

## Operational Description

Before start up the device, a diagnostic is needed to see if the components are perfectly connected then a calibration of sensors: the user launch on the Controlserver the diagnostic program that verifies the connectivity of the parts after that he start the calibration program which test the alignment of the sensors and make the calibration.

The sensors are then fixed to the face and the tongue of the proband. In order to avoid any rauschen signal the proband is grounded.

A magnetic field is broadcast around the proband and now can the movement of the sensors be measured and recorded on the PC with special program.

For more accurate results the head movement during check-may be corrected with another program also delivered with the AG501.

AG501 Operation:

- The T9 Board controls the transmitter coils.
- The C Board defines the frequency for each coils
- The coils diffuse the magnetic feld
- The Sensin Board collects the sensors movements and converts them into an analog amplified signal.
- The Sybox record the Sound and synchronizes it with the movement
- The Encoder measures and controls the position of the motor
- The DSPcon Board is the main part of the system by which the signals are transmitted and received. This board contains all the connectors (expect RJ45) for connecting the functional groups.
- The FPGA Board is the brain of the AG501, it contains the main program to control all electronics on the AG501

# Assemblies

---

## I. Table of Contents

I.	Table of Contents .....	1
A.	E-Box.....	2
1.	DSPCon2 Board .....	3
2.	FPGA Board .....	4
3.	T9 Board .....	5
4.	Power supply MPT-200C .....	6
5.	E-Box mounting parts.....	7
6.	Interne Kabel .....	9
7.	Connection Cable .....	11
8.	E-Box Case (Rose) .....	14
B.	Transmitterholder (Fa. Krempel).....	14
1.	Coils support C94 .....	14
2.	Coils holder Schiff5-left .....	15
3.	Coils holder Schiff5-right .....	15
4.	Coils holder Schiff5-Back .....	15
5.	Transmitter Coils (3).....	16
6.	C-Plat .....	16
7.	BNC Kabel.....	17
C.	Input Amplifier .....	18
1.	Sensin8 board .....	18
D.	Sybox .....	18
1.	Sybox Board .....	18
E.	Controlserver .....	19

## A. E-Box

The main electronics of the Articulograph AG501 are located in the E-Box. The connection between different parts is shown in figure 1

1. HDMI cable (19 pol.) to Encoder in the Circal
2. Round shielded cable to the motor in the Circal (3 pol.)
3. Signal cable with D-subminiature connector (15 pol.) to the Sybox
4. Three Samtec V-Port cables to each Sensin Board.

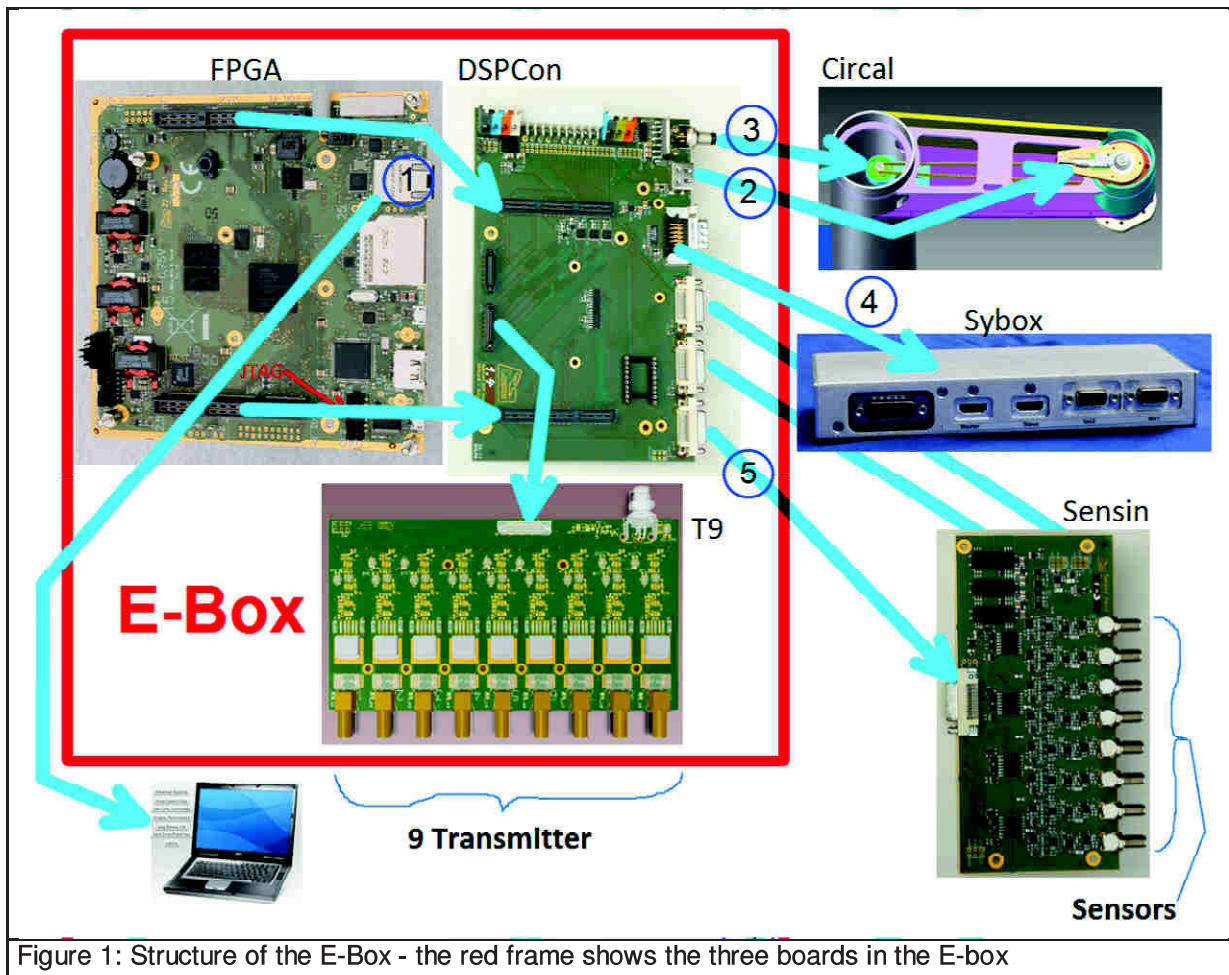


Figure 1: Structure of the E-Box - the red frame shows the three boards in the E-box

## 1. DSPCon2 Board

The DSPCon2 board allows the connection between all modules.

