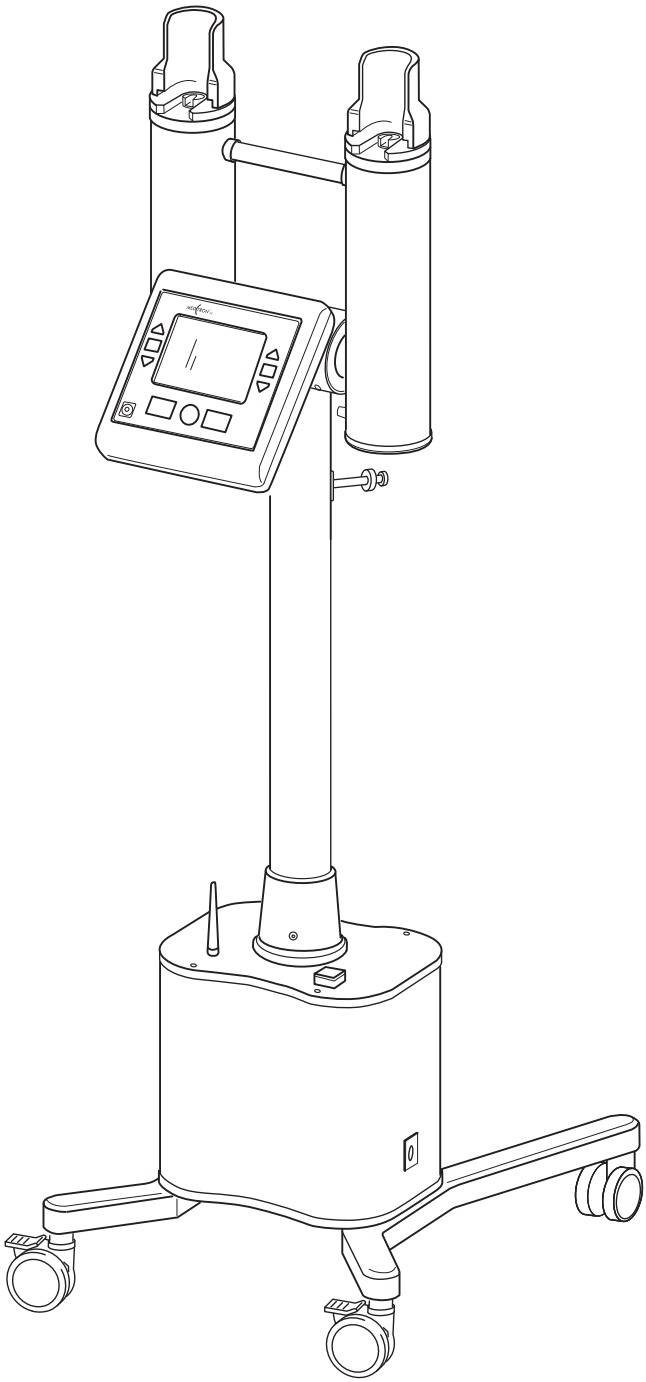
MEDTRON® AG

Accutron MR

Instructions for use



Manufacturer:

MEDTRON® AG

Hauptstraße 255
66128 Saarbrücken
GERMANY
Telephone +49 (0)681/970 17-0
Telefax +49 (0)681/970 17-20
http://www.medtron.com

CE 0482

These instructions for use Accutron MR
apply to the injector Accutron MR (model number 880).

Document number: 13068
Version 8.0
2022-02
(en)

Contents

1 Introduction

Regarding these instructions for use 5
Intended use 6
Manufacturer's plate 6
Contents 7
Symbols used on the packaging 8
Symbols used on the injector 9
Symbols used in these instructions for use 11
General conventions 11

2 Safety instructions

Protection of people and property 13
Electromagnetic compatibility 16
Medical-electrical system 17

3 Product description

General features 19
Items supplied and accessories 20
Equipment 20
Optional accessories 20
Consumables 20
Assemblies 21
Controls 22
Connections on the control unit 22
Controls mounted on the control panel 23
Pilot light 24
Touch screen 24
Functions of the touch screen buttons 26
On/Off switch 28
Connection for the charger 28
Castors 28
Remote control 28
Handle 28

4 Commissioning the injector

Charging the battery cells 29
Switching ON 31
Self-test 31
Selecting a remote control 32
Setting the system 33
Adjusting the display brightness 33
Displaying the state of charge 33
Selecting a language 34
Calibrating the touch screen 34
Setting the stand-by time 35

Setting the empty syringe velocity of the pistons 36
Setting the fill velocity of the pistons 36
Preparing the injection units 37
Moving the pistons back 37
Inserting the syringes 39
Connecting the tube system 40

5 Operating the injector

Filling the injector with contrast medium and NaCl 43
Moving both pistons forward 44
Venting the tube system 48
Changing the maximum pressure 51
Selecting an injection profile 52
Changing an injection profile 53
Saving changes 54
Overwriting an existing profile 55
Entering a profile name 56
Saving changes under a new profile 57
Creating a new profile 58
Adding a new phase 59
Deleting a phase 60
Performing an injection 61
Maintaining vein access with the KVO function 62
Starting the injection 63
Interrupting the injection 65
Injection end 66
Replenishing the injector with contrast medium/NaCl 67
Enter the filling volume and fill 68
Venting after replenishing 69
Post-examination work 72

6 Annex

Waste disposal 73
Safety inspections and maintenance 73
Cleaning and storage 74
System messages 75
Technical data 76
Index 79

1 Introduction

This chapter contains some preliminary remarks on the use of the injector Accutron MR with Easy Loading Syringe (ELS) as well as explanations on the structure of these instructions for use and on the use of symbols and text markings.

Regarding these instructions for use

Read these instructions for use carefully and keep them for future reference.

These instructions for use explain how to correctly commission and operate the Accutron MR for your application.

All figures and display texts refer to the ELS 200 ml syringe. However, if you use the ELS 65 ml syringe, the functionality remains the same.
For further information about the use of the ELS 65 ml syringe or prefilled contrast medium syringes, please refer to the appendix to the instructions for use *Accutron MR Use of other syringe types*.

It is important to MEDTRON that you operate the Accutron MR safely and properly.
To this end, it is essential that you read these instructions for use thoroughly before you use the injector. They contain important instructions designed to assist you in avoiding risks and, at the same time, increasing both the reliability and service life of the injector and its accessories.

For your own safety you should read the section *Safety instructions*. Comply exactly with all the instructions to ensure that you do not put yourself, other employees or patients at risk and prevent damage to the injector.

The user interface displays shown in these instructions for use are only for illustration purposes and may differ from the actual displays on the device.

If you have any questions concerning the handling of the Accutron MR not answered by these operating instructions, please contact:

MEDTRON® AG

Hauptstraße 255
66128 Saarbrücken
GERMANY
Telephone +49 (0)6 81/970 17-0
Telefax +49 (0)6 81/970 17-20

Intended use

The injector Accutron MR is intended exclusively for the injection of contrast media and physiological saline solution into patients for examinations involving magnetic resonance imaging (MRI) by trained and authorised staff.
The injector is intended for continuous operation for up to ten patients per hour.
Any use above and beyond this scope is deemed as inappropriate.
Never use the Accutron MR for other purposes!

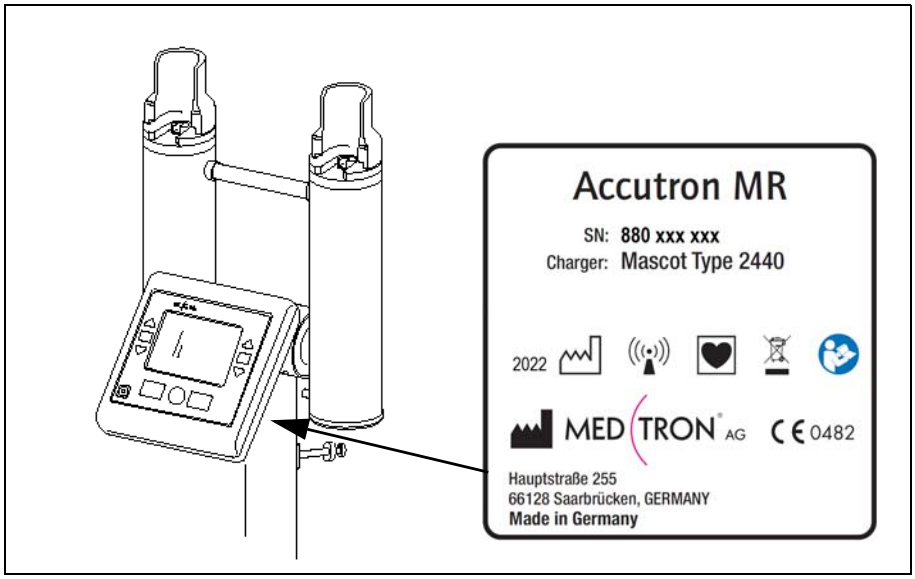
The injector Accutron MR may not be used in case of contrast medium intolerance.

The person responsible for the injection has to make sure before every injection that the injection parameters currently set do not endanger the patient.

The injector has to be positioned in the examination room in such a way that the connection of the consumables to the patient lying on the examination table can be established. The operator has to stand at the injector in such a way that he/she can perform all operating steps according to the instructions for use.

Manufacturer's plate

The manufacturer's plate of the Accutron MR bearing the model name and serial number is located at the top of the column stand. You will require this information if you contact the MEDTRON Customer Service, e.g. if you want to order accessories or spare parts.



Enter the model name and serial number here so that you have them at hand when required:

Model name: _____

Serial number: 880_____

Contents

This manual describes the commissioning and operation of the injector Accutron MR. It consists of the following chapters:

- The chapter *Safety instructions* contains important safety instructions which are essential to observe for the safety of people and the system.
- The chapter *Product description* introduces you to the injector with its functions and controls.
- The chapter *Commissioning the injector* describes how to set the touch screen to suit your needs, how to prepare the injection units and connect the tube system.
- The chapter *Operating the injector* explains how to fill the contrast medium and saline solution, how to deal with the injection profiles and how to perform the injection.
- In the *Annex* you will find notes on inspection and maintenance work, cleaning and storage, a table with system messages and errors and their remedy as well as the technical specifications of the injector and the declaration of conformity.
- The *Index* helps you to quickly find the desired text passages.

Symbols used on the packaging

The symbols used on the packaging have the following meanings:

This way up

Fragile; handle with care

Store in a dry place

Symbols used on the injector

The symbols on the injector have the following meanings:

SN	Serial number
	Manufacturing date
	Follow instructions for use
	Do not put the device to the normal domestic waste
	Application part type CF
	Non-ionizing radiation
	Do not lean against the injector
	Electrostatic-sensitive device
	Caution
	Indoor use only
	Manufacturer
	MR Conditional
	Do not move the injector any closer to the diagnostic device than to the 100 mT line in order to ensure an interference-free operation. Observe the instructions of the diagnostic device manufacturer.

No heavy load
(Do not exceed specified maximum load)

Mass including safe working load

Consult instructions for use

ON/OFF

Device of protection class II (charger)

Symbols used in these instructions for use

You will find the following two symbols identifying important safety instructions at several points in this manual:

CAUTION!
This symbol indicates risks which could involve fatal or serious personal injuries or severe damage to property.

ATTENTION!
This symbol highlights risks which could involve material damage.

The following symbol indicates tips and special features:

Note!
This symbol indicates tips and special features that make it easier for you to operate the device.

General conventions

Bold type print

Designations and lettering of menus, menu items and buttons are printed in **bold** type.

Italic type print

Cross references to other chapters or text passages are printed in *italics*.

Inverted commas

Device functions and dialogue messages are placed in "inverted commas".

Control steps

Control steps are identified as follows:

- Make sure that the piston is moved back.
- Push the syringe into the recipient until it engages audibly.
- Remove the protective cap from the syringe.

Listings

Listings are marked as follows:

– Point A
– Point B
– Point C

2 Safety instructions

Read the following safety instructions thoroughly and adhere to them closely. They are intended to protect your own safety and the safety of colleagues and patients as well as to avoid damage to the Accutron MR and its accessories.

Protection of people and property

CAUTION!
Risk of fatal or serious injuries due to air embolisms!

- Do not connect the patient to the system until you have vented the syringes and the tube system.
- Vent the syringe and the tube system every time after filling the injector with contrast medium or saline solution.
- Make sure before every injection that there are no air inclusions in the syringes and the connected tubes.
- Only start an injection when the syringes are in the lowered position (injection position).
- Make sure before every injection that the injection parameters shown on the display do not endanger the patient.
- Maintenance and repair work may only be performed by the MEDTRON Customer Service or by persons trained and authorised by MEDTRON.
  Trained and authorised persons will receive the documents necessary for the maintenance and safety inspections from MEDTRON.
- Make sure that the injector is no longer operated when the display of the injector has only failed slightly or fails completely.

CAUTION!
Risk of uncontrolled supply of contrast medium due to hydrostatic pressure compensation!
Make sure that the patient and the syringes are at the same level.

CAUTION!
Risk of infection!

