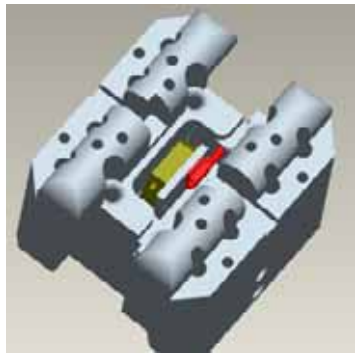
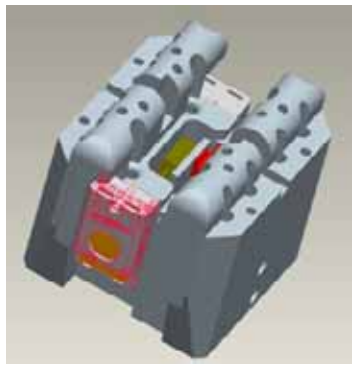
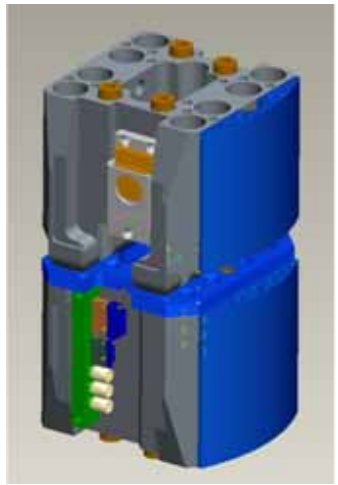
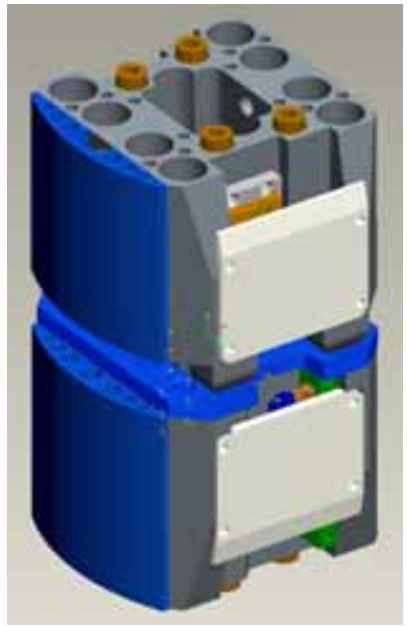
M=BUS

Impactor Applications









For further information: http://www.mbus-sensor.de

1. Introduction
2. Components
3. Reliability
4. Test Configuration
5. Test Sequence
6. Compatibility
7. Maintenance

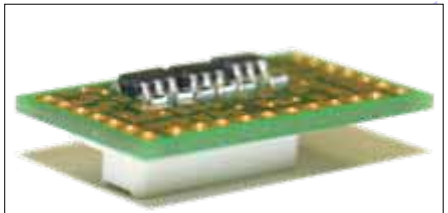
1. Introduction

Improvements in preparation and testing

- Reduction of wiring
- Backup system
- Simple tear-off mechanism
- Real free motion of impactor / Stand-alone operation
- Easy retrofitting of all conventional test probes
- M=BUS® Software plus evaluation tool CS3 Workshop for free
- Automatic sensor scan
- Compatibility to other systems
- Easy exchange of impactor and sensor data
- Crimp connectors at bus line
- Solder contacts for sensor wires
- Quick repair and adaption of bus cables on site
- Universal concept (wide range of applications)
- Economic system extension

M=BUS simplifies the wiring!

Adaptor Plugs with soldering tags for the analogue sensor wires and necessary bridge completions.