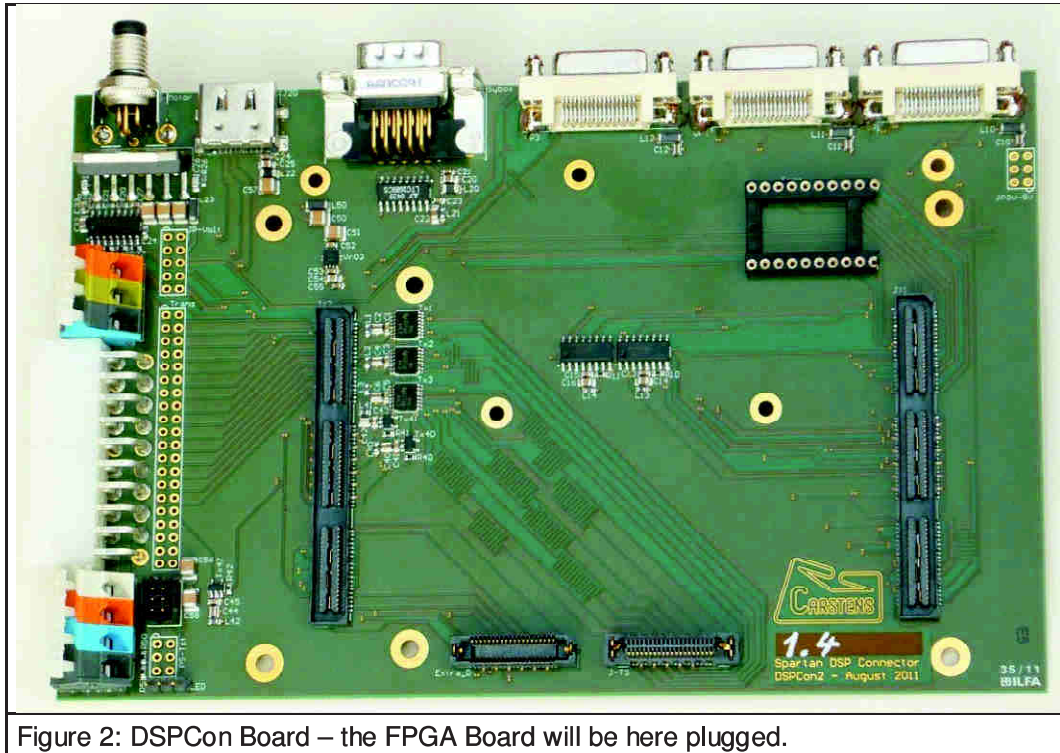
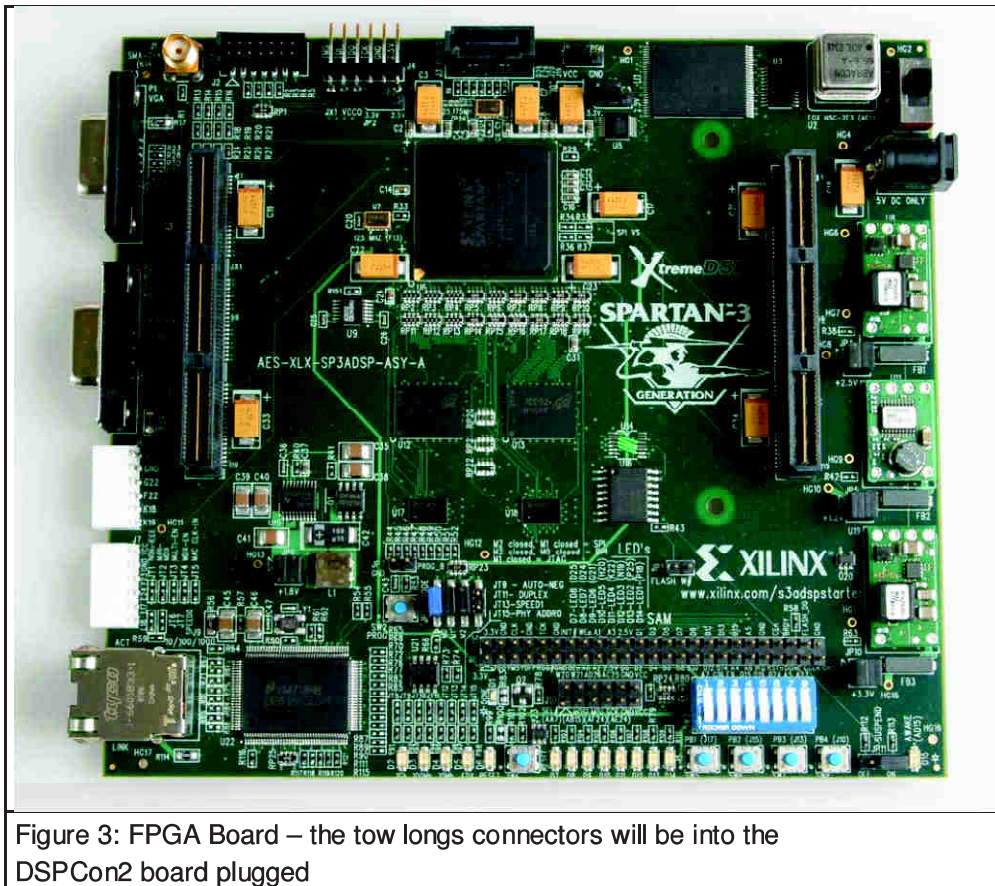


Figure 2: DSPCon Board – the FPGA Board will be here plugged.

## 2. FPGA Board

Xilinx Embedded Development HW/SW Kit - Spartan-3A DSP S3D1800A  
MicroBlaze Processor Edition  
AVNET: HW SD 1800A DSP SB UNI-G

FPGA - Xilinx Device:  
XC3SD1800A-4FGG676C Spartan-3A DSP FPGA



The main electronics and the Microblaze are located in the FPGA board



### 3. T9 Board

Electronics to control the nine transmission coils (Transmitter)

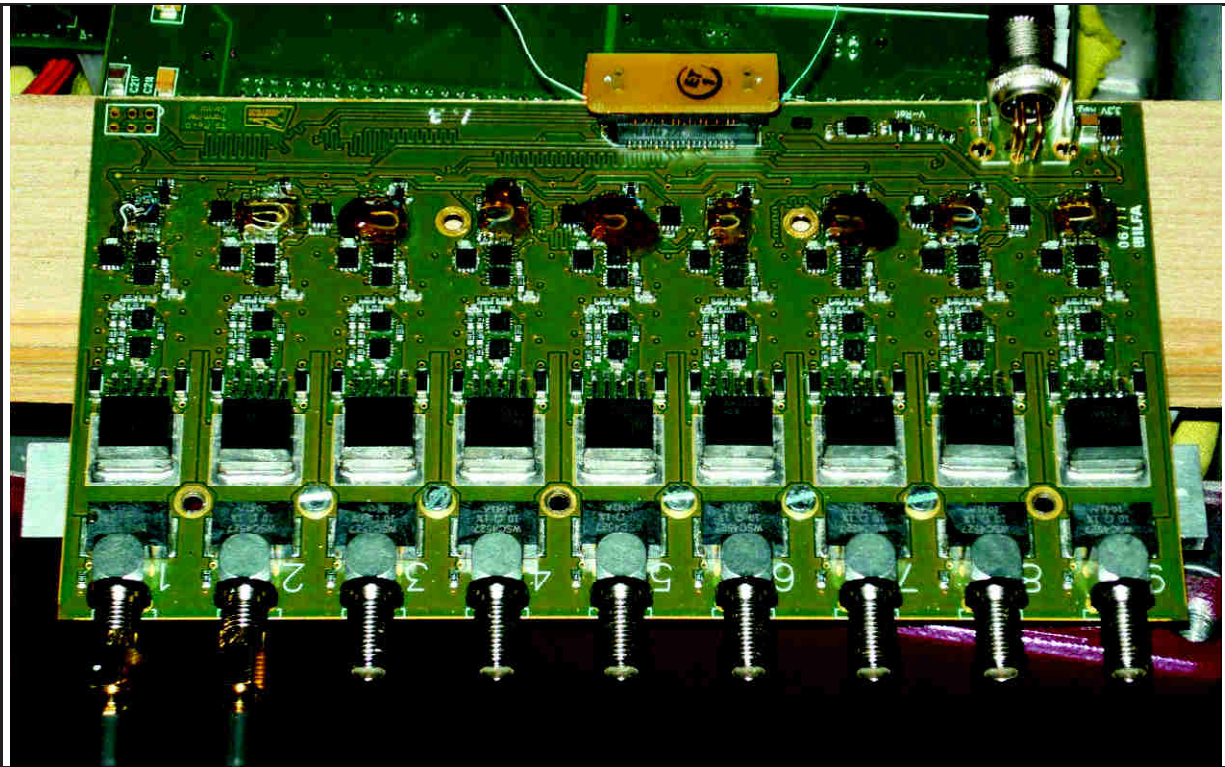
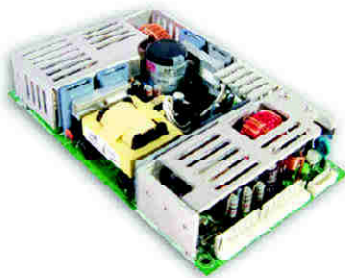


