

P80

User Guide - English
Guía de Operación - Español
Guia de Operação - Português

ESAOTE

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Article Number: 9740440002

Revision History

a	3.1998	d	01.2001
b	9.2000	e	06.2001
c	11.2000	f	07.2001

Associated Documents

Guide to the Interpretation and Measurement Program E/ D
Article Number 9740440008

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Manufactured by:

SCHILLER AG
Altgasse 68
CH-6341 Baar, Switzerland

CE 0123

93/42/EEC Medical Devices
0123 'Notified Body' TÜV P.S.

SAG (2.510189f)

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DECLARATION OF CONFORMITY

Electrocardiograph:

ESAOTE P-80 / P80 White

We, the undersigned, hereby declare that the medical device (class II a) specified above conforms with the Essential Requirements listed in Annex I, of EC Directive 93/42/EEC

This declaration is supported by:

TÜV Product Service GmbH, Management Service, D – 80339 Munich

Certificate of approval No:

Q1Z 01 03 41505 002 DIN EN ISO 9001:2000 / DIN EN 46001:1996

G1 01 03 41505 001 Annex II, Section 3 of the Directive 93/42/EEC Medical Devices

Valid date 02/2004.

Baar (Switzerland), 21.03.2001

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Markus Büttler
Quality Assurance Manager

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Quality Assurance Manager

Where to Obtain Service and Sales Advice
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Terms of Warranty

The ESAOTE P80 is warranted against defects in material and manufacture for the duration of one year (as from date of purchase). Excluded from this guarantee is damage caused by an accident or as a result of improper handling. The warranty entitles free replacement of the defective part. Any liability for subsequent damage is excluded. The warranty is void if unauthorized or unqualified persons attempt to make repairs.

In case of a defect, contact your dealer or the manufacturer.

The manufacturer can only be held responsible for the safety, reliability, and performance of the apparatus if:

- * assembly operations, extensions, readjustments, modifications, or repairs are carried out by persons authorized by him, and
- * the P80 and approved attached equipment are used in accordance with the manufacturers instructions.

THERE ARE NO EXPRESS OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREINABOVE SET FORTH. ESAOTE MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT OR PARTS THEREOF.

About this Handbook

The philosophy of the manufacturer is one of continuous improvement. Our aim is to provide the user with the most up-to-date information and the latest technological developments.

Your suggestions and comments are welcome on all ESAOTE documentation. Please contact the ESAOTE Cardiology Corporate Marketing Department.

PHYSICIAN'S RESPONSIBILITY

THE P80 ELECTROCARDIOGRAPH IS PROVIDED FOR THE EXCLUSIVE USE OF QUALIFIED PHYSICIANS OR PERSONNEL UNDER THEIR DIRECT SUPERVISION. THE NUMERICAL AND GRAPHICAL RESULTS FROM A RECORDING MUST BE EXAMINED WITH RESPECT TO THE PATIENTS OVERALL CLINICAL CONDITION. THE RECORDING PREPARATION QUALITY AND THE GENERAL RECORDED DATA QUALITY, WHICH COULD EFFECT THE REPORT DATA ACCURACY, MUST ALSO BE TAKEN INTO ACCOUNT.

IT IS THE PHYSICIANS RESPONSIBILITY TO MAKE THE DIAGNOSIS OR TO OBTAIN EXPERT OPINION ON THE RESULTS, AND TO INSTITUTE CORRECT TREATMENT IF INDICATED.

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Safety Notices

TO PREVENT ELECTRIC SHOCK DO NOT DISASSEMBLE THE UNIT. NO SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

DO NOT USE THIS UNIT IN AREAS WHERE THERE IS ANY DANGER OF EXPLOSION OR THE PRESENCE OF FLAMMABLE GASES SUCH AS ANAESTHETIC AGENTS.

THIS PRODUCT IS NOT DESIGNED FOR STERILE USE.

SWITCH THE UNIT OFF BEFORE CLEANING AND DISCONNECT FROM THE MAINS.

