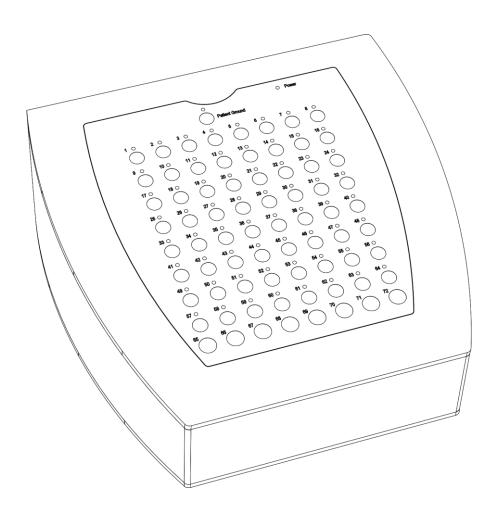
Refa

Technical Specifications

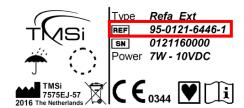


Introduction

This document includes the technical specifications of the available configurations of the Refa device. This document is supplementary to the User Manual provided with the product. Refer to the User Manual for instructions for use of the device.

Use of this document

 Locate the device label on your Refa device. The label can be found on the bottom of the device and looks like the picture depicted here:



- 2. Use the table of contents on the next pages to locate your device. The document is sorted on REF code that can be found on the label.
- 3. Click the correct device in the table of contents or go to the designated page number to find the device's technical specifications.

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95-0108-324-3, Refa8-24e 2048Hz

Type Refa8-24e REF code 95-0108-324-3

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 24

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 20 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector safety din per channel and subD37 female connector per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

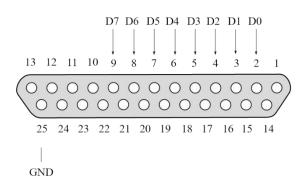
Sampling:

Number of channels 24 channels simultaneously Resolution 22 bits, ExG 0.0715 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	Functio	on	resolution	range
1	A1	Unipola	r input 1	0.0715 μV	-150 mV to +150 mV
2	C3	Unipola	r input 2	0.0715 μV	-150 mV to +150 mV
3	P3	Unipola	r input 3	0.0715 μV	-150 mV to +150 mV
4	Cz	Unipola	r input 4	0.0715 μV	-150 mV to +150 mV
5	Oz	Unipola	r input 5	0.0715 μV	-150 mV to +150 mV
6	C4	Unipola	r input 6	0.0715 μV	-150 mV to +150 mV
7	T6	Unipola	r input 7	0.0715 μV	-150 mV to +150 mV
8	A2	Unipola	r input 8	0.0715 μV	-150 mV to +150 mV
9	T3	Unipola	r input 9	0.0715 μV	-150 mV to +150 mV
10	T5	Unipola	r input 10	0.0715 μV	-150 mV to +150 mV
11	01	Unipola	r input 11	0.0715 μV	-150 mV to +150 mV
12	Pz	Unipola	r input 12	0.0715 μV	-150 mV to +150 mV
13	02	Unipola	r input 13	0.0715 μV	-150 mV to +150 mV
14	P4	Unipola	r input 14	0.0715 μV	-150 mV to +150 mV
15	F8	Unipola	r input 15	0.0715 μV	-150 mV to +150 mV
16	T4	Unipola	r input 16	0.0715 μV	-150 mV to +150 mV
17	F7	Unipola	r input 17	0.0715 μV	-150 mV to +150 mV
18	Fp1	Unipola	r input 18	0.0715 μV	-150 mV to +150 mV
19	F3	Unipola	r input 19	0.0715 μV	-150 mV to +150 mV
20	Fz	Unipolar input 20		0.0715 μV	-150 mV to +150 mV
21	Fpz	Unipolar input 21		0.0715 μV	-150 mV to +150 mV
22	Fp2	Unipola	r input 22	0.0715 μV	-150 mV to +150 mV
23	F4	Unipola	r input 23	0.0715 μV	-150 mV to +150 mV
24	X0	Unipola	r input 24	0.0715 μV	-150 mV to +150 mV
25	Digi	Digital c	hannel (bits)	1 (bit)	
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8	always 1		
		9-13	Sawtooth test signal		
		14-31	reserved		
	•	•			•

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	Pat. GND
14	-
33	-
15	-
34	-
16	-
35	-
17	-
36	-
18	-
37	-
19	-

95-0108-332-6, Refa8-32e 2048Hz

Type Refa8-32e REF code 95-0108-332-6

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 20 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector safety din per channel and subD37 female connector per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

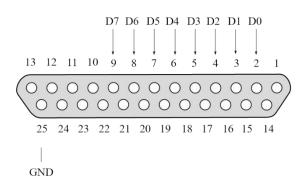
Sampling:

Number of channels 32 channels simultaneously Resolution 22 bits, ExG 0.0715 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	function	resolution	range
1	A1	Unipolar input 1	0.0715 μV	-150 mV to +150 mV
2	C3	Unipolar input 2	0.0715 μV	-150 mV to +150 mV
3	Р3	Unipolar input 3	0.0715 μV	-150 mV to +150 mV
4	Cz	Unipolar input 4	0.0715 μV	-150 mV to +150 mV
5	Oz	Unipolar input 5	0.0715 μV	-150 mV to +150 mV
6	C4	Unipolar input 6	0.0715 μV	-150 mV to +150 mV
7	T6	Unipolar input 7	0.0715 μV	-150 mV to +150 mV
8	A2	Unipolar input 8	0.0715 μV	-150 mV to +150 mV
9	T3	Unipolar input 9	0.0715 μV	-150 mV to +150 mV
10	T5	Unipolar input 10	0.0715 μV	-150 mV to +150 mV
11	01	Unipolar input 11	0.0715 μV	-150 mV to +150 mV
12	Pz	Unipolar input 12	0.0715 μV	-150 mV to +150 mV
13	O2	Unipolar input 13	0.0715 μV	-150 mV to +150 mV
14	P4	Unipolar input 14	0.0715 μV	-150 mV to +150 mV
15	F8	Unipolar input 15	0.0715 μV	-150 mV to +150 mV
16	T4	Unipolar input 16	0.0715 μV	-150 mV to +150 mV
17	F7	Unipolar input 17	0.0715 μV	-150 mV to +150 mV
18	Fp1	Unipolar input 18	0.0715 μV	-150 mV to +150 mV
19	F3	Unipolar input 19	0.0715 μV	-150 mV to +150 mV
20	Fz	Unipolar input 20	0.0715 μV	-150 mV to +150 mV
21	Fpz	Unipolar input 21	0.0715 μV	-150 mV to +150 mV
22	Fp2	Unipolar input 22	0.0715 μV	-150 mV to +150 mV
23	F4	Unipolar input 23	0.0715 μV	-150 mV to +150 mV
24	X0	Unipolar input 24	0.0715 μV	-150 mV to +150 mV
25	X1	Unipolar input 25	0.0715 μV	-150 mV to +150 mV
26	X2	Unipolar input 26	0.0715 μV	-150 mV to +150 mV
27	X3	Unipolar input 27	0.0715 μV	-150 mV to +150 mV
28	X4	Unipolar input 28	0.0715 μV	-150 mV to +150 mV
29	X5	Unipolar input 29	0.0715 μV	-150 mV to +150 mV
30	X6	Unipolar input 30	0.0715 μV	-150 mV to +150 mV
31	X7	Unipolar input 31	0.0715 μV	-150 mV to +150 mV
32	X8	Unipolar input 32	0.0715 μV	-150 mV to +150 mV
33	Digi	Digital channel (bits)	1 (bit)	
		0 Digital input bit 0		
		1 Digital input bit 1		
		2 Digital input bit 2		
		3 Digital input bit 3		
		4 Digital input bit 4		
		5 Digital input bit 5		
		6 Digital input bit 6		
		7 Digital input bit 7 (MSB)		
		8 always 1		
		9-13 Sawtooth test signal		
		14-31 reserved		

Digital input DD23 connector		
Pin	Input	
2	bit 0 (parallel to BNC connector in software)	
3	bit 1	
4	bit 2	
5	bit 3	
6	bit 4	
7	bit 5	
8	bit 6	
9	bit 7 (MSB)	
25	common ground	



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0108-332-12, Refa8-32e 2048Hz

Type Refa8-32e REF code 95-0108-332-12

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 20 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector safety din per channel and subD37 female connector per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

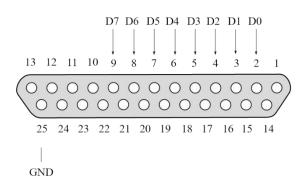
Sampling:

Number of channels 32 channels simultaneously Resolution 22 bits, ExG 0.0715 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	function	resolution	range
1	A1	Unipolar input 1	0.0715 μV	-150 mV to +150 mV
2	C3	Unipolar input 2	0.0715 μV	-150 mV to +150 mV
3	F3	Unipolar input 3	0.0715 μV	-150 mV to +150 mV
4	Cz	Unipolar input 4	0.0715 μV	-150 mV to +150 mV
5	Fpz	Unipolar input 5	0.0715 μV	-150 mV to +150 mV
6	C4	Unipolar input 6	0.0715 μV	-150 mV to +150 mV
7	F8	Unipolar input 7	0.0715 μV	-150 mV to +150 mV
8	A2	Unipolar input 8	0.0715 μV	-150 mV to +150 mV
9	T3	Unipolar input 9	0.0715 μV	-150 mV to +150 mV
10	F7	Unipolar input 10	0.0715 μV	-150 mV to +150 mV
11	Fp1	Unipolar input 11	0.0715 μV	-150 mV to +150 mV
12	Fz	Unipolar input 12	0.0715 μV	-150 mV to +150 mV
13	Fp2	Unipolar input 13	0.0715 μV	-150 mV to +150 mV
14	F4	Unipolar input 14	0.0715 μV	-150 mV to +150 mV
15	T6	Unipolar input 15	0.0715 μV	-150 mV to +150 mV
16	T4	Unipolar input 16	0.0715 μV	-150 mV to +150 mV
17	T5	Unipolar input 17	0.0715 μV	-150 mV to +150 mV
18	01	Unipolar input 18	0.0715 μV	-150 mV to +150 mV
19	P3	Unipolar input 19	0.0715 μV	-150 mV to +150 mV
20	Pz	Unipolar input 20	0.0715 μV	-150 mV to +150 mV
21	Oz	Unipolar input 21	0.0715 μV	-150 mV to +150 mV
22	O2	Unipolar input 22	0.0715 μV	-150 mV to +150 mV
23	P4	Unipolar input 23	0.0715 μV	-150 mV to +150 mV
24	X0	Unipolar input 24	0.0715 μV	-150 mV to +150 mV
25	X1	Unipolar input 25	0.0715 μV	-150 mV to +150 mV
26	X2	Unipolar input 26	0.0715 μV	-150 mV to +150 mV
27	X3	Unipolar input 27	0.0715 μV	-150 mV to +150 mV
28	X4	Unipolar input 28	0.0715 μV	-150 mV to +150 mV
29	X5	Unipolar input 29	0.0715 μV	-150 mV to +150 mV
30	X6	Unipolar input 30	0.0715 μV	-150 mV to +150 mV
31	X7	Unipolar input 31	0.0715 μV	-150 mV to +150 mV
32	X8	Unipolar input 32	0.0715 μV	-150 mV to +150 mV
33	Digi	Digital channel (bits)	1 (bit)	
		0 Digital input bit 0		
		1 Digital input bit 1		
		2 Digital input bit 2		
		3 Digital input bit 3		
		4 Digital input bit 4		
		5 Digital input bit 5		
		6 Digital input bit 6		
		7 Digital input bit 7 (MSB)		
		8 always 1		
		9-13 Sawtooth test signal		
		14-31 reserved		

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0120-1440-1, Refa8-8e4b4a 20000Hz

Type Refa8-8e4b4a REF code 95-0120-1440-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 8

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector micro coax, active shielding

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 70 \mbox{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 16 channels simultaneously

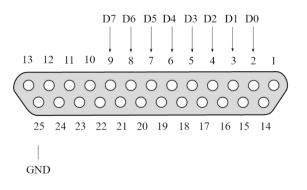
Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 20000 Hz, 10000 Hz, 5000 Hz, 2500 Hz, 1250 Hz

nr	name	function	on	resolution	range
1	ExG1	Unipol	lar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipo	Unipolar input 2		-150 mV to +150 mV
3	ExG3	Unipol	lar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipo	lar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipo	lar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipo	lar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipo	lar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipol	lar input 8	0.01839 μV	-150 mV to +150 mV
9	BIP9	Bipola	r input 9	0.01839 μV	-150 mV to +150 mV
10	BIP10	Bipola	r input 10	0.01839 μV	-150 mV to +150 mV
11	BIP11	Bipola	r input 11	0.01839 μV	-150 mV to +150 mV
12	BIP12	Bipola	r input 12	0.01839 μV	-150 mV to +150 mV
13	AUX13	Auxilia	ry input 13	0.48828 μV	-3 V to +3 V
14	AUX14	Auxilia	ry input 14	0.48828 μV	-3 V to +3 V
15	AUX15	Auxilia	ry input 15	0.48828 μV	-3 V to +3 V
16	AUX16	Auxilia	ry input 16	0.48828 μV	-3 V to +3 V
17	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
18	Saw	Sawto	oth test signal (bits)	1 (bit)	0 to 32767

Digital input DB25 connector

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



95-0120-2000-0, Refa8-16e 20000Hz

Type Refa8-16e REF code 95-0120-2000-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 16

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

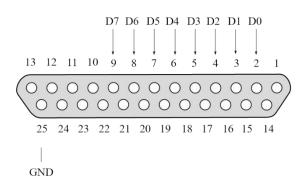
Sampling:

Number of channels 16 channels simultaneously Resolution 24 bits, ExG 18.39 nV per bit