- Replace all consumables with new ones after they have been used once. Otherwise, you jeopardise your patients' health.
- Do not remove the protective caps of the syringes and the tube ends until you have made the connections.
- Only use consumables and accessories which MEDTRON recommends.
- Make sure that the packings of the consumables do not show any signs of damage.
- Make sure that the 'use-by' date of the consumables has not been passed.

CAUTION!
Danger from electric current!

- Make sure that no liquid can enter the injector and the peripheral equipment. Should this happen, switch off the device immediately, and secure it from being switched on again.
- Make sure that the electric connection cables are intact and cannot be bent or squeezed. If you discover any damage, secure the remote control from being switched on again and do not continue to use the charger.
- Make sure that the charger of the injector is only connected to a mains supply with protective earth conductor.
- When connecting the charger and during the charging process, make sure that you do not touch the injector and the patient at the same time.
- Be careful not to touch the connector contacts of the charger and the patient at the same time when the charger is connected to the mains supply.

CAUTION!
Danger from injector toppling over!

- Do not lean against the injector.
- Make sure that all castors of the injector are locked when the injector is positioned on an inclined plane.
- Move the injector slowly over obstacles and steps and hold the injector firmly.

CAUTION!
Danger from modifications to the Accutron MR!
The injector may not be modified without the permission of the manufacturer.

CAUTION!
Risk of material damage and injuries due to magnetic attraction of the injector!
Do not move the injector any closer to the diagnostic device than to the 100 mT line.
Always lock all castors of the injector when placing it in the MR room.
The injector may only be used with a diagnostic device with a magnetic field strength > 3 T after having consulted MEDTRON.
The installation may require additional safety measures.

ATTENTION!
Risk of malfunctions of the Accutron MR!
Only use syringes and tubes recommended by MEDTRON.

Electromagnetic compatibility

The injector meets the requirements of the DIN EN 60601-1-2 standard for medical devices with regard to interference emission and interference immunity.

The injector is subject to special precautions with regard to electromagnetic compatibility. Installation and commissioning are carried out by specialist personnel who have been trained and authorised by MEDTRON.

The characteristics of the injector, determined by emissions, allow its use in the industrial sector and in hospitals (CISPR 11, Class A). When used in a residential environment (CISPR 11, Class B), the injector may not provide adequate protection of radio services. If necessary, corrective measures such as repositioning or realigning the injector must be taken.

Electromagnetic interference exceeding the limits of the standard can result in a reduction of the performance characteristics of the injector and thus in an abortion of the injection.

ATTENTION!
Portable HF communication devices (radio equipment) in the immediate vicinity of the injector can result in a reduction in the performance characteristics of the injector.
Do not use these devices at a distance of less than 30 cm from the injector.

ATTENTION!
The injector may only be used with the accessories described in the instructions for use.
Operation of the injector with other accessories or equipment may result in increased emitted interference or a reduction in the interference immunity.

ATTENTION!
Using the injector directly next to other equipment or with other equipment in stacked form may result in incorrect operation.
Avoid use in the manner described above, or monitor the injector and other equipment to ensure that they are operating properly.

The document *Angaben zu elektromagnetischen Beeinflussungen* (Information about electromagnetic interference) can be requested from MEDTRON.

Medical-electrical system

When using the injector Accutron MR with the touch screen remote control Accutron MR, a medical-electrical system (ME system) is created which corresponds to DIN EN 60601-1:2013.

ATTENTION!
Risk of damage to the individual devices of the ME system!
Observe the ambient conditions and operating modes of the individual devices when installing the ME system.

CAUTION!
Danger from modifications to the ME system!
The ME system may not be modified without the permission of the manufacturer.

3 Product description

General features

The Accutron MR is designed for exactly dosed injections of contrast medium (CM) and physiological saline solution (NaCl). You can store the injection parameters you want

- Delay time
- Volume,
- Concentration
- Flow rate and
- Injection time

in up to 80 profiles and retrieve them at any time. The reproducibility of the injection parameters is therefore reliable and easy. A profile can consist of a maximum of 6 individually programmable injection phases which are performed automatically after the program has been started. With the parameter "Concentration", you can, if required, inject contrast medium and NaCl at the same time.

The Accutron MR has two injection units which can be controlled independently of each other and so the contrast medium can be positioned variably and accurately in the examination area with NaCl, depending on the application. This prevents tailings of the contrast medium which previously made delimitation of the examination area more difficult.
The function "Keep Vein Open" (KVO) injects 0.5 ml of NaCl every two minutes and therefore ensures that access to the vein is retained.

The injector runs independently of the mains supply as it is wireless and is operated with battery cells. By means of the remote control you can control the injector from the control room.

Items supplied and accessories

The scope of delivery includes the following items:

Equipment

- injector, charger Mascot Type 2440, bottle holder, cup holder, instructions for use
- Touch screen remote control Accutron MR

Optional accessories

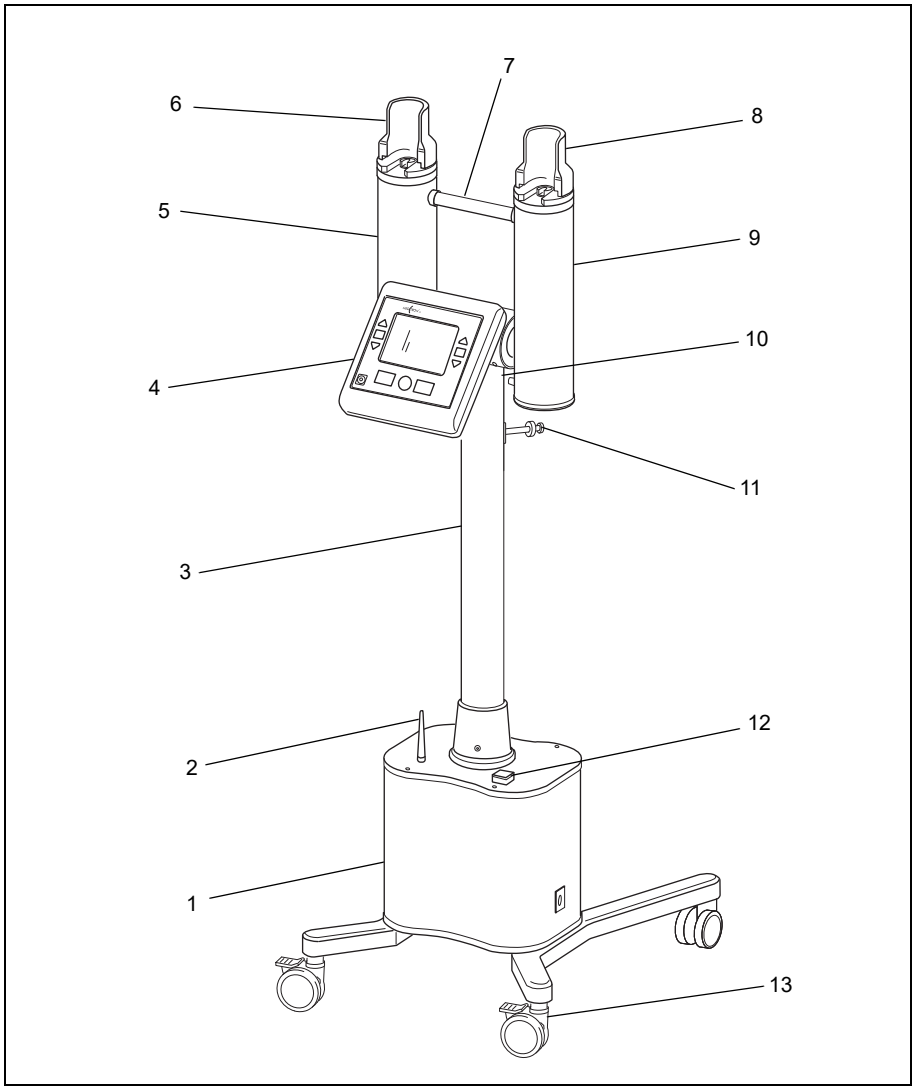
- Adapter for the use of the ELS 65 ml syringe
- Adapter and software option for the use of pre-filled syringes

Consumables

- Syringes
- Tube system
- Patient line

Note!
Detailed information about the available consumables can be found in the MEDTRON product catalogue.

Assemblies



1 Injector base with battery cells and connector for charger
2 Antenna for data transmission to the remote control
3 Column stand
4 Control panel with touch screen
5 Swivelling injection unit for contrast medium
6 Recipient for holding the syringe for contrast medium
7 Handle for swivelling the injection unit
8 Recipient for holding the syringe for NaCl
9 Swivelling injection unit for NaCl
10 Retaining ring for plastic cup to catch the liquid during venting
11 Bottle holders for contrast medium and NaCl bottles
12 On/Off switch
13 Four smooth-running castors with locking brakes

Controls

The following contains a description of the controls of the Accutron MR.

Note!
All figures and display texts refer to the ELS 200 ml syringe. However, if you use the ELS 65 ml syringe, the functionality remains the same.

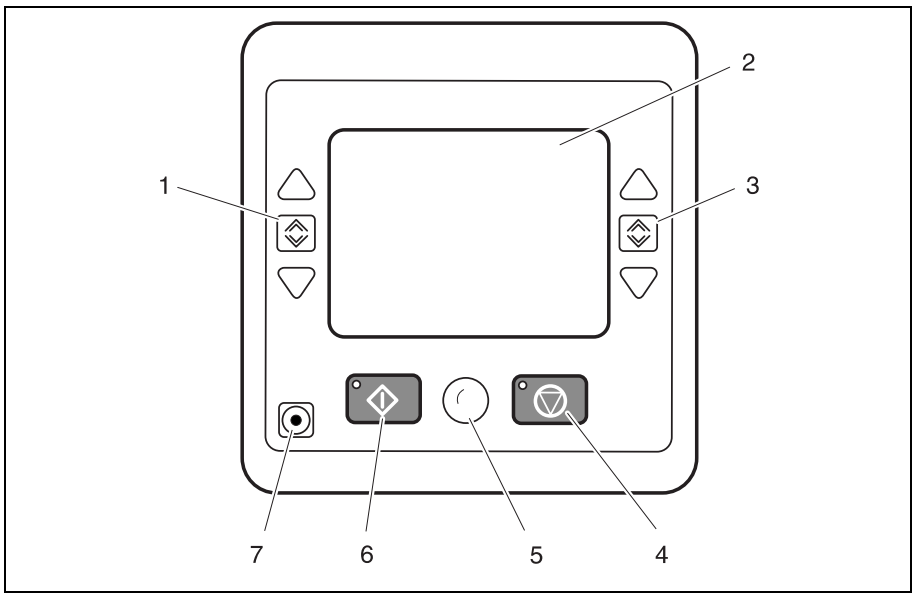
Connections on the control unit

There are three connections on the back of the control unit which are irrelevant for the operation of the injector.

- Two connections for the cables to the limit switches of the pistons. The cables always remain connected.
- A service connector for the MEDTRON Customer Service

Controls mounted on the control panel

The control panel of the Accutron MR consists of buttons on a keypad and a central touch screen, a combination of display and entry field.



No.	Symbol	Designation	Function
1	Left-hand button group for manual piston movements for CM		
		Piston forward	While pushing the button the piston moves forward
		Increase piston speed	The current piston speed increases on each push of the button
		Piston back	While pushing the button the piston moves back
2		Touch screen	To display and enter injection parameters
3	Right-hand button group for manual piston movements for NaCl (same function as left-hand button group)		
4		Interrupt injection	When pushing the button the injection is interrupted
5		Pilot light	– lights up red for a short time when switching the injector on – lights up green when the injector is switched on – flashes green during the injection – lights up red in the event of a fault
6		Start injection	When pushing the button the injection starts
7		Wake-up button	When pushing the button the display is activated

Pilot light

The pilot light is situated on the front side of the operating unit. It briefly lights up red when switching the injector on. It lights up green when the injector is switched on. It flashes green during the injection. The pilot light lights up red in the event of a fault.

Touch screen

The touch screen displays messages and graphics like a normal monitor. In addition, you can make entries and call up functions by touching the buttons displayed. If a button cannot be used at the moment, it is greyed.

ATTENTION!
Damage to the touch screen possible!
Do not strike or hit the touch screen.
Do not use any items such as pencils or tools.
Only touch the buttons lightly with your fingers.

Touch the symbol you want lightly with your finger tip. Depending on the button, you can mark or select a value or call up a function and a new window will open.

In addition to entering commands, the main window of the touch screen also serves to display the process information currently set. The profile name is located in the text field in the top left and the parameters of the injection profile currently selected are in the table underneath.

