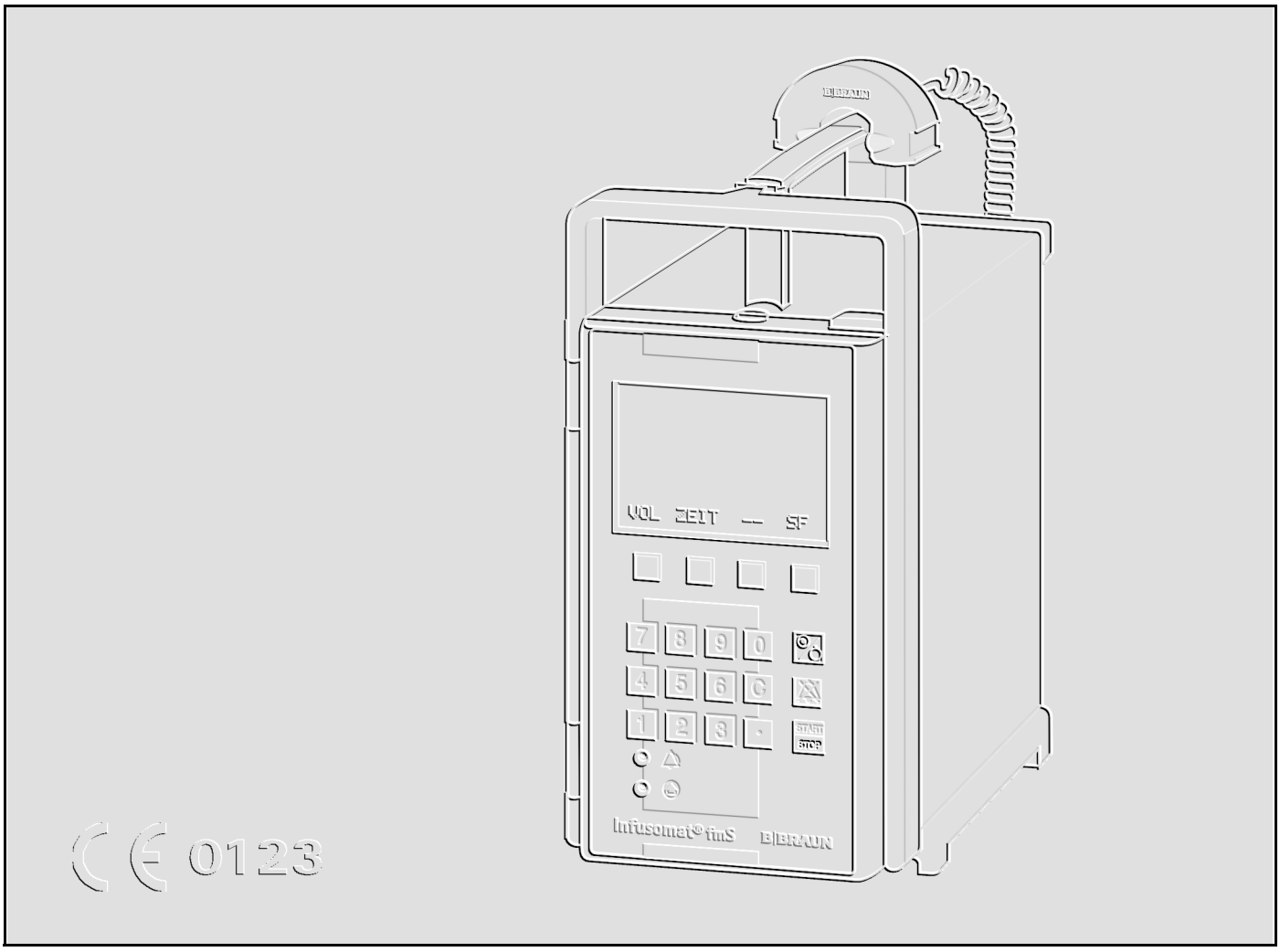
Infusomat® fmS

Service Manual



Version 2.3 English

B|BRAUN
SHARING EXPERTISE

This Service Manual is valid for

Voltage 230 V:	Ord. No.
Infusomat® fmS, German	871 5424
Infusomat® fmS, French	871 5521
Infusomat® fmS, Dutch	871 5530
Infusomat® fmS, Italian	871 5564
Infusomat® fmS, Danish	871 5432
Infusomat® fmS, Norwegian	871 5491
Infusomat® fmS, Swedish	871 5505
Infusomat® fmS, Finnish	871 5513
Infusomat® fmS, Czech	871 5580
Infusomat® fmS, Polish	871 5599
Voltages 200 V / 230 V / 240 V, switchable:	
Infusomat® fmS, English	871 5440
Infusomat® fmS, English	871 5548
Infusomat® fmS, Spanish	871 5459
Infusomat® fmS, Portuguese	871 5467
Infusomat® fmS, Turkish	871 5572
Voltages 100 V / 110 V / 120 V, switchable:	
Infusomat® fmS, English	871 5416
Infusomat® fmS, Dutch	871 5475
Infusomat® fmS, Spanish	871 5483
Infusomat® fmS, Portuguese	871 5394

This Service Manual is available under the following part number:

Designation	Part No.
Service Manual Infusomat® fmS, English	8713 9124

Languages of this Manual

Designation	Part No.
Service Manual Infusomat® fmS, German	8713 9123

The complete Service Manual contains the following pages:

Table of Contents 0

0 Table of Contents

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
- fulfill the personal requirements (training and knowledge).

Technical Safety Checks

The user is obliged to perform or to have performed the Technical Safety Checks on those medial products for which these checks have been prescribed by the manufacturer and to carry them out according to the indications of the manufacturer as well as the generally approved technical standards while adhering to the periods stated (§ 6 MP BetreibV).

B. Braun also recommends training on the Technical Safety Checks, or to perform at least the steps indicated in the current version of the manual, as:

- the TSC 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 which may lead to a dangerous unit condition in case of inappropriate operation. Furthermore, a special service connector may be necessary.

Current Versions

This manual version corresponds to the state when the manual was written. B Braun reserves the right to make technical modifications. The state of the revision is indicated by the index number in the footer of every 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 (fee required).

Responsibility of the Manufacturer

The manufacturer, person who assembles, installs or imports the device can only be held responsible for safety, reliability and performance if

- mounting, enhancements, new settings, changes or repairs are carried out by duly authorized persons,

- the electrical installation in the corresponding room meets the requirements of the VDE 0107, VDE 0100 part 710 or IEC 60364-7-710 and the national standards,
- the device is used in accordance with the instructions for use and the Service Manual,
- the Technical Safety Checks are performed at regular intervals,
- a current manual which corresponds to the revision state is used when carrying out maintenance, repair and service,
- the service technician takes part in the revision service,
- the technician has participated in a technical training course for the specific B. Braun unit.

Quality Management

B. Braun is certified in accordance with DIN EN ISO 9001 and ISO 13485. This certification also includes maintenance and service.

The unit has the CE label. The CE label confirms that the device corresponds to the "Directive of the Council for Medical Products 93/42/EC" of June 14, 1993.

Checks and Repair

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.

After repair a device check or diagnosis is to be carried out.

Notes on ESD

Semiconductors can be destroyed by electrostatic discharge. Especially MOS components can be damaged by interference from electrostatic fields, even without discharge via contact. This type of damage is not immediately recognizable. Unit malfunctions can even occur after a longer period of operation.

Each workstation must be equipped according to the recommendations with the necessary static protective measures, if ESD components or boards are handled.

Each workstation must be equipped with a conductive table surface. The conductive surface, the soldering iron or the soldering stations must be grounded via protective resistors.

Chairs must be of antistatic design. The floor or floor mats should be of electrically conductive material.

Personnel must wear conductive wristbands which are connected to a central ground potential via protective resistors, e.g. the ground contact of a wall outlet. Furthermore it is recommended that personnel wear cotton clothing and electrically conductive shoes to prevent electrostatic charge.

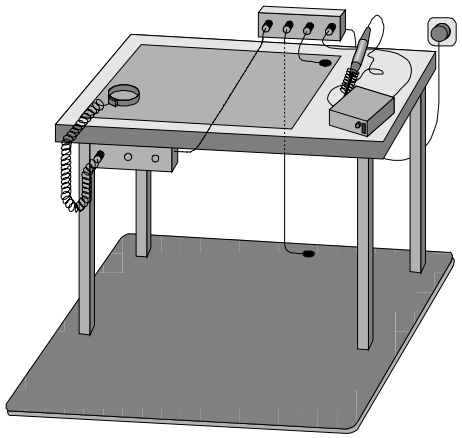


Fig.: 0 - 1

Spare Parts and Test Equipment

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 Section 9.

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

Setting Off

Additional notes and warnings are set off as follows:

Note

Is used for additional or special notes concerning 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.

References to chapters are shown as follows
(see "Setting Off" ➨ pg. 0 - 8)

References to figures and tables are shown as follows
Fig.: 2 - 3 or Table 2 - 1

References to item numbers in figures are shown as follows
(Fig.: 1 - 1 / Item 1)
In this case "Fig.: 1 – 1" is the figure number and "Item 1" the item number within the figure.

When the Service Manual is stored as pdf-file, these references are displayed green. Click with the mouse button on a reference to jump to the corresponding source.

Menu commands are described as:
Menu *File*.

List of Abbreviations

Abbreviations which are not generally known, but are used in this manual, are listed below.

CC	Computer Controlled
CLR	Clear
Dig	Digit
ESD	Electrostatic Discharge
UA	Unit Alarm
FuP	Function Microprocessor
KuP	Control Microprocessor
LCD	Liquid Crystal Display
OIL	Original Infusomat Line
PCA	Patient Controlled Analgesia
TSC	Technical Safety Check
TEMP	Temperature

Contact Persons 0

Technical Training

Via local representative.

Entry for Technical Training

Application for a technical training course must be made via the responsible representative.

Ordering of Spare Parts and Test Equipment

Please contact your local B. Braun subsidary.

International Technicians (Intercompany)
Nadja Machal
Fax: +49 5661 / 75 -47 89
e-mail: nadja.machal@bbraun.com

Service Hotline

Karl Tippel, Tanja Kördel
Phone: +49 5661 / 71 - 35 25
Fax: +49 5661 / 71 - 35 26
e-mail: karl.tippel@bbraun.com
e-mail: tanja.koerdel@bbraun.com

Return of Spare Parts and Test Equipment

B. Braun Melsungen AG
Schwarzenberger Weg 73-79
Wareneingang Werk C
34 212 Melsungen
Germany

Safety Officer (§ 30 MPG)

Dr. Ludwig Schütz
e-mail: ludwig.schuetz@bbraun.com

Translation

Brückner GmbH, Germany

0 Contact Persons

For your notes:

System Overview 1

Physical Construction

The Infusomat® fmS is a compact volumetric peristaltic infusion pump.

Standard delivery rate range 0.1 to 999.9 ml/h

The unit is operated via a membrane keyboard. It is equipped with an LCD-display (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.

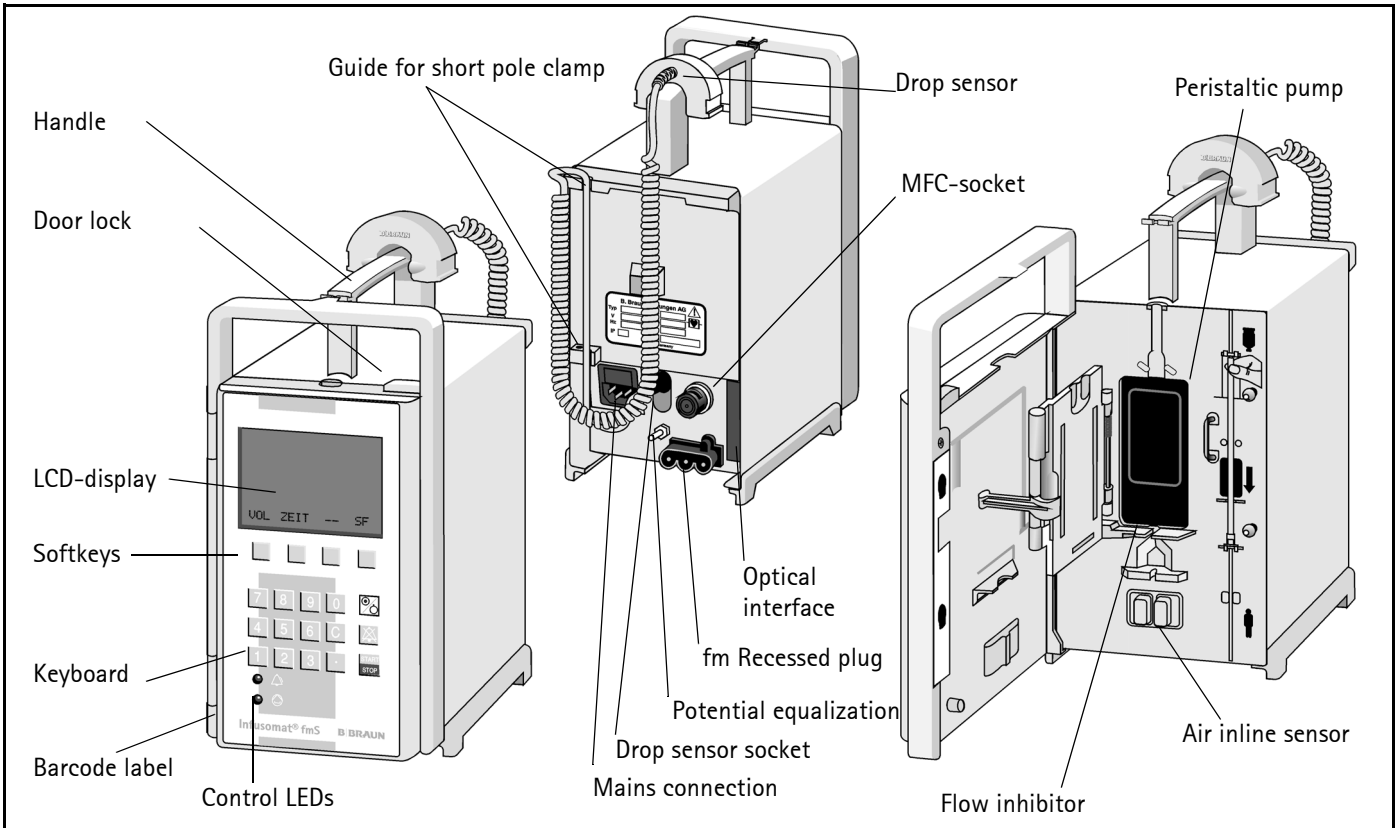


Fig.: 1 - 1 Unit design Infusomat® fmS

Barcode

A barcode label is attached to the left front side of new Infusomat® fmS 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 Infusomat® fmS is operated in an fm-system.

Infusion Lines

The Infusomat® fmS can be operated with the Original Infusomat® Line (OIL) and the Infusomat® Space Line. The lines are distinguished by the different silicone pump segments. They have to be inserted in a different way; in addition the TSC differs.

WARNING

OPERATING THE UNIT ALTERNATELY WITH THE ORIGINAL INFUSOMAT® LINE AND THE INFUSOMAT® SPACE LINE IS NOT RECOMMENDED.

Note

Please observe the "Instruction for Technical Service - Adjustment to Space Line" when using the Infusomat® Space Line for the first time.

