 3.0)
- Digital analyser for all ranges, tilt measurement
- Signal quality monitoring with data grabber
- Measurement data storage via USB
- Upstream generator 5–65 MHz (CW und PRBS)
- Interference measurement (EMI)
- Rechargeable lithium ion battery 7.2 V/6.6 Ah

Possible options

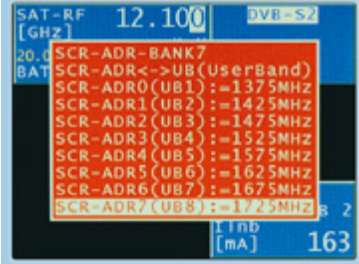
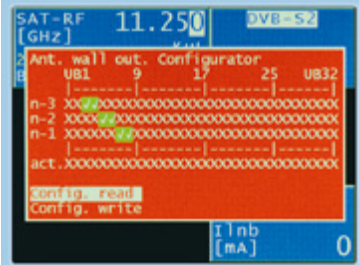
- DVB-T/DVB-T2 measurement module
- Extended frequency range 5–1.050 MHz
- Evaluated S/N meas. for analogue TV signals
- Optical receiver with SC/APC input including possibility to connect microscope via USB
- Software module for upstream evaluation

The VAROS 107 was specially designed for installation and maintenance of cable TV networks. The large high resolution TFT display, the backlit keyboard, the built-in DOCSIS 3.0 and EMI measurement all contribute to making work for the technician easier.

In addition to displaying the optical power the optional optical measurement input can also display the optical modulation index (OMI) as single or summed OMI. As a result of the internal reconversion of optical signals to an RF signal the known measurements are also made available.

The VAROS 107 is equipped with an upstream generator to enable it to manage the increased demands on the return channel capability in the networks with regards measurement. For this the device sends up to 4 simultaneous transmission carriers (CW or PRBS) from the TAD in the return channel. These carriers can then be measured with the AMA 310 or Kronback X16/KWS.

VAROS TECHNOLOGIE



Dimensions in mm: 164 w x 266 h x 170 d
Weight 1.3 kg

The technical data sheets and device-specific downloads are available from our homepage www.kws-electronic.de.



For SAT specialists:

VAROS 109

Satellite measuring receiver

- High resolution luminous 5.7" colour TFT
- Frequency range from 910–2,150 MHz
- DVB-S and DVB-S2
- RF level, BER, MER, Packet errors, Noise Margin
- MPEG 4 decoder for SD and HD picture display with CI slot
- NIT evaluation
- Spectrum analyser for narrow/broadband modes
- Scan functions for reliable satellite recognition
- DiSEqC, UNICABLE, JESS (EN 50494 and 50607)
- Programming function for addressable antenna outlet
- Screenshots and updates via USB
- DVI-out
- Rechargeable lithium ion battery 7.2 V/6.6 Ah

Compact device and yet a full-fledged satellite measuring receiver: the VAROS 109 is used for installation and troubleshooting in classic multi-switch systems as well as UNICABLE/JESS distribution networks.

Using the optical measuring input (option) it is possible to measure optical LNBs. The device displays the optical power and the optical modulation index (OMI). The LNB power supply is provided directly from the RF connector of the VAROS 109.

The scan function has access to a comprehensive list of pre-installed satellite positions. The unambiguous display, especially with regards seldom used orbital positions, significantly reduces time consuming searches. The packet loss counter supports the localisation of critical problems.

Possible options

- Constellation diagram
- Optical receiver with SC/APC input including possibility to connect microscope via USB

