OptiFlex – S

Service Manual

Starting from serial number 3000

Table of contents

1. History

Revision	Date	Name	Change
1	01.06.2003	S. Herr	Service Manual created
2	05.04.2004	S. Herr	Update Pos. 13, Pos. 40, function test
3	24.09.2007	S. Herr	New hand held programming unit

2. Purpose

The purpose of this Service Manual is to help you make simple repairs on the device.
Only authorized staff may perform repairs and maintenance as the manufacturer's warranty and liability would otherwise be invalidated.
Only original parts may be used for servicing in accordance with the attached spare parts list.

3. General

3.1 Electronics, connection cables

No plugs may be connected or disconnected while the unit is switched on. Always switch the device off before connecting or disconnecting a plug.

The locks for spiral cable for the hand-held programming unit and the motor element assembly have to be closed at all times.

When you assembling with electronic parts make sure to use ESD (Electro Static Discharge) equipment.

Only original chipcards may be used. Insert the chipcards so that OptiFlex is visible.

Possible errors: Errors will be displayed on the hand held programming unit .
Depending on the version of the hand held programming unit there are different error messages.

Old version (Pos. 1.1)

Following error messages will be shown on the display:

Chipcard not readable:
The chipcard was not readable or it contains invalid data
-> Try to format the chipcard
-> Use new chipcard
-> Replace hand held programming unit

Chipcard K2 PRO
Chipcard of knee CPM K2 PRO was inserted
-> Use chipcard of shoulder CPM
-> Use new chipcard

Error motor X Motor error
The motor did not turn properly
-> Replace motor element assembly

Error motor X Over current
The current for motor X exceeded the maximum limit
-> Replace motor element assembly

Error motor X Motor control
Internal error in motor control of motor X
-> Replace motor element assembly

Error motor X CPM ROM error
Memory error in motor control of motor X
-> Replace motor element assembly

Error motor X Communication
Communication to motor X not possible
-> Check spiral cables and connectors
-> Replace motor element assembly

Error motor X CPM device error
General error in motor control of motor X
-> Replace motor element assembly

Error motor X Enable timeout
Motor X could not be enabled in time
-> Replace motor element assembly

Error motor X Inval. Parameter
Motor control X has received an invalid parameter from the hand held programming unit
-> Replace motor element assembly
-> Replace hand held programming unit

Error motor X Mot. Release
The motor could not be released
-> Replace motor element assembly
-> Replace hand held programming unit

Error motor X Stop unexpected
The motor X stopped unexpected
-> Check spiral cables and connectors
-> Replace motor element assembly

Error motor X Motor disabled
The motor control X disabled the motor
-> Replace motor element assembly

Error motor X ROM exceeded
Motor X moved beyond the programmed range of motion
-> Replace motor element assembly

Error motor X CPM 5V supply
5V supply of motor control X not sufficent
-> Replace motor element assembly

Error motor X CPM 24V supply
24V supply of motor control X not sufficent
-> Replace motor element assembly

Error motor X Enable error
The motor X could not be enabled
-> Replace motor element assembly

Error motor X Disable timeout
The motor X Disable timeout
-> Replace motor element assembly

Error motor X Internal com.
Invalid interchip communication inside motor X
-> Replace motor element assembly

Error motor X Unknown CPM err.
Unknown error in motor control X
-> Replace motor element assembly

Error motor X Undefined err.
Undefined error in motor control X
-> Replace motor element assembly

Handset error H. Set ROM
Memory error in the hand held programming unit
-> Replace hand held programming unit

Handset error HS 24V supply
24V supply of hand held programming unit not sufficient
-> Replace electronic S3 complete
-> Replace hand held programming unit

Handset error HS 5V supply
5V supply of the hand held programming unit not sufficent
-> Replace hand held programming unit

Handset error HS 3.3 V
3.3V supply of the hand held programming unit not sufficent
-> Replace hand held programming unit

Handset error Internal com.
Invalid interchip communication inside the hand held programming unit
-> Replace hand held programming unit

Handset error Bus system
System bus error
-> Replace hand held programming unit
-> Replace motor element assembly
-> Replace electronic S3 complete

Parameter not valid
Internal error in the hand held programming unit
-> Replace hand held programming unit

Configuration not valid
Invalid configuration of the hand held programming unit
-> Replace hand held programming unit

Wrong product combination
Mixup between non compatible chair and hand held programming unit
-> Use correct hand held programming unit

