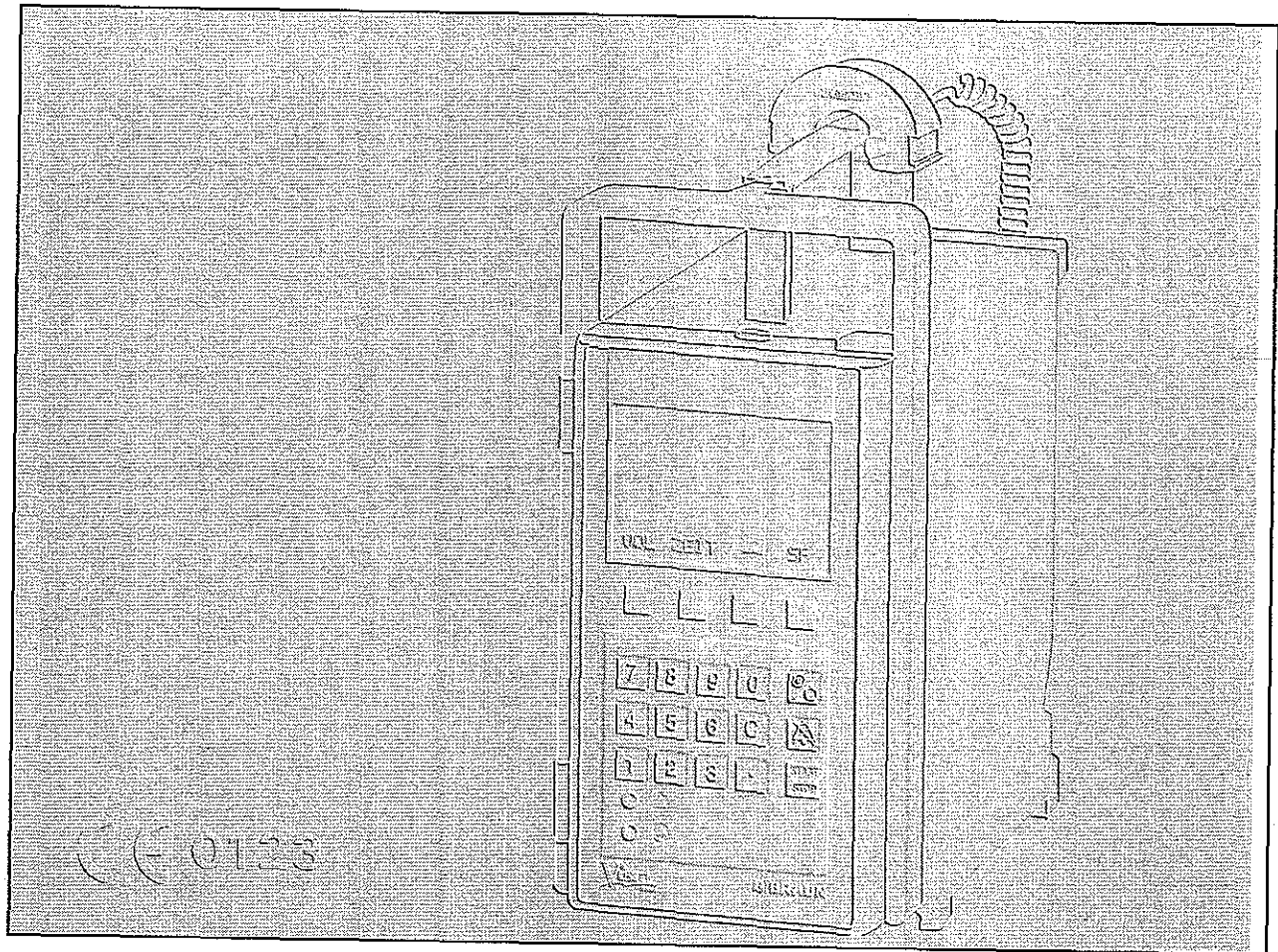


# Vista® basic

## Service Manual



950971 Rev A (5/04)

Version 1.0 English

Software: IFVA23002.....637- 102  
IFVB23003.....637- 202



**This Service Manual is valid for**

**The complete Service Manual contains  
the following pages:**

**Voltages 100 V / 110 V / 120 V, switchable:**

Vista basic ..... 637-102

Vista basic ..... 637-202

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# Important Information on this Manual



The following notes should be observed:

## **Service Work**

The present manual is for your information only. The possession of this manual does not authorize the performance of service work. Service tasks may only be executed by persons, who

- have received appropriate training on the system from B. Braun
- are included in the revision service
- possess the necessary test equipment and mechanical aids, and
- fulfil the personal requirements (training and knowledge).

## **Technical Safety Inspections**

B. Braun also recommends training on the technical safety inspections, or to perform at least the steps indicated in the current version of the manual, as:

- the TSI requires that the instructions in the manuals are observed
- the manuals are a reference for measurements
- depending on the unit type, the service program must be called up which may lead to a dangerous unit condition in the case of an inappropriate operation. Furthermore, a special service connector may be necessary.

## **Current Versions**

This manual version corresponds to the state when the manual was written. Technical changes, especially software modifications must always be expected. The state of the revision is indicated by the index number on the title page.

## **Revision Service**

The possession of this manual does not automatically mean inclusion in the revision service. You will be included in the revision service after:

- technical training by B. Braun Melsungen or
- a written order placed with the sales department of B. Braun (incurred costs).

## **Non-Liability**

B. Braun Melsungen AG does not assume any responsibility for injuries to persons, property damages or other damages caused by:

- the use of a wrong manual, or a manual which does not correspond to the revision state for maintenance, repair, and service tasks
- the non-inclusion of the service technician in the revision service
- technicians who have not participated in a technical training course for the specific B. Braun unit.



## Important Information on this Manual

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ISO 9000 ff/EN 46 000 ff

**Repair and Inspection only  
by Trained Technicians**

**Spare Parts and Test Equipment**

**Setting Off**

B. Braun is certified in accordance with DIN ISO 9001 and DIN EN 46 001. This certification also includes maintenance and service.

The Vista basic complies with the IEC/EN60601-1 and IEC/EN60601-2-24 standards and is certified with the CE label according to the EC directive 93/42/EC.

Training may only be performed by B. Braun. The possession of the manual does not authorize the performance of repairs. The instructions on electrostatic sensitive components (ESD standards) must be observed.

An electrical check must be performed following each repair (see "Checks after Repair" pg. 5-1).

Only use original spare parts from the manufacturer. Do not tamper with assembly groups which can only be exchanged completely. The spare parts required are listed in the repair instructions.

The inspection personnel is responsible for the calibration of the test equipment. Original test equipment can be calibrated at the works of B. Braun. Further information is available upon request.

Additional notes and warnings are set off as follows:

### **Note**

Gives additional or special notes on information and working steps.

### **CAUTION**

Is used for working steps which may result in damage to the unit, system or to a connected device.

### **WARNING**

IS USED FOR WORKING STEPS WHICH MAY RESULT IN PERSONAL INJURY.

# General Information



## **Technical Training**

B. Braun Medical Inc.  
1601 Wallace Drive, Suite 150  
Carrollton, Texas 75006

### **Responsibility**

B. Braun Medical Inc., Service Tel.: 1 800 241-2243  
Fax: 972 245-1612

## **Entry for the Product Training**

Only via the responsible representative

## **Ordering of Spare Parts and Test Equipment**

B. Braun Medical Inc.  
1 800 627-PUMP (7867)

## **Return of Spare Parts**

B. Braun Medical Inc.  
1601 Wallace Drive, Suite 150  
Carrollton, Texas 75006

## **Technical Service Support**

Carrollton, Texas 75006  
Tel.: 1 800 241-2243

[illegible]



# System Overview

1

## Design

The Vista basic is a compact volumetric peristaltic infusion pump. Standard delivery rate range 0.1 to 999.9 ml/h with Intrafix and 0.1 to 800.0 ml/h with Vista Pump Set.

The unit is operated via a membrane keypad. It is equipped with an LCD (liquid crystal display) for the display of the delivery rate and the operating support of the user. Two control LEDs display alarms, and the running of the infusion pump.

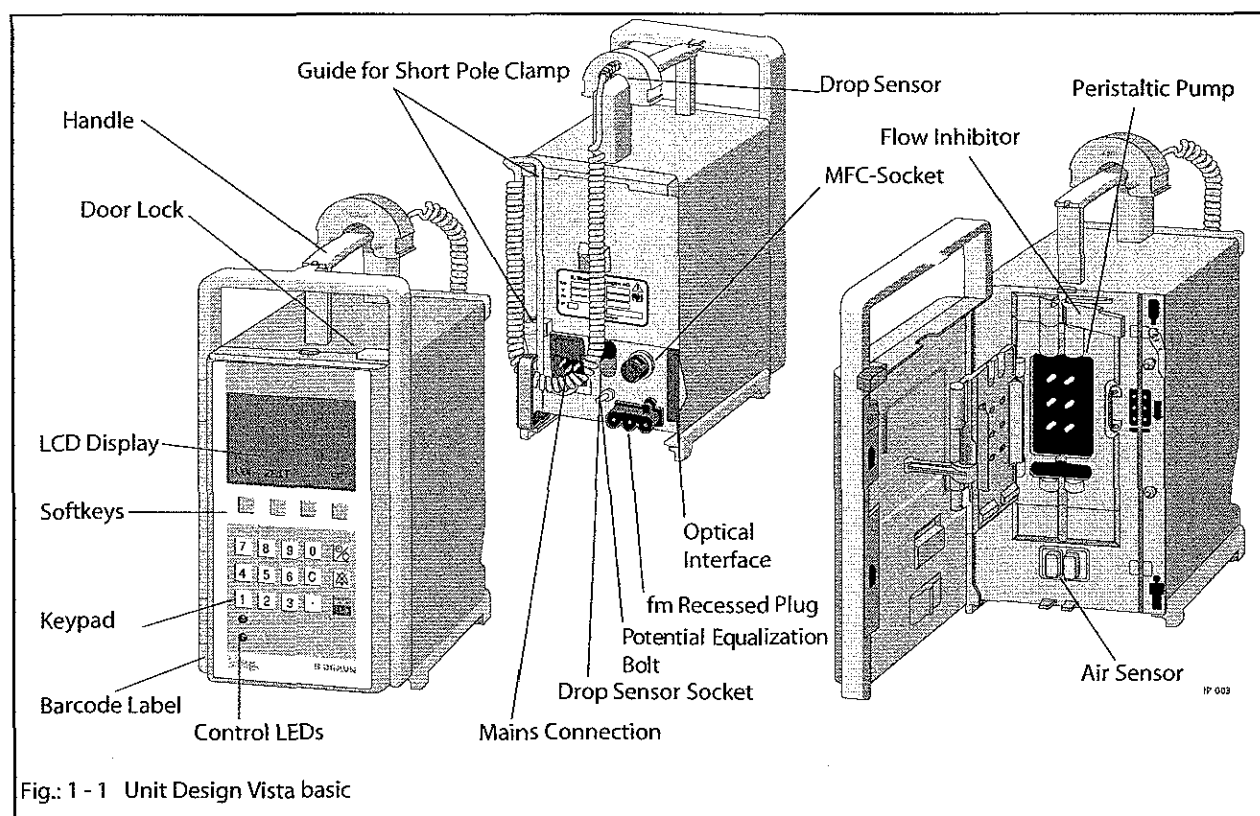


Fig.: 1 - 1 Unit Design Vista basic

A barcode label is attached to the left front side of new Vista basic unit versions which can be retrofitted on previous devices. This barcode label is used to read the serial and DIANET type number via a scanner when the Vista basic is operated in an fm-system.