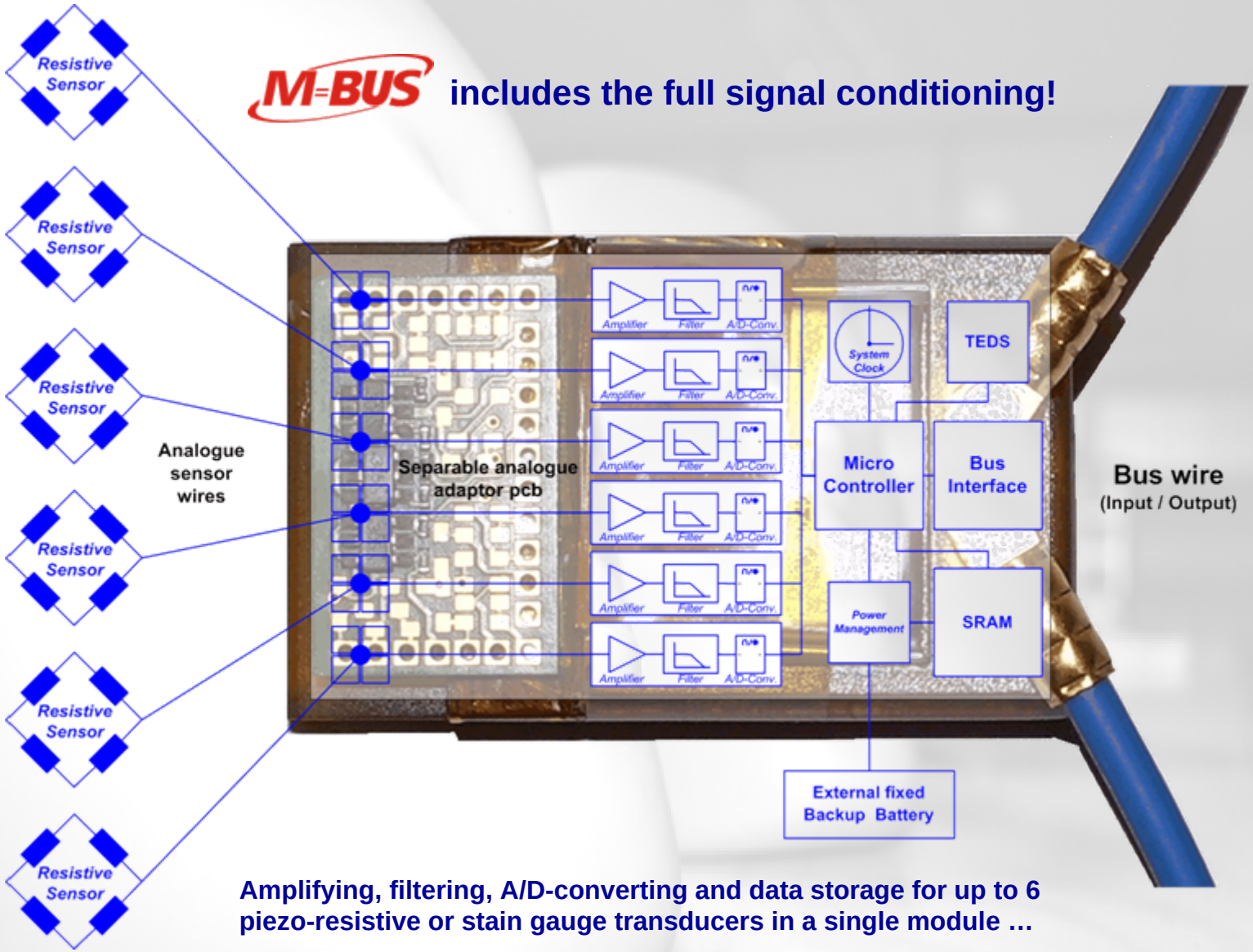
Separable Adaptor PCBs

Shrinking length of analogue sensor cables due to locating the M=BUS® units near or in the transducers.

Daisy-Chain wiring of up to 32 participants with support of 6 channels each in one M=BUS® strand with high flexible 2.5mm diameter coax cables.

MMCX-Connectors for easy handling

M=BUS includes the full signal conditioning!

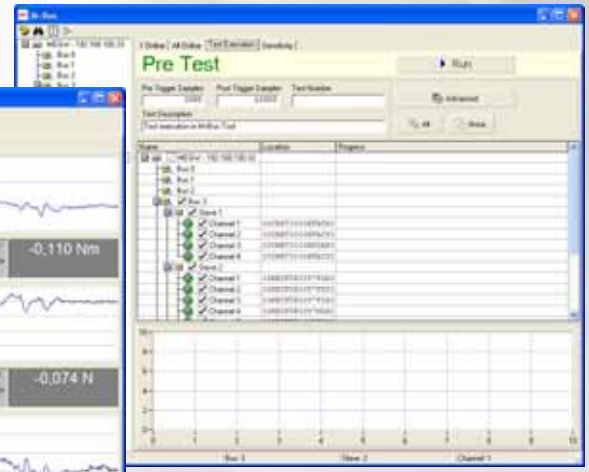


Amplifying, filtering, A/D-converting and data storage for up to 6 piezo-resistive or stain gauge transducers in a single module …

M=BUS - Ready for test!