VAROS TECHNOLOGIE



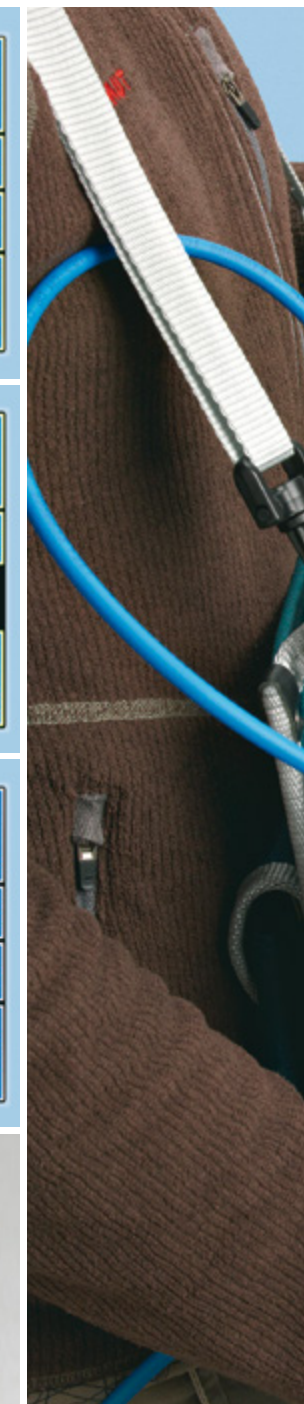
Dimensions in mm: 252 w x 135 h x 272 d
Weight 4.4 kg

The technical data sheets and device-specific downloads are available from our homepage www.kws-electronic.de.

TV	E59	DVB-T2(8)
BAT		locked
		32kFFT(E) 64QAM
		CR=3/4 1/16
LEVEL	PP4	PAPR-OFF
	FRAME-NORMAL	ROT-ON
	Cell_ID=1	Netw_ID=12002
	Sys_ID=8232	STSO
	PLPs=1	PLP_ID=1
CBER	0.0	5.4
PSI extraction ready!	Rmt.supply 0V	
	I_rmt [mA]	0

SAT-RF [GHz]	11.494	DVB-S2
	KuL 000	SR 22000
BAT		
LEVEL [dBµV]		76.0
SatScan		
Astra 1KR/1L/1 19.2°E		
Search position found:	DiSeqCoff 18V	
Astra 1KR/1L/1 19.2° East	I_lnb [mA]	0

SAT-HF [GHz]	11.303	DVB-S2
	KuL 000	locked
BAT		SR 22000
		CR=2/3 8PSK
PEGEL [dBµV]		67.5
PE=	0 / 00.00.45	MER [dB]
CBER	7.65e-4	16.7
Programmsuche fertig!	UNICABLE P1 H/Lo UB1	
ORF 19.2° Ost	I_lnb [mA]	223





No compromise:

VAROS 306

Antenna measuring receiver

- High resolution luminous 5" TFT screen
- Frequency range from 5-2,150 MHz
- RF Level measurement for return path, FM and analogue TV
- DVB-S, DVB-S2, DVB-C, DVB-T: RF level measurement, BER, MER, Packet errors
- MPEG 4 decoder for SD and HD picture display with CI slot
- NIT evaluation
- Spectrum analyser for all ranges
- Scan function for secure satellite identification
- Echo measurement for DVB-T (impulse response)
- DiSEqC, UNICABLE, JESS (EN 50494 and 50607)
- Programming function for addressable antenna outlets
- Measurement data memory/Screenshots directly via USB
- Video/audio input/output via SCART, DVI out
- Rechargeable lithium ion battery 7.2V/6.6 Ah

Possible options

- DVB-T2 measurement module
- DAB/DAB+ measurement module

You want high measurement accuracy and a completely equipped device with minimum investment? You require easy handling? The VAROS 306 provides you with the answers for both today's and tomorrow's questions.

Many of the technical innovations and improvements from the AMA technology have been incorporated in this device concept. A clear and concise presentation of the measured values or undisturbed picture evaluation is possible any time using the 5" VGA colour TFT.

Documentation made easily: measured data (xml) and screenshots (bmp) can be stored directly on a USB stick. This allows for trouble-free processing and archiving of data.

The VAROS 306 has a scan function for reliable retrieval of satellite positions.

KWS SCHULUNGEN





Setting a precedent:

Seminars at KWS-Electronic

Goal of **AMA seminars** is to identify and document all kinds of errors in larger distribution networks. Especially issues such as the evaluation of constellation diagrams and NIT tables are explained.

Distribution network basics are addressed marginally in the AMA seminars.

Goal of **VAROS seminars** is to make the technicians fit for simple and uncomplicated problem solving when out on the network.