Sample frequency 20000 Hz, 10000 Hz, 5000 Hz, 2500 Hz, 1250 Hz

nr	name	functio	on	resolution	range
1	ExG1	Unipol	ar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipol	ar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipol	ar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipol	ar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipol	ar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipol	ar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipol	ar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipol	ar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipol	ar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipol	ar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipol	ar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipol	ar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipol	ar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipol	ar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipol	ar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipol	ar input 16	0.01839 μV	-150 mV to +150 mV
17	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
18	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	-
10	-
29	-
11	-
30	-
12	-
31	-
13	-
32	-
14	-
33	-
15	-
34	-
16	-
35	-
17	-
36	Pat. GND
18	-
37	-
19	-

95-0120-2000-1, Refa8-16e 20000Hz

Type Refa8-16e REF code 95-0120-2000-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 16

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

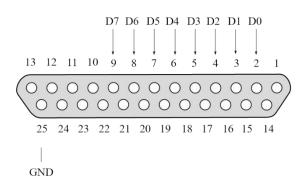
Sampling:

Number of channels 16 channels simultaneously Resolution 24 bits, ExG 18.39 nV per bit

Sample frequency 20000 Hz, 10000 Hz, 5000 Hz, 2500 Hz, 1250 Hz

nr	name	functio	n	resolution	range
1	ExG1	Unipolar input 1		0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2		0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipola	ar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipola	ar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipola	ar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipola	ar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipola	ar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipola	ar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipola	ar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipola	ar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipola	ar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipola	ar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipol	ar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14		0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15		0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipol	ar input 16	0.01839 μV	-150 mV to +150 mV
17	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
18	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

numbers.	
DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	-
10	-
29	-
11	-
30	-
12	-
31	-
13	-
32	-
14	-
33	-
15	-
34	-
16	-
35	-
17	-
36	Pat. GND
18	-
37	-
19	_
1	1

95-0120-4006-0, Refa8-32e 2048Hz

Type Refa8-32e REF code 95-0120-4006-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

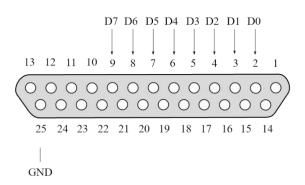
Sampling:

Number of channels 32 channels simultaneously Resolution 24 bits, ExG 18.39 nV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	functio	n	resolution	range
1	ExG1	Unipola	ar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2		0.01839 μV	-150 mV to +150 mV
3	ExG3		ar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipola	ar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipola	ar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6		ar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7		ar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipola	ar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipola	ar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipola	ar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipola	ar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipola	ar input 12	0.01839 μV	
13	ExG13	Unipola	ar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipola	ar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipola	ar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipola	ar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipola	ar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipola	ar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipola	ar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipola	ar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipola	ar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipola	ar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23		0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24		0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25		0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipola	ar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipola	ar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipola	ar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipola	ar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipola	ar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipola	ar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipola	ar input 32	0.01839 μV	-150 mV to +150 mV
33	Digi	Digital channel (bits)		1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
34	Saw	Sawtoc	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

numbers.	Champal
DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-
ı —-	

95-0120-4006-1, Refa8-32e 2048Hz

Type Refa8-32e REF code 95-0120-4006-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

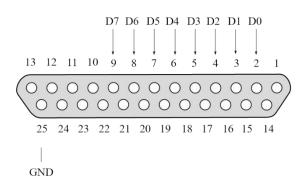
Sampling:

Number of channels 32 channels simultaneously Resolution 24 bits, ExG 18.39 nV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	functio	n	resolution	range
1	ExG1	Unipola	ar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2		0.01839 μV	
3	ExG3		ar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4		ar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5		ar input 5	0.01839 μV	
6	ExG6	· ·	ar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7		ar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	•	ar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9		ar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipola	ar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11		ar input 11	•	-150 mV to +150 mV
12	ExG12	· ·	ar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	· ·	ar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipola	ar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipola	ar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	· ·	ar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipola	ar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18		ar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipola	ar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipola	ar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipola	ar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipola	ar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23		0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24		0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25		0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipola	ar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipola	ar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipola	ar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipola	ar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipola	ar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipola	ar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipola	ar input 32	0.01839 μV	-150 mV to +150 mV
33	Digi	Digital channel (bits)		1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
34	Saw	Sawtoc	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0120-4442-0, Refa8-32e4b4a 10000Hz

Type Refa8-32e4b4a REF code 95-0120-4442-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

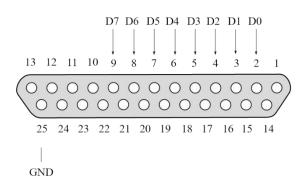
Number of channels 40 channels simultaneously

Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 10000 Hz, 5000 Hz, 2500 Hz, 1250 Hz, 625 Hz

		£		unnalist": :	
nr	name	function		resolution	range
1	ExG1	-	r input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	— ·	r input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	— ·	r input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	— ·	r input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	· ·	r input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	· ·	r input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	•	ır input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8		r input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipola	r input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	· ·	r input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipola	r input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipola	ır input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipola	r input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipola	r input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipola	r input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipola	r input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipola	r input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipola	r input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipola	r input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipola	r input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipola	r input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipola	r input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipola	r input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipola	r input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipola	ir input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipola	ir input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipola	ir input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipola	ir input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipola	ir input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipola	ir input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipola	r input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipola	r input 32	0.01839 μV	-150 mV to +150 mV
33	BIP33		input 33	0.01839 μV	-150 mV to +150 mV
34	BIP34	Bipolar	input 34	0.01839 μV	-150 mV to +150 mV
35	BIP35	Bipolar	input 35	0.01839 μV	-150 mV to +150 mV
36	BIP36	Bipolar	input 36	0.01839 μV	-150 mV to +150 mV
37	AUX37	<u> </u>	y input 37	0.48828 μV	-3 V to +3 V
38	AUX38		y input 38	0.48828 μV	-3 V to +3 V
39	AUX39		y input 39	0.48828 μV	-3 V to +3 V
40	AUX40		y input 40	0.48828 μV	-3 V to +3 V
41	Digi	1	channel (bits)	1 (bit)	0 to 255
	2.8.	0	Digital input bit 0	_ (,	0 10 200
		1	Digital input bit 1	1	
		2	Digital input bit 2	1	
		3	Digital input bit 3	1	
		4	Digital input bit 4	1	
		5	Digital input bit 5	1	
		6	Digital input bit 6	1	
		7	Digital input bit 7 (MSB)	1	
		8-15	reserved	1	
42	Saw	1	th test signal (bits)	1 (bit)	0 to 32767
44	Javv	Jawioo	נוז נכטנ אוצוומו (מונט)	T (DIL)	0 10 32/0/

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

numbers.	T
DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-
1 1 2	_

95-0120-4444-0, Refa8-32e4b4a 4000Hz

Type Refa8-32e4b4a REF code 95-0120-4444-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

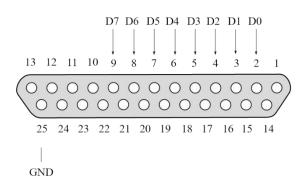
Number of channels 40 channels simultaneously

Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 4000 Hz, 2000 Hz, 1000 Hz, 500 Hz, 250 Hz

ExG2	
2 ExG2 Unipolar input 2 0.01839 μV -150 mV 3 ExG3 Unipolar input 3 0.01839 μV -150 mV 4 ExG4 Unipolar input 4 0.01839 μV -150 mV 5 ExG5 Unipolar input 5 0.01839 μV -150 mV 6 ExG6 Unipolar input 6 0.01839 μV -150 mV 7 ExG7 Unipolar input 8 0.01839 μV -150 mV 9 ExG9 Unipolar input 9 0.01839 μV -150 mV 10 ExG10 Unipolar input 10 0.01839 μV -150 mV 11 ExG11 Unipolar input 11 0.01839 μV -150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV 13 ExG13 Unipolar input 13 0.01839 μV -150 mV 14 ExG14 Unipolar input 13 0.01839 μV -150 mV 15 ExG15 Unipolar input 14 0.01839 μV -150 mV 15 ExG16 Unipolar input 16 0.01839 μV	
Semant	NV to +150 mV
4 ExG4 Unipolar input 4 0.01839 μV -150 mV 5 ExG5 Unipolar input 6 0.01839 μV -150 mV 7 ExG7 Unipolar input 7 0.01839 μV -150 mV 8 ExG8 Unipolar input 8 0.01839 μV -150 mV 9 ExG9 Unipolar input 10 0.01839 μV -150 mV 10 ExG10 Unipolar input 10 0.01839 μV -150 mV 11 ExG11 Unipolar input 11 0.01839 μV -150 mV 12 ExG12 Unipolar input 12 0.01839 μV -150 mV 13 ExG13 Unipolar input 13 0.01839 μV -150 mV 14 ExG14 Unipolar input 14 0.01839 μV -150 mV 15 ExG15 Unipolar input 15 0.01839 μV -150 mV 16 ExG16 Unipolar input 16 0.01839 μV -150 mV 17 ExG17 Unipolar input 17 0.01839 μV -150 mV 18 ExG18 Unipolar input 19 0.01839	NV to +150 mV
5 ExGS Unipolar input 5 0.01839 μV -150 mV 6 ExG6 Unipolar input 6 0.01839 μV -150 mV 7 ExG7 Unipolar input 7 0.01839 μV -150 mV 8 ExG8 Unipolar input 8 0.01839 μV -150 mV 9 ExG9 Unipolar input 9 0.01839 μV -150 mV 10 ExG10 Unipolar input 10 0.01839 μV -150 mV 11 ExG11 Unipolar input 12 0.01839 μV -150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV 13 ExG13 Unipolar input 13 0.01839 μV -150 mV 14 ExG14 Unipolar input 14 0.01839 μV -150 mV 15 ExG15 Unipolar input 16 0.01839 μV -150 mV 16 ExG16 Unipolar input 17 0.01839 μV -150 mV 17 ExG17 Unipolar input 18 0.01839 μV -150 mV 18 ExG28 Unipolar input 20 0.01839 μ	NV to +150 mV
6 ExG6 Unipolar input 6 0.01839 μV -150 mV 7 ExG7 Unipolar input 7 0.01839 μV -150 mV 8 ExG8 Unipolar input 8 0.01839 μV -150 mV 9 ExG9 Unipolar input 9 0.01839 μV -150 mV 10 ExG10 Unipolar input 10 0.01839 μV -150 mV 11 ExG11 Unipolar input 11 0.01839 μV -150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV 13 ExG13 Unipolar input 13 0.01839 μV -150 mV 14 ExG14 Unipolar input 14 0.01839 μV -150 mV 15 ExG15 Unipolar input 15 0.01839 μV -150 mV 16 ExG16 Unipolar input 17 0.01839 μV -150 mV 16 ExG16 Unipolar input 18 0.01839 μV -150 mV 17 ExG17 Unipolar input 18 0.01839 μV -150 mV 18 ExG18 Unipolar input 29 0.0183	V to +150 mV
Fig. 2	V to +150 mV
8 ExG8 Unipolar input 8 0.01839 μV -150 mV 9 ExG9 Unipolar input 9 0.01839 μV -150 mV 10 ExG10 Unipolar input 10 0.01839 μV -150 mV 11 ExG11 Unipolar input 11 0.01839 μV -150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV 13 ExG13 Unipolar input 14 0.01839 μV -150 mV 14 ExG14 Unipolar input 15 0.01839 μV -150 mV 15 ExG15 Unipolar input 16 0.01839 μV -150 mV 16 ExG16 Unipolar input 17 0.01839 μV -150 mV 17 ExG17 Unipolar input 18 0.01839 μV -150 mV 18 ExG18 Unipolar input 19 0.01839 μV -150 mV 19 ExG19 Unipolar input 20 0.01839 μV -150 mV 20 ExG20 Unipolar input 21 0.01839 μV -150 mV 21 ExG21 Unipolar input 22	V to +150 mV
9 EXG9	V to +150 mV
10	V to +150 mV
11 ExG11	V to +150 mV
12	V to +150 mV
13	V to +150 mV
14	V to +150 mV
15	V to +150 mV
16	V to +150 mV
17	V to +150 mV
18 ExG18	V to +150 mV
19 ExG19	V to +150 mV
20 ExG20 Unipolar input 20 0.01839 μV -150 mV	V to +150 mV
ExG21	V to +150 mV
22 ExG22 Unipolar input 22 0.01839 μV -150 mV	V to +150 mV
23 ExG23 Unipolar input 23 0.01839 μV -150 mV	V to +150 mV
24 ExG24 Unipolar input 24 0.01839 μV -150 mV 25 ExG25 Unipolar input 25 0.01839 μV -150 mV 26 ExG26 Unipolar input 26 0.01839 μV -150 mV 27 ExG27 Unipolar input 27 0.01839 μV -150 mV 28 ExG28 Unipolar input 28 0.01839 μV -150 mV 29 ExG29 Unipolar input 29 0.01839 μV -150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV 31 ExG31 Unipolar input 31 0.01839 μV -150 mV 32 ExG32 Unipolar input 32 0.01839 μV -150 mV 33 BIP33 Bipolar input 33 0.01839 μV -150 mV 34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input	V to +150 mV
25 ExG25 Unipolar input 25 0.01839 μV -150 mV 26 ExG26 Unipolar input 26 0.01839 μV -150 mV 27 ExG27 Unipolar input 27 0.01839 μV -150 mV 28 ExG28 Unipolar input 28 0.01839 μV -150 mV 29 ExG29 Unipolar input 29 0.01839 μV -150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV 31 ExG31 Unipolar input 31 0.01839 μV -150 mV 32 ExG32 Unipolar input 32 0.01839 μV -150 mV 33 BIP33 Bipolar input 33 0.01839 μV -150 mV 34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary i	V to +150 mV
26	V to +150 mV
27 ExG27 Unipolar input 27 0.01839 μV -150 mV 28 ExG28 Unipolar input 28 0.01839 μV -150 mV 29 ExG29 Unipolar input 29 0.01839 μV -150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV 31 ExG31 Unipolar input 31 0.01839 μV -150 mV 32 ExG32 Unipolar input 32 0.01839 μV -150 mV 33 BIP33 Bipolar input 33 0.01839 μV -150 mV 34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0	NV to +150 mV
28 ExG28 Unipolar input 28 0.01839 μV -150 mV 29 ExG29 Unipolar input 29 0.01839 μV -150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV 31 ExG31 Unipolar input 31 0.01839 μV -150 mV 32 ExG32 Unipolar input 32 0.01839 μV -150 mV 33 BIP33 Bipolar input 33 0.01839 μV -150 mV 34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input bit 0 0 0 Digital input bit 0 1 Digital input bit 0 1 0 0 0 0 0 0	NV to +150 mV
ExG29	NV to +150 mV
Section Sec	NV to +150 mV
ExG31	V to +150 mV
Section 2 Section 2 Section 3 Sec	V to +150 mV
33 BIP33 Bipolar input 33 0.01839 μV -150 mV 34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	NV to +150 mV
34 BIP34 Bipolar input 34 0.01839 μV -150 mV 35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	V to +150 mV
35 BIP35 Bipolar input 35 0.01839 μV -150 mV 36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 2 0 to 255 1 Digital input bit 2 0 to 255 0 2 Digital input bit 2 0 to 255 0 3 AUX39 AUX40 AU	V to +150 mV
36 BIP36 Bipolar input 36 0.01839 μV -150 mV 37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	V to +150 mV
37 AUX37 Auxiliary input 37 0.48828 μV -3 V to +3 38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	V to +150 mV
38 AUX38 Auxiliary input 38 0.48828 μV -3 V to +3 39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 2 Digital input bit 2 0 0 0	V to +150 mV
39 AUX39 Auxiliary input 39 0.48828 μV -3 V to +3 40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 2 Digital input bit 2 0 0	+3 V
40 AUX40 Auxiliary input 40 0.48828 μV -3 V to +3 41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	+3 V
41 Digi Digital channel (bits) 1 (bit) 0 to 255 0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	+3 V
0 Digital input bit 0 1 Digital input bit 1 2 Digital input bit 2	+3 V
1 Digital input bit 1 2 Digital input bit 2	5
2 Digital input bit 2	
3 Digital input bit 3	
4 Digital input bit 4	
5 Digital input bit 5	
6 Digital input bit 6	
7 Digital input bit 7 (MSB)	
8-15 reserved	
42 Saw Sawtooth test signal (bits) 1 (bit) 0 to 3276	767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0120-4446-0, Refa8-32e4b4a 2048Hz