The column headers for the injection parameters at the top of the display describe the following parameters for each phase:

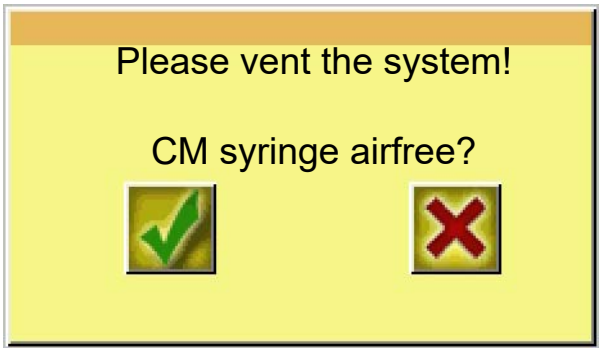
Phase	Numbering of the individual phases
Delay (s)	Breaks between the injection phases in seconds
Volume (ml)	The amount of fluid, in millilitres, to be injected
Concentration (%)	Concentration of the injection media: – 100% means only contrast medium – 40% means 40% contrast medium, 60% NaCl – 0% means only NaCl
Flow (ml/s)	Injection speed in millilitres per second
Inj. time (s)	Injection time in seconds

	The remaining contrast medium in millilitres is shown below the green syringe symbol The remaining NaCl in millilitres is shown below the blue syringe symbol
	The battery symbol shows the current state of charge of the battery cells.

During the injection the touch screen also shows status information on the current injection in two windows. With the button **Info** you can switch between the windows.

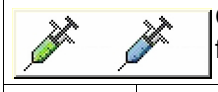
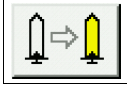
Injected volume CM	Contrast medium injected so far
Injected volume NaCl	NaCl injected so far
Phase time (s)	Duration of the current injection phase
Delay (s)	Breaks between the injection phases
Injection time	Duration of all phases
KVO	Indicates whether the KVO function (Keep Vein Open) is activated

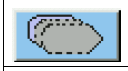
Example of dialogue messages:



You answer dialogue messages by touching the corresponding button.
In the example shown above you can either confirm the question "Please vent the system! CM syringe airfree?" by touching the button with the green symbol **Confirm** or negate the question by touching the button with the red cross **No/ Reject**.

Functions of the touch screen buttons

Symbol	Designation	Function
	Call up profile	To call up an existing profile
	Save profile	To save a profile
	Confirm	To confirm inquiries and changes
	No/Reject	To reject unstored entries or to negate inquiries
	Back	To scroll backwards within a menu
	Forward	To scroll forwards within a menu
	KVO	To activate and deactivate the Keep Vein Open function in order to maintain access to the vein
	Call up filling menu	To call up the filling menu
	Fill syringe	To enter the filling volume in the filling menu

Symbol	Designation	Function
	Piston forward	To move the piston forward in the filling menu To scroll upwards within a list
	Piston back	To move the piston back in the filling menu To scroll downwards within a list
	Add phase	To add a new phase to an injection profile
	Delete phase	To delete a phase
	Hold	To temporarily stop the injection
	Set system	To open the **System settings** menu
	Calibrate touch screen	To calibrate the touch screen
	Save system settings	To save changed system settings
	Info	To change between the two windows with the injection data
	Activate injector	To prepare the injector for the injection
	Continue	To continue the injection after an interruption with the button **Hold**
	NaCl filling volume	To select preset filling volumes of NaCl: - 20, 40, 60 ml (with ELS 65 ml syringe) - 50, 100, 200 ml (with ELS 200 ml syringe)
	CM filling volume	To select preset filling volumes of contrast medium: - 10, 15, 20, 60 ml (with ELS 65 ml syringe) - 15, 20, 60, 100 ml (with ELS 200 ml syringe)
	Leave menu	To leave the menu back to the main window
	Confirm venting	To confirm the previously performed venting operation

On/Off switch

The On/Off switch of the Accutron MR is located on the injector base. When you switch the injector on, the integrated lamp of the On/Off switch and the pilot light on the control panel light up green. By pressing the button again, you switch the injector off again and both lights go off.

Connection for the charger

A socket is located on the side of the injector base. Here you can connect the connecting cable to the charger when you want to charge the battery cells.

Castors

You can conveniently move the injector using the smooth-running castors to the location you want. When it is in the correct position, secure the injector using the locking castors. To this end press the locking lever downwards with your foot. When you want to release the castors, raise the locking lever slightly with your foot.

Note!
Secure the injector position using the locking castors before you swivel the injection units upwards or downwards.

Remote control

The injector can be remotely controlled using the remote control. The data are transferred to the injector by radio. You will find more details in the instructions for use *Touch Screen remote control Accutron MR*.

Handle

There is a connecting bar between the two swivelling injection units. With this bar you swivel the injection units downwards into the injection position after establishing all the injection parameters. To prepare a new injection, swivel the injection units upwards into the vertical position by means of the connecting bar.

Note!
Secure the injector position using the locking castors before you swivel the injection units upwards or downwards.

4 Commissioning the injector

In this chapter you learn how to charge the battery cells, set the touch screen, insert the syringes into the injection units and connect the tube system.

Charging the battery cells

Prior to initial commissioning, you must charge the battery cells accommodated in the injector base.

Note!
If the unit has been out of service for a prolonged period, charge the battery cells before starting it up again.

Note!
The battery cells are maintenance-free. They are replaced when necessary exclusively by MEDTRON Customer Service.

ATTENTION!
The injector must be switched off before the battery cells are charged.

CAUTION!
Do not charge the unit in the MR room.
The injector must be at least 2.5 m away from the patients when the battery cells are being charged.

CAUTION!
Risk of overheating of the charger!
Position the charger free-standing on firm ground to ensure sufficient cooling of the charger. Do not place any objects on the charger.
This prevents an overheating of the charger and the risk of damage to the charger as well as the risk of burns.

- Make sure that the injector is switched off.
- Insert the connector for the charger into the socket on the injector base and connect the charger to the mains supply.

ATTENTION!
Risk of sudden stop of piston movement or injector switching off!
Do not switch on the injector when it is connected to the charger.

- Position the injector in a place where you can easily reach the mains plug and disconnect the injector from the mains supply at any time.

The charging process starts when the LED on the charger lights yellow. Shortly before the battery cells are fully charged the LED flashes yellow. The LED lights green when the battery cells are fully charged.

Note!
The charging time depends on the state of charge of the battery cells. If they are completely discharged, charging takes about 8 hours.

- As soon as the battery cells are fully charged, disconnect the charger from the mains supply and pull the connector of the charger out of the socket on the injector base.

The injector is now ready to be switched on, see next section.

Switching ON

Before being switched on, the injector must be charged and disconnected from the charger.

- Press the On/Off switch on the injector base to switch the injector on.

The integrated lamp of the switch comes on and the pilot light on the control panel lights up green.

Self-test

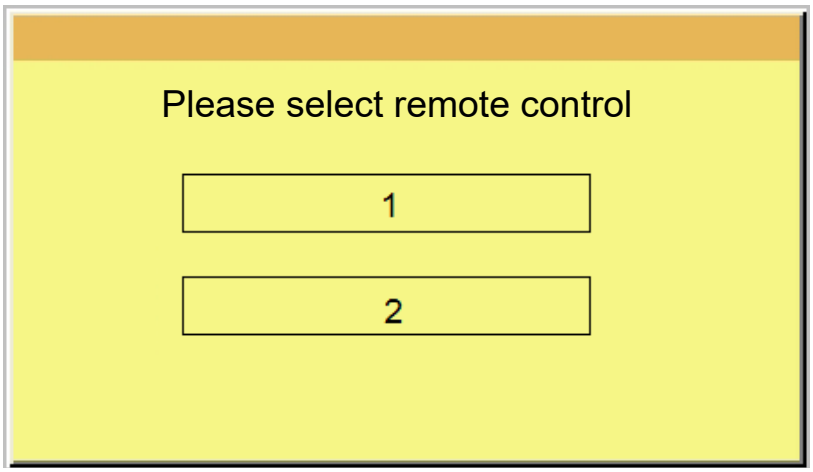
After being switched on, the unit automatically performs a self-test. As soon as the self-test is completed, you briefly see the display with the MEDTRON logo:

If your Accutron MR is equipped with the option for the use of two remote controls, the injector now displays a window where you can select the remote control. Please continue with the next section *Selecting a remote control*.

Then the touch screen immediately shows the main window from where you can call up the submenus.

Selecting a remote control

If your Accutron MR is equipped with the option for the use of two remote controls, you now have to select the remote control you want to work with. After the MEDTRON logo was shown, a window with the request "Please select remote control" is displayed:



Note!
In the delivery condition, the remote controls are named "1" and "2". The names of the remote controls can be changed as you like during installation by the MEDTRON Customer Service or persons trained and authorised by MEDTRON.

- Touch the button with the name of the desired remote control.

The desired remote control has been selected. The main window is displayed.

- Make sure that the unselected remote control is switched off.
- Switch on the selected remote control as described in the instructions for use *Touch Screen Remote Control for Accutron MR*.

Note!
If the remote control displays the message “No connection”, switch the remote control off and on again.

If you want to select another remote control later, proceed as follows:

- Switch off the currently selected remote control.
- Switch the injector off and on again.
- Repeat the above steps to select the desired remote control.

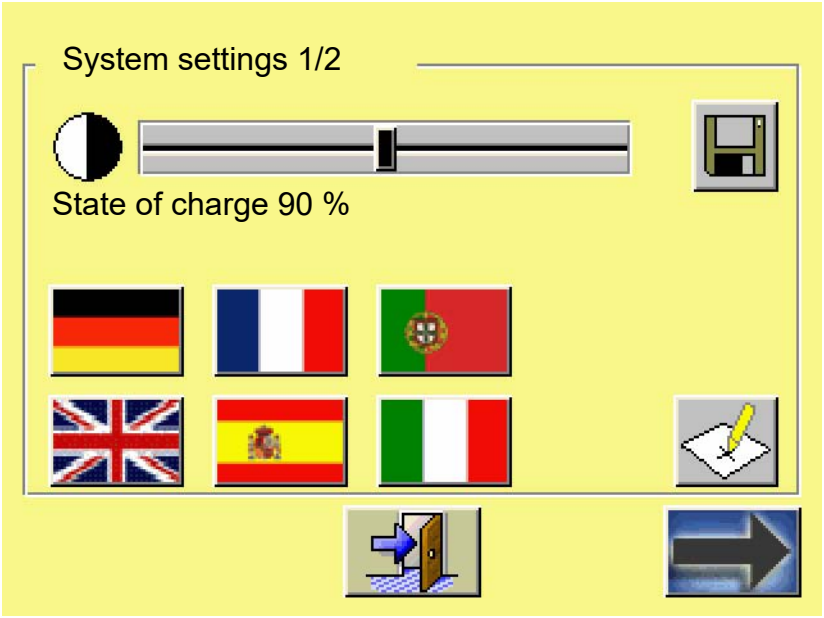
Setting the system

In order to be able to use the injector easily and without any problems, you should set it at the outset to suit your operating habits and the environmental conditions. The menu **System settings** consists of two windows where you can make the following settings:

- Select language for the display texts
- Adjust touch screen to the tactile characteristics of the operator
- Set stand-by time for the injector
- Set empty syringe velocity of the pistons
- Set fill velocity of the pistons

•  Open the **System settings** menu.

The dialogue window **System settings 1/2** is displayed:



Adjusting the display brightness

The brightness cannot be adjusted for this type of display. The slider at the top of the dialogue window has no function.

Displaying the state of charge

In addition to the battery symbol in the main window, the injector features also a more exact display of the charge state. The **System settings 1/2** window displays the state of charge in percent.

If the state of charge is less than 10 %, you must charge the battery cells. In this case charge the battery cells fully using the charger, see *Charging battery cells* on page 29.

Selecting a language

In this dialogue window you can select the language in which the texts in the touch screen are to be displayed. The following can be selected

- German
- French
- Portuguese
- English
- Spanish
- Italian

- Touch the button with the relevant flag.

Calibrating the touch screen

Everyone operates a touch screen in their own particular way. A right-handed person, for example, does not position his finger at the same place as a left-handed person. The size and angle of the fingers also play a role. To ensure that the touch screen correctly adopts your entries and commands, you must first calibrate it to your touch habits.

To be able to calibrate the touch screen, you must first log into the system.

-  Touch the button **Calibrate touch screen** in the dialogue window **System settings 1/2**.

The dialogue window **Login** is displayed. You are requested to select your name.

- Touch the list entry **User**.
- Enter the identification 1001 on the numeric keypad.
- Touch the button **OK**.
-  Touch the button **Calibrate touch screen**.

The calibration window is displayed.
Cross hairs are shown in the centre of the window.
Here you are requested in a German text:

"Bitte drücken Sie fest auf die Fadenkreuze.
Bleiben Sie solange auf den Fadenkreuzen, bis diese verschwinden."

Which means:
"Please press the cross hairs firmly.
Remain on the cross hairs until they disappear."

- Keep your finger pressed on the cross hairs in the centre of the screen until they disappear.