Operation Flow Chart

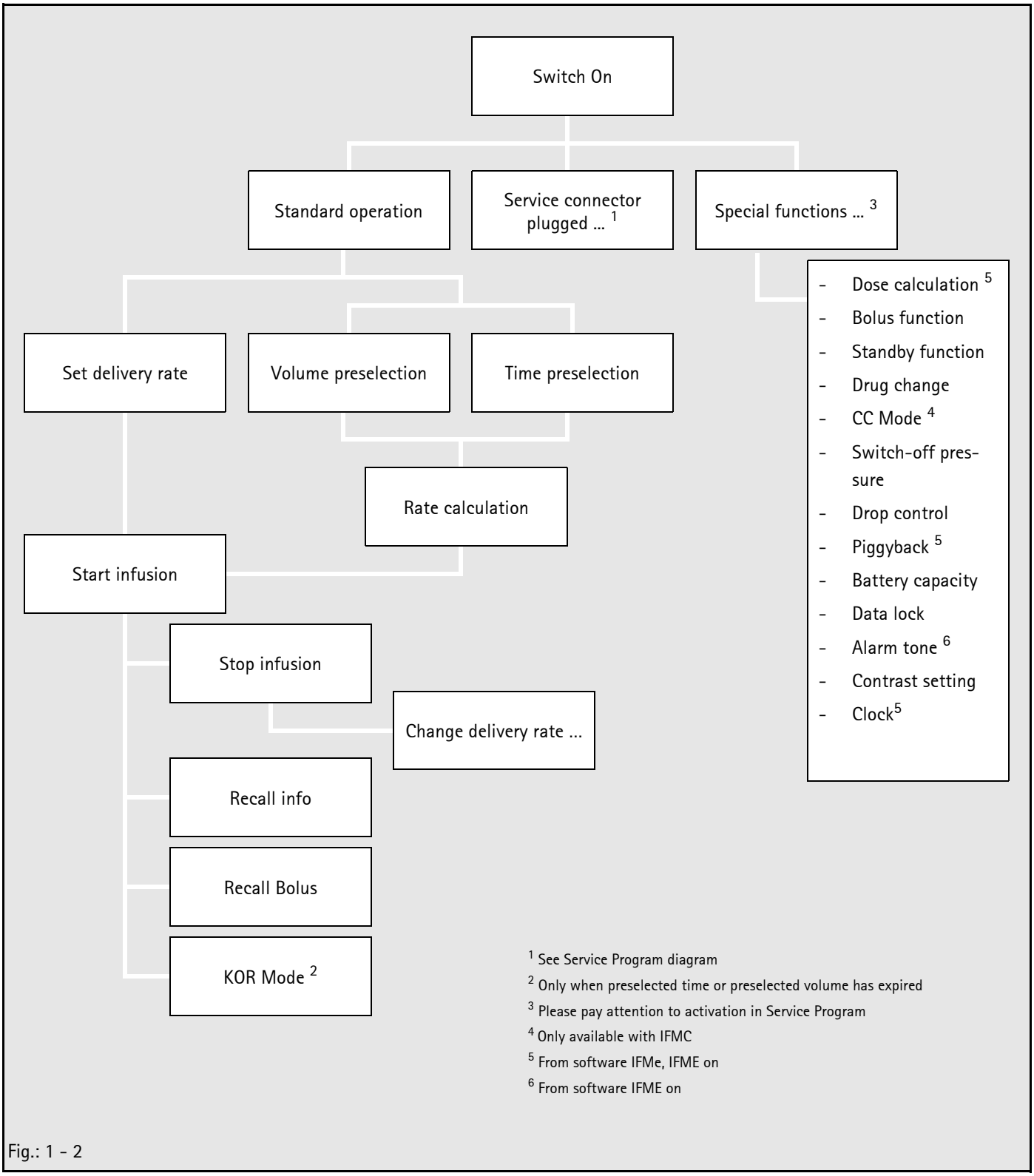


Fig.: 1 - 2

See instructions for use for detailed information.

1 System Overview

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 microprocessors and the results are counter checked (CF- and FC-latch).

The input via the keyboard 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“ ➪ p. 1 - 6).

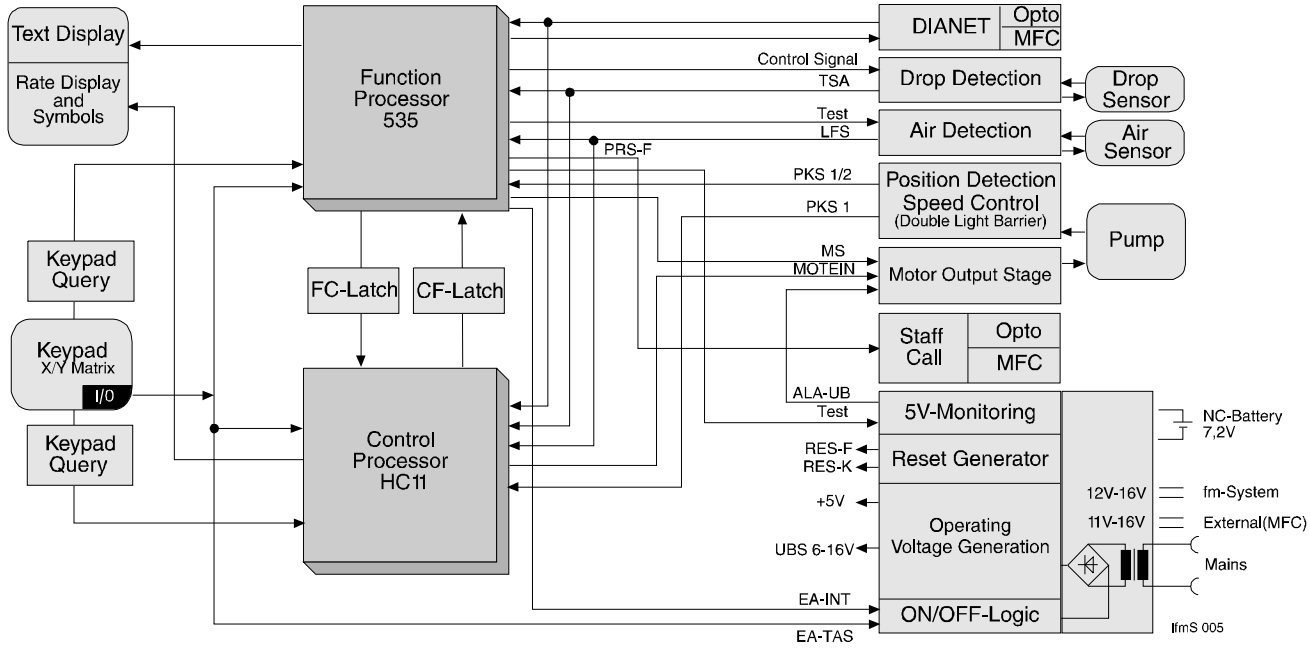


Fig.: 1 - 3 Block diagram

Voltage Supply

The voltage supply is generated either directly from mains, via the FM connector (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-connector. 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 UPS, 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 UPS 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 driver 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.

1 System Overview

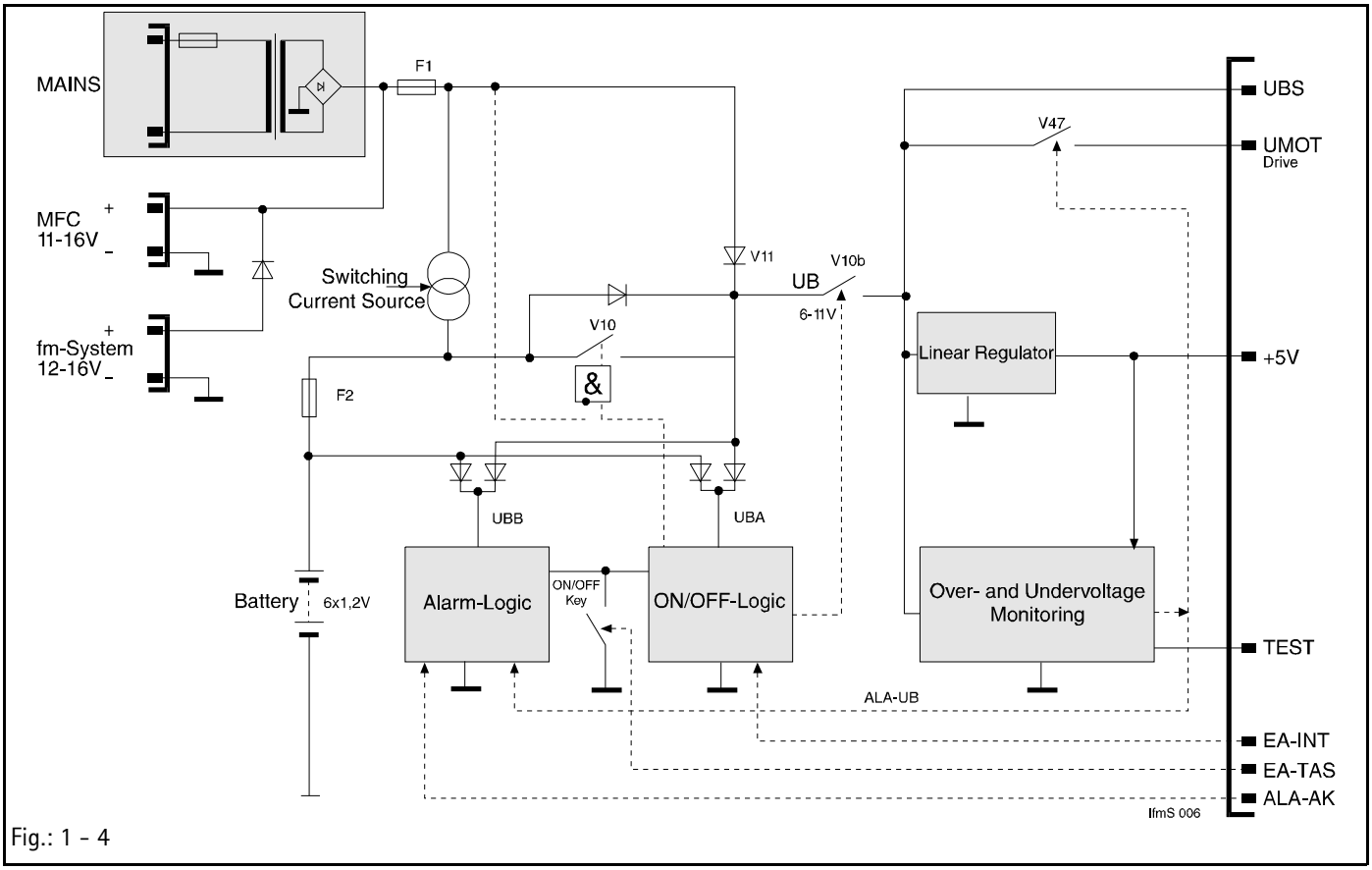


Fig.: 1 - 4

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
E/A-TAS	ON/OFF Key	SCK	Serial Data Clock

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

Signal	Meaning	Signal	Meaning
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	UPS	Switched Operating Voltage UB
PH2	Phase 2	UPS-M	UPS 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 charging, the voltage supply is maintained. In this case only a battery balance is carried out, because a key was not pressed. The current battery capacity and the battery operting 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 Infusomat® fmS is switched off in mains operation with the ON/OFF key, the internal mains voltage is still present.

In mains operation battery function is checked during the switch-on test. Therefor the charge and discharge current are measured and the charging of the battery is interrupted for the duration of measurement.

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 switch-on test. The theoretical load condition is read from the clock module of the battery. Then the battery is connected to UPS 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 via ALA-AK (control channel) or via ALA-UB. The alarm volume is about 65dBA.
- 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 Infusomat® fmS, e.g. open pump cover during operation.

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 Infusomat® fmS 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.

Computer Interface

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

Up to software version IFMC: DIANET
From software version IFMe, IFME on: Dianet^{Star}

1 System Overview

Braun fluid manager system (fm system)

The Infusomat® fmS 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

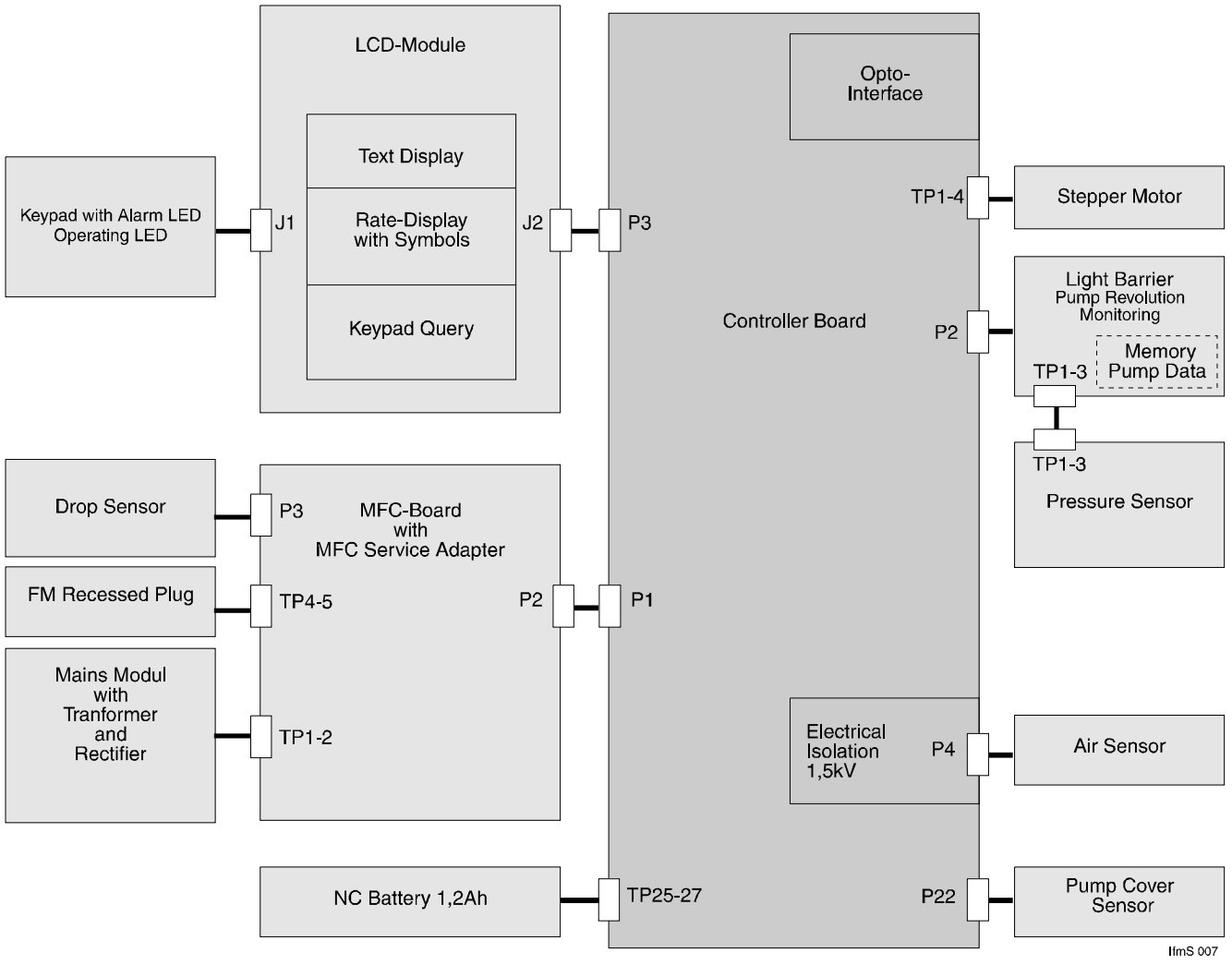


Fig.: 1 - 5

Accessories

General

Designation	Ord. No.
Mounting clip for drop chamber "TK 2000"	3477 3223
Mounting clip for drop chamber "Intrafix air"	3477 3215
Drop sensor, complete	3450 578A
Short pole clamp	3450 5873
Drop chamber holder	3477 3088
Mains lead (200-240V~)	3450 2718
Mains lead (100-120V~)	3450 5423
Mains lead USA / CAN	3450 5393
Universal clamp, complete	3450 5857
Pole clamp (universal clamp, rotating)	3450 9054

For your notes:

Software 2

Software Update

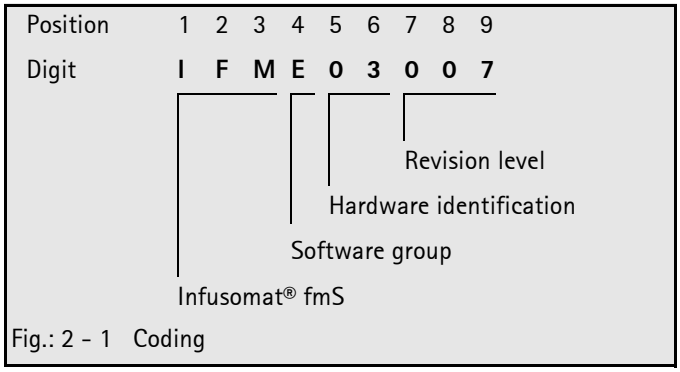


Fig.: 2 - 1 Coding

Designation	Ord. No.
Update kit IFMC02003	3450 645A
Update kit IFMe02004 / IFME03004	3450 645C
Update kit IFMe02005 / IFME03005	3450 645D
Update kit IFMe02006 / IFME03006	3450 645E
Update kit IFMe02007 / IFME03007	3450 645F
MFC interface line	0871 1661

The higher digit always replaces the lower digit for the revision level, e.g. IFME02007 replaces IFME02006.

