Servicing Documents
Technical Information
ECG-Suction-Electrode-Systems
Applicard ® 2.0

English Version

Riemer MEDITECH GMBH		**Germany**	document	tiac20e
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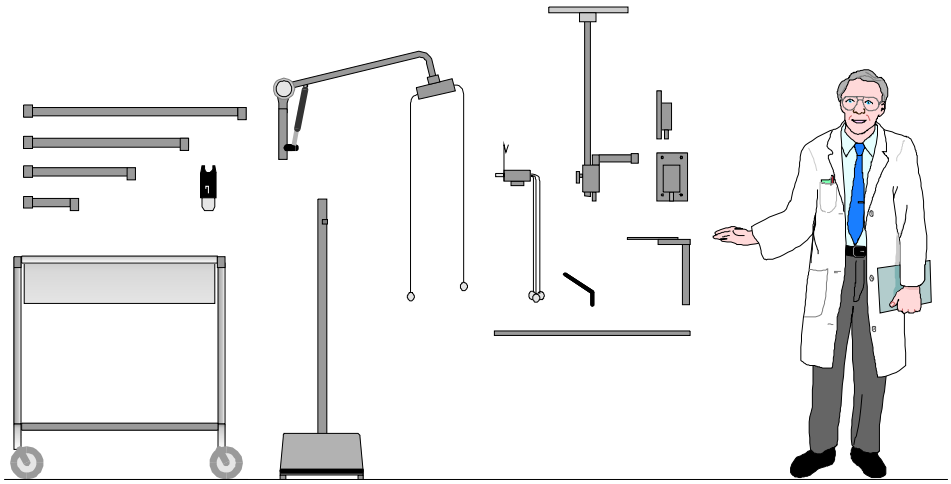
Table of contents 07.2001

		pages	version
1.	**General Points**		
1.1.	System description	2	05.2000
1.2.	*History of the unit*		
1.3.	Maintenance instruction	1	05.2000
1.3.1	Cleaning with ultrasound	1	05.2000
1.4.	*Troubleshooting chart*		
1.5.1	**Applicard** ® pressure adjustment	2	05.2000
1.5.2	**Applicard** ® **UE** pressure adjustment	1	05.2000
2.	**Compressor unit**		
2.1.	Design drawing	1	05.2000
2.2.	Connection diagram for mains switch	1	05.2000
3.	**Arm**		
3.1.	Connection diagram for the ECG-socket	1	05.2000
3.2.	Distribution board components	1	05.2000
3.3.	*Dismantling / assembling arm*		
3.4.	*Delivery hose replacement*		
3.5.1.	Electrode hose replacement	1	05.2000

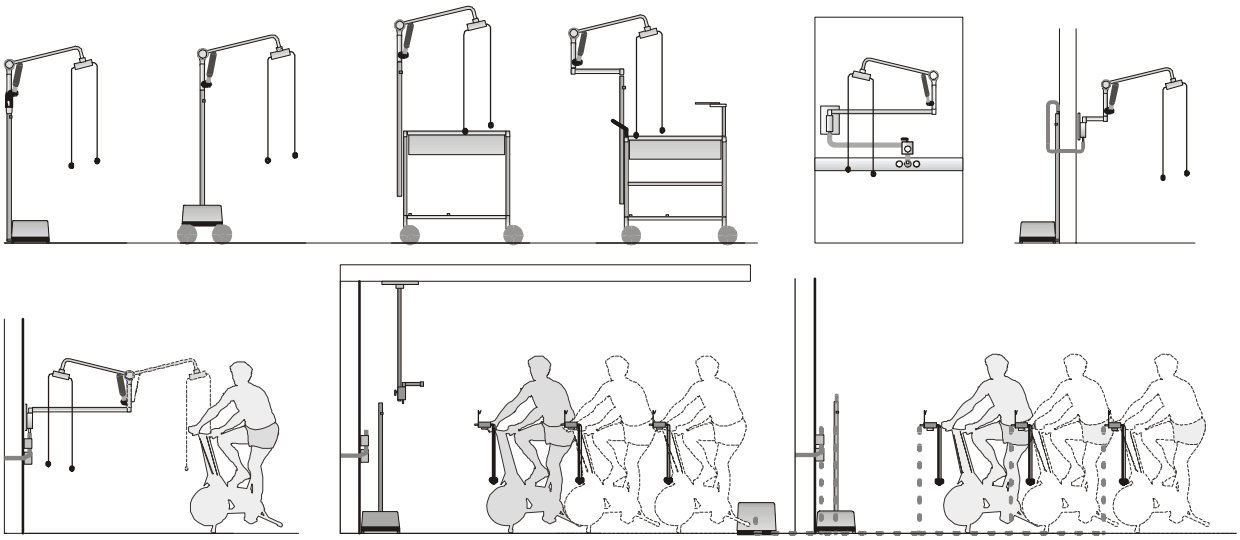
Topics in italics are still in the preparatory phase

The ECG Suction electrode device **Applicard®** is a product of **Riemer MediTech electromedicine**

Applicard® is international patented and a registered trademark.



The modular build up of **Applicard®** system allows adaptable arrangements.



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General System Description

An induction motor (***Papst*** external rotor motor) was mounted in the compressor housing of the **Applicard** ® up until the **end of 1990.**

This drove a maintenance-free **rotary piston compressor**. In this version, ambient air was suctioned through filters, compressed and brought to constant pressure using microfilters and pressure-regulating valves. The compressed air entered the support tube and swivel arm and made its way to the distributor.

The hoses, which are labeled and whose color-marking conforms to standards, transport both the electrical signal and the compressed air to the **Injectrode®** **.**

An air jet pump in each **Injectrode®** generates the constant negative pressure necessary and thus the secure suction grip.

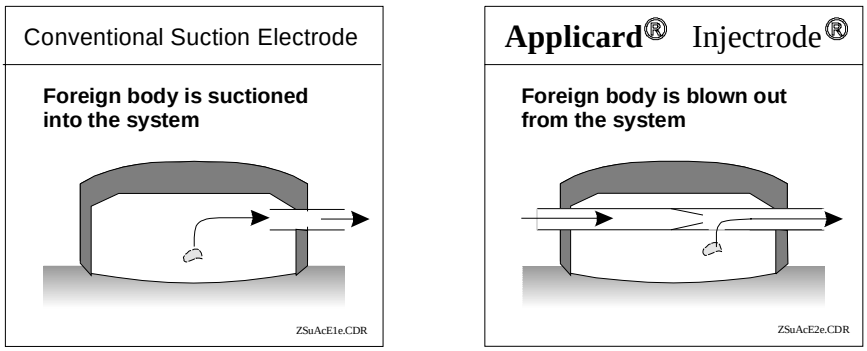
From about the start of 1991 the pump was replaced by two **diaphragm compressors** which are controlled in duo procedure by diodes, each with opposing half sine waves. This patented type of pump is not only maintenance-free, it is also **almost totally resistant to wear**. The functional system of the **Applicard** ® has not changed except that the pump now has two integrated suction filter strips and that the screw filter on the compressor only has the function of a pressure buffer because the system is resistant to wear.
Since September 1999 Applicard is now also available in the version 2.0. The difference to the Applicard 6 S consists in the fact that we use now new developed electrodes, that need less air so that we can use smaller pumps that are also substantially quieter. This led finally to the fact that since at the end of 2003 only **one** so-called linear compressor is necessary. This entailed a still smaller size, particularly with the so-called installation unit.

Injectrode® principle

MediTech **Injectrodes**® operate according to the jet pump principle which we have patented. Compressed air is generated in one unit and is then carried to the **Injectrodes**® via the electrode hose. Such an air jet pump (comparable to the well-known water jet pump) is built into every **Injectrode**®. This generates the negative pressure necessary for suction grip.

The advantage of this method over conventional suction electrodes are:

- **As the air flows out from the Injectrode®, the system ensures that no foreign bodies such as water, perspiration, skin particles, hairs, etc. Enter the unit generating compressed air.**



- **The system ensures that the negative pressure of a single injectrode remains constant even if the other Injectrode® are not in use.**
- **By simply covering the air outlet, individual Injectrode® may be effortlessly removed to change their position on the body, etc.**
- **All Injectrodes® fall off automatically when the compressed air is switched off.**
- **A water separator which normally presents hygienic problems is no longer necessary.**

Notes on Injectrode® Cleaning and Maintenance

- Clean the **Injectrode**® **after approximately 10 ECG recordings** or daily after the last recording. With the device switched on, hang the **Injectrode**® to be cleaned over the edge of a large, wide vessel which is filled with approx. 3 - 5 cm **clear or demineralised water**.
- Disinfectants used in hospitals and private practices (*Sagrotan*, etc.) may be added to the water. Observe the mixing ratio given by the manufacturer.
- If required (e.g. in dermatitis or danger of infection) the **Injectrode**® and electrode leads may be sterilized with a commercial cold-sterilization agent according to the instructions for use and mixing specification of the manufacturer.
- Always rinse system parts which come into contact with the skin in **clear water for approx. 2 - 3 minutes** after sterilization.
- With the compressor switched on, allow the **Injectrode**® to drain off for several minutes after being taken out of the water or cleaning solution when cleaning is complete.
- If the suction performance of the **Injectrode**® deteriorates in spite of regular cleaning, deposits of calciferous water, perspiration or dirt particles in the nozzle could be the cause.
- Then you may change the nozzle easily.
- With very stubborn deposits it is advantageous to unscrew the injectrode buttons and to place the parts separately in a vessel with **Appliclean**® (according to the enclosing note), possibly even cleaning them with a ***soft*** toothbrush.
- Then thoroughly rinse the **Injectrode**® with clear water and immediately screw them onto the electrode hoses.
- They should be left to drain off for a few minutes with the compressor switched on.
- The **Injectrode**® may also be cleaned with ultrasound in connection with **Appliclean**® **US** (cf. **TI 1.3.1**)

Note:

- Do not use **hot** water or **detergent** (apart from the additions described)
- Do not wipe **Injectrode**® with cloths giving off **fluff** and also do not **sand** or **scratch**
- **Never** pierce injectrode nozzles with needles, canulas or similar objects
- Do not use another contact spray as **Applifluid**®
- The electrodes should **not** be exposed to **direct sunlight**, because silver-silverchloride is a photoconductor material and becomes gradually non conductive because of the UV radiation.
- If you disinfect or clean the electrodes with **alcohol** you should immediately **rinse** them in **clear water**
- Never bring other metals in contact with the silver-silverchloride

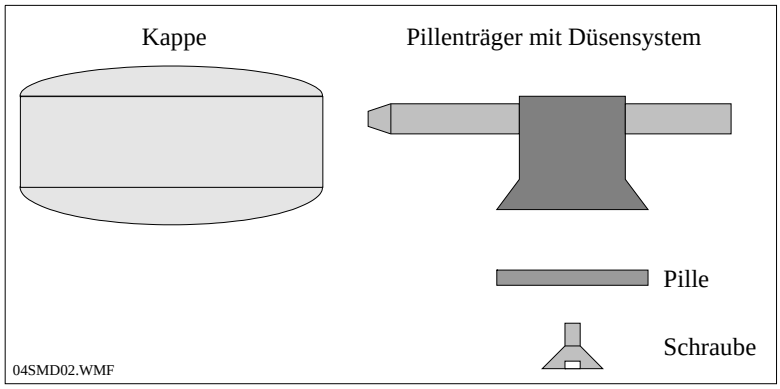
Careful observation of these cleaning and maintenance instructions will help protect the sensitive silver-silver chloride buttons and the injectrode nozzle, ensuring that the **Injectrode**® have a long working life. The warranty claim becomes invalid in case of mechanical damage or disintegration of the electrodes due to non approved contact sprays.

Notes on Ultrasound Cleaning of the Injectrode®

1. Mix 10 ml **Appliclean**® US with ½ litre of warm (approx. 60°C - 70°C) water and pour into ultrasound device.
2. For regular cleaning (approx. once a week), unscrew **Injectrode**® from electrode hose and place them in the cleaning unit with the button side facing downwards.
3. Cleaning duration: approx. 10 - 15 minutes
4. Allow **Injectrode**® to drain, rinse briefly in clear water.
5. Screw **Injectrode**® back on to the electrode hose, switch on **Applicard**® and let **Injectrode**® bubble briefly (approx. 1 minute) in clear water; remove the **Injectrode**® and let them blow dry

Every month, proceed as follows for Point 2:

Dismantle injectrode if possible



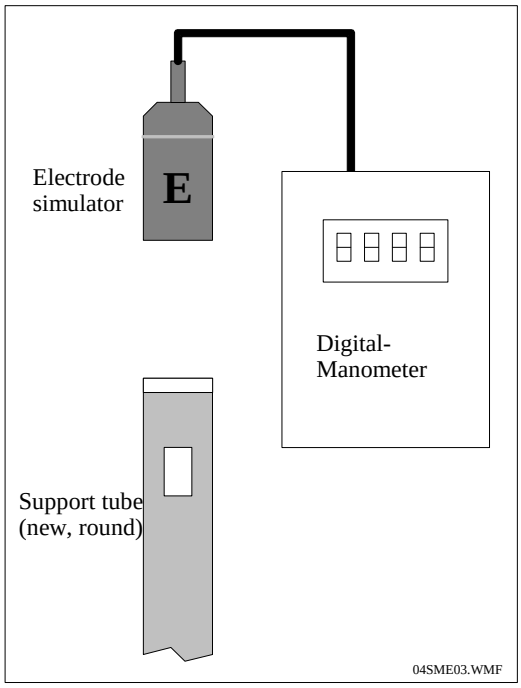
and place these parts into the ultrasound device.

Points 3 and 4 as above

Then reassemble parts and proceed with Point 5.

Notes on Pressure Adjustment in Applicard® Units

1. To adjust the pressure, there is a screw accessible from the outside at the rear of the unit)
2. Now lift off the electrode arm and replace it by the electrode simulator E.
   Connect the hose of the +/- manometer.

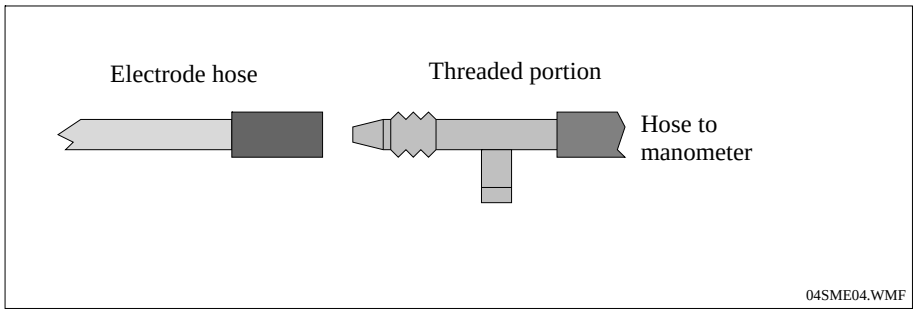


3. Adjust the pressure by twisting the adjusting screw in a clockwise direction (higher pressure) or in the other direction (lower pressure). The pressure should be approx. 140 - 150 mbar (positive).

4. Please refer to TI 2.4 if the pressure does not reach this value.

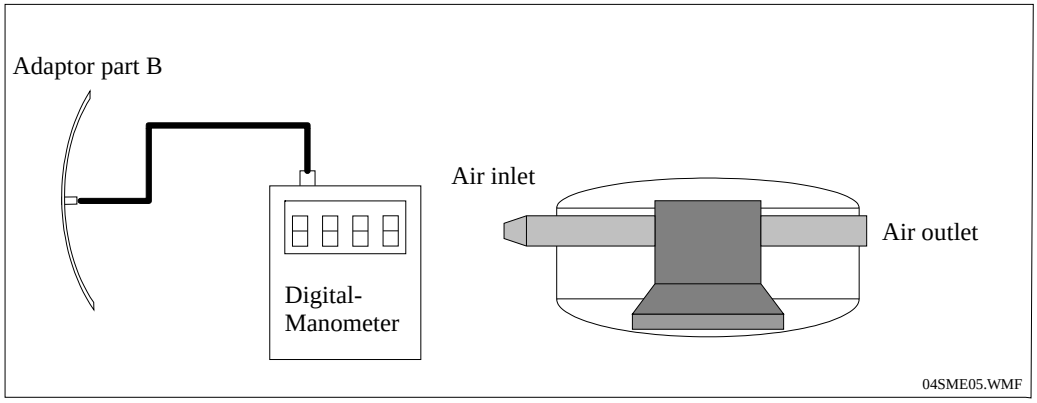
5. If you do not have a simulator unscrew an injectrode from an extremity lead and connect to the manometer using the threaded portion A.

6. Set pressure value as described in Point 3.



7. Then screw the injectrode back on.

8. You also check the pressure of each individual **Injectrode**® with the +/- manometer and the adapter part B. If the pressure is not at least -140 mbar (negative), adjust it by twisting the adjusting screw on the air outlet side of the **Injectrode**® .



9. If this does not achieve the desired result, injectrode cleaning according to TI 1.3 is recommended.

10. Even more stubborn calciferous deposits in the nozzle can be removed with a 0.5 mm drill bit by careful drilling from the air outlet side of the injectrode. However, this must be done very carefully because any widening of the nozzle bore will cause irreparable damage to the **Injectrode**® .

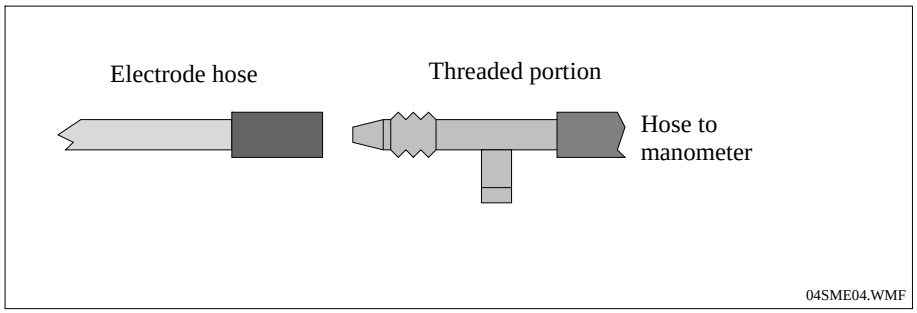
11. If you carried out the check without the electrode simulator E, check the positive pressure once more after these work steps. To do this, proceed as in Point 5.

12. The adjusting screw of the compressor should at any rate be resealed (if necessary with adhesive).

13. Firmly retighten the cover of the compressor.

Notes on Pressure Adjustment in the Applicard® UE Units (Monitoring systems)

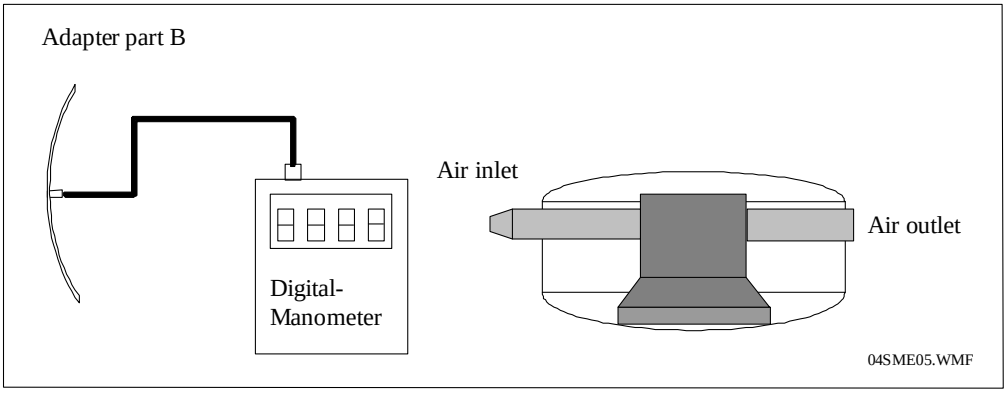
1. Unscrew an **Injectrode®** from an extremity hose and connect this hose to the manometer using the threaded portion A. The pressure should be approx. 140 - 150 mbar (positive).



2. Depending on the system, adjust the pressure either at the valve of the compressor or at the pressure-reducing valve of the central compressed air system.

3. Then screw the **Injectrode®** back on again.

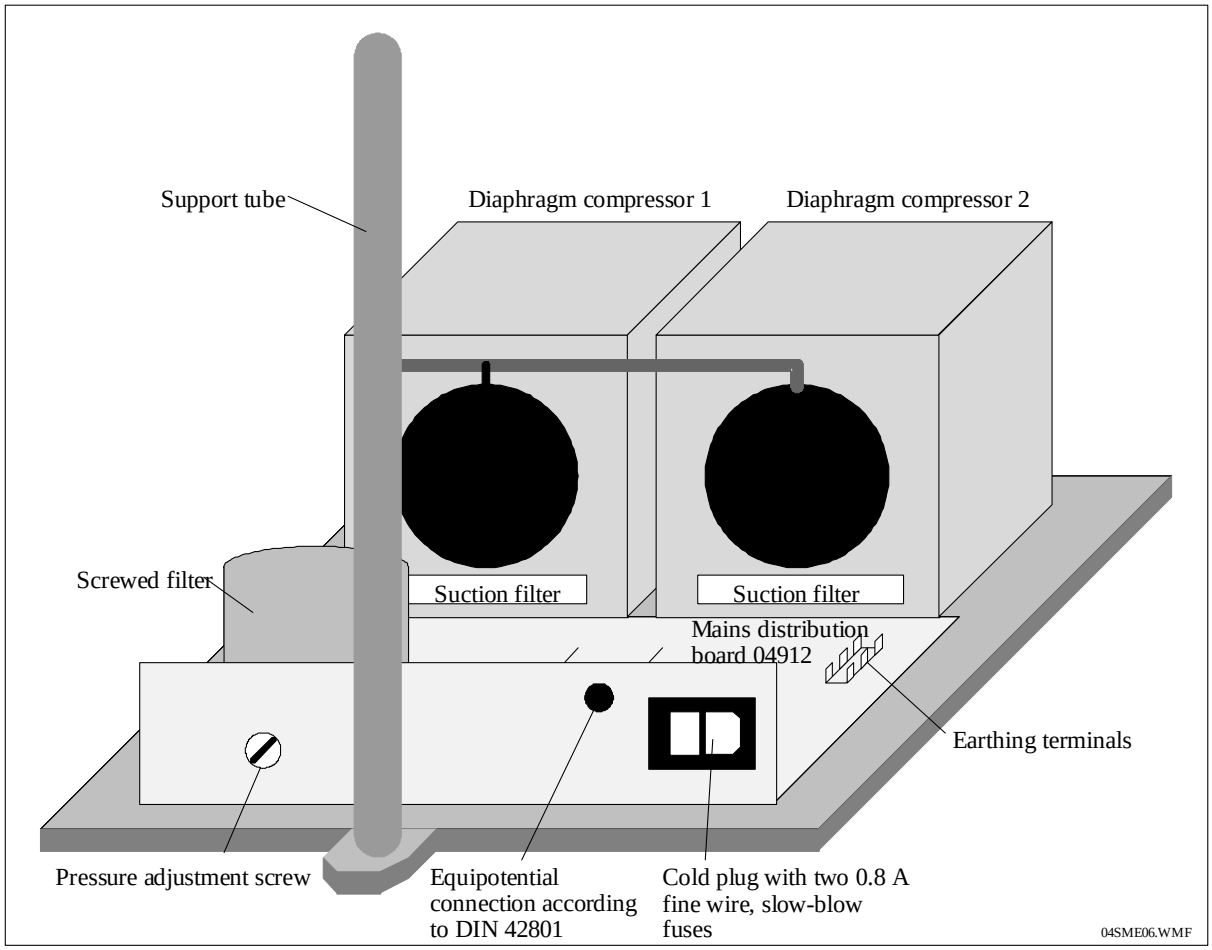
4. You also check the pressure of each **Injectrode®** with the +/- manometer and the adapter part B. If the pressure is not at least -140 mbar (negative), adjust it by twisting the adjusting screw on the air outlet side of the **Injectrode®**.



5. If this does not achieve the desired result, injectrode cleaning according to TI 1.3 is recommended.

6. Even more stubborn calciferous deposits in the nozzle can be removed with a 0.50 mm drill bit by careful drilling from the outlet side of the **Injectrode®**. However, this must be done very carefully because any widening of the nozzle bore will cause irreparable damage to the **Injectrode®** .

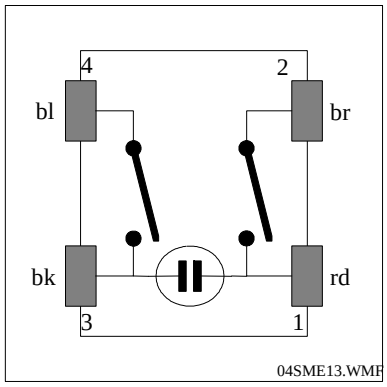
Design Drawing of the Applicard® from the end of 1991



Since the end of 2003 there is only one linear pump

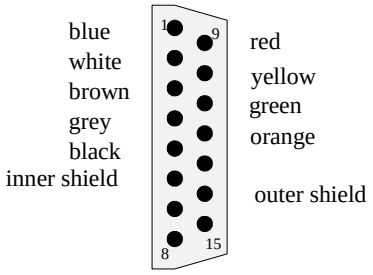
Notes on Connecting the Mains Switch

A. Configuration using single strands



Notes on Configuration of ECG Socket

1. Configuration of 10-channel model



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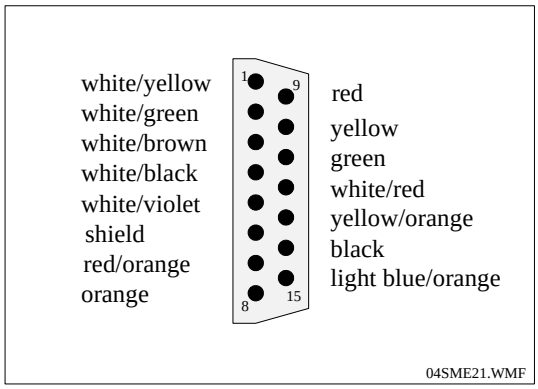
2. Configuration of 14-channel model

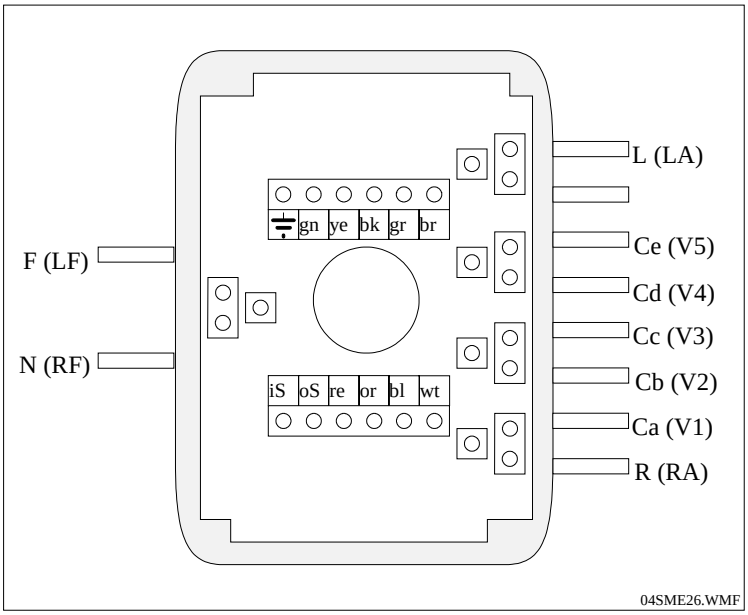


04SME21.WMF

The configuration of the different ECG plugs which can be directly connected to the APPLICARD may be obtained on request.

Notes on the Distribution Board

1. PCB 04990 board from mid 1992 (screwed version **with** loop and screwed arm cable)



Color coding for 10-channel model

cable (double shielded 9 x 0.19)

R	red
L	yellow
F	green
N	outer shield
Ca	orange
Cb	blue
Cc	white
Cd	brown
Ce	grey
Cf	black
Shield	inner shield

Notes on Replacing Electrode Hoses

1. Unscrew **Injectrode**®
2. Unscrew the lower sheet metal plate on the distribution box
3. Unscrew the faulty cable (2 Phillips screws)
4. Lift the electrode hose from the hose stem using a screwdriver
5. Push the new hose with antikink device and marking ring onto the hose stem
6. Screw on the cable
7. Push up the marking ring and shrink (if necessary with a lighter)
8. Push over antikink device using detergent (or saliva if necessary) to enable the antikink device to slide along the electrode hose
9. Screw the lower sheet metal plate back on again; ensure air-tightness, i.e. no air flowing out
10. Screw the **Injectrode**® back on again