## Operation Flow Chart

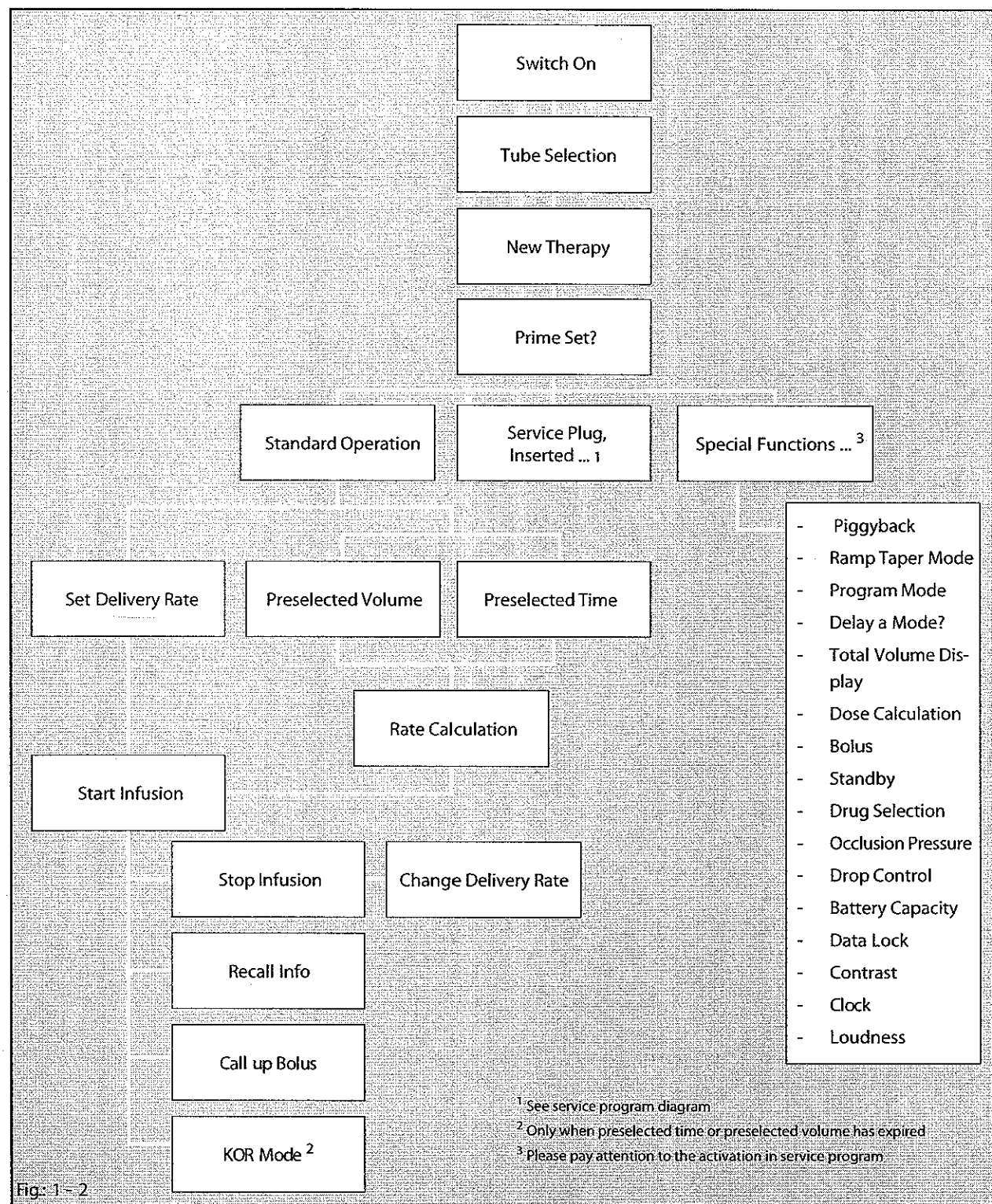


Fig: 1 - 2

See Instructions for Use for detailed information.

## Function

Two independent software-controlled microprocessor systems control and monitor the hardware. On the basis of their functions, they are defined respectively as a control and a function processor. Both systems work with independent clock frequencies and have access to different program and data memories. All safety-relevant functions are handled by both processors and the results are counter checked (CF- and FC-latch).

The input via the keypad is fed to both processors. Additionally the acknowledgement signal of the ON/OFF key is fed to the mains power supply logic (voltage E/A-TAS). The function processor has also access to this logic via E/A-INT.

Description of the voltage signals (see "Signal Table" pg. 1 - 6).

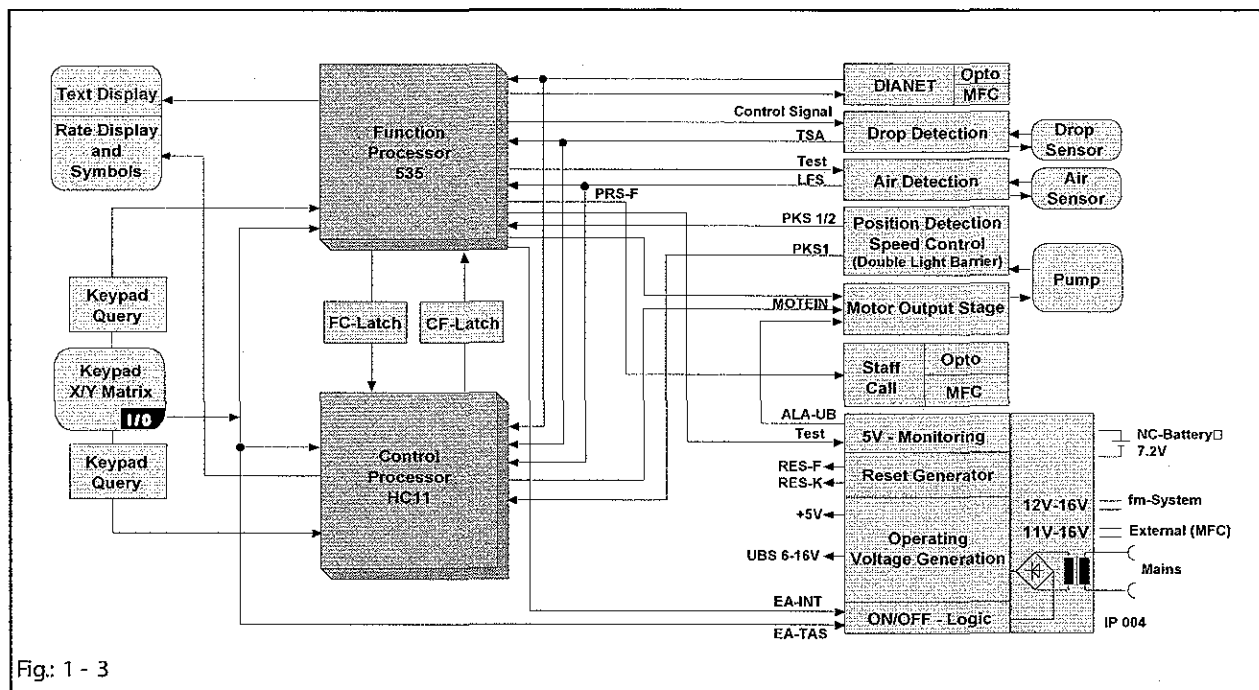


Fig: 1 - 3



## Voltage Supply

The voltage supply is generated either directly from mains, via the FM plug (14 V connection to the fluid manager system), or via the MFC connector (11 to 16 V) and as an internal supply via the internal 7.2 V NiCD battery. The mains module is available in three versions: 230 V, 220 / 230 / 240 V and 100 / 110 / 120 V. The rated voltage has a tolerance of + 10% to - 15 %.

A voltage of 11 V to 18 V is available after transformation and rectification. This voltage is fed to the battery charge circuit and the unit supply. This is also valid for an external 12 V supply from the MFC or FM plug. The FET V10 switches between the external and the internal voltage supply. The transistor V10b works as an ON/OFF switch for the operating voltages UBS, UMOT and +5V. The +5V supplies the complete electronics including the double channel microprocessor system. A window comparator constantly monitors the +5V for undervoltage or overvoltage. The function is checked during switch-on. The operating voltage UBS supplies the stepper motor and the UMOT, the stepper motor drive.

The transistor V47 switches the operating voltage UMOT. In case of an alarm the motor is switched off by V47. Additionally the switching function of the transistor is checked during the switch-on test.

The circuit has two separate assembly groups with separate supply voltages UBA and UBB. The ON/OFF circuit has a retrIGGERABLE delay switch-off. A follow-up charging circuit drives the transistor V10b.

The alarm logic (operating voltage UBB) is an RS latch. This is set when the unit is running and activates the alarm circuit. The alarm buzzer and drive are also driven by UBB. The ON/OFF circuit is activated and the voltage supply is switched on by pressing the ON/OFF key. The alarm latch is reset simultaneously. A function test of the voltage monitoring, motor circuit and alarm activation is performed. The voltage supply is maintained by cyclic self-holding pulses fed to the logic. The alarm latch is also activated.

## System Overview

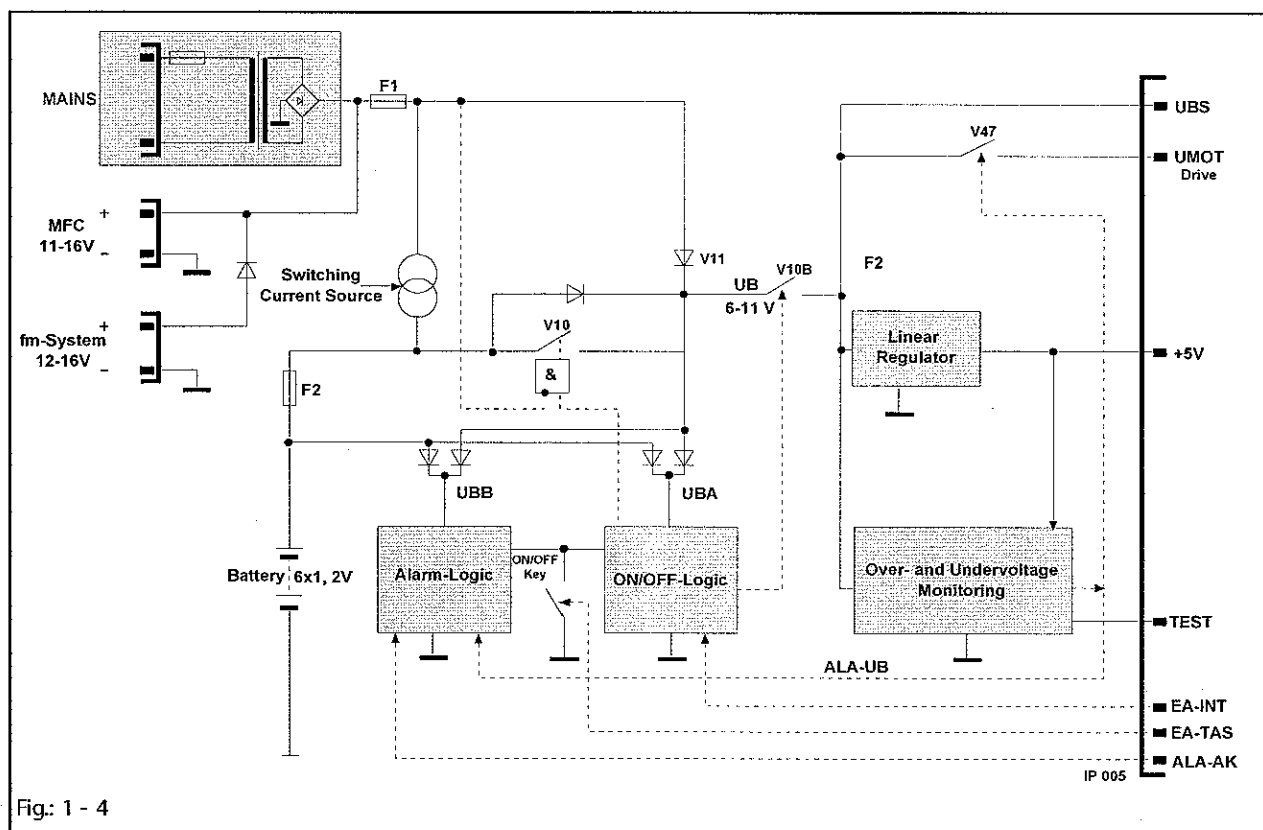


Fig.: 1 - 4

### Signal Table

Signal	Meaning	Signal	Meaning
+5V	Voltage Supply Electronic	PKS2	Pump Head Sensor 2
5V-HT	Overvoltage Test	PKSS	Pump Head Sensor Control
5V-LT	Undervoltage Test	PRS	Staff Call Relay Control
AK-I	Battery Charge and Discharge Current	PRS-F	Staff Call Relay Function Channel
AK-LAD	Battery Capacity ON/OFF	PKSS	Pump Head Sensor Control
AK-Test	Battery Test	PRS.RUF	Staff Call Relay Control
ALA-UB	Operating Voltage Alarm	RDE	Rate Display Enable
CS	Chip Select	RES	Power on Reset
DI	Data Input	RES-F	Reset Function Channel
DO	Data Output	RES-K	Reset Control Channel
E/A-INT	ON/OFF by Microprocessor	RTS	Return to Send (DIANET)
E/A-ST	ON/OFF Status	Rx	Receive Data