Units with an old software version (e.g. IFMC02001) can be updated to the new software version IFME03007.

When the software group changes 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. IFME) is to be found on the cover page of the instructions for use.)

Note

Do not use an update program on Windows NT systems.

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 IFMC02003 to IFMC02001!).

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!

2 Software

Approved Software Versions

IFMC02001

- Basic software
  (Must not be used any more. Please contact the Technical Service of B. Braun).

IFMC02002

- Error elimination
  at Bolus special function
  at staff call on the fm system
- Optimized air sensor evaluation

IFMC02003

- EMC optimized
- New error code FF16, defective membrane keyboard

IFMe02002

- Preselected volume and time counted down to 0
- Interface changed to DIANET Star
  (not compatible with Dianet)
- New special function dose calculation
- New special function Piggyback
- New special function clock
- Storage of alarms in case of malfunctions, which can be re-called in the Service Program, function 230

IFME03002

Only controller board with loudspeaker (see „Controller Board“ ➪ p. 4 - 5).

Like IFMe02002 and in addition:

- Alarm volume can be set
- History function

IFMe02003

- Dianet Star corrected

IFME03003

- Additionally History corrected
- Log of volume delivered
- New event: normal mode / piggy mode

IFMe02004 / IFME03004

- Optimized dose calculation
- New language “Hungarian” in language group E

IFMe02005 / IFME03005

- Cyclical battery test
- Retaining or deleting last dose calculation when unit is switched off, can be set in the Service Program

IFMe02006 / IFME03006

- Optimized switch-off cycle of Service Program

IFMe02007 / IFME03007

- Reset the battery capacity from 0 mAh to 1 mAH in the event of a negative battery test result.
- Reset the battery voltage acceptance thresholds from 7.55 V to 7.35 V.

Error Messages and Alarms

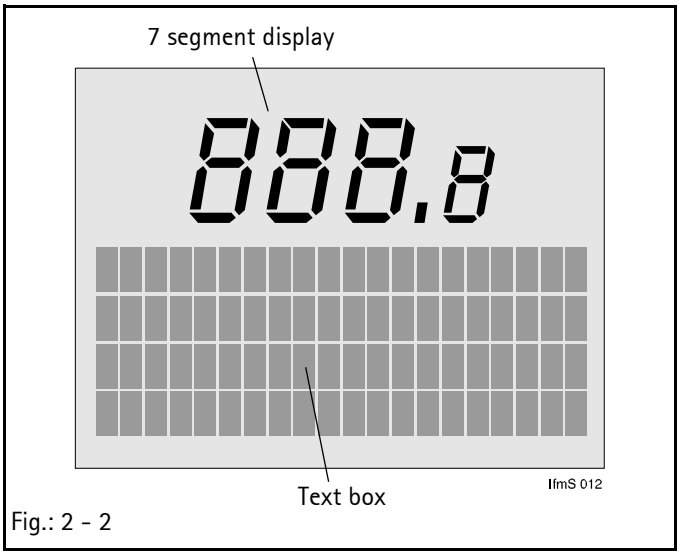


Fig.: 2 - 2

Alarms of the function processor 80c535 are displayed in the text box of the LCD-display. 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 box as "Unit Alarms" in the selected language. Additionally the error number is displayed in the text box.

Function Processor 80c535

Text Box	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 keyboard 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 ROM

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
FF05	defective program memory
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)
FF16	defective membrane keyboard (from IFMC02003 on)

Table 2 - 2

Software Default Values **Unit No.:** _____

	Menu Item	Default	Customer Setting
Standard function	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 0	blank	_____
	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	_____
	Maximum air bubble	0.30 ml	_____
Special functions	Dose calculation	deactivated	_____
	Bolus	deactivated	_____
	Standby	activated	_____
	Drug selection	deactivated	_____
	CC Mode [2)]	deactivated	_____
	Switch-off pressure	activated	_____
	Drop control	deactivated	_____
	Piggyback[1)]	deactivated	_____
	Battery capacity	deactivated	_____
	Data lock	deactivated	_____
	Alarm tone [1)]	deactivated	_____
	Contrast	deactivated	_____
	Clock [1)]	deactivated	_____
SM menu	Interval Bolus dose	Off	_____
	Online rate setting	On	_____
	Double rate entry	Off	_____
User data	Switch-off pressure	high	_____
	Contrast	optimum contrast	_____
	CC Address[2)]	1	_____
	Drug	0	_____
	Data lock	Off	_____
	Standby time	24h 00min	_____
	Drug control	On	_____

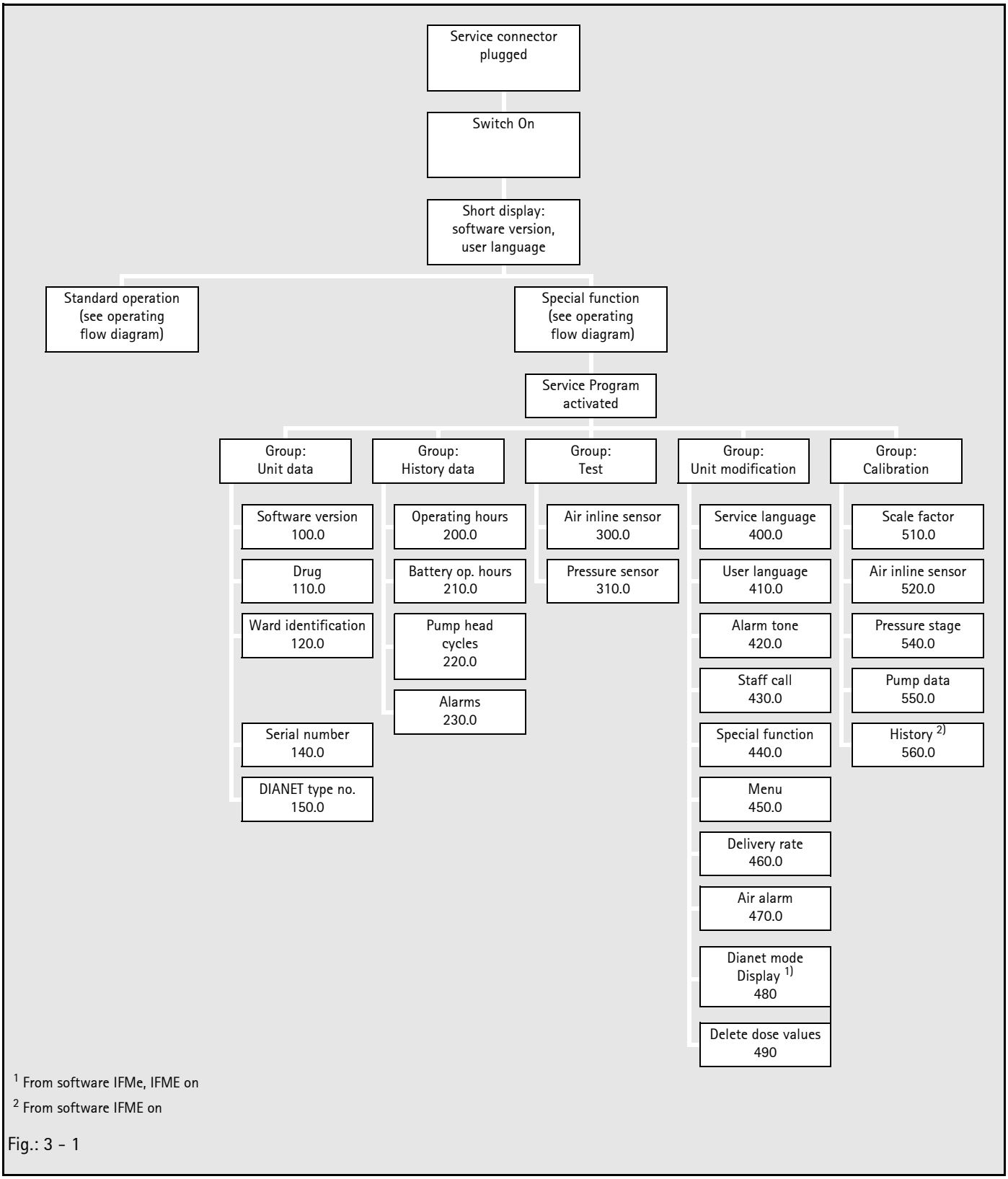
[1)] From software IFMe, IFME on
[2)] No longer available in software IFMe, IFME

	Menu Item	Default	Customer Setting
	Bolus key	On	_____
	Bolus rate	999.9 ml/h	_____
Calibration data	Air sensor calibration value	182 mV	must not be changed
	Scale factor	54	_____
Unit specific data	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	_____

For your notes:

Service Program 3

Structure of the Service Program



[1] From software IFMe, IFME on

[2] From software IFME on

Fig.: 3 - 1

3 Service Program

Additional Functions with Plugged Service Connector

Software Version and User Language

1. Plug service connector on 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 language are displayed in the LCD-display.
4. The unit is switched on when the ON/OFF button is released.
5. ** appears in the LCD-display if the service connector is plugged.

Two LEDs are integrated in the service connector:

- green = Power supply active
- red = Alarm

The following conditions are activated:

- The operating alarms are muted.
- All special functions are accessible (including the disabled).
- The special functions are slightly modified. (Example: SM battery capacity has keys 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.

Contrast Setting

1. Select "Contrast Setting" with the SM key. The softkey symbols will flash.
2. Set display contrast with the (+) or (-) key.
3. Return to main menu with END.

Disabling the Pressure Sensor (Occlusion Pressure Mechanical)

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

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

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

Start / Quit the Service Program

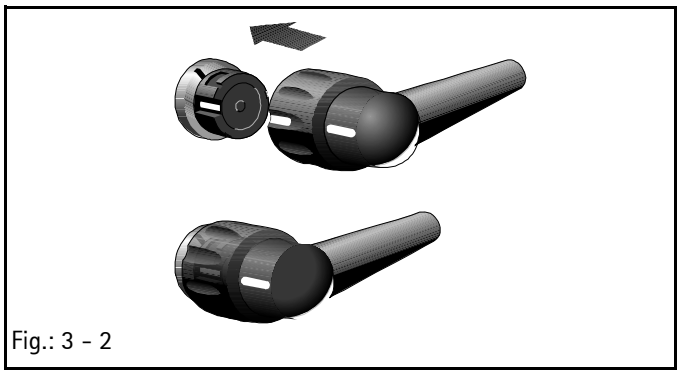


Fig.: 3 - 2

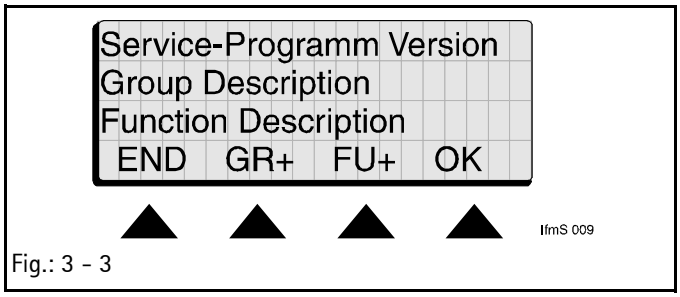


Fig.: 3 - 3

Activate the Service Program

1. Plug service connector on 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 unit and remove service connector.

Note

Disconnect the unit 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-display:
   - User program version with date
   - Language with text version. Further languages with (+).
   - Service Program version
   - Service language with text version
3. Return to initial function with END.

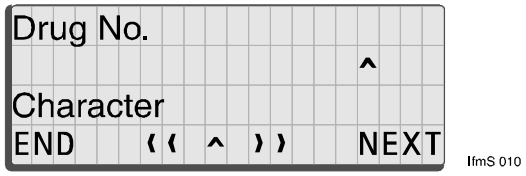


Fig.: 3 - 4

Drug Name **Function 110.0**

Memory for maximum 10 drugs and 20 characters per name.

1. Display stored drug names with 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 procedure for each character.
5. Return to 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 procedure for each character.
3. Return to initial function with END.

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 interface mode.

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

History Data

Operating Hour Counter **Function 200.0**

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

Battery Operating Hours **Function 210.0**

1. OK activates the display.

2. Return to 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 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 operating alarms with CLR.
4. Return to initial function with END.

Unit alarms will also be displayed from software version IFMe, IFME on

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	CC alarm (interface)
7	KOR end alarm
8 to 14	free
15	Operating alarm

Fig.: 3 - 5

Test

Air Inline Sensor **Function 300.0**

After exchange check the function of the air inline sensor.

See TSI-List for permissible check values (see „Technical Safety Check TSC“ ➪ p. 7 - 1).

1. Press OK. The received signal amplitude is displayed as a measured 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 initial function with END.

Pressure Sensor **Function 310.0**

Test Equipment

Calibration gauge 4 mm

(see „Test Equipment and Special Tools“ ➪ p. 9 - 1)

1. Push in the bottom slide of the finger pump.
2. Activate function with OK button.
3. Open unit door.
4. Note value measured by the pressure sensor (actual value).
5. Insert the 4 mm calibration gauge and close unit door.
6. The measured value read on the pressure sensor must be 5 to 15 digits above the value noted.
7. Quit function with END.

Note

If the 5 to 15 digits are not reached, the pressure sensor unit must be mechanically adjusted (see „Pressure Sensor“ ➪ p. 4 - 14).

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 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 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.

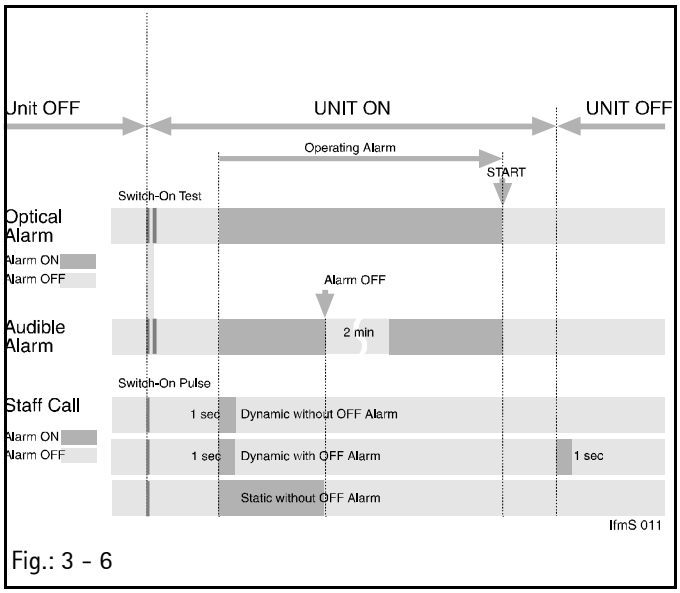


Fig.: 3 - 6

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

- the staff call is connected and
- the Infusomat® fmS 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 initial function with END.

