Electrical Interface of PLUG-type Shim Systems

Contents

1 Purpose

This document defines the electrical interface for shim systems with detachable cables and one or two DSUB50 connectors, i. e. PLUG-type shim systems.
In order to facilitate testing of the integrity of shim systems in the field, tables containing typical resistance values are provided.

2 Scope of Applicability

The interface definitions apply to shim systems with PLUG-type connectors. These are:

BOSS type	Part number, SAP article description	
BOSS1-SB PLUG	Z49734.1	SHIMCOIL BOSS1 S1 PLUG
	Z49734.8	SHIMCOIL BOSS1 S8 PLUG
BOSS1-WB PLUG	Z46434.A	SHIMCOIL BOSS1/W1
	Z46434.B	SHIMCOIL BOSS1/W2
	Z46434.C	SHIMCOIL BOSS1/W3
	Z46434.D	SHIMCOIL BOSS1/W4
	Z49721.B	SHIMCOIL BOSS1/W2–>SWB1
	Z49721.D	SHIMCOIL BOSS1/W4–>SWB4
	Z49721.E	SHIMCOIL BOSS1/W5–>SWB3
	Z49731.B	SHIMCOIL BOSS1/W4–>SWB4
BOSS2-SB PLUG	Z49732.1	SHIMCOIL BOSS2 STD S1 PLUG
	...	...
	Z49732.9	SHIMCOIL BOSS2 STD S9 PLUG
	Z49732.A	SHIMCOIL BOSS2 STD SA PLUG
	Z46428.A	SHIMCOIL BOSS/W1 S2/BOSS2
	Z46428.B	SHIMCOIL BOSS/W2 S4/BOSS2
	Z46428.C	SHIMCOIL BOSS/W3 S5/BOSS2
	Z46428.D	SHIMCOIL BOSS/W4 S6/BOSS2
	Z46428.E	SHIMCOIL BOSS/W4 S7/BOSS2
BOSS3-SB PLUG	Z49732.1	SHIMCOIL BOSS3 STD S1 PLUG
	...	...
	Z73436.9	SHIMCOIL BOSS3 STD S9 PLUG
	Z73436.A	SHIMCOIL BOSS3 STD SA PLUG
BOSS-WB PLUG	Z46435.A	SHIMCOIL BOSS2/W1
	Z46435.B	SHIMCOIL BOSS2/W2
	Z46435.C	SHIMCOIL BOSS2/W3
	Z46435.D	SHIMCOIL BOSS2/W4

For the naming scheme used to denote a BOSS type we refer to [1].

3 Reference Table

[1] ZTPE0001, *BRUKER Shim Systems — an Overview*,

4 Interface definition

4.1 Connector

On the side of the shim system one or two *male* DSUB50 connectors are used as shown in figure 1. These connectors are also known as 50-pin D-subminiature connectors or DD-50 connectors.
The standard pin numbering is given in figure 2. Pins that form a pin pair are listed in table 1 on the next page. Their function is given for the cases that they are on the first or on the second connector of a shim system.

Figure 1: *DSUB50 connector and cable; the picture shows a detail of a BOSS-WB system*

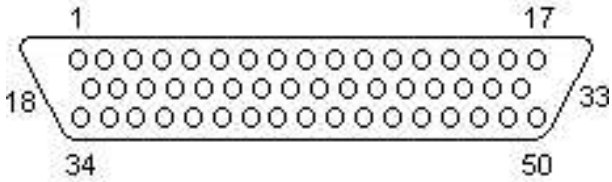

Figure 2: *Pin numbering of male DSUB50 connector as seen from outside*

4.2 Pin assignment

The 50 pins of the DSUB connector are grouped into 25 pin pairs (+/–) which are connected either to one of twenty possible elementary shim coils ('Coil 1' to 'Coil 20' and 'Coil 21' to 'Coil 40' respectively) or to the sweep coil ('H0') or to a PT100 thermoresistor ('PT100(1)' and 'PT100(2)') or to an identification resistor ('RID(1)' to 'RID(3)'). The last pin pair ('CONTROL(1)' and 'CONTROL(2)') is reserved for future uses, e. g. in the context of a BIS electronic. If there is a second connector, another twenty shim coils, an additional thermoresistor and a third identification resistor are possible. The pin pairs for a second sweep coil ('H0(B)') and a fourth identification resistor ('RID(4)') are not to be used.
There is no electrical connection between the shield and any of the pins.
Note that the coil numbers *do not* correspond to current source numbers on the SCB13 boards nor to shim function codes of the BSMS.