DO NOT, UNDER ANY CIRCUMSTANCES, IMMERSE THE UNIT OR CABLE ASSEMBLIES IN LIQUID.

THE DEVICE MUST ONLY BE OPERATED USING BATTERY POWER IF THE EARTH CONNECTION IS SUSPECT OR IF THE MAINS LEAD IS DAMAGED OR SUSPECTED OF BEING DAMAGED.

DO NOT USE HIGH TEMPERATURE STERILISATION PROCESSES (SUCH AS AUTOCLAVING). DO NOT USE E-BEAM OR GAMMA RADIATION STERILISATION.

DO NOT USE SOLVENT CLEANERS

USE ONLY ACCESSORIES AND OTHER PARTS RECOMMENDED OR SUPPLIED BY ESAOTE. USE OF OTHER THAN RECOMMENDED OR SUPPLIED PARTS MAY RESULT IN INJURY INACCURATE INFORMATION AND/ OR DAMAGE TO THE UNIT.

THE P80 COMPLIES WITH EMC REGULATIONS FOR MEDICAL PRODUCTS WHICH AFFORDS PROTECTION AGAINST EMISSIONS AND ELECTRICAL INTERFERENCE. HOWEVER SPECIAL CARE MUST BE EXERCISED WHEN THE UNIT IS USED WITH HIGH FREQUENCY EQUIPMENT.

IT MUST BE ENSURED THAT NEITHER THE PATIENT NOR THE ELECTRODES (INCLUDING THE NEUTRAL ELECTRODE) COME INTO CONTACT WITH OTHER PERSONS OR CONDUCTING OBJECTS (EVEN IF THESE ARE EARTHED).

*THERE IS NO DANGER WHEN USING THE ECG UNIT FOR A **PACEMAKER PATIENT** OR WITH SIMULTANEOUS USE OF OTHER ELECTRICAL STIMULATION EQUIPMENT. HOWEVER, THE STIMULATION UNITS SHOULD ONLY BE USED AT A SUFFICIENT DISTANCE FROM THE ELECTRODES. IN CASE OF DOUBT, THE PATIENT SHOULD BE DISCONNECTED FROM THE RECORDER.*

THIS UNIT IS CF CLASSIFIED ACCORDING TO IEC 601-1. THIS MEANS THAT THE PATIENT CONNECTION IS FULLY ISOLATED AND DEFIBRILLATION PROTECTED. THE MANUFACTURER CAN ONLY GUARANTEE PROTECTION AGAINST DEFIBRILLATION VOLTAGE HOWEVER, WHEN THE ORIGINAL ESAOTE PATIENT CABLE IS USED.

DO NOT TOUCH THE CASING DURING DEFIBRILLATION

IF THE PATIENT CABLE SHOULD BECOME DEFECTIVE AFTER DEFIBRILLATION, LEAD OFF WILL BE DISPLAYED AND AN ACOUSTIC ALARM GIVEN

P80
07.2001

Page 3

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Introduction

Intended Use

The P80 is an electrocardiograph devoted to acquiring and printing resting ECGs obtained non-invasively. The original ESAOTE S.p.A patient cable and the standard accessories are part of the unit.

The unit receives and processes all ECG signals simultaneously and continuously records the data in a 10 second memory.

If there is any disturbance (i.e. loose electrode or end of paper), an audible alarm is given and the corresponding indicator lamp flashes. As long as the disturbance remains, no ECG can be stored. As soon as the defect is eliminated, storage starts.

The P80 is a 3-channel ECG recorder with the following features:

- Low weight and compact dimensions.
- Built-in rechargeable battery for mains-independent use.
- Simple one key operation.
- Automatic or manual recording modes.
- Selectable printing formats with integrated quality thermal printer.
- ECG memory for easy copying.
- Choice of up to 10 languages for printing.
- Optional measurement program for accurate analysis of recording.