Chair Memory error
Defective memory chip inside the chair
-> Replace electronic S3 complete

Chipcard unkown
A foreign or defective chipcard was inserted
-> Use new chipcard

Chipcard missing
No chipcard is inserted
-> Insert chipcard

Chipcard not writable
The chipcard is not writable
-> Use new chipcard
-> Replace hand held programming unit

Error motor X Calibration
The calibration data for the motor X is invalid or lost
-> Motor X needs to be calibrated

Error motor X Potentiometer
Potentiometer reading was invalid
-> Replace motor element assembly

Error motor X Pot. Contact
Potentiometer connection is broken
-> Replace motor element assembly

Error motor X Motor driver
The motor driver IC reported an error
-> Replace motor element assembly

New version (Pos. 1.2)

Following error codes in number will be shown on the display:

1 Potentiometer error:
Wrong angle information provided from potentiometer

-> Check the settings
-> Replace motor element assembly

2 Failure at the potentiometer:
Connection to the potentiometer is interrupted

-> Replace motor element assembly

3 Motor driver error:
The motor driver IC reported an error
-> Replace motor element assembly

4 Motor error:
The motor did not turn properly.
-> Replace motor element assembly

5 Motor over current:
The current for the motor exceeded the maximum limit
-> Replace motor element assembly

6 Motor control error:
Internal error in the motor control.
-> Replace motor element assembly

7 Eprom access error:
Memory error in the access of the EPROM.
-> Replace hand held programming unit

8 CPM ROM error:
Memory error in the motor control
-> Replace motor element assembly

9 Communication:
Communication to the motor control is not possible
-> Check cables and connectors
-> Replace hand held programming unit
-> Replace motor element assembly

10 Unkown error in the motor control:
Unknown error in the motor control
-> Replace motor element assembly

11 Motor enable timeout
Motor could not be enabled in time.
-> Replace motor element assembly

12 Invalid parameter motor error:
Motor has received a invalid parameter
-> Replace hand held programming unit
-> Replace motor element assembly

13 Stop release error:
The motor could not be released
-> Replace hand held programming unit
-> Replace motor element assembly

14 Unexpected motor Stop:
-> Check cables and connectors
-> Replace motor element assembly

15 Motor disabled:
Motor control disabled the motor.
-> Replace motor element assembly

16 Wrong command in the motor :
-> Replace hand held programming unit
-> Replace motor element assembly

17 5V supply error:
5V supply of motor control not sufficient
-> Replace motor element assembly

18 Initialise error real time clock:
-> Replace hand held programming unit

19 Communication error real time clock:
-> Replace hand held programming unit

20 Error real time clock:
-> Replace hand held programming unit

21 Range exceeded:
The measured angle is out of the range of motion.
-> Replace motor element assembly

22 ROM error in the hand held programming unit:
Memory error in the hand held programming unit
-> Replace hand held programming unit

23 Invalid parameter:
Internal error in the hand held programming unit
-> Replace hand held programming unit

24 24V supply error motor control:
Error in the 24V supply in the motor control
-> Replace hand held programming unit
-> Replace electronic S3 complete

25 Bus error:
Bus system error
-> Replace spiral cable of the hand held programming unit
-> Replace hand held programming unit
-> Replace motor element assembly

26 24V supply hand held programming unit:
24V supply of the hand held programming unit is defective
-> Replace hand held programming unit

27 5V supply hand held programming unit:
5V supply of the hand held programming unit is defective.
-> Replace hand held programming unit

28 3.3V supply hand held programming unit:
3.3V supply of the hand held programming unit is defective
-> Replace hand held programming unit