Pin +	Pin -	Function on connector 'A'	Function on connector 'B'
16	17	Coil 1	Coil 21
14	15	Coil 2	Coil 22
12	13	Coil 3	Coil 23
10	11	Coil 4	Coil 24
8	9	Coil 5	Coil 25
5	6	Coil 6	Coil 26
3	4	Coil 7	Coil 27
1	2	Coil 8	Coil 28
28	29	Coil 9	Coil 29
26	27	Coil 10	Coil 30
24	25	Coil 11	Coil 31
22	23	Coil 12	Coil 32
49	50	Coil 13	Coil 33
47	48	Coil 14	Coil 34
45	46	Coil 15	Coil 35
43	44	Coil 16	Coil 36
41	42	Coil 17	Coil 37
38	39	Coil 18	Coil 38
36	37	Coil 19	Coil 39
34	35	Coil 20	Coil 40
32	33	H0	H0(B) – not used
7	40	PT100(1)	PT100(2)
18	19	RID(1)	RID(3)
20	21	RID(2)	RID(4) – not used
30	31	CONTROL(1)	CONTROL(2)

Table 1: *Function of the pin pairs*

5 Resistance values for shim systems

The following tables show typical resistance values for shim systems with DSUB50 connectors and detachable cables. The resistance values are measured *excluding* cables and BSMS adapter. Note that the effective resistance values vary with the length of the shim system. Especially shim systems used as insert into a system of bigger diameter show higher resistance values than the ones given in the table. In these cases the common offset in resistance will be in the order of a few ohms.
The column *DSUB50* names the pin pair between which the resistance is measured, where 'A' and 'B' denote the first and second connector and the numbering is according to figure 2.

5.1 Shim systems with one DSUB50 connector

Name	DSUB50	Resistance BOSS1-SB PLUG	Resistance BOSS1-WB PLUG
Coil 1	A 16/17	15.0 Ω	15.5 Ω
Coil 2	A 14/15	16.0 Ω	15.0 Ω
Coil 3	A 12/13	16.5 Ω	15.5 Ω
Coil 4	A 10/11	17.5 Ω	15.5 Ω
Coil 5	A 8/ 9	16.0 Ω	15.5 Ω
Coil 6	A 5/ 6	12.0 Ω	12.0 Ω
Coil 7	A 3/ 4	13.0 Ω	10.5 Ω
Coil 8	A 1/ 2	10.0 Ω	11.0 Ω
Coil 9	A 28/29	14.5 Ω	11.5 Ω
Coil 10	A 26/27	14.5 Ω	11.5 Ω
Coil 11	A 24/25	12.0 Ω	12.0 Ω
Coil 12	A 22/23	13.0 Ω	10.5 Ω
Coil 13	A 49/50	10.0 Ω	11.0 Ω
Coil 14	A 47/48	10.0 Ω	—
Coil 15	A 45/46	16.5 Ω	—
Coil 16	A 43/44	11.5 Ω	7.5 Ω
Coil 17	A 41/42	10.0 Ω	—
Coil 18	A 38/39	11.5 Ω	7.5 Ω
Coil 19	A 36/37	9.0 Ω	8.5 Ω
Coil 20	A 34/35	9.0 Ω	8.5 Ω
H0	A 32/33	121.0 Ω	130.0 Ω
PT100(1)	A 7/40	112.0 Ω	112.0 Ω
RID(1)	A 18/19	330 kΩ	330 kΩ
RID(2)	A 20/21	—	35.7 kΩ
CONTROL(1)	A 30/31	—	—