Staff Call **Function 430.0**

Different staff call modes can be selected:

- 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 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 - 2.

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

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

Air Alarm **Function 470.0**

The air inline 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 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.

Deleting Dose Data — Function 490.0

When this function is activated operation can be continued with the dose data of the previous therapy.

Calibration

Note

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

Scale Factor — Function 510.0

The scale factor can be set in the limits 40 to 99 digits. 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.

A test infusion line (OIL test infusion line with an Infusomat® fmS adjusted for the Original Infusomat® line, and a Space calibration line with an Infusomat® fmS set for the Infusomat® Space Line is to be used for determining the correction value (see „Test Equipment and Special Tools" ➪ p. 9 - 1).

1. OK activates the function.
2. The value can be changed with the entry keyboard (see „Delivery Accuracy" ➪ p. 8 - 6).
3. Acknowledge with YES.
4. Return to initial function with END.
5. Quit the Service Program and save changes with YES.
6. Switch on unit and check delivery rate (see „Delivery Accuracy" ➪ p. 8 - 6).
   If necessary repeat the delivery rate measurement.

Air Inline Sensor **Function 520.0**

Alignment or check of the air inline sensor value (alarm threshold) (see „Air Inline Sensor“ ➪ p. 4 - 17).

1. OK activates the function.
2. Press OK again to activate the air inline sensor value.
3. The value can be changed with the entry keyboard.
4. Acknowledge with YES.
5. AIR SENSOR IS SET acknowledges the entry.
6. Return to initial function with END.
7. Quit the Service Program and save changes with YES.

Occlusion Level **Function 540.0**

Calibrate (see „Pressure Sensor“ ➪ p. 4 - 14).

Pump Data **Function 550.0**

Note

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

History **Function 560.0 ***

The history function can be activated or deactivated.

1. Press OK key twice to activate the function.
2. Select the history function with NEXT.
3. ON activates the function. The history protocol memory is initialized (the current software version and the serial number are registered).
   Press OFF key to deactivate the function. The history protocol memory is deleted.
4. Return to initial function with END.

Note

See instructions for use for detailed information.

* Only software IFME

Unit Elements 4

4.1 Mains Fuses

Designation	Ord. No.
Fuse T 0.16 A for 200 / 230 / 240 V (10 pcs.)	3477 2847
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 fuses and press in fuse holder. Only use recommended fuses.

Check

Safety check, functional check.

4.2 Battery

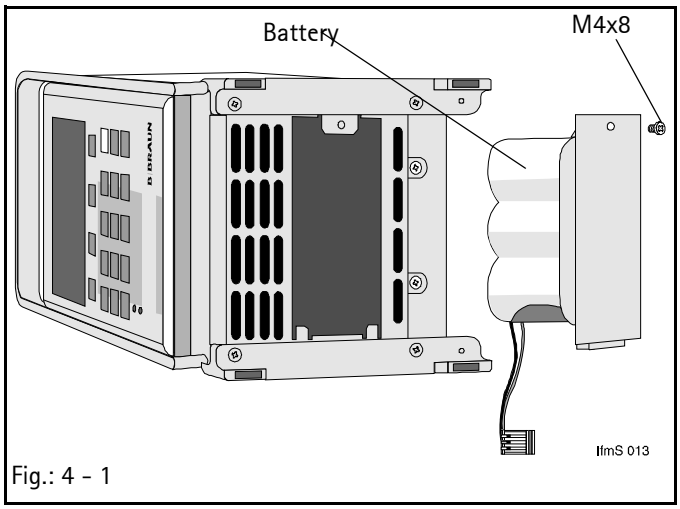


Fig.: 4 - 1

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 battery compartment cover and remove battery.
3. Pull off battery connector.
4. Assembly is done in reverse order.
5. After having exchanged the battery the Infusomat® fmS 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 Melsungen AG, Wareneingang.

Check

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

4.3 Door Lock

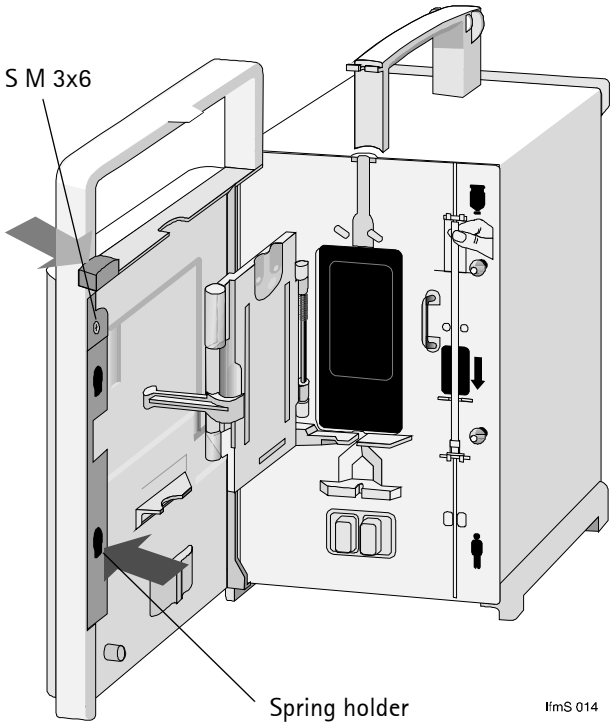


Fig.: 4 - 2

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

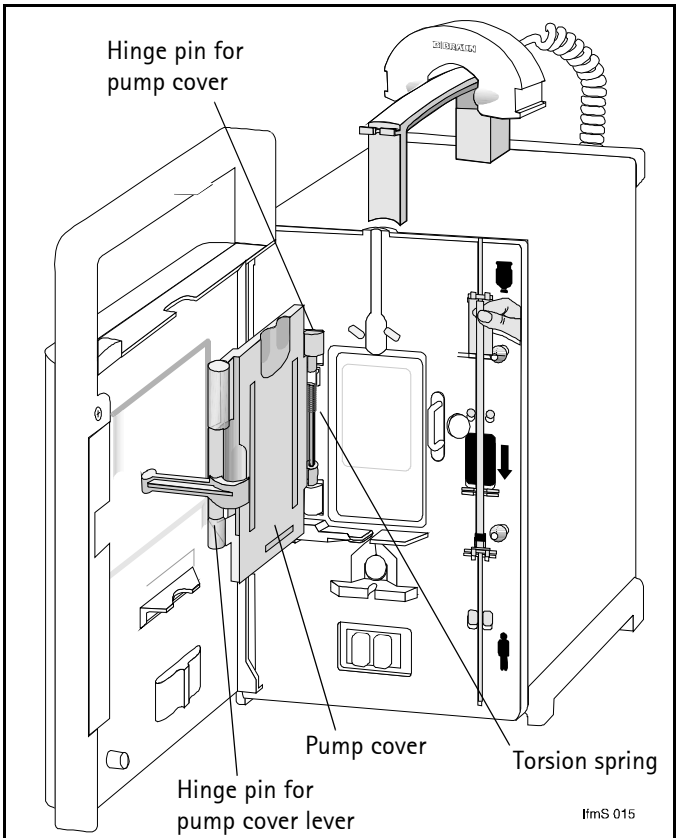


Fig.: 4 - 3

Designation	Ord. No.
Pump cover with lock	3450 5717
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, 4 mm gauge

1. Open door and remove hinge pin with pin punch (1.8 mm) from below. Do not lose torsion spring.
2. Disassemble pump cover.
3. Insert torsion spring in new pump cover. Insert hinge pin with pin punch (6 mm) from above.
4. Check pressure sensor with 4mm gauge in the Service Program, and calibrate, if necessary.

Check

Safety check, pump unit check.

4.5 Housing and Handle

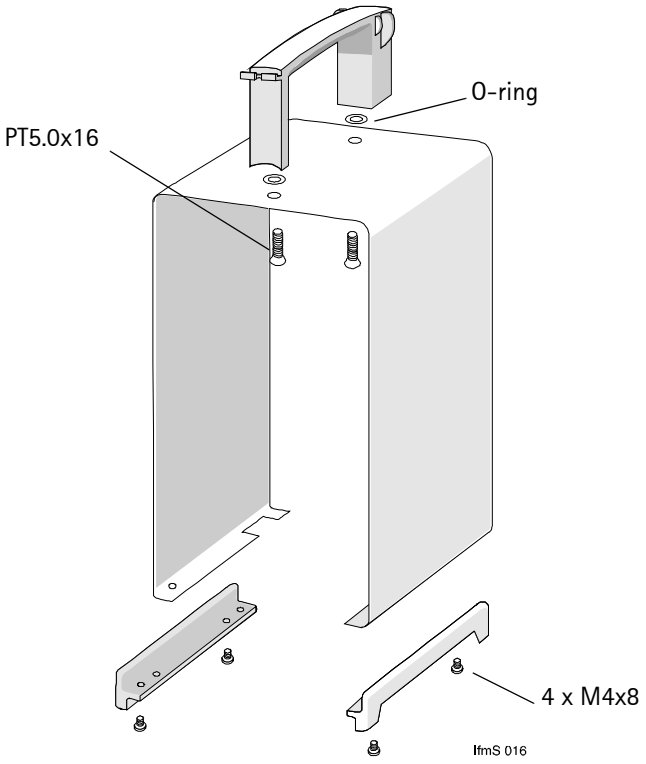


Fig.: 4 - 4

Designation	Ord. No.
Housing labelling	
German	3450 1843
French	3450 2130
Dutch	3450 2149
Italian	3450 2157
English	3450 2165
Spanish	3450 2173
Danish	3450 2181
Norwegian	3450 2190
Swedish	3450 2203
Finnish	3450 2211
Portuguese	3450 2220
Czech	3450 2238
Polish	3450 2246
Turkish	3450 2459
Foot stand complete with rubber feet	3450 5415
Rubber feet (20 pcs.)	3477 3096
Unit handle with O-rings and PT screws	3450 1789

Exchange

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Loosen 4 screws from the foot stands and remove foot stands.
3. Remove safety seal from rear panel, break tamper-proof cap and remove screw.
4. Slidly widen the sides at the bottom of the housing and pull off to the top.
5. Assembly is done in reverse order. To do so, place unit on front side.
6. Safety seal the rear panel screw after functional check.

Check

Safety check.

4.6 Controller Board

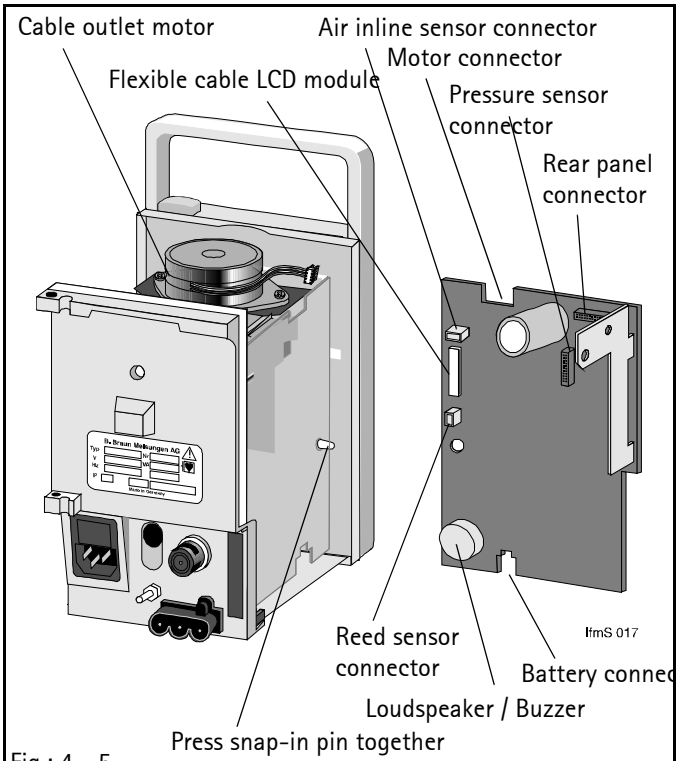


Fig.: 4 - 5

Designation	Ord. No.
Distance sleeve	3450 3366
Buzzer	3450 3447
Loudspeaker	3450 8848

Controller board with buzzer, raw material no. 3810 7651, software IFMC, can be updated to software IFMe:

Language Group*	New Part	Exchange
A	Ord. No.:3450 1967	Ord.No.:3488 0844
B	Ord. No.:3450 1975	Ord.No.:3488 0852
C	Ord. No.:3450 1983	Ord.No.:3488 0860
D	Ord. No.:3450 1991	Ord.No.:3488 0879
E	Ord. No.:3450 2033	Ord.No.:3488 0887

Controller board with loudspeaker, volume control and history function, raw material no. 3810 7996, software IFME:

Language Group*	New Part	Exchange
A	Ord. No.:3450 8759	Ord. No.:3488 1019
B	Ord. No.:3450 8708	Ord. No.:3488 1190
C	Ord. No.:3450 8716	Ord. No.:3488 1204
D	Ord. No.:3450 8724	Ord. No.:3488 1212
E	Ord. No.:3450 8732	Ord. No.:3488 1240

The controller boards (raw material no. 3810 7651 and 3810 7996) are completely compatible.

This allows older units to be upgraded with the new features (loudspeaker, volume control, and history function) without any problems. In this case the controller board must be ordered as new part.

Exchange

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Dismount cover (see „Housing and Handle“ ➪ p. 4 - 4).
3. Press snap-in pin together at the distance sleeves and remove board carefully.
4. Pull off connector (see figure).
5. Exchange board or buzzer.

* Language Group:
A German, French, Dutch, Italian
B English, Dutch, Spanish, Castellano
C Danish, Norwegian, Swedish, Finnish
D Spanish, Portuguese, English, Turkish
E Czech, Polish, German, English

6. Assembly is done in reverse order. Be careful with the optical components. Insert board in 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 whether the correct board (risk of mix-up) was assembled.

Check

Safety check, functional check.