Table 1 - 1 Signal Table (Part 1 of 2)

Signal	Meaning	Signal	Meaning
E/A-TAS	ON/OFF Key	SCK	Serial Data Lock
EDB	Electronic Occlusion Pressure	TD-A0	Text Display Address 0
FMC-F	FM Connection Function Channel	TD-A1	Text Display Address 1
FMC-K	FM Connection Control Channel	TD-A2	Text Display Address 2
UEXT-N	External 12V Supply (-)	TD-A3	Text Display Address 3
UEXT-P	External 12V Supply (+)	TD-E	Text Display Enable
UFM-P	External 12V Supply (FM)	TD-R/W	Text Display Read/Write
LFCL	Air Sensor Clock	TD4	Text Display Data 4
LFDA	Air Sensor Data	TD5	Text Display Data 5
LFS	Air Sensor Signal	TD6	Text Display Data 6
LFSEL	Air Sensor Selection	TD7	Text Display Data 7
LFT	Air Sensor Reset	TSA	Drop Sensor Output
MISO	Serial Data Output Interface	TSCL	Drop Sensor Clock
MOSI	Serial Data Input Interface	TSE	Drop Sensor Receiver
MOTEIN	Motor ON	TSR	Drop Sensor Regulation
MS	Motor Control	TSS	Drop Sensor Control
P-ENA	Port Enable	Tx	Transmit Data
PH0	Phase 0	UBA, UBB	Supply Voltage for Alarm, On/Off Logic, RTC
PH1	Phase 1	UBS	Switched Operating Voltage UB
PH2	Phase 2	UBS-M	UBS Measurement Line
PH3	Phase 3	UMOT	Supply Voltage of Motor Drive
PKS	Pump Cover Sensor	UMOT-M	UMOT Measurement Line
PKS1	Pump Head Sensor 1	URTC	Supply Voltage Clock Module

Table 1 - 1 Signal Table (Part 2 of 2)

### Mains Operation

When the unit is connected to mains the unit supply voltage is switched on for the duration of the switch-off delay time. If the microprocessor recognizes a sufficient mains voltage for the charging, the voltage supply is maintained. In this case only a battery balance is carried out, because a key was not pressed. The actual battery capacity and the battery operating hours are displayed in the LCD. The unit is switched off when the ON/OFF key is pressed for at least 2 seconds. Thereby the self-holding is triggered and the alarm latch is reset with a delay. After another 20 seconds the unit is switched off, because the pulses are missing. If the Vista basic is switched off in mains operation with the ON/OFF key, the internal mains voltage is still present.

In mains operation the battery function is checked during the switch-on test. Therefore the charge and discharge current is mea-



## System Overview

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sured and the charging of the battery is interrupted for the duration of the measurement.

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### Battery Operation

The battery function is monitored by the following data: charge current, discharge current and time, and self-discharge time. In battery operation the battery function is checked during the switch-on test. The theoretical load condition is read from the clock module of the battery. Then the battery is connected to UBS and the voltage is measured. If the minimum requirements are not reached a battery alarm is activated.

---

### Alarm Circuit

The alarm generation consists of:

- Standstill of pump due to switch-off of MS (motor circuit) and UMOT (motor operating voltage)
- Audible alarm due to the drive of the buzzer or the loudspeaker via ALA-AK (control channel) or via ALA-UB
- Optical alarm. Is displayed in the LCD and a separate LED display. Additionally the set rate flashes with AAA.A.
- Staff call via the MFC staff call cable.

The user must check the optical and audible alarm during the switch-on test. An alarm must be activated to test the staff call alarm of the Vista basic, e.g. open pump cover during operation.

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### Pump Unit

The pump head is driven by a stepper motor. Each full step of the motor is realized by 5 microsteps. The motor is driven by an FET output stage. The function processor controls the motor with the MS signal. A slot disc which is mounted on the pump head axle is scanned by two light barriers (PKS1 and PKS2 signal). Thereby the control microprocessor monitors the direction of rotation and speed of the pump head.

The pump head position is also determined with the PKS2 signal. The motor can therefore be accelerated during the withdrawal phase. Thus a nearly pulse-free flow is realized in the lower delivery range (<100 ml/h). The total pump head cycles and running time are available in the service program under history data.





### **Mechanical Occlusion Pressure:**

The Vista basic has a linear peristaltic pump. This pump has 12 slides which are driven by a camshaft.

When the pump cover is closed, the pump tube is squeezed (occlusion) by at least one of the slides, independent of the pump head position. The complete pump unit is mounted behind the front panel in the cabinet frame. The hinges and the locking bow for the pump cover are led through the front panel. The pump cover is automatically closed when the operating unit door is closed. The slides are pressed against the pump cover by a spring system in the pump unit. Thereby a delivery pressure is realized and mechanically limited by the springs.

If the pressure limit is exceeded there is no volume delivery. The drop sensor activates an alarm. If one of the springs fails, the spring system will ensure that an unsafe condition cannot occur (free flow). The two remaining springs ensure an appropriately high occlusion pressure.

### **Electronic Occlusion Pressure:**

The electronic occlusion sensor is mounted on the output side of the pump. A spring pressure loaded slide is seated on the infusion line. An increase of pressure in the infusion line leads to a deflection of the coil core via the pressure slide. The depth of immersion is measured inductively. When a preset pressure threshold is reached the pump drive is switched off, and an alarm is activated. The electronic occlusion pressure is a single channel circuit. In case of a failure, the mechanically limited maximum pressure can be reached.

### **Motor Switch- Off by Both Processors:**

Function processor: MS signal to switch-off the motor drive. -  
Control processor: MOTEIN signal to switch-off the drive of the motor operating voltage.

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## **Computer Interface**

The Vista basic is equipped with a computer interface. It can be connected to the optical interface or via the MFC service plug. To activate the computer operation please ask for a detailed description from B. Braun.

## Braun fluid managementsystem (fm system)

The Vista basic can be operated as a stand-alone unit or integrated in an intensive care unit, e.g. the B. Braun fluid manager system (fm system). It is integrated by simply snapping the unit into the system.

Mains supply and data communication are automatically connected. Thereby data acquisition and transmission to higher computer system levels are possible.

## Internal Assignment

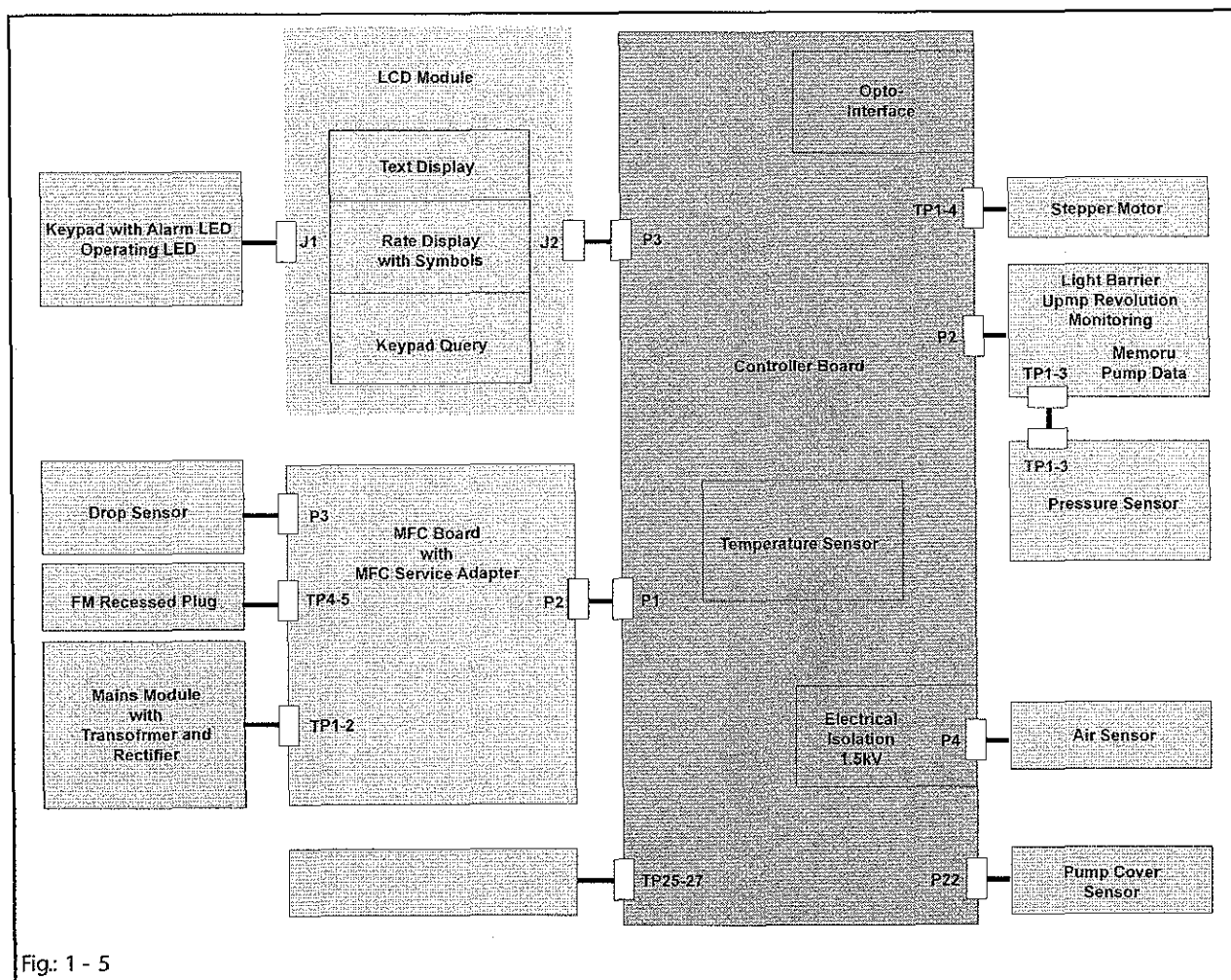


Fig: 1 - 5



## Language Groups

A: German, English, French, Spanish  
 B: English, French, Spanish, Portuguese  
 C: English, French, Spanish, Portuguese  
 D: English, French, Spanish, Portuguese  
 E: English, French, Spanish, Portuguese  
 F: English, French, Spanish, Portuguese

## Accessories

### General

Designation	Ord. No.
Universal adapter for drop sensor .....	871 1747
Drop sensor, complete .....	3450 578A
Short Stand .....	3450 5873
Power Cord (Hospital Grade) .....	3450 5458

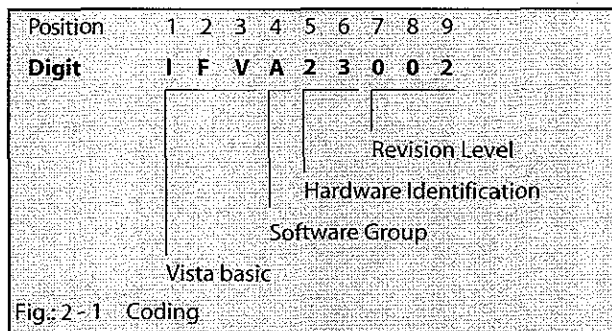
### Universal Clamp

Pole Clamp (rotating) .....	3450 9054
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## System Overview

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**Software Update****Designation****Ord. No.**

MFC interface line ..... 871 1661

The higher digit always replaces the lower digit for the revision level, e.g. IFVA23002 replaces IFVA23001.

When the software group changes (IFVA23002) the unit functions are changed, too. Therefore unit users must be informed (e.g. instruct the user and exchange the instructions for use – software coding, e.g. IFVA is on the cover page of the instructions for use.)

**Note**

Mark the unit after having updated the software! The new software version must be clearly recognizable.

Only update from old to new software versions, never in reverse order (e.g. never update from IFVA23002 to IFVA23001!).

All units used in one ward should have the same software status and basic setup to avoid operator mistakes.

**Note**

Software updates must be reported to B. Braun for registration. Observe the notes of the update program and the supplements!