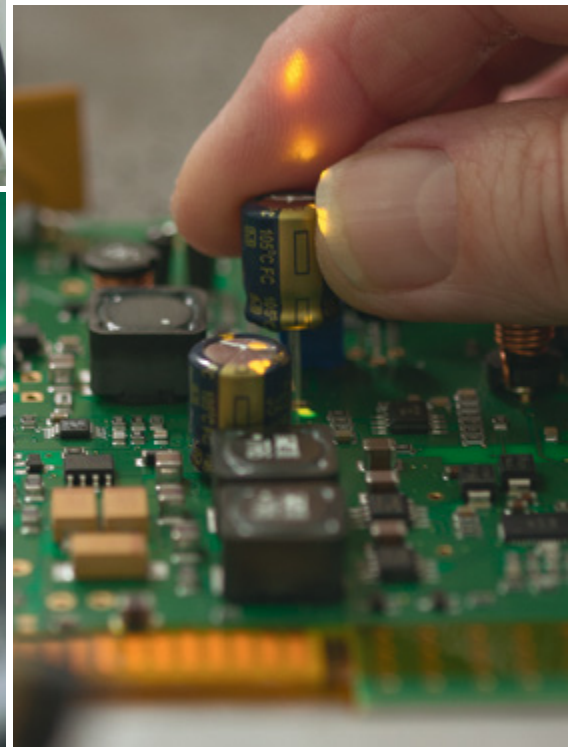
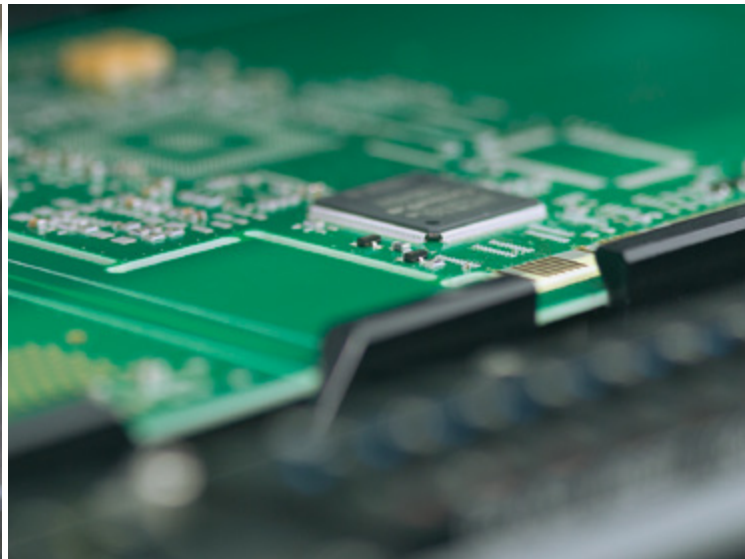
The operation of the measuring devices and interpretation of measured values are addressed extensively.

Please note: the seminars at KWS-Electronic are only held in German language.

In addition to providing on-site training at wholesalers, chambers of craft, and electrical guilds, KWS-Electronic also offers you the opportunity to participate in 2-day seminars directly at the company in Tattenhausen. These intensive courses constitute a successful combination of theoretical knowledge and its application in daily usage. The practical part is completed with hands-on troubleshooting on realistic test walls.

In the picturesque foothills of the Alps we provide a seminar group of maximal 8 participants exactly the knowledge they need to successfully deploy their KWS measuring receiver.

Knowledge as a competitive advantage – seminars from KWS-Electronic provide you with know-how that pays dividends.





This is the way sophisticated measuring devices from KWS-Electronic are produced in the upper Bavarian town of Tattenhausen; from the assembly of the printed circuit boards right up to the packing of the finished measuring device.

An ultra-modern SMT production line (MYDATA) places the components on the boards before they are completed in the manual production. We solder RoHS compliant (lead-free). By doing so we ensure the components used achieve their maximal lifespan.

Assembly inspection: Only optically and electrically tested modules are used for new and upgraded devices as well as repairs. Each KWS measuring receiver is customised according to customer's specifications in the final assembly.

All KWS-Electronic measuring devices are thoroughly checked and calibrated with high quality reference devices.



