

**SERVICE MANUAL**  
**BodyFlow™-P2CH/-P1CH**

Revision: 11 / 2007



**bodyflow™**

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Bodyflow™ is made in Germany in compliance with the quality requirements of ISO 9001 and the applicable safety standards and regulations of the Council Directive 93/42/EEC of 14 June 1993 concerning medical devices.

A conformity check acc. to Annex II, approved by the notified body 1275, was carried out.

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# 1 Technical Data

**Table 1: Treatment**

Protection class acc. to VDE 0750 / IEC 601	Battery Mode Only, Type BF
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**Table 2: Charging**

Protection class acc. to VDE 0750 / IEC 601	II
Input voltage	17 VDC
Input current	0.8 ADC
Power Supply	7,2 V 1350mAh Ni-MH Accumulator

**Table 3: General Technical Data**

CE characterization	acc. to Council Directive concerning medical devices (93/42 EEC)
Class acc. to Council Directive concerning medical devices	IIa
Ambient temperature (operation)	+ 10 °C ... + 40 °C
Storage temperature	+ 10 °C ... + 40 °C
Dimensions (W x H x D)	17.5 cm x 4.5 cm x 10 cm
Weight	0.485 kg

**Table 4: Battery Charger**

Type (to be used exclusively)	Switchmode Charger FW 7219 / NI 4-10 NTC
Mains supply	100 ... 240 VAC
Input current	0.1 ... 0.3 A
Mains frequency	50 ... 60 Hz
Output voltage	17 VDC
Output current	0.8 ADC

**Table 5: Stimulation Current Output Parameters**

	Standard	Light
Current	40 mA	40 mA
Resistance	500 Ohm	500 Ohm

**Manufacturer Address**

**PHYSIOMED ELEKTROMEDIZIN AG**

Hutweide 10

91220 Schnaittach/Laipersdorf

Germany


## 2 Instrument Overview



**Table 6: Legend**




1	Display	2	Function Keys
3	Intensity Control <i>Circuit I</i>	4	Intensity Control <i>Circuit II (only BodyFlow™-P2CH)</i>
5	Output Indicator	6	Power Connector
7	Power Switch	8	Patient Lead Connector

**Table 7: Symbols**

	Type BF component, not connected to protective ground wire!
---	---

## 2.1 Setmenu

In the *Setmenu*, you can adjust the following device parameters:

Symbol	Meaning
	Contrast of the <b>Display &lt;1&gt;</b>
	Brightness of the <b>Display &lt;1&gt;</b>
	Back to start screen

## 2.2 Introduction

With your Bodyflow™ you have acquired a high-quality and extremely versatile unit for stimulation current therapy. The instrument will only show its true potential, however, if you are well informed about its functions. For this reason, carefully read the Operating Instructions and familiarize yourself with the use of the instrument.

## 2.3 General Notes

The instrument complies with the technical specifications of IEC 601, VDE 0750 and is assigned to class IIa according to the Council Directive concerning Medical Devices.

The instrument may only be operated by qualified personnel who have undergone special training. You must operate the instrument properly, i.e. in accordance with the Operating Instructions.

It is not intended for operation in explosion hazard zones or hydrotherapy rooms. Drastic temperature changes should be avoided, since condensation could be caused within the instrument. Do not start up the instrument until it is in temperature equilibrium with its environment!

Operating the instrument in the proximity (e.g. 1 m) of a short-wave or micro-wave therapy unit may cause output irregularities and should be avoided for this reason. Simultaneous connection of the patient to high-frequency surgical instrument should also be avoided.

Using the electrodes near the chest can increase the risk of heart beat irregularities.

## 2.4 Instrument Description

Bodyflow™ is a portable stimulation current therapy unit. The device is equipped with a rechargeable battery and is intended to be used as a mobile unit, e.g. in situations where no connection to the mains is available. This unit can only be used on battery power and not whilst plugged into mains power.

The function of Bodyflow™ is controlled by a microprocessor. Essential components are permanently controlled by the processor and thus malfunctions are prevented. After switching on, all instrument functions are checked during an automatic self-test routine.

The instrument complies with all current safety standards. It meets the requirements of the EC directive concerning medical devices (93/42/EEC) and is therefore CE-labelled.

