

Cobalt 2504 WA

Automatic balunless measuring system for LAN cables with Wago connectors



photos for information only

DESCRIPTION

LAN cables are more and more specified for large and wider frequency ranges. Balun based systems cannot measure more than 3 frequency decades with reasonable accuracy. The Cobalt system based on a modal decomposition mathematical algorithm supports the development of new cables (extensive tests in the lab) and simplifies operator's difficult job within systematic testing operations during production which are essential to achieve reliable results.

Cobalt can measure also very easily. It doesn't need frequent and time-consuming calibration routines. It can provide not only the standard parameters such as Next and RL, but also many other cable and individual wire parameters required for development of new cable designs and/or for detailed troubleshooting and quality analysis.

KEY FEATURES

- **Multiple uses**
 - Quality inspection, with very high accuracy
 - Development, with individual values per wire
 - Data cables
- **High-Tech**
 - Balunless technology (modal decomposition mathematical algorithm)
 - Performant HF switches using MIL standardized relays (min 2'000'000 cycles)
- **Performant**
 - More than 170 parameters (including TCL measurement with integrated common mode)
 - Performs all electric tests on cables responding to major standards
- **Go over the limits**
 - Very broad frequency range (2.5GHz) for cat 8 and higher
 - Full dynamic range available
 - Short cable length (10m)
- **Add-on**
 - EMC parameters (TI, AS, AC)
 - Alien Crosstalk



TECHNICAL SPECIFICATIONS

| | |
|-----------------|--|
| Measuring range | 100 kHz – 2.5 GHz |
| Components | <ul style="list-style-type: none"> • 4 pairs connecting frame for HF measurements • 1 state-of-the-art computer with a 17" colour monitor • Operating Windows system • 1 license OptiTest, AESA measurement and result management software • Power supplies, interfaces, connecting cables and measurement accessories |
| Standards | Performs all electrical tests (except dielectric strength and insulation resistance) on cables responding to: <ul style="list-style-type: none"> • ANSI/TIA-568-C.2 for Category 3, 5e, 6 and 6A • ANSI/TIA-568-C.2-1 for Category 8 • IEC 61156-5/-6 for Category 5e, 6, 6A, 7 and 7A • IEC 61156-7/-8 for cables up to 1200MHz • IEC 61156-9/-10 for Category 8.1 and 8.2 |
| Supply voltage | 100 - 240 VAC / 50-60Hz |
| Interfaces | 6 x USB (e.g. for printer) 1 x VGA Display Port connector for external monitor (delivered with the system) 1 x DVI Display Port 1 x HDMI 1 x RJ45 for LAN connection |
| Dimensions | 760 x 530 x 570 mm (24.9" x 17.4" x 18.8") |
| Weight | ≈ 80 kg (78 lb) |
| Article No | 03.3504.0006.0 |