Figure 4: T9 Board with 9 SMA connectors

4. Power supply MPT-200C



■ Features

65,94 €

- Universal AC input / Full range
- Low leakage current <180µA
- Protections: Short circuit/Over load/Over voltage/Over temperature
- Free air convection for 140W and forced air convection for 200W
- UL2601-1 medical safety approved
- With power good and fail signal output
- Built-in remote ON-OFF control
- Built-in remote sense function
- Fixed switching frequency at 100KHz
- 3 years warranty



MODEL	OUTPUT VOLTAGE	RATED CURRENT	OUTPUT CURRENT				RIPPLE & NOISE (Max.) (Note 2)	VOLTAGE TOLERANCE (Note 3)	LINE REGULATION	LOAD REGULATION	EFFICIENCY
			MINIMUM LOAD	CONVECTION (max.)	WITH FAN (25CFM)	PEAK LOAD WITH 25CFM FAN (Note 4)					
MPT-200C	5V	20A	4A	15A	20A	24A	80mVp-p	±2.0%	±0.5%	±1.0%	79%
	15V	4.7A	0.5A	3.3A	4.7A	5.6A	150mVp-p	±8.0%	±1.0%	±5.0%	
	-15V	2A	0A	1A	2A	2.4A	80mVp-p	±5.0%	±0.5%	±1.0%	

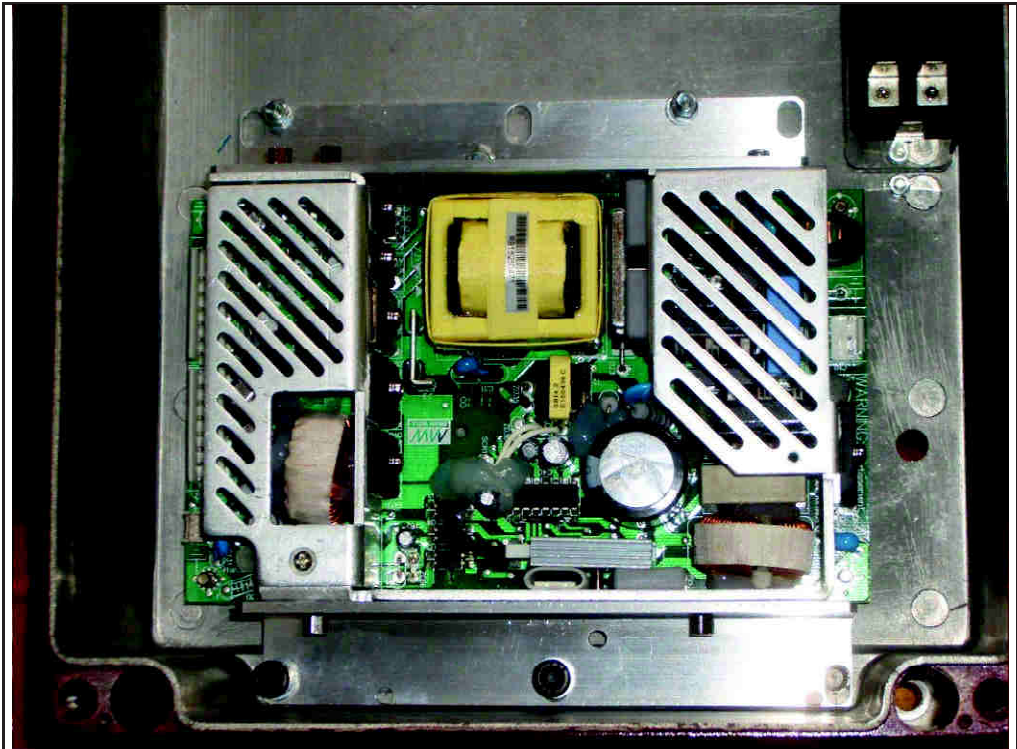
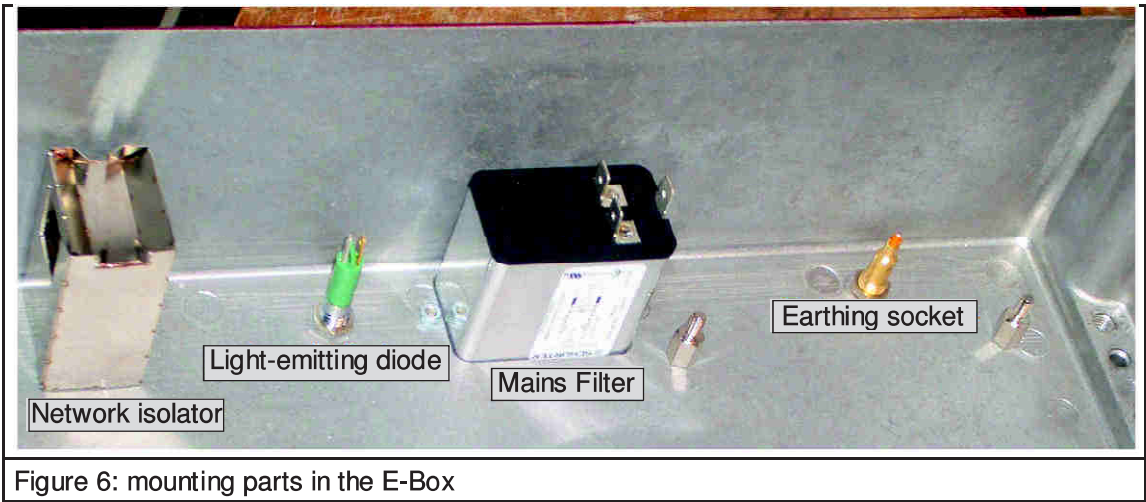


Figure 5: the mounted power supply in the E-box

5. E-Box mounting parts



a) Mains filter

Gerätestecker-Kombielemente mit Netzfilter

www.schurter.com/pg06

DD12

IEC Gerätestecker C14 mit Filter, Sicherungshalter 1-oder 2-polig, Netzschalter 2-polig