Bodyflow™ has two modes of operation:

- *Treatment*: In this mode, the instrument is disconnected from the mains. When the battery charger is plugged in, the instrument cannot be switched on and treatment is not possible. Plugging in the battery charger into the instrument during treatment has the consequence that treatment is being interrupted and the intensity will be automatically turned down to zero and the instrument switches off.
- *Charging*: Charging is only possible when the device is switched off (refer to [Mains and Battery Operation](#) on page 16).



## 3 Calibration

The following service instructions allow you to do a basic calibration.

Usually for later balancing (e.g. repairs) the entire balancing procedure is performed. Only occasionally, if severe errors concerning the balancing procedure are not apparent or have been cleared, it may be limited to individual components.

This service manual covers one channel devices (BodyFlow™-P1CH) as well as two channel devices (BodyFlow™-P2CH).

**When a second channel is indicated, the respective instructions are only valid for BodyFlow™-P2CH, but not for BodyFlow™-P1CH!**

**Parameters only valid for the second channel are written in *italics*.**

### 3.1 Additional Equipment Required

	State of calibration*
Oscilloscope with probe	B
Digital multimeter	B
Frequency meter	B


\*State of calibration B = precision 2 %

For information necessary for the calibrating procedure such as positions of the trimmers or test points, refer to the wiring scheme and the parts list from page 19.

## 4 Test Menu

To access the test menu, a jumper has to be set at the pins 1 + 2 of the socket X1 PM0615-1 before starting up the instrument. When switching on the instrument, you can access the test menu then.

**Screen 1: Output Current**



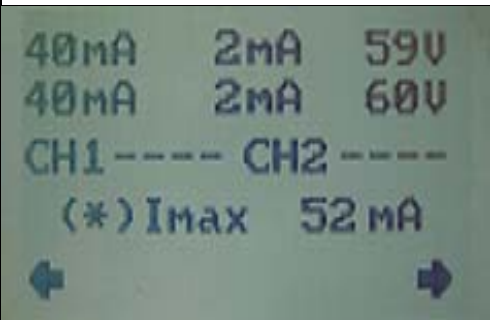
**Selectable parameters for functional testing**

0 – 60 min	
<u>CH1</u> 0 – 40mA	<u>CH2</u> 0-40mA
Ti 1 – 10ms	Ri 0 – 950ms
pole plus	pole auto      pole minus
-> Proceed to screen 2 (maximum intensity)	

Select the required parameter using the NAV buttons and press ENTER to confirm (e.g. the timer value will be highlighted and flash).

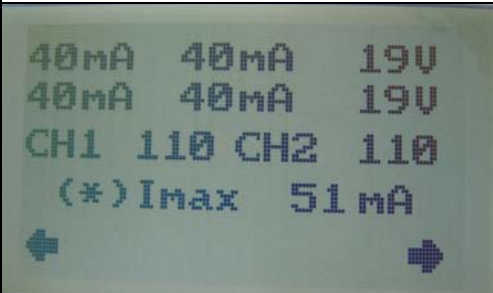
Use the NAV buttons to modify the parameter value. To check the output signals of CH1 (and CH2), use an oscillograph and a resistive load of 500 Ohm.

**Screen 2: Checking the displayed value at maximum intensity without output load**




<b>CH1</b>	Required value DCmA	Actual value DCmA	Output voltage DCV
<b>CH2</b>	Required value DCmA	Actual value DCmA	Output voltage DCV
<b>CH1 / CH2</b>		<b>digital value</b>	
<b>Imax Test function "Trigger safety shutoff"</b>			
<b>Pressing ENTER key: Imax = 45 -55 DCmA</b>			
< - Return to screen 1		-> Proceed to screen 3	

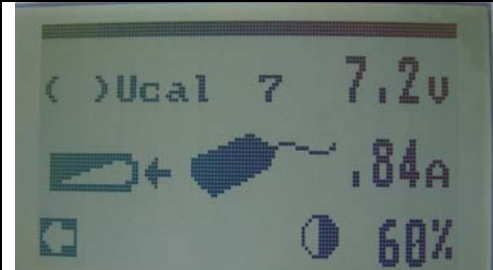
**Screen 3: Checking the displayed value at maximum dose with resistive output load  
CH1 500 Ohm / CH2 500 Ohm**  
**Calibrating actual value vs. required value**