Possible options

- DVB-T2 measurement module
- DAB/DAB+ measurement module
- DOCSIS analyser 3.0
- Optical receiver with SC/APC input
- UMS module for return path monitoring in conjunction with VAROS 107

Dimensions in mm: 360 w x 160 h x 300 d
 Weight 6.1 kg



- High resolution luminous 5.5" TFT screen
- Frequency range from 5–1,050 MHz for return path, FM, TV and 910–2,150 MHz for SAT
- Analogue: FM, TV
- Digital: DVB-S, DVB-S2, DVB-C, DOCSIS, DVB-T
- Return path: RF level, BER, MER and constellation diagram in conjunction with VAROS 107
- MPEG 4 decoder for SD and HD picture display with 2 CI slots
- Real time constellation diagram
- Hum and phase jitter verification
- CATV: MER up to 40 dB, S/N (analogue) up to 55 dB
- Digital analyser for all ranges, tilt measurement, ingress measurement
- Echo measurement for DVB-T (impulse response)
- Video text analogue/digital, DVB subtitling
- DiSEqC, UNICABLE, JESS (EN 50494 and 50607)
- Programming function for addressable antenna outlets
- Signal quality monitoring with data grabber
- Printer for measured values and screenshots
- USB, SCART in/out, DVI out, Ethernet (RJ 45)
- Rechargeable lithium ion battery 14.4 V/6.6 Ah

Professional technology
doesn't have to be complicated.