ACCURACY

| | 100 kHz - 10 MHz | 10 MHz - 100 MHz | 100 MHz - 200 MHz | 200 MHz - 400 MHz | 400 MHz - 750 MHz | 750 MHz - 1.5 GHz | 1.5 GHz - 2.5 GHz |
|---|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Attenuation (corrected at 20°C) | | | | | | | |
| -80 to -50 dB | ± 1.3 dB | ± 1.5 dB | ± 1.7 dB | ± 1.9 dB | ± 3 dB | ± 4 dB | ± 6 dB |
| -50 to -25 dB | ± 0.5 dB | ± 0.5 dB | ± 0.6 dB | ± 0.7 dB | ± 0.9 dB | ± 1.5 dB | ± 2 dB |
| -25 to -10 dB | ± 0.2 dB | ± 0.2 dB | ± 0.3 dB | ± 0.4 dB | ± 0.8 dB | ± 1.3 dB | ± 1.7 dB |
| -10 to 0 dB | ± 0.1 dB | ± 0.1 dB | ± 0.2 dB | ± 0.4 dB | ± 0.8 dB | ± 1.3 dB | ± 1.5 dB |
| Near-End Crosstalk NEXT & Far-End Crosstalk FEXT | | | | | | | |
| -90 to -60 dB | ± 2 dB | ± 2 dB | ± 2 dB | ± 2.5 dB | ± 4 dB | ± 6 dB | ± 8 dB |
| -60 to -30 dB | ± 1.6 dB | ± 1.4 dB | ± 1.4 dB | ± 1.6 dB | ± 1.8 dB | ± 4 dB | ± 6 dB |
| -30 to -10 dB | ± 0.5 dB | ± 0.8 dB | ± 0.8 dB | ± 1 dB | ± 1.5 dB | ± 2 dB | ± 3 dB |
| Impedance | | | | | | | |
| 70 Ω - 90 Ω | ± 1 Ω | ± 1.5 Ω | ± 2.5 Ω | ± 2.5 Ω | ± 3.5 Ω | ± 4.5 Ω | ± 6 Ω |
| 90 Ω - 110 Ω | ± 0.75 Ω | ± 1.5 Ω | ± 2.0 Ω | ± 2.0 Ω | ± 3 Ω | ± 4 Ω | ± 5 Ω |
| 110 Ω - 130 Ω | ± 1 Ω | ± 1.5 Ω | ± 2.5 Ω | ± 3.5 Ω | ± 3.5 Ω | ± 4.5 Ω | ± 6 Ω |

REQUIRED COMPONENTS

The system must be equipped with:

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

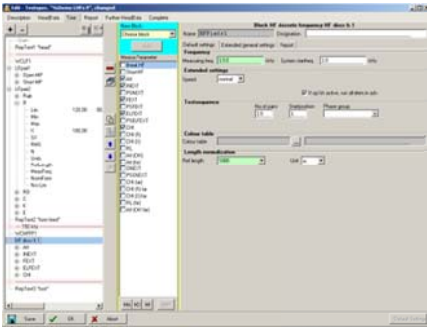
AVAILABLE OPTIONS

Add-ons to the system includes:

- Low frequency parameters measuring unit
- Coaxial cable measurement (50Ω or 50+75Ω)
- Switch for further options
- EMC parameters
(Transfer Impedance, Screening/Coupling Attenuation)
- 9000 Low Frequency standards
- 9800 High Frequency standards
- Spare parts

AESA proposes other specific equipment for high frequency measurement

KEY BENEFITS



USER-FRIENDLY

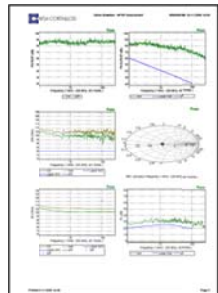
- Fast measurements
- No special HF or LF knowledge required
- OptiTest software is multilingual
- Direct results without post calculation
- Test order library

ISO 17025 ACCREDITED



ACCURATE AND REPEATABLE

- The equipment is checked against traceable calibration standards according to ISO/IEC 17025
- Perfect reproducibility
- The risk of human error is reduced to its strict minimum
- Calibration managed/saved by computer



SMART

- All data (results & conditions) are saved in the PC
- Reports and evaluations can be printed out
- Data can be exported (PDF, TXT or XLS files)

Overview

SYSTEM

No baluns so individual values per wire available and not only pair.
 Accept wire diameters up to 1.2mm.
 Full two ports calibration (Thru-Open-Short-Load) for high accuracy measurement.
 No movable parts for maximum measurement speed and reliability.
 Robust mechanical design studied to facilitate maintenance and servicing operations.

LOW FREQUENCY PARAMETERS (Optional)

The low frequency parameters feature is designed to measure pairs or quads.
 The resistance is measured at 4 points (Kelvin bridge)
 The capacitance can be measured at different frequencies in order to accommodate different cable lengths
 (Please refer to our application note 'Length Restrictions in Cable Testing').
 The feature provides self-calibration.