	<b>CH1</b>	Required value DCmA	Actual value DCmA	Output voltage DCV
	<b>CH2</b>	Required value DCmA	Actual value DCmA	Output voltage DCV
		<b>CH1 / CH2      digital value</b>		
<b>Imax Test function "Trigger safety shutoff"</b> <b>Pressing ENTER key: Imax = 45 -55 DCmA</b>				
		<b>&lt; - Return to screen 2                      -&gt; Proceed to screen 4</b>		

**Screen 4: Calibration of Ubatt (DCV)**  
**Attention! Battery charger is not connected**

	Enable the selection field <b>Ucal</b> (cursor flashes). Measure <b>Ubatt</b> at the battery using the digital multimeter. Set the measured value in the display using the NAV buttons.	
	<b>Charging current</b> <input type="checkbox"/>	
<b>&lt;- Return to screen 2</b>		<b>Contrast of the Display &lt;1&gt;</b>

**Screen 5: Charging current**  
**Attention! Battery charger is connected**

	Enable the selection field <b>Ucal</b> (Cursor flashes). Measure <b>Ubatt</b> at the battery using the digital multimeter. Set the measured value in the display using the NAV buttons.	
	<b>Charging current</b> <b>The measured value DCA is calculated by the microprozessor!</b>	
<b>&lt;- Return to screen 2</b>		<b>Contrast of the Display &lt;1&gt;</b>

Finally :

1. Unplug the battery charger when charging is finished.
2. Remove the jumper at X1 (pins 1 and 2) and switch of the device!

## 5 Selftest

To execute the instrument selftest, press the following key sequence when in therapy mode:

Pres **ENTER <2>** and **POWER <7>** simultaneously.

You have to press both keys until you have checked the following display values:

### Screen 6: Instrument Selftest



<b>CH1</b>	Optocoupler check value $\leq 5$	Value 10mA +/- 10%	Value 40mA +/- 10%
<b>CH2</b> <i>(only for P2CH)</i>	Optocoupler check value $\leq 5$	Value 25mA +/- 10%	
<b>Imax Test function "Trigger safety shutoff"</b> <b>Pressing ENTER key: Imax = 45 -55 DCmA</b>			

When the instrument selftest has detected no problems, the following message is displayed:

"NF . . OK " + "Imax . . OK "

In the case of a problem, a monitoring note is displayed instead of OK (refer to page 18)!

## 6 Controls and Indicators

The design of Bodyflow™ allows for easy operation. Because of its small size, the instrument is very easy to transport. It has been designed for operation both inside and outside of therapy rooms, and is fed by rechargeable batteries for that reason (refer to [Mains and Battery Operation](#) on page 16).

All controls and indicators are integrated into the housing, thus allowing for easy cleaning of the instrument's surface and protecting it from dust.

The instrument's microprocessor monitors the safety-related components, prevents from malfunctions and checks the instrument after switching it on.

### 6.1 Display <1>



The **Display <1>** shows all menu items including the therapy parameters of the instrument. You can select the parameters using the **Function Keys <2>**.

#### Symbols in the Upper Status Bar

The upper status bar shows the following symbols:

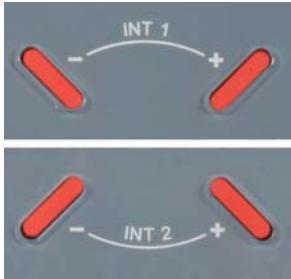
	Button to open the popup menu
	Currently selected menu
	State of charge of the battery (refer to <a href="#">Mains and Battery Operation</a> on page 16)

### 6.2 Function Keys <2>




The **function keys <2>** are used to select the therapy parameters and to operate the instrument. After switching on the instrument, the **Display <1>** shows the start screen. You can now access the desired therapy program by pressing the right or left key. To select an item, simply press the **ENTER** button in the middle.

### 6.3 Intensity Control Circuit I <3> and Circuit II <4>



**Intensity Control Circuit I <3>** and **Intensity Control Circuit II <4>** (only BodyFlow™-P2CH) serve to set the intensity in the circuits I and II in steps of 0.5 mA. When turning up the intensity of the two intensity controls, the associated therapy timer in the **Display <1>** will be started as well.

