Accessories for Acoustic Emission Systems

Specification

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Specifications are subject to change as product developments are made.

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Revision Record

Date	Changes
04-2015	HVF removed, SCA-SI and SCA-CU added. DCPL2 and SysVeri-CSet-USB added. Company name change from Agilent to Keysight.

Purpose of this Document

This document:

- Explains the part codes of accessories for acoustic emission systems
- Outlines specifications of the individual items

Contents

1 Magnetic Holders

The magnetic holders MAG4R/M/SI/H/V have a drill hole between the handles which gives an exact measure reference for the center of the sensor.

MAG4R Very strong magnetic holder for –R case sensors (e.g. VS150-RIC). Magnet holding force 2*200N. Sensor hold-down force 50N. Handles for convenient removal. 80*30*55 mm (incl. handles), -10°C (ice free) to +85°C

MAG4M Very strong magnetic holder for -M case sensors (e.g. VS150-M). Magnet holding force 2*120N. Sensor hold-down force 50N. Handles for convenient removal. 70*25*50 mm (incl. handles), -10°C (ice free) to +85°C

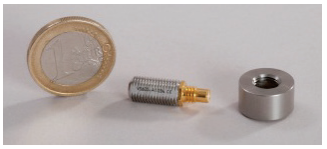
MAG4SI Very strong magnetic holder for -SI case sensors (e.g. VS30-SIC/SI-xxdB). Magnet holding force 2*200N. Sensor hold-down force 50N. Handles for convenient removal. 80*30*76 mm (incl. handles), -10°C (ice free) to +85°C

MAG4H Very strong magnetic holder for -H case sensors (e.g. VS45-H). Magnet holding force 2*120N. Sensor hold-down force 50N. Handles for convenient removal. 70*25*57 mm (incl. handles), -10°C (ice free) to +85°C

MAG4V Very strong magnetic holder for -V case sensors (e.g. VS30-V). Magnet holding force 2*120N. Sensor hold-down force 45N. Handles for convenient removal. 70*25*72 mm (incl. handles), -10°C (ice free) to +85°C

MAG4NS Very strong high-temp magnetic holder for -NS case sensors (e.g. VS160-NS), magnet holding force 2*200N, sensor hold-down force 50N, 100*32*67mm (incl. handle), -10°C (ice free) to 180°C

MAG4A1 Magnetic sensor holder (on right of image) for -A1 and -A2 cases (VS600-A1 sensor in the center of image). Can be screwed on the sensor case. See appendix for mounting instructions.



MAG2S Magnetic sensor holder for -R, -M, -H, -V and -S case, -10°C (ice free) to 65°C

2 Couplants

SCA-CU sensor couplant agent, compound with micro-sized copper particles in non-melting semi-synthetic grease, temperature range: -50°C to +80°C. Coupling quality does not change with time as it is observed with SCA-SI in the first minutes after sensor mounting.

SCA-SI sensor coupling agent, silicon grease, 100 g tube, -40°C to 180°C. Coupling quality can change in the first minutes after mounting.
We measured the coupling quality over time by using the AMSY-6 pulser with sensors mounted on metal plate. With VS150-RIC it needed up to 5 minutes after mounting until sensor amplitude was within 0,2 dB_{AE} of long-term average, with VS30-SIC-46dB it needed up to 30 minutes until sensor amplitude was within 0,2 dB_{AE} of long-term average.

SIK Bond for permanent coupling at -20°C to +150°C, 83ml tube

3 Transport Boxes

FlightCaseMB2 Rugged trolley case for MB2 chassis. Large enough to accommodate one MB2, sensors, preamplifiers and short cables, but dimensions still within the recommendations of IATA/FAA for hand luggage during flights (however, allowed dimensions and weight for hand luggage depends on the used airline).
Approx. outer dimensions (LxWxH): 56x35x23cm. Weight empty: 6.2kg

BoxMB6 Strong box for storage and transport, with handles, suited for MB2 and MB6 (AMSY-6) as well as M6 (AMSY-5), approx. outer dimensions (LxWxH): 50x43x42cm, with 50-95mm shock protection padding. Weight: 7.3kg

BoxMB19 Strong box for storage and transport, with handles, suited for MB19 and EB21 (AMSY-6) as well as M16 and E20 (AMSY-5) and for MC15 & EC21 (AMSY4), approx. outer dimensions (LxWxH): 70x63x30cm, with 50-95mm shock protection padding. Weight: 8.6kg

CardBoxMB6 Cardboard box for shipping MB2 or MB6

CardBoxMB19 Cardboard box for shipping MB19, EB21, or MR19, ER21

4 Cables

BNC Cables

BNC-xM BNC to BNC cable 50 Ohm, RG58C/U, to connect preamplifier with ASIP-2 board. Replace '*x*' by the desired length: 2, 5, 10, 25, 50, 100 or 150m standard (e.g. BNC-5M), every length possible.
Approximate AC attenuation: 3.6dB/km @ 50kHz; 5.5dB/km @150kHz; 10.5dB/km @ 800kHz

Approximate DC resistance: 25 Ohm/km.