Get started with the supplied M=BUS® Software Tool for the test execution:

- Sensor Check
- Online View
- TEDS Editor
- Test Preparation and Execution
- Data file export
- Complete evaluation tool (CS3 Workshop)



2. Components

M=BUS® Data Logger:

- 3 or 6 channel support
- Complete signal conditioning
- Transducer Electronic Data Sheet (TEDS)
- Recording time of 17s per channel
- Sampling Rate of 20kHz
- Resolution of 16bit
- Anti-Aliasing: 8-pol Bessel; 2,4kHz
- Backup-System (Auto-Trigger: 7s Pre- and 10s Post Trigger)
- External Battery: Li-Polymer, 50mAh/3.7V
- Outer Dimensions: (40x25x14)mm
- Weight: 15g
- Input Voltage: 18-22V
- Bridge Excitation: 3,3V

M=BUS® Ethernet Gateway:

- Bus interface (power, trigger, network)
- Connection of up to 6 bus strands with up to 32 participants (1152 channels maximum)
- Display for feedback of system state
- Backup system
- Orientation detection

M=BUS® Aktive Terminator:

- Bus termination (high frequency line)
- Response of bus completion
- Connectivity of external temperature sensor
- Logging of temperature sequence (Software)

M=BUS® USB Gateway:

- Bus interface (power, trigger, network)
- Connection of 1 bus strand with up to 32 participants (192 channels)
- External power supply for the operation of a complete bus strand
- Support of up to 2 participants (Logger 6C) via USB
- Communication via USB
- Not ruggedized (test rig application)
- Slide-in rack for fixation

3. Reliability

Q1/2003 – Project Kick-Off, specifications, development of M=BUS® Protocol

Q1/2004 – Electronic design of Gateways and Logger 3C

Q3/2004 – Logger 3C (BLA) and NA33 Gateway available

Q4/2004 – New M=BUS® Logger: 6 channels in hot-mold housing (InDummy Design)

Q1/2005 – Partnership with BAM (Drop Tests with CASTOR Containers)

Q4/2005 – Build-up of an ATD and InDummy DAS department

Q1/2006 – Ethernet Gateway and Logger 6C (BLB) available

Q2/2006 – First inhouse Sled Test Series of M=BUS® as InDummy DAS

Q3/2006 – Introduction of the first M=BUS®-HF-Dummy

Q4/2006 – Introduction of the first M=BUS®-Y7-Dummy

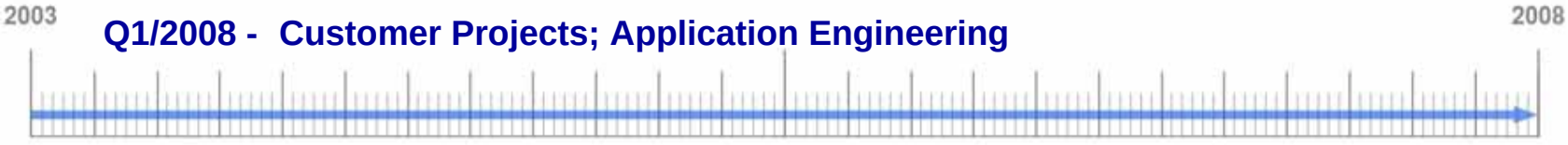
Q4/2006 – Rollover Tests with M=BUS® in stand-alone configuration

Q2/2007 – Development start of M=BUS® solutions for impactor applications

Q3/2007 – Introduction of the first M=BUS®-ES2(re)-Dummy

Q4/2007 – Introduction of the first M=BUS®-Q3-Dummy

Q1/2008 - Customer Projects; Application Engineering



MESSRING's Engineering Performance

CAD | Light-weight construction with high-grade materials | Test rigs | Own crash facility

Reversible Upgrades according SAE, ECE/EG, CFR, ISO and MISRA:

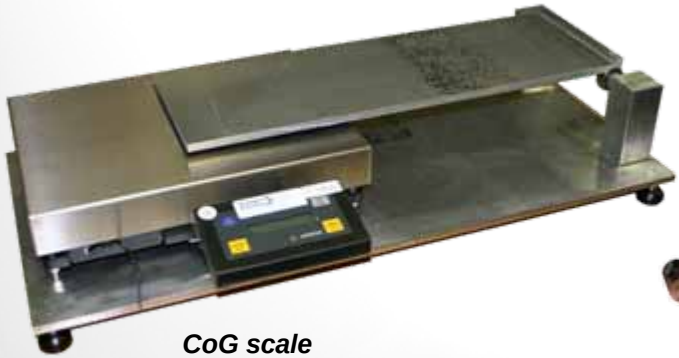
- Check of all outgoing components (no random inspections)
- Reliability test (life cycle of connectors, daily use, customers experiences etc.)
- Software tests
- EMC tests
- Shock tests (drop tower)
- Climate chamber tests
- Research of temperature behaviour
- CAD calculations
- Mass property research
- Sled tests

CAD - Design

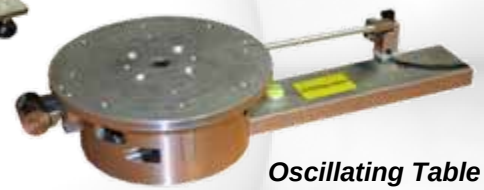
Sled facility with HydroBreak

Drop Tower

Climate Chamber



CoG scale



Oscillating Table

BAM — Partnership in drop testing of CASTOR Containers; M=BUS equipment for MEMS and strain gauge applications

bast — M=BUS® Dummy Certification

DTC — H3 Dummy, ES2, M=BUS® OnBoard Instrumentation

MPA Universität Stuttgart — M=BUS® Q3 Dummy

CAPE — M=BUS® Y7 Dummy

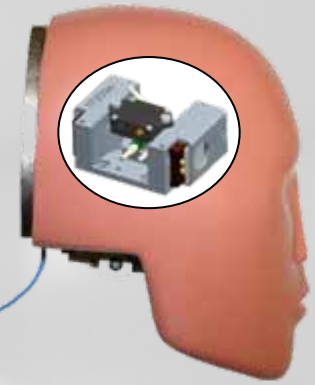
Autoliv — M=BUS® H3 Dummy

ACTS Advanced Car Technology Systems Joint Venture of MAGNA & TRW — M=BUS® Test Rig Instrumentation

4. Test Configuration

… for impactor applications

Propulsion



Tear-off receptacle at propulsion

Tear-off plug at impactor

Instr. Impactor with

- M=BUS® Logger
- M=BUS® Terminator

Second M=BUS® cable for data download

Ethernet Gateway

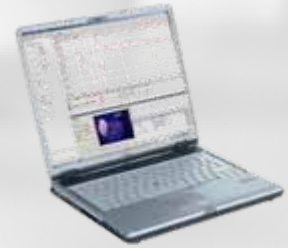
or

USB Gateway

Power Supply

Trigger Source

Ethernet / Network PC



Receptacle fixed at Cylinder

Plug at impactor side

Receptacle with chassis fixation

Reinforced strain relief on plug

Cable Crimp Connectors (SMB, SMS)

5. Test sequence

1. Prepare whole system
2. Start M=BUS® Software
3. Connect to Gateway
4. Automatic bus scan
5. Check bus completion
6. Check battery state
7. Check calibration
8. Check sensor operation
9. Check sensor orientation

M=BUS synchronizes data and time!

Recalculation of the trigger time (t_0) realized by synchronized clocks in master and slaves:

1. Arming the measuring system:
   Clock synchronisation (< 50µs)

2. Planned Trigger (Master) — Test Period — Cable disruption (Emergency Trigger on slave)

3. Recording in accordance with the emergency pre and post trigger time setup (17s)

4. Reconnecting by user

5. Determining of time difference between master and slave

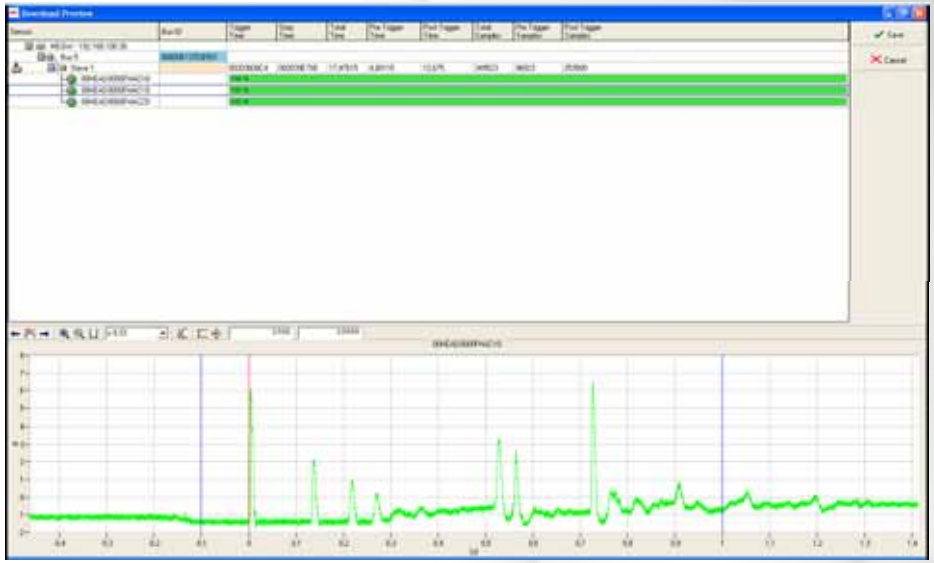
6. Recalculation by equalizing the course of time

7. Data download of the needed time section

… without accurate master trigger:

Either…

1. Refer recording period to slave trigger at time of disconnecting the bus line.
2. Find t_0 manually with M=BUS® Tool Software.



… or …

1. Refer recording period to slave trigger at time of disconnecting the bus line.
2. Export data to evaluation software.
3. Software is determining t_0 automatically regarding defined requirements.

6. Compatibility

… in Software …

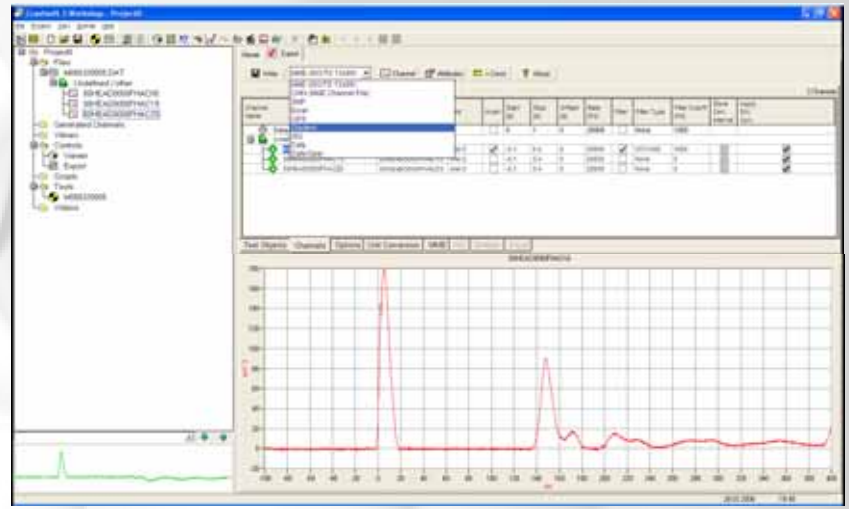
Crashsoft®3 Full Package

Complete data analysis with the additional CrashSoft3® Package...

…and full compatibility to other data analysis software products.

Hardware support of other OEMs: Interlink DTS, Hentschel and KT.

M=BUS® Tool and CS3 Workshop



Export the test data to a compatible file format with CS3 Workshop.

… and Hardware!

Standard features:

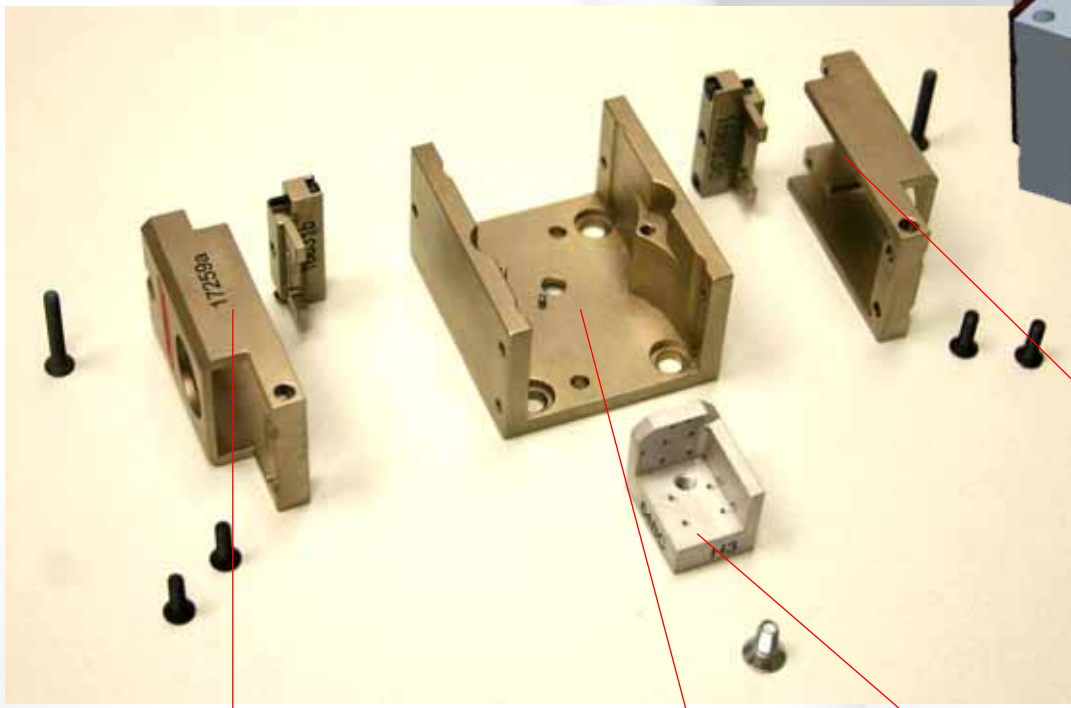
1. NA33 Slide-in board
2. NA33 compatible power supply of Ethernet Gateway
3. Trigger Bus input (differential signal)
4. Ethernet Interface (100Mbit) or USB2.0

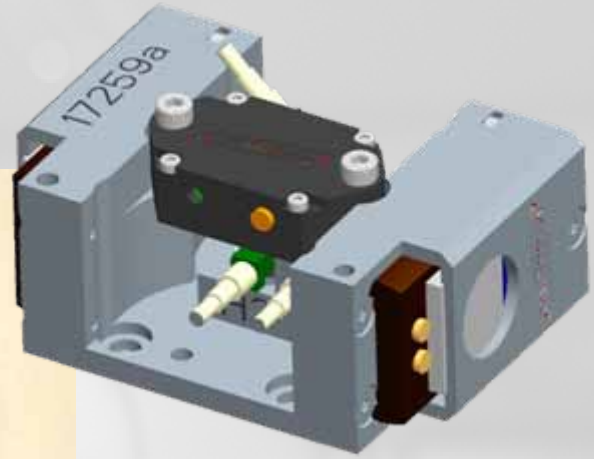
Mechanical adaptation to CrashLink®:

1. Voltage conversion
2. Media conversion

7. Maintenance

Interface Components:





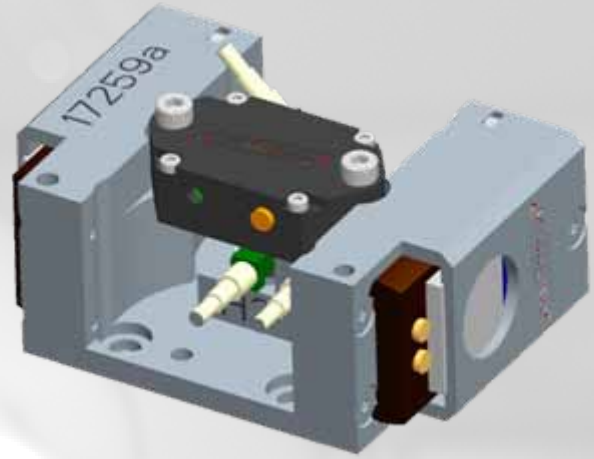
Bracket AC/AV-Logger

Bracket FO/MO-Logger

Base

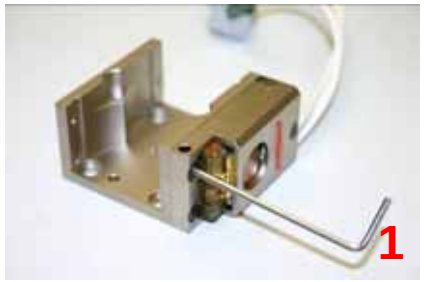
Accelerometer mount

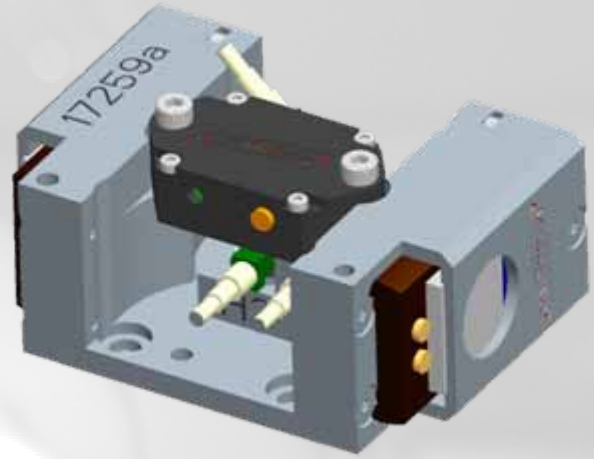
Assembly Bracket AC/AV-Logger:



1. Hold PCB and cables in position.
2. Attach clamp to bracket. Fix it with two screws M2x10. Pay attention to the cable routing. Don‘t squeeze the wires!
3. Mount the accelerometer to the block (See mounting scheme). Attention! Only use metric screws M1,4x4 with washers!
4. Push the Logger in the bracket. Be sure that the connector is engaged.

Head Interface Assembly:



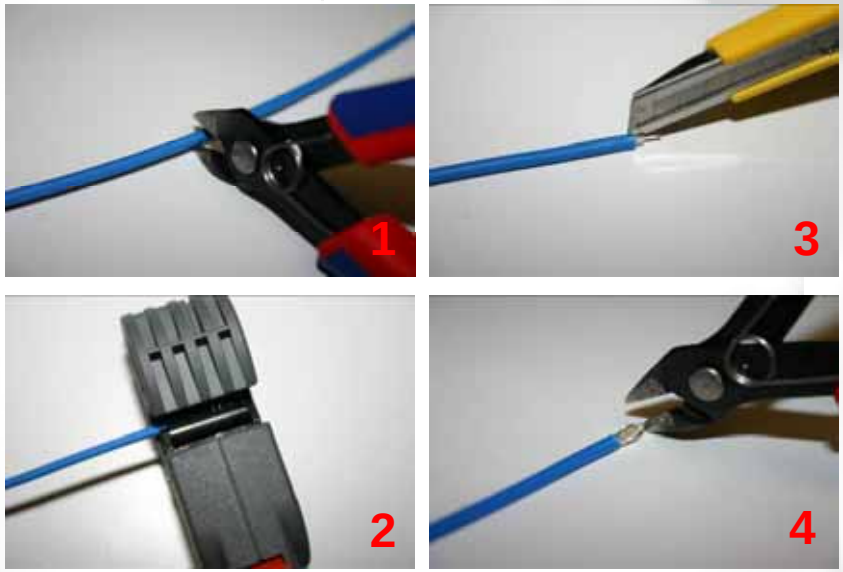


1. Mount Bracket AC/AV at Base with 2x countersunk screw M3x10, 1x M3x20.
2. Fit accelerometer block to Base. Attend the cable routing!
3. Mount accelerometer block to Base with countersunk screw M4x10.
4. Fix Bracket FO/MO, a second Bracket AC/AV or a simulator at the Base with 2x countersunk screws M3x10 and 1x M3x20.

For customizing the bus lines a tool set is available:

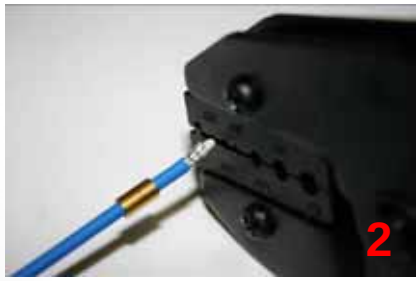
- M=BUS® Tool Set
  - Cable Stripper
  - Crimping Tool
  - Press-in Tool
  - Wire Cutter
  - Set of Metric Allen Wrenches
- Starter-Kit Bus Cables and MMCX Connectors
- Metric screw set

Straight MMCX Connector:



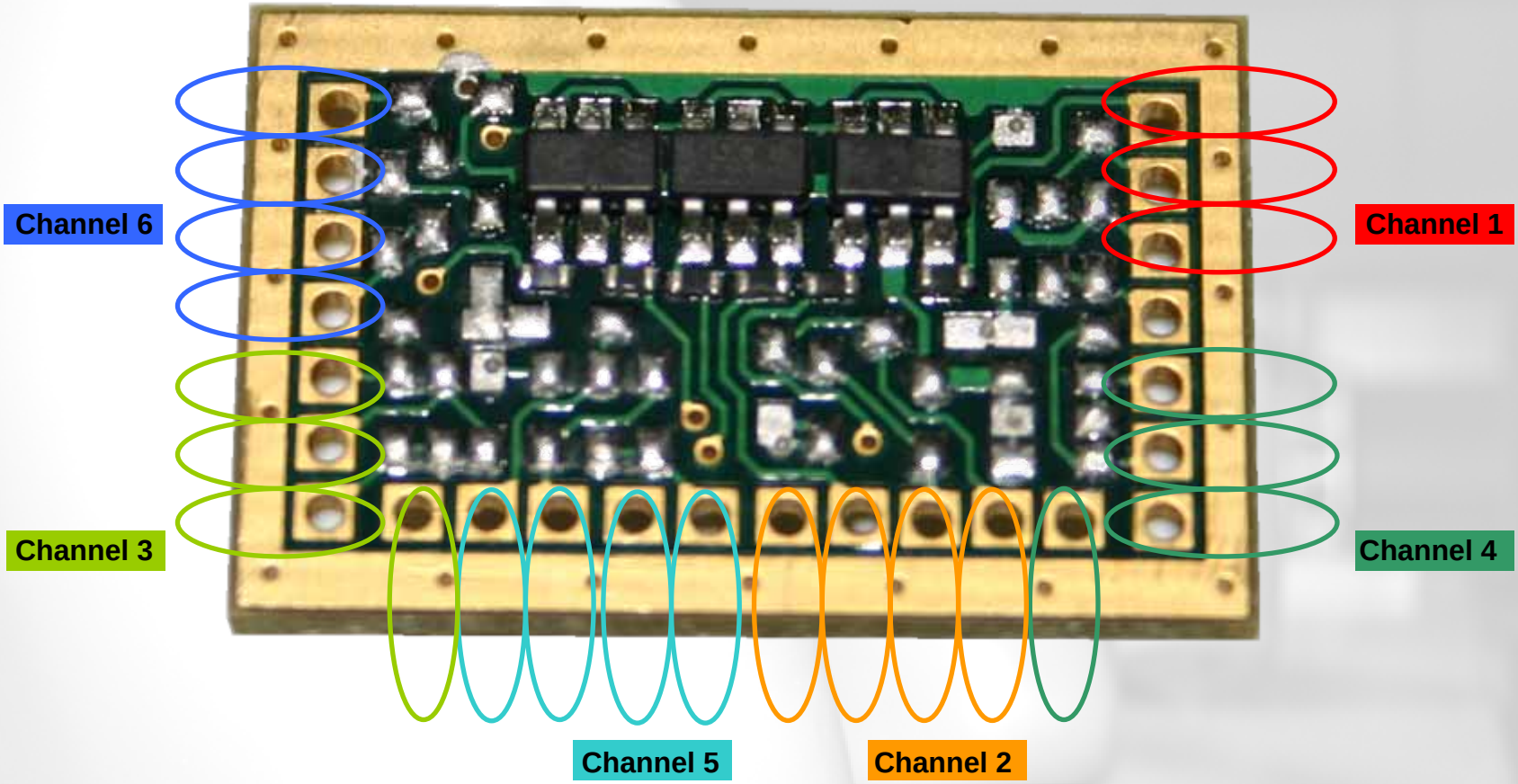
1. Cut cable to required length.
2. Use cable stripper on coax cable (2 turns).
3. Cut isolation and remove isolation, shield and dielectric.
4. Cut inner conductor to required length.

Straight MMCX Connector:



1. Push sleeve onto cable. Attach pin to inner conductor.
2. Squeeze pin with crimping tool (0,28) onto inner conductor.
3. Splice shield and push plug onto dielectric.
4. Push sleeve over shield and plug.
5. Squeeze sleeve with crimping tool (1,28) onto plug.

Sensor Wire Tags:



External Rechargeable Battery:

- Li-Polymer, 50mAh/3.7V
- Charged when powered by Gateway
- Easy replacement
- No phasing out
- Status monitoring by software
- Soldered to flexible strip conductor
- Embedded strip solder tags
- Battery replacement during DAS calibration

? ? ?

Thanks for your attention!!!

Download Data Sheets at: **http://www.mbus-sensor.de**