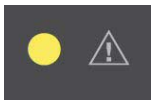
#### Automatic Output Current Switch-off

Bodyflow™ features an automatic output current switch-off, activated in case the current flow of the electrodes is interrupted (electrode falls off or is disconnected from the instrument). The symbol  will appear in alternation with the intensity on the **Display <1>** and the current will be automatically turned down to a minimum basic current in the respective circuit. The timer stops the therapy time.

To eliminate the error, you have to press the button with the minus symbol of **Intensity Control Circuit I <3>** or **Intensity Control Circuit II <4>** one time to be able to continue. The message will disappear and you can increase the intensity again.

### 6.4 Output Indicator <5>

The **Output Indicator <5>** tells you to be cautious when handling the electrodes.



#### Caution

When the **Output Indicator <5>** flashes, the **Patient Lead Connector <8>** is under voltage!

Make sure you do not touch the electrodes when the current is turned up! Touching the electrodes with your fingers may startle as the electrodes need to disperse the current evenly!

### 6.5 Power Connector <6>



The **Power Connector <6>** is located at the front side of the instrument. Here, you plug in the supplied battery charger if you want to charge the batteries.

### 6.6 Power Switch <7>



The **Power Switch <7>** is on the bottom of the instrument's upper side. By means of this switch, you can switch the instrument on and off. After switching on, a selftest is automatically carried out by the instrument.

## 6.7 Patient Lead Connector <9>

The **Patient Lead Connector <8>** on the front side of the instrument serves to plug in the electrodes.



The two connectors on the left (seen with the instrument facing up) are assigned to circuit I, the two on the right to circuit II.

The polarity is of no importance, since the instrument operates in biphasic mode.

---






## 7 Operation of the Device

The operating steps not directly relating to the therapy are described in the following paragraphs.

### 7.1 Mains and Battery Operation

At battery operation, the battery has to be fully charged before operating it for the first time. The typical life expectancy of this battery and its recharge life is 500 cycles or recharges.

The charging status of the batteries is displayed on the **Display <1>**:

Battery Charge	Symbol
0%	
25%	
50%	
75%	
100%	

#### How to Charge the Battery

If you want to charge the battery, proceed as follows:

1. Plug the supplied battery charger into the **Power Connector <6>** on the front side of the device.
2. The batteries are being charged. When the batteries are completely discharged, the charging procedure will take approx. 3 hours.

#### Important

In order to ensure a long battery life, the batteries must be charged completely when first charged. The first charging procedure should not be interrupted!

### 7.2 Notes on Handling the Batteries

If the battery capacity is very low during operation, the 3-step warning system is activated:

- a. The charging status symbol flashes.
- b. An acoustic signal sounds every second and the charging status symbol flashes. The intensity is reduced prematurely.
- c. The device shuts down to avoid complete discharging of the batteries.

In this case, recharge the battery, as described in section [How to Charge the Battery](#) on page 16.



### Important

If the unit is not used for a longer period of time, please fully charge the battery once a month. This will help to avoid exhaustive discharge.

## 7.3 Battery Charger

The supplied battery charger (Ref. No 00584) has an LED to indicate the current state of the batteries.



*Battery Charger*

Depending on the current state of the batteries, the LED is illuminated or flashing in green or yellow. This has the following significance:

State of Battery Charger	LED Light Code
Standby	LED is permanently yellow
Precharge	LED flashes slowly in yellow
Rapid Charge	LED flashes quickly in green
Maintain	LED flashes slowly in green
Error	LED flashes quickly in yellow
Ready	LED is permanently green
Wait	LED flashes slowly in green and yellow (alternating)

The battery charger can be equipped with different primary adaptors to match the line voltage of the destination country. One primary adaptor for the respective country is in the scope of delivery.

## 7.4 Economy Mode

The unit automatically switches over to the economy mode to save power. This will occur after approx. 20 seconds. The **Display <1>** is no longer illuminated. Pressing any key will re-activate the illumination.