4.7 Rear Panel

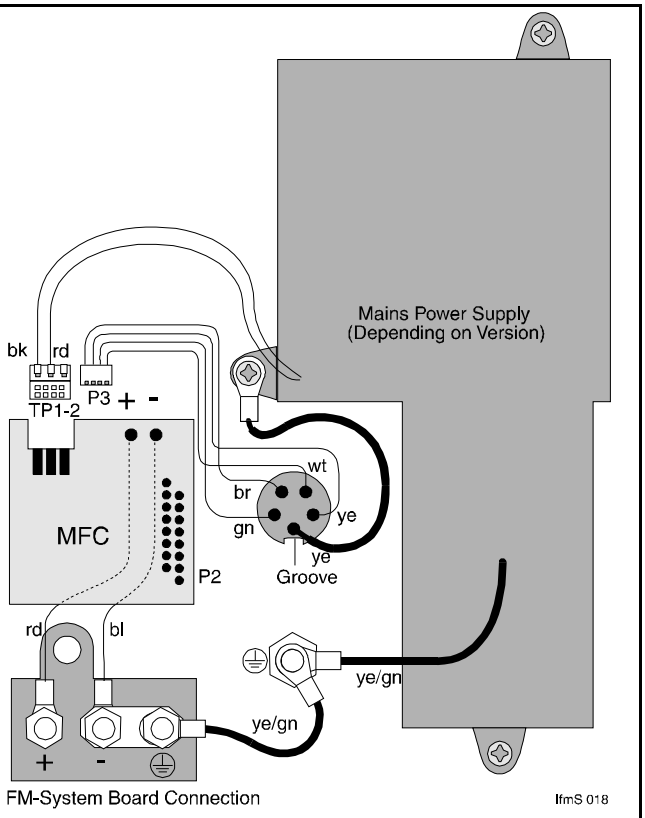


Fig.: 4 - 6

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
Plain washer 3.2 (20 pcs.)	3477 3193
Power supply module 200/230/240 V	3450 1886
Power supply module 100/110/120 V	3450 1894
Power supply module 230 V	3450 1908
Drop sensor socket incl. cable and plug	3450 1878

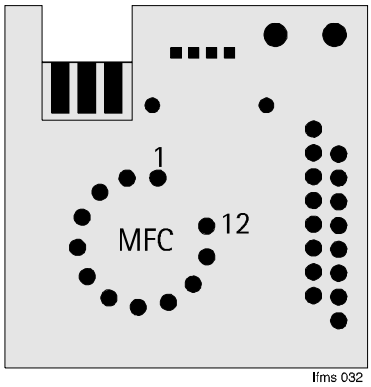


Fig.: 4 - 7

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 -series resistance
Pin 5	Ub	Output supply voltage
Pin 6	MFC-KAD	Analog input K
Pin 7	Emergency Off	Input interface
Pin 8	MFC-FAD	Analog input F
Pin 9	Tx	Transmit line interface
Pin 10	STB	Output with 470 -series resistance, activation of MFC circuit
Pin 11	Rx	Receive line interface
Pin 12	Uext+	Input of external supply voltage

Table 4 - 1 MFC pin assignment

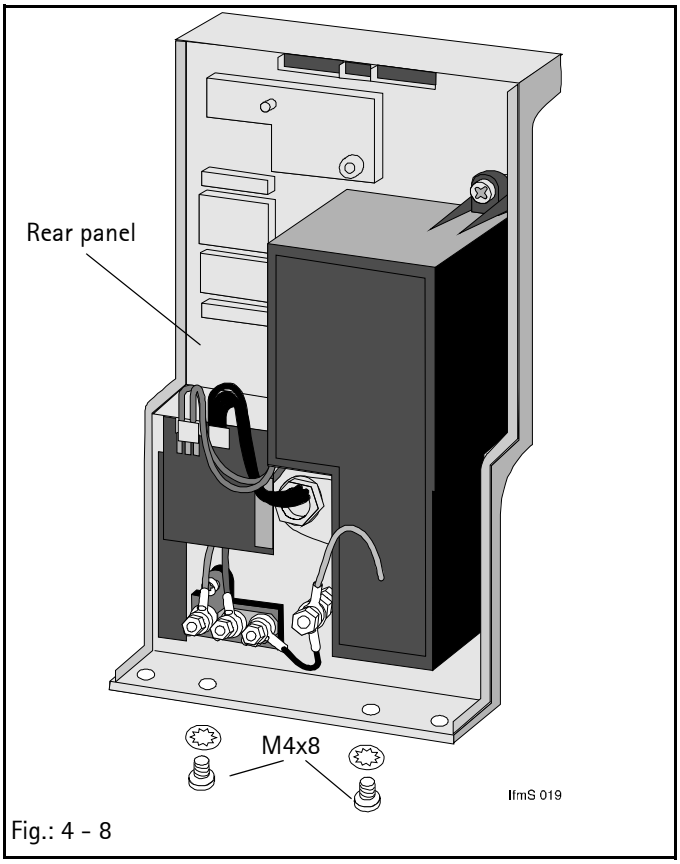


Fig.: 4 - 8

Exchange Rear Panel

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Dismount cover (see „Housing and Handle“ ➪ p. 4 - 4).
3. Pull off rear panel connectors and loosen both screws on the unit bottom.

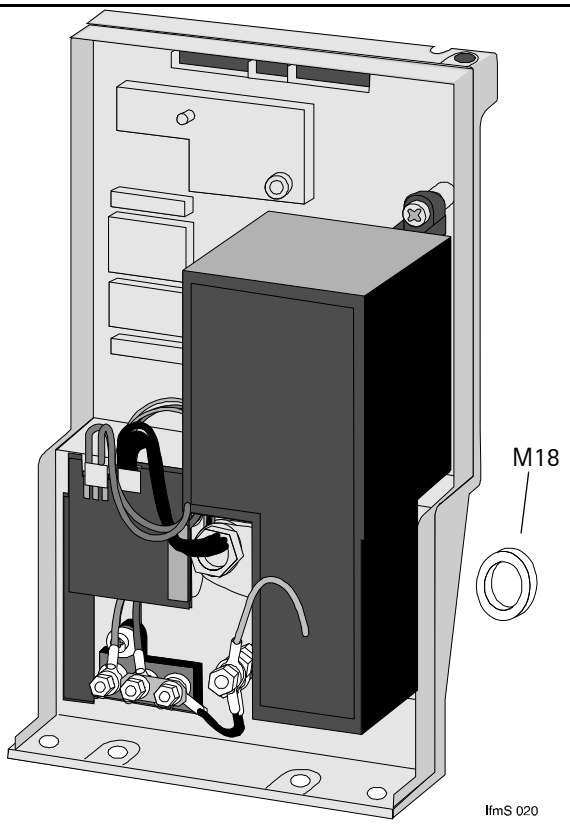


Fig.: 4 - 9

Exchange MFC Connector Board

Tools: Special socket spanner M18

1. Remove nuts at the fm recessed plug (red/blue).
2. Pull off connector to the mains power supply and drop sensor, see Fig.: 4 - 6.
3. Loosen MFC socket with special socket spanner M18.
4. Assembly is done in reverse order.

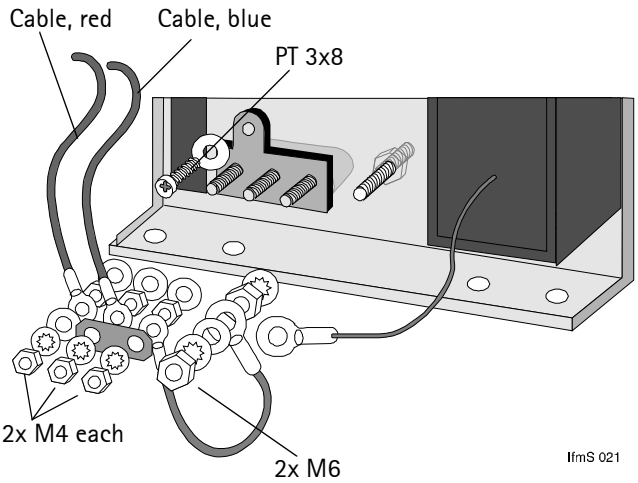


Fig.: 4 - 10

Exchange fm Recessed 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 bolt.

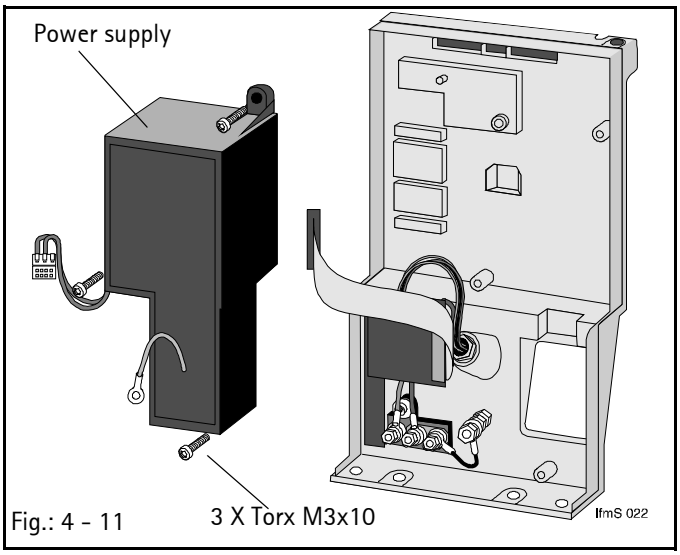


Fig.: 4 - 11

Exchange Mains Module

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 drop sensor socket.
2. Safety lock with Sicomet 50.
3. Make ground connection.

Check

Safety check, functional check.

4.8 Front Frame

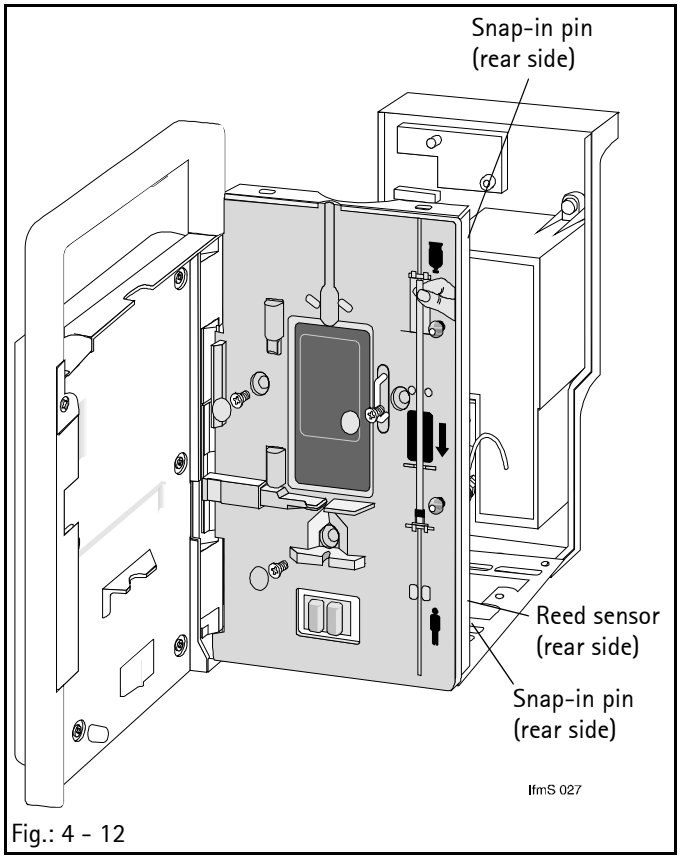


Fig.: 4 - 12

Designation	Ord. No.
Front frame without flow inhibitor and pressure spring	3450 5822
Circular seal 571 mm / 45 mm	3477 3126
Flow inhibitor with pressure spring	3477 3258
Pressure spring for flow inhibitor (5 pcs.)	3477 3266
Tamper-proof caps 10 mm (50 pcs.)	3477 3134
Reed sensor	3450 1754

Exchange

Tools: Pin punch

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Dismount cover (see „Housing and Handle“ ➪ p. 4 - 4).
3. Disassemble pump cover (see „Pump Cover“ ➪ p. 4 - 3).
4. Loosen countersunk screws by piercing a screwdriver through the caps and remove caps.

Note

Do not loosen the assembly screw on the lower pressure sensor board! Otherwise the pump has to be recalibrated with a 4mm gauge.

5. Press Reed sensor out of holder on the rear side, see Fig.: 4 - 13.
6. Press both snap-in pins inwards (rear side top and bottom). Then remove front frame to the front.
7. Remove flow inhibitor with pressure spring and Reed sensors and assemble in new front frame.
8. Insert the seal. Assembly is done in reverse order. Snap-in pins manually. Insert Reed sensor and fasten cables firmly with cable ties.

Check

Safety check, pump unit check.

4.9 Pump Unit

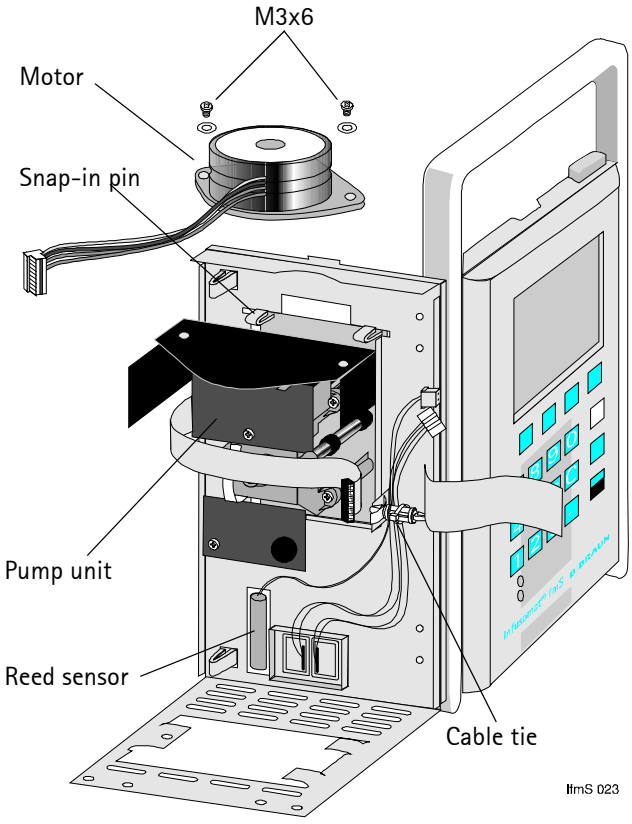


Fig.: 4 - 13

Designation	Ord. No.
Finger pump (without motor) including pump, pump cover, seal membrane and boards	3450 1738
Finger pump (without motor and board) incl. pump, pump cover, and seal membrane	3450 9038
Membrane incl. seal	3450 5733
Motor with pinion for finger pump	3450 1924

Exchange

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Dismount cover (see „Housing and Handle“ ➪ p. 4 - 4).
3. Disassemble front frame (see „Front Frame“ ➪ p. 4 - 11).
4. Loosen motor screws, pull off motor connector and remove motor from pump unit.

Note

Do not loosen the assembly screw on the lower pressure sensor board! Otherwise the pump has to be recalibrated with a 4mm gauge.

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

Note

Be sure that the cable of the Reed sensor and air inline sensor do not hinder the function of the pressure 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 data faulty" 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 data faulty" is displayed, select the Service Program and quit with "Save? Yes".

Check

Safety check, pump unit check.

4.10 Pressure Sensor

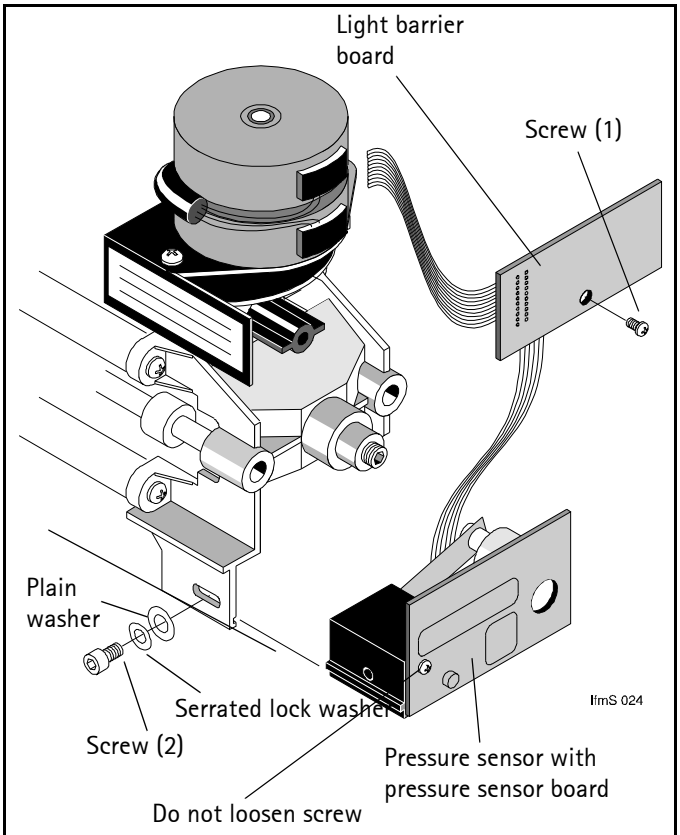


Fig.: 4 - 14

Test Equipment	Ord. No.
Pressure calibration device	0770 5018
Calibration gauge 4 mm (for adjustment after exchange of the pump cover)	0770 1489

Designation	Ord. No.
Pressure sensor (cmpl.). (only delivered when a pressure calibration device is available)	3450 7353

Exchange

CAUTION

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

The pressure sensor consists of the light barrier board with EEPROM and the pressure sensor board with holder. Coil core and bending element are screwed to this holder. Both boards are connected via a flat cable.