Measured parameters

| | <u>Pairs</u> | <u>Quads</u> |
|----------------------------------|--------------|-------------------------|
| Conductor Resistance | Ra, Rb | Ra, Rb, Rc, Rd |
| Loop Resistance | R | R1, R2 |
| Resistance unbalanced | DR | DR1, DR2, DR3 |
| Capacitance | C | C1, C2, C3 |
| Capacitance unbalanced | K | K1-K12 |
| Capacitance unbalanced to ground | Ei, Ea, E | Ei1-Ei3, Ea1-Ea3, E1-E3 |

Calculated parameters at 800Hz (1'000Hz)

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.

2 connecting frames allow to connect both ends of the cable for an automatic measurement of all parameters.

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

Available HF parameters:

| | |
|---------------------------------------|---|
| <p>Transmission/Reflection</p> | <ul style="list-style-type: none"> • Reflection Differential Mode (each parameter is available at near and/or far end): Return Loss dd, characteristic impedance, S11, Fitted impedance, SRL • Transmission Differential Mode (each parameter is available for forward and reverse measurement): Attenuation (Insertion Loss), S21, S21 phase, Phase delay, phase delay velocity, Group delay, Delay skew... • Reflection Common Mode (each parameter is available at near and/or far end): Return Loss cc, characteristic impedance, S11, Fitted impedance and RL, SRL • Transmission Common Mode (each parameter is available for forward and reverse measurement): Insertion Loss, S21, S21 phase, Phase delay, phase delay velocity, Group delay, Delay skew... • Conversion Loss (each parameter is available for forward and reverse measurement): LCLdc, LCTLdc, TCLcd, TCTLcd, ELTCTLcd • Single Ended Reflection (each parameter is available at near and/or far end and for wire a and/or b): Characteristic impedance, S11, Fitted impedance, SRL • Single Ended Transmission (each parameter is available for forward and reverse measurement and for wire a and/or b): Attenuation (Insertion Loss), S21, Phase, Phase delay, In Pair Skew... • Single Ended NEXT: S31, S13, S42, S24 • Single Ended FEXT: S41, S14, S32, S23 |
| <p>Near-NEXT</p> | <ul style="list-style-type: none"> • NEXT Differential Mode: Nextdd, PSNextdd, ACR-Ndd, PSACR-Ndd • NEXT Common/Differential Mode: Nextcd • NEXT Differential/Common Mode: Nextdc • NEXT • Common Mode: Nextcc |
| <p>Far-NEXT</p> | <ul style="list-style-type: none"> • Same as Near-NEXT but measured at the far end |
| <p>FEXT</p> | <ul style="list-style-type: none"> • FEXT Differential Mode: Fextdd, PSFextdd, Elfextdd, PSEIfextdd, ACR-Fdd, PSACR-Fdd • FEXT Common/Differential Mode: Fextcd • FEXT Differential/Common Mode: Fextdc • FEXT Common Mode: Fextcc |

Statistical parameters

Maximum and minimum measured values

Worst case

Pair of worst case

Frequency of worst case

and more ...