**Approved Software Versions****IFVA23002**

- Basic software

**IFVB23003**

## Error Messages and Alarms

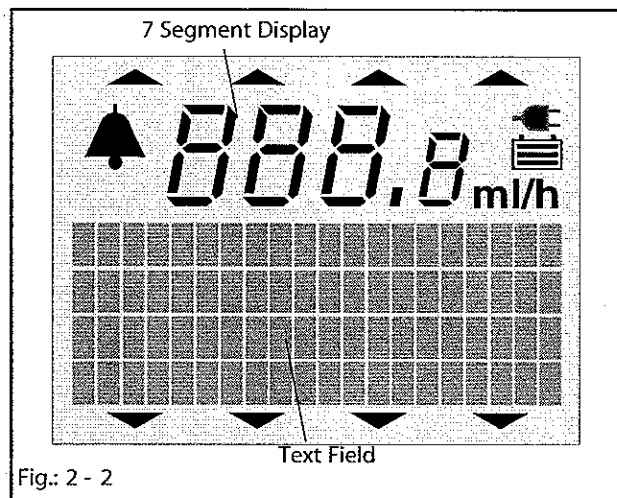


Fig.: 2 - 2

Alarms of the function processor 80c535 are displayed in the text field of the LCD. Alarms of the control processor 68HC11 are displayed in the 7 segment display. The alarms help to troubleshoot unit malfunctions. As not all malfunctions can be considered, unit malfunctions with different messages, which are not listed, can be displayed, or there may be no message.

Detected unit alarms are displayed in the text field as "Unit Alarms" in the selected language. Additionally the error number is displayed in the text field.

Text Field	Description
100	defective RAM memory
101	UMOT cannot be switched on
102	UMOT still switched on despite overvoltage
103	UMOT still switched on despite MOTEIN=0
104	UMOT still switched on despite undervoltage
105	ON/OFF key pressed longer than 14 sec
106	defective air sensor (calibration value?)
107	defective program memory
108	defective program flow
109	different number of pump head cycles
110	different keypad gaps between 80c838 and 68hc11
111	different program versions between 80c535 and 68hc11
112	defective program flow
113	testbit!=0 out of switch-on test
116	defective program memory - text
117	defective program memory - text does not match with program
118	reset during active operation
119	defective program memory transit time ROM-test
120	defective program memory tube parameters

Table 2 - 1

**Control Microprocessor 68hc11**

FFxx is displayed in the 7 segment display with flashing dots. FFxx is the error code.

**7 Segment Display Description**

FF01	dummy for test
FF02	battery not present / missing battery current
FF03	defective RAM memory
FF04	defective program memory - ROM test error 1
FF05	defective program memory - ROM test error 2
FF06	calibration data error from EEPROM
FF07	pump head cycle not plausible
FF08	failure / inaccuracy of system clock
FF09	failure 100msec system clock
FF10	reset during active operation
FF12	no dynamic pressure sensor signal (EDB)
FF14	defective temperature sensor
FF16	defective membrane keypad
FF17	defective program memory tube parameters

Table 2 - 2





## Software Default Values

Unit No.: \_\_\_\_\_

	Menu Point	Default	Customer Setting
<b>Standard Function</b>	User Language	Depending on Art. No.	_____
	Alarm Type	Single stage	_____
	Staff Call	Static without OFF Alarm, without switch-on pulse	_____
	Ward Identification	"Ward Identification"	_____
	Drug 1 ... 9	Drug 1 ... 9	_____
	Operating Alarms	0	_____
	Minimum Delivery Rate	0.1 ml/h	_____
	Maximum Delivery Rate	999.9 ml/h	_____
	Maximum Air Rate	1.5 ml/h (0.0 = Off)*	_____
	Maximum Air Bubble	0.30 ml	_____
<b>Special Functions</b>	*Clear All	Activated	_____
	Piggyback	Activated	_____
	Ramp Taper Mode	Activated	_____
	Program Mode	Activated	_____
	Delay a Mode?	Activated	_____
	Total Volume Display	Activated	_____
	Dose Calculation	Deactivated	_____
	Bolus	Activated	_____
	Standby	Activated	_____
	Drug Selection	Deactivated	_____
	Occlusion Pressure	Activated	_____
	Drop Control	Deactivated	_____
	Battery Capacity	Activated	_____
	Data Lock	Deactivated	_____
	Contrast	Deactivated	_____
	Clock	Activated	_____
	Loudness	Activated	_____
<b>SM Menu</b>	*Resume Function	Activated	_____
	Double Rate Entry	Off	_____
	Online Rate Setting	On	_____
	Interval Bolus	Off	_____
	Tube Selection	Off	_____
	New Therapy	On	_____
<b>User Data</b>	Priming	On	_____
	Occlusion Pressure	High	_____
	Contrast	Optimum contrast	_____
	Drug	Blank	_____
	Data Lock	Off	_____

\* Available only on Model 637-202

	Menu Point	Default	Customer Setting
<b>Calibration Data</b>	Standby Time	24h 00min	_____
	Drop Control	Off	_____
	Alarm Tone	Stage 7	_____
	Dianet Mode Display	60sec	_____
	Bolus Key	On	_____
	Bolus Rate	999.9 ml/h	_____
	Air Sensor Calibration Value	130 mV	Must not be changed
	Tube group I (dependent on tube)		
	Air Sensor Calibration Value	130 mV	Must not be changed
	Intrafix Air P or Vista Pump Set (dependent on tube)		
<b>Unit Specific Data</b>	Scale Factor (dependent on tube)	50 (Intrafix Air P or Vista Pump Set)	_____
	Occlusion Level, Low	6 (no PSI)	_____
	Occlusion Level, High	12 (no PSI)	_____
	History Function	Activated	_____
	DIANET Type No.	Depending on unit	_____
	Unit No.	Depending on unit	_____
	Operating Hours	Depending on unit	_____
	Battery Hours	Depending on unit	_____
	Number of Pump Head Cycles	Depending on unit	_____

Structure of the Service Program

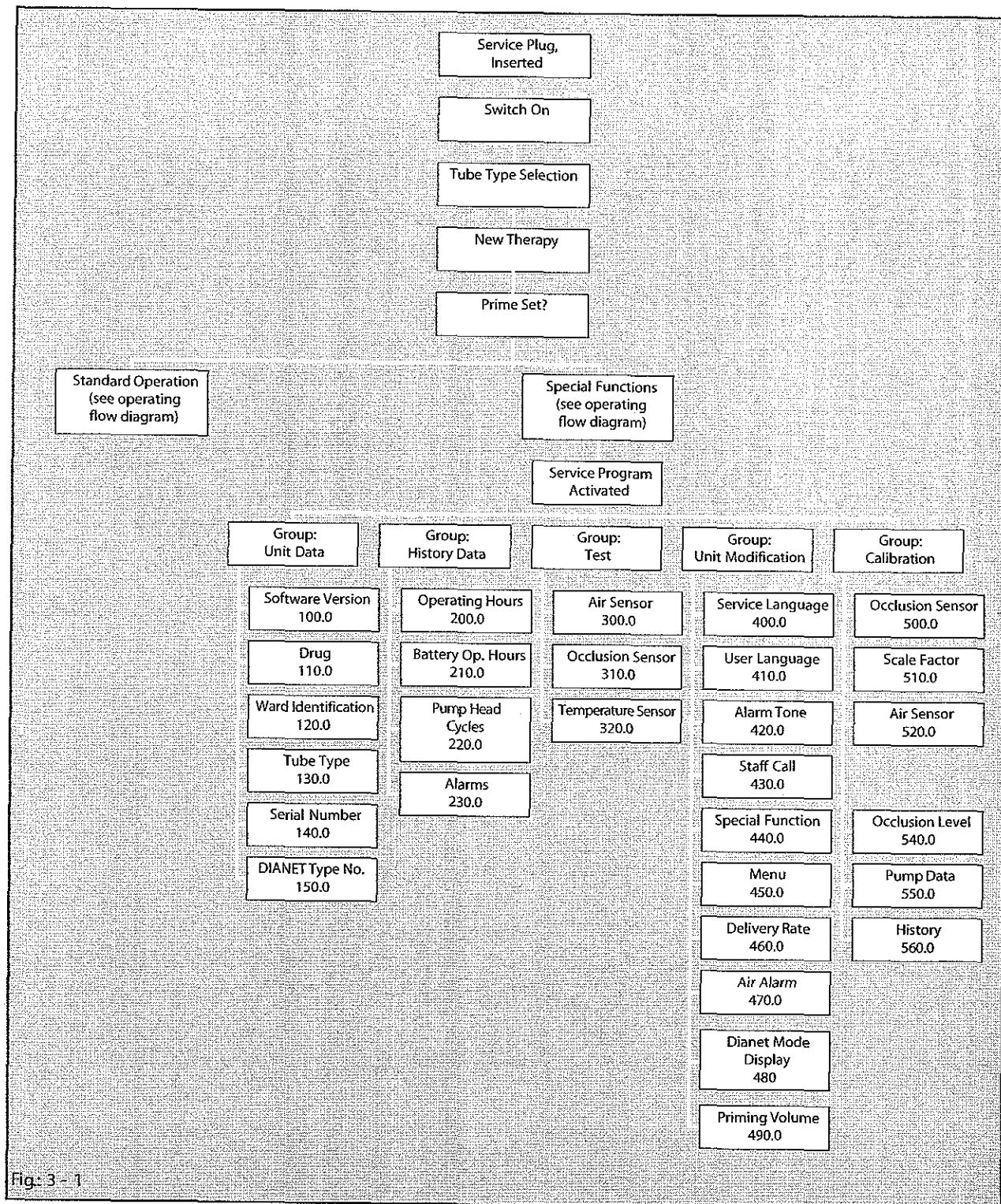


Fig: 3 - 1



## Service Program

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### Additional Functions with Inserted Service Plug

#### Software Version and User Languages

1. Insert service plug into the MFC socket at the rear of the unit.
2. Switch on unit and keep the ON/OFF button pressed (for max. 15 s).
3. The software version and user languages are displayed in the LCD.
4. The unit is switched on when the ON/OFF button is released.
5. \*\* appears in the LCD if the service plug is inserted.

Two LEDs are integrated in the service plug:

- green = Power supply active
- red = Alarm

The following conditions are active:

- The operating alarms are muted.
- All special functions are accessible (including the disabled).
- The special functions are slightly modified. (Example: SM battery capacity has key for 0 min/32 min presetting).
- The battery capacity display switches between the nominal and the actual capacity. If the maximum battery capacity is not reached "?" will be displayed before the new nominal capacity.
- The tube type will be displayed in the tube selection menu.

#### Disabling the Occlusion Sensor

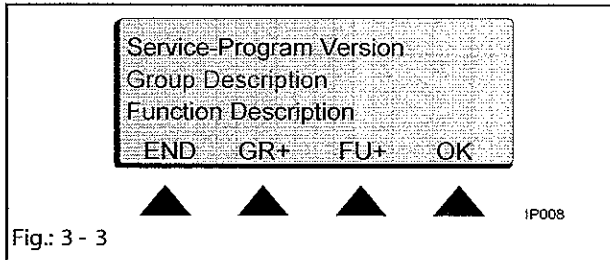
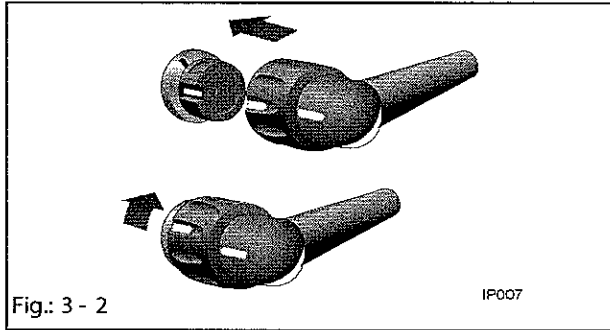
The electronic pressure monitoring can be deactivated to check the mechanical occlusion pressure.

1. Select "Occlusion Pressure" with the SM key.
2. Then select "mechanical".
3. Return to the main menu with END.

A too low pump speed is indicated in the display by "Pressure Alarm" with underlined stars.

The display "Pressure Alarm" with underlined questions marks indicates that no tube has been inserted.

## Start /Quit the Service Program



## Activate the Service Program

1. Insert service plug into the MFC socket at the rear of the unit.  
- \*\* appears in the display.
2. Select "Service Program" with the SM key. When the service program is activated the red alarm LED flashes. The LED displays the code number of the selected group and function.

## FUNCTION

- |     |  |
|-----|--|
| END | Jumps to the initial function  |
| GR+ | Selects group  |
| FU+ | Selects function in the activated group  |
| OK  | Activates the selected function or if necessary skips to the sub-functions with NEXT |

## Quit the Service Program

1. Press END in the main menu - A data storage query is activated: "Save Changes? Yes / No".  
Y / N terminates the service program.  
Press END to jump to the last function.
2. Switch off the Infusomat P and remove service plug.

