

## Helios 10

*Specific system for measuring electrical parameters of telephone, xDSL and industrial cables...*



Picture: Helios 10104

### DESCRIPTION

Helios has been designed to offer an effective solution for testing telephone, xDSL and industrial cables up to 10MHz. It allows the automatic low frequency measurement of pairs and quads (RCKE) as well as high frequency parameters of large composition of symmetrical pair cables.

The resistance  $R$  is measured according to the 4 point Kelvin method while the capacitance  $C$  and the unbalanced KE are measured at low frequency. Additionally, Helios allows for the measurement of HF parameters at the very low end of the high frequency range, either by using the fixed points or sweeping methods.

Customer requirements can vary considerably in terms of size and design of connecting frames depending on how many pairs need to be hooked up to the frame simultaneously. Helios proposes several alternatives up a maximum of 104 pairs.

### KEY FEATURES

- **Fast and compliant**
  - The fastest measurement system on the market today
  - Compliant to all major national and international standards for telephone and industrial cables
- **Easy to use and modular**
  - No wire preparation needed due to self-cutting knives
  - Several table sizes available (32, 56, 104 pairs)
  - Accept conductor diameter up to 0.9 mm (1.5 mm on request)
  - Can measure wire, pair, triad or quads
- **Accurate and certified**
  - Quality inspection with very high accuracy
  - Check against certified ISO 17025 standards



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## TECHNICAL SPECIFICATIONS

Parameters	All standard low frequency and high frequency parameters available (Resistance, Capacitance, Insertion Loss, Impedance, NEXT, FEXT, ...)		
Diameters	Accept wire diameter from $\varnothing$ 0.3 to 0.9 mm (1.5 mm on request)		
Standards	Compliant to all major national and international standards for telephone and industrial cables.		
Components	<ul style="list-style-type: none"> <li>• Central measuring unit, containing :                             <ul style="list-style-type: none"> <li>○ Low frequency parameters (RCKE) measuring unit</li> <li>○ 1 state-of-the-art embedded computer with a 17" colour monitor and mouse</li> <li>○ Windows 10 Operating system</li> <li>○ 1 license OptiTest - AESA measurement and result management software</li> </ul> </li> <li>• Near and Far end connecting frames for automatic LF/HF measurements</li> <li>• Power supplies, interfaces, connecting cables and measurement accessories</li> </ul>		
Supply Voltage	100 - 240 VAC / 50 - 60 Hz, Consumption: 600 W without printer, 1000 W with printer		
Versions	Helios 1032	Helios 1056	Helios 10104
Dimensions (Width x Depth x Height)	Central unit : 110 x 81 x 105 cm (43 x 32 x 41 inches) Connecting frame : 45 x 45 x 100 (18 x 18 x 39 inches)	Central unit : 110 x 81 x 105 cm (43 x 32 x 41 inches) Connecting frame : 85 x 85 x 100 (33 x 33 x 39 inches)	
Weight	265 kg / 584 lb	320 kg / 705 lb	
Article No:	05.1032.0001.0	05.1056.0001.0	05.1104.0001.0

## LOW FREQUENCY PARAMETERS ACCURACY

Accuracy		Pairs	Triads	Quads	Accuracy
Resistance	Conductor	Ra, Rb	Ra, Rb, Rc	Ra, Rb, Rc, Rd	$\pm 0,1\% + 10 \text{ m}\Omega$
	Loop	R	R1	R1, R2	
	Unbalance	DR	DR1	DR1, DR2, DR3	
Capacitance	Mutual	C	C1	C1, C2, C3	$\pm 0,25\% \pm 10\text{pF}$ at 800/1000 Hz $\pm 0,25\% \pm 10\text{pF}$ at 125 Hz $\pm 0,25\% \pm 50\text{pF}$ at 12,5Hz
	Unbalance	K	K1	K1 – K12	
	Unbalance to ground	Ei Ea E	Ei1 Ea1 E1	Ei1-Ei3 Ea1-Ea3 E1-E3	
Inductance	Inductance	L	L1	L1, L2	Computed, in mH
	Inductance/Resistance	L/R	L1/R1	L1/R1, L2/R2	Computed, in mH/ $\Omega$