STANDARDS

Cobalt capabilities

Standard requirements

| | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | Port 6 | Port 7 | Port 8 |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|
| Port 1 | RLdd11 | NEXTdd12 | NEXTdd13 | NEXTdd14 | ILdd15 | FEXTdd16 | FEXTdd17 | FEXTdd18 |
| Port 2 | NEXTdd21 | RLdd22 | NEXTdd23 | NEXTdd24 | FEXTdd25 | ILdd26 | FEXTdd27 | FEXTdd28 |
| Port 3 | NEXTdd31 | NEXTdd32 | RLdd33 | NEXTdd34 | FEXTdd35 | FEXTdd36 | ILdd37 | FEXTdd38 |
| Port 4 | NEXTdd41 | NEXTdd42 | NEXTdd43 | RLdd44 | FEXTdd45 | FEXTdd46 | FEXTdd47 | ILdd48 |
| Port 5 | ILdd51 | FEXTdd52 | FEXTdd53 | FEXTdd54 | RLdd55 | NEXTdd56 | NEXTdd57 | NEXTdd58 |
| Port 6 | FEXTdd61 | ILdd62 | FEXTdd63 | FEXTdd64 | NEXTdd65 | RLdd66 | NEXTdd67 | NEXTdd68 |
| Port 7 | FEXTdd71 | FEXTdd72 | ILdd73 | FEXTdd74 | NEXTdd75 | NEXTdd76 | RLdd77 | NEXTdd78 |
| Port 8 | FEXTdd81 | FEXTdd82 | FEXTdd83 | ILdd84 | NEXTdd85 | NEXTdd86 | NEXTdd87 | RLdd88 |
| Port 1 | LCLdc11 | NEXTdc12 | NEXTdc13 | NEXTdc14 | LCLdc15 | FEXTdc16 | FEXTdc17 | FEXTdc18 |
| Port 2 | NEXTdc21 | LCLdc22 | NEXTdc23 | NEXTdc24 | FEXTdc25 | LCLdc26 | FEXTdc27 | FEXTdc28 |
| Port 3 | NEXTdc31 | NEXTdc32 | LCLdc33 | NEXTdc34 | FEXTdc35 | FEXTdc36 | LCLdc37 | FEXTdc38 |
| Port 4 | NEXTdc41 | NEXTdc42 | NEXTdc43 | LCLdc44 | FEXTdc45 | FEXTdc46 | FEXTdc47 | LCLdc48 |
| Port 5 | LCLdc51 | FEXTdc52 | FEXTdc53 | FEXTdc54 | LCLdc55 | NEXTdc56 | NEXTdc57 | NEXTdc58 |
| Port 6 | FEXTdc61 | LCLdc62 | FEXTdc63 | FEXTdc64 | NEXTdc65 | LCLdc66 | NEXTdc67 | NEXTdc68 |
| Port 7 | FEXTdc71 | FEXTdc72 | LCLdc73 | FEXTdc74 | NEXTdc75 | NEXTdc76 | LCLdc77 | NEXTdc78 |
| Port 8 | FEXTdc81 | FEXTdc82 | FEXTdc83 | LCLdc84 | NEXTdc85 | NEXTdc86 | NEXTdc87 | LCLdc88 |
| Port 1 | TCLcd11 | NEXTcd12 | NEXTcd13 | NEXTcd14 | TCLcd15 | FEXTcd16 | FEXTcd17 | FEXTcd18 |
| Port 2 | NEXTcd21 | TCLcd22 | NEXTcd23 | NEXTcd24 | FEXTcd25 | TCLcd26 | FEXTcd27 | FEXTcd28 |
| Port 3 | NEXTcd31 | NEXTcd32 | TCLcd33 | NEXTcd34 | FEXTcd35 | FEXTcd36 | TCLcd37 | FEXTcd38 |
| Port 4 | NEXTcd41 | NEXTcd42 | NEXTcd43 | TCLcd44 | FEXTcd45 | FEXTcd46 | FEXTcd47 | TCLcd48 |
| Port 5 | TCLcd51 | FEXTcd52 | FEXTcd53 | FEXTcd54 | TCLcd55 | NEXTcd56 | NEXTcd57 | NEXTcd58 |
| Port 6 | FEXTcd61 | TCLcd62 | FEXTcd63 | FEXTcd64 | NEXTcd65 | TCLcd66 | NEXTcd67 | NEXTcd68 |
| Port 7 | FEXTcd71 | FEXTcd72 | TCLcd73 | FEXTcd74 | NEXTcd75 | NEXTcd76 | TCLcd77 | NEXTcd78 |
| Port 8 | FEXTcd81 | FEXTcd82 | FEXTcd83 | TCLcd84 | NEXTcd85 | NEXTcd86 | NEXTcd87 | TCLcd88 |
| Port 1 | RLcc11 | NEXTcc12 | NEXTcc13 | NEXTcc14 | ILcc15 | FEXTcc16 | FEXTcc17 | FEXTcc18 |
| Port 2 | NEXTcc21 | RLcc22 | NEXTcc23 | NEXTcc24 | FEXTcc25 | ILcc26 | FEXTcc27 | FEXTcc28 |
| Port 3 | NEXTcc31 | NEXTcc32 | RLcc33 | NEXTcc34 | FEXTcc35 | FEXTcc36 | ILcc37 | FEXTcc38 |
| Port 4 | NEXTcc41 | NEXTcc42 | NEXTcc43 | RLcc44 | FEXTcc45 | FEXTcc46 | FEXTcc47 | ILcc48 |
| Port 5 | ILcc51 | FEXTcc52 | FEXTcc53 | FEXTcc54 | RLcc55 | NEXTcc56 | NEXTcc57 | NEXTcc58 |
| Port 6 | FEXTcc61 | ILcc62 | FEXTcc63 | FEXTcc64 | NEXTcc65 | RLcc66 | NEXTcc67 | NEXTcc68 |
| Port 7 | FEXTcc71 | FEXTcc72 | ILcc73 | FEXTcc74 | NEXTcc75 | NEXTcc76 | RLcc77 | NEXTcc78 |
| Port 8 | FEXTcc81 | FEXTcc82 | FEXTcc83 | ILcc84 | NEXTcc85 | NEXTcc86 | NEXTcc87 | RLcc88 |