AMA 310

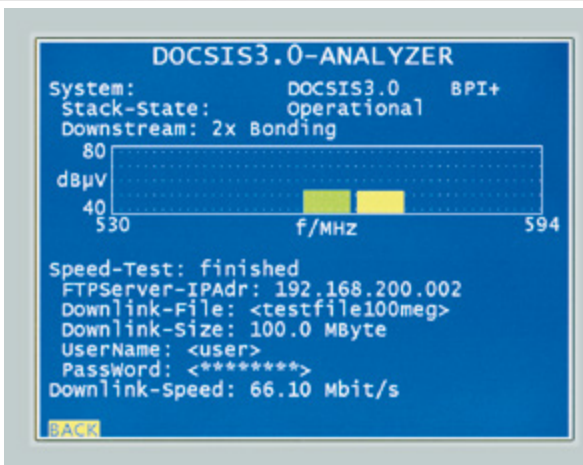
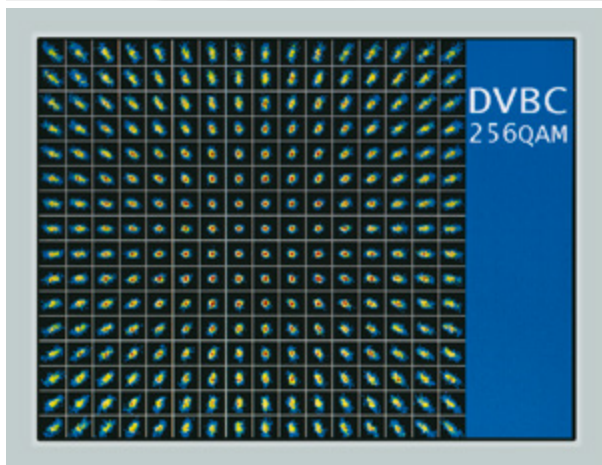
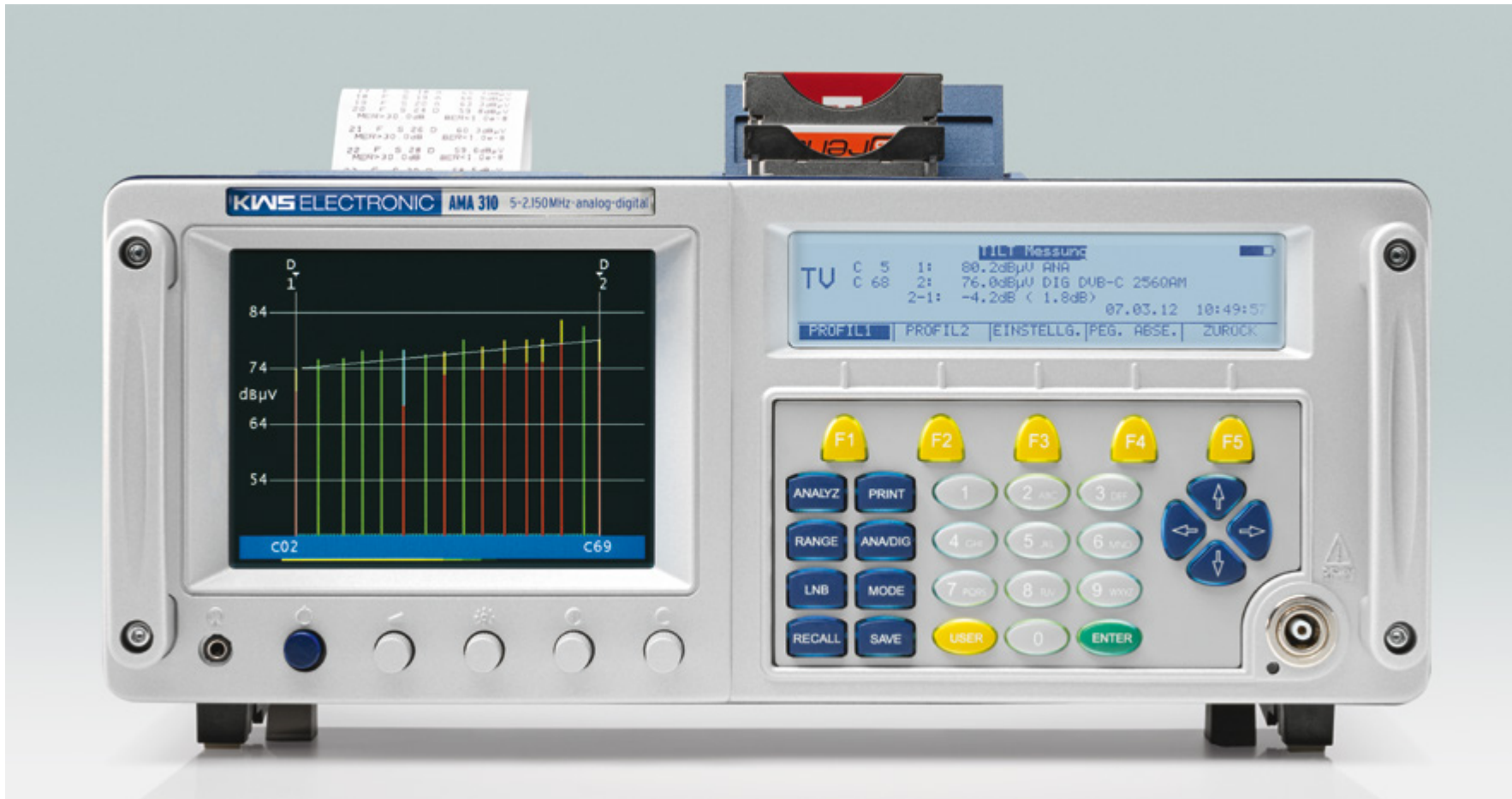
Antenna measuring receiver

The AMA 310 is an obvious step into broadband measuring technology. Despite having an abundance of functions thanks to the time-proven KWS concept it still retains a clear user friendly interface.

Advanced modules and a sophisticated matured housing concept ensure extreme durability and longevity. Extensive surveillance and monitoring functions, diverse copy and save functions are outwardly visible qualities of the AMA 310.

Resulting from the numerous upgrade possibilities and the on-going development of the device firmware the life AMA 310 is not limited by changes in technical standards.

It is a model of longevity and investment security ...
measurement technology "Made in Germany".





AMA TECHNOLOGIE

AMA 310

Antenna measuring receiver

You can comfortably generate and process the measuring receiver's memory lists with the PC software »AMA.remote«. In addition, the software enables the AMA 310 measuring receiver to remotely query and monitor via SNMP (Simple Network Management Protocol).

You can also check cable networks for RF leakage using the EMI option in the AMA 310 in conjunction with additional equipment available from KWS-Electronic. Locating leaks, which are largely responsible for increased interference, is as a result greatly facilitated.