## HIGH FREQUENCY PARAMETERS\* ACCURACY

Accuracy		1 kHz - 30 kHz	30 kHz - 100 kHz	100 kHz - 2 MHz	2 MHz - 10 MHz
<b>Attenuation</b> (corrected at 20°C)	-80 to -30 dB	$\pm 0.8 \text{ dB}$	$\pm 1.0 \text{ dB}$	$\pm 1.5 \text{ dB}$	$\pm 2.0 \text{ dB}$
	-30 to -10 dB	$\pm 0.6 \text{ dB}$	$\pm 0.8 \text{ dB}$	$\pm 1.2 \text{ dB}$	$\pm 1.5 \text{ dB}$
	-10 to 0 dB	$\pm 0.2 \text{ dB}$	$\pm 0.3 \text{ dB}$	$\pm 0.4 \text{ dB}$	$\pm 0.7 \text{ dB}$
<b>NEXT &amp; FEXT</b> Near-End Crosstalk Far-End Crosstalk	-100 to -70 dB	$\pm 2.5 \text{ dB}$	$\pm 3.0 \text{ dB}$	$\pm 3.5 \text{ dB}$	$\pm 4.0 \text{ dB}$
	-70 to -40 dB	$\pm 1.5 \text{ dB}$	$\pm 1.8 \text{ dB}$	$\pm 2.0 \text{ dB}$	$\pm 3.0 \text{ dB}$
	-40 to -10 dB	$\pm 1.0 \text{ dB}$	$\pm 1.2 \text{ dB}$	$\pm 1.0 \text{ dB}$	$\pm 1.2 \text{ dB}$
<b>Impedance</b>	85 $\Omega$ - 135 $\Omega$	$\pm 2.0\%$		$\pm 1.5\%$	
	75 $\Omega$ - 155 $\Omega$	$\pm 3.0\%$		$\pm 4.0\%$	

\* A list of all measured and calculated parameters is available on request.

## REQUIRED COMPONENTS

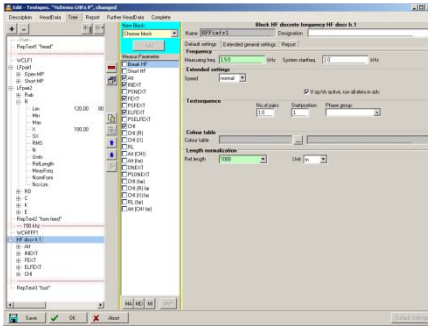
- Vector Network Analyzer (VNA). It can be either provided by AESA or by the customer

## OPTIONS

- 50 $\Omega$  switch for options
- EMC parameters (Transfer Impedance, Screening/Coupling Attenuation)
- Printer
- 9000 RCKE ISO 17025 certified standards
- 9800 HF ISO 17025 certified standards (50 $\Omega$  SMA)
- Maintenance contract
- Spare parts

AESA proposes other specific equipment for low & high frequency measurement.

## KEY BENEFITS



### USER-FRIENDLY

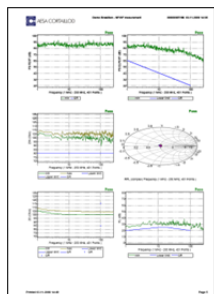
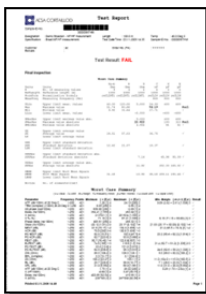
- Self-cutting knives for a fast cable connection
- Multilingual Optitest software
- Direct results without post calculation
- Calibration managed/saved by computer
- Library with full specifications and limits formulas

### ISO 17025 ACCREDITED



### ACCURATE

- The equipment is checked against traceable calibration standards according to ISO/IEC 17025
- The risk of human error is reduced to its strict minimum
- No movable parts for maximum measurement speed, accuracy and reliability



### SMART

- All data (results and conditions) are saved in the internal PC
- Reports can be printed
- Data can be exported through the LAN in an ASCII or XLS file

# OVERVIEW

## SYSTEM

The system consists of a central measuring unit installed in a trolley for easy movement. The connection tables are mobile, thus facilitating the handling and connection of the cable. Reinforced 5 meters long cables connect everything together.