1. Dismount rear panel (see „Rear Panel“ ➪ p. 4 - 6) or pump unit (see „Pump Unit“ ➪ p. 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 pressure sensor and remove it together with plain washer and serrated lock washer. Then remove pressure sensor with pressure sensor board and light barrier board.
5. Fit pressure sensor with pressure sensor- and light barrier board.

Note

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

6. Calibrate pressure sensor:
   a) Switch on unit and call in the pressure sensor reading in the Service Program (see „Pressure Sensor Function 310.0“ ➪ p. 3 - 6)
   b) Loosen screw (2) on the side of the pressure sensor unit (2.5 mm Allen key).

c) Push pressure sensor with pressure sensor board to the rear until stopper.

d) Move lower slide of the finger pump rearwards.

e) Note down pressure sensor value.

f) Insert 4 mm calibration gauge.

g) Push pressure sensor with pressure sensor board slightly forward.

h) Tighten screw (2).
The measured value read on the pressure sensor must be 5 to 15 digits above the value noted.

Note

Pull nut slightly out of the pressure sensor housing.

i) After calibration return to the initial function with END.

j) Select SAVE NO. (Do not actuate the YES key.)

k) Switch off unit.

7. Assembly is done in reverse order.
8. Check the user data and reenter, if necessary, as data was saved in the EEPROM of the exchanged light barrier board.
9. Calibrate pressure sensor:

Note

Calibration weights are required to calibrate the pressure sensor. An alignment with infusion lines is not permitted.

a) Clean the pump front side.

b) Place the Infusomat® fmS without mains lead and drop sensor and the service connector inserted horizontally (front facing upwards) in the cellular packing of the calibration device.

c) Switch on unit and call in the pressure sensor reading in the Service Program (see „Pressure Sensor Function 310.0“ ➪ p. 3 - 6).

d) Open pump cover.

e) Fasten holders for the calibration weights under the pump cover and let snap in at the locking bow.

f) Position weight 1 (100 g) for 400 mbar carefully in the holder on the pressure sensor. The weight must be placed without any friction in the holder.

g) Note down measured value.

h) Repeat steps f) and g) with weight 2 (128 g) for 800 mbar and weight 3 (166 g) for 1200 mbar.

i) Remove weight and holder and do **not** save data.

j) Call in calibration of pressure stage (function 540) in the Service Program.

k) Enter the calibration values via the keyboard and acknowledge with "yes".

l) Quit Service Program and save data.

m) Register the changed pressure values in the unit book.

n) Check the electronic occlusion pressure (see „Pressure Cut-Off, Electronic“ ➪ p. 8 - 5).

Check

Safety check, functional check.

4.11 Air Inline Sensor

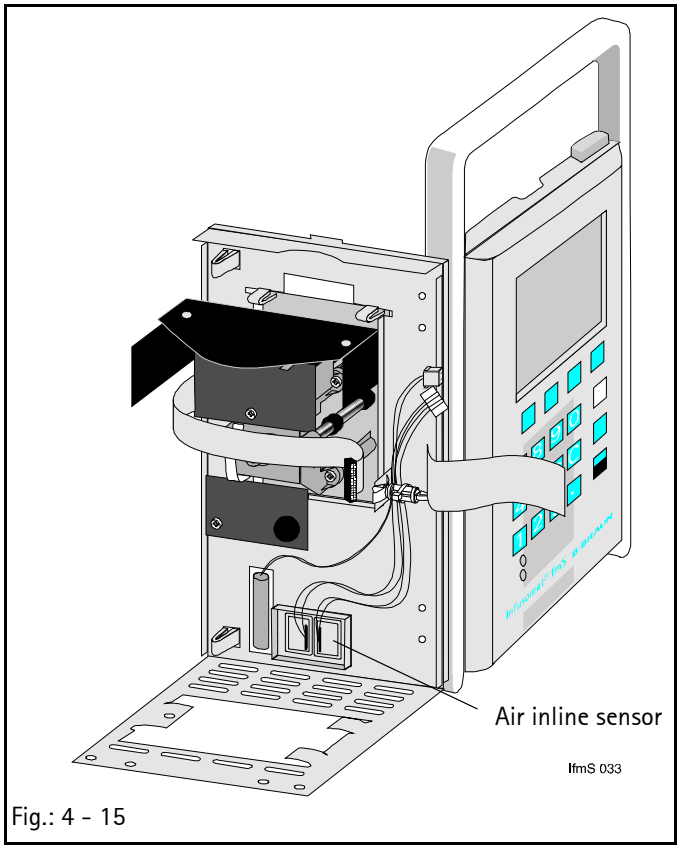


Fig.: 4 - 15

Designation **Ord. No.**

Air inline sensor incl. connector 3450 193A

Exchange

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Dismount cover (see „Housing and Handle“ ➪ p. 4 - 4).
3. Dismount controller board (see „Controller Board“ ➪ p. 4 - 5).
4. Disassemble front frame (see „Front Frame“ ➪ p. 4 - 11).
5. Press the complete sensor from behind and out of the frame.
6. Insert new sensor and fasten cables firmly with cable ties.

Note

Shielded air inline sensors are installed from serial no. 34504 on.

Note

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

Check

After exchange of the air inline sensor, please check:

- Air value
- Water value
- Calibration value (alarm threshold), adjust if necessary

Safety check, functional check.

4.12 Operating Unit

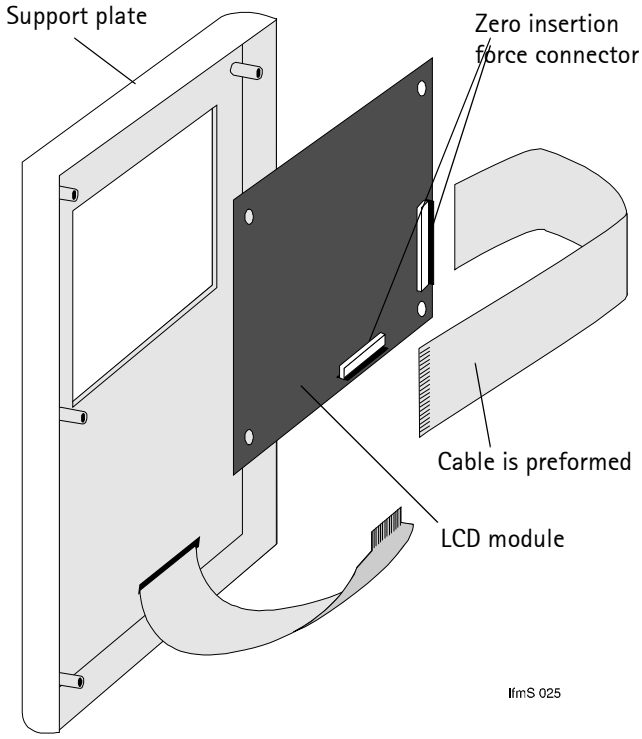


Fig.: 4 - 16

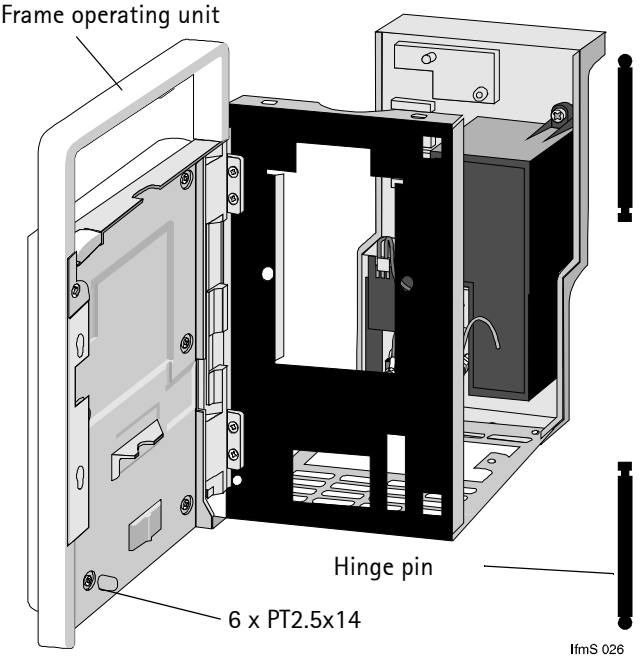


Fig.: 4 - 17

Designation	Ord. No.
Membrane keyboard with support plate and seal	3450 1797
LCD module	3450 1819
Frame incl. pressure spring and magnet	3450 1827
Round cord 42 mm (5 pcs.)	3477 3347
Circular seal	3477 3126
Hinge unit	3450 5571
Hinge pin (3 mm)	3450 5580
Magnet	3450 5849
Flex cable, preformed	3450 8830

Exchange

1. Remove battery (see „Battery“ ➪ p. 4 - 1).
2. Disassemble door lock.
3. Loosen countersunk screw and bridge.
4. Remove tamper-proof caps (6 pieces) on the door frame by piercing a screwdriver through the caps and loosen countersunk screws.
5. Unlatch zero insertion force connector and loosen flex cable.

Note

The position of the flex cable must not be changed, i.e. the preformed section must be in the hinge area (pivot). Mark cable, if necessary.

6. Disassemble either LCD module or support plate with membrane keyboard or door hinge pins respectively and exchange door frame.
7. Assembly is done in reverse order. Pay attention to the correct direction of the door hinge pin during assembly.

Note

Do not kink either of the flex cables. Push the contacts to the stopper of the zero insertion force connector and lock in same position.

Check

Electrical safety, functional check, pump unit check.

4.13 Barcode Label

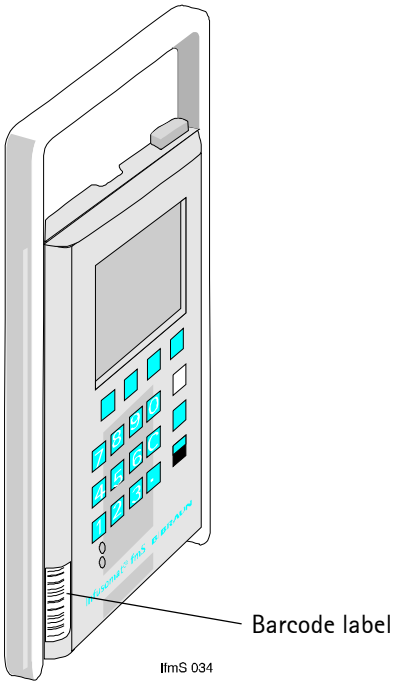


Fig.: 4 - 18

Designation **Ord. No.**

Barcode label 3450 9070

Exchange

1. Remove old barcode label, if existing.
2. Clean adhesion surface with an alcoholic cleaning agent and let dry.
3. Loosen barcode label from the base material and stick it on.

Note

Destroy the type plate delivered.

Check

Check that serial number and pump symbol in the plain text field of the barcode label correspond with the type plate on the pump of the Infusomat® fmS.

4.14 Frame with Seal

Designation **Ord. No.**

Seal plate between frame and front frame (exchange not recommended) 3477 3240

Frame with seal plate 3450 1762

Exchange

1. Disassemble all parts as described before and exchange frame with seal plate.

Check

Electrical safety, functional check, pump unit check.

For your notes:

Checks after Repair 5

Depending on the work carried out, perform the relevant check blocks (1., 2. and / or 3.).

1. Visual Inspection	2. Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751	3. Functional Inspection
❒ Infusomat® fmS: Cleanliness, completeness, damage and faults affecting safety Particularly: ❒ Damage to and readability of the labels ❒ Completeness, damage and readability of the additional labels on an Infusomat® fmS set for the Infusomat® Space Line ❒ Pump sealing diaphragm ❒ Membrane keyboard ❒ Rubber feet ❒ Operating unit ❒ Locking mechanism of the pump cover ❒ Flow inhibitor ❒ Mains plug connector ❒ MFC connector incl. MFC cable ❒ Check voltage values 100/110/120 V = T 0.315 A 200/230/240 V = T 0.16 A ❒ Mains cable ❒ Drop sensor with cable and plug connector	❒ Mains voltage _____ V AC ❒ Protective conductor resistance incl. mains cable < 0.2 _____ ❒ Insulation resistance >> 2 M _____ ❒ Earth leakage current at NC 30 A _____ A	**Switch on unit** ❒ Self-test ❒ Audible alarm ❒ Status displays ❒ LCD lighting ❒ Display (all symbols and pixels) in the LCD display **Operation** ❒ Opening and closing mechanism of the door ❒ Functions of the buttons ❒ Enter delivery rate, volume and time. The values displayed in the LCD display correspond to the values entered. ❒ Staff call Test incl. MFC staff call line, if used ❒ Pump cover alarm ❒ Alarm suppression **Pressure cut-off, electronic** (Reference values measured with electronic pressure sensor) Delivery rate: 50 ml/h Volume: 250 ml Test without drop sensor **Note** Depending on the setting, the measurement should be performed only with one of the two lines. ❒ With original Infusomat® line ❒ Pressure level, low ❒ Pressure level, middle ❒ Pressure level, high ❒ With Infusomat® Space line ❒ Pressure level, low ❒ Pressure level, middle ❒ Pressure level, high

(Part 1 of 2)

5 Checks after Repair

1. Visual Inspection	2. Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751	3. Functional Inspection
		Pressure limitation, mechanical (Reference values measured with electronic pressure sensor) ❒ With original Infusomat® line ❒ P_{max} ❒ P_{min} ❒ With Infusomat® Space line ❒ P_{max} ❒ Value P_{max} by min. 0.10 bar higher than pressure level, high, electronic ❒ P_{min} **Safety clamp (flow inhibitor)** ❒ P_{min} **Delivery accuracy** Ambient temperature 20 ... 25 °C Delivery rate: 250 ml/h Measured volume: 25 ml ❒ Divergence **Drop sensor** Delivery rate: 400 ml/h ❒ Drop sensor alarm, occlusion ❒ Drop sensor alarm, flow **Air inline sensor** Delivery rate: 250 ml/h ❒ Water value ❒ Air alarm ❒ Air value ❒ Threshold value **Battery test** Operation mains/battery/mains: ❒ Uninterrupted operation Switch on unit without mains connection ❒ Self-test is executed

(Part 2 of 2)

Observe the procedure information **(see „Procedural Instructions on the TSC" ➪ p. 8 - 1)**!

Maintenance 6

It is recommended every 2 years. In addition to the technical safety inspection, the following assemblies/components are to be checked:

1. Check rubber feet and if necessary exchange.
2. Check easy running of the pump cover, lock mechanism and door.
3. Check easy running of the flow inhibitor, clean and if necessary exchange pressure springs.
4. Check seal membrane and if necessary exchange.
5. Check the drop sensor optics and spring mechanics and clean, if necessary.
6. Open unit. Internal visual inspection. Clean seal surfaces and if necessary exchange seal strip.
7. Check mechanical occlusion pressure and if necessary calibrate.
8. Check electronic occlusion pressure and if necessary calibrate (see „Pressure Sensor“ ➪ p. 4 - 14).
9. Assemble and seal unit ready for operation.

6 Maintenance

For your notes:

Technical Safety Check TSC

Index d

(Master – to be added to the documentation)

Checklist for Technical Safety Check – Every 24 Months

Unit: Infusomat® fmS
Manufacturer: B. Braun Melsungen AG

Observe the Service Manual and the instructions for use. All measured values are to be documented. Accessories used should be included in testing. Make exclusive use of calibrated measuring equipment.