### Note

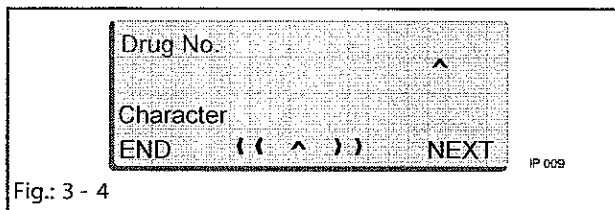
Disconnect the Vista basic from mains for at least 30 seconds after termination of the service program (memory is deleted). Then the unit can be switched on again.

## Unit Data

## Software Version

## Function 100.0

1. Select sub-functions with NEXT.
2. The current software version is displayed in the LCD:
  - User program version with date
  - Language with text version. Further languages with (+).
  - Service program version
  - Service language with text version
  - Tube type version
3. Return to the initial function with END.

**Drug Name****Function 110.0**

Memory for maximum 9 drugs and 20 characters per name.

1. Display the stored drug names with the NEXT key.
2. Delete displayed entry with CLR.
3. Press YES to modify a drug name:  
Move cursor to character with NEXT.  
Select new character from line 3 with << or >>.
4. Repeat the procedure for each character.
5. Return to the initial function with END.

**Ward Identification****Function 120.0**

Enter and display of a ward specific unit identification. Permanent display if the unit is connected to mains and switched off.

1. Delete displayed entry with CLR. Press YES to enter modifications:  
Move cursor to character with NEXT.  
Select new character from line 3 with << or >>.
2. Repeat the procedure for each character.
3. Return to the initial function with END.

**Tube Type****Function 130.0**

This function is for future extensions.

**Serial Number****Function 140.0**

The displayed serial number must correspond with the number on the unit type plate, as this number is used in the interface mode.

1. YES activates the entry mode. Enter via the numeric keypad.
2. YES stores the changed or new number.
3. Return to the initial function with END.

**DIANET Type Number****Function 150.0**

The displayed serial number must correspond with the number on the unit type plate, as this number is used in the interface mode.

1. YES activates the entry mode. Enter via the numeric keypad.
2. YES stores the changed or new number.
3. Return to the initial function with END.

## History Data

## Operating Hour Counter

**Function 200.0**

1. OK activates the display.
2. Return to the initial function with END.

## Battery Operating Hours

**Function 210.0**

1. OK activates the display.
2. Return to the initial function with END.

## Pump Head Cycles

**Function 220.0**

Display of the pump head cycles (delivered volume).

1. OK activates the display.
2. Return to the initial function with END.

## Operating Alarms

**Function 230.0**

The last 20 operating alarms can be recalled.

They are displayed as 16 bit binary codes and each bit position can be set from 0 to 1.

1. OK activates the alarm display.
2. Display operating alarms -01 to -20 with the (+) and (-) key.
3. Delete the operating alarms with CLR.
4. Return to the initial function with END.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Code	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Example for Alarm "Pump Cover Open"																
0	Battery empty (battery alarm)															
1	Pump cover open															
2	Drop alarm															
3	Air alarm															
4	Occlusion Alarm															
5	Expired standby time															
6	Interface alarm															
7	KOR end alarm															
8 to 14	free															
15	Operating alarm															

Fig. 3- 5

**Test****Air Sensor****Function 300.0**

After exchange check the function of the air sensor.

See TSI-List for permissible check values (see "Technical Safety Inspection TSI" pg. 7-1).

1. Press OK. The received signal amplitude is displayed as a measurement value.  
(The test value with NEXT is not important).
2. Insert an infusion line filled with air and check the maximum permissible air value.
3. Insert an infusion line filled with fluid and check the minimum permissible water value.
4. Return to the initial function with END.

**Pressure Sensor****Function 310.0****Test Equipment**

2.2 mm template

(see "Test Equipment and Special Tools" pg. 9-1)

1. Push in the bottom slide of the finger pump.
2. Press OK twice.
3. Open unit door.
4. Note the measurement value (actual value).
5. Insert the 2.2 mm template and close the unit door.
6. The new measurement value will be displayed. It must be 15 to 25 digits higher than the first value.
7. Return to the initial function with END.

If the 15 to 25 digits are not reached, the pressure sensor unit must be mechanically aligned (see "Occlusion Sensor" pg. 4-14).

**Temperature Sensor****Function 320.0**

Display of the measured temperature of both processors. Deviations are possible, the display is only for internal use.

1. OK activates the display.
2. Return to the initial function with END.



**Unit Modifications****Service Language****Function 400.0**

English or German can be selected.

1. OK activates the function.
2. Select language with NEXT.
3. Acknowledge with YES.
4. Return to the initial function with END.

**User Language****Function 410.0**

Four user languages per language group are available (depending on software).

1. OK activates the function.
2. Select language with NEXT.  
The language no. and text version are displayed.
3. Acknowledge with YES.
4. Return to the initial function with END.

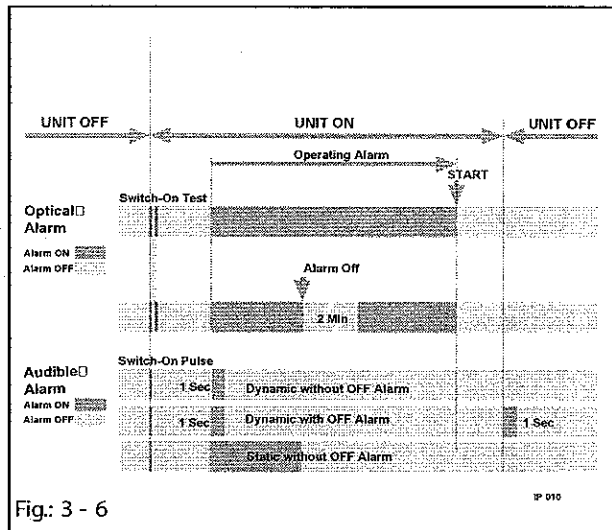
**Alarm Tone****Function 420.0**

Different alarm modes can be selected:

- Single stage
- A "10 minutes off alarm" can be selected.  
In this mode the audible alarm is activated with a delay of 10 minutes.

The activation of the 10 minutes off alarm is only permissible, if:

- the staff call is connected and
  - the Vista basic has an attention label (label drawing no. M007100000F04).
1. OK activates the function.
  2. Select alarm tone with NEXT.
  3. Acknowledge with YES.
  4. Return to the initial function with END.

**Staff Call****Function 430.0**

Select first, whether the switch-on pulse shall be activated (YES/NO). The switch-on pulse is used to test the staff call line. Different staff call modes can be selected with the NEXT key:

- Dynamic with OFF Alarm
- Dynamic without OFF Alarm
- Static without OFF Alarm

For further details see staff call line in the instructions for use.

An additional switch-on pulse (YES/NO) can be activated for each mode to test the staff call unit.

1. OK activates the function.
2. Select staff call type with NEXT.
3. Acknowledge with YES.
4. Return to the initial function with END.

**Special Functions****Function 440.0**

Special functions can be activated in the service program, which are then available on the user interface. Deactivated special functions will not be displayed. The SM softkey will not be displayed in standard operation, if all special functions are deactivated. - Special functions to be selected, see Fig: 1-1.

1. OK activates the function.
2. Select special functions with NEXT.
3. Activate / deactivate the respective function with YES/NO.
4. Return to the main menu with END.



### Menu

### Function 450.0

The availability of menus on the user interface can be set.

- Double rate entry
- Online rate entry
- Interval bolus
- Tube selection

1. OK activates the function.
2. Activate / deactivate the decimal function with NEXT.
3. Acknowledge with YES.
4. Return to the main menu with END.

### Delivery Rate

### Function 460.0

The maximum and minimum delivery rates can be set. Range of adjustment of the delivery rate: 0.1 to 999.9 ml/h

1. OK activates the function.
2. Select the min./max. delivery rate with NEXT.
3. Acknowledge with YES.
4. Enter value with a numeric key.
5. Acknowledge with OK.
6. Return to the initial function with END.

### Air Alarm

### Function 470.0

The air sensor sensitivity of the air rate alarm in ml/h (total air alarm) and of the maximum air bubble in ml (single bubble) can be adjusted.

Setting range air rate: 0.5 to 3.5 ml/h

Setting range air bubble: 0.01 to 0.3 ml/h

1. OK activates the function.
2. Select air rate (ml/h) or air bubble (ml) with NEXT.
3. Acknowledge with YES.
4. Enter value with a numeric key.
5. Acknowledge with OK.
6. Return to the initial function with END.

**Dianet Mode Display****Function 480.0**

When operated with DianetStar the respective DianetStar-Mode (CA, CC, CD) with address 01, e.g. mode CA and address 01 is displayed by: "###CA01###".

The duration of the display after the last data transmission can be set between 0 and 255 seconds.

**Priming Volume****Function 490.0****Calibration**

All safety-relevant parameters are set by the manufacturer. If these parameters are changed, a new calibration must be performed with calibrated test equipment.

**Occlusion Sensor****Function 500.0**

Measurement and setting of the zero value "3" of the occlusion sensor, Ord. No.: 3452 0619. Calibration (see "Occlusion Sensor" pg. 4-14).

1. Press the OK key twice.
2. Press the Align key.
3. Open the unit door and remove tube.
4. Check the occlusion sensor for cleanliness and function (briefly operate the sensor and check whether the displayed measurement value changes).
5. Wait until the displayed measurement value does not change any more (+/- one digit). The measurement value must be between 250 and 400 digits.
6. Acknowledge the entry with YES.
7. Return to the initial function with END.

It is not allowed to enter the zero point value via the keypad.

**Scale Factor****Function 510.0**

The scale factor can be set in the limits between 40 and 99 digits for each tube type. Every digit step is equivalent to a 0.5 % modification of the delivery rate. An increase of the scale factor reduces the pump speed, and a decrease increases the pump speed.

1. Press the OK key twice to activate the function.
2. Select the tube type with the NEXT key.
3. "Yes" activates the function for the selected tube type.
4. The value can be changed with the entry keypad.
5. Acknowledge the entry with OK.
6. Return to the initial function with END.

7. Quit the service program and save changes with YES.
8. Switch on unit and check the delivery rate (see "Delivery Accuracy" pg. 8-4).  
If necessary repeat the delivery rate measurement.

## Air Sensor

## Function 520.0

Alignment or check of the air sensor value (alarm threshold) (see "Air Sensor" pg. 4-17).

### Note

The value is dependent on the tube type.

1. Press OK twice and then YES to activate the function.
2. Press OK again to activate the air sensor value.
3. The value can be changed with the entry keypad.
4. Acknowledge the entry with YES.
5. AIR SENSOR IS SET acknowledges the entry.
6. Return to the initial function with END.
7. Quit the service program and save changes with YES.

## Occlusion Level

## Function 540.0

Setting of the occlusion threshold values for the occlusion levels "low" and "high".

1. Press the OK key twice to activate the function.
2. Select the occlusion level with NEXT.
3. YES activates the entry mode.
4. Enter the pressure value via the numeric keys (pay attention to the displayed limit values!).
5. Press the YES key to take over the settings.
6. Return to the initial function with END.

## Pump Data

## Function 550.0

### Note

Compatibility between controller board and pump must be checked before acknowledging. Only press YES if pump corresponds to controller board.

## History

## Function 560.0

The history function can be activated or deactivated.

1. Press the OK key twice to activate the function.
2. Select the history function with NEXT.



## Service Program

---

3. ON activates the function. The history protocol memory is initialized (the actual software version and the serial number are registered).  
Press the OFF key to deactivate the function. The history protocol memory is deleted.
4. Return to the initial function with END.

## 4.1 Mains Fuses

### Designation

### Ord. No.

Fuse T 0.315 A for 100 / 110 / 120 V

(10 pcs.) ..... 3477 0534

Fuse holder ..... 3450 0979

### Note

Only use recommended fuses.

### Exchange

1. Press the expansion clamps at the fuse holder on the recessed mains plug with a screw driver in direction of the arrows and pull out fuse holder.
2. Replace blown fuse and press in fuse holder. Only use recommended fuses.