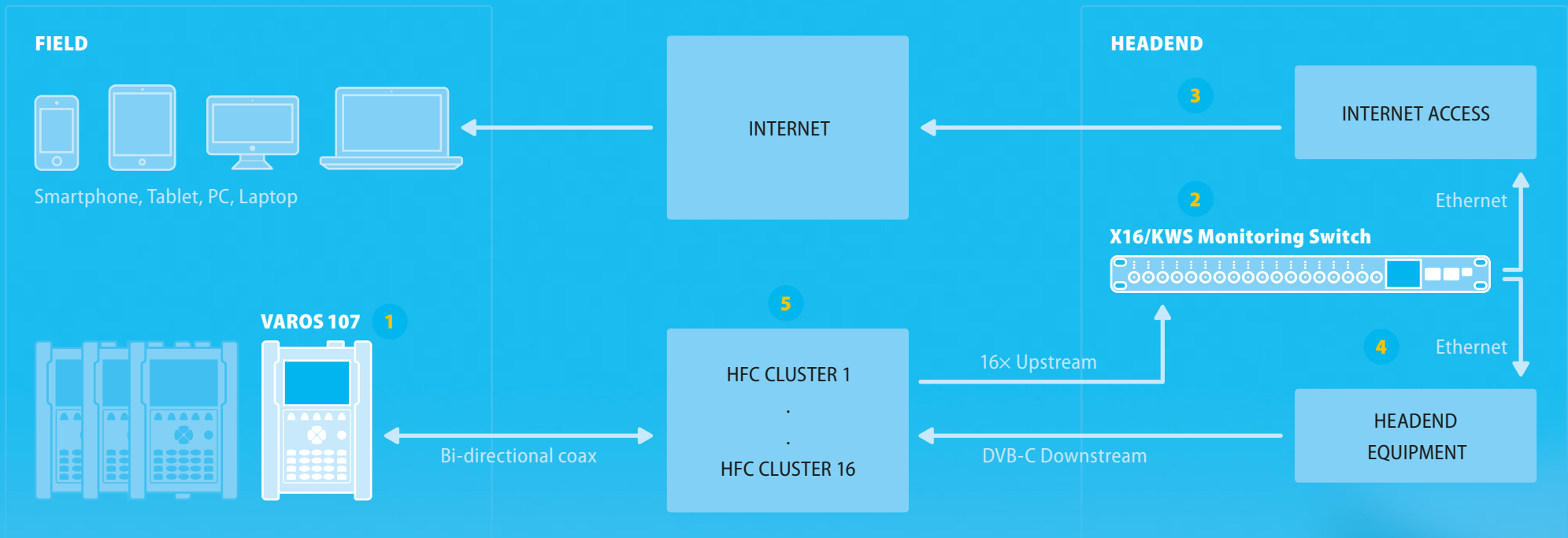
The functional bag not only offers protection for the device but also enables the smooth operation of the instrument. The large opening side flaps provide easy access to all the interfaces.

The new DOCSIS analyser in the AMA 310 was implemented in accordance with the DOCSIS 3.0 specification.

Both Euro-DOCSIS and US-DOCSIS signals can be measured. Channel bonding, as available with DOCSIS 3.0, is presented in a highly visible graphical manner.

With the AMA 310 it is possible to assess the quality of the transmission in return path with greater confidence. With the VAROS 107 used as signal source – e.g. at the outlet – the AMA 310 displays the RF level, BER, MER, and constellation diagram for the received signal in the return path – e.g. at the house amplifier.

An overview of the various option packages as well as information about the »AMA.remote« software is available on our home page www.kws-electronic.de.