29 Calibration:
The calibration data in the motor control are wrong.
-> Perform a calibration

30 Calibration error:
-> Repeat the calibration
-> Replace motor element assembly

31 Calibration timeout:
-> Replace motor element assembly

32 Motor enable error:
The motor could not be enabled
-> Replace motor element assembly

33 Motor disable error:
The motor could not be disabled
-> Replace motor element assembly

34 Motor stop error:
Motor stop command timeout error**:**
-> Replace motor element assembly

35 Configuration error:
Invalid configuration of the hand held programming unit
-> Replace hand held programming unit

36 Parameter not valid chipcard
-> Replace chipcard
-> Replace hand held programming unit

37 Checksum error chipcard
-> Replace chipcard
-> Replace hand held programming unit

38 Unknow chipcard error:
-> Replace hand held programming unit

39 A chipcard of another product got used:
-> Formate the chipcard
-> Replace chipcard

40 Unkown chipcard:
-> Replace chipcard

41 Chipcard is missing:
No chipcard is insert
-> Insert chipcard
-> Replace chipcard

42 Chipcard write error:
The chipcard is not writable
-> Replace chipcard
-> Replace hand held programming unit

43 Chipcard read error
Chipcard is not readable.
-> Replace chipcard
-> Replace hand held programming unit

44 Chipcard verify
-> Replace chipcard
-> Replace hand held programming unit

45 Wrong product combination:
Mixup between non compatible device and hand held programming unit
-> Use the correct hand held programming unit

46 Handset error internal communication:
Invalid interchip communication inside the hand held programming unit
-> Replace hand held programming unit

47 Internal communication error motor control:
Internal communication error motor control..
-> Replace motor element assembly

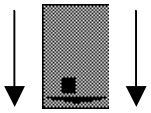
48 User stoped the special function

49 Unkown error in the motor control:
-> Replace motor element assembly

50 Decoding unit keyboard not programmed/ defect
-> Replace hand held programming unit

54 Decoding unit rotary encoder not programmed/ defect
-> Replace electronic S3 complete

Chipcard missing



-> Replace chipcard

3.2 Motor element assembly

No plugs may be connected or disconnected while the unit is switched on. Always switch the device off before connecting or disconnecting a plug.

The motor element assembly plugs have to be locked at all times.

The movable screws should not be completely unscrewed when adjustments are being made. Make sure that the movable screws are tightened for operation and transport.

Make sure that no load is on the profile when making adjustments on the upper arm.
To remove the load, slightly lift motor B.

3.3 Other

The scale profiles with the labeling 2,3 and 5 must not be lubricated or oiled.

No solvents may be used when cleaning the device.
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4. Packing and unpacking

The following settings must be made to transport the device:

Activate the packaging setting: Motor A 35 ° and motor B 0°.

Switch off the device.

Pull the power cord.

Remove the armrest complete.

Pull the plugs of the motor element assembly and the hand held programming unit.

Pull out the motor element assembly.

Set the ante/ retro version to 0° .

Reinsert the armrest.

Move the backrest all the way to the front.

Remove the two tube safety, pull out and reverse the chair´s leg and reattach the tube safety.

Only use orginial packaging for transport.

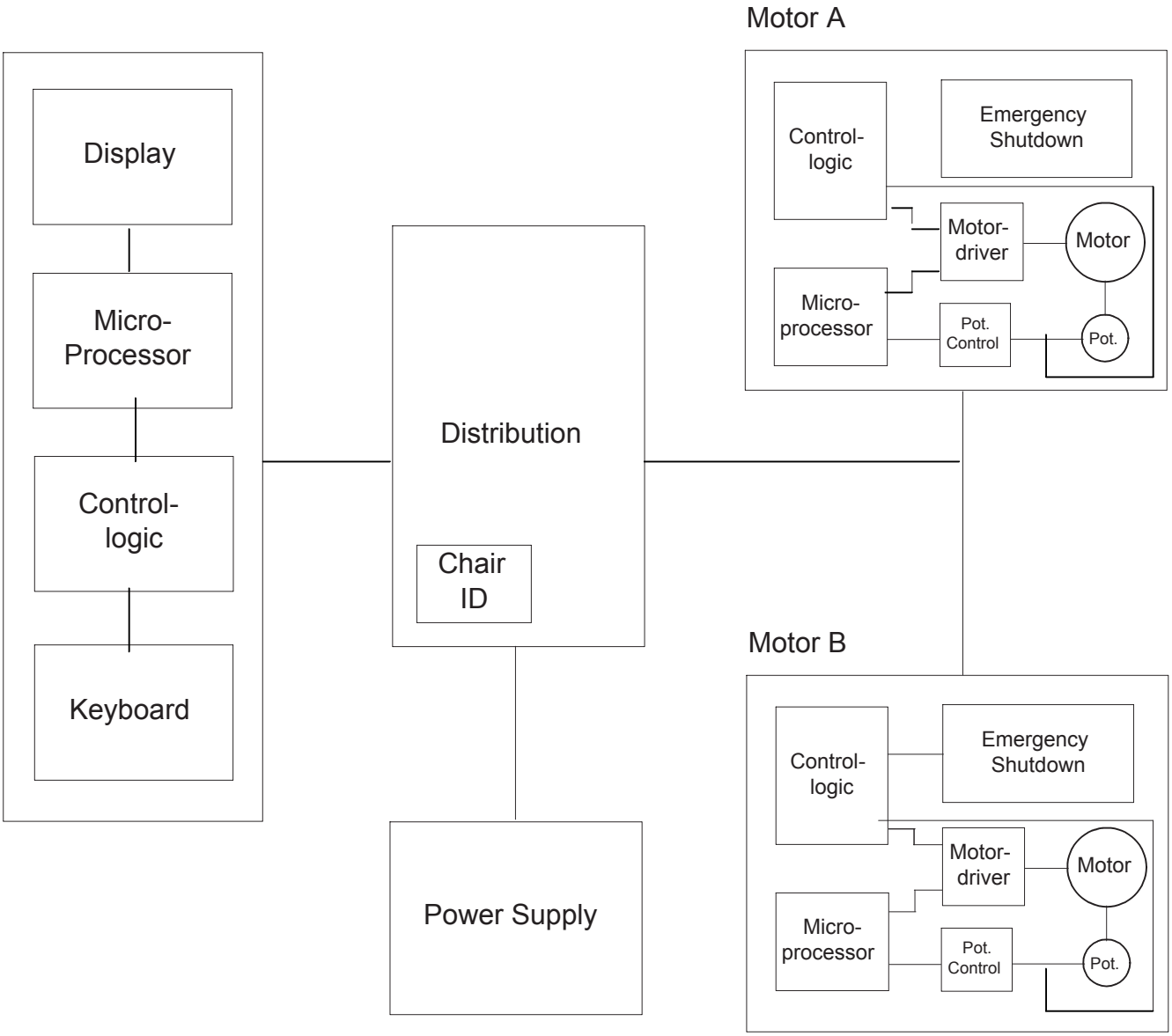
Put the device on its legs in the carton.