Standard- oder Medizinal-Filter

new

2 A Medizinal Version (M5)

2-polig

2-polig

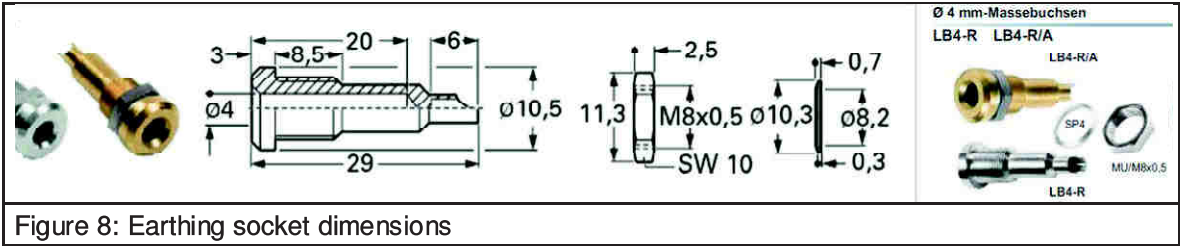
DD12.2321.111

Sicherungsschublade mit und ohne Spannungswählereinsatz

Fingergrip, 2-polig	4301.1401
Extra-Safe, 2-polig	4301.1403
Fingergrip, 1-polig	4301.1405
Extra-Safe, 1-polig	4301.1407

Figure 7: Netzfilter mit 2 pol. Sicherheitsschublade 'Extra-Safe'

b) Earthing socket





## BESCHREIBUNG

### c) Network isolator (Baaske)

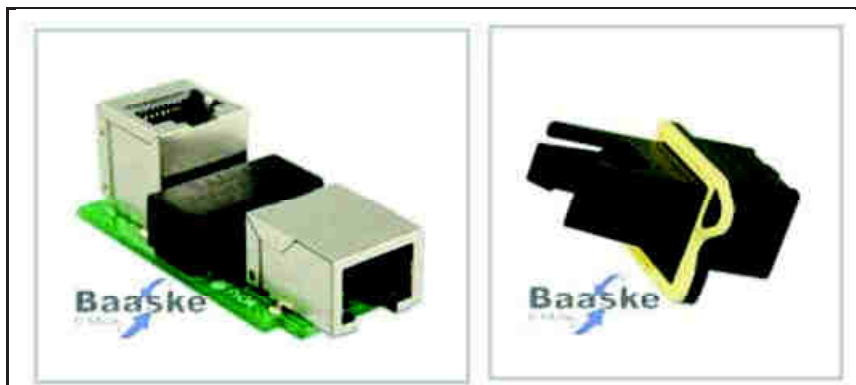


Figure 9: Network isolator (left) and Harting attachment housing (rights)

The Harting housing is inserted from the outside through the housing opening and the network isolator is locked from the inside.

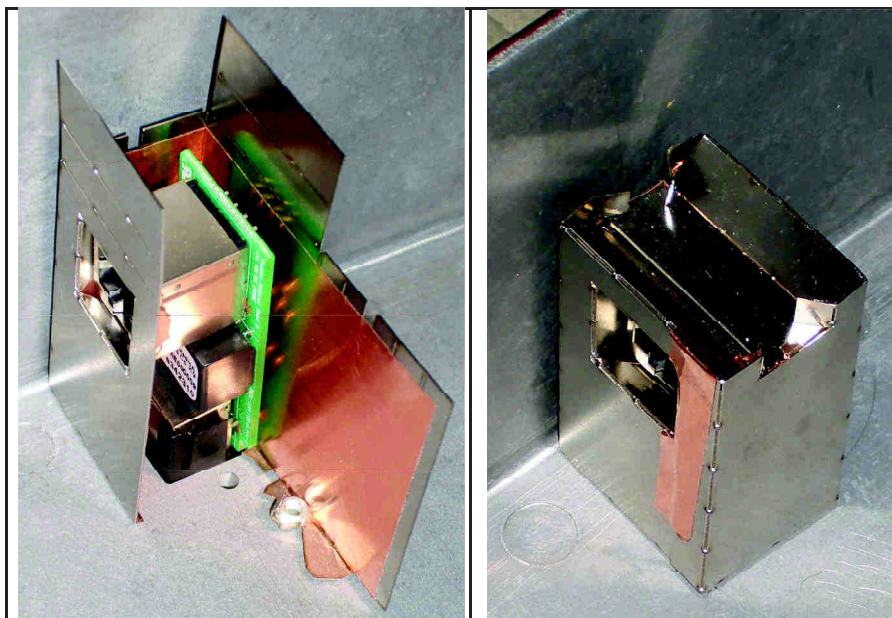









Figure 10: The 'Iso-Blech' is attached to the Isolator

## 6. Interne Kabel

### a) AG501 Cable set (Dikon)

The cable set of Dikon is composed of the following cables:

1. From Power Supply MPT-200C to DSPCon2 board. There are 2 connectors on the Power Supply MPT-200C and one connector on the board.
2. Cable from the Power Entry module DD12.23.21.111 to the Power Supply MPT-200C and to the ground screw
3. Cable from the ground screw to the Power Supply MPT-200C and the Earthing socket

T9-Pwr	DSPCon2-Board and T9-Board	
Power14	DSPCon2-board and Power Supply MPT- 200C	
Pwr- C	DSPCon2-board and Power Supply MPT- 200C	
Pwr230	Power Entry Module DD12.23.21.111 and Power Supply MPT- 200C	
Gnd-In	Power Entry Module DD12.23.21.111 und ground screw	
Gnd-Nt	Ground screw and Power Supply MPT- 200C)	
Gnd- Bu	Ground screw And earthing socket	
Figure 11:Cables set of Dikon		