### Check

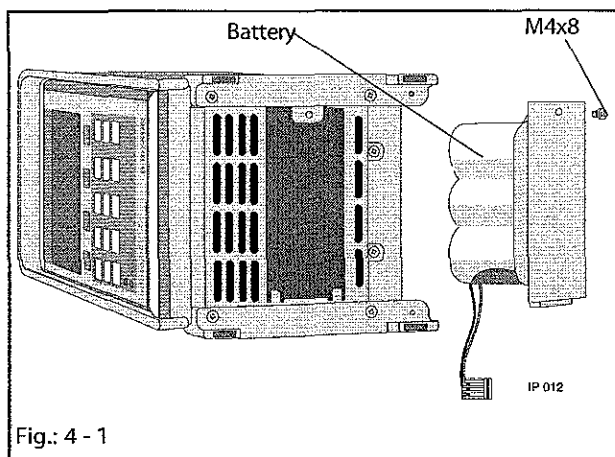
Safety check, functional check.

## 4.2 Battery

### Designation

### Ord. No.

Battery incl. connector 1.2 AH / 7.2 V and holder. . . . 3450 2556



### Exchange

1. Switch off unit and disconnect from mains.
2. Loosen screw, open the cover of the battery compartment and remove battery.
3. Pull off the battery connector.
4. Assembly is done in reverse order.
5. After having exchanged the battery the Vista basic must be connected to mains, before switching on the unit. Thereby the charge and discharge currents are aligned.
6. Charge battery (16 h).

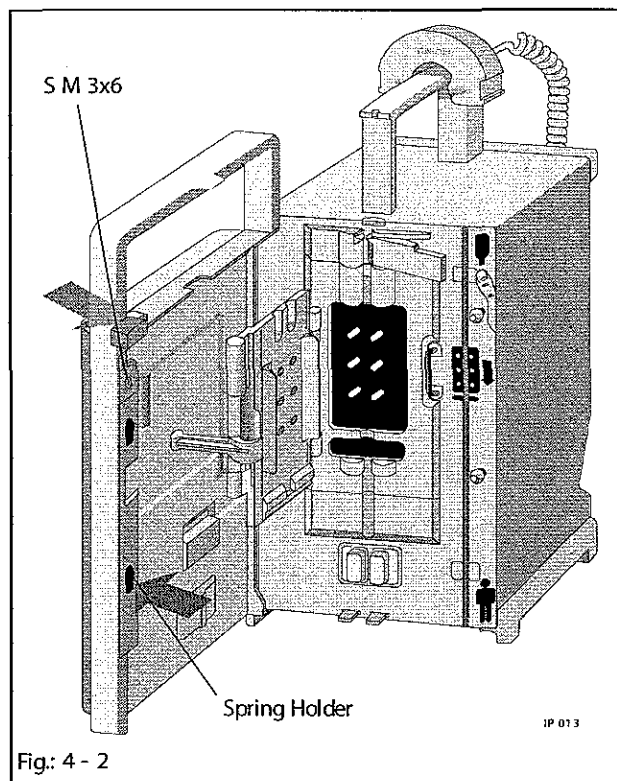
### Note

Defective batteries must be orderly disposed of, e.g. send back to B. Braun (see "Return of Spare Parts" pg. 0-7).

### Check

Perform switch-on test in battery operation and check the battery running time, if necessary.

### 4.3 Door Lock



#### Designation

#### Ord. No.

Door lock complete with push button .....	3450 5601
Spring holder for door lock .....	3450 5440
Mounting for door lock .....	3477 2790

#### Exchange

1. Open door and unlatch the spring holder.
2. Remove countersunk screw and press out the mounting by pressing the holder for the door lock.
3. Remove door lock in an upward direction and exchange.
4. Assembly is done in reverse order.

#### Check

Pump unit check (only mechanical occlusion pressure).



#### 4.4 Pump Cover

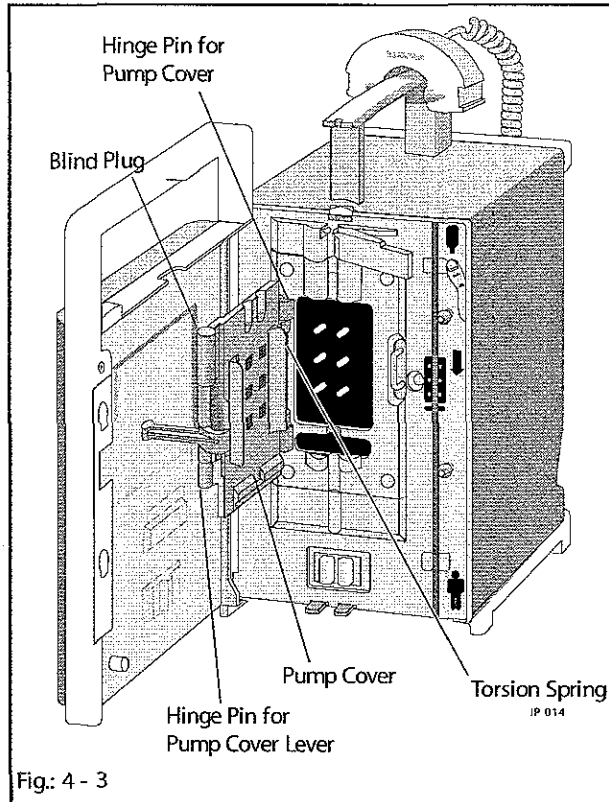


Fig.: 4 - 3

#### Designation

#### Ord. No.

Pump cover with lock .....	3450 1916
Blind plug 7.1 mm (10 pcs.) .....	3477 3207
Torsion spring in lever/pump cover (5 pcs.) .....	3477 3363
Torsion spring for pump cover (5 pcs.) .....	3477 3355
Lever (pump cover) .....	3477 4092
Hinge pin for pump cover .....	3477 3967
Hinge pin for pump cover lever .....	3450 5725

#### Exchange

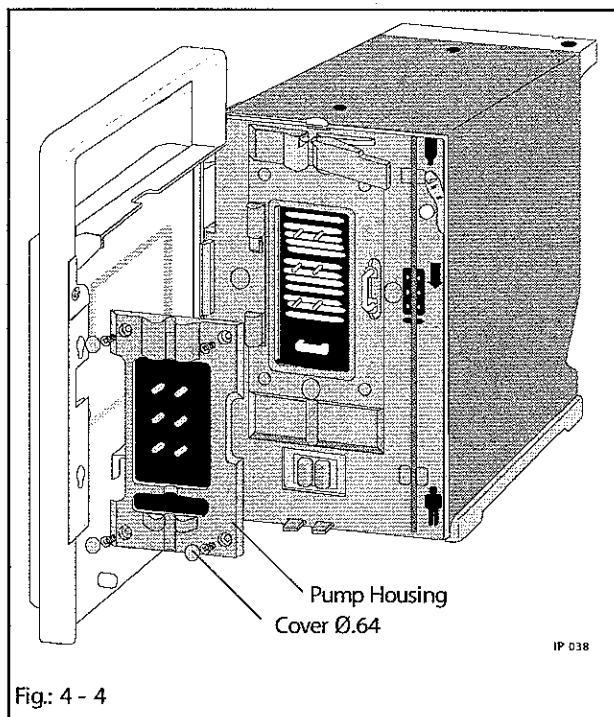
Tools: Pin punch 1.8 mm, pin punch 6 mm, 2.2 mm template

1. Open door and remove hinge pin with pin punch (1.8 mm) from below. Do not lose the torsion spring.
2. Disassemble pump cover.
3. Insert the torsion spring in new pump cover. Insert the hinge pin from the top with a pin punch (6 mm).
4. Check the occlusion sensor with 2.2 mm template in the service program, and align, if necessary.

#### Check

Safety check, pump unit check.

#### 4.5 Pump Housing



#### Designation

#### Ord. No.

Pump housing, (cpl.)..... 3450 3390

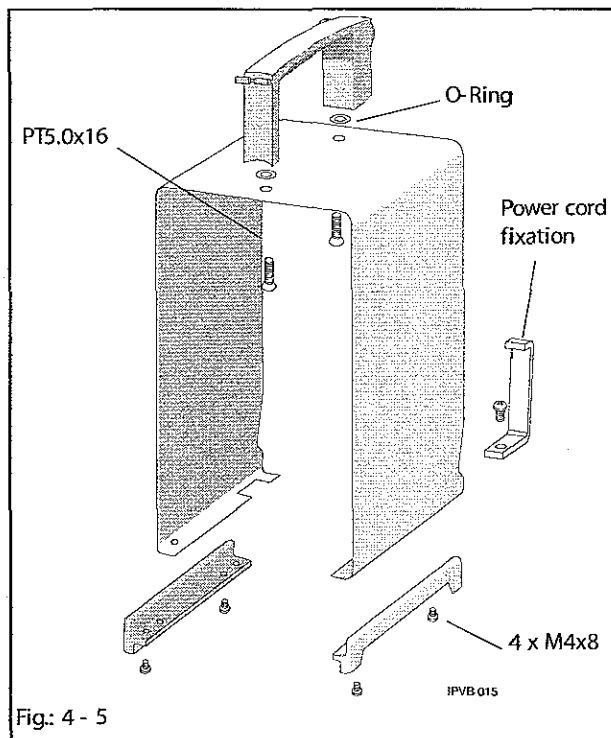
#### Exchange

1. Remove 4 tamper-proof caps by piercing a screwdriver through the caps.
2. Loosen the screws.
3. Remove the pump housing.

#### Note

Do not use the pump housing again, but replace it by a new one.

#### 4.6 Housing and Handle



#### Designation

#### Ord. No.

Housing Labelling .....	3452 0643
Foot stand complete with rubber feet .....	3450 5415
Rubber feet (20 pcs.) .....	3477 3096
Unit handle with O-rings and PT screws .....	3450 3450
Power cord fixation .....	3452 0651

#### Exchange

1. Remove battery (see "Battery" pg. 4-1).
2. Loosen 4 screws from the foot stands and remove foot stands.
3. Remove the plug holder.
4. Remove the safety seal from the rear panel, break tamper-proof cap and remove screw.
5. Slidly widen the sides at the bottom of the housing and pull off to the top.
6. Lay the unit on the front side and assemble in reverse order.
7. Safety seal the rear panel screw after functional check.

#### Check

Safety check.

## 4.7 Controller Board

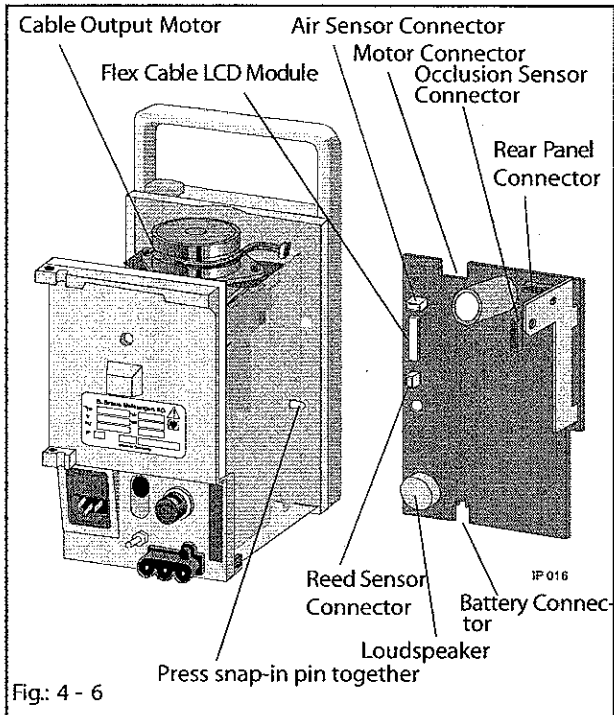


Fig.: 4 - 6

## Designation

## Ord. No.

Distance sleeve .....	3450 3366
Loudspeaker .....	3450 8848
Controller board with loudspeaker, volume control and history function, raw material no. 3810 8003 .....	3450 8740

## Exchange

1. Remove battery (see "Battery" pg. 4-1).
2. Dismount housing (see "Housing and Handle" pg. 4-5).
3. Press snap-in pin together at the distance sleeves and remove the board carefully.
4. Pull off connector (see figure).
5. Exchange the board or buzzer.
6. Assembly is done in reverse order. Be careful with the optical components. Insert the board into the lower guide parallel to the base plate. (Otherwise problems with the optical interface can occur.)

## Note

If "Calibration Defective" is displayed after having exchanged the controller board, check that the correct board (risk of mix-up) was assembled.

## Check

Safety check, functional check.