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 in 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.

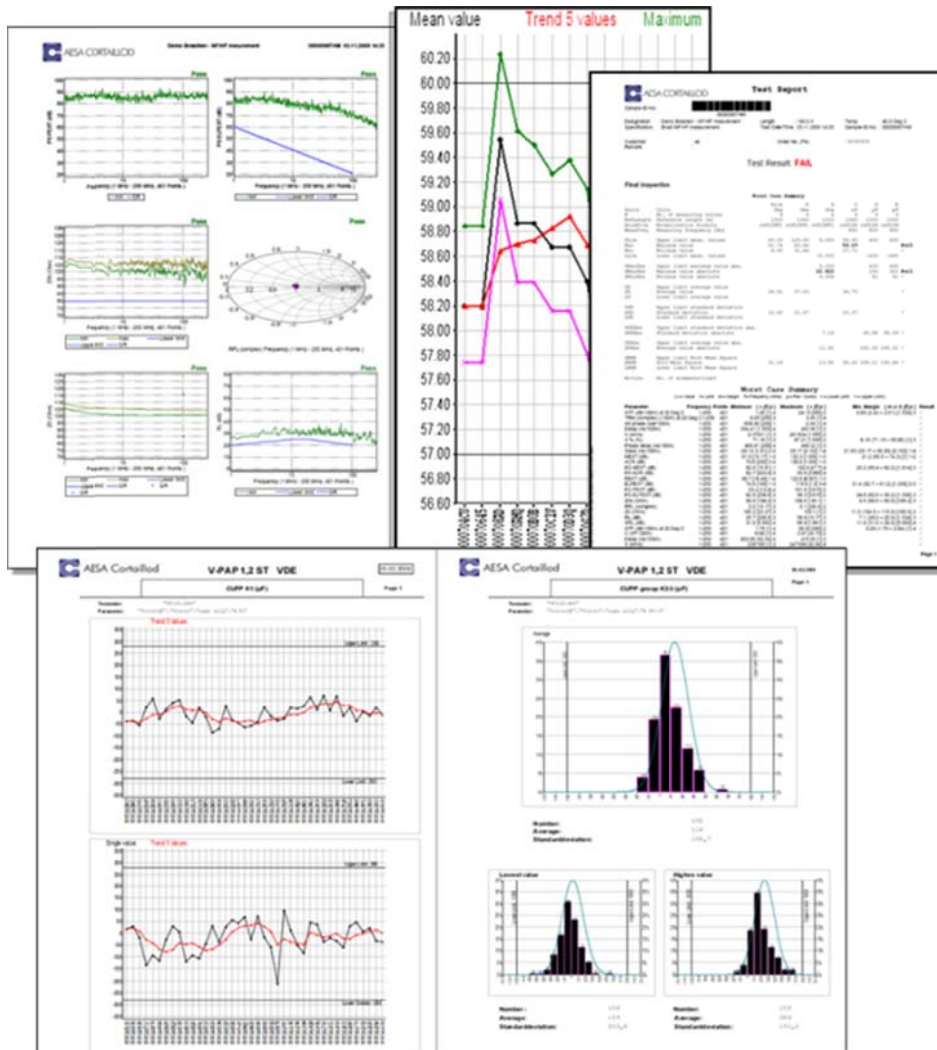
Filters and search criteria normally generate sample lists which facilitate multiple further actions such as:

- 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. Network Analyzer

- Keysight type E5080B 4 ports (9 kHz – 4.5 GHz)
- Rohde & Schwarz ZNB4 (9 kHz – 4.5 GHz)

Article No: 51.0001.0097.0

Article No: 51.0001.0060.0

Other types can be proposed upon request. VNA from customer can also be integrated.

2. 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 |



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3. 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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4. Coaxial cables measuring option

The option includes the modification of the equipment (N-connectors, switch,...) and the related software module to allow the measurement of coaxial cables with Vega.

- 50 or 75 ohms coaxial option
- 50 + 75 ohms coaxial option

Article No: 50.0001.0031.0

Article No: 50.0001.0029.0

| Coaxial accuracy (frequency range will depend on the VNA) | From | To | | 100 kHz 100 MHz | 100 MHz 500 MHz | 500 MHz 1 GHz | 1 GHz 3 GHz | 3 GHz 6 GHz |
|---|------|-----|----|--------------------|--------------------|------------------|----------------|----------------|
| S21 transmission (Attenuation, NEXT) corrected at 20°C | -80 | -50 | dB | ± 1.5 dB | ± 1.7 dB | ± 1.9 dB | ± 2.4 dB | ± 3.0 dB |
| | -50 | -25 | dB | ± 0.5 dB | ± 0.6 dB | ± 0.7 dB | ± 0.9 dB | ± 1.5 dB |
| | -25 | -10 | dB | ± 0.2 dB | ± 0.3 dB | ± 0.4 dB | ± 0.8 dB | ± 1.3 dB |
| | -10 | 0 | dB | ± 0.2 dB | ± 0.2 dB | ± 0.4 dB | ± 0.8 dB | ± 1.3 dB |
| Impedance | 50 | 50 | Ω | ± 0.5 Ω | ± 0.7 Ω | ± 1.0 Ω | ± 1.5 Ω | ± 4.0 Ω |
| | 75 | 75 | Ω | ± 0.75 Ω | ± 1.2 Ω | ± 1.5 Ω | ± 2.0 Ω | ± 6.0 Ω |

5. LF option for Cobalt 4WA

Article No: 50.0001.0036.0

The low frequency parameters measuring technology provides a self-calibration. It is designed to test up to 4 pairs or 2 quads. Different measuring frequencies are integrated in the capacitance bridge. They can be used depending on the length of the cable

| Description | Designation for pairs | Designation for quads | Accuracy | Scale |
|---------------------------------|-----------------------|-----------------------------|--|---------------|
| Conductor resistance | Ra, Rb | Ra, Rb Rc, Rd | ± 0,1% + 10 mΩ | 0 - 19,999 kΩ |
| Loop resistance | R | R1, R2 | | |
| Resistance unbalance | DR | DR1, DR2, DR3 | Computed | %, Ω |
| Capacitance | C | C1, C2, C3 | ± 0,25% ± 10pF at 800 Hz ± 0,25% ± 10pF at 125 Hz ± 0,25% ± 50pF at 12,5Hz | 0 – 2'000nF |
| Capacitance unbalance | K | K1 – K12 | ± 1% ± 6pF at 800 Hz | |
| Capacitance unbalance to ground | Ei, Ea, E | Ei1-Ei3 Ea1-Ea3 E1-E3 | ± 1% ± 3pF at 125 Hz ± 1% ± 30pF at 12,5 Hz | |