### b) Internes Netzwerkkabel (CtCenter)



Figure 12: Network cable to connect the FPGA board and Network isolator

## BESCHREIBUNG

### c) Edge Rate Flex Datenlin cable (Samtec)

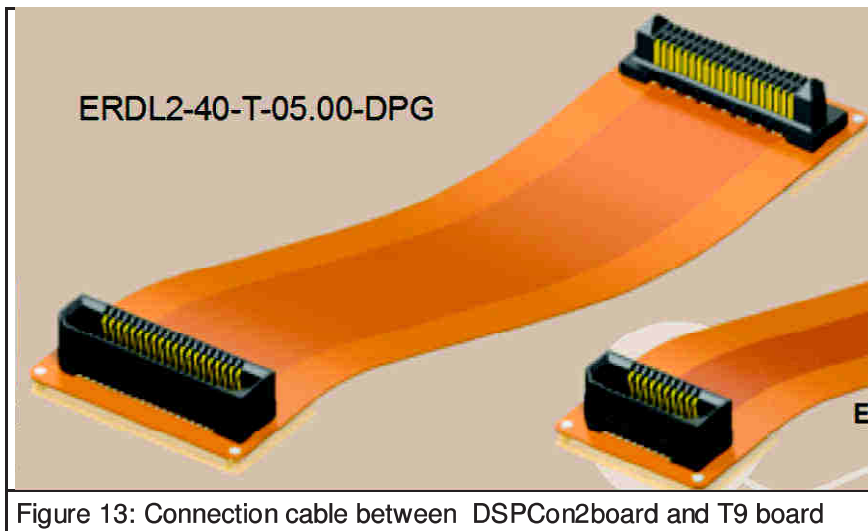


Figure 13: Connection cable between DSPCon2board and T9 board

## 7. Connection Cable

### a) Network cable

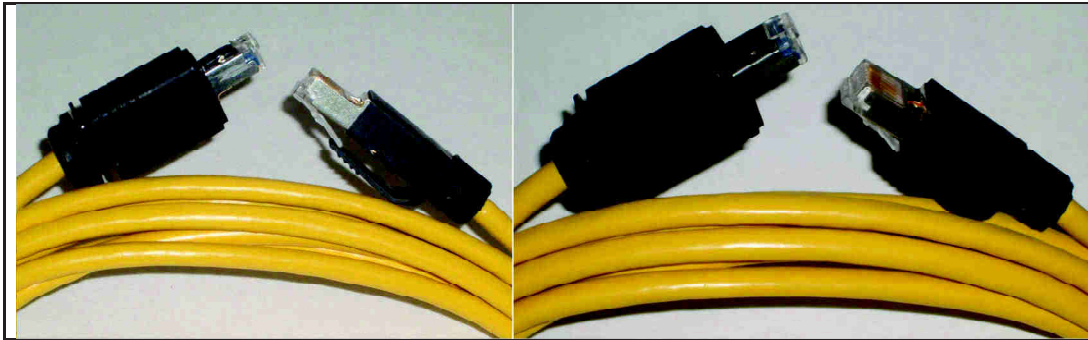


Figure 14: to connect the Controlserver and E-Box

### b) Power cable

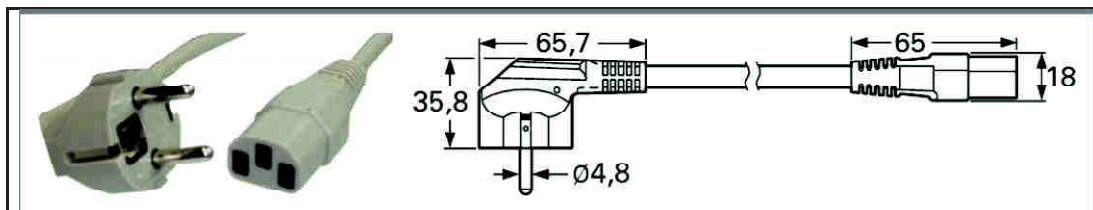


Figure 15: Power cable tot he E-Box

With protective contact, double isolation, one side angled Schuko plug according to CEE (7) VII, other side straight IEC coupling according to EN 60320 / C13. Cable type: H05VV-F3G0,75 mm<sup>2</sup>, rated voltage: 250 VAC Rated current: 10 A.

### c) V-Port Cable



Figure 16: Samtec V-Port Kabel connect DSPCon2 and receiver

[http://www.samtec.com/documents/webfiles/deutsche\\_version/vpstp\\_d.pdf](http://www.samtec.com/documents/webfiles/deutsche_version/vpstp_d.pdf)