Type Refa8-32e4b4a REF code 95-0120-4446-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

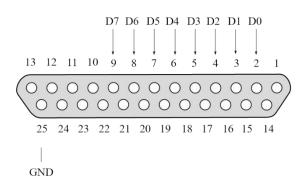
Number of channels 40 channels simultaneously

Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nrnamefunction1ExG1Unipolar input 12ExG2Unipolar input 23ExG3Unipolar input 34ExG4Unipolar input 45ExG5Unipolar input 56ExG6Unipolar input 67ExG7Unipolar input 78ExG8Unipolar input 8	resolution 0.01839 μV	-150 mV to +150 mV -150 mV to +150 mV
2 ExG2 Unipolar input 2 3 ExG3 Unipolar input 3 4 ExG4 Unipolar input 4 5 ExG5 Unipolar input 5 6 ExG6 Unipolar input 6 7 ExG7 Unipolar input 7	0.01839 μV 0.01839 μV 0.01839 μV 0.01839 μV 0.01839 μV	-150 mV to +150 mV -150 mV to +150 mV -150 mV to +150 mV -150 mV to +150 mV
3 ExG3 Unipolar input 3 4 ExG4 Unipolar input 4 5 ExG5 Unipolar input 5 6 ExG6 Unipolar input 6 7 ExG7 Unipolar input 7	0.01839 μV 0.01839 μV 0.01839 μV 0.01839 μV	-150 mV to +150 mV -150 mV to +150 mV -150 mV to +150 mV
4 ExG4 Unipolar input 4 5 ExG5 Unipolar input 5 6 ExG6 Unipolar input 6 7 ExG7 Unipolar input 7	0.01839 μV 0.01839 μV 0.01839 μV 0.01839 μV	-150 mV to +150 mV -150 mV to +150 mV
5 ExG5 Unipolar input 5 6 ExG6 Unipolar input 6 7 ExG7 Unipolar input 7	0.01839 μV 0.01839 μV 0.01839 μV	-150 mV to +150 mV
6 ExG6 Unipolar input 6 7 ExG7 Unipolar input 7	0.01839 μV 0.01839 μV	
7 ExG7 Unipolar input 7	0.01839 μV	-150 mv to +150 mv
- Pro-		
8 ExG8 Unipolar input 8	1001839110	-150 mV to +150 mV
10 15 00		-150 mV to +150 mV
9 ExG9 Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10 ExG10 Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11 ExG11 Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12 ExG12 Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13 ExG13 Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14 ExG14 Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15 ExG15 Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16 ExG16 Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17 ExG17 Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18 ExG18 Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19 ExG19 Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20 ExG20 Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21 ExG21 Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22 ExG22 Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23 ExG23 Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24 ExG24 Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25 ExG25 Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26 ExG26 Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27 ExG27 Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28 ExG28 Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29 ExG29 Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30 ExG30 Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31 ExG31 Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32 ExG32 Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33 BIP33 Bipolar input 33	0.01839 μV	-150 mV to +150 mV
34 BIP34 Bipolar input 34	0.01839 μV	-150 mV to +150 mV
35 BIP35 Bipolar input 35	0.01839 μV	-150 mV to +150 mV
36 BIP36 Bipolar input 36	0.01839 μV	-150 mV to +150 mV
37 AUX37 Auxiliary input 37	0.48828 μV	-3 V to +3 V
38 AUX38 Auxiliary input 38	0.48828 μV	-3 V to +3 V
39 AUX39 Auxiliary input 39	0.48828 μV	-3 V to +3 V
40 AUX40 Auxiliary input 40	0.48828 μV	-3 V to +3 V
Digital channel (bits)	1 (bit)	0 to 255
0 Digital input bit 0		
1 Digital input bit 1		
2 Digital input bit 2		
3 Digital input bit 3		
4 Digital input bit 4		
5 Digital input bit 5		
6 Digital input bit 6		
7 Digital input bit 7 (MSB)		
8-15 reserved		
42 Saw Sawtooth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

Channel number	DB37 pin number
-	1
1	20
2	2
3	21
4	3
5	22
6	4
7	23
8	5
9	24
10	6
11	25
12	7
13	26
14	8
15	27
16	9
17	28
18	10
19	29
20	11
21	30
22	12
23	31
24	13
25	32
26	14
27	33
28	15
29	34
30	16
31	35
32	17
Pat. GND	36
-	18
-	37
-	19

95-0120-4446-1, Refa8-32e4b4a 2048Hz

Type Refa8-32e4b4a REF code 95-0120-4446-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

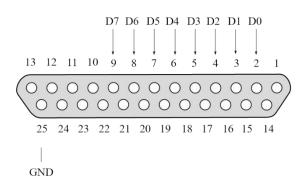
Number of channels 40 channels simultaneously

Resolution 24 bits, ExG & BIP $0.01839 \mu V$ per bit, AUX $0.48828 \mu V$ per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

n-	namo	function	<u> </u>	recolution	rango
nr	name			resolution	range
1	ExG1	<u> </u>	r input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	· ·	r input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	<u> </u>	r input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	•	r input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5		r input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6		r input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7		r input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipola	r input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipola	r input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipola	Unipolar input 10		-150 mV to +150 mV
11	ExG11	Unipola	r input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipola	r input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipola	r input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipola	r input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipola	r input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipola	r input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipola	r input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipola	r input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipola	r input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipola	r input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21		r input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipola	r input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	<u> </u>	r input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	· ·	r input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25		r input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	<u> </u>	r input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	· ·	r input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28		0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29		0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30		0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31		0.01839 μV	-150 mV to +150 mV
32	ExG32		Unipolar input 32		-150 mV to +150 mV
33	BIP33		input 33	0.01839 μV 0.01839 μV	-150 mV to +150 mV
34	BIP34	•	input 34	0.01839 μV	-150 mV to +150 mV
35	BIP35	1	input 35	0.01839 μV	-150 mV to +150 mV
36	BIP36	•	input 36	0.01839 μV	-150 mV to +150 mV
37	AUX37		/ input 37	0.48828 μV	-3 V to +3 V
38	AUX38		/ input 38	0.48828 μV	-3 V to +3 V
39	AUX39		/ input 39	0.48828 μV	-3 V to +3 V
40	AUX40		/ input 40	0.48828 μV	-3 V to +3 V
41	Digi		hannel (bits)	1 (bit)	0 to 255
71	ואוסו	0	Digital input bit 0	1 (5/1)	0 10 233
		1	Digital input bit 1	1	
		2	Digital input bit 2	1	
		3	Digital input bit 3	1	
		4	Digital input bit 4	1	
		5	Digital input bit 5	1	
		6	Digital input bit 6	1	
		7	•	1	
			Digital input bit 7 (MSB)	-	
42	Cove	8-15	reserved	1 (b:+)	0 to 22767
42	Saw	29Mt00	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0120-4446-2, Refa8-32e4b4a 2048Hz

Type Refa8-32e4b4a 3.8x gain

REF code 95-0120-4446-2

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 32

RMS Noise $< 3 \mu V$ (@ lowest sample frequency)

Gain 3.8 x

Input signal difference -1.05 V to +1.05 V (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

Input impedance $> 100 \text{ M}\Omega$ CMRR > 80 dB

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current = 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 40 channels simultaneously

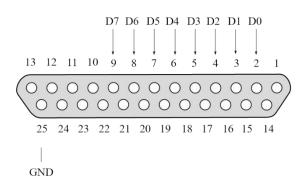
Resolution 24 bits, ExG 128.73nV per bit, BIP 18.39 nV per bit,

AUX 0.48828 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	function	<u> </u>	resolution	range
	ExG1		r input 1	0.12873 μV	-1.05 V to +1.05 V
1		<u> </u>	•	•	
2	ExG2	· ·	r input 2	0.12873 μV	-1.05 V to +1.05 V
3	ExG3	· ·	r input 3	0.12873 μV	-1.05 V to +1.05 V
4	ExG4	•	r input 4	0.12873 μV	-1.05 V to +1.05 V
5	ExG5		r input 5	0.12873 μV	-1.05 V to +1.05 V
6	ExG6	-	r input 6	0.12873 μV	-1.05 V to +1.05 V
7	ExG7		r input 7	0.12873 μV	-1.05 V to +1.05 V
8	ExG8		r input 8	0.12873 μV	-1.05 V to +1.05 V
9	ExG9		r input 9	0.12873 μV	-1.05 V to +1.05 V
10	ExG10	· ·	r input 10	0.12873 μV	-1.05 V to +1.05 V
11	ExG11	· ·	r input 11	0.12873 μV	-1.05 V to +1.05 V
12	ExG12	Unipola	r input 12	0.12873 μV	-1.05 V to +1.05 V
13	ExG13	Unipola	r input 13	0.12873 μV	-1.05 V to +1.05 V
14	ExG14	Unipola	r input 14	0.12873 μV	-1.05 V to +1.05 V
15	ExG15	Unipola	r input 15	0.12873 μV	-1.05 V to +1.05 V
16	ExG16	Unipola	r input 16	0.12873 μV	-1.05 V to +1.05 V
17	ExG17	Unipola	r input 17	0.12873 μV	-1.05 V to +1.05 V
18	ExG18	Unipola	r input 18	0.12873 μV	-1.05 V to +1.05 V
19	ExG19	Unipola	r input 19	0.12873 μV	-1.05 V to +1.05 V
20	ExG20	Unipola	r input 20	0.12873 μV	-1.05 V to +1.05 V
21	ExG21	Unipola	r input 21	0.12873 μV	-1.05 V to +1.05 V
22	ExG22	Unipola	r input 22	0.12873 μV	-1.05 V to +1.05 V
23	ExG23	Unipola	r input 23	0.12873 μV	-1.05 V to +1.05 V
24	ExG24	Unipola	r input 24	0.12873 μV	-1.05 V to +1.05 V
25	ExG25	Unipola	r input 25	0.12873 μV	-1.05 V to +1.05 V
26	ExG26	Unipola	r input 26	0.12873 μV	-1.05 V to +1.05 V
27	ExG27	Unipola	r input 27	0.12873 μV	-1.05 V to +1.05 V
28	ExG28	Unipolar input 28		0.12873 μV	-1.05 V to +1.05 V
29	ExG29	Unipolar input 29		0.12873 μV	-1.05 V to +1.05 V
30	ExG30	Unipolar input 30		0.12873 μV	-1.05 V to +1.05 V
31	ExG31	Unipolar input 31		0.12873 μV	-1.05 V to +1.05 V
32	ExG32	Unipola	Unipolar input 32		-1.05 V to +1.05 V
33	BIP33	Bipolar	input 33	0.12873 μV 0.01839 μV	-150 mV to +150 mV
34	BIP34	Bipolar	input 34	0.01839 μV	-150 mV to +150 mV
35	BIP35	Bipolar	input 35	0.01839 μV	-150 mV to +150 mV
36	BIP36	•	input 36	0.01839 μV	-150 mV to +150 mV
37	AUX37	Auxiliar	y input 37	0.48828 μV	-3 V to +3 V
38	AUX38		y input 38	0.48828 μV	-3 V to +3 V
39	AUX39		y input 39	0.48828 μV	-3 V to +3 V
40	AUX40		y input 40	0.48828 μV	-3 V to +3 V
41	Digi		hannel (bits)	1 (bit)	0 to 255
	o o	0	Digital input bit 0	1 (1-1)	
		1	Digital input bit 1		
		2	Digital input bit 2	-	
		3	Digital input bit 3	1	
		4	Digital input bit 4	1	
		5	Digital input bit 5	1	
		6	Digital input bit 6	1	
		7	Digital input bit 7 (MSB)	1	
		8-15	reserved	1	
42	Saw		th test signal (bits)	1 (bit)	0 to 32767
44	Javv	Jawtoo	נוו נפטנ אוצוומו (טונא)	T (DIL)	0 10 32/0/