## 8 Monitoring Notes

### 8.1 Selftest

ERROR CODE	Monitoring note
MUX...ERR	101
DAC...ERR	102
NF...ERR	105
Imax...ERR	106
NF...ERR CH2	125

### 8.2 Therapy

ERROR CODE	Monitoring note
I20% ERROR CH1 / CH2	201
Imax H_ERROR CH1 / CH2	202
Imax S_ERROR CH1 / CH2	203
T/R ERROR CH1 / CH2	204
0mA/0V ERROR CH1 / CH2	205
Imax S_INT_ERROR CH1 / CH2	206

### 8.3 Battery Charger

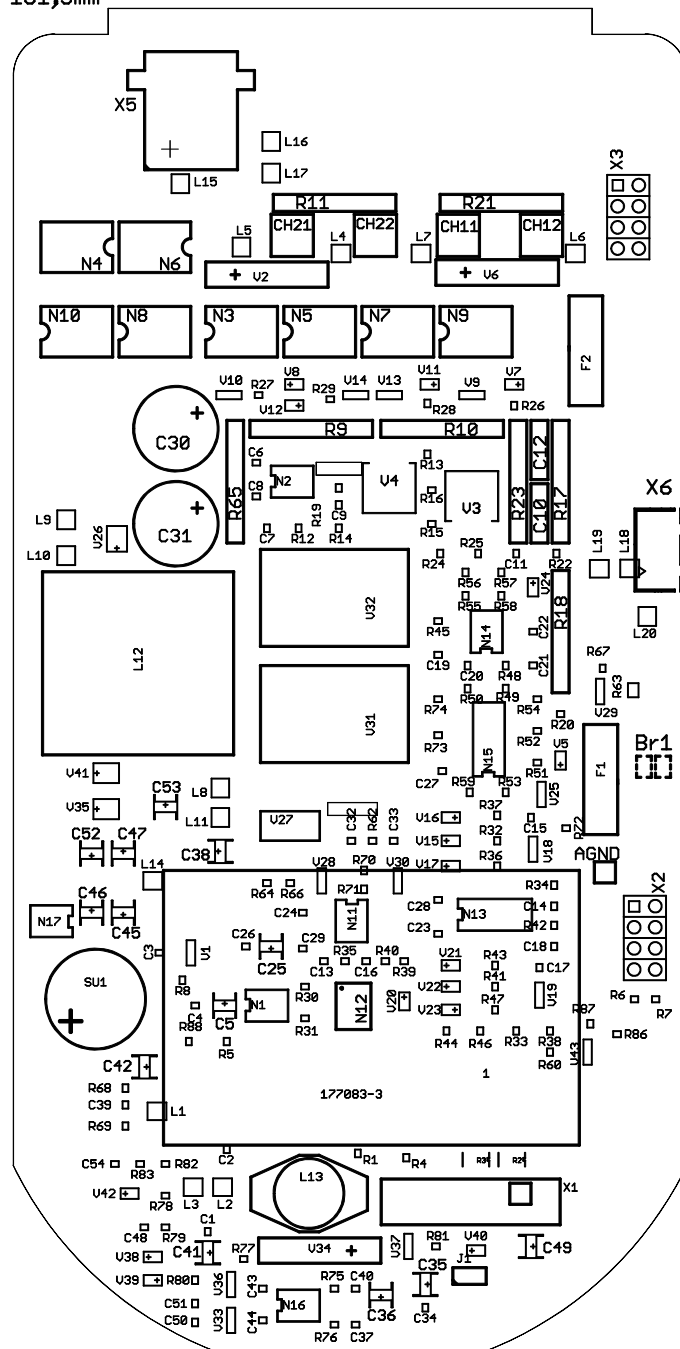
Test	Monitoring note
Battery charger connected, TEST OKAY	***
Battery charger connected, TEMPERATURE SENSOR FAULT	901
Battery charger connected, CHARGING CURRENT MEASUREMENT FAULT	902