d) Encoder Cable

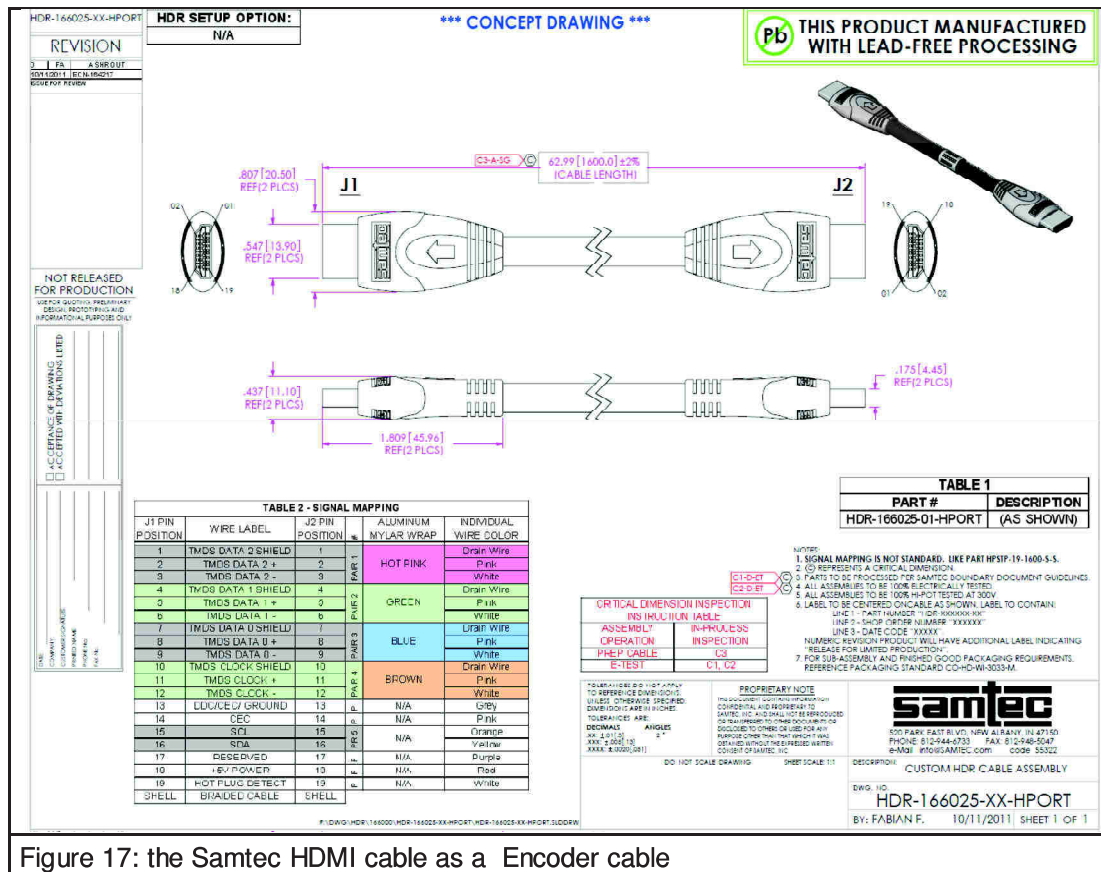


Figure 17: the Samtec HDMI cable as a Encoder cable

e) Motor Cable

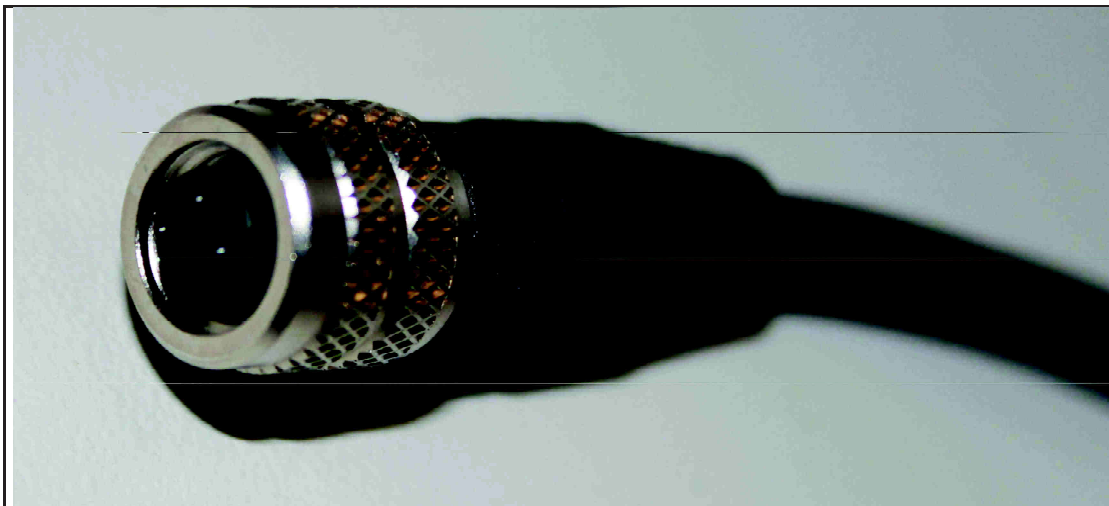


Figure 18: three-pole motor cable

## BESCHREIBUNG

f) Cable to the FPGA board

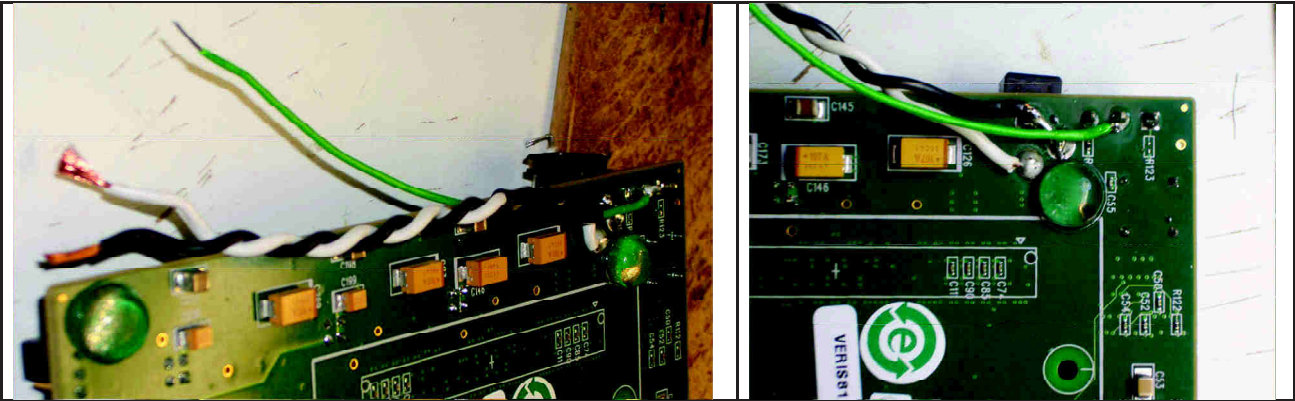


Abbildung 19: The 'Power Good' Signal (green) and the 5V Supply will be performed on the Wago terminals (DSPCon2)