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	Channel number
1	-
20	1
2	2
21	3
3	4
22	5
4	6
23	7
5	8
24	9
6	10
25	11
7	12
26	13
8	14
27	15
9	16
28	17
10	18
29	19
11	20
30	21
12	22
31	23
13	24
32	25
14	26
33	27
15	28
34	29
16	30
35	31
17	32
36	Pat. GND
18	-
37	-
19	-

95-0120-8444-0, Refa8-64e4b4a 4000Hz

Type Refa8-64e4b4a REF code 95-0120-8444-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously

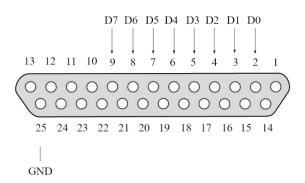
Resolution 24 bits, ExG & BIP $0.01839 \mu V$ per bit, AUX $0.48828 \mu V$ per bit

Sample frequency 4000 Hz, 2000 Hz, 1000 Hz, 500 Hz, 250 Hz

nr	name	function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipolar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipolar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipolar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipolar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipolar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	$0.01839\mu\text{V}$	-150 mV to +150 mV
30	ExG30	Unipolar input 30	$0.01839~\mu V$	-150 mV to +150 mV
31	ExG31	Unipolar input 31	$0.01839~\mu V$	-150 mV to +150 mV
32	ExG32	Unipolar input 32	$0.01839~\mu V$	-150 mV to +150 mV
33	ExG33	Unipolar input 33	$0.01839~\mu V$	-150 mV to +150 mV
34	ExG34	Unipolar input 34	$0.01839~\mu V$	-150 mV to +150 mV
35	ExG35	Unipolar input 35	$0.01839~\mu V$	-150 mV to +150 mV
36	ExG36	Unipolar input 36	$0.01839~\mu V$	-150 mV to +150 mV
37	ExG37	Unipolar input 37	$0.01839~\mu V$	-150 mV to +150 mV
38	ExG38	Unipolar input 38	$0.01839~\mu V$	-150 mV to +150 mV
39	ExG39	Unipolar input 39	$0.01839~\mu V$	-150 mV to +150 mV
40	ExG40	Unipolar input 40	$0.01839~\mu V$	-150 mV to +150 mV
41	ExG41	Unipolar input 41	$0.01839~\mu V$	-150 mV to +150 mV
42	ExG42	Unipolar input 42	0.01839 μV	-150 mV to +150 mV
43	ExG43	Unipolar input 43	$0.01839~\mu V$	-150 mV to +150 mV
44	ExG44	Unipolar input 44	$0.01839~\mu V$	-150 mV to +150 mV
45	ExG45	Unipolar input 45	$0.01839~\mu V$	-150 mV to +150 mV
46	ExG46	Unipolar input 46	$0.01839~\mu V$	-150 mV to +150 mV
47	ExG47	Unipolar input 47	$0.01839~\mu V$	-150 mV to +150 mV
48	ExG48	Unipolar input 48	0.01839 μV	-150 mV to +150 mV

nr	name	function	on	resolution	range
49	ExG49	Unipol	ar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipol	ar input 50	0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipol	ar input 51	0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipol	ar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipol	ar input 53	0.01839 μV	-150 mV to +150 mV
54	ExG54	Unipol	ar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipol	ar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipol	ar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipol	ar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipol	ar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipol	ar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipol	ar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipol	ar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipol	ar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipol	ar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipol	ar input 64	0.01839 μV	-150 mV to +150 mV
65	BIP65	Bipola	r input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipola	r input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipola	r input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipola	r input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	-3 V to +3 V
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawto	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector
אמוווח ווון זכסע piii number	Channel number	Channel number
1	Channel number	Channel number
	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
26	13	45
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	-	-

95-0120-8444-1, Refa8-64e4b4a 4000Hz

Type Refa8-64e4b4a REF code 95-0120-8444-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

Input impedance $> 100 \text{ M}\Omega$ CMRR > 90 dB

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously

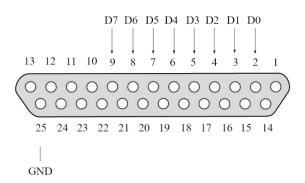
Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 4000 Hz, 2000 Hz, 1000 Hz, 500 Hz, 250 Hz

nr	name	function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipolar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipolar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipolar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipolar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipolar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33	ExG33	Unipolar input 33	0.01839 μV	-150 mV to +150 mV
34	ExG34	Unipolar input 34	0.01839 μV	-150 mV to +150 mV
35	ExG35	Unipolar input 35	0.01839 μV	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	-150 mV to +150 mV
37	ExG37	Unipolar input 37	0.01839 μV	-150 mV to +150 mV
38	ExG38	Unipolar input 38	0.01839 μV	-150 mV to +150 mV
39	ExG39	Unipolar input 39	0.01839 μV	-150 mV to +150 mV
40	ExG40	Unipolar input 40	0.01839 μV	-150 mV to +150 mV
41	ExG41	Unipolar input 41	0.01839 μV	-150 mV to +150 mV
42	ExG42	Unipolar input 42	0.01839 μV	-150 mV to +150 mV
43	ExG43	Unipolar input 43	0.01839 μV	-150 mV to +150 mV
44	ExG44	Unipolar input 44	0.01839 μV	
45	ExG45	Unipolar input 45	0.01839 μV	-150 mV to +150 mV
46	ExG46	Unipolar input 46	0.01839 μV	-150 mV to +150 mV
47	ExG47	Unipolar input 47	0.01839 μV	-150 mV to +150 mV
48	ExG48	Unipolar input 48	0.01839 μV	-150 mV to +150 mV

nr	name	function	on	resolution	range
49	ExG49	Unipol	ar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipol	ar input 50	0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipol	ar input 51	0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipol	ar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipol	ar input 53	0.01839 μV	-150 mV to +150 mV
54	ExG54	Unipol	ar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipol	ar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipol	ar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipol	ar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipol	ar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipol	ar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipol	ar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipol	ar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipol	ar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipol	ar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipol	ar input 64	0.01839 μV	-150 mV to +150 mV
65	BIP65	Bipola	r input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipola	r input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipola	r input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipola	r input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	-3 V to +3 V
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawto	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector
,,,,,,,	Channel number	Channel number
1	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
26	13	45
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	-	-

95-0120-8446-0, Refa8-64e4b4a 2048Hz

Type Refa8-64e4b4a REF code 95-0120-8446-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously

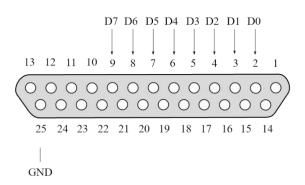
Resolution 24 bits, ExG & BIP $0.01839 \,\mu\text{V}$ per bit, AUX $0.48828 \,\mu\text{V}$ per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	
2	ExG2	Unipolar input 2	0.01839 μV	
3	ExG3	Unipolar input 3	•	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	
5	ExG5	Unipolar input 5	0.01839 μV	
6	ExG6	Unipolar input 6	0.01839 μV	
7	ExG7	Unipolar input 7	0.01839 μV	
8	ExG8	Unipolar input 8	•	-150 mV to +150 mV
9	ExG9	Unipolar input 9	•	-150 mV to +150 mV
10	ExG10	Unipolar input 10		-150 mV to +150 mV
11	ExG11	Unipolar input 11	•	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	
13	ExG13	Unipolar input 13		-150 mV to +150 mV
14	ExG14	Unipolar input 14		-150 mV to +150 mV
15	ExG15	Unipolar input 15	•	-150 mV to +150 mV
16	ExG16	Unipolar input 16		-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	
18	ExG18	Unipolar input 18	0.01839 μV	
19	ExG19	Unipolar input 19		-150 mV to +150 mV
20	ExG20	Unipolar input 20	•	-150 mV to +150 mV
21	ExG21	Unipolar input 21	·	-150 mV to +150 mV
22	ExG22	Unipolar input 22	•	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	
24	ExG24	Unipolar input 24	0.01839 μV	
25	ExG25	Unipolar input 25	•	-150 mV to +150 mV
26	ExG26	Unipolar input 26	•	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	
28	ExG28	Unipolar input 28	•	-150 mV to +150 mV
29	ExG29	Unipolar input 29		-150 mV to +150 mV
30	ExG30	Unipolar input 30	•	-150 mV to +150 mV
31	ExG31	Unipolar input 31		-150 mV to +150 mV
32	ExG32	Unipolar input 32		-150 mV to +150 mV
33	ExG33	Unipolar input 33		-150 mV to +150 mV
34	ExG34	Unipolar input 34		-150 mV to +150 mV
35	ExG35	Unipolar input 35	0.01839 μV	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	
37	ExG37	Unipolar input 37	0.01839 μV	-150 mV to +150 mV
38	ExG38	Unipolar input 38	0.01839 μV	-150 mV to +150 mV
39	ExG39	Unipolar input 39		-150 mV to +150 mV
40	ExG40	Unipolar input 40	•	-150 mV to +150 mV
41	ExG41	Unipolar input 41	•	-150 mV to +150 mV
42	ExG42	Unipolar input 42		-150 mV to +150 mV
43	ExG43	Unipolar input 43		-150 mV to +150 mV
44	ExG44	Unipolar input 44		-150 mV to +150 mV
45	ExG45	Unipolar input 45	•	-150 mV to +150 mV
46	ExG46	Unipolar input 46	•	-150 mV to +150 mV
47	ExG47	Unipolar input 47	•	-150 mV to +150 mV
48	ExG48	Unipolar input 48	· ·	-150 mV to +150 mV

nr	name	functio	on	resolution	range
49	ExG49	Unipol	ar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipolar input 50		0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipolar input 51		0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipol	ar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipol	ar input 53	0.01839 μV	-150 mV to +150 mV
54	ExG54	Unipol	ar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipol	ar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipol	ar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipol	ar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipol	ar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipol	ar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipol	ar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipol	ar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipol	ar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipol	ar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipol	ar input 64	0.01839 μV	-150 mV to +150 mV
65	BIP65	Bipolar	input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipolar	input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipolar	input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipolar	input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	-3 V to +3 V
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector
2207 piir riuriider	Channel number	Channel number
1	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
26	13	45
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	-	_

95-0120-8446-1, Refa8-64e4b4a 2048Hz

Type Refa8-64e4b4a REF code 95-0120-8446-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously

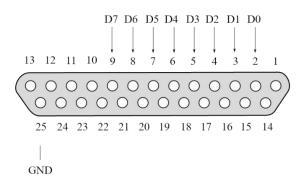
Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