Temperature range: -20°C to +70°C

BNC Cable Drums

Drum-50M Cable drum with 50m RG-58 coaxial cable and BNC male connectors at both ends.

Drum-100M Cable drum with 100m RG-58 coaxial cable and BNC male connectors at both ends.

Drum-150M Cable drum with 150m RG-58 coaxial cable and BNC male connectors at both ends.

All cable drums have approximately 3m of the inner cable end wound up at drum's side.

Temperature range: -20°C to +65°C.

Sensor to Preamplifier Cables

Cables tested to suit low noise applications. Connects sensor to preamplifier with BNC input (e.g. AEP3N, AEP4, ASCO-PXx). Other lengths are available on request.

SEC Coax-cable RG174U, 1.2m, up to 80°C, connectors: Microdot to BNC

SEC-T Coax-cable RG178U (less flexible than SEC), 1.2m, up to 100°C at the sensor side, connectors: Microdot to BNC

SEC-TSA Coax-cable RG178U, 1.2m, up to 180°C at the sensor side; connectors: SMC-angled to BNC

SEC-TSD Coax-cable R178d 1.2m with double screen for higher noise rejection, up to 180°C at the sensor side, connectors: SMC to BNC

5 Signal / DC-voltage decoupling

Vallen Systeme preamplifiers, such as AEP3N or AEP4, are designed to receive 28 V_{DC} via the same coaxial cable (typically BNC RG58 C/U) that also transfers the amplified AE signal. The digital Vallen Systeme GmbH multi-channel AE systems provide the required voltage and decouple the AE-signal internally.

If clients want to use Vallen Systeme GmbH preamplifiers without an AE system, DCPL2 can be used to add a DC-voltage to the preamplifier line and to remove ("decouple") DC from the signal to the measuring unit.

Decoupling Box (DCPL2)

The Decoupling Box (DCPL2) contains a suited decoupling circuit in a metal box, providing two BNC connectors and two 4mm banana sockets:

- BNC1 is to connect the output of a Vallen Systeme preamplifier (combined AC signal/DC power line), to provide DC supply, 50Ω termination and to receive the high frequency AE signal.
- BNC2 is to provide the high frequency AC signal, decoupled from DC over 0.1µF, to a measuring unit (e.g. an oscilloscope or an ADC-Board), with an input impedance of at least 1 MΩ.
- 28…30 VDC are to be fed-in over two separate 4mm banana sockets from an external power supply. Plus: red, minus: blue. Minus is connected to BNC shield over an internal 3.3 mH inductor.
  The voltage supplied to the preamplifier (connector “Preamp”) is about 1.5V less than the voltage at the V_{DC} input. The Vallen preamplifiers require a supply voltage of 28 VDC. However, the preamplifiers work also with supply voltages between 27 and 29 VDC – only a little change in gain will be observed (<0,1 dB change). Therefore as supply voltage for the DCPL2 a range of 28 to 30 V_{DC} is acceptable.

One power supply can supply multiple decoupling boxes, because both DC-voltage inputs (plus and minus) are internally decoupled from the AC signal path over 3.3mH inductors. We recommend using a linearly regulated supply, because switched power supplies may add undesired noise to the AE signal.

The external supply for decoupling box shall at least meet the following requirements:

- 28V_{DC} (isolated from earth), see above for more information
- 150mA per decoupling box (during power-on),
- 70mA per decoupling box continuous

Each preamplifier requires one decoupling box.

Dimensions: 30 x 55 x 91 mm (HxWxL, including BNC connectors). Weight: 145g
Temperature range: -5°C to 85°C

Remark to DCPL1: this was the predecessor of DCPL2 with different housing and very similar electrical properties.

Power supply for Decoupling Box (DTP10)

DTP10 is a switched power supply providing 28 V_{DC} to up to three DCPL1 or DCPL2. We recommend to use a linearly regulated power supply for the decoupling box to achieve the best

signal-to-noise ratio. Linearly regulated power supplies are not in our product range. DTP10 should only be used, if noise levels are not crucial for the AE application. In comparison to a linearly regulated power supply the noise increases by 3 dB_{AE} peak and 7 dB_{AE} RMS. This noise further increases when more DCPL1/DCPL2's are supplied by one DTP10. Please see table below for noise levels of different example setups.