## 8. E-Box Case (Rose)

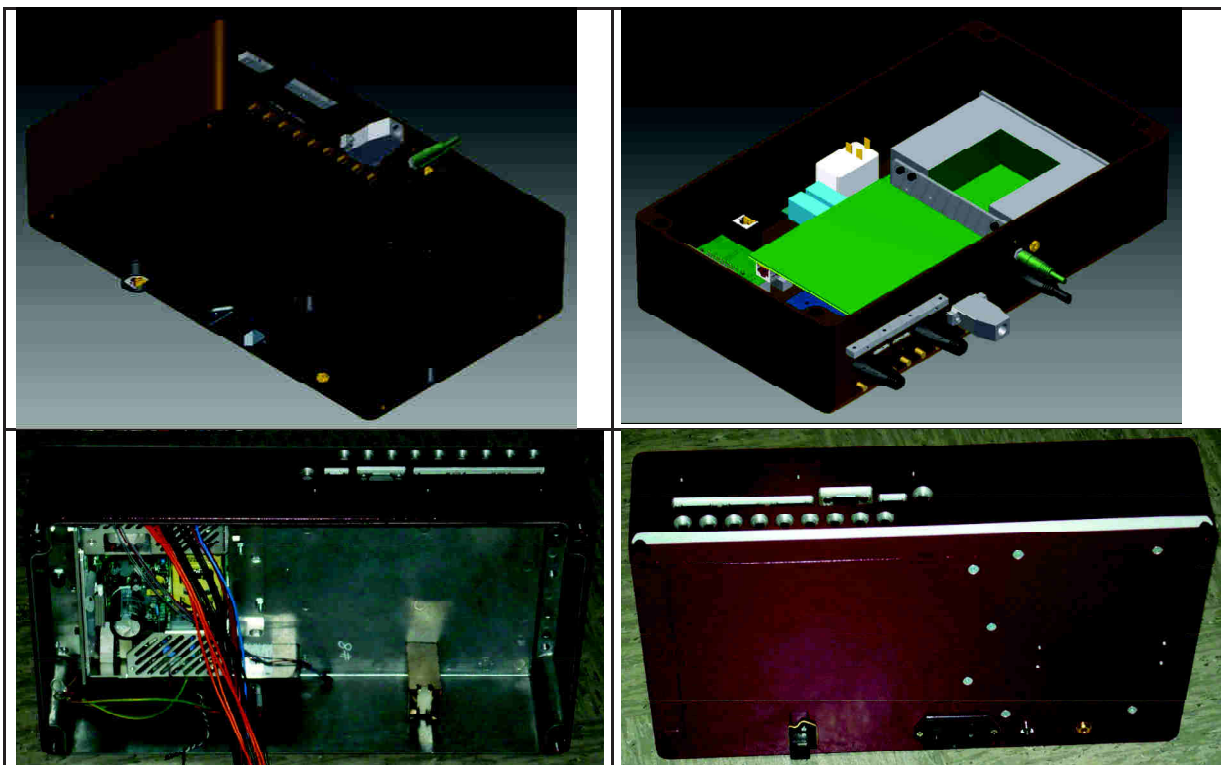


Figure 20: the E-Box case in different view

## B. Transmitterholder (Fa. Krempel)

### 1. Coils support C94

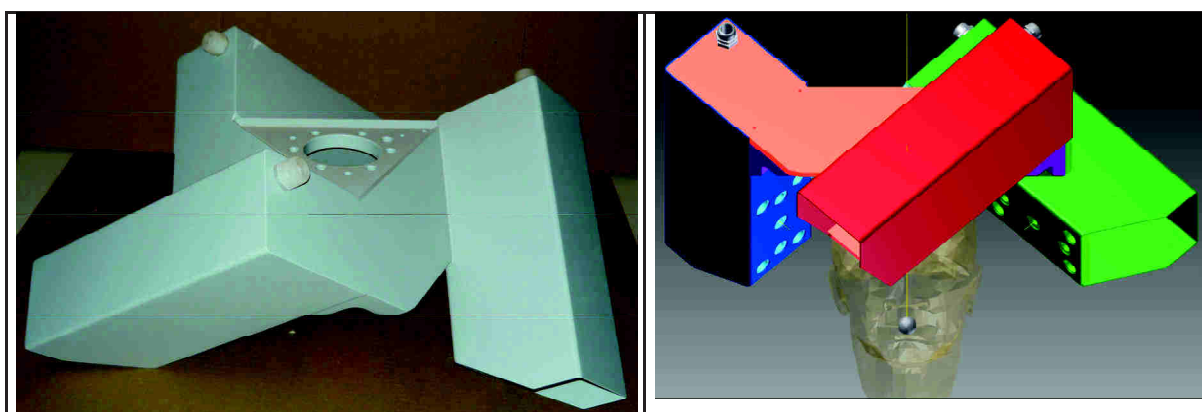


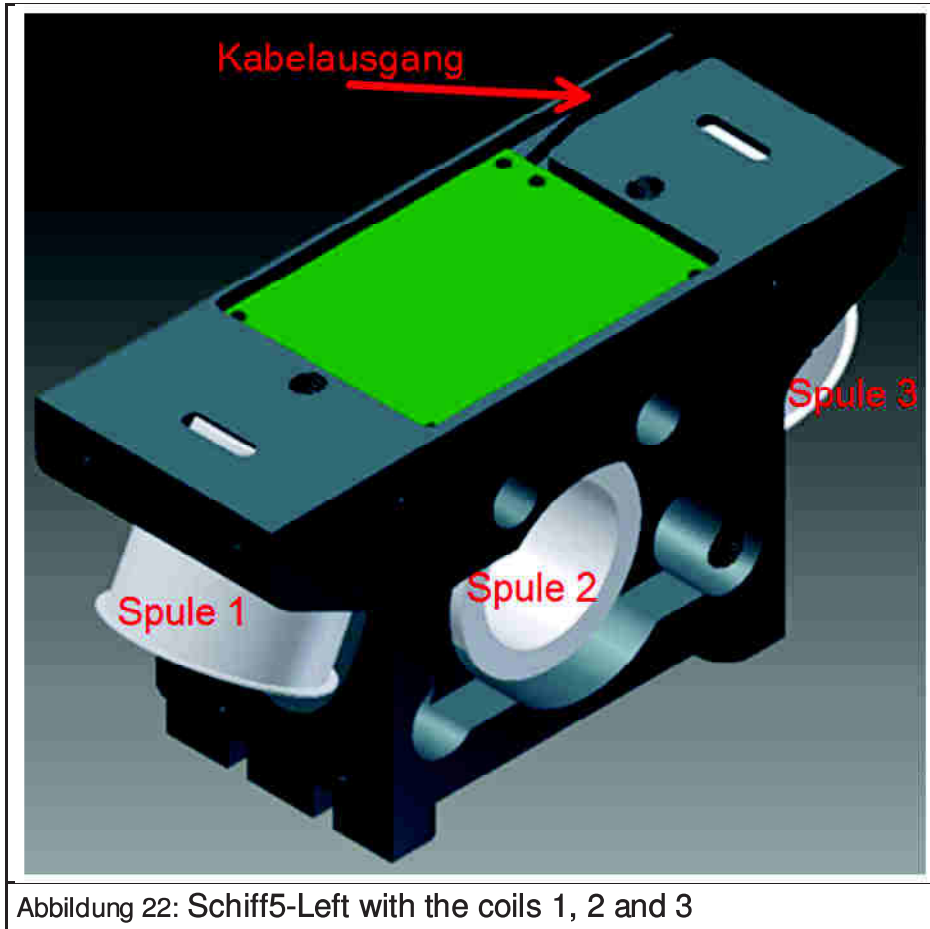
Figure 21: left: the GFK coils support C94 – right as a model

## 2. Coils holder Schiff5-left

The three coils holders Schiff5 are made with the same components. The transmitter coils are adjusted on the C-Plat with the help of different capacitors.