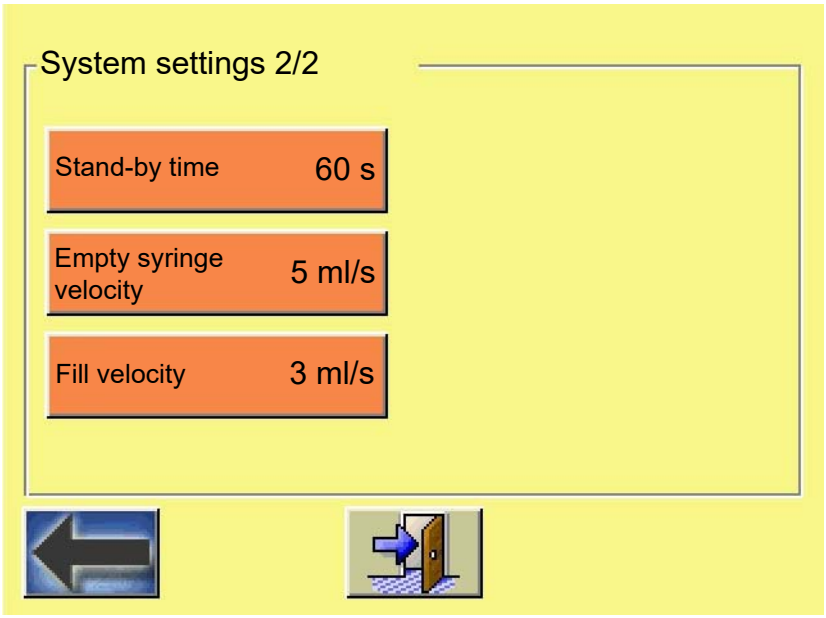
The cross hairs are gradually displayed in each corner of the screen.

- Press each cross hair until it disappears.
-  Save calibration.
-  Leave the menu to display the dialogue window **System settings 1/2**.

To be able to make the further settings, you must open the dialogue window **System settings 2/2**:

-  Scroll forwards to the dialogue window **System settings 2/2**.

In the dialogue window **System settings 2/2** you can make the following settings:



Setting the stand-by time

After a preset period, the injector switches into stand-by mode when it is not being used or during the injection. The display and the pilot light switch off. This saves energy and avoids any disruptive electromagnetic radiation during the scan operation. You can switch on the display again at any time by pressing the Stop button or Wake-up button. 10 – 240 s can be set.

Note!
If you switch on the display again during the injection, the injection will be stopped automatically.

Setting the empty syringe velocity of the pistons

Here you can set at what speed the empty pistons are to be moved.
1 – 6 ml/s can be set.

Setting the fill velocity of the pistons

Here you can set at what speed the liquids are to be filled.
1 – 5 ml/s can be set.

Make all settings as follows:

- Touch the relevant button with your finger.

A pop-up window opens. The value currently set and the entry range are displayed.

- Overwrite the marked value using the numeric keypad with a new value.

If you have accidentally entered the wrong number, you can delete it with the **DEL** key.

-  Confirm the new value.

The pop-up window closes.

When you have made all the settings, you can now either:

-  change to the window **System settings 1/2**

or

-  leave the **System settings** to display the main window.

When all settings have been made, you can now insert the syringes. For this purpose read the next section *Preparing the injection units* on page 37.

Preparing the injection units

Note!
You can only insert the syringes into the injection units when the pistons of the injector are fully moved back.

CAUTION!
Risk of infection!
Do not remove the protective caps of the syringes until you have made the connections. Make sure that the packings of the consumables do not show any signs of damage.

Moving the pistons back

On delivery the pistons are retracted. After the routine removal of used syringes, however, the pistons are advanced.

CAUTION!
Risk of injury due to damage to the syringes!
Make sure that the syringes with tube system have been removed from the recipients before moving the pistons back.

In order to be able to insert new syringes, you must first move the pistons back.
For this purpose:

-  **Call up filling menu** in the main window.

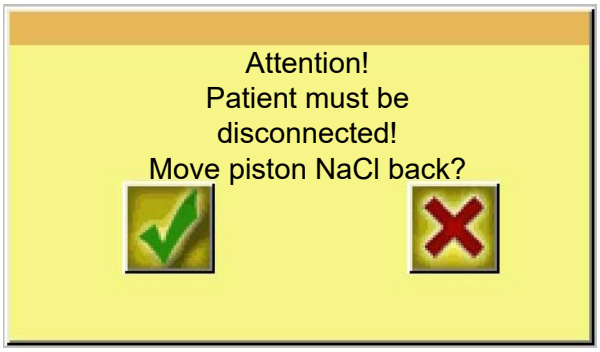
-  Touch left button for the CM piston.

The dialogue message with the confirmation prompt "Attention! Patient must be disconnected! Move piston CM back?" is displayed.

-  Confirm the message.

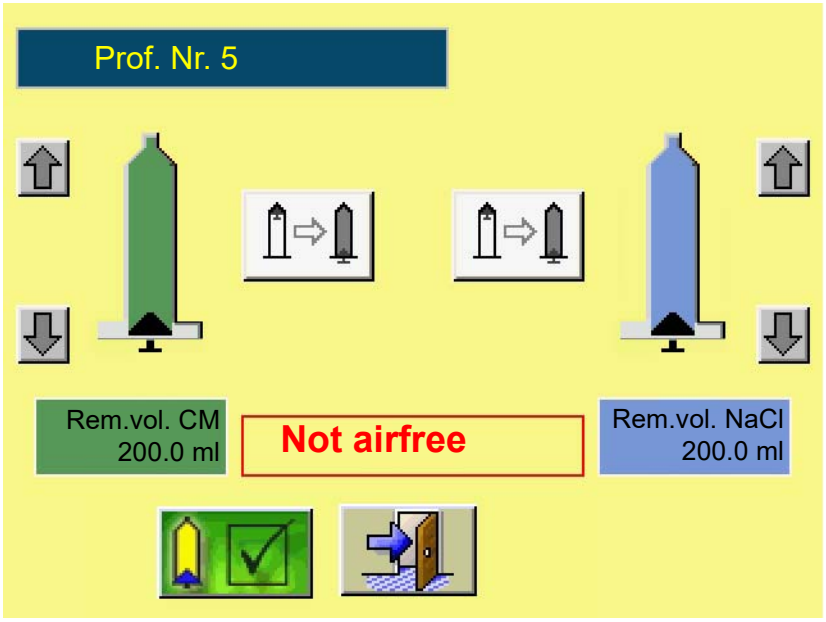
-  Touch right button for the NaCl piston.

The dialogue message with the confirmation prompt "Attention! Patient must be disconnected! Move piston NaCl back?" is displayed.



-  Confirm the message.

Both pistons move back into their lowest position.



The piston is retracted when it is right at the bottom of the syringe, the syringe is completely green/blue and the remaining volume displayed is 200 ml (see diagram).

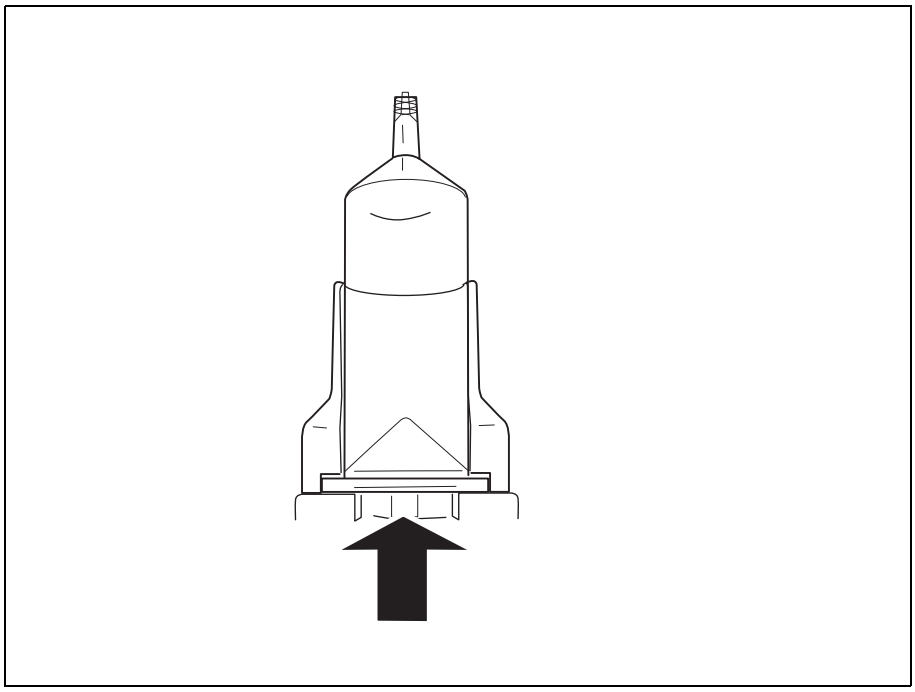
-  Return to the main window.

Inserting the syringes

- Make sure that both pistons are moved back.

Note!
The left-hand piston is intended for the injection of **contrast medium**, the right-hand piston for **NaCl solution**.

- Push the syringe from the front into the respective recipient until it engages audibly.



Then you can connect the tube system, see next section.

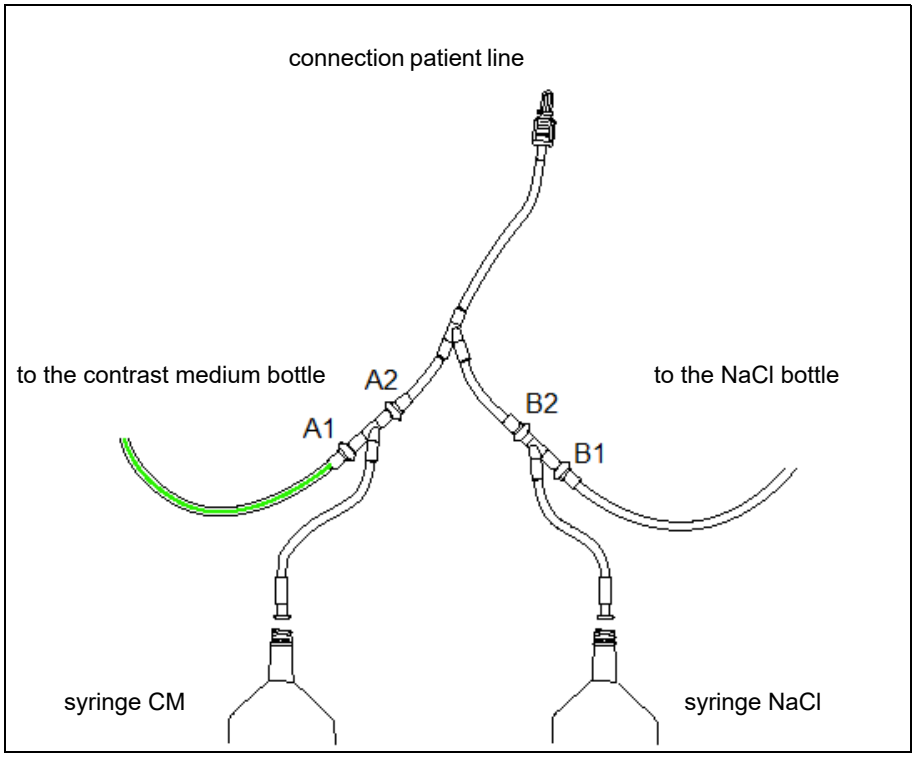
Connecting the tube system

CAUTION!
Risk of infection!
Do not remove the protective caps of the tube ends until you make the connections.
Make sure that the packings of the consumables do not show any signs of damage.

Note!
For detailed information about the consumables you use, please refer to the separate instructions for use enclosed with the respective product.

The function of a double piston tube system with two drip chambers is described below as an example solution. The tube system has four valves which function as follows:

- When you fill the syringe **CM** with contrast medium, valve **A1** is opened and valve **A2** closed.
- When you inject contrast medium out of the syringe **CM**, valve **A1** is closed and valve **A2** opened.
- The valves **B1** and **B2** function in the same way.



Note!
The tube marked with a green stripe is intended for the contrast medium. The tube section between valve **A2** and the Y-piece is very short in order to save contrast medium.

The tube system is connected to the syringes as follows:

- Remove the protective caps from the CM syringe and CM tube end.

ATTENTION!
Risk of damage to the syringe and tube system!
When screwing on the tube system with too much force you may damage the Luer Lock thread and therefore make the syringe and tube system unusable.
Therefore do not overtighten the Luer Lock thread.

- Screw the tube system onto the syringe with approx. one half-turn.
- Repeat the steps for the NaCl side.

In the next step connect the tube system to the bottle:

Note!
If you use a CM bag with Luer Lock connection, please use a tube system with inline drip chamber.

- Hang the contrast medium bottle and NaCl bottle with the opening downwards on the bottle holder.
- Pull the protective cap off the spike of the drip chamber and press the spike into the contrast medium bottle.
- Open the ventilating flap on the drip chamber.
- Briefly press drip chamber together twice to fill it roughly half-full with contrast medium.
- Repeat the steps for the NaCl drip chamber.

The injector is now ready to be filled with contrast medium and NaCl.

5 Operating the injector

This chapter describes how to operate the injector manually, how to work with injection profiles and how to carry out an injection.

Filling the injector with contrast medium and NaCl

Note!
Fill the injector with contrast medium first and then with the saline solution.