Put the proper styrofoam part on top of the chair.

Pack the hand held programming unit in the extra box.

Put the piece parts into the styrofoam part in the following order as shown in the figure below: Motor element assembly and power cord.

5. Block diagram of service parts



6. Bill of material for service parts

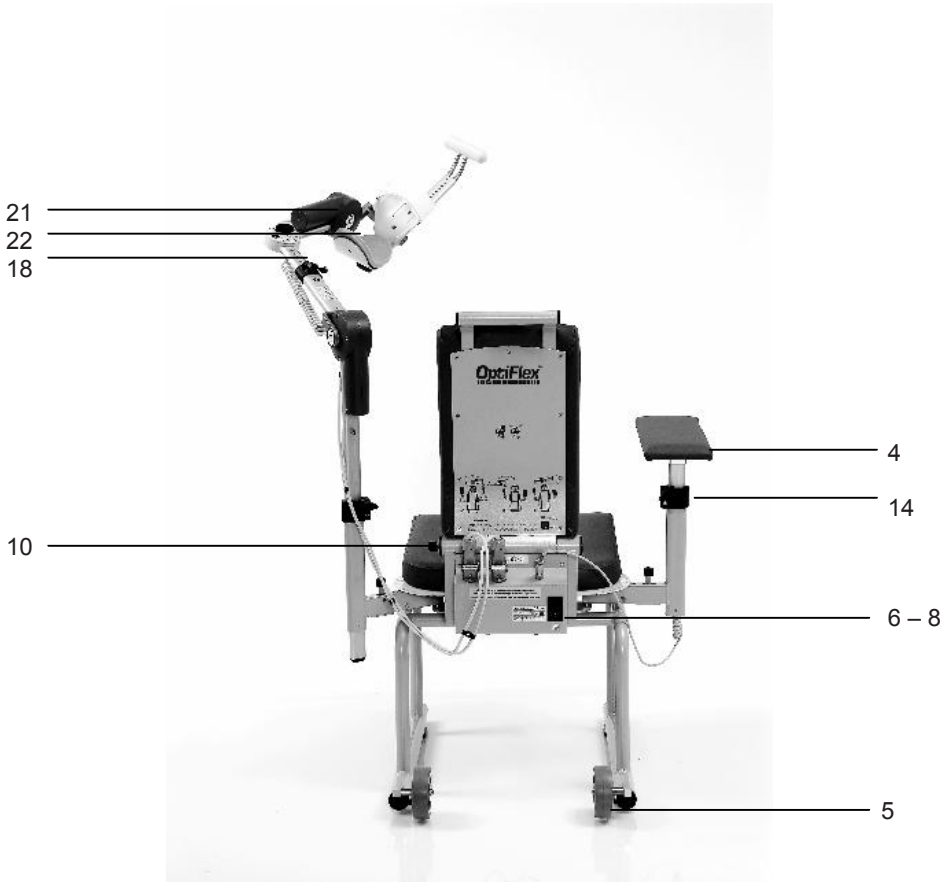
Position	Description	Order number
1.1	Hand held programming unit OptiFlex S + spiral cable (old version)	0.0034.082
1.2	Hand held programming unit OptiFlex S + spiral cable (new version)	0.0034.320
	Spiral cable for hand held programming unit (old version)	2.0034.355
	Spiral cable for hand held programming unit (new version)	2.0037.035
	Protection for hand held programming unit	0.0037.103
4	Armrest assembly	2.0034.022
5	Wheel assembly	0.0034.006
6-8	Electronic S3 complete	0.0034.041
	Fuse T 1.0 A	0.0000.005
10	Wing screw backrest	2.0034.044
14	Clamping piece exchange kit up to S/N 3386	0.0034.060
	Clamping piece exchange kit starting from S/N 3387	0.0034.059
16+21	Motor element assembly complete (with both motors)	0.0034.065
18	Lever assembly	0.0034.012
20	Wing nut ellbow joint	GN532-40-M8-E
22	Elbow cup pad	2.0034.255
23	Armrest cup complete	0.0034.190
24	Belt loop	2.0003.001
26	Lever assembly	0.0034.012
28	Wing nut swing bar	GN-532-40-M8-E
30	Tube safety	0.0034.249
31	Chair leg right	0.0034.079
32	Chair leg left	0.0034.078
	Power cord US version	0.0034.011