ExG1	nr	name	function	resolution	range
Ex62					
Section					
4 ExG4 Unipolar input 4 0.01839 μV -150 mV to +150 mV 5 ExG5 Unipolar input 6 0.01839 μV -150 mV to +150 mV 6 ExG6 Unipolar input 7 0.01839 μV -150 mV to +150 mV 7 ExG7 Unipolar input 8 0.01839 μV -150 mV to +150 mV 9 ExG9 Unipolar input 10 0.01839 μV -150 mV to +150 mV 10 ExG10 Unipolar input 11 0.01839 μV -150 mV to +150 mV 11 ExG11 Unipolar input 12 0.01839 μV -150 mV to +150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV to +150 mV 13 ExG13 Unipolar input 14 0.01839 μV -150 mV to +150 mV 14 ExG14 Unipolar input 15 0.01839 μV -150 mV to +150 mV 15 ExG15 Unipolar input 16 0.01839 μV -150 mV to +150 mV 16 ExG16 Unipolar input 17 0.01839 μV -150 mV to +150 mV 17 ExG21 Unipolar input 17 0.01839 μV <t< td=""><td></td><td></td><td>·</td><td></td><td></td></t<>			·		
Exc Sec Unipolar input 5 0.01839 μV -150 mV to +150 mV to			• •		
6 ExG6 Unipolar input 7 0.01839 μV -150 mV to +150 mV 7 ExG7 Unipolar input 8 0.01839 μV -150 mV to +150 mV 8 ExG8 Unipolar input 8 0.01839 μV -150 mV to +150 mV 9 ExG9 Unipolar input 10 0.01839 μV -150 mV to +150 mV 10 ExG10 Unipolar input 11 0.01839 μV -150 mV to +150 mV 11 ExG11 Unipolar input 12 0.01839 μV -150 mV to +150 mV 12 ExG12 Unipolar input 13 0.01839 μV -150 mV to +150 mV 13 ExG13 Unipolar input 14 0.01839 μV -150 mV to +150 mV 15 ExG14 Unipolar input 15 0.01839 μV -150 mV to +150 mV 16 ExG16 Unipolar input 17 0.01839 μV -150 mV to +150 mV 17 ExG17 Unipolar input 17 0.01839 μV -150 mV to +150 mV 18 ExG19 Unipolar input 19 0.01839 μV -150 mV to +150 mV 20 ExG21 Unipolar input 20 0.01839 μV					
FXG7			·		
8 ExG8 Unipolar input 9 .0.01839 µV -150 mV to +150 mV 10 ExG9 Unipolar input 10 .0.01839 µV -150 mV to +150 mV 11 ExG11 Unipolar input 11 .0.01839 µV -150 mV to +150 mV 12 ExG12 Unipolar input 12 .0.01839 µV -150 mV to +150 mV 13 ExG13 Unipolar input 13 .0.01839 µV -150 mV to +150 mV 14 ExG14 Unipolar input 15 .0.01839 µV -150 mV to +150 mV 15 ExG15 Unipolar input 15 .0.01839 µV -150 mV to +150 mV 16 ExG16 Unipolar input 16 .0.01839 µV -150 mV to +150 mV 17 ExG17 Unipolar input 17 .0.01839 µV -150 mV to +150 mV 18 ExG18 Unipolar input 19 .0.01839 µV -150 mV to +150 mV 19 ExG19 Unipolar input 20 .0.01839 µV -150 mV to +150 mV 20 ExG20 Unipolar input 21 .0.01839 µV -150 mV to +150 mV 21 ExG21 Unipolar input 22 .0.01			·		
Sec Sec Unipolar input 9 Sec Sec Unipolar input 10 Sec Sec Unipolar input 11 Sec Sec			·	•	
10			·	•	
11 ExG11			·		
12 ExG12			·	•	
13				•	
14 EXG14 Unipolar input 14 0.01839 μV -150 mV to +150 mV 15 EXG15 Unipolar input 15 0.01839 μV -150 mV to +150 mV 16 EXG16 Unipolar input 16 0.01839 μV -150 mV to +150 mV 17 EXG17 Unipolar input 17 0.01839 μV -150 mV to +150 mV 18 EXG18 Unipolar input 18 0.01839 μV -150 mV to +150 mV 19 EXG19 Unipolar input 19 0.01839 μV -150 mV to +150 mV 20 EXG20 Unipolar input 21 0.01839 μV -150 mV to +150 mV 21 EXG21 Unipolar input 22 0.01839 μV -150 mV to +150 mV 22 EXG22 Unipolar input 23 0.01839 μV -150 mV to +150 mV 23 EXG23 Unipolar input 24 0.01839 μV -150 mV to +150 mV 24 EXG24 Unipolar input 25 0.01839 μV -150 mV to +150 mV 25 EXG25 Unipolar input 25 0.01839 μV -150 mV to +150 mV 26 EXG26 Unipolar input 27 0.01839 μV </td <td></td> <td></td> <td></td> <td></td> <td></td>					
15					
16		<u> </u>			
17 ExG17 Unipolar input 17 0.01839 μV -150 mV to +150 mV 18 ExG18 Unipolar input 18 0.01839 μV -150 mV to +150 mV 19 ExG19 Unipolar input 19 0.01839 μV -150 mV to +150 mV 20 ExG20 Unipolar input 20 0.01839 μV -150 mV to +150 mV 21 ExG21 Unipolar input 21 0.01839 μV -150 mV to +150 mV 22 ExG22 Unipolar input 22 0.01839 μV -150 mV to +150 mV 23 ExG23 Unipolar input 23 0.01839 μV -150 mV to +150 mV 24 ExG24 Unipolar input 24 0.01839 μV -150 mV to +150 mV 25 ExG25 Unipolar input 25 0.01839 μV -150 mV to +150 mV 26 ExG26 Unipolar input 26 0.01839 μV -150 mV to +150 mV 27 ExG27 Unipolar input 27 0.01839 μV -150 mV to +150 mV 28 ExG28 Unipolar input 28 0.01839 μV -150 mV to +150 mV 29 ExG29 Unipolar input 29 0.01839 μV -150 mV to +150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV to +150 mV 31 <td></td> <td></td> <td>·</td> <td></td> <td></td>			·		
18 ExG18 Unipolar input 18 0.01839 μV -150 mV to +150 mV 19 ExG19 Unipolar input 19 0.01839 μV -150 mV to +150 mV 20 ExG20 Unipolar input 21 0.01839 μV -150 mV to +150 mV 21 ExG21 Unipolar input 21 0.01839 μV -150 mV to +150 mV 22 ExG22 Unipolar input 22 0.01839 μV -150 mV to +150 mV 23 ExG23 Unipolar input 23 0.01839 μV -150 mV to +150 mV 24 ExG24 Unipolar input 24 0.01839 μV -150 mV to +150 mV 25 ExG25 Unipolar input 25 0.01839 μV -150 mV to +150 mV 26 ExG26 Unipolar input 27 0.01839 μV -150 mV to +150 mV 27 ExG27 Unipolar input 28 0.01839 μV -150 mV to +150 mV 29 ExG28 Unipolar input 28 0.01839 μV -150 mV to +150 mV 30 ExG30 Unipolar input 30 0.01839 μV -150 mV to +150 mV 31 ExG31 Unipolar input 31 0.01839 μV -150 mV to +150 mV 32 ExG32 Unipolar inp			·		
ExG19			·		
ExG20			• •		
ExG21					
22 ExG22 Unipolar input 23 0.01839 μV -150 mV to +150 mV 23 ExG23 Unipolar input 23 0.01839 μV -150 mV to +150 mV 24 ExG24 Unipolar input 24 0.01839 μV -150 mV to +150 mV 25 ExG25 Unipolar input 25 0.01839 μV -150 mV to +150 mV 26 ExG26 Unipolar input 26 0.01839 μV -150 mV to +150 mV 27 ExG27 Unipolar input 27 0.01839 μV -150 mV to +150 mV 28 ExG28 Unipolar input 28 0.01839 μV -150 mV to +150 mV 29 ExG29 Unipolar input 30 0.01839 μV -150 mV to +150 mV 30 ExG30 Unipolar input 31 0.01839 μV -150 mV to +150 mV 31 ExG31 Unipolar input 32 0.01839 μV -150 mV to +150 mV 33 ExG33 Unipolar input 33 0.01839 μV -150 mV to +150 mV 34 ExG34 Unipolar input 34 0.01839 μV -150 mV to +150 mV 35 ExG35 Unipolar input 35 0.01839 μV </td <td></td> <td></td> <td>·</td> <td></td> <td></td>			·		
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46 ExG46 Unipolar input 46 0.01839 μV -150 mV to +150 mV			·	•	
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48 ExG48 Unipolar input 48 0.01839 μV -150 mV to +150 mV		<u> </u>	·		

nr	name	functio	n	resolution	range
49	ExG49	Unipola	ar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipola	ar input 50	0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipolar input 51		0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipola	ar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipola	ar input 53	0.01839 μV	-150 mV to +150 mV
54	ExG54	Unipola	ar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipola	ar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipola	ar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipola	ar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipola	ar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipola	ar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipola	ar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipola	ar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipola	ar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipola	ar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipola	ar input 64	0.01839 μV	-150 mV to +150 mV
65	BIP65	Bipolar	input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipolar	input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipolar	input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipolar	input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector
,,,,,,,	Channel number	Channel number
1	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
26	13	45
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	-	-

95-0120-8446-2, Refa8-64e4b4a 2048Hz

Type Refa8-64e4b4a 3.8x gain

REF code 95-0120-8446-2

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 3 \mu V$ (@ lowest sample frequency)

Gain 3.8 x

Input signal difference -1.05 V to +1.05 V (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

Input impedance $> 100 \text{ M}\Omega$ CMRR > 80 dB

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously Resolution 24 bits, ExG 0.12873 μ V per bit,

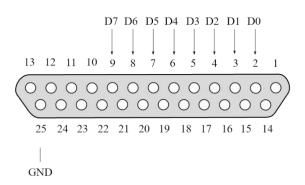
BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

nr	name	function	resolution	range
1	ExG1	Unipolar input 1	0.12873 μV	-1.05 V to +1.05 V
2	ExG2	Unipolar input 2	0.12873 μV	-1.05 V to +1.05 V
3	ExG3	Unipolar input 3	0.12873 μV	-1.05 V to +1.05 V
4	ExG4	Unipolar input 4	0.12873 μV	-1.05 V to +1.05 V
5	ExG5	Unipolar input 5	0.12873 μV	-1.05 V to +1.05 V
6	ExG6	Unipolar input 6	0.12873 μV	-1.05 V to +1.05 V
7	ExG7	Unipolar input 7	0.12873 μV	-1.05 V to +1.05 V
8	ExG8	Unipolar input 8	0.12873 μV	-1.05 V to +1.05 V
9	ExG9	Unipolar input 9	0.12873 μV	-1.05 V to +1.05 V
10	ExG10	Unipolar input 10	0.12873 μV	-1.05 V to +1.05 V
11	ExG11	Unipolar input 11	0.12873 μV	-1.05 V to +1.05 V
12	ExG12	Unipolar input 12	0.12873 μV	-1.05 V to +1.05 V
13	ExG13	Unipolar input 13	0.12873 μV	-1.05 V to +1.05 V
14	ExG14	Unipolar input 14	0.12873 μV	-1.05 V to +1.05 V
15	ExG15	Unipolar input 15	0.12873 μV	-1.05 V to +1.05 V
16	ExG16	Unipolar input 16	0.12873 μV	-1.05 V to +1.05 V
17	ExG17	Unipolar input 17	0.12873 μV	-1.05 V to +1.05 V
18	ExG18	Unipolar input 18	0.12873 μV	-1.05 V to +1.05 V
19	ExG19	Unipolar input 19	0.12873 μV	-1.05 V to +1.05 V
20	ExG20	Unipolar input 20	0.12873 μV	-1.05 V to +1.05 V
21	ExG21	Unipolar input 21	0.12873 μV	-1.05 V to +1.05 V
22	ExG22	Unipolar input 22	$0.12873 \; \mu V$	-1.05 V to +1.05 V
23	ExG23	Unipolar input 23	0.12873 μV	-1.05 V to +1.05 V
24	ExG24	Unipolar input 24	$0.12873~\mu V$	-1.05 V to +1.05 V
25	ExG25	Unipolar input 25	$0.12873~\mu V$	-1.05 V to +1.05 V
26	ExG26	Unipolar input 26	0.12873 μV	-1.05 V to +1.05 V
27	ExG27	Unipolar input 27	0.12873 μV	-1.05 V to +1.05 V
28	ExG28	Unipolar input 28	0.12873 μV	-1.05 V to +1.05 V
29	ExG29	Unipolar input 29	0.12873 μV	-1.05 V to +1.05 V
30	ExG30	Unipolar input 30		-1.05 V to +1.05 V
31	ExG31	Unipolar input 31	0.12873 μV	-1.05 V to +1.05 V
32	ExG32	Unipolar input 32	0.12873 μV	-1.05 V to +1.05 V
33	ExG33	Unipolar input 33	0.12873 μV	-1.05 V to +1.05 V
34	ExG34	Unipolar input 34	0.12873 μV	-1.05 V to +1.05 V
35	ExG35	Unipolar input 35	0.12873 μV	
36	ExG36	Unipolar input 36	0.12873 μV	
37	ExG37	Unipolar input 37	0.12873 μV	-1.05 V to +1.05 V
38	ExG38	Unipolar input 38	0.12873 μV	
39	ExG39	Unipolar input 39	0.12873 μV	
40	ExG40	Unipolar input 40	0.12873 μV	-1.05 V to +1.05 V
41	ExG41	Unipolar input 41	0.12873 μV	
42	ExG42	Unipolar input 42	0.12873 μV	
43	ExG43	Unipolar input 43	0.12873 μV	
44	ExG44	Unipolar input 44	0.12873 μV	
45	ExG45	Unipolar input 45	0.12873 μV	
46	ExG46	Unipolar input 46	0.12873 μV	
47	ExG47	Unipolar input 47	0.12873 μV	
48	ExG48	Unipolar input 48	0.12873 μV	-1.05 V to +1.05 V

nr	name	functio	n	resolution	range
49	ExG49	Unipola	ar input 49	0.12873 μV	-1.05 V to +1.05 V
50	ExG50	Unipolar input 50		0.12873 μV	-1.05 V to +1.05 V
51	ExG51	Unipolar input 51		0.12873 μV	-1.05 V to +1.05 V
52	ExG52	Unipola	ar input 52	0.12873 μV	-1.05 V to +1.05 V
53	ExG53	Unipola	ar input 53	0.12873 μV	-1.05 V to +1.05 V
54	ExG54	Unipola	ar input 54	0.12873 μV	-1.05 V to +1.05 V
55	ExG55	Unipola	ar input 55	0.12873 μV	-1.05 V to +1.05 V
56	ExG56	Unipola	ar input 56	0.12873 μV	-1.05 V to +1.05 V
57	ExG57	Unipola	ar input 57	0.12873 μV	-1.05 V to +1.05 V
58	ExG58	Unipola	ar input 58	0.12873 μV	-1.05 V to +1.05 V
59	ExG59	Unipola	ar input 59	0.12873 μV	-1.05 V to +1.05 V
60	ExG60	Unipola	ar input 60	0.12873 μV	-1.05 V to +1.05 V
61	ExG61	Unipola	ar input 61	0.12873 μV	-1.05 V to +1.05 V
62	ExG62	Unipola	ar input 62	0.12873 μV	-1.05 V to +1.05 V
63	ExG63	Unipola	ar input 63	0.12873 μV	-1.05 V to +1.05 V
64	ExG64	Unipola	ar input 64	0.12873 μV	-1.05 V to +1.05 V
65	BIP65	Bipolar	input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipolar	input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipolar	input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipolar	input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	-3 V to +3 V
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector
	Channel number	Channel number
1	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
26	13	45
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	-	-

95-0120-8447-0, Refa8-64e4b4a 2000Hz

Type Refa8-64e4b4a REF code 95-0120-8447-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 64

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

Input impedance $> 100 \text{ M}\Omega$ CMRR > 90 dB

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 72 channels simultaneously

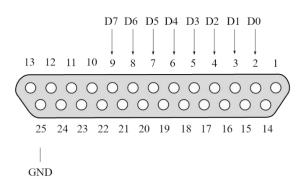
Resolution 24 bits, ExG & BIP 0.01839 μ V per bit, AUX 0.48828 μ V per bit