1 VAROS 107 measurement possibilities

- Real time display of the Kronback X16/KWS measured spectrum
- VAROS 107 signalling option via the return channel in order to select the input channel on X16/KWS for the display range
- Cascade diagram representation
- Measurement of the frequency response in the return path (sweeping)
- Comfortable adjustment of the in-house return path amplifiers
- Automatic measurement with protocol generation in XML format
- Ranging in reference level (specified by headend device)

2 X16/KWS Device

- Up to 16 X16 devices (256 input channels) can be cascaded. Each X16 device provides 16 input channels for:
- Spectrum display in real time (5–85 MHz)
 - Cascade diagram
 - Long-term recording of the cascade diagram for fault tracing
 - Ingress detection with real time spectrum or cascade diagram

3 Using a Web interface ...

- to display the following on lap tops and mobile devices:
- Spectrum data of each return channel in real time
 - Long-term monitoring of the spectrum data for each single return channel as cascade diagram

4 To transfer the data ...

to the VAROS 107 field devices, an MPEG-2 data stream via Ethernet (RTP) is issued. In the headend equipment this can then be mixed in a DVB-C channel (as a separate data service).

5 HFC

Hybrid Fiber Coax Network: Optical and coax cable distribution network for downstream and upstream from the headend to the subscriber.

KWS UPSTREAM

Kronback X16/KWS & VAROS 107

Upstream Monitoring System



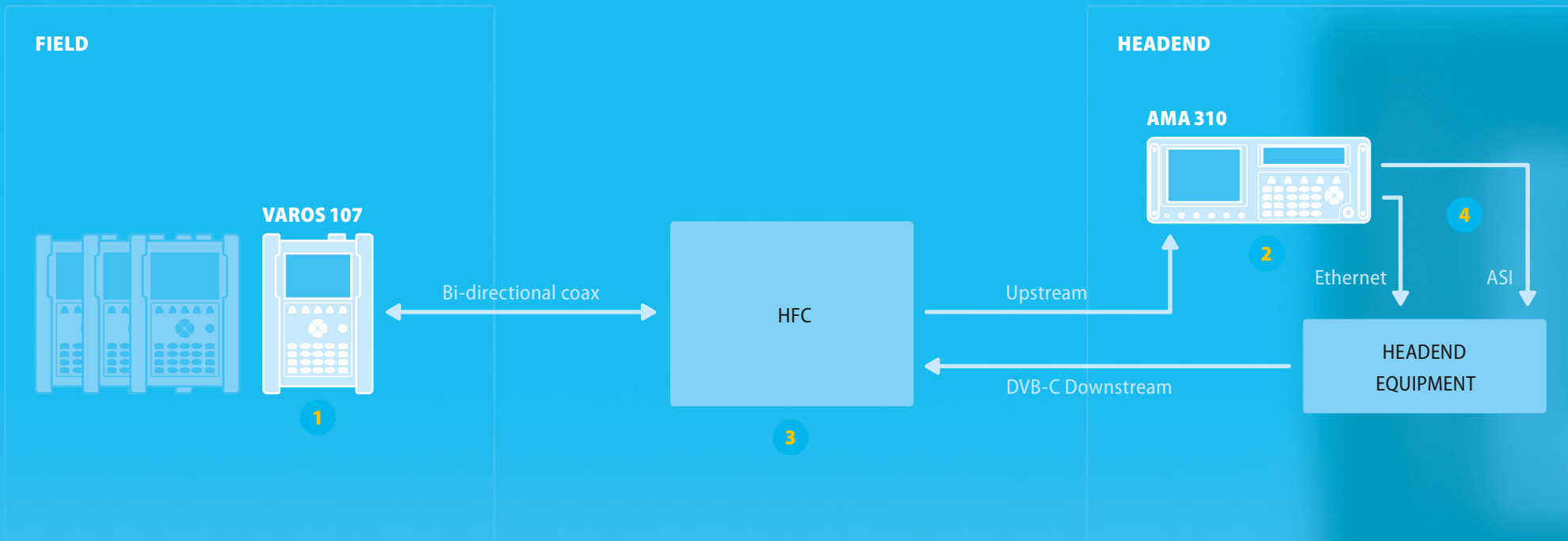
Fast internet services, VoIP, online gaming ... an interference-free return path is essential for a high-quality broadband DOCSIS connection.

The combination of a special KWS version of the real time X16 Kronback Tracer spectrum analyser in the headend and the successful cable handheld VAROS 107 as a field device provides a system that ensures high signal quality in the upstream frequency range.