---

## 9 Appendix

part number / O-No	description / ND	step/cost	perpos.no.	item notice	quantity
<b>p.ID:</b> 01151	<b>var./sw:</b> 1/0-0-0	<b>desc 1/2:</b> Bodyflow portable mit Zubehör		Zweikanalversion	
<b>O#:</b> 01151		<b>desc 3/4:</b> Drainagegerät			
<b>ND:</b> BODYFLOW		<b>desc 5/6:</b>			
<b>Ersteller:</b> Legl		<b>desc 7/8:</b>			
<b>Typ:</b> Bodyflow BF-P 1CH/2CH		<b>Bem:</b> Sparepartlist			
51696	[¶] housing lower part bodyflow BF-P	1	1	1	1,0000 Stck
51695	[¶] housing upper part bodyflow BF-P	1	1	2	1,0000 Stck
51697	[¶] vision panel 1 channel bodyflow BF-P	1	100	3	1,0000 Stck
51720	[¶] vision panel 2 channel bodyflow BF-P	1	100	4	1,0000 Stck
51698	[¶] keyboard pad 1-channel bodyflow BF-P	1	100	5	1,0000 Stck
51721	[¶] keyboard pad 2-channel bodyflow BF-P	1	100	6	1,0000 Stck
51723	[¶] 0615-1/2-CH mainboard bodyflow BF-P	1	1	7	1,0000 Stck
51726	[¶] 0503-1/PVB processor board bodyflow BF-P	1	1	8	1,0000 Stck
51724	[»] 0616-1 keypad board bodyflow BF-P	1	1	9	1,0000 Stck
51725	[»] 0617-1 display board bodyflow BF-P	1	1	10	1,0000 Stck
51734	[¶] accumulator FT 7,2-02	1	1	11	1,0000 Stck
51735	[¶] insulating plate/ Accu bodyflow BF-P	1	1	12	1,0000 Stck
51699	[¶] rubber foot bodyflow BF-P	1	1	13	4,0000 Stck
51739	[¶] TEXAS socket 3-pole bodyflow BF-P	1	1	14	1,0000 Stk
51700	[¶] plug socket holder bodyflow BF-P	1	100	15	1,0000 Stck
51740	[¶] plug socket 2mm (red) MLA2-G bodyflow BF-P	1	100	16	2,0000 Stck
51741	[¶] plug socket (black) MLA2-G bodyflow BF-P	1	100	17	2,0000 Stck

161,3mm



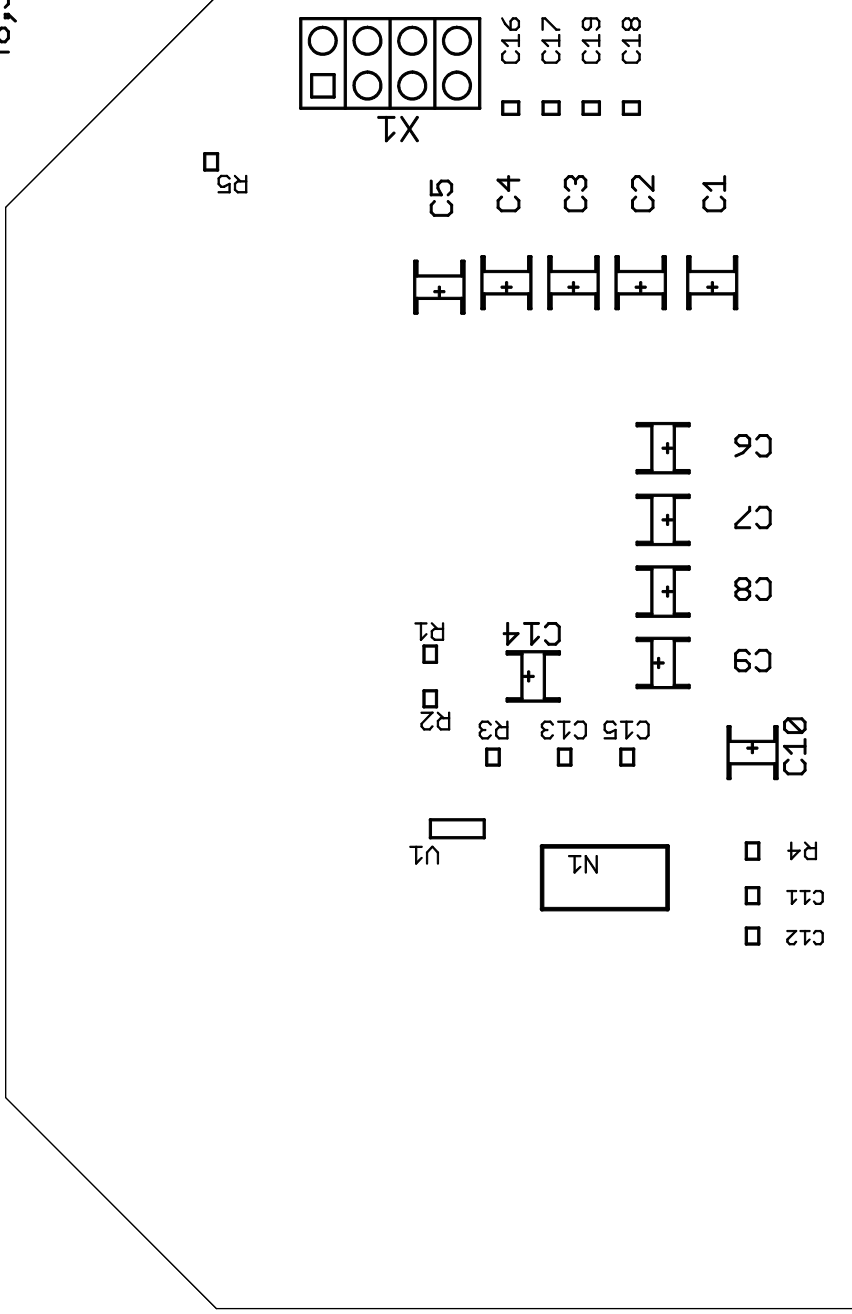
Soldered side:  
Lötseite:  
X2, X3, X6, Br1