Sample frequency 2000 Hz, 1000 Hz, 500 Hz, 250 Hz, 125 Hz

nr	name	function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	
2	ExG2	Unipolar input 2	0.01839 μV	
3	ExG3	Unipolar input 3	·	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	
5	ExG5	Unipolar input 5	0.01839 μV	
6	ExG6	Unipolar input 6	0.01839 μV	
7	ExG7	Unipolar input 7	0.01839 μV	
8	ExG8	Unipolar input 8	•	-150 mV to +150 mV
9	ExG9	Unipolar input 9	•	-150 mV to +150 mV
10	ExG10	Unipolar input 10		-150 mV to +150 mV
11	ExG11	Unipolar input 11	•	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	
13	ExG13	Unipolar input 13	•	-150 mV to +150 mV
14	ExG14	Unipolar input 14		-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16		-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33	ExG33	Unipolar input 33	0.01839 μV	-150 mV to +150 mV
34	ExG34	Unipolar input 34	0.01839 μV	-150 mV to +150 mV
35	ExG35	Unipolar input 35	•	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	
37	ExG37	Unipolar input 37	•	-150 mV to +150 mV
38	ExG38	Unipolar input 38		-150 mV to +150 mV
39	ExG39	Unipolar input 39	•	-150 mV to +150 mV
40	ExG40	Unipolar input 40	•	-150 mV to +150 mV
41	ExG41	Unipolar input 41		-150 mV to +150 mV
42	ExG42	Unipolar input 42		-150 mV to +150 mV
43	ExG43	Unipolar input 43		-150 mV to +150 mV
44	ExG44	Unipolar input 44	•	-150 mV to +150 mV
45	ExG45	Unipolar input 45	•	-150 mV to +150 mV
46	ExG46	Unipolar input 46	•	-150 mV to +150 mV
47	ExG47	Unipolar input 47	· ·	-150 mV to +150 mV
48	ExG48	Unipolar input 48	0.01839 μV	-150 mV to +150 mV

nr	name	functio	on	resolution	range
49	ExG49	Unipol	ar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipolar input 50		0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipolar input 51		0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipol	ar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipol	ar input 53	0.01839 μV	-150 mV to +150 mV
54	ExG54	Unipol	ar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipol	ar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipol	ar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipol	ar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipol	ar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipol	ar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipol	ar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipol	ar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipol	ar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipol	ar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipol	ar input 64	0.01839 μV	-150 mV to +150 mV
65	BIP65	Bipolar	input 65	0.01839 μV	-150 mV to +150 mV
66	BIP66	Bipolar	input 66	0.01839 μV	-150 mV to +150 mV
67	BIP67	Bipolar	input 67	0.01839 μV	-150 mV to +150 mV
68	BIP68	Bipolar	input 68	0.01839 μV	-150 mV to +150 mV
69	AUX69	Auxilia	ry input 69	0.48828 μV	-3 V to +3 V
70	AUX70	Auxilia	ry input 70	0.48828 μV	-3 V to +3 V
71	AUX71	Auxilia	ry input 71	0.48828 μV	-3 V to +3 V
72	AUX72	Auxilia	ry input 72	0.48828 μV	-3 V to +3 V
73	Digi	Digital	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
74	Saw	Sawtoo	oth test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

numbers. DB37 pin number	First Connector	Second Connector
DB37 piii iiuiiibei	Channel number	Channel number
1	-	-
20	1	33
2	2	34
21	3	35
3	4	36
22	5	37
4	6	38
23	7	39
5	8	40
24	9	41
6	10	42
25	11	43
7	12	44
		45
26	13	
8	14	46
27	15	47
9	16	48
28	17	49
10	18	50
29	19	51
11	20	52
30	21	53
12	22	54
31	23	55
13	24	56
32	25	57
14	26	58
33	27	59
15	28	60
34	29	61
16	30	62
35	31	63
17	32	64
36	Pat. GND	Pat. GND
18	-	-
37	-	-
19	_	-
-	1	i

95-0121-6446-0, Refa Ext 128e4b4a 2048Hz

Type Refa_Ext-128e4b4a REF code 95-0121-6446-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 128

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 136 channels simultaneously

Resolution 24 bits, ExG & BIP 0.01839 μV per bit, AUX 0.48828 μV per bit

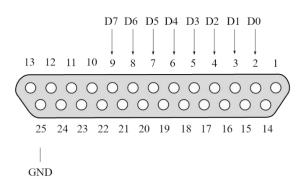
Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

	el list:	Franchica		
nr	name	Function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipolar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipolar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipolar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipolar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipolar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33	ExG33	Unipolar input 33	0.01839 μV	-150 mV to +150 mV
34	ExG34	Unipolar input 34	0.01839 μV	-150 mV to +150 mV
35	ExG35	Unipolar input 35	0.01839 μV	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	-150 mV to +150 mV
37	ExG37	Unipolar input 37	0.01839 μV	-150 mV to +150 mV
38	ExG37	Unipolar input 38	0.01839 μV	-150 mV to +150 mV
39	ExG39	Unipolar input 39	0.01839 μV	-150 mV to +150 mV
40	ExG39 ExG40	Unipolar input 40	0.01839 μV 0.01839 μV	-150 mV to +150 mV
41	ExG40	Unipolar input 40 Unipolar input 41	0.01839 μV	-150 mV to +150 mV
42	ExG41	Unipolar input 41 Unipolar input 42	0.01839 μV	-150 mV to +150 mV
43	ExG42 ExG43	Unipolar input 42 Unipolar input 43	0.01839 μV	-150 mV to +150 mV
44	ExG43	Unipolar input 43 Unipolar input 44	0.01839 μV 0.01839 μV	
45	ExG44 ExG45	Unipolar input 44 Unipolar input 45		-150 mV to +150 mV -150 mV to +150 mV
			0.01839 μV	
46 47	ExG46 ExG47	Unipolar input 46 Unipolar input 47	0.01839 μV	-150 mV to +150 mV -150 mV to +150 mV
			0.01839 μV	
48	ExG48	Unipolar input 48	0.01839 μV	-150 mV to +150 mV
49	ExG49	Unipolar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipolar input 50	0.01839 μV	-150 mV to +150 mV
51	ExG51	Unipolar input 51	0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipolar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipolar input 53	0.01839 μV	-150 mV to +150 mV

nr	name	Function	resolution	range	
54	ExG54	Unipolar input 54	0.01839 μV	-150 mV to +150 mV	
55	ExG55	Unipolar input 55	0.01839 μV	-150 mV to +150 mV	
56	ExG56	Unipolar input 56	0.01839 μV	-150 mV to +150 mV	
57	ExG57	Unipolar input 57	0.01839 μV	-150 mV to +150 mV	
58	ExG58	Unipolar input 58	0.01839 μV	-150 mV to +150 mV	
59	ExG59	Unipolar input 59	0.01839 μV	-150 mV to +150 mV	
60	ExG60	Unipolar input 60	0.01839 μV	-150 mV to +150 mV	
61	ExG61	Unipolar input 61	0.01839 μV	-150 mV to +150 mV	
62	ExG62	Unipolar input 62	0.01839 μV	-150 mV to +150 mV	
63	ExG63	Unipolar input 63	0.01839 μV	-150 mV to +150 mV	
64	ExG64	Unipolar input 64	0.01839 μV	-150 mV to +150 mV	
65	ExG65	Unipolar input 65	0.01839 μV	-150 mV to +150 mV	
66	ExG66	Unipolar input 66	0.01839 μV	-150 mV to +150 mV	
67	ExG67	Unipolar input 67	0.01839 μV	-150 mV to +150 mV	
68	ExG68	Unipolar input 68	0.01839 μV	-150 mV to +150 mV	
69	ExG69	Unipolar input 69	0.01839 μV	-150 mV to +150 mV	
70	ExG70	Unipolar input 70	0.01839 μV	-150 mV to +150 mV	
71	ExG71	Unipolar input 71	0.01839 μV	-150 mV to +150 mV	
72	ExG72	Unipolar input 72	0.01839 μV	-150 mV to +150 mV	
73	ExG73	Unipolar input 73	0.01839 μV	-150 mV to +150 mV	
74	ExG74	Unipolar input 74	0.01839 μV	-150 mV to +150 mV	
75	ExG75	Unipolar input 75	0.01839 μV	-150 mV to +150 mV	
76	ExG76	Unipolar input 76	0.01839 μV	-150 mV to +150 mV	
77	ExG77	Unipolar input 77	0.01839 μV	-150 mV to +150 mV	
78	ExG78	Unipolar input 78	0.01839 μV	-150 mV to +150 mV	
79	ExG79	Unipolar input 79	0.01839 μV	-150 mV to +150 mV	
80	ExG80	Unipolar input 80	0.01839 μV	-150 mV to +150 mV	
81	ExG81	Unipolar input 81	0.01839 μV	-150 mV to +150 mV	
82	ExG82	Unipolar input 82	0.01839 μV	-150 mV to +150 mV	
83	ExG83	Unipolar input 83	0.01839 μV	-150 mV to +150 mV	
84	ExG84	Unipolar input 84	0.01839 μV	-150 mV to +150 mV	
85	ExG85	Unipolar input 85	0.01839 μV	-150 mV to +150 mV	
86	ExG86	Unipolar input 86	0.01839 μV	-150 mV to +150 mV	
87	ExG87	Unipolar input 87	0.01839 μV	-150 mV to +150 mV	
88	ExG88	Unipolar input 88	0.01839 μV	-150 mV to +150 mV	
89	ExG89	Unipolar input 89	0.01839 μV	-150 mV to +150 mV	
90	ExG90	Unipolar input 90	0.01839 μV	-150 mV to +150 mV	
91	ExG91	Unipolar input 91	0.01839 μV	-150 mV to +150 mV	
92	ExG92	Unipolar input 92	0.01839 μV	-150 mV to +150 mV	
93	ExG93	Unipolar input 93	0.01839 μV	-150 mV to +150 mV	
94	ExG94	Unipolar input 94	0.01839 μV	-150 mV to +150 mV	
95	ExG95	Unipolar input 95	0.01839 μV	-150 mV to +150 mV	
96	ExG96	Unipolar input 96	0.01839 μV	-150 mV to +150 mV	
97	ExG97	Unipolar input 97	0.01839 μV	-150 mV to +150 mV	
98	ExG98	Unipolar input 98	0.01839 μV	-150 mV to +150 mV	
99	ExG99	Unipolar input 99	0.01839 μV	-150 mV to +150 mV	
100	ExG100	Unipolar input 100	0.01839 μV	-150 mV to +150 mV	
101	ExG101	Unipolar input 101	0.01839 μV	-150 mV to +150 mV	
102	ExG102	Unipolar input 102	0.01839 μV	-150 mV to +150 mV	
103	ExG103	Unipolar input 103	0.01839 μV	-150 mV to +150 mV	
104	ExG104	Unipolar input 104	0.01839 μV	-150 mV to +150 mV	
105	ExG105	Unipolar input 105	0.01839 μV	-150 mV to +150 mV	
106	ExG106	Unipolar input 106	0.01839 μV	-150 mV to +150 mV	
107	ExG107	Unipolar input 107	0.01839 μV	-150 mV to +150 mV	

nr	name	Functio	n	resolution	range
108	ExG108	Unipola	r input 108	0.01839 μV	-150 mV to +150 mV
109	ExG109	Unipola	r input 109	0.01839 μV	-150 mV to +150 mV
110	ExG110	Unipolar input 110		0.01839 μV	-150 mV to +150 mV
111	ExG111	Unipola	r input 111	0.01839 μV	-150 mV to +150 mV
112	ExG112	Unipola	r input 112	0.01839 μV	-150 mV to +150 mV
113	ExG113	Unipola	r input 113	0.01839 μV	-150 mV to +150 mV
114	ExG114	Unipola	r input 114	0.01839 μV	-150 mV to +150 mV
115	ExG115	Unipola	r input 115	0.01839 μV	-150 mV to +150 mV
116	ExG116	Unipola	r input 116	0.01839 μV	-150 mV to +150 mV
117	ExG117	Unipola	r input 117	0.01839 μV	-150 mV to +150 mV
118	ExG118	Unipola	r input 118	0.01839 μV	-150 mV to +150 mV
119	ExG119	Unipola	r input 119	0.01839 μV	-150 mV to +150 mV
120	ExG120	Unipola	r input 120	0.01839 μV	-150 mV to +150 mV
121	ExG121	Unipola	r input 121	0.01839 μV	-150 mV to +150 mV
122	ExG122	Unipola	r input 122	0.01839 μV	-150 mV to +150 mV
123	ExG123	Unipola	r input 123	0.01839 μV	-150 mV to +150 mV
124	ExG124	Unipola	r input 124	0.01839 μV	-150 mV to +150 mV
125	ExG125	Unipola	r input 125	0.01839 μV	-150 mV to +150 mV
126	ExG126	Unipola	r input 126	0.01839 μV	-150 mV to +150 mV
127	ExG127	Unipola	r input 127	0.01839 μV	-150 mV to +150 mV
128	ExG128	Unipola	r input 128	0.01839 μV	-150 mV to +150 mV
129	BIP129	Bipolar input 129		0.01839 μV	-150 mV to +150 mV
130	BIP130	Bipolar	input 130	0.01839 μV	-150 mV to +150 mV
131	BIP131	Bipolar	input 131	0.01839 μV	-150 mV to +150 mV
132	BIP132	Bipolar	input 132	0.01839 μV	-150 mV to +150 mV
133	AUX133	Auxiliar	y input 133	0.48828 μV	-3 V to +3 V
134	AUX134	Auxiliar	y input 134	0.48828 μV	-3 V to +3 V
135	AUX135	Auxiliar	y input 135	0.48828 μV	-3 V to +3 V
136	AUX136	Auxiliar	y input 136	0.48828 μV	-3 V to +3 V
137	Digi	Digital o	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
138	Saw	Sawtoo	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector	Third Connector	Fourth Connector
•	Channel number	Channel number	Channel number	Channel number
1	-	-	-	-
20	1	33	65	97
2	2	34	66	98
21	3	35	67	99
3	4	36	68	100
22	5	37	69	101
4	6	38	70	102
23	7	39	71	103
5	8	40	72	104
24	9	41	73	105
6	10	42	74	106
25	11	43	75	107
7	12	44	76	108
26	13	45	77	109
8	14	46	78	110
27	15	47	79	111
9	16	48	80	112
28	17	49	81	113
10	18	50	82	114
29	19	51	83	115
11	20	52	84	116
30	21	53	85	117
12	22	54	86	118
31	23	55	87	119
13	24	56	88	120
32	25	57	89	121
14	26	58	90	122
33	27	59	91	123
15	28	60	92	124
34	29	61	93	125
16	30	62	94	126
35	31	63	95	127
17	32	64	96	128
36	Pat. GND	Pat. GND	Pat. GND	Pat. GND
18	-	-	-	-
37	-	-	-	-
19	-	-	-	-