Table 2: *Shim systems with one DSUB50 connector 'A'*

5.2 Shim systems with two DSUB50 connectors

Name	DSUB50	Resistance BOSS2-SB PLUG	Resistance BOSS3-SB PLUG	Resistance BOSS-WB PLUG
Coil 1	A 16/17	15.5 Ω	15.0 Ω	4.0 Ω
Coil 2	A 14/15	16.5 Ω	16.5 Ω	14.0 Ω
Coil 3	A 12/13	17.5 Ω	16.5 Ω	13.0 Ω
Coil 4	A 10/11	—	13.5 Ω	8.0 Ω
Coil 5	A 8/ 9	18.0 Ω	15.5 Ω	8.0 Ω
Coil 6	A 5/ 6	17.0 Ω	15.5 Ω	12.0 Ω
Coil 7	A 3/ 4	16.5 Ω	12.0 Ω	12.0 Ω
Coil 8	A 1/ 2	—	12.0 Ω	9.5 Ω
Coil 9	A 28/29	—	12.0 Ω	9.5 Ω
Coil 10	A 26/27	7.0 Ω	12.0 Ω	5.5 Ω
Coil 11	A 24/25	7.0 Ω	—	5.5 Ω
Coil 12	A 22/23	7.0 Ω	7.0 Ω	11.0 Ω
Coil 13	A 49/50	7.0 Ω	7.0 Ω	11.0 Ω
Coil 14	A 47/48	—	7.0 Ω	11.0 Ω
Coil 15	A 45/46	5.5 Ω	5.5 Ω	8.0 Ω
Coil 16	A 43/44	5.5 Ω	5.5 Ω	8.0 Ω
Coil 17	A 41/42	4.5 Ω	4.5 Ω	6.0 Ω
Coil 18	A 38/39	4.5 Ω	4.5 Ω	6.0 Ω
Coil 19	A 36/37	4.0 Ω	4.0 Ω	5.0 Ω
Coil 20	A 34/35	4.0 Ω	4.0 Ω	5.0 Ω
H0	A 32/33	124.0 Ω	124.0 Ω	132.0 Ω
PT100(1)	A 7/40	112.0 Ω	112.0 Ω	112.0 Ω
RID(1)	A 18/19	150 kΩ	96.4 kΩ	54.1 kΩ
RID(2)	A 20/21	96.4 kΩ	54.1 kΩ	43.5 kΩ
CONTROL(1)	A 30/31	—	—	—

Table 3: *Shim systems with two DSUB50 connectors 'A' and 'B'*

Name	DSUB50	Resistance BOSS2-SB PLUG	Resistance BOSS3-SB PLUG	Resistance BOSS-WB PLUG
Coil 21	B 16/17	7.0 Ω	7.0 Ω	10.0 Ω
Coil 22	B 14/15	7.0 Ω	7.0 Ω	10.0 Ω
Coil 23	B 12/13	4.0 Ω	4.0 Ω	5.0 Ω
Coil 24	B 10/11	4.0 Ω	4.0 Ω	5.0 Ω
Coil 25	B 8/ 9	4.0 Ω	4.0 Ω	5.0 Ω
Coil 26	B 5/ 6	4.0 Ω	4.0 Ω	5.0 Ω
Coil 27	B 3/ 4	—	7.0 Ω	11.0 Ω
Coil 28	B 1/ 2	5.5 Ω	5.5 Ω	8.0 Ω
Coil 29	B 28/29	4.0 Ω	4.0 Ω	5.0 Ω
Coil 30	B 26/27	4.0 Ω	4.0 Ω	5.0 Ω
Coil 31	B 24/25	4.5 Ω	4.5 Ω	6.0 Ω
Coil 32	B 22/23	5.5 Ω	5.5 Ω	8.0 Ω
Coil 33	B 49/50	7.0 Ω	7.0 Ω	10.0 Ω
Coil 34	B 47/48	7.0 Ω	7.0 Ω	10.0 Ω
Coil 35	B 45/46	4.0 Ω	4.0 Ω	5.0 Ω
Coil 36	B 43/44	4.0 Ω	4.0 Ω	5.0 Ω
Coil 37	B 41/42	4.0 Ω	4.0 Ω	5.0 Ω
Coil 38	B 38/39	4.0 Ω	4.0 Ω	5.0 Ω
Coil 39	B 36/37	4.5 Ω	4.5 Ω	6.0 Ω
Coil 40	B 34/35	—	—	—
H0(B)	B 32/33	—	—	—
PT100(2)	B 7/40	—	—	112.0 Ω
RID(3)	B 18/19	25.6 kΩ	22.0 kΩ	25.6 kΩ
RID(4)	B 20/21	—	—	—
CONTROL(2)	B 30/31	—	—	—

Table 4: *Shim systems with two DSUB50 connectors 'A' and 'B' (continued)*

6 History

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00	28.3.2006	document created	SPT

Table 5: *History*