Noise values (typical):

	DTP10 1x AEP4	**DTP10 2x AEP4**	**DTP10 3x AEP4**
	Noise [µV / dB_{AE}]	**Noise [µV / dB_{AE}]**	**Noise [µV / dB_{AE}]**
34 dB, 95 – 850 kHz, peak	27.1 / 28.7	32.7 / 30.3	34.1 / 30.7
34 dB, 95 – 850 kHz, RMS	9.5 / 19.6	10.5 / 20.4	12.0 / 21.6
40 dB, 95 – 850 kHz, peak	18.4 / 25.3	22.5 / 27.0	21.6 / 26.7
40 dB, 95 – 850 kHz, RMS	4.8 / 13.6	5.4 / 14.6	6.2 / 15.8
40 dB, 95 – 300 kHz, peak	8.8 / 18.9	11.3 / 21.1	14.7 / 23.3
40 dB, 95 – 300 kHz, RMS	2.8 / 8.9	3.9 / 11.8	5.0 / 14.0
40 dB, bypass, peak	34.1 / 30.1	48.0 / 33.6	49.3 / 33.9
40 dB, bypass, RMS	5.7 / 15.1	6.5 / 16.3	7.5 / 17.5

Specification of DTP10:

Input:	100-240 V_{AC}, 47-63 Hz (1.5 m lead, euro-plug)
Output:	28 V_{DC}, 0.35 A (1.7 m lead, two 4 mm banana plugs to connect to DCPL1 or DCPL2)
Temperature range:	0°C to +40°C
Dimensions (WxDxH):	85x55x47 mm without plug
Weight:	120 g without cables
Hold-up time (power failure):	>20 ms @ 230 V_{AC}

6 Hsu Nielsen Sources

5HNS03	5 pieces of Hsu-Nielsen Sources (pencils) with shoe according to ASTM E976 for 0.35 mm leads.
5HNS05	5 pieces of Hsu-Nielsen Sources (pencils) with shoe according to ASTM E976 for 0.5 mm leads.
5HNS03-Shoe	5 replacement shoes for Hsu-Nielsen Sources 0.35 mm.
5HNS05-Shoe	5 replacement shoes for Hsu-Nielsen Sources 0.5 mm
12HNS03-Ld	12 packages, each containing 12 pencil leads 0.35mm
12HNS05-Ld	12 packages, each containing 12 pencil leads 0.5mm.

7 Laptop and Docking Station

DLC	Dell Latitude 5000 series notebook
DCD	Advanced port replicator for Dell Latitude notebooks

8 PC

TFT22	External TFT-monitor, at least 22 inch
PC-Desk	Dell Optiplex 30xx series PC

9 Arbitrary Function Generator

FG33511B	Arbitrary function generator, programmable with USB or LAN interfaces for Vallen Sensor Tester and SysVeri. Function generator model: Keysight 33511B

10 DC Calibrator

M2000A	2000A DC calibrator, programmable via RS232

11 Vallen Sensor Tester (VST)

The Vallen Sensor Tester (VST) is an easy to use software tool to verify the sensitivity to AE-sensors. The software package (VSTSW) requires VSTTerm, function generator and one signal emitter suitable for the frequency range of the sensor under test. If VST is used with an ASIPP card (AMSY4 or AMSY-5), special dummy filters are also required. These filters are not required if ASIP-2 boards are used (AMSY-5 or AMSY-6).

VSTSW	Vallen Sensor Tester software package
VSTTerm	Vallen Sensor Tester termination Set (1xBNC-T + 50Ω terminator)
FG33511B	Keysight (former Agilent) function generator, see section 9. Keysight/Agilent model 33220A also supported.
VSTSH	Sensor holder for Sensor Tester. Suitable for all Vallen sensors and VSTEM101 as well as VSTEM103.
VSTEM101	Sensor Tester signal emitter for low frequency sensors (e.g. VS30-V) + BNC cable
VSTEM103	Sensor Tester signal emitter for standard sensors (e.g. VS150-M) + SEC cable
HP4-dum	Dummy high-pass filter for ASIPP, recommended for Vallen Sensor Tester
TP4-dum	Dummy low-pass filter for ASIPP, recommended for Vallen Sensor Tester

12 System Verification (SysVeri)

Vallen SysVeri allows for software supported (semi-automatic) verification of AMSY4, AMSY-5 and AMSY-6 and the installed signal processor boards (ASIPP and ASIP-2).