The system is equipped with self cutting knives designed for wire diameters from 0.3mm to 0.9mm (1.5 mm on request) for a fast connection.

Test heads include "open/short/load" capability allowing a fully automatic calibration procedure.

No other calibration is required, which reduces the service time.

Robust mechanical design to facilitate maintenance and servicing operations.

## LOW FREQUENCY PARAMETERS (RCKE - L)

The low frequency parameters unit is designed to measure wires, pairs, triads or quads.

The resistances R and DR are measured according to the 4 points method (Kelvin).

The capacitances CKE can be measured at different frequencies to accommodate different cable lengths.

*(Please refer to our application note 'Length Restrictions in Cable Testing').*

The inductances L and L/R ratio are computed from other LF parameters

The unit provides self-calibration.

<u>Measured parameters</u>	<u>Pairs</u>	<u>Triads</u>	<u>Quads</u>
Conductor Resistance	Ra, Rb	Ra, Rb, Rc	Ra, Rb, Rc, Rd
Loop Resistance	R	R1	R1, R2
Resistance unbalanced <i>(computed)</i>	DR	DR1	DR1, DR2, DR3
Capacitance	C	C1	C1, C2, C3
Capacitance unbalanced	K	K1	K1-K12
Capacitance unbalanced to ground	Ei, Ea, E	Ei1, Ea1, E1	Ei1-Ei3, Ea1-Ea3, E1-E3
Inductance <i>(computed)</i>	L	L1	C1, C2, C3
Inductance / Resistance ratio <i>(computed)</i>	L/R	L1/R1	L1/R1, L2/R2

## Calculated parameters (from 100Hz to 10 kHz)

Attenuation

Characteristic Impedance

Crosstalk

Phase

Velocity of propagation (VOP)

## Statistical parameters

Maximum and minimum measured values

Upper quality factor

Absolute minimum measured value

Lower quality factor

Average value

RC product

Quadratic average

Standard deviation RC

Standard deviation

Variance

and more ...

## HIGH FREQUENCY PARAMETERS

The high frequency parameters are measured as pairs only ( 1 quad = 2 pairs).

The measurement can be done according to a configurable curve or predefined fixed points.

The high frequency parameters are measured using an embedded Vector Network Analyser (VNA).

Helios allows measuring these parameters at the very low end of the high frequency range.

A complete calibration is saved in the system allowing to change the specifications without having to perform a new calibration.

## Measured parameters

Transmission:

Attenuation or Insertion Loss

Near end crosstalk

Far end crosstalk

Reflection:

Impedance

### **Calculated parameters**

Fitted Impedance  
Return Loss (RL) (Open/Short and Terminated 100Ω) (fully complex method)  
NEXT Power Sum  
FEXT Power Sum  
Individual ACR, ACR Worst Case, Power Sum ACR  
ELFEXT Pair to Pair  
Phase Delay  
Velocity of Propagation (VOP)  
and more ...

### **Statistical parameters**

Maximum and minimum measured values  
Worst case  
Pair of worst case  
Frequency of worst case  
and more ...

## **OPTITEST (Software)**

The measuring system is equipped with OptiTest (a module of our CIQ quality data management software) which allows to prepare a measurement, to control the ATE to automatically acquire all the values of the defined parameters, to evaluate the results, to provide the measurement reports in the desired format, and finally to save or export the measured values.

The software has been developed in the Microsoft® Windows™ environment and complies with the Windows features.

### **Creation and administration of test specification**

The early creation of "Test Plan" file allows to define:

- the successive measuring sequences (Line test, LF, HF, EMC, ...)
- the appropriated limits and conditions (including complex limit curves)
- the scales (logarithmic or linear)
- the HF measuring method (sweep or frequency table; start/stop frequencies; number of points,...)
- the configuration of reports

The test plan is created only once per cable type and can be saved and re-used accordingly.

Possibility to create an unlimited number of cable specifications and test sequences.

These "test specifications" will be stored with an individual customised name and are easily retrievable.