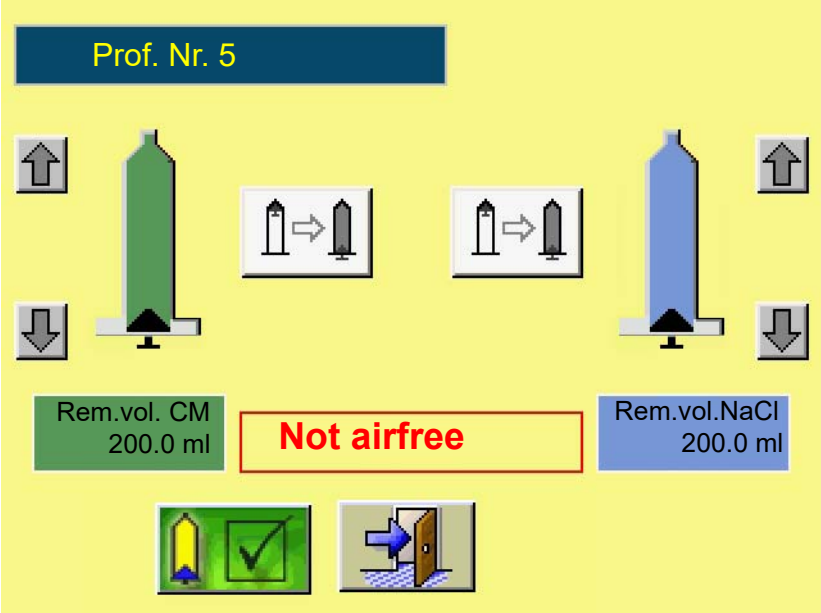
Both syringes are inserted, left for contrast medium, right for NaCl, the tube system is connected, the injector is switched on. The main display is shown.

In order to fill the syringes, the pistons must first be moved forward.

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
Make sure that the patient is not yet connected to the system!

-  Call up the filling menu in the main window.

The filling menu is displayed.



Note!
When the pistons are fully moved back, the corresponding filling button isn't active and thus marked grey.

Moving both pistons forward

- Touch left button for the CM piston.

The dialogue message with the confirmation prompt "Attention! Patient must be disconnected! Move piston CM forward?" is displayed.

- Confirm the message.

-  Touch right button for the NaCl piston.

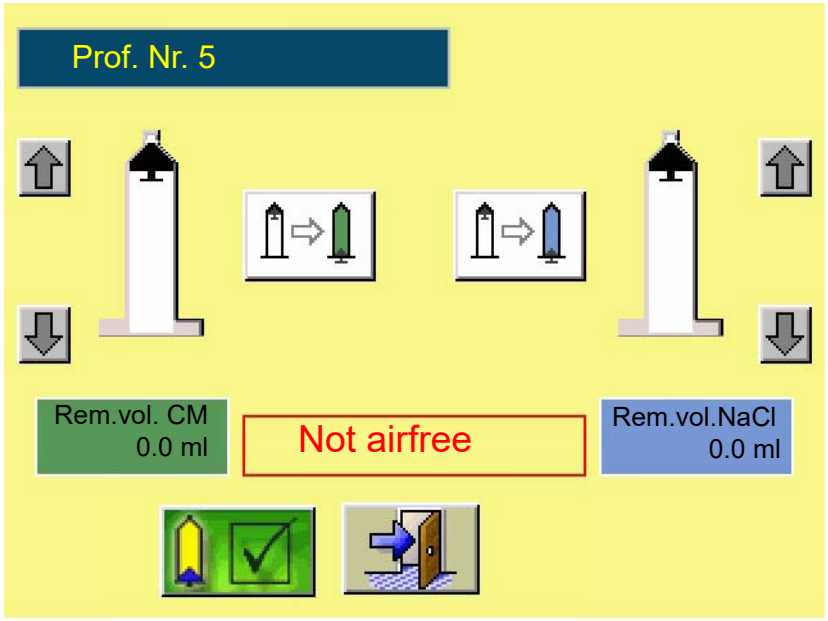
The dialogue message with the confirmation prompt "Attention! Patient must be disconnected! Move piston NaCl forward?" is displayed.

-  Confirm the message.

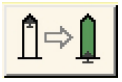
Both pistons of the syringes move forwards into their uppermost position, the remaining volume displayed becomes lower on both sides, the two symbols for the syringes become white.

Note!
When advancing the pistons, the valves may cause a low hissing sound – this is normal.

When the pistons are fully extended, the filling menu is shown like this:



Enter the filling volume for contrast medium and fill

-  In the filling menu touch the button **Fill syringe** in order to enter the filling volume for contrast medium.

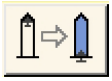
A dialogue window with numeric keypad is displayed.

The range which you can enter, e.g. 0.0 – 200.0 (ml), is shown in the top right of the dialogue window **Enter filling volume and fill**.
The current (maximum) value is already specified. You can change the value by entering the value you want on the numeric keypad. If you have accidentally entered a wrong number, you can delete it using the button **DEL**.

- Enter the filling volume you want.
-  Confirm entry.

The dialogue window **Enter filling volume and fill** is closed.
The piston of the syringe for contrast medium moves back.

Enter the filling volume for NaCl and fill

-  Touch the blue button **Fill syringe** in the filling menu to enter the filling volume for NaCl.

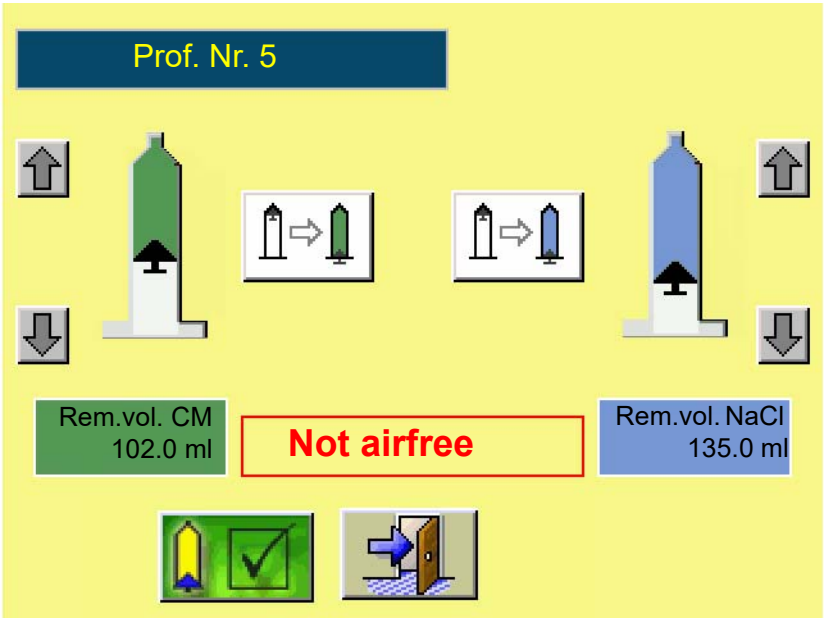
A dialogue window with numeric keypad is displayed.

The range which you can enter, e.g. 0.0 – 200.0 (ml), is shown in the top right of the dialogue window **Enter filling volume and fill**.
The current (maximum) value is already specified. You can change the value by entering the value you want on the numeric keypad. If you have accidentally entered a wrong number, you can delete it using the button **DEL**.

- Enter the filling volume you want.
-  Confirm entry.

The dialogue window **Enter filling volume and fill** is closed.
The piston of the syringe for NaCl moves back.

While the pistons draw in contrast medium and NaCl, you see the following display:



- Then connect the patient line to the tube system.

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
At the latest now you must connect the patient line to the tube system so that the entire tube system right to the patient is completely vented.

Venting the tube system

The syringes and the tube system still contain air. You must vent the system using the buttons for the manual piston movements.

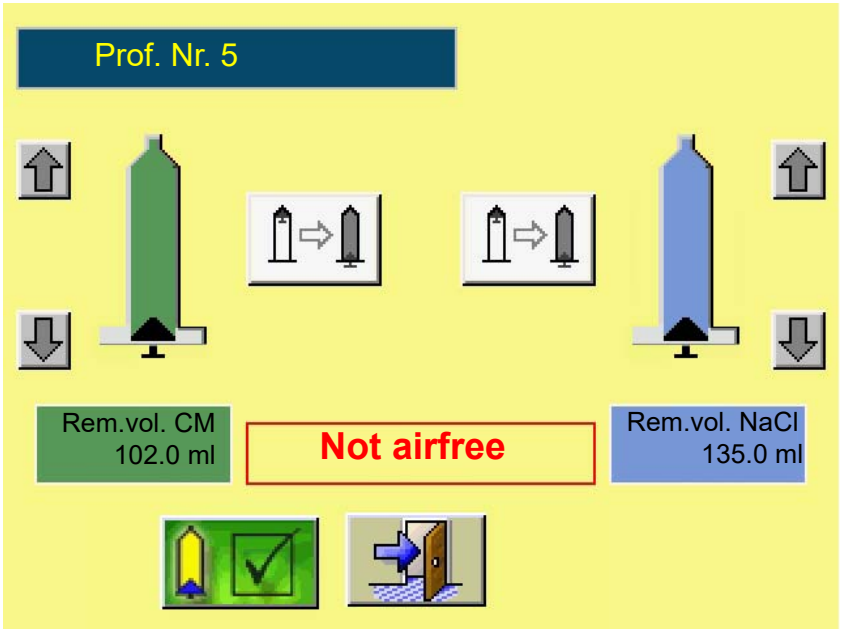
Note!
Firstly, vent the contrast medium side up to the Y-piece and only then the entire system including the patient line with the piston for NaCl. In this way you save contrast medium.

- Make sure that the patient line is connected to the tube system.
- Swivel the two injection units into the vertical position.
-  In the left-hand button group for the manual piston movements press the button **Piston forward** and keep it depressed to advance the CM piston.
-  To gradually increase the piston speed, also press this adjacent button.
- Keep venting the **CM** side until there are no more air inclusions just after the Y-piece.
-  In the right-hand button group for the manual piston movements press the button **Piston forward** and keep it depressed to advance the NaCl piston.
-  To gradually increase the piston speed, also press this adjacent button.
- Vent the entire tube system including the patient line with the **NaCl** piston.

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
There must be no more air inclusions in the entire tube system.

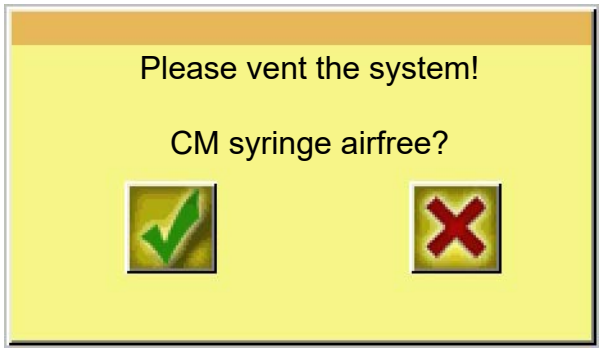
- Keep venting until there are no more air inclusions in the entire tube system.

During venting the injection volume actually available appears in the window **Rem. vol. (ml)**.



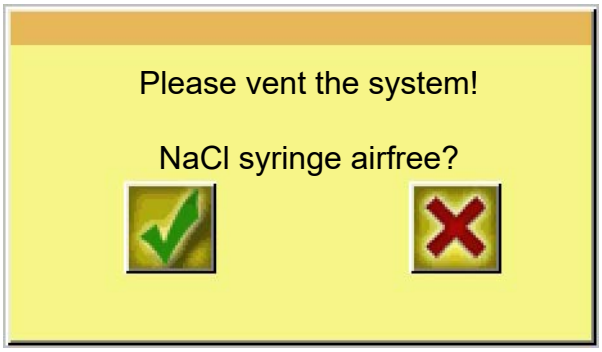
-  On completion of venting touch the now active button **Confirm venting** or the text field **Not airfree**.

The dialogue message with the confirmation prompt "Please vent the system! CM syringe airfree?" is displayed.



-  Confirm completed venting.

The dialogue message with the confirmation prompt "Please vent the system! NaCl syringe airfree?" is displayed.



-  Confirm completed venting.

The parameters of the current injection profile are displayed.
The text field indicates **Airfree** in green.
The button **Activate injector** is highlighted in colour and therefore active.

- Swivel the injection units downwards into the injection position.

The injector is now ready for the injection.

Changing the maximum pressure

You can set the desired pressure limit (maximum pressure). The pressure actually reached during injection depends on a number of ambient variables such as the viscosity of the contrast medium, needle diameter, set flow rate, etc.

If the set maximum pressure is reached during the injection, the injection is stopped.

CAUTION!
Risk to the patient!
Make sure that the maximum pressure set does not endanger the patient.

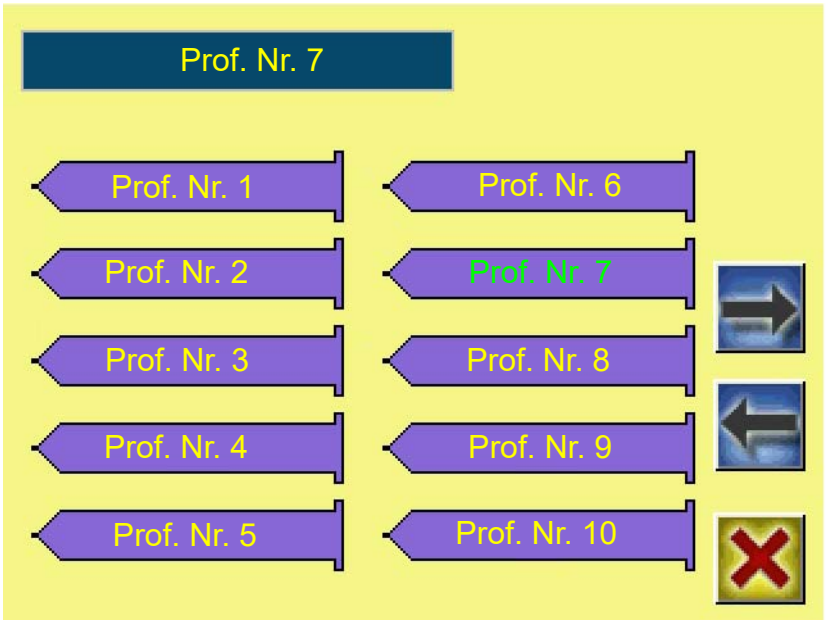
The maximum pressure can only be changed on the remote control supplied with the Accutron MR. Please read the separate instructions for use to see how to proceed for this purpose.

Selecting an injection profile

You can create with the injector up to 80 injection profiles and store them under a profile number. Depending on the application, you call up the profile you want with the injection parameters saved and you can immediately start the injection. For this purpose proceed as follows:

-  Call up profile.

The dialogue window with the injection profiles already available is displayed.



Using the arrow buttons, you can scroll forwards and backwards and in this way view all profile names.

- Touch the syringe symbol of the profile you want to use.

In this way you have selected a profile.
The parameters of this profile (here Prof. Nr. 7) are in the main window.

Changing an injection profile

You can change the parameters of an injection profile as required.

The touch screen displays the injection profile to be changed.

Example:
The profile to be changed is displayed. You want to change the volume of a phase.

- Touch the relevant value with your finger.

A pop-up window opens.
The value currently set and the entry range are displayed.

- Overwrite the marked value using the numeric keypad with a new value.

If you have accidentally entered the wrong number, you can delete it with the **DEL** key.

-  Confirm the new value.

You edit the other values, such as delay, concentration, and flow in the same way.

Note!
Take note before entering the concentration:

– 100% means contrast medium only
– 40% means 40% contrast medium, 60% NaCl
– 0% means NaCl only

Note!
Some values have a reciprocal effect on one another.
If you change the volume value or the flow, the injection time of this phase changes automatically.
If you change the injection time, the flow is changed accordingly.

CAUTION!
Risk of serious injuries!
Before entering the flow (up to 10 ml/s possible!), check the constitution of the patient to be examined.

The system displays the changed value in the main window.
The profile name has changed automatically. **Prof. Nr. 0** is now shown in the main window.

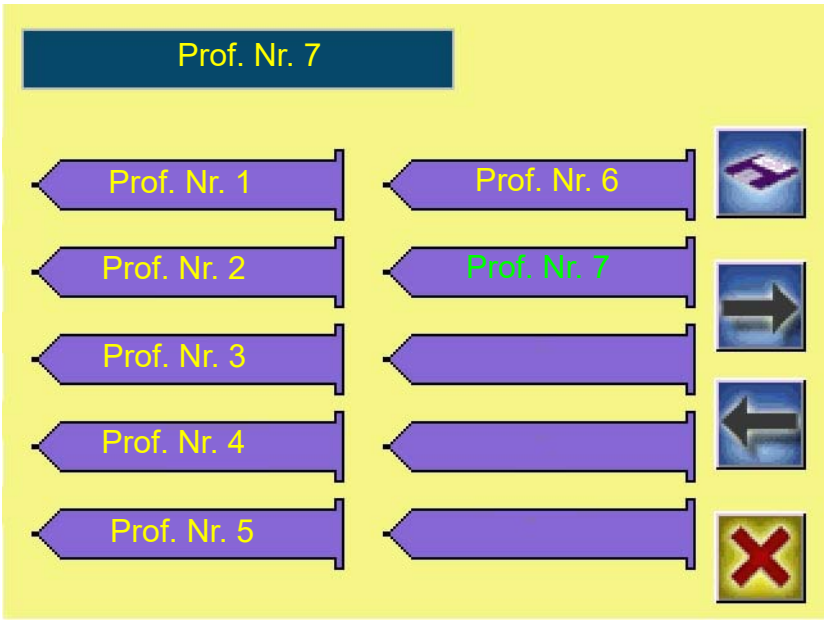
Saving changes

If you have made changes to the parameters of an injection profile, you must store the profile.
However, after a change the original name of the profile is no longer on the screen but **Prof. Nr. 0**.

ATTENTION!
Risk of data loss!
Save changes to parameters under a profile number.
Otherwise the changes are lost when you switch off the injector.

-  Save profile.

The dialogue window with the injection profiles already available is displayed.



You can scroll forwards and backwards using the arrow buttons and in this way view all profile names.

You have two possibilities:

– *overwriting an existing profile*, see next paragraph, or
– *saving the changes under a new profile*, see page 57.

Overwriting an existing profile

If you want to overwrite an already existing profile,

- touch the appropriate syringe symbol.

The writing in the syringe symbol is green and the name of the selected profile number is now in the text field for the profile name.

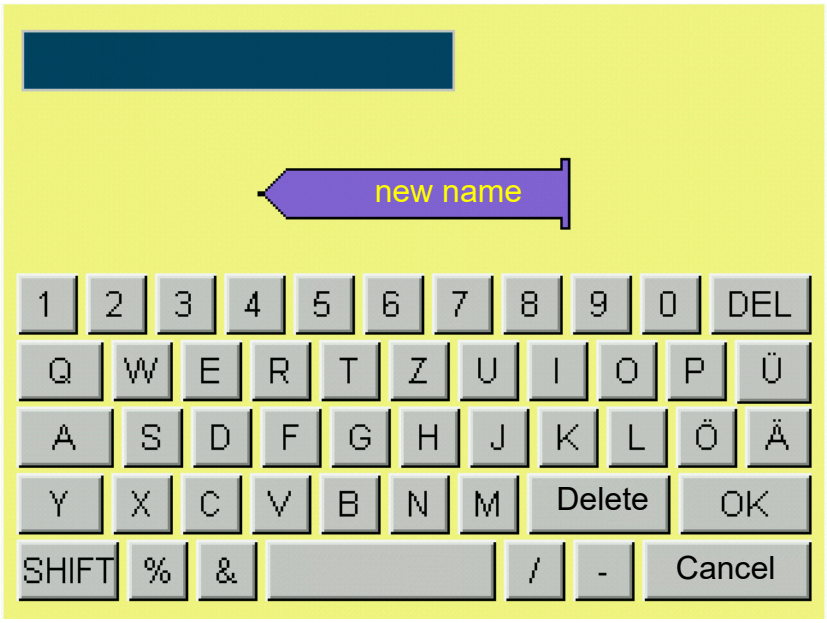
Entering a profile name

If you want to change the name of this profile:

- touch the dark-blue text field.

The touch screen displays the input mask for the profile name.

You can enter the new profile name using the keyboard. You can delete individual letters with the button **DEL** or delete the entire name with the button **Delete**. You can write capital letters with the button **SHIFT**.



- Enter a new profile name.
- Touch the button **OK** to confirm the entry.
-  Save the new name for the profile.

The changed profile is stored and the main window is displayed.

Saving changes under a new profile

If you want to save the changed profile under a new profile,

- select the empty syringe symbol.

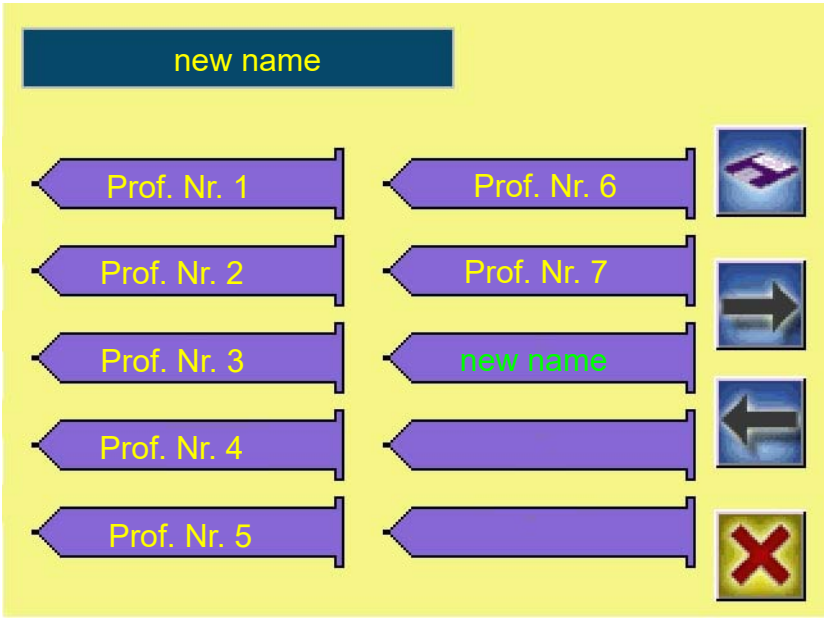
The marking in the syringe symbol is green and is also shown at the top in the dark-blue text field.

- Touch the dark-blue text field.

The touch screen displays the input mask for the profile name, see preceding section.

- Enter the name for the new profile with the keyboard.
- Touch the button **OK** to confirm the entry.

The new entry is now in the profile list.



-  Save the new profile with the new profile name.

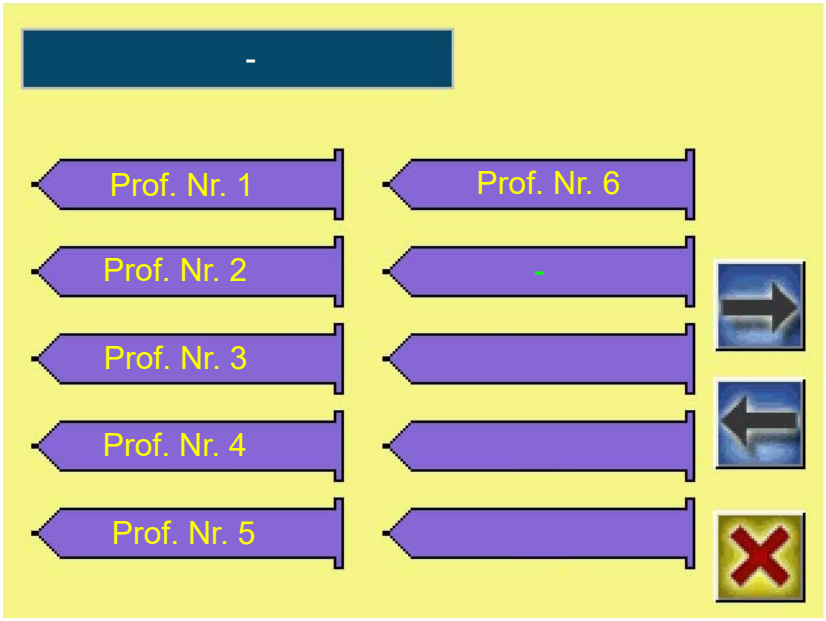
The main window displays the newly created profile.

Creating a new profile

If you want to create a completely new profile, you must first select the relevant syringe symbol. For this purpose:

-  Call up profile in the main window.

The list with the profiles is displayed.



You can scroll forwards and backwards with the arrow buttons and in this way view all the syringe symbols.

- Choose the empty syringe symbol of the new profile and touch it.

In the main window you have opened an empty profile with only one phase which you can now fill with the injection parameters you want.

- Enter all the profile data and parameters you want.
-  Save profile.
- Select the syringe symbol you want again.
- Touch dark-blue text field to enter the profile name.

The touch screen displays the input mask for the profile name, see page 56.

- Enter the name for the new profile with the keyboard.
- Touch the button **OK** to confirm the entry.
-  Save the new profile with the new profile name.

The main window displays the newly created profile.

Adding a new phase

You can add a new phase (a maximum of 6 are possible) to an existing profile with, for example, 2 phases.
The main window of the relevant profile is displayed.

-  Add a phase.
- Touch parameter fields of the new phase.
- Enter the individual values in the input mask using the numeric keypad.
-  Confirm the new value.

The main window of the profile is displayed.

-  Save the changes.
- Touch the appropriate syringe symbol.

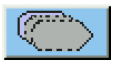
The lettering in the syringe symbol is green and the profile number is in the text field at the top.

- Enter profile name as described on page 56.
- Touch the button **OK** to confirm the entry.
-  Save the profile under the profile name selected.

The changed profile is stored and displayed in the main window.

Deleting a phase

You can completely delete the last phase from a profile. Proceed as follows:

-  Delete phase in the main window of the corresponding profile.
-  Save the changed profile.
- Touch the appropriate syringe symbol.

The lettering in the syringe symbol is green and the profile number is in the text field at the top.

- Enter profile name as described on page 56.
- Touch the button **OK** to confirm the entry.
-  Save the profile under the profile name selected.

The changed profile is stored and the main window is displayed.

Performing an injection

CAUTION!
Risk of fatal or serious injuries due to air embolisms!

- Do not connect the patient to the system until you have vented the syringes and the tube system.
- Vent the syringes and the tube system every time after filling the injector with contrast medium or saline solution.
- Make sure before every injection that there are no air inclusions in the syringes and the connected tubes.
- Only start an injection when the syringes are in the lowered position (injection position).
- Make sure before every injection that the injection parameters shown on the display do not endanger the patient.

- Swivel the injection units out of the vertical position downwards into the lowest position (injection position).

This injection position ensures that possibly remaining air bubbles in the syringe rise to the piston and are not injected.

- Make sure again that the tube system and the patient line do not contain any air inclusions.
- Remove protective cap from the patient line and connect the patient line to the patient access.

CAUTION!
Risk of uncontrolled supply of contrast medium due to hydrostatic pressure compensation!
Make sure that the patient and the syringes are at the same level.

The injector is vented, the button **Activate injector** on the touch screen is active.

Maintaining vein access with the KVO function

Before performing the injection, you can now establish whether you want to activate the Keep Vein Open function (KVO).The KVO function ensures that access to the vein is retained during prolonged examinations.

If you activate this function, the injector injects 0.5 ml of saline solution every 2 minutes.

- 

If you want, activate KVO.

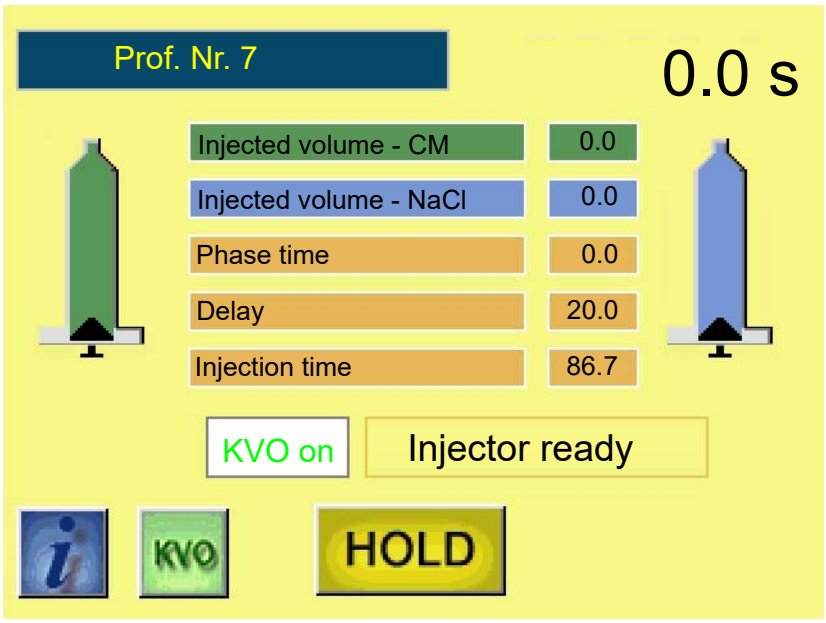
– If the KVO function is activated, the button is green.
– If the KVO function is deactivated, the button is grey.

Note!
If the NaCl volume falls below the minimum of a KVO volume when the KVO function is activated, the KVO function is deactivated.

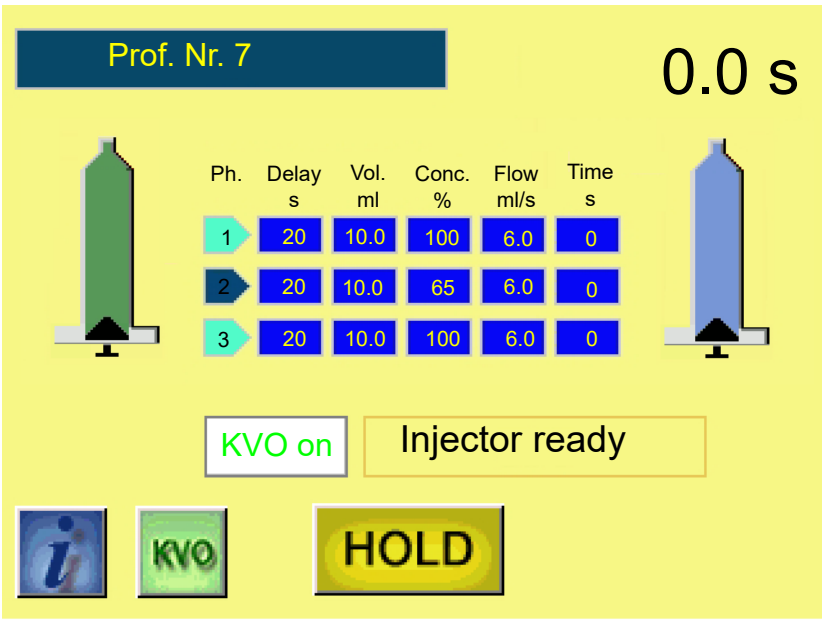
Starting the injection

-  Touch the button **Activate injector**.

The following window is displayed:



-  Using the button **Info**, you can change to a second window with more injection data.



The LEDs of the start and stop button on the control panel come on.

- Press the button **Start injection** on the control panel of the injector or the button **START/Continue** on the remote control.

The injection starts.

The pilot light on the control panel flashes green.

Note!
The touch screen on the injector switches off on expiry of the set stand-by time and you can follow the course of the injection on the remote control.

After the start of the injection, you can follow the individual phases and the details of already injected and remaining contrast medium, phase time, delay, and injection time on the display of the remote control. The stopwatch in the top right begins to run when you press the start button.

Interrupting the injection

If the display is deactivated, you can stop the injection at any time by

-  pressing the Stop button on the control panel of the injector

or by

-  pressing the Wake-up button on the control panel of the injector.

The injector stops the injection.
The display switches on again and a pop-up window is displayed.

If you would like to cancel the injection completely:

-  Touch the button **Confirm**.

The injection is stopped.

If you would like to continue the interrupted injection:

-  Touch the button **Continue**.

The device then continues the injection at the point where it was interrupted.

You can also interrupt the injection on the remote control as described in the instructions for use of the *Touch screen remote control Accutron MR*.

Injection end

The program stops after passing through all the phases.
All time values of the injection count backwards to 0.The injected volume counts forwards.

Note!
The program run stops when all the phases have been passed through. If the KVO function has been activated, NaCl is injected until you confirm the program end.

The message "Injection finished" is displayed.

-  Confirm message.
-  If necessary, wake up touch screen on the injector.
- The main window is displayed in the touch screen.
- When the examination is over, disconnect the patient line from the patient access and dispose of the consumables.

CAUTION!
Risk of infection!
Replace the consumables with new ones after they have been used once. Otherwise, you jeopardise your patients' health.

Observe the applicable hygiene regulations!

If you want to stop working with the injector, read and follow the instructions in the chapter *Post-examination work* on page 72.

Replenishing the injector with contrast medium/NaCl

When the contrast medium or NaCl filling of the syringes is coming to an end and you want to perform more injections or if the message "CM volume too low. Please replenish CM or adjust injection profile." or "NaCl volume too low. Please replenish NaCl or adjust injection profile." appears, refill the syringe.

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
Make sure that the patient is not yet connected to the system!

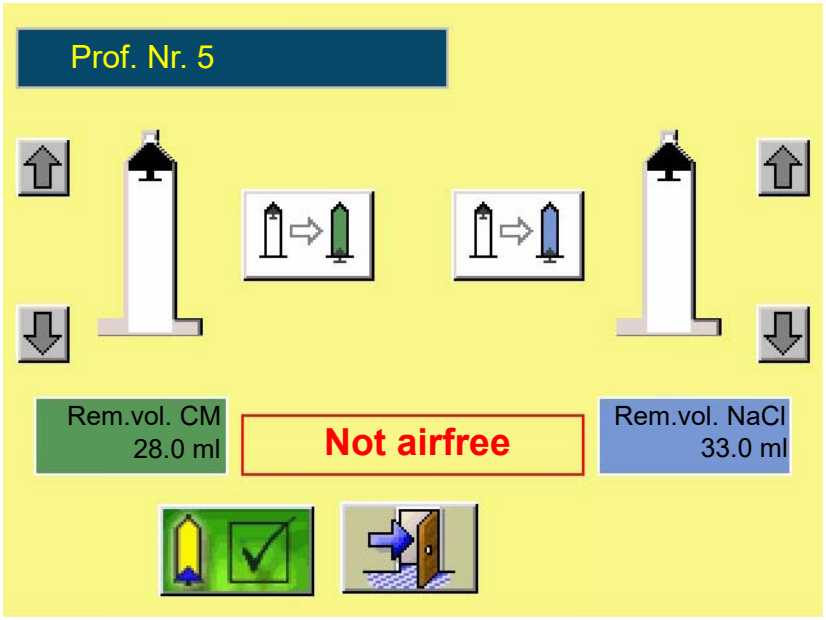
How to proceed is described here taking the example of contrast medium.

- Confirm message "CM volume too low. Please replenish CM or adjust injection profile."

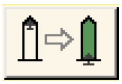
The main window of the touch screen is displayed.

- Remove the patient line from the patient access.
-  Touch the button **Call up filling menu** in the main window.

The filling menu is displayed.



Enter the filling volume and fill

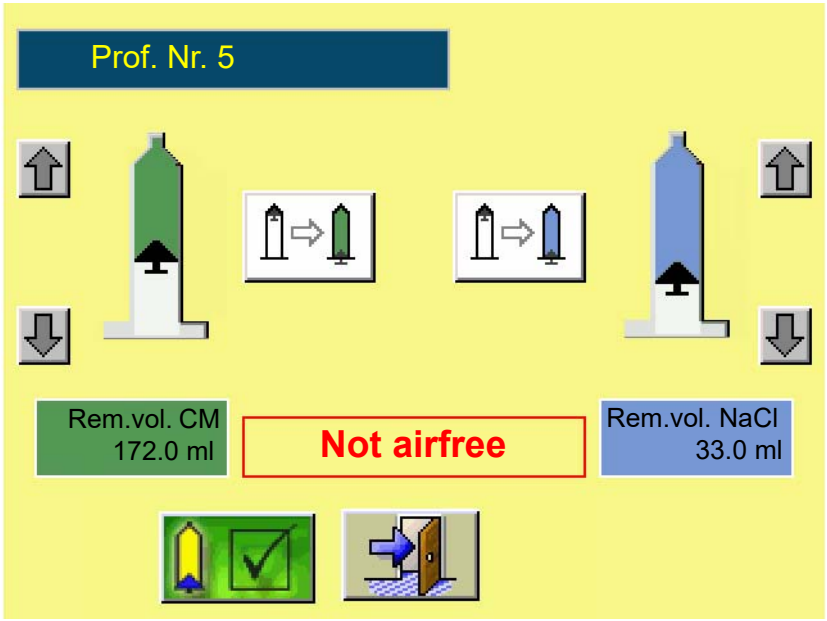
-  Touch the green button **Fill syringe** in the filling menu to enter the filling volume for contrast medium.

The dialogue window **Enter filling volume and fill** with numeric keypad is displayed.

The range with the possible values you can enter, e.g. 0.0 – 172.0 (ml), is in the top right of the dialogue window. The current (maximum) value is already specified, in this example that is 172 ml as 28 ml are available as the remaining volume. You can change the value by entering the value you want on the numeric keypad. If you have accidentally entered the wrong number, you can delete it with the button **DEL**.

- Enter the filling volume you want.
-  After entry, confirm the value you want.

The dialogue window **Enter filling volume and fill** is closed. The piston of the syringe moves back. While the piston draws in the contrast medium, you see the following display:



Venting after replenishing

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
At the latest now you must connect the patient line to the tube system so that the entire tube system right to the patient is completely vented.

- Make sure that the patient line is connected to the tube system.

At present, the syringe and the tube system still contain air. You must vent the system using the buttons for the manual piston movements.

Note!
First vent the contrast medium side up to the Y-piece and only then the entire system including the patient line with the piston for NaCl.
In this way you save contrast medium.

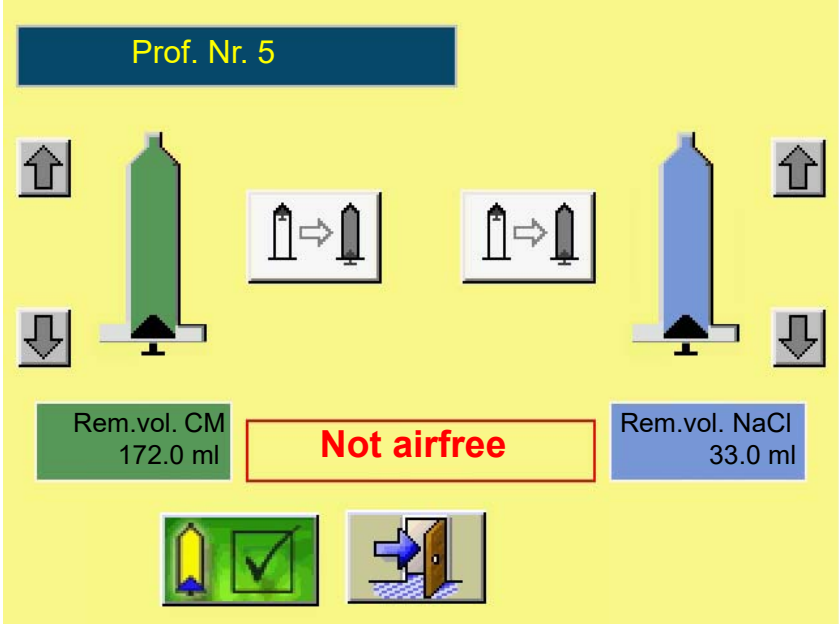
- Swivel both injection units into the vertical position.
-  In the left-hand button group for the manual piston movements press the button **Piston forward** and keep it depressed to advance the CM piston.
-  To gradually increase the piston speed, also press this adjacent button.
- Keep venting **CM** side until there are no more air inclusions downstream of the Y-piece.
-  In the right-hand button group for the manual piston movements press the button **Piston forward** and keep it depressed to advance the NaCl piston.
-  To gradually increase the piston speed, also press this adjacent button.

With the **NaCl** piston vent the entire tube system including the patient line.

CAUTION!
Risk of fatal or serious injuries due to air embolisms!
There must be no more air inclusions in the entire tube system.

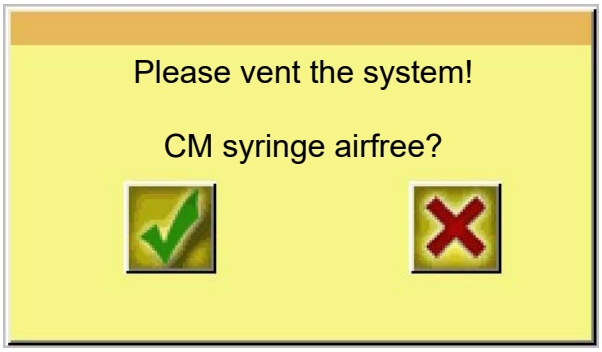
- Keep venting until there are no more air inclusions in the entire tube system.

During venting the injection volume actually still available appears in the window **Rem.vol. (ml)**.



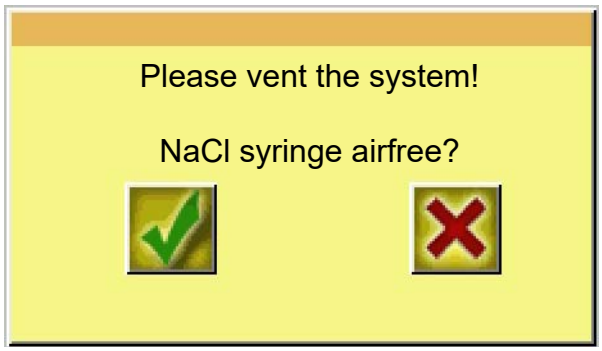
-  On completion of venting touch the now active button **Confirm venting** or the text field **Not airfree**.

The dialogue message with the confirmation prompt "Please vent the system! CM syringe airfree?" is displayed.



-  Confirm completed venting.

The dialogue message with the confirmation prompt "Please vent the system! NaCl syringe airfree?" is displayed.



-  Confirm completed venting.

The parameters of the current injection profile are displayed.
The text field indicates **Airfree** in green.
The button **Activate injector** is highlighted in colour and therefore active.

The injector is again ready for the injection.

Post-examination work

- When the examination is over, disconnect the patient line from the patient access and dispose of the consumables.

CAUTION!
Risk of infection!
Replace the consumables with new ones after they have been used once. Otherwise, you jeopardise your patients' health.

Observe the applicable hygiene regulations!

You can remove the syringe with tube system at every piston position. For this,

- turn the syringe by 90° and remove it by pulling it upwards.
- Properly dispose of all consumables in accordance with the regulations on waste disposal and hygiene applying to the operator.

CAUTION!
Risk of injury due to damage to the syringes!
Make sure that the syringes with tube system have been removed from the recipients before moving the pistons back.

- In the filling menu, *move both pistons back*, see page 37.

Note!
To insert a new syringe, the piston has to be in the lowest position.

- Press the On/Off switch to switch the injector off.

The green LED of the switch and the pilot light go out.

- If required, connect the injector to the charger.

Note!
To avoid damage to the battery cells, connect the injector to the charger during longer periods without operation (≥ 1 week).

6 Annex

Waste disposal

Do not put old devices to the normal domestic waste!
MEDTRON undertakes to take back its old devices as well as electric and electronic accessories, such as chargers, remote controls and similar, in order to avoid environmental pollution caused by electronic waste.

The consumables are to be disposed of in accordance with the regulations on waste disposal and hygiene applying to the operator, in order to avoid any risk of infection.

Safety inspections and maintenance

CAUTION!
Risk of injury to operator and patient!
Maintenance and repair work may only be performed by the MEDTRON Customer Service or persons authorised by MEDTRON. Trained and authorised persons will receive the documents necessary for the maintenance and safety inspections from MEDTRON:

– *FB 07.20.16 Service report injectors*

Maintenance and repair work on all parts of the injector and on all connected and attached accessories must not be carried out while a patient is connected to the injector.

MEDTRON recommends annual maintenance and an annual safety inspection for the injector. The maintenance work is performed by staff trained and authorised by MEDTRON. Regular maintenance ensures the functionality of the injector.

Safety Inspections and maintenance work should be certified and documented in the medical equipment logbook.

Cleaning and storage

Remove any consumables from the injector immediately after use and dispose of them properly. Consumables must not be sterilised and re-used. Remove all contamination caused by contrast medium – particularly from the recipients, piston holders and ball thrust pieces – with warm water before it dries in.

ATTENTION!
Risk of malfunctions of the Accutron MR!
Do not immerse the injector in water!
Do not use any aggressive cleaning agents or solvents.
Warm water and a mild soap are sufficient.

To disinfect the Accutron MR, we recommend Mikrozid Liquid from Schülke & Mayr GmbH, Germany. Do not use any aggressive disinfectant to disinfect the injector.

The user interface of the touch screen must be kept free of dirt, dust, fingerprints and other materials that could impair the optical properties.

For best results, use a microfibre cloth and any commercially available window cleaner to clean the touch screen.

ATTENTION!
Risk of damage to the touch screen!
Do not use any abrasive materials to clean the touch screen.
Do not apply the cleaning agent directly to the touch screen but to the cloth.

In the case of prolonged breaks in operation, store the Accutron MR in a safe place where it is protected against dust and moisture.

System messages

The following table contains system messages which indicate either faults in the injector or incorrect operation. Using the following table, try to eliminate the cause of the fault in question.
If the cause remains unclear and the suggestions for remedy prove unsuccessful, please contact the MEDTRON Customer Service.

Message/Error	**Possible cause and remedy**
CM volume too low. Please replenish CM or adjust injection profile.	There is too little contrast medium in the syringe to implement the injection profile. Acknowledge message and replenish contrast medium, see page 67, or adjust injection profile.
NaCl volume too low. Please replenish NaCl or adjust injection profile.	There is too little NaCl in the syringe to implement the injection profile. Acknowledge message and replenish NaCl, see page 67, or adjust injection profile.
No operation possible	The value for the volume or flow is missing in at least one phase. Enter missing values.
Configuration on the remote control	This message appears while settings are being made on the touch screen of the remote control.
At the same time: Configuration on the remote control Configuration on the injector	This message appears when settings have been made on the remote control and the remote control has been switched off and on again in the meantime. Press the Stop button on the injector.
Piston position could not be determined! Please remove the syringe and activate the OK button! The piston moves back!	Inspect the limit switch cables for correct fitting. Then confirm the inquiry. The pistons move back into the initial position. Switch the injector off and on again.
Error code: […]	This message appears if a device error has occurred. Please contact the MEDTRON Customer Service and mention the displayed error message.

Technical data

Flow rate per unit	0.1 ml/s – 10 ml/s, increment 0.1 ml/s
Injection volume	Contrast medium: 200 ml/64 ml Saline solution: 200 ml/64 ml
Partial volume which can be pre-selected	0 ml – 200 ml/64 ml, increment 0.1 ml
Injection pressure	5 – 21 bar, increment 1 bar
Fill velocity	1 ml/s – 5 ml/s, increment 1 ml/s
Empty syringe velocity	1 ml/s – 6 ml/s, increment 1 ml/s
Manual piston movement speed (forward/backward)	2 ml/s (start) – 6 ml/s (five-time acceleration)
KVO parameters	0.5 ml of saline solution every 2 minutes
Injection profiles	80
Injection phases	1 – 6
Accuracy	– Volume: ± (1 % + 1 ml) – Flow rate: ± (1 % + 0.1 ml/s) – Times: ± (1 % + 0.1 s) – Pressure: ± (5 % + 1 bar) – All values ≥ 0
Charger	Mascot Type 2440 with medical approval
Input voltage charger	100 – 240 V AC, 50 – 60 Hz
Power consumption charger	< 160 VA
Fuse	2x Littelfuse T 630 mA (injector base) voltage: 250 V DC; current: 630 mA; size: 8.5 × 8 mm (Ø × H); breaking capacity: 35 A Thermal circuit breaker, E-T-A 106-P30, 6 A/ 48 V DC (injector base, accessible from outside) voltage: 48 V DC; current: 6 A; size: 19 × 11 × 41.1 mm (L × W × H); breaking capacity: 200 A
Battery	Saft LS 14250 3,6 V lithium (internal, injector base)
Degree of protection against ingress of water	IPX0
Protection class injector	Device with internal power supply Protection class II (during charging process)

Operating mode	Continuous operation, ≤ 10 patients per hour	
Device type	CF, identified by ♥	
Dimensions (H × W × D)	1180 × 470 × 620 mm in the injection position	
Weight (injector without accessories)	approx. 38 kg	
Ambient conditions during operation	– operating temperature – relative humidity – air pressure	10 °C – 30 °C 30 % – 75 % 700 hPa – 1060 hPa
Ambient conditions for storage and transport	– storage temperature – relative humidity – air pressure	- 20 °C – 60 °C up to 75 % 700 hPa – 1060 hPa
Battery cells	24 V, 22 Ah (2x Yuasa REC22-12I; injector base)	
Operating time of the battery cells	With fully charged battery cells, the operating time of the injector is at least 30 hours[1]	
Radio communication	Bluetooth	
Bluetooth class	Class 1	
Frequency range	2.402 – 2.48 GHz	

The injector satisfies the requirements of the standard DIN EN 60601-1-2 for medical equipment in terms of the emitted interference and interference immunity.

[1]based on a stand-by time of 30 seconds.
The operating time can be increased by reducing the stand-by time.

Index

A
Air inclusions 48, 69
Ambient conditions 77

B
Battery cells 77
    charging 29
    charging time 30
Battery symbol 25
Bluetooth class 77
Bottle holders 21
Breaks in operation 74
Brightness
    setting 34

C
Calibrating touch screen 34
Calibration window 34
Castors 21, 28
Charger 29, 76
Cleaning and storage 74
Column stand 21
Concentration 25
    changing 53
Connections 22
Consumables
    disposing of 72
Contrast medium
    filling 43
    replenishing 67
Contrast medium side
    venting 69
Control panel 23
Cross hairs 34

D
Delay 25, 54
Disinfection 74
Drip chamber 41

E
Electromagnetic compatibility 16
Empty syringe velocity
    setting 36

F
Fill velocity 76
    setting 36
Flow 25, 54
    changing 53
Flow rate 76
Frequency range 77

H
Handle 28

I
Inj. time 25
Injected volume 25
Injection
    end 66
    performing 61
    position 61
    pressure 76
    starting 63
    unit 21
Injection phases 76
Injection pressure 76
Injection profile
    saving changes 54
Injection profiles 76
Injector
    commissioning 29
    switching ON 31
Inspection and maintenance work 73
Intended use 6
Items supplied 20

K
Keep Vein Open function 62
KVO 25
KVO parameters 76

L
Language
    selecting 34
Login 34

M
Main window 24
Maintenance work 73
Manufacturer’s plate 6
Maximum pressure 51
Medical equipment logbook 73
Model name 6

N

NaCl
- filling 43
- replenishing 67

NaCl side
- venting 48, 69

O

On/Off switch 21, 28
Operating
- habits 33

Operating time of the battery cells 77
Optional accessories 20

P

Parameters
- changing 53

Phase 25
- adding new 59

Phase time 25
Pistons
- move forward 44
- moving back 37

Pressure
- maximum 51

Profile
- changing 53
- selecting 52

Protection
- of people 13
- of property 13

Protection class 76

R

Radio communication 77
Recipient 21
Remote control 28
Repair work 73

S

Safety instructions 13
Serial number 6
State of charge
- displaying 33

Storage 74
Switching ON 31
Syringe
- inserting 39
- venting 48

Syringe symbol 52, 58
System messages 75
System settings 33, 35

T

Touch screen 24
- calibrating 34

V

Venting the syringe 48
Volume 25

W

Waste disposal 73