95-0121-6446-1, Refa Ext 128e4b4a 2048Hz

Type Refa_Ext-128e4b4a REF code 95-0121-6446-1

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 128

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

Input impedance $> 100 \text{ M}\Omega$ CMRR > 90 dB

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 136 channels simultaneously

Resolution 24 bits, ExG & BIP $0.01839 \mu V$ per bit, AUX $0.48828 \mu V$ per bit

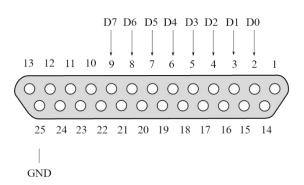
Sample frequency 2048 Hz, 1024 Hz, 512 Hz, 256 Hz, 128 Hz

	ei iist:	Pour alian		T
nr	name	Function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipolar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipolar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipolar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipolar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipolar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33	ExG33	Unipolar input 33	0.01839 μV	-150 mV to +150 mV
34	ExG34	Unipolar input 34	0.01839 μV	-150 mV to +150 mV
35	ExG35	Unipolar input 35	0.01839 μV	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	-150 mV to +150 mV
37	ExG37	Unipolar input 37	0.01839 μV	-150 mV to +150 mV
38	ExG38	Unipolar input 38	0.01839 μV	-150 mV to +150 mV
39	ExG39	Unipolar input 39	0.01839 μV	-150 mV to +150 mV
40	ExG40	Unipolar input 40	0.01839 μV	-150 mV to +150 mV
41	ExG41	Unipolar input 41	0.01839 μV	-150 mV to +150 mV
42	ExG42	Unipolar input 42	0.01839 μV	-150 mV to +150 mV
43	ExG43	Unipolar input 43	0.01839 μV	-150 mV to +150 mV
44	ExG44	Unipolar input 44	0.01839 μV	-150 mV to +150 mV
45	ExG45	Unipolar input 45	0.01839 μV 0.01839 μV	-150 mV to +150 mV
46	ExG45	Unipolar input 45 Unipolar input 46	0.01839 μV 0.01839 μV	-150 mV to +150 mV
47	ExG46	Unipolar input 46 Unipolar input 47	0.01839 μV 0.01839 μV	-150 mV to +150 mV
48	ExG48	Unipolar input 48	0.01839 μV 0.01839 μV	-150 mV to +150 mV
49	ExG49	Unipolar input 49	0.01839 μV 0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipolar input 49	0.01839 μV 0.01839 μV	-150 mV to +150 mV
51	ExG50	Unipolar input 50 Unipolar input 51	0.01839 μV	-150 mV to +150 mV
52			0.01839 μV 0.01839 μV	
53	ExG52	Unipolar input 52	-	-150 mV to +150 mV
J 3	ExG53	Unipolar input 53	0.01839 μV	-150 mV to +150 mV

nr	name	Function	resolution	range
54	ExG54	Unipolar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipolar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipolar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipolar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipolar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipolar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipolar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipolar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipolar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipolar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipolar input 64	0.01839 μV	-150 mV to +150 mV
65	ExG65	Unipolar input 65	0.01839 μV	-150 mV to +150 mV
66	ExG66	Unipolar input 66	0.01839 μV	-150 mV to +150 mV
67	ExG67	Unipolar input 67	0.01839 μV	-150 mV to +150 mV
68	ExG68	Unipolar input 68	0.01839 μV	-150 mV to +150 mV
69	ExG69	Unipolar input 69	0.01839 μV	-150 mV to +150 mV
70	ExG70	Unipolar input 70	0.01839 μV	-150 mV to +150 mV
71	ExG71	Unipolar input 71	0.01839 μV	-150 mV to +150 mV
72	ExG72	Unipolar input 72	0.01839 μV	-150 mV to +150 mV
73	ExG73	Unipolar input 73	0.01839 μV	-150 mV to +150 mV
74	ExG74	Unipolar input 74	0.01839 μV	-150 mV to +150 mV
75	ExG75	Unipolar input 75	0.01839 μV	-150 mV to +150 mV
76	ExG76	Unipolar input 76	0.01839 μV	-150 mV to +150 mV
77	ExG77	Unipolar input 77	0.01839 μV	-150 mV to +150 mV
78	ExG78	Unipolar input 78	0.01839 μV	-150 mV to +150 mV
79	ExG79	Unipolar input 79	0.01839 μV	-150 mV to +150 mV
80	ExG80	Unipolar input 80	0.01839 μV	-150 mV to +150 mV
81	ExG81	Unipolar input 81	0.01839 μV	-150 mV to +150 mV
82	ExG82	Unipolar input 82	0.01839 μV	-150 mV to +150 mV
83	ExG83	Unipolar input 83	0.01839 μV	-150 mV to +150 mV
84	ExG84	Unipolar input 84	0.01839 μV	-150 mV to +150 mV
85	ExG85	Unipolar input 85	0.01839 μV	-150 mV to +150 mV
86	ExG86	Unipolar input 86	0.01839 μV	-150 mV to +150 mV
87	ExG87	Unipolar input 87	0.01839 μV	-150 mV to +150 mV
88	ExG88	Unipolar input 88	0.01839 μV	-150 mV to +150 mV
89	ExG89	Unipolar input 89	0.01839 μV	-150 mV to +150 mV
90	ExG90	Unipolar input 90	0.01839 μV	-150 mV to +150 mV
91	ExG91	Unipolar input 91	0.01839 μV	-150 mV to +150 mV
92	ExG92	Unipolar input 92	0.01839 μV	-150 mV to +150 mV
93	ExG93	Unipolar input 93	0.01839 μV	-150 mV to +150 mV
94	ExG94	Unipolar input 94	0.01839 μV	-150 mV to +150 mV
95	ExG95	Unipolar input 95	0.01839 μV	-150 mV to +150 mV
96	ExG96	Unipolar input 96	0.01839 μV	-150 mV to +150 mV
97	ExG97	Unipolar input 97	0.01839 μV	-150 mV to +150 mV
98	ExG98	Unipolar input 98	0.01839 μV	-150 mV to +150 mV
99	ExG99	Unipolar input 99	0.01839 μV	-150 mV to +150 mV
100	ExG100	Unipolar input 100	0.01839 μV	-150 mV to +150 mV
101	ExG101	Unipolar input 101	0.01839 μV	-150 mV to +150 mV
102	ExG102	Unipolar input 102	0.01839 μV	-150 mV to +150 mV
103	ExG103	Unipolar input 103	0.01839 μV	-150 mV to +150 mV
104	ExG104	Unipolar input 104	0.01839 μV	-150 mV to +150 mV
105	ExG105	Unipolar input 105	0.01839 μV	-150 mV to +150 mV
106	ExG106	Unipolar input 106	0.01839 μV	-150 mV to +150 mV
107	ExG107	Unipolar input 107	0.01839 μV	-150 mV to +150 mV

nr	name	Functio	n	resolution	range
108	ExG108	Unipolar input 108		0.01839 μV	-150 mV to +150 mV
109	ExG109	Unipolar input 109		0.01839 μV	-150 mV to +150 mV
110	ExG110	Unipolar input 110		0.01839 μV	-150 mV to +150 mV
111	ExG111	Unipola	Unipolar input 111		-150 mV to +150 mV
112	ExG112	Unipola	r input 112	0.01839 μV	-150 mV to +150 mV
113	ExG113	Unipola	r input 113	0.01839 μV	-150 mV to +150 mV
114	ExG114	Unipola	r input 114	0.01839 μV	-150 mV to +150 mV
115	ExG115	Unipola	r input 115	0.01839 μV	-150 mV to +150 mV
116	ExG116	Unipola	r input 116	0.01839 μV	-150 mV to +150 mV
117	ExG117	Unipola	r input 117	0.01839 μV	-150 mV to +150 mV
118	ExG118	Unipola	r input 118	0.01839 μV	-150 mV to +150 mV
119	ExG119	Unipola	r input 119	0.01839 μV	-150 mV to +150 mV
120	ExG120	Unipola	r input 120	0.01839 μV	-150 mV to +150 mV
121	ExG121	Unipola	r input 121	0.01839 μV	-150 mV to +150 mV
122	ExG122	Unipola	r input 122	0.01839 μV	-150 mV to +150 mV
123	ExG123	Unipola	r input 123	0.01839 μV	-150 mV to +150 mV
124	ExG124	Unipola	r input 124	0.01839 μV	-150 mV to +150 mV
125	ExG125	Unipola	r input 125	0.01839 μV	-150 mV to +150 mV
126	ExG126	Unipola	r input 126	0.01839 μV	-150 mV to +150 mV
127	ExG127	Unipola	r input 127	0.01839 μV	-150 mV to +150 mV
128	ExG128	Unipolar input 128		0.01839 μV	-150 mV to +150 mV
129	BIP129	Bipolar input 129		0.01839 μV	-150 mV to +150 mV
130	BIP130	Bipolar input 130		0.01839 μV	-150 mV to +150 mV
131	BIP131	Bipolar	input 131	0.01839 μV	-150 mV to +150 mV
132	BIP132	Bipolar input 132		0.01839 μV	-150 mV to +150 mV
133	AUX133	Auxiliar	y input 133	0.48828 μV	-3 V to +3 V
134	AUX134	Auxiliar	y input 134	0.48828 μV	-3 V to +3 V
135	AUX135		y input 135	0.48828 μV	
136	AUX136	Auxiliar	y input 136	0.48828 μV	-3 V to +3 V
137	Digi	Digital c	hannel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
138	Saw	Sawtoo	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector	Third Connector	Fourth Connector
•	Channel number	Channel number	Channel number	Channel number
1	-	-	-	-
20	1	33	65	97
2	2	34	66	98
21	3	35	67	99
3	4	36	68	100
22	5	37	69	101
4	6	38	70	102
23	7	39	71	103
5	8	40	72	104
24	9	41	73	105
6	10	42	74	106
25	11	43	75	107
7	12	44	76	108
26	13	45	77	109
8	14	46	78	110
27	15	47	79	111
9	16	48	80	112
28	17	49	81	113
10	18	50	82	114
29	19	51	83	115
11	20	52	84	116
30	21	53	85	117
12	22	54	86	118
31	23	55	87	119
13	24	56	88	120
32	25	57	89	121
14	26	58	90	122
33	27	59	91	123
15	28	60	92	124
34	29	61	93	125
16	30	62	94	126
35	31	63	95	127
17	32	64	96	128
36	Pat. GND	Pat. GND	Pat. GND	Pat. GND
18	-	-	-	-
37	-	-	-	-
19	-	-	-	-
	•	•	•	•

95-0121-6447-0, Refa_Ext 128e4b4a 2000Hz

Type Refa_Ext-128e4b4a REF code 95-0121-6447-0

Unipolar ExG inputs (EEG, ECG, EOG, EMG etc):

Number 128

RMS Noise $< 1 \mu V$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal)
Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 90 \text{ dB} \end{array}$

Connectors active shielded micro coax per channel

subD37 female unshielded per 32 channels

Bipolar ExG inputs (ECG, EOG, EMG etc):

Number 4

RMS Noise $< 1 \,\mu\text{V}$ (@ lowest sample frequency)

Gain 26.55 x

Input signal difference -150 mV to +150 mV (@ 0 V common signal) (no positive overflow)

Input common mode range -2 V to +2 V (@ 0 V differential signal)

 $\begin{array}{ll} \mbox{Input impedance} & > 100 \mbox{ M}\Omega \\ \mbox{CMRR} & > 90 \mbox{ dB} \end{array}$

Connector 4 pin plastic connector, active shielding

AUX inputs:

Number 4

RMS Noise $< 20 \mu V$ (@ lowest sample frequency)

Gain 1 x

Input signal difference -3 V to +3 V (@ 0 V common signal)
Input common mode range -4 V to +4 V (@ 0 V differential signal)

 $\begin{array}{ll} \text{Input impedance} & > 100 \text{ M}\Omega \\ \text{CMRR} & > 70 \text{ dB} \end{array}$

Output voltage +5 V & -5 V, max. 20 mA for all channels together

Connector 5 pin plastic connector

Digital input

Input turn-on current 2 mA @ 3 V input, max. input = 5 V

Isolation > 4000 V, by means of optocoupler (H11L1)

Connector 8 bit via DB25 female, shared first bit via BNC female

Sampling:

Number of channels 136 channels simultaneously

Resolution 24 bits, ExG & BIP $0.01839 \mu V$ per bit, AUX $0.48828 \mu V$ per bit

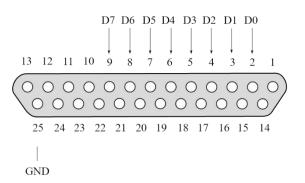
Sample frequency 2000 Hz, 1000 Hz, 500 Hz, 250 Hz, 125 Hz