Communication between the field device and headend unit is bi-directional and uses the coaxial or HFC network currently being measured. As such, no Internet connection is required.

All real time spectral measurement parameters of the headend are displayed on the field device. The 16 inputs of the headend device, its small size (19"/1 RU), the option to cascade up to 16 such units, and the possibility of measuring with multiple handheld devices simultaneously in the field, provide for sufficient flexibility even in large networks.

Numerous measurement and adjustment aids and an automated measurement and report generation complete this powerful system.



1 VAROS 107 measurement possibilities

- Measurement of the frequency response in the return path (sweeping)
- Comfortable adjustment of the in-house return path amplifiers
- Display of MER, BER, and constellation diagram of modulated test channels in the return path (are sent from VAROS 107)
- Real time display of the receive spectrum (in the headend)
- Max-hold and cascade diagram display
- Automated measurement with protocol generation in XML format
- Registration and deregistration of field devices for exclusive measuring access (signalling via telemetry range in the return channel)
- Ranging and reference levels (specified by headend device)

2 AMA 310 UMS

Measurement possibilities:

- Real time spectrum of the return path range (5–65 MHz)
- Measurement of modulated test channels in the upstream with MER, BER, constellation diagram (sent by VAROS 107)

Interaction with VAROS 107

- Bi-directional communication between AMA 310 UMS and VAROS 107 possible over the HFC network

3 HFC

Hybrid Fiber Coax Network: Optical and coax cable distribution network for downstream and upstream from the headend to the subscriber.

4 Transfer of measurement data to ...

to the headend equipment

- as MPEG-2 data stream over Ethernet (UDP and RTP)
- as MPEG-2 data stream over ASI

In the headend these data streams can be mixed in existing DVB-C channels (as a separate data service).

KWS UPSTREAM



AMA 310 UMS & VAROS 107

Upstream Monitoring System

This system combines both the KWS devices AMA 310 and VAROS 107 to a high-end monitoring system for the return path. An AMA 310 with UMS option in the 19" adapter (5 RU) is deployed in the headend; the cable handheld VAROS 107 in the field.

Both devices communicate over the coaxial or HFC network that is being currently measured. An Internet connection is therefore not necessary. The key component of the AMA 310 UMS is a real time spectrum analyser.

Common errors are reliably detected, for example, an increased noise floor, brief ingress interferer, or an inclined position in the upstream frequency range. In addition, known RF measurement parameters such as MER, BER, and constellation diagram can be recorded from the upstream and returned to the VAROS 107 field devices. In addition, the test signals sent from the field devices test signals are measured to a highly degree of accuracy using the AMA 310.

The ease of use, numerous measurement possibilities, automated test sequences, and a simple and clear logging complete this monitoring system.





Setting a precedent:

A selection of possible topics:

- Reference signals in the broadband cable network
- Frequency bands and channel tables
- Calculating in dB sizes
- Level relationships in the broadband cable network
- CATV modulation and transmission standards
- Source and channel coding for digital transmissions
- Spectral analysis
- MPEG transport stream and MPEG decoder
- DOCSIS
- Basics of fibre optical technology and measurements
- EMI measurements
- Return path monitoring
- SNMP & AMA.remote

Please note: the seminars at KWS-Electronic are only held in German language.

CATV-Seminars

and technology seminars at
KWS-Electronic

KWS offers special technical seminars for all users and technicians with the corresponding prior knowledge. Alongside practical training this 2-day event at the company headquarters in Tattenhausen also provides comprehensive theoretical content.

Issues such as DOCSIS, optical transmission, or the very extensive area of return path measurements belong to the program just as much as the theoretical foundations of RF transmission and common modulation types. Our instructors are in a position to respond precisely to your expectations and requirements.

A selection from an extensive portfolio of prepared topics is discussed with the participants at the beginning of the first seminar day.

Each participant should learn exactly what they want to know and what they need for their work as on-site technicians.



KWS ELECTRONIC

HIGH FREQUENCY TEST EQUIPMENT

You are interested in obtaining further information about our products, solutions and services?

KWS-Electronic is at your disposal with expert advice. Call us or send us an e-mail.

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David Schmidt, Thomas Stelzer

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