Most of the limits and formulas recommended by the international standards are already integrated.

Their variables are programmable to enable the preparation of special specifications

### **Measurement**

The operator only needs to connect the cable on the frame, set the right test plan, fulfil the specific data (order number, operator name,...) and start the full automatic measurement.

- Fully automatic calibration management including automated calibration procedure
- Preliminary line test to verify the cable connection (short cut, crossover,...)
- Switching sequences indicated by LEDs
- In case of problem, the operator can repeat the measurement or continue by accepting the wrong value.

### **Reporting**

Report generation is set in the test plan and is automatically generated.

The results may be displayed, printed, stored as PDF files, exported (e.g. Excel) or sent by email.

Different highly comprehensive reports can be generated containing a limit case compilation with graphics and for each measuring block a separate summary with related graphics.

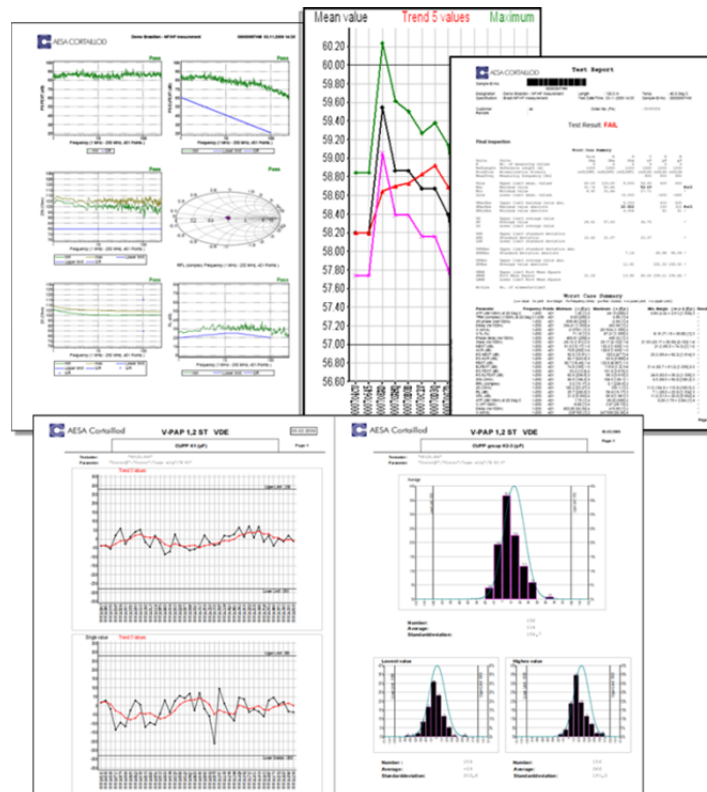
Filters and search criteria normally generate sample lists which facilitate multiple further actions such as:

- Display and process measured values
- Print reports and labels

**Evaluation**

All data is available for evaluation at any time. Thus, all test data of a cable can be collectively evaluated and printed. Some examples of how to perform evaluations are:

- Sample list sorted by test order
- Search with pre-defined or customized filters through the data pool
- Generate quality charts (statistics)
- Statistical distribution (Gauss type curve)
- Evolution and parameter survey as function of time
- Measurements repartition in a defined time period to determine the testing load



**Data management**

Connected to CIQ (AESA quality data management system), all data gathered with OptiTest can be used for further statistical evaluations and combined with other measurements gathered during the complete manufacturing process, from incoming good inspection to the dispatch of the finished product.

# Options

## 1. Vector Network Analyzer (VNA)

A VNA must be integrated into the equipment. It can be provided as an option by AESA. If the customer already has a VNA, he can send it to us (if compatible). In this case, AESA will only charge the integration cost.

- Keysight E5071C 2 ports, 9 kHz – 4.5 GHz (incl. VNA, integrations, driver) [Article No: 51.0001.0054.0](#)
- Integrated Bode100, 100 kHz - 40 MHz (incl. VNA, integration, driver) [Article No: 51.0001.0039.0](#)

Other VNAs available upon request.