79,5mm

				Datum	Name	Component Placement Main Board
			Bearb.	15.06.07	Grö/Nie	
			Gepr.	15.06.07	Grö	Bestückungsplan Hauptplatine
						Bodyflow -P1CH (-P2CH)
						Platine PC-Board
						0615-1
						Blatt 1
Rev	Änderung	Datum	Name			File BE0615-1

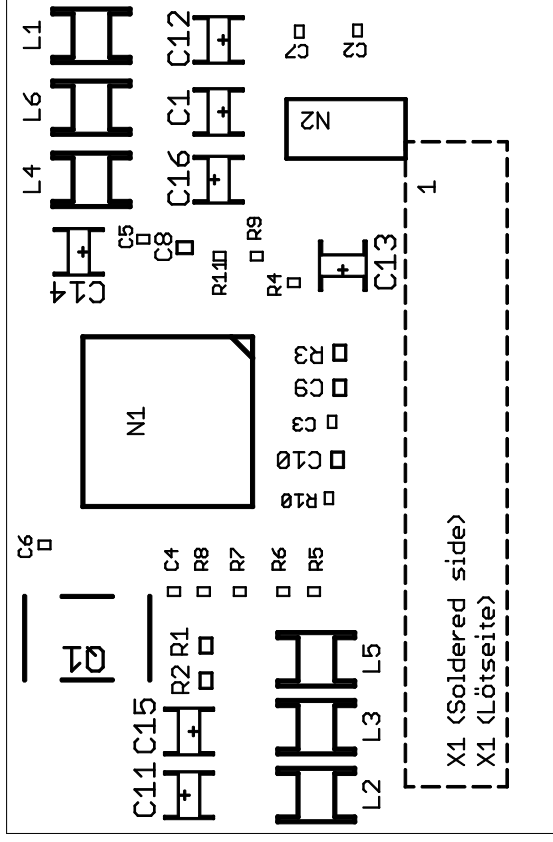


48,5mm



74,5mm

Component Placement		Datum	Name
Display Board	Bearb	27.03.07	Grö/Nie
Bestückungsplan	Gepr	27.03.07	Grö
Displayplatine			
Bodyflow -P1CH (-P2CH)			
Platine PC-Board			
Ø617-1 Bottom	PHYSIOMED ELEKTROMEDIZIN AG Hutweide 10 91220 Schnaittach / Laipersdorf /Germany		
Blatt 1	Rev	Änderung	Datum
File	BE0617-1-BOT		



Rev	Änderung	Datum	Name	Datum	Name	Component Placement
						Processor Board
						Bestückungsplan
						Processorplatine
						PHYSIOUAC - Basic
						Platine PC-Board
						PHYSIONED ELEKTRONEDIZIN AG Hutweide 10 91220 Schnaittach / Laipersdorf /Germany
						0503-1_PUB
						Blatt 1
						File Be0503-1_PUB