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Operation Modes

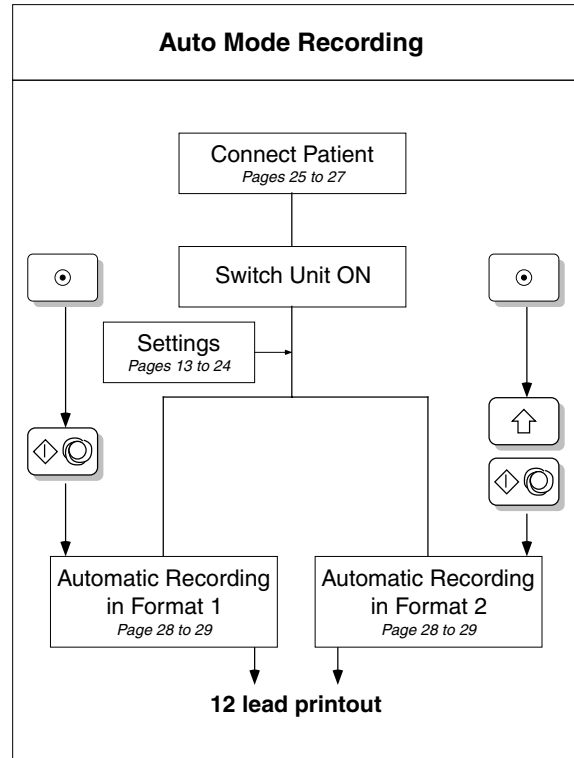
Automatic Mode

Automatic Mode provides a printout giving 10 seconds of ECG recording of all 12 leads in 2 different formats.

The following can be programmed freely in each of the formats before recording:

- Lead Format
- Chart Speed
- Measurements
- Average Cycles & Markings

For further information see Paragraph "ECG Recording in Automatic Mode".



Operation Modes

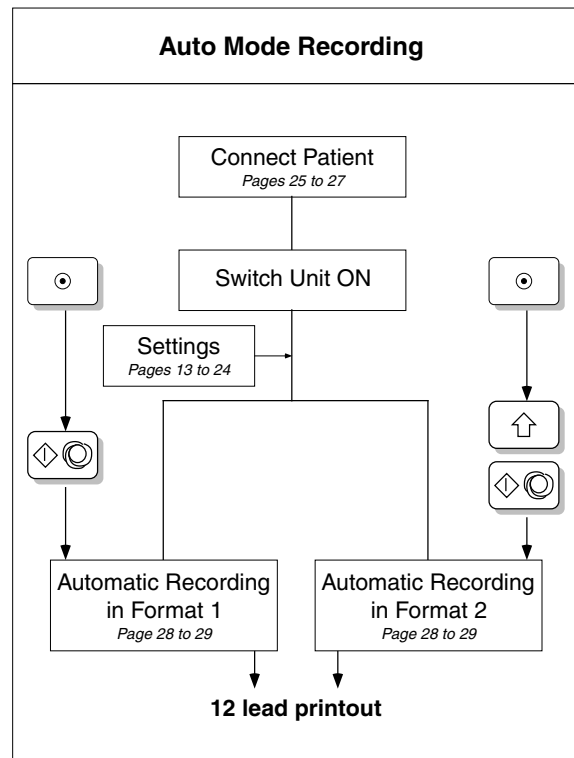
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Operation Modes