## 2. 50Ω switch for options

[Article No: 50.0001.0032.0](#)

By adding a specific input (N connectors), options such as the measurement of EMC parameters can be connected to the central unit. The solution includes the required hardware and software modules.

## 3. EMC parameters\* (Transfer Impedance, Screening/Coupling Attenuation)

*\* this option requires a system with a 50 ohms switch.*

To perform EMC measurements with the tri-axial method, following accessories are required:

- the hardware package to prepare the sample and take care for the impedance adaptation
- the software package (specific measurement module)

These accessories allow measuring the transfer impedance, the screening attenuation and coupling attenuation according to IEC 62153-4-9 when knowing the impedance of the internal coaxial cable created with the sample under test.



- Transfer Impedance Kit, Ø 2.3 - 9.8 mm
- Transfer Impedance Kit, Ø 6 - 22 mm

[Article No: 50.0001.0035.0](#)  
[Article No: 50.0001.0056.0](#)

## 4. Laserjet printer

[Article No: 51.0500.0021.0](#)

The trolley housing the central measuring unit can be equipped with a printer for local printing of a measurement report.

## 5. Set of ISO 17025 certified LF standards type AESA 9000

[Article No: 45.9000.0001.0](#)

This set of "Low Frequency" standards, certified ISO 17025, allows the periodic calibration, thus proving the accuracy of the complete measurement system. The kit is composed of:

- |                      |            |          |          |             |
|----------------------|------------|----------|----------|-------------|
| - Standard type 9001 | C1,2       | 19,20 nF | ± 0,1 %  | ± 30 ppM/°C |
| - Standard type 9002 | C1,2       | 192,0 nF | ± 0,1 %  | ± 30 ppM/°C |
| - Standard type 9003 | C3         | 16,0 nF  | ± 0,1 %  | ± 30 ppM/°C |
|                      | K1, K2, K3 | 16000 pF | ± 0,1 %  | ± 30 ppM/°C |
| - Standard type 9004 | E1, E2, E3 | 12000 pF | ± 0,1 %  | ± 30 ppM/°C |
| - Standard type 9005 | RA, RD     | 192 Ω    | ± 0,01 % | ± 2 ppM/°C  |
|                      | RB, RC     | 1920 Ω   | ± 0,01 % | ± 2 ppM/°C  |



ISO 17025 ACCREDITED



**6. Set of ISO 17025 certifies HF calibration standards type AESA 9800**

Article No: 45.9800.0001.0

This set of "coaxial" primary standards, certified ISO 17025, allows the periodic calibration, thus proving the accuracy of the complete measurement system (Vector Network Analyzer + RF multiplexer + connecting frame).

This set of "coaxial" primary standards should not be mixed up with the "symmetrical" zero correction kit, delivered with the ATE, which is used to carry out the periodical zero correction files of the equipment, required to measure LAN cables.

The set of certified HF standards is composed of:

- 2 attenuation references type 9801                         – 3dB
- 2 attenuation references type 9802                         – 6dB
- 2 attenuation references type 9803                         –10dB
- 2 attenuation references type 9804                         –20dB
- 2 attenuation references type 9805                         –30dB
- 2 x 50Ω terminations
- 2 special connectors for the terminations
- 4 HF connecting cables for the attenuation
- 1 set of miscellaneous HF material



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**7. Maintenance contract & Warranty extension**

Even the most reliable systems require regular, planned and preventive maintenance to perform at optimum levels and according to specifications. For this reason, AESA proposes service packages according to your specific needs and installed base of equipment. Our Packages include advantages such as an extended warranty period, priority remote support and discounted spare parts. Details are available on request.

**8. Spare Parts**

AESA recommends following set of spare parts for an operation safety of two years:

Helios Type	HF measurement only (Mini kit)	Including LF measurement (Full kit)
1 CKE measuring bridge type KM		✓
1 R measuring bridge type RM		✓
1 LF relay matrix board type AZU		✓
1 CPU board		✓
2 test heads (4 if two different connecting frames)	✓	✓
2 HF relays	✓	✓
1 control boards set	✓	✓
1 set of HF cable	✓	✓
1 set of different mechanical and electronic hardware	✓	✓
Article No	50.0900.0003.0	50.0900.0002.0