Calculated parameters at 800Hz (1'000Hz)

- Attenuation
- Phase
- Characteristic Impedance
- Crosstalk

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 | |

6. Switch for options

The option includes the necessary hardware to connect specific options to the system (e.g. , EMC,...).

- **Switch + 50 ohms N-connector for options**

Article No: 50.0001.0032.0

7. EMC Parameters (TI, AS, AC)*

To perform EMC measurements (Transfer Impedance, Coupling Attenuation, Screening Attenuation) with the tri-axial method, following accessories are required:

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

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

** this option requires a system with a 50 ohms switch. If the system is not equipped with it, it must be ordered separately.*

Pictures next page.

- **Transfer Impedance Kit, Ø 2.3 - 9.8 mm**

Article No: 51.0001.0035.0

- **Transfer Impedance Kit, Ø 6 - 22 mm**

Article No: 51.0001.0056.0

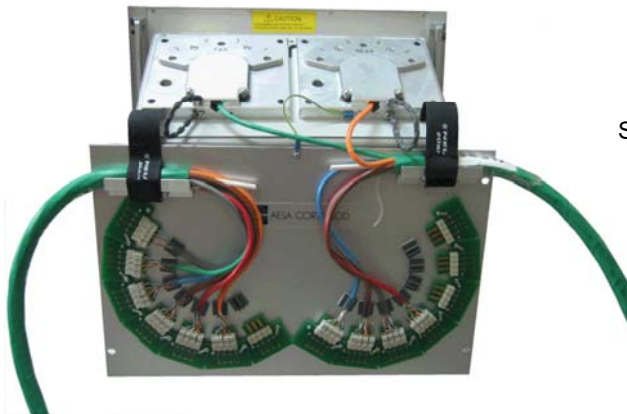


8. Option Alien Crosstalk AXT for ATE up to Cat. 6A (semi-automatic, incl. software)

[Article No: 52.0001.0007.0](#)

AESA has developed a software package along with a test procedure that allows the swapping of the different cables on a 4-pair connecting frame. It allows making all necessary measurements in a well-defined order. The software will then compute the measured crosstalk and show the results as specified in the standards.

This option is optimized for 4-pair unshielded cables (U/UTP) up to 500MHz.



Semi-automatic AXT option connecting frame

9. Option Alien Crosstalk AXT for ATE up to Cat. 8 (semi-automatic, incl. software)

[Article No: 52.0001.0011.0](#)

AESA has developed a software package along with a test procedure that allows the swapping of the different cables on a 4-pair connecting frame. It allows making all necessary measurements in a well-defined order. The software will then compute the measured crosstalk and show the results as specified in the standards.

This option is optimized for screened cables (X/FTP, F/UTP) up to 2000MHz and unshielded cables (U/UTP) up to 500MHz.



Semi-automatic AXT option Cat 8 connecting frame

10. Movable Trolley

Article No: 51.0190.0001.0



For convenience or operational reasons, it is possible to add a professional movable trolley to the system. In such a case, all tester components are integrated in the trolley, including the computer system and the printer.

11. Spare parts

AESA recommends following set of spare parts for a secured operation for two years:

| Cobalt Type | HF measurement only (Mini kit) | Including optional 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 | | ✓ |
| 1 test heads (4 if two different connecting frames) | ✓ | ✓ |
| 2 HF relays (3 if two different connecting frames) | ✓ | ✓ |
| 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 |