7. Figure for bill of material

Position 1.1

Position 1.2


16
23 + 24
20
1
26 + 28
30
32
31


21
22
18
4
14
10
6 – 8
5

8. Special function Service Menu
(Hand held programming unit old version)

Depending on the version of the hand held programming unit there are different special functions Service Menu.

Old version

Possible functions of the Service Menu:

- Device runtime
- Factory settings
- Error log
- Calibration

Entering the Service Menu:

- Switch to the programming mode
- Press FUNC key
- Select Service Menu using the + and - keys
- Press SET for 5 Sekunden
  For service only ! is flashing
- Select a special function by using + and - keys

8.1 Device runtime

- Display: **Device runtime**
- Press SET key
- The display shows the device runtime of each motor
  Display: **A: X h B: X h**

8.2 Factory settings (=Packaging setting)

- Display: **Factory settings**
- Press SET key
- Display: **Werkseinstellung bereit**
- Device changes language to German
- Press STOP key
- Display: **Bereich anfahren START drücken**
- Press START key, the device moves automatically to factory settings
- Display: **STOP Dauerbetrieb**

8.3 Error log

- Display: **Error log**
- Press SET key
- Display: **Error log Up + Down –**
- By using the + and – keys you can see the entries of the error log
- Entries are always in english
- The entries are ordered by causer and not in temporal order
- In the first line is shown the causer (e.g motor A) and below the error message in shortform
- There is only one line in the error log for the error message so the words can be different to the original words

8.4 Calibration

How to perform a calibration:

- Display: **Calibration**
- Press SET key
- Display: **Enter key**
- Press + and – keys simultaneously
- Display: **Select motor With +/- ➔ A**
- Press SET key
  Display: **Move Mot A to 90° Press SET**
- Move motor A to 90° by using + and - keys
- Press SET key
  Display: **Calibrating M A Please wait**
  Motor A moves in the complete range of motion automatically
- After motor A stops the display shows:
  Display: **Calibration M. A successful**
- Press STOP key
- Display: **Select motor With +/- ➔ A**
- Press + key
  Display: **Select motor With +/- ➔ B**
- Press SET key
  Display: **Move Mot B to 0° Press SET**
- Move motor B to 0° by using + and - keys
- Press SET key
  Display: **Calibrating M B Please wait**
  Motor B moves in the complete range of motion automatically
- After motor B stops the display shows:
  Display: **Calibration M. B successful**
- Press STOP key two times
- Display: **Move to ROM Press START**

9. Special function Service Menu
(Hand held programming unit new version)

Depending on the version of the hand held programming unit there are different special functions Service Menu.