Schiff5-links

Coil 1 – 8000Hz    coil 2 – 10500Hz    coil 3 12000Hz



## 3. Coils holder Schiff5-right

Coil 4 – 9000Hz    coil 5 – 11000Hz    coil 6 13000Hz

## 4. Coils holder Schiff5-Back

Coil 7 – 9500Hz    coil 8 – 11500Hz    coil 9 13500Hz



## 5. Transmitter Coils (3)



Figure 23: transmitter coils in Schiff5 mounted

## 6. C-Plat

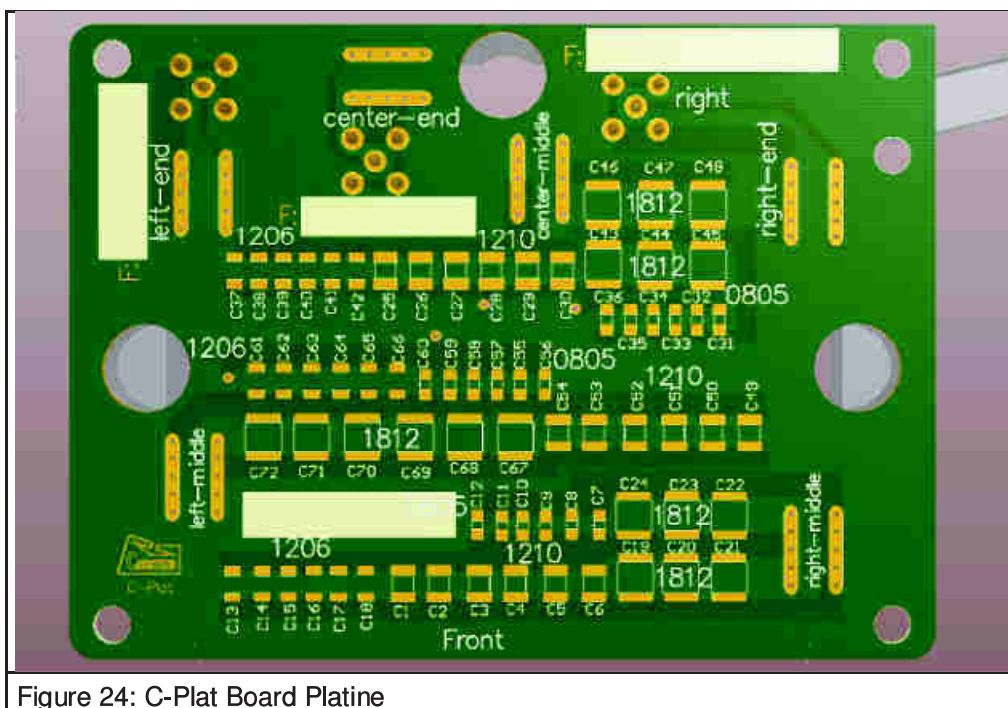


Figure 24: C-Plat Board Platine

## 7. BNC Kabel

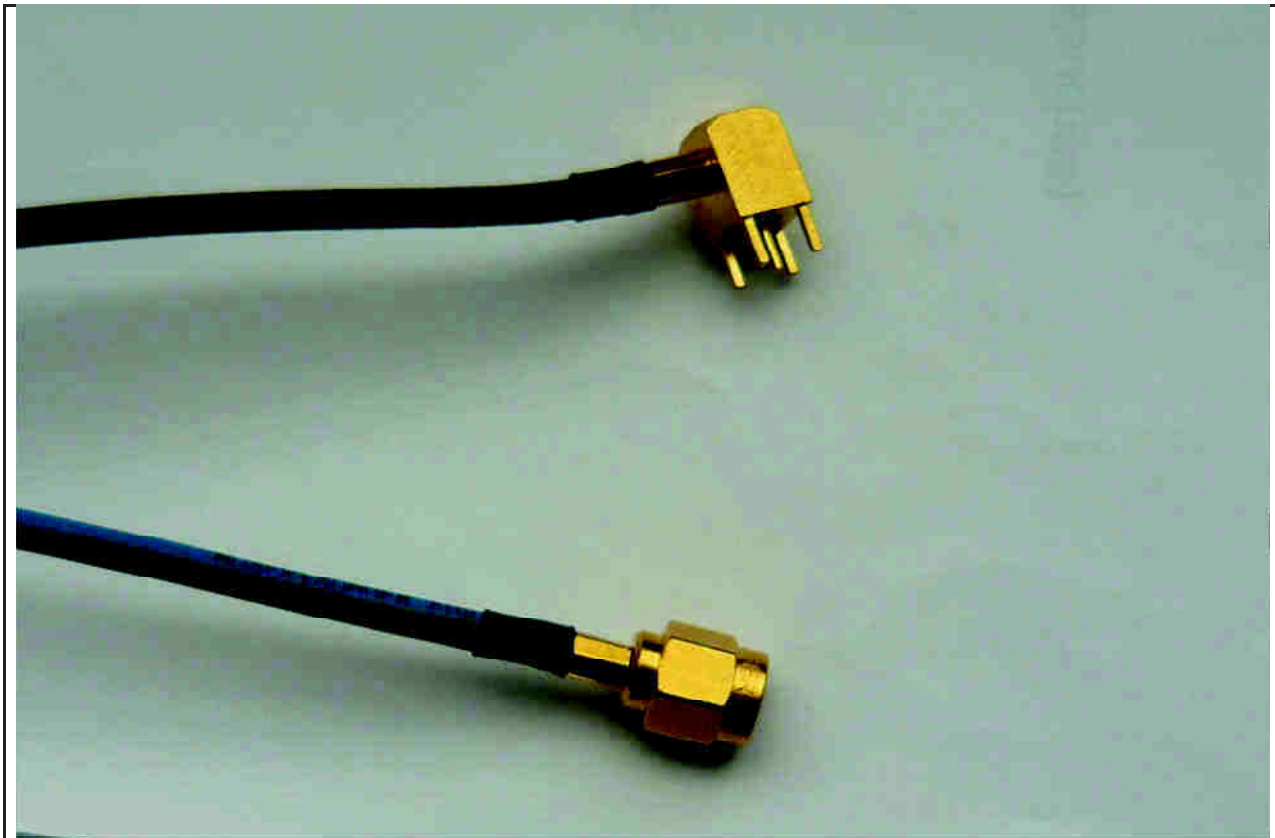


Figure 25: The BNC cable connect the T9 Board with the C-Plat board

## C. Input Amplifier

### 1. Sensin8 board

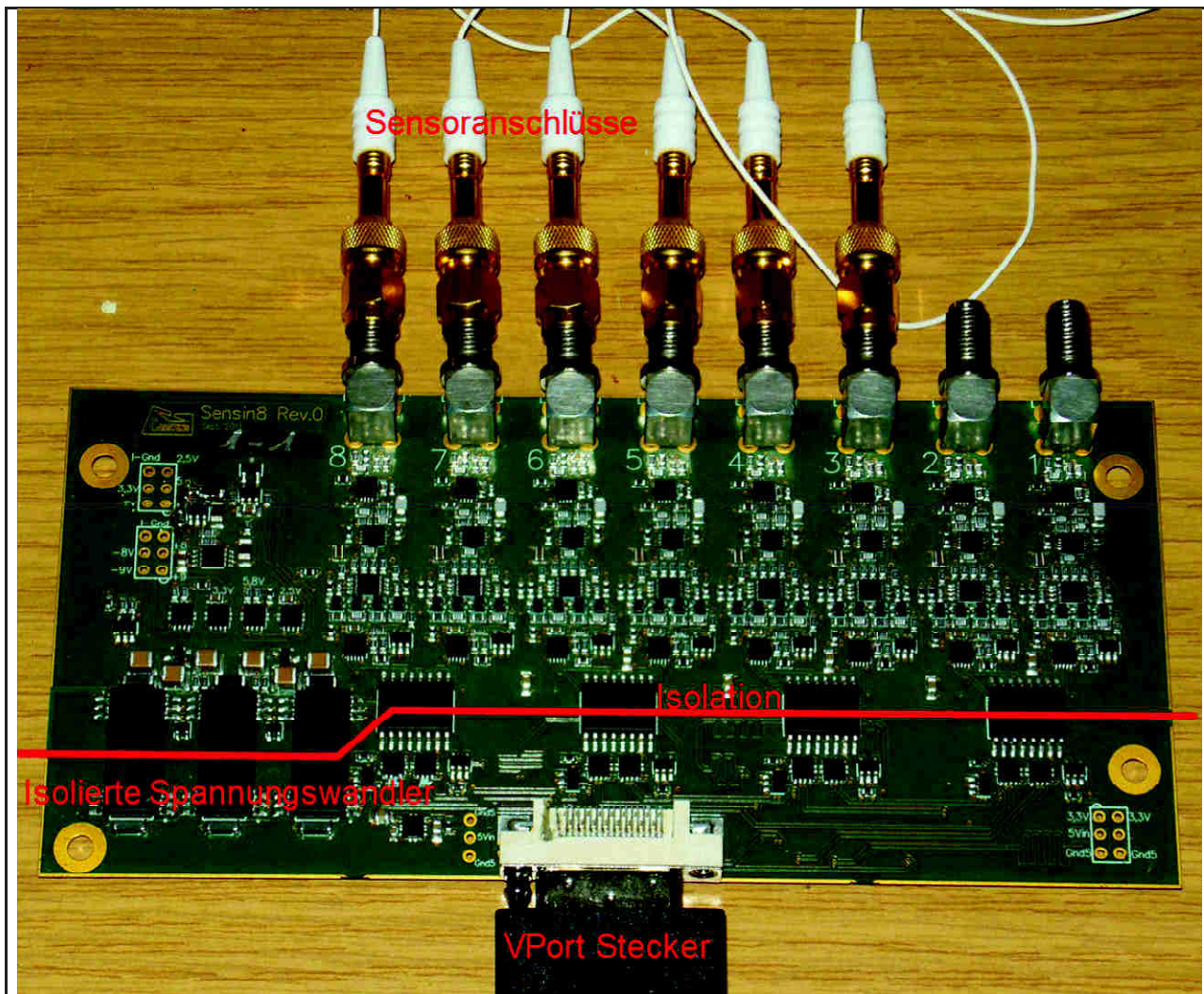


Figure 26: the sensin8 board

## D. Sybox

### 1. Sybox Board

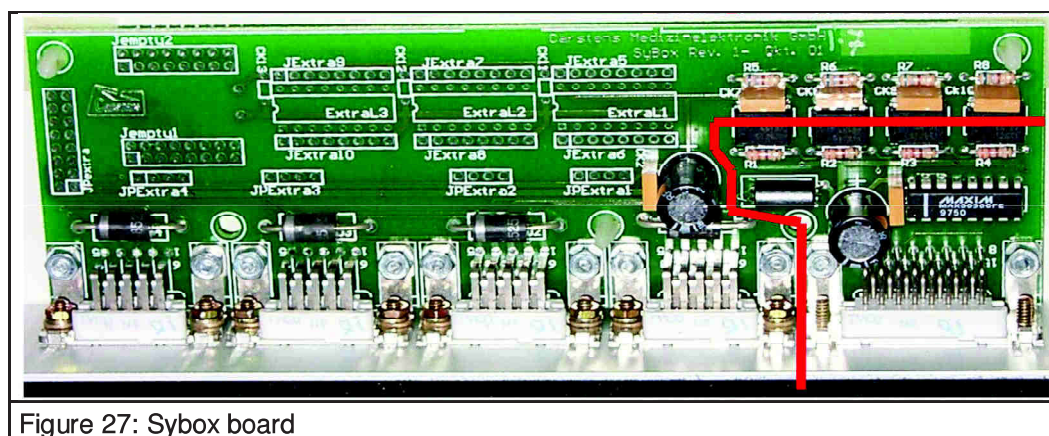


Figure 27: Sybox board

## **E. Controlserver**



Figure 28: das Dell Notebook als Controlserver



## BESCHREIBUNG