## 4.8 Rear Panel

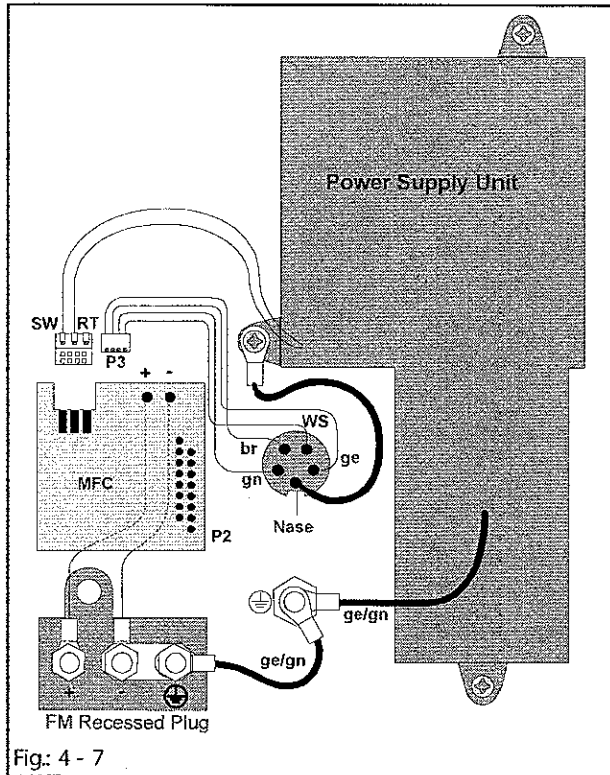


Fig: 4 - 7

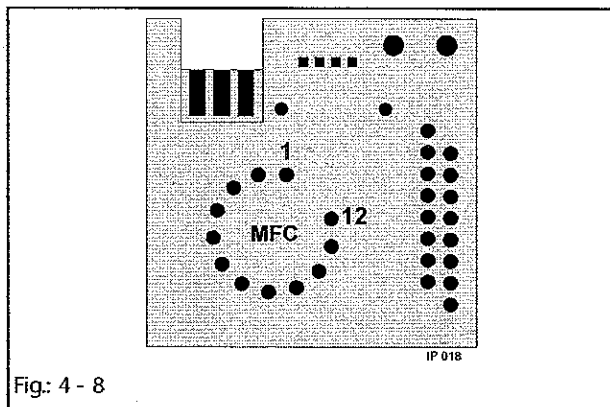


Fig: 4 - 8

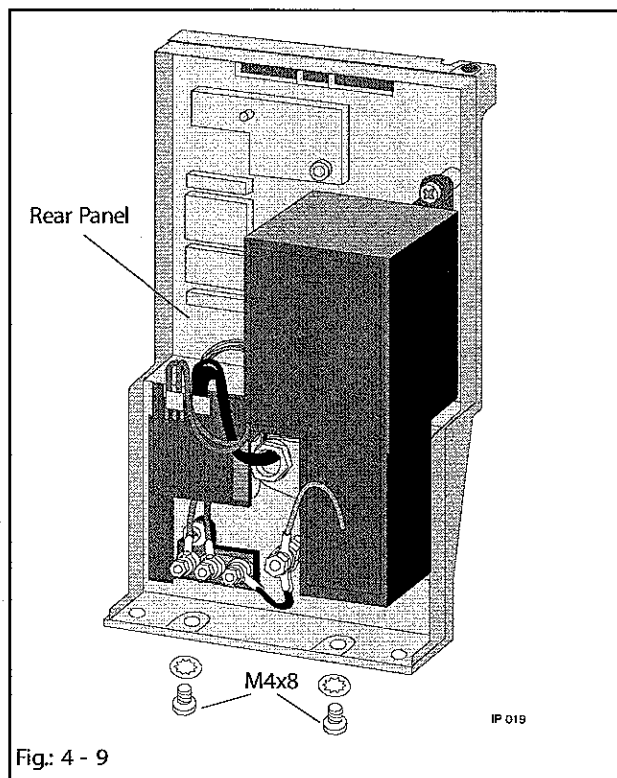
## Designation

## Ord. No.

Rear panel with screws (M3) and seal .....	3450 1860
Cover for optical interface .....	3477 3164
Strip seal for rear panel .....	3477 3142
MFC connector board .....	3450 3374
Potential equalization bolt .....	3477 0550
fm recessed plug (3 pin) .....	3477 3177
Screw 30x8 for fm recessed plug (20 pcs.) .....	3477 3185
U Washer 3.2 (20 pcs.) .....	3477 3193
Mains module 100/110/120 V .....	3450 189A
Drop sensor socket incl. cable and plug. ....	3450 1878

Pin No.	Signal Name	Function
Pin 1	Uext-	Input of external supply voltage, connection of shield
Pin 2	not assigned	
Pin 3	GND	Reference level 0V
Pin 4	Staff call	Output open collector or standard 74HC level each with 220 $\Omega$ series resistance
Pin 5	Ub	Output supply voltage
Pin 6	MFC-KAD	Analogue input K
Pin 7	Emergency Off	Input interface
Pin 8	MFC-FAD	Analogue input F
Pin 9	Tx	Transmit line interface
Pin 10	STB	Output with 470 $\Omega$ series resistance, activation of MFC circuit

Table 4 - 1 MFC Pin Assignment



Pin No.	Signal Name	Function
Pin 11	Rx	Receive line interface
Pin 12	Uext+	Input of external supply voltage

Table 4 - 1 MFC Pin Assignment

**Exchange Rear Panel**

1. Remove battery (see "Battery" pg. 4-1).
2. Dismount housing (see "Housing and Handle" pg. 4-5).
3. Pull off the rear panel connectors and loosen both screws on the unit bottom.

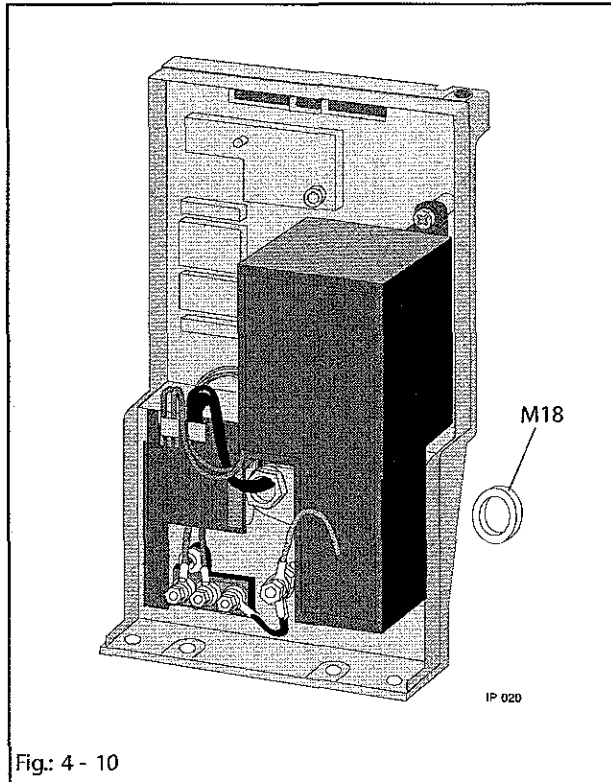


Fig: 4 - 10

**Exchange MFC Connector Board**

Tools: Special socket spanner M18

1. Remove nuts at the fm recessed plug (red/blue).
2. Pull off the connector to the mains power supply and drop sensor, see Fig.: 4- 7.
3. Loosen the MFC socket with special socket spanner M18.
4. Assembly is done in reverse order.

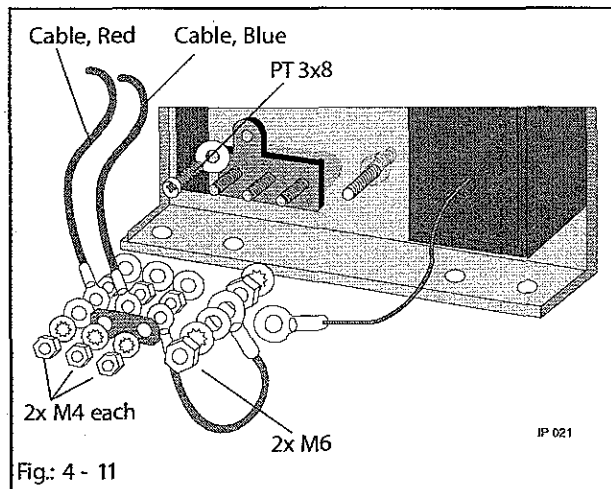


Fig: 4 - 11

**Exchange fmRecessed Plug**

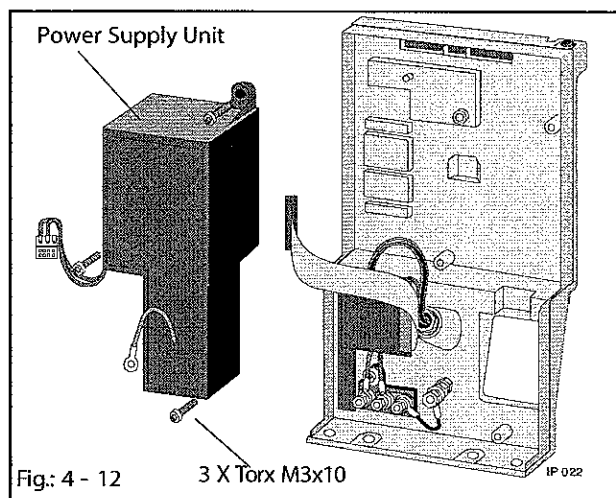
1. Loosen screws and nuts.

**Note**

The new recessed plug must be slightly moveable after assembly.

**Exchange Potential Equalization Bolt**

1. Remove nuts with ring spanner.
2. Exchange the bolt.



### Exchange Mains Module

Tools: Screw driver Torx T10

1. Loosen 3 screws and remove the power supply unit.

### Note

The voltage selection for switchable power supplies is at the fuse element.

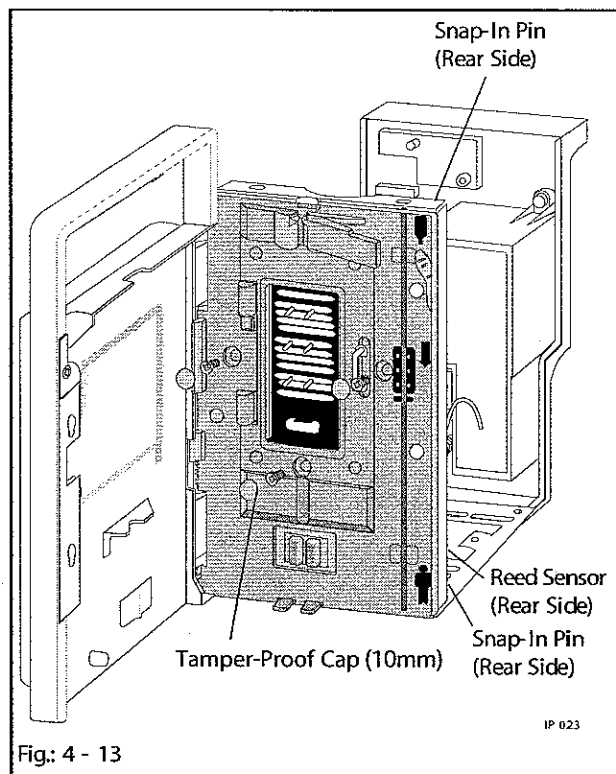
### Exchange Drop Sensor Socket

1. Loosen nut and exchange the drop sensor socket.
2. Safety lock with Sicomet 50.
3. Make ground connection.

### Check

Safety check, functional check.

## 4.9 Front Panel



### Designation

### Ord. No.

Front panel without clamp lever and torsion spring..	3450 2092
Circular seal 45 mm.....	3477 3126
Tamper-proof caps 10 mm (50 pcs.) .....	3477 3134
Cover Ø 6.4 .....	3450 3412
Clamp lever with torsion spring and pin 4x20 .....	3450 3420
Torsion spring .....	3450 3439
Reed sensor.....	3450 1754

### Exchange

Tools: Pin punch

1. Remove battery (see "Battery" pg. 4-1).
2. Dismount housing (see "Housing and Handle" pg. 4-5).
3. Disassemble pump cover (see "Pump Cover" pg. 4-3).
4. Disassemble pump housing (see "Pump Housing" pg. 4-4).
5. Remove countersunk screws by piercing a screwdriver through the caps to loosen the countersunk screws.
6. Press reed sensor out of the holder on the rear side, see Fig.: 4-14.
7. Press both snap-in pins inwards (rear side top and bottom). Then remove the front panel to the front.
8. Exchange the flow inhibitor, i.e. pull straight pin with M3 screw. Prior to assembly slightly grease the plastic surfaces with Molikote Platislip PG 602 grease.