New version:

Possible function of the Service Menu:

Menu level 1

Calibration motor A

Calibration motor B

Display contrast

Error log

Menu level 2

Runtime motor A

Runtime motor B

Entering the service menu:

Press the menu key until Service Menu shows up (menu level 4).

Press for 5 seconds,

is flashing on the display

The display will change and show:
Entering code.

For the code press: 1 3 2 4

Now you see the symbols of the service menu

Menu level 1:

Menu level 2:

9.1 Calibration

ATTENTION!

Before you do a calibration switch the device OFF and ON.

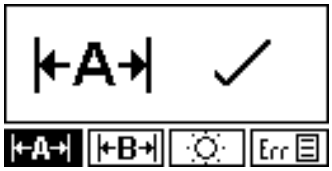
Calibration motor A:

Press the symbol calibration motor A

Display:

Press + and – key to move motor A to 90 degrees.

Press START key. The calibration starts automatically.
Motor A moves in the complete range of motion.
Wait until the motor A stops.
If the calibration was succesful motor A stops at 90 degrees and show following symbols on the display:

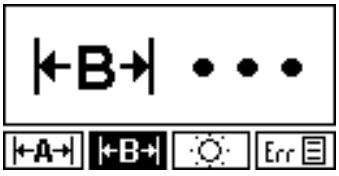


Press the STOP key twice to leave the Service Menu

Calibration motor B:

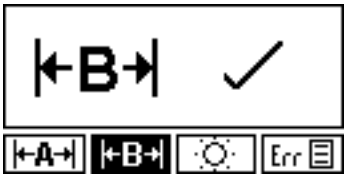
Press the symbol calibration motor B

Display:



Press + and – key to move motor B to 0 degrees.

Press START key. The calibration starts automatically.
Motor B moves in the complete range of motion.
Wait until the motor B stops.
If the calibration was succesful motor B stops at 0 degrees and show following symbols on the display:

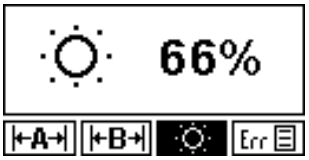


Press the STOP key twice to leave the Service Menu

9.2 Display contrast

Press the symbol display contrast

Display:



Press + or – to set up the requested display contrast. You can set the display contrast from 0 – 100%.
Press the STOP key twice to save the settings and to leave the Service Menu.

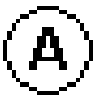
9.3 Error log

Press the symbol error log

You will find following information on the display:
Upper line: Number of the current showed error message and the total number of the saved error messages.
Right number is the error code of the error message (see chapter 3.1)

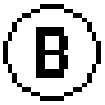
Lower line: Error message
Left side: The symbol of the causer.

= Hand held programming unit



= Motor A

= Electronic complete



= Motor B

Press + or - to see the entries of the error log.

General note to the error log:

Entries are always in english.
The entries are ordered by causer and not in temporal order.

Press the STOP key twice to leave the Service Menu.

9.4 Runtime

Runtime motor A

Press the symbol for runtime motor A 

The display shows the runtime of motor A:

Runtime motor **B**

Press the symbol for runtime motor B 

The display shows the runtime of motor B:

Press the STOP key twice to leave the Service Menu.

10. How to perform repairs

10.1 Electronic complete (Pos. 6-8)

ATTENTION!
When you assembling with electronic parts make sure to use ESD (Electro Static Discharge) equipment.

Switch off the device.
First, the plug for the power cord, the motor element assembly and the plug for the hand held programming unit´s spiral cable have to be unplugged. Then remove the 4 screws in the plate and take the whole electronic complete with plate off the ground wire plug connection. Once the spare part has been installed, a function and safety test has to be performed.

10.2 Clamping piece exchange kit (Pos. 14)

The exchange kit of clamping pieces contains 2 clamping pieces (1 left and 1 right) with all of the required screws and an exact instruction for mounting.

10.3 Lever assembly (Pos. 18 + 26)

Remove one of the side retaining rings and pull out the pin so that the defective lever can be taken out. When using the new lever, make sure that both springs are properly set. The retaining rings then have to be put onto both side of the pin.
The complete lever assembly has to be regularly serviced.

10.4 Elbow cup pad (Pos.22)

First, the defective pad has to be removed carefully so that the new pad can be attached.

10.5 Armrest cup complete (Pos. 23)

Unscrew both screws and remove the armrest cup. Screw the new armrest cup onto the bar using the rubber washers and countersunk screws.

10. Belt loop (Pos. 24)

Pull the belt out through the metal loop, exchange the belt loop and install the new belt loop.

10.7 Wing nut (Pos. 20 + 28)

Make sure that the new wing nut is tight.
Attention: Wing nut must not be interchanged.

10.8 Wing screw (Pos. 10)

Make sure that the new wing screw is tight.
Attention: Wing screw must not be interchanged.

10.9 Fuse (Pos. 8)

Switch off the device and disconnect the plug. Remove the fuse holder below the main switch and plug it back after the fuses have been exchanged.
Only use the appropriate fuses.

10.6 Repairs of the drive unit and motor control

ATTENTION!
Only authorized and certified staff may perform repairs and maintenance at the drive unit and motor control otherwise the manufacturer´s warranty and liability will be invalidated.

ATTENTION!
When you assembling with electronic parts make sure to use ESD (Electro Static Discharge) equipment.

11. Checkliste of safety and function test
(Hand held programming unit old version)

Safety test			Measured value	Date/ Signature
Protective earth conductor resistance	≤	0,1 Ohm	Ohm	
Ground leakkage current EN 60601 / IEC 601/ VDE 0751	≤	500 µA	µA	
Or				
Ground leakkage current as in UL 2601	≤	300 µA	µA	

Function test	OK	Error
1. Switch on the device and press SET. Display: Software version VX.X XX.XX.XX (X=optional) Press SET for 5 seconds. Display: OptiFlex S S2 Standard		
2. The motion range for ab/ adduction (motor A) is 30 to 175 degrees. At 90 degrees, the angle is to be checked with a tolerance of +/- 4 degrees.		
3. The motion range for rotation (motor B) is from -90 to 90 degrees. At 0 degrees, the angle is to be checked with a tolerance of +/- 4 degrees.		
4. Check the emergency-off function. Switch the device on in continuous operation. Press any key to stop motors A and B immediately. Check this for all keys.		
5. Press ab/adduction and STOP simultaneously to switch to the programming mode. Dipslay: Adduction as well as the present and the programmed angles.		
6. Press FUNC. Press + to change to the special function New Patient and press SET. Display: New Patient Ready Now press STOP. Now press START. The device moves into center position.		
7. Check the set values. Press the following keys to do so: Add/ Abduktion -> Display: ADD 89 90 ABD 91 Rotation -> Dipslay: INT -1 0 EXT 1 Pause -> Display: ADD/IROT 0 S, ABD/EROT 0 S Motors ON/ OFF -> Display: M.A ADD/ABD EIN, M.B ROTAT. ON Speed -> Display: Speed 100 % = 230 °/min Timer -> Display: Timer Continuous		

12. Checkliste of safety and function test
(Hand held programming unit new version)

Safety test			Measured value	Date/ Signature
Protective earth conductor resistance	≤	0,1 Ohm	Ohm	
Ground leakkage current EN 60601 / IEC 601/ VDE 0751	≤	500 µA	µA	
Or				
Ground leakkage current as in UL 2601	≤	300 µA	µA	

Function test	OK	Error
1. Switch on the device. Press the two outer buttons simultaneously. Display: Software version VX.X XX.XX.XX (X = optional). Keep on pressing. Display: OptiFlex S3 Standard Chip		
2. The maximum range of motion Add/ Abduction (Motor A) is 30 to 175 degrees. Check the angle of motor A in a position 90 degrees. Tolerance +/- 4 degrees.		
3. The maximum range of motion for rotation (Motor B) is -90 to +90 degrees. Check the angle of motor B in a position 0 degrees. Tolerance +/- 4 degrees.		
4. Check the emergency-off function. Start the device in any mode. Press any key, motor A and B will stop immediately. Check this for all keys.		
5. Set up the special function New Patient Following settings set up automatically: →0← Add/ Abduction -> Dispaly: 89 91 Rotation -> Display: -1 1 Pause -> Display: 0 Motors ON/ OFF -> Display: EIN Speed -> Display: 100 % Timer -> Display: 00:00		
6. Press START key. Motor A moves to Adduction angle of 89 degrees and stops automatically. Motor B moves in the middle position of 0 degrees and stops automatically.		

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