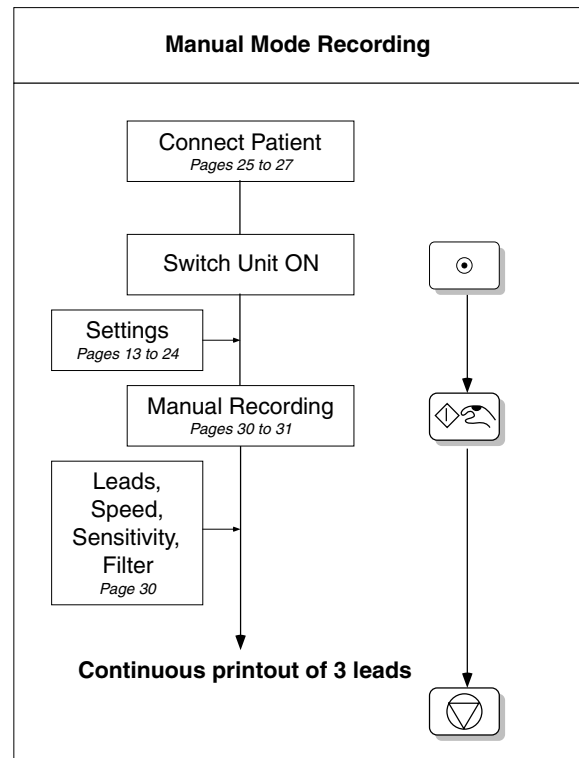
Manual Mode

Manual Mode provides a real time printout of 3 leads that are selected and indicated on the keyboard.

The following can be freely selected before or during recording:

- Lead Group
- Chart Speed
- Sensitivity
- Myogram Filter

For further information see Paragraph "ECG Recording in Manual Mode".



Operation Modes

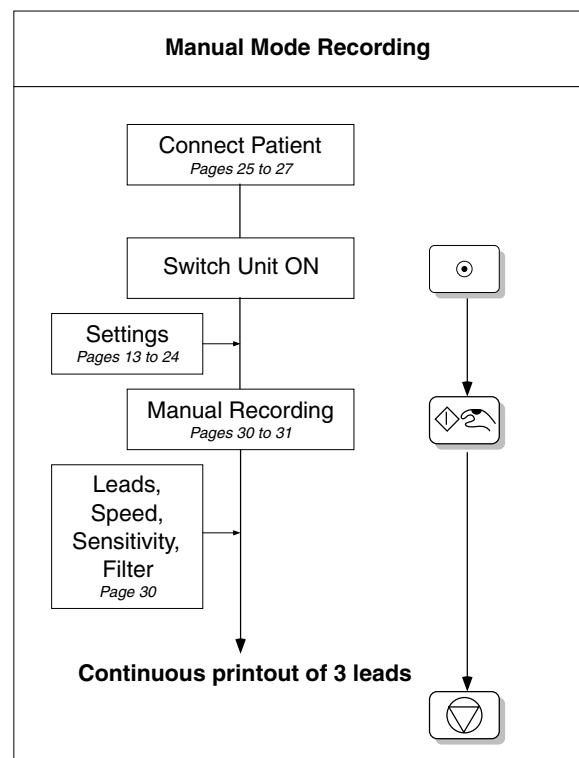
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Basic Information

Location

Do not keep or operate the apparatus in a wet, moist, or dusty environment. Also, avoid exposure to direct sunlight or heat from other sources. Do not allow the unit to come into contact with acidic vapours or liquids, as such contact may cause irreparable damage. The unit should not be placed near X-ray or diathermy units, large transformers or motors.

The unit must be placed on a flat surface.

The unit should not be operated in areas where there is any danger of explosion.

Power Supply

The unit can either be operated from the built-in rechargeable battery, or from the mains.

The mains connection is on the rear of the unit.

The mains indicator lamp is always lit when the unit is connected to the mains supply.

A battery indicator lamp confirms battery operation. When the battery capacity is limited, the indicator flashes. To recharge the battery, connect the apparatus to the mains supply by means of the supplied power cable. A totally discharged battery needs less than 15 hours to be fully recharged (60% in less than 3 hours).

A fully charged battery lasts approximately 2 hours of normal use. The unit can remain connected to the mains supply without any danger of damage to either the battery or the unit.

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Basic Information

Switching On and Off

The P80 is switched on by means of the  key and off by means of the  key.

The unit is switched off after 5 minutes (30 seconds if battery capacity is limited) if no key is pressed and the patient cable is not connected.



Potential Equalisation

If the P80 is used in conjunction with other patient connected equipment, we recommend that the potential equalisation stud () on the rear of the unit is connected to the hospital / building common ground with the yellow/green ground cable.

When working from an emergency vehicle, the vehicle common ground can be used.


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