9. Insert circular seal. Assembly is done in reverse order. Snap-in pins manually. Insert reed sensor and seat the cables firmly with cable ties.

**Note**

Always use a new pump housing.

**Check**

Safety check, pump unit check.

## 4.10 Pump Unit

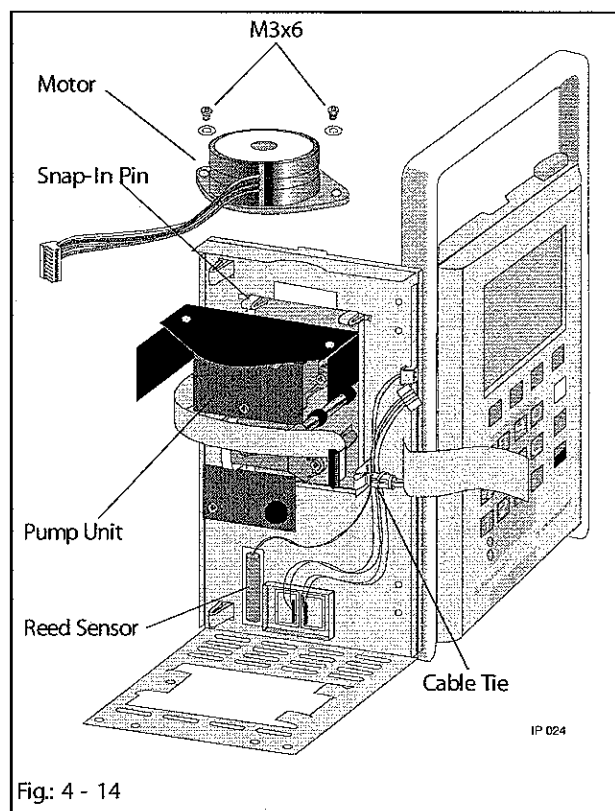


Fig: 4 - 14

## Designation

## Ord. No.

Finger pump (without motor) including pump, ..... 3452 0600  
pump cover, seal membrane and occlusion sensor  
board

Motor with pinion for finger pump. .... 3450 1924

## Exchange

1. Remove battery (see "Battery" pg. 4-1).
2. Dismount housing (see "Housing and Handle" pg. 4-5).
3. Disassemble front panel (see "Front Panel" pg. 4-10).
4. Loosen motor screws, pull off the motor connector and remove motor from pump unit.

## Note

Do not loosen the assembly screw on the lower occlusion sensor board! Otherwise the pump has to be calibrated with the 2.2 mm template.

5. Pull off the connector from the controller board.
6. Press down snap-in pins (from the inside) and tilt the pump forward and unhinge.
7. Assembly is done in reverse order.

## CAUTION

Due to the improved occlusion sensor the finger pump to be installed is dependent on the controller board and the software.

## Note

Be sure that the cable of the reed sensor and air sensor do not hinder the function of the occlusion sensor and the monitoring of the motor speed (slot disc).

The complete pump unit (pump without motor, pump cover, membrane, boards) was calibrated by B.Braun. After a complete exchange the unit data and user data must be entered in the service program again as the data memory is on the pump board:

8. Enter unit and user data in the EEPROM.
  - Serial number according to the type plate
  - DIANET type number according to the type plate

If necessary enter:

  - Drug name
  - Ward identification
  - Alarm tone

- Delivery rate min./max.
- Air alarm: air bubbles in ml and air rate in ml/h respectively
- User language
- Special functions (ON/OFF)
- Menu
- Staff call type

**Note**

If data is not entered, "Calibration Defective" may be displayed after the unit is switched on again.

9. After ending the service program save the data.

The counters for operating hours, battery operation and pump head cycles are reset to zero when the pump unit is exchanged. If "Calibration Defective" is displayed, select the service program and quit with "Save? Yes".

**Check**

Safety check, pump unit check.

#### 4.11 Occlusion Sensor

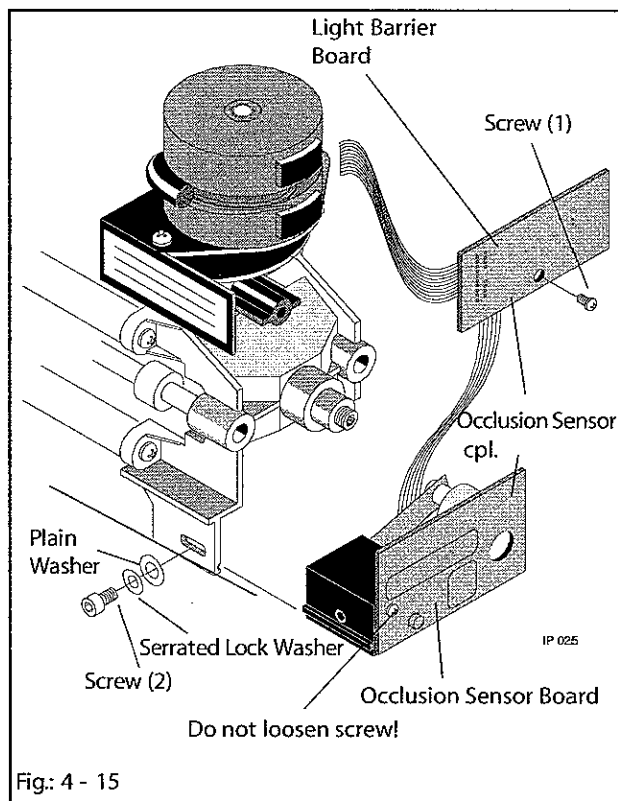


Fig.: 4 - 15

#### Test Equipment

Template 2.2 mm .....	770 5034
Calibration device .....	770 501A

#### Designation

Occlusion sensor (cpl.) .....	3452 0619
-------------------------------	-----------

#### Exchange

##### CAUTION

The occlusion sensor unit is mechanically very sensitive. It must not be dismantled, which means that the occlusion sensor board and the spring element must not be detached from the occlusion sensor support (plastic part). Make sure that the movement of the coil core inside the coil is not hindered.

The occlusion sensor consists of the light barrier board with EE-PROM and the occlusion sensor board with holder. Coil core and bending element are screwed on this holder. Both boards are connected via a flat cable.

1. Dismount the rear panel (see "Rear Panel" pg. 4-7) or the pump unit (see "Pump Unit" pg. 4-12).
2. Pull off the connecting cable to the microprocessor board.
3. Loosen and remove screw (1) of the light barrier board.
4. Loosen screw (2) of the occlusion sensor and remove it together with plain washer and serrated lock washer. Then remove the occlusion sensor with occlusion sensor board and light barrier board.
5. Mount new occlusion sensor.

##### CAUTION

The occlusion sensor to be installed is dependent on the controller board and the software.

##### Note

Make sure that the occlusion sensor slide can smoothly run in the guides and that the coil core can move inside the coil.

6. Calibrate occlusion sensor:
  - a) Call the pressure display in the service program (see "Pressure Sensor Function 310.0" pg. 3-6).
  - b) Loosen hexagon socket screw (M 3x6) on the occlusion sensor unit (with a 2.5 mm Allen key).

- c) Push the occlusion sensor unit with board slightly forward or backward.
  - d) Tighten the Allen screw.
  - e) The new measurement value will be displayed (repeat if necessary until the value is increased by 15 to 25 digits).
  - f) After calibration return to the initial function with END.
    - Select SAVE NO. (Do not operate the YES key.)
  - g) Switch off the unit.
7. Assembly is done in reverse order.

After a complete exchange the unit data and user data must be entered in the service program again as the data memory is on the lightbarrier board.

8. Enter unit and user data in the EEPROM.
- Serial number according to the type plate
  - DIANET type number according to the type plate
  - If necessary enter:
    - Drug Name
    - Ward identification
    - Alarm tone
    - Delivery rate min./max.
    - Air alarm: air bubbles in ml and air rate in ml/h respectively
    - User language
    - Special functions (ON/OFF)
    - Menu
    - Staff call type

**Note**

If data is not entered, "Calibration Defective" may be displayed after the unit is switched on again.

9. Calibrate occlusion sensor, Ord. No. 3452 0619: (see "Occlusion Sensor Function 500.0" pg. 3-10).
- a) Clean the pump front side.

- b) Place the Vista basic without mains lead and drop sensor and the service plug inserted horizontally (front facing upwards) in the cellular packing of the calibration device.
- c) Call function 500 in the service program (see "Pressure Sensor Function 310.0" pg. 3-6).
- d) Activate the calibration function with "Align".
- e) Select calibration value low "1" by pressing ">>".
- f) Open the pump cover.
- g) Fasten the holders for the calibration weights under the pump cover and let snap in at the locking bow.
- h) Position weight 1 (100 g) for calibration value low "1" (1.04 N) carefully on the occlusion sensor. The weight must be placed without any friction in the holder.
- i) Acknowledge calibration value low "1" with ">>" and set calibration value high "2" with weight 3 (166g).
- j) Acknowledge calibration value high "2" by pressing ">>" and remove weight.
- k) Acknowledge calibration value "3" "Zero point" with "Yes".
- l) Remove the holder.

#### Note

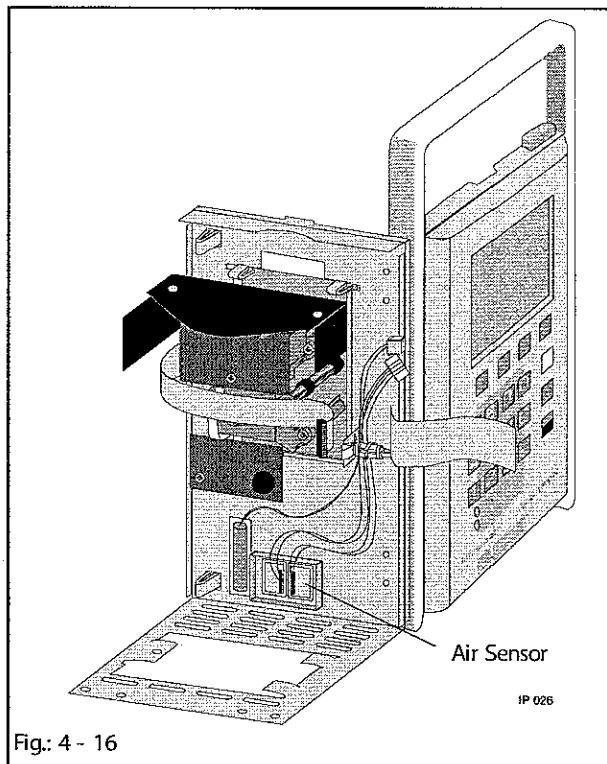
If the calibration values are known the values can also be entered manually.

- m) Call function 500 in the service program (see "Occlusion Sensor Function 500.0" pg. 3-10).
  - n) Open the data entry window with "yes".
  - o) Select Calibration value low "1" and Calibration value high "2" by pressing "<<" and ">>". Enter the calibration values via the keypad and acknowledge with "yes".
  - p) Quit function in the service program and save data.
  - q) Register the changed pressure values in the unit book.
  - r) Check the electronic occlusion pressure (see "Electronic Occlusion Pressure (Occlusion Sensor)" pg. 8-3).
11. Quit function in the service program and save data.
  12. Check the electronic occlusion pressure (see "Electronic Occlusion Pressure (Occlusion Sensor)" pg. 8-3).

#### Check

Safety check, functional check.

## 4.12 Air Sensor



## Designation

## Ord. No.

Air sensor incl. connector ..... 3450 193A

## Exchange

1. Remove battery (see "Battery" pg. 4-1).
2. Dismount housing (see "Housing and Handle" pg. 4-5).
3. Dismount controller board (see "Controller Board" pg. 4-6).
4. Disassemble front panel (see "Front Panel" pg. 4-10).
5. Press the complete sensor from behind and out of the frame.
6. Insert new sensor and seat the cables firmly with cable ties.

## Note

Be sure that the cables of the reed sensor and air sensor do not hinder the function of the occlusion sensor and the monitoring of the motor speed (slot disc).

## Check

After exchange of the air sensor:

- Check the air value, please refer to the TSI-list (see "Technical Safety Inspection TSI" pg. 7-1).
- Check the water value; please refer to the TSI-list (see "Technical Safety Inspection TSI" pg. 7-1).
- Check the calibration value (alarm threshold) and adjust if necessary; refer to the TSI-list (see "Technical Safety Inspection TSI" pg. 7-1).

Safety check, functional check.