User

Article No.	Unit No.	Year of Procurement	Stock No.

Visual Inspection	Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751	Functional Inspection
❒ Infusomat® fmS: Cleanliness, completeness, damage and faults affecting safety Particularly: ❒ Damage to and readability of the labels ❒ Completeness, damage and readability of the additional labels on an Infusomat® fmS set for the Infusomat® Space Line ❒ Pump sealing diaphragm ❒ Membrane keyboard ❒ Rubber feet ❒ Operating unit ❒ Locking mechanism of the pump cover ❒ Flow inhibitor ❒ Mains plug connector ❒ MFC connector incl. MFC cable ❒ Check voltage values 100/110/120 V = T 0.315 A 200/230/240 V = T 0.16 A ❒ Mains cable ❒ Drop sensor with cable and plug connector	❒ Mains voltage _____ V AC ❒ Protective conductor resistance incl. mains cable < 0.2 _____ ❒ Insulation resistance >> 2 M _____ ❒ Earth leakage current at NC 30 A _____ A	**Switch on unit** ❒ Self-test ❒ Audible alarm ❒ Status displays ❒ LCD lighting ❒ Display (all symbols and pixels) in the LCD display **Operation** ❒ Opening and closing mechanism of the door ❒ Functions of the buttons ❒ Enter delivery rate, volume and time. The values displayed in the LCD display correspond to the values entered. ❒ Staff call Test incl. MFC staff call line, if used ❒ Pump cover alarm ❒ Alarm suppression

(Part 1 of 3)

Visual Inspection	Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751	Functional Inspection
		Pressure cut-off, electronic (Reference values measured with electronic pressure sensor) Delivery rate: 50 ml/h Volume: 250 ml Test without drop sensor **Note** Depending on the setting, the measurement should be performed only with one of the two lines. ❒ With original Infusomat® line ❒ Pressure level, low (0,25 ... 0.65 bar) _____ bar ❒ Pressure level, middle (0,55 ... 0.95 bar) _____ bar ❒ Pressure level, high (0,90 ... 1.30 bar) _____ bar ❒ With Infusomat® Space line ❒ Pressure level, low (0,21 ... 0.61 bar) _____ bar ❒ Pressure level, middle (0,48 ... 0.88 bar) _____ bar ❒ Pressure level, high (0,83 ... 1.23 bar) _____ bar **Pressure limitation, mechanical** (Reference values measured with electronic pressure sensor) ❒ With original Infusomat® line ❒ P_{max} (1.35 ... 1.76 bar) _____ bar ❒ P_{min} (> 0.95 bar) _____ bar ❒ With Infusomat® Space line ❒ P_{max} (1.30 ... 1.70 bar) _____ bar ❒ Value P_{max} by min. 0.10 bar higher than pressure level, high, electronic ❒ P_{min} (> 0.83 bar) _____ bar **Safety clamp (flow inhibitor)** ❒ P_{min} (> 0.40 bar) _____ bar

(Part 2 of 3)

(Master – to be added to the documentation)

Visual Inspection	Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751	Functional Inspection
		Delivery accuracy Ambient temperature 20 ... 25 °C Delivery rate: 250 ml/h Measured volume: 25 ml ❒ Divergence (± 5%) _____ % **Drop sensor** Delivery rate: 400 ml/h ❒ Drop sensor alarm, occlusion _____ s (< 5s) ❒ Drop sensor alarm, flow **Air inline sensor** Delivery rate: 250 ml/h ❒ Water value (> 481 mV) _____ mV ❒ Air alarm ❒ Air value (< 78 mV) _____ mV ❒ Threshold value (< 182 mV) _____ mV **Battery test** Operation mains/battery/mains: ❒ Uninterrupted operation Switch on unit without mains connection ❒ Self-test is executed

(Part 3 of 3)

Technical Safety Check TSC

Index d

(Master – to be added to the documentation)

Lines Used	Accessories Used	
❒ Original Infusomat line (OIL) ❒ Infusomat® Space Line ❒ Manufacturer: _____ Type: _____ ❒ Manufacturer: _____ Type: _____	❒ MFC staff call line ❒ _____ ❒ _____ ❒ _____ ❒ _____	Calibrated for usage of: ❒ Original Infusomat Line (OIL) ❒ Infusomat® Space Line (Note the stickers and retrofit, if necessary)

Test result:

Defects found which could endanger patients, users or third parties: ☐ Yes ☐ No

Measures to be taken: ☐ Repair

☐ _____

Special features / documentation:

Inspection performed by:
Unit handed over on:
To:
Date / Signature:
Next deadline for TSC:

Procedural Instructions on the TSC 8

Visual Inspection

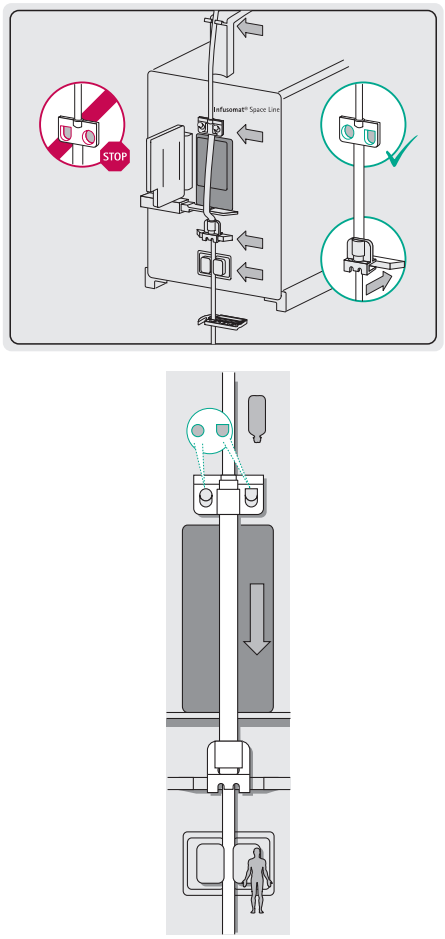


Fig.: 8 - 1

1. Check the Infusomat® fmS and accessories for cleanliness.
2. Check the Infusomat® fmS and accessories for completeness and check configuration. Pay special attention to the following parts:
   a) Check the special additional labels of the Infusomat® fmS adjusted for the Infusomat® Space Line, please see Fig.: 8 - 1.
3. Check the Infusomat® fmS and its accessories for damage and the labels for readability. Pay special attention to the following parts:
   a) Pump sealing diaphragm
   b) Membrane keyboard
   c) Rubber feet
   d) Operating unit
   e) Lock mechanism of the pump cover
   f) Flow inhibitor
   g) Mains plug connector
   h) MFC plug connector
   i) Check fuse values
   A fuse with T 0.315 A must be installed for devices for 100/110/120 V.
   A fuse with T 0.16 A must be installed for devices for 200/230/240 V.

8 Procedural Instructions on the TSC

Electrical Safety according to IEC / EN 60601-1 or VDE 0750 and VDE 0751

The values to be measured are specified in the TSC (see „Technical Safety Check TSC“ ➪ p. 7 - 1). The measured values are to be recorded.

1. Disconnect all connection and interface cables from the device.

Protective Conductor Resistance

1. Measure between the protective conductor of the mains cable and the following parts:

- Potential equalization bolt
- Bolt for door lock
- Left-hand contact (when looking at the connector) of the FM connector
- Unit housing:
  a) If the unit is not sealed countersunk screw at the rear of the unit.
  b) If the unit is sealed, remove lacquer from one of the holes in the foot stands.
  c) Document largest value.

Note

Do not use the foot stand assembly screws as alternative measurement points.

Insulation Resistance

1. Measurement with 500 V between the short-circuited mains connectors and the potential equalization bolt.

Earth Leakage Current

1. Measure the earth leakage current without single fault condition (NC = Normal Condition) incl. mains cable.
2. Measure the earth leakage current without single fault condition (NC = Normal Condition) incl. mains cable with reversed polarity.
3. Document largest value.

Functional Inspection

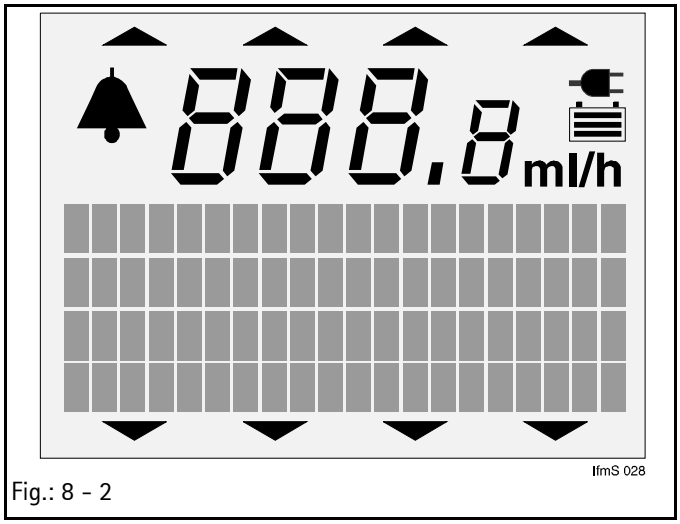


Fig.: 8 - 2

Switch on Unit

1. Switch on unit and check the following details:
   - Self-test
   - Audible alarm
     One short and afterwards two short tones
   - Status displays
     LEDs (red, green) light up for a short moment
   - LCD lighting
   - Display on the LC display
     All symbols and display pixels flash for a short moment
     Fig.: 8 - 2. Then „000.0ml/h" is displayed

Operation

1. Open door.
   Pump cover must automatically open when the unit door is opened.
2. Insert the Original Infusomat Line (OIL). If the unit is designed for an Infusomat® Space Line, then insert an Infusomat® Space Line.
3. Close door.
   The door must lock smoothly and close correctly at the top and bottom.
4. Carry out infusion with intermediate bolus and press all buttons at least once.
   Infusion and bolus are performed and all buttons trigger the function desired.
5. Plug MFC service connector on the MFC socket.
6. Trigger a staff call (e.g. open pump cover during operation).
   The red LED in the MFC service connector lights up.
   - if "dynamic" is set, 1 sec.
   - if "static" is set, until the alarm is acknowledged.
   Check the MFC staff call line if installed.
7. Press the alarm button.
   The current alarm is suppressed for 2 minutes.

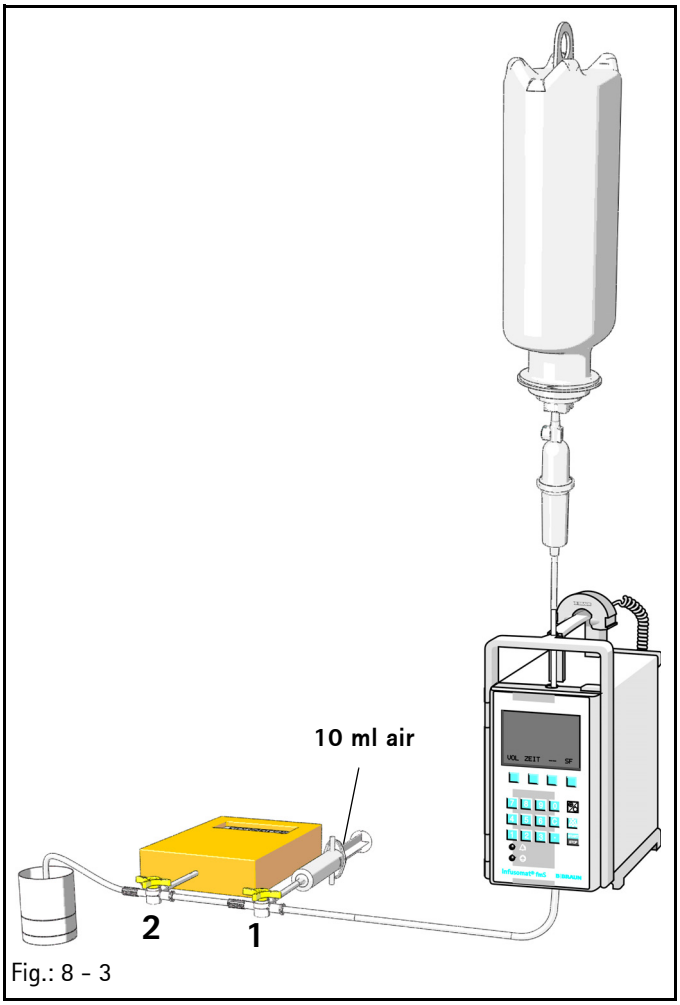


Fig.: 8 - 3

Test Setup

Perform test setup with the subassemblies listed below, please see also **Fig.: 8 - 3**:

An electronic manometer should be used for the measurement described hereafter.

If a mechanic manometer is used instead values which are approx. 100 mbar lower are to be expected. Proceed as follows:

Note

The liquid level in the container must be approx. 80 cm above the lower edge of the device.

- Original Infusomat® Line
  (new, can be used for the complete TSC incl. functional check)
  (1 piece)

or

- Infusomat® Space Line
  (new, can be used for the complete TSC incl. functional check)
  (1 piece)

- Infusion bag or bottle, min. 500 ml
  (1 piece)
- Three-way valve
  (2 pieces for measurement with electronic manometer)
- 10 ml syringe (air buffer for measurement with electronic manometer)
  (syringe drawn up with air to 10 ml and piston fixed mechanically)
  (1 piece)
- 1 ml syringe for air bubble injection
  (1 piece)
- Electronic manometer with peak value recognition
  (1 piece)
- Pressure cell (option of electronic manometer)
  Diameter 100 mm / 160 mm, measuring range 2.5 bar / 4 bar
  (1 piece)
- Graduated cylinder 25 ml, +/- 0.4 ml
  (1 piece)

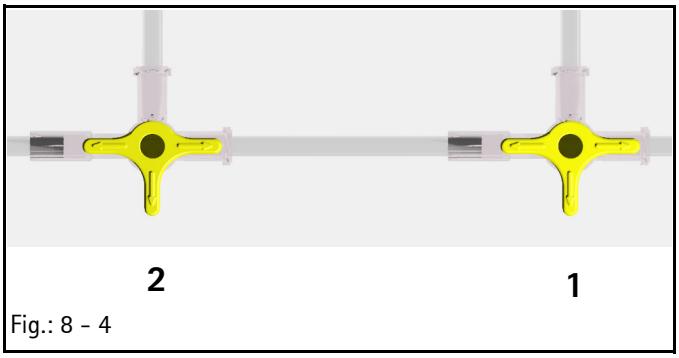


Fig.: 8 - 4

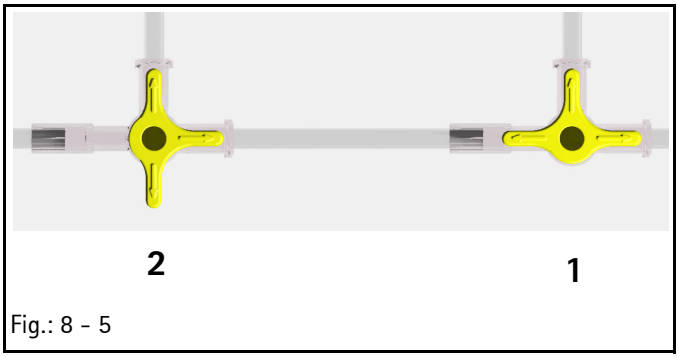


Fig.: 8 - 5

Pressure Cut-Off, Electronic

The MFC service connector must not be plugged.
The drop sensor must not be connected.