CHAIIII	1	Т .		
nr	name	Function	resolution	range
1	ExG1	Unipolar input 1	0.01839 μV	-150 mV to +150 mV
2	ExG2	Unipolar input 2	0.01839 μV	-150 mV to +150 mV
3	ExG3	Unipolar input 3	0.01839 μV	-150 mV to +150 mV
4	ExG4	Unipolar input 4	0.01839 μV	-150 mV to +150 mV
5	ExG5	Unipolar input 5	0.01839 μV	-150 mV to +150 mV
6	ExG6	Unipolar input 6	0.01839 μV	-150 mV to +150 mV
7	ExG7	Unipolar input 7	0.01839 μV	-150 mV to +150 mV
8	ExG8	Unipolar input 8	0.01839 μV	-150 mV to +150 mV
9	ExG9	Unipolar input 9	0.01839 μV	-150 mV to +150 mV
10	ExG10	Unipolar input 10	0.01839 μV	-150 mV to +150 mV
11	ExG11	Unipolar input 11	0.01839 μV	-150 mV to +150 mV
12	ExG12	Unipolar input 12	0.01839 μV	-150 mV to +150 mV
13	ExG13	Unipolar input 13	0.01839 μV	-150 mV to +150 mV
14	ExG14	Unipolar input 14	0.01839 μV	-150 mV to +150 mV
15	ExG15	Unipolar input 15	0.01839 μV	-150 mV to +150 mV
16	ExG16	Unipolar input 16	0.01839 μV	-150 mV to +150 mV
17	ExG17	Unipolar input 17	0.01839 μV	-150 mV to +150 mV
18	ExG18	Unipolar input 18	0.01839 μV	-150 mV to +150 mV
19	ExG19	Unipolar input 19	0.01839 μV	-150 mV to +150 mV
20	ExG20	Unipolar input 20	0.01839 μV	-150 mV to +150 mV
21	ExG21	Unipolar input 21	0.01839 μV	-150 mV to +150 mV
22	ExG22	Unipolar input 22	0.01839 μV	-150 mV to +150 mV
23	ExG23	Unipolar input 23	0.01839 μV	-150 mV to +150 mV
24	ExG24	Unipolar input 24	0.01839 μV	-150 mV to +150 mV
25	ExG25	Unipolar input 25	0.01839 μV	-150 mV to +150 mV
26	ExG26	Unipolar input 26	0.01839 μV	-150 mV to +150 mV
27	ExG27	Unipolar input 27	0.01839 μV	-150 mV to +150 mV
28	ExG28	Unipolar input 28	0.01839 μV	-150 mV to +150 mV
29	ExG29	Unipolar input 29	0.01839 μV	-150 mV to +150 mV
30	ExG30	Unipolar input 30	0.01839 μV	-150 mV to +150 mV
31	ExG31	Unipolar input 31	0.01839 μV	-150 mV to +150 mV
32	ExG32	Unipolar input 32	0.01839 μV	-150 mV to +150 mV
33	ExG33	Unipolar input 33	0.01839 μV	-150 mV to +150 mV
34	ExG34	Unipolar input 34	0.01839 μV	-150 mV to +150 mV
35	ExG35	Unipolar input 35	0.01839 μV	-150 mV to +150 mV
36	ExG36	Unipolar input 36	0.01839 μV	-150 mV to +150 mV
37	ExG37	Unipolar input 37	0.01839 μV	-150 mV to +150 mV
38	ExG38	Unipolar input 38	0.01839 μV	-150 mV to +150 mV
39	ExG39	Unipolar input 39	0.01839 μV	-150 mV to +150 mV
40	ExG40	Unipolar input 40	0.01839 μV	-150 mV to +150 mV
41	ExG41	Unipolar input 41	0.01839 μV	-150 mV to +150 mV
42	ExG42	Unipolar input 42	0.01839 μV	-150 mV to +150 mV
43	ExG43	Unipolar input 43	0.01839 μV	-150 mV to +150 mV
44	ExG44	Unipolar input 44	0.01839 μV	-150 mV to +150 mV
45	ExG45	Unipolar input 45	0.01839 μV	-150 mV to +150 mV
46	ExG46	Unipolar input 46	0.01839 μV	-150 mV to +150 mV
47	ExG47	Unipolar input 47	0.01839 μV	-150 mV to +150 mV
48	ExG48	Unipolar input 48	0.01839 μV	-150 mV to +150 mV
49	ExG49	Unipolar input 49	0.01839 μV	-150 mV to +150 mV
50	ExG50	Unipolar input 50	0.01839 μV	-150 mV to +150 mV
51	ExG50	Unipolar input 51	0.01839 μV	-150 mV to +150 mV
52	ExG52	Unipolar input 52	0.01839 μV	-150 mV to +150 mV
53	ExG53	Unipolar input 52	0.01839 μV 0.01839 μV	-150 mV to +150 mV
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nr	name	Function	resolution	range
54	ExG54	Unipolar input 54	0.01839 μV	-150 mV to +150 mV
55	ExG55	Unipolar input 55	0.01839 μV	-150 mV to +150 mV
56	ExG56	Unipolar input 56	0.01839 μV	-150 mV to +150 mV
57	ExG57	Unipolar input 57	0.01839 μV	-150 mV to +150 mV
58	ExG58	Unipolar input 58	0.01839 μV	-150 mV to +150 mV
59	ExG59	Unipolar input 59	0.01839 μV	-150 mV to +150 mV
60	ExG60	Unipolar input 60	0.01839 μV	-150 mV to +150 mV
61	ExG61	Unipolar input 61	0.01839 μV	-150 mV to +150 mV
62	ExG62	Unipolar input 62	0.01839 μV	-150 mV to +150 mV
63	ExG63	Unipolar input 63	0.01839 μV	-150 mV to +150 mV
64	ExG64	Unipolar input 64	0.01839 μV	-150 mV to +150 mV
65	ExG65	Unipolar input 65	0.01839 μV	-150 mV to +150 mV
66	ExG66	Unipolar input 66	0.01839 μV	-150 mV to +150 mV
67	ExG67	Unipolar input 67	0.01839 μV	-150 mV to +150 mV
68	ExG68	Unipolar input 68	0.01839 μV	-150 mV to +150 mV
69	ExG69	Unipolar input 69	0.01839 μV	-150 mV to +150 mV
70	ExG70	Unipolar input 70	0.01839 μV	-150 mV to +150 mV
71	ExG71	Unipolar input 71	0.01839 μV	-150 mV to +150 mV
72	ExG72	Unipolar input 72	0.01839 μV	-150 mV to +150 mV
73	ExG73	Unipolar input 73	0.01839 μV	-150 mV to +150 mV
74	ExG74	Unipolar input 74	0.01839 μV	-150 mV to +150 mV
75	ExG75	Unipolar input 75	0.01839 μV	-150 mV to +150 mV
76	ExG76	Unipolar input 76	0.01839 μV	-150 mV to +150 mV
77	ExG77	Unipolar input 77	0.01839 μV	-150 mV to +150 mV
78	ExG78	Unipolar input 78	0.01839 μV	-150 mV to +150 mV
79	ExG79	Unipolar input 79	0.01839 μV	-150 mV to +150 mV
80	ExG80	Unipolar input 80	0.01839 μV	-150 mV to +150 mV
81	ExG81	Unipolar input 81	0.01839 μV	-150 mV to +150 mV
82	ExG82	Unipolar input 82	0.01839 μV	-150 mV to +150 mV
83	ExG83	Unipolar input 83	0.01839 μV	-150 mV to +150 mV
84	ExG84	Unipolar input 84	0.01839 μV	-150 mV to +150 mV
85	ExG85	Unipolar input 85	0.01839 μV	-150 mV to +150 mV
86	ExG86	Unipolar input 86	0.01839 μV	-150 mV to +150 mV
87	ExG87	Unipolar input 87	0.01839 μV	-150 mV to +150 mV
88	ExG88	Unipolar input 88	0.01839 μV	-150 mV to +150 mV
89	ExG89	Unipolar input 89	0.01839 μV	-150 mV to +150 mV
90	ExG90	Unipolar input 90	0.01839 μV	-150 mV to +150 mV
91	ExG91	Unipolar input 91	0.01839 μV	-150 mV to +150 mV
92	ExG92	Unipolar input 92	0.01839 μV	-150 mV to +150 mV
93	ExG93	Unipolar input 93	0.01839 μV	-150 mV to +150 mV
94	ExG94	Unipolar input 94	0.01839 μV	-150 mV to +150 mV
95	ExG95	Unipolar input 95	0.01839 μV	-150 mV to +150 mV
96	ExG96	Unipolar input 96	0.01839 μV	-150 mV to +150 mV
97	ExG97	Unipolar input 97	0.01839 μV	-150 mV to +150 mV
98	ExG98	Unipolar input 98	0.01839 μV	-150 mV to +150 mV
99	ExG99	Unipolar input 99	0.01839 μV	-150 mV to +150 mV
100	ExG100	Unipolar input 100	0.01839 μV	-150 mV to +150 mV
101	ExG101	Unipolar input 101	0.01839 μV	-150 mV to +150 mV
102	ExG102	Unipolar input 102	0.01839 μV	-150 mV to +150 mV
103	ExG103	Unipolar input 103	0.01839 μV	-150 mV to +150 mV
104	ExG104	Unipolar input 104	0.01839 μV	-150 mV to +150 mV
105	ExG105	Unipolar input 105	0.01839 μV	-150 mV to +150 mV
106	ExG106	Unipolar input 106	0.01839 μV	-150 mV to +150 mV
107	ExG107	Unipolar input 107	0.01839 μV	-150 mV to +150 mV

nr	name	Function		resolution	range
108	ExG108	Unipolar input 108		0.01839 μV	-150 mV to +150 mV
109	ExG109	Unipolar input 109		0.01839 μV	-150 mV to +150 mV
110	ExG110	Unipola	Unipolar input 110		-150 mV to +150 mV
111	ExG111	Unipola	r input 111	0.01839 μV	-150 mV to +150 mV
112	ExG112	Unipola	r input 112	0.01839 μV	-150 mV to +150 mV
113	ExG113	Unipola	r input 113	0.01839 μV	-150 mV to +150 mV
114	ExG114	Unipola	r input 114	0.01839 μV	-150 mV to +150 mV
115	ExG115	Unipola	r input 115	0.01839 μV	-150 mV to +150 mV
116	ExG116	Unipola	r input 116	0.01839 μV	-150 mV to +150 mV
117	ExG117	Unipola	r input 117	0.01839 μV	-150 mV to +150 mV
118	ExG118	Unipola	r input 118	0.01839 μV	-150 mV to +150 mV
119	ExG119	Unipola	r input 119	0.01839 μV	-150 mV to +150 mV
120	ExG120	Unipola	r input 120	0.01839 μV	-150 mV to +150 mV
121	ExG121	Unipola	r input 121	0.01839 μV	-150 mV to +150 mV
122	ExG122	Unipola	r input 122	0.01839 μV	-150 mV to +150 mV
123	ExG123	Unipola	r input 123	0.01839 μV	-150 mV to +150 mV
124	ExG124	Unipola	r input 124	0.01839 μV	-150 mV to +150 mV
125	ExG125	Unipola	r input 125	0.01839 μV	-150 mV to +150 mV
126	ExG126	Unipola	r input 126	0.01839 μV	-150 mV to +150 mV
127	ExG127	Unipolar input 127		0.01839 μV	-150 mV to +150 mV
128	ExG128	Unipola	r input 128	0.01839 μV	-150 mV to +150 mV
129	BIP129	Bipolar input 129		0.01839 μV	-150 mV to +150 mV
130	BIP130	Bipolar input 130		0.01839 μV	-150 mV to +150 mV
131	BIP131	Bipolar	Bipolar input 131		-150 mV to +150 mV
132	BIP132	Bipolar	input 132	0.01839 μV	-150 mV to +150 mV
133	AUX133	Auxiliar	y input 133	0.48828 μV	-3 V to +3 V
134	AUX134	Auxiliar	y input 134	0.48828 μV	-3 V to +3 V
135	AUX135	Auxiliar	y input 135	0.48828 μV	-3 V to +3 V
136	AUX136	Auxiliar	y input 136	0.48828 μV	-3 V to +3 V
137	Digi	Digital o	channel (bits)	1 (bit)	0 to 255
		0	Digital input bit 0		
		1	Digital input bit 1		
		2	Digital input bit 2		
		3	Digital input bit 3		
		4	Digital input bit 4		
		5	Digital input bit 5		
		6	Digital input bit 6		
		7	Digital input bit 7 (MSB)		
		8-15	reserved		
138	Saw	Sawtoo	th test signal (bits)	1 (bit)	0 to 32767

Pin	Input
2	bit 0 (parallel to BNC connector in software)
3	bit 1
4	bit 2
5	bit 3
6	bit 4
7	bit 5
8	bit 6
9	bit 7 (MSB)
25	common ground



Headcap connector

DB37 pin number	First Connector	Second Connector	Third Connector	Fourth Connector
•	Channel number	Channel number	Channel number	Channel number
1	-	-	-	-
20	1	33	65	97
2	2	34	66	98
21	3	35	67	99
3	4	36	68	100
22	5	37	69	101
4	6	38	70	102
23	7	39	71	103
5	8	40	72	104
24	9	41	73	105
6	10	42	74	106
25	11	43	75	107
7	12	44	76	108
26	13	45	77	109
8	14	46	78	110
27	15	47	79	111
9	16	48	80	112
28	17	49	81	113
10	18	50	82	114
29	19	51	83	115
11	20	52	84	116
30	21	53	85	117
12	22	54	86	118
31	23	55	87	119
13	24	56	88	120
32	25	57	89	121
14	26	58	90	122
33	27	59	91	123
15	28	60	92	124
34	29	61	93	125
16	30	62	94	126
35	31	63	95	127
17	32	64	96	128
36	Pat. GND	Pat. GND	Pat. GND	Pat. GND
18	-	-	-	-
37	-	-	-	-
19	-	-	-	-