SysVeri	Verification software for AMSY system and ASIPP / ASIP-2 boards
SysVeri-Cset	cable set for SysVeri, consisting of 1xET1, 1xCbP, 1xCbA, 1xCbE, 1xBNC
SysVeri-Cset-USB	endtest adapter and cable set for SysVeri to allow control of AMSY-5/6 external- and alarm-interface over USB. Consists of end test adapter ET2, CbA/CbE cable for connection ET2 to external- and alarm-connector of AMSY-5/6, USB cable, 1,5 m BNC cable. The 1,5 m BNC cable is used to connect ASIP-2 board with function generator. Supported since software release R2013.0809.
ET1	endtest adapter for SysVeri (requires parallel port interface on PC running System Verification software)
ET2	endtest adapter for SysVeri. Alternative to using ET1. ET2 is based in USB interface.

Note:

ET2 needs an USB driver. The driver is automatically copied to hard disk drive when AE-Suite software is installed (location: c:\Vallen\Drivers) but it is not registered with the system. To install the driver simply connect ET2 to PC and wait until OS detects a new device. Select as source for installing the driver c:\Vallen\Drivers\ET2. Alternatively one could install the driver via the device manager.

CbP	SubD25-SubD25 (male-male) cable, all pins wired, 2m long
CbA	SubD9 (male) - 10pole (female), 25cm long (for Alarm connector)
CbE	SubD15 (female) - 16pole (female), 25cm long (for Externals connector)
CbCAL	Cable set for connecting DC calibrator to parametric inputs (4 cables each 1.5m)
FG33511B	Keysight (former Agilent) function generator, see section 9. Keysight/Agilent model 33220A also supported.
M2000A	see section 10

13 Chassis Accessory

blank panel-1	Blank panel to cover one empty ASIP-2 board slot
blank panel-3	Blank panel to cover three empty ASIP-2 board slots

14 Literature - Training Guide

Trngguide	J.D. Leaird: AE Training Guide

15 Warranty Conditions

The warranty period is for one year from the date of its delivery, provided the parts have been correctly handled. This warranty does not cover “consumable” items such as couplants and cables, nor does it cover the repair of any accidental damage.

The warranty period for cables is 3 months from the date of delivery. The cable warranty does not cover damage caused by external force (e.g. folding the cable).

We warrant that the goods as delivered will conform to the specifications. On notification during the warranty period defective items will be replaced, free of costs and within a reasonable time. If transportation should become necessary, the customer has to provide the permits for export and re-import of replacement parts and bear the costs of transportation.

Except as expressed before, we disclaim all other warranties.

16 Appendix

16.1 Magnetic holder mounting description for MAG4A1

This description applies only for mounting the magnetic holder on sensor VSxxx-A1. With sensor VSxxx-A2 just screw the ring magnet on to the sensor until the end of the thread.

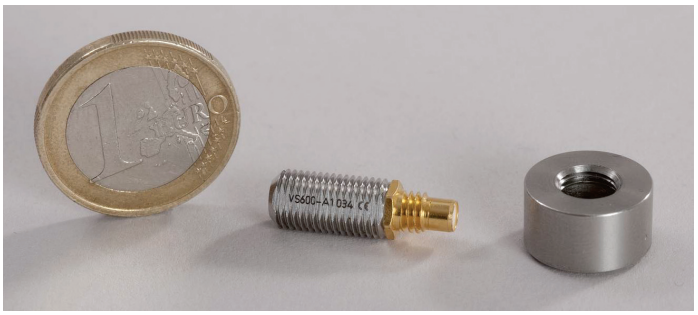


Figure 16-1: VS600-A1 and MAG4A1 compared to the size of a one Euro coin.

AE-sensors of type A1 have a threaded casing for screwing on a MAG4A1. The MAG4A1 is a strong magnetic holder for this type of AE-sensor casing. It consists of a magnet and a counter screw. We recommend following practice to mount the magnetic holder onto the AE-sensor.

Step 1:

Mount the AE-sensor cable (SEC-TSD). This ensures easier handling of the AE-sensor.

Step 2:

First screw the counter nut on the AE-sensor. Afterwards screw on the magnet (from active side of AE-sensor) until the AE-sensor sticks out a little bit.

Step 3:

Mount the AE-sensor on the test object.

Step 4:

Adjust (by screwing) the MAG4A1 until it touches the test object's surface. Then turn it back by a quarter rotations.

Step 5:

Fasten the counter nut by use of a jaw wrench (size 10).

Note:

Please make sure that the AE-sensor is electrically isolated against the test object´s surface. If the surface is a conductive material use e.g. Flashbreaker® 1 tape from Airtech (www.airtechintl.com) as interface.