1. Insert the line of the test setup in the device.
2. Enter a delivery rate according to the TSC.
3. Select pressure stage according to the TSC.
4. Vent test setup, position of the three-way cocks please see Fig.: 8 - 4.
5. Start infusion and deliver first of all in to an open system (without manometer).
6. Switch over three-way cocks, please see Fig.: 8 - 5, and deliver against the manometer.
   Read off maximum value on the pressure gauge upon an alarm and before an automatic pressure reduction and compare with the specifications in the TSC.
7. Check all pressure stages listed in the TSC and document values.

Pressure Limitation, Mechanical

The drop sensor must not be connected.

1. Plug MFC service connector on the MFC plug connector.
2. Activate the occlusion pressure mechanical (see „Disabling the Pressure Sensor (Occlusion Pressure Mechanical)“ ➪ p. 3 - 2).
3. Enter a delivery rate according to the TSC.
4. Start infusion and deliver first of all in to an open system (without manometer).
5. Deliver against the manometer.
   Read off the corresponding value on the manometer and compare with the specifications of the TSC for P_{max} and P_{min}.
6. Document values. Do not reduce pressure.

Safety Clamp (Flow Inhibitor)

1. Stop infusion from the pressure limitation test mechanically and unlock the operating unit,
   read off value on the manometer and compare with the specifications in the TSC.

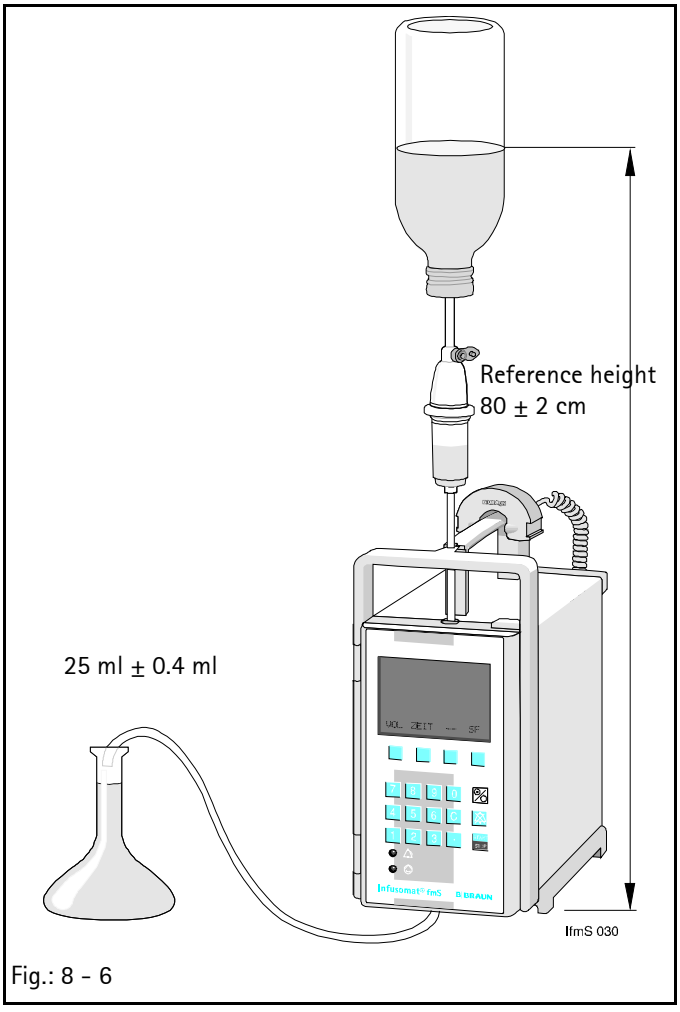


Fig.: 8 - 6

2. Document value.
3. Pull off the MFC service connector.

WARNING

SWITCH THE DEVICE OFF AFTER THE SAFETY CLAMP WAS CHECKED SO THAT THE ELECTRONIC PRESSURE CONTROL IS RE-ACTIVATED AFTER A RESTART.

4. Switch device off.

Delivery Accuracy

Requirements:

- Mount test setup as shown in Fig.: 8 - 6.
- Ambient temperature and delivery rate according to the TSC.

1. Insert line of the test setup in the device.
2. Vent test setup. Bottom part of drop chamber must be 2/3 filled.
3. Insert cannula in empty graduated cylinder.
4. Set delivery rate according to the TSC.
5. Simultaneously start infusion and stop watch.
6. Stop the stop watch when the measured volume defined in the TSC is reached.
7. Evaluate deviation in percent according to Table 8 - 1 and record.

Measuring Time	Deviation %
6 min 40.0 sec	-10
6 min 18.9 sec	-5
6 min 15.0 sec	-4
6 min 11.1 sec	-3
6 min 7.3 sec	-2
6 min 3.6 sec	-1
6 min 0.0 sec	0
5 min 56.4 sec	1
5 min 52.9 sec	2
5 min 49.5 sec	3
5 min 46.2 sec	4
5 min 42.9 sec	5
5 min 27.3 sec	10

Table 8 - 1

The accuracy of the delivery rate can be checked using a normal infusion line when the TSC is carried out.

A test infusion line (OIL test infusion line with an Infusomat® fmS adjusted for the Original Infusomat® line, and a Space calibration line with an Infusomat® fmS set for the Infusomat® Space Line) is to be used for calibration (see „Scale Factor Function 510.0“ ➪ p. 3 - 9)! (see „Test Equipment and Special Tools“ ➪ p. 9 - 1).

Drop Sensor

1. Set delivery rate according to the TSC.
2. Connect drop sensor to the device.
3. Start infusion according to the specifications of the TSC.
4. Squeeze off line above the pump. The drop sensor triggers an alarm.
5. Squeeze the drop chamber bottom part, to generate a jet. The drop sensor triggers an alarm immediately.

Air Inline Sensor

1. Plug MFC service connector on the MFC plug connector.
2. Insert a line filled with water in the device and close operating unit.
3. Read off test value of the air inline sensor via the function 300.0 "Air inline sensor" in the Service Program (see „Air Inline Sensor Function 300.0“ ➪ p. 3 - 5).
4. Read off value after approximately 10 seconds and compare with the water value specifications of the TSC.
5. Document values.
6. Enter a delivery rate of 250 ml/h and a volume of 250 ml.
7. Start infusion.
8. Generate an air bubble of approx. 0.4 ml (approx. 56 mm length of line with air) in the supply line to the pump. An alarm is triggered when the air bubble is detected.
9. Insert a line filled with air in the device and close operating unit, or disconnect the line at the container and "vent" in order to remove the water out of the line.
10. Read off test value of the air inline sensor via the function 300.0 "Air inline sensor" in the Service Program (see „Air Inline Sensor Function 300.0“ ➪ p. 3 - 5).
11. Read off value after approximately 10 seconds and compare with the air value specifications of the TSC.
12. Read off threshold value via the function 520.0 "Air inline sensor" in the Service Program (see „Air Inline Sensor Function 520.0“ ➪ p. 3 - 10).

13. Compare value with the threshold value specifications of the TSC.

Battery Check

1. Disconnect the device from the mains supply during operation.
2. The symbol for the mains plug on the LC display goes off. An error message is not triggered and operation of the unit is continued.
3. Reconnect unit to the mains.
4. The symbol for the mains plug is displayed on the LC display. An error message is not triggered and operation of the unit is continued.
5. Switch device off.
6. Disconnect unit from mains.
7. Switch on unit.
   A self-test is carried out.

Test Equipment and Special Tools 9

For Repair / for TSC

	Order No.
Test equipment case Infusomat fm (complete)	0770 1527
with:	
Calibration gauge 4 mm (for adjustment after exchange of the pump cover)	0770 1489
Pin punch 1.8 mm x 160 mm (for hinge pin/ disassembly of the pump cover)	0770 1446
Pin punch 6 mm x 125 mm (for hinge pin/ assembly of the pump cover)	0770 1454
Flat tool 100 x 20 mm (for assembly/ disassembly of the tube adapter)	0770 1462
Special socket spanner M18 (for disassembly of the recessed plug)	0770 1497
Manometer 0 - 4 bar	0770 1357
Service connector (red)	0770 0709
MFC service connector	3450 1215
OIL-test infusion line	0770 1500
Space calibration line	0770 1610
Pressure calibration device	0770 5018

9 Test Equipment and Special Tools

For your notes:

Spare Parts List 10

Unit Elements

Designation	Order – No.
Battery	
Battery incl. connector plug 1.2 Ah / 7.2 V and holder	3450 2556
Mains Fuses	
Fuse T 0.16 A for 200 / 230 / 240 V (10 pcs.)	3477 2847
Fuse T 0.315A for 100 / 110 / 120 V (10 pcs.)	3477 0534
Fuse holder	3450 0979
Housing	
Housing Labelling	
German	3450 1843
French	3450 2130
Dutch	3450 2149
Italian	3450 2157
English	3450 2165
Spanish	3450 2173
Danish	3450 2181
Norwegian	3450 2190
Swedish	3450 2203
Finnish	3450 2211
Portuguese	3450 2220
Czech	3450 2238
Polish	3450 2246
Turkish	3450 2459
Foot stand complete with rubber feet	3450 5415
Unit handle with O-rings and PT screws	3450 1789
Controller Board	
Distance sleeve	3450 3366
Buzzer	3450 3447
Loudspeaker	3450 8848

Designation	Order – No.
Rear Panel	
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 200 / 230 / 240 V	3450 1886
Mains module 100 / 110 / 120 V	3450 1894
Mains module 230 V	3450 1908
Drop sensor socket incl. cable and plug	3450 1878
Pump Cover	
Pump cover with lock	3450 5717
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
Front Panel	
Front panel without flow inhibitor and pressure spring	3450 5822
Circular seal 570 mm / 45 mm	3477 3126
Flow inhibitor with pressure spring	3477 3258
Pressure spring for flow inhibitor (5 pcs.)	3477 3266
Tamper-proof caps 10 mm (50 pcs.)	3477 3134
Reed sensor	3450 1754

Spare Parts List

Designation	Order – No.
Pump Unit	
Finger pump (without motor) including pump, pump cover, seal membrane and boards	3450 1738
Finger pump (without motor and board) incl. pump, pump cover, and seal membrane	3450 9038
Membrane incl. seal	3450 5733
Motor with pinion for finger pump	3450 1924
Pressure Sensor	
Pressure sensor (cmpl.)	3450 7353
Air Sensor	
Air sensor incl. connector	3450 193A
Door Lock	
Door lock complete with push button	3450 5601
Spring holder for door lock	3450 5440
Mounting for door lock	3477 2790
Operating Unit	
Membrane keypad with support plate and seal	3450 1797
LCD module	3450 1819
Frame incl. pressure spring and magnet	3450 1827
Flexible cable 42 mm (5 pcs.)	3477 3347
Hinge unit	3450 5571
Hinge pin (3 mm)	3450 5580
Magnet	3450 5847

Designation	Order – No.
Frame with Seal	
Seal plate between frame and front panel (exchange not recommended)	3450 3240
Frame with seal plate	3450 1762
Mounting for door lock	3477 2790
Colours	
Touch-up pen RAL 7031 (grey)	3450 6985
Miscellaneous	
Assembly screw for display board PT 2.5x14 (10 pcs.)	3477 3100
Screw PT 3x10 Torx (self-forming)	3450 0960
Rubber feet grey (20 pcs.)	3477 3096
Attention label fuse T 0.16 A (5 pcs.)	3450 0898
Screw M 6x8 for fm recessed plug (20 pcs.)	3477 3185
U Washer 3.2 (20 pcs.)	3477 3193
Software Update	
Update kit IFMC02003	3450 645A
Update kit IFMe02004 / IFME03004	3450 645C
Update kit IFMe02005 / IFME03005	3450 645D
Update kit IFMe02006 / IFME03006	3450 645E
MFC interface line	0871 1661

Designation **Order - No.**

Poleclamp

Pole clamp (universal clamp, rotating) 3450 9054

Universal Clamp (Poleclamp)

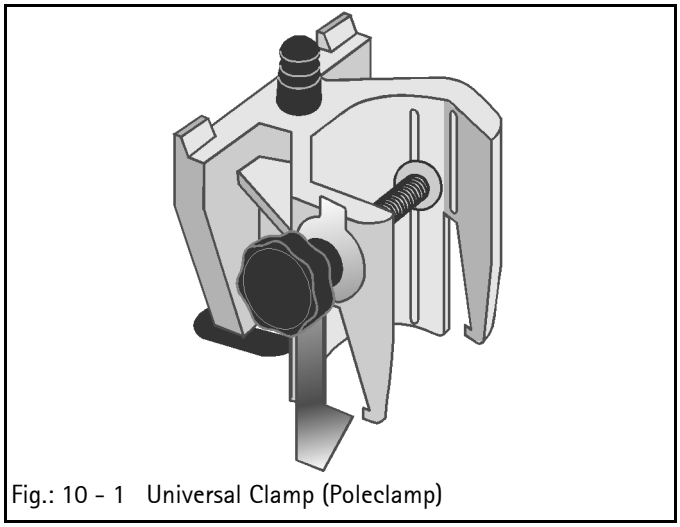


Fig.: 10 - 1 Universal Clamp (Poleclamp)

Universal clamp, complete 3450 5857
Universal clamp 3450 8325
Threaded rod. 3450 8333
Star handle body 3450 8384
Safety clip. 3450 8341
Safety hook. 3450 8368
Plate (2 pcs.) 3450 2610
Connection cap D12/4 (5 pcs.) 3477 4149
Bellows (5 pcs.) 3477 3274
Pressure spring (5 pcs.) 3477 4165

Designation **Order - No.**

Universal Clamp

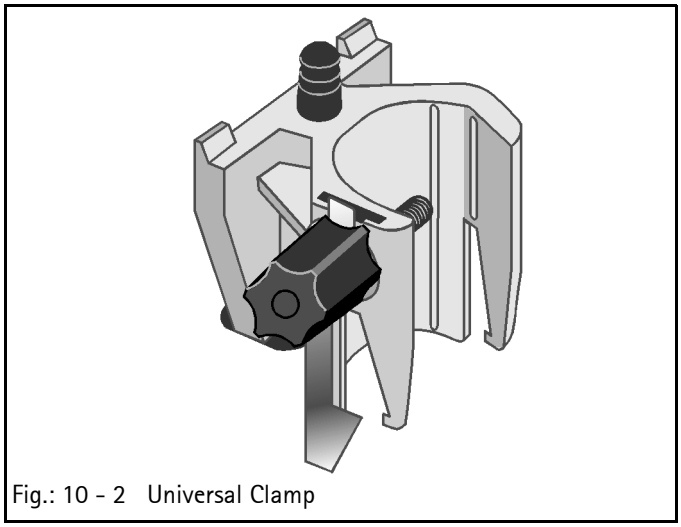


Fig.: 10 - 2 Universal Clamp

Universal clamp, complete . . . . . not available any more
Threaded rod 34 50 5903
Safety hook. 34 50 5865
Turning handle 34 50 5890
Rubber cover (5 pcs.) 34 77 3290
Bellows (5 pcs.) 34 77 3274
Connection cap (5 pcs.) 34 77 3304
Pressure spring for pole fixation (5 pcs.) 34 77 3282

10 Spare Parts List

For your notes:

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Revision Documentation

A

Revision Service-Documentation

Version 2.0

This manual has been completely revised. The most important changes are listed below:

- Changed manual structure
- New TSI list
- New paragraph pressure sensor (exchange / calibration)
- New test equipment for pressure sensor
- New software
- New spare parts
- Total list of spare parts

Version 2.1

- New TSI list
- New controller board
- New software

Version 2.2

This version was approved by B. Braun on 19.04.2006.

The most important changes of this version are listed below:

- New software
- New Service Program functions
- New spare parts
- Changed occlusion pressure data

Version 2.3

This version was approved by B. Braun on 18.02.2008.

The most important changes of this version are listed below:

- New software
- Possible use of the Infusomat® Space line
- New TSC
- Revised procedural instructions on the TSC

Current Information

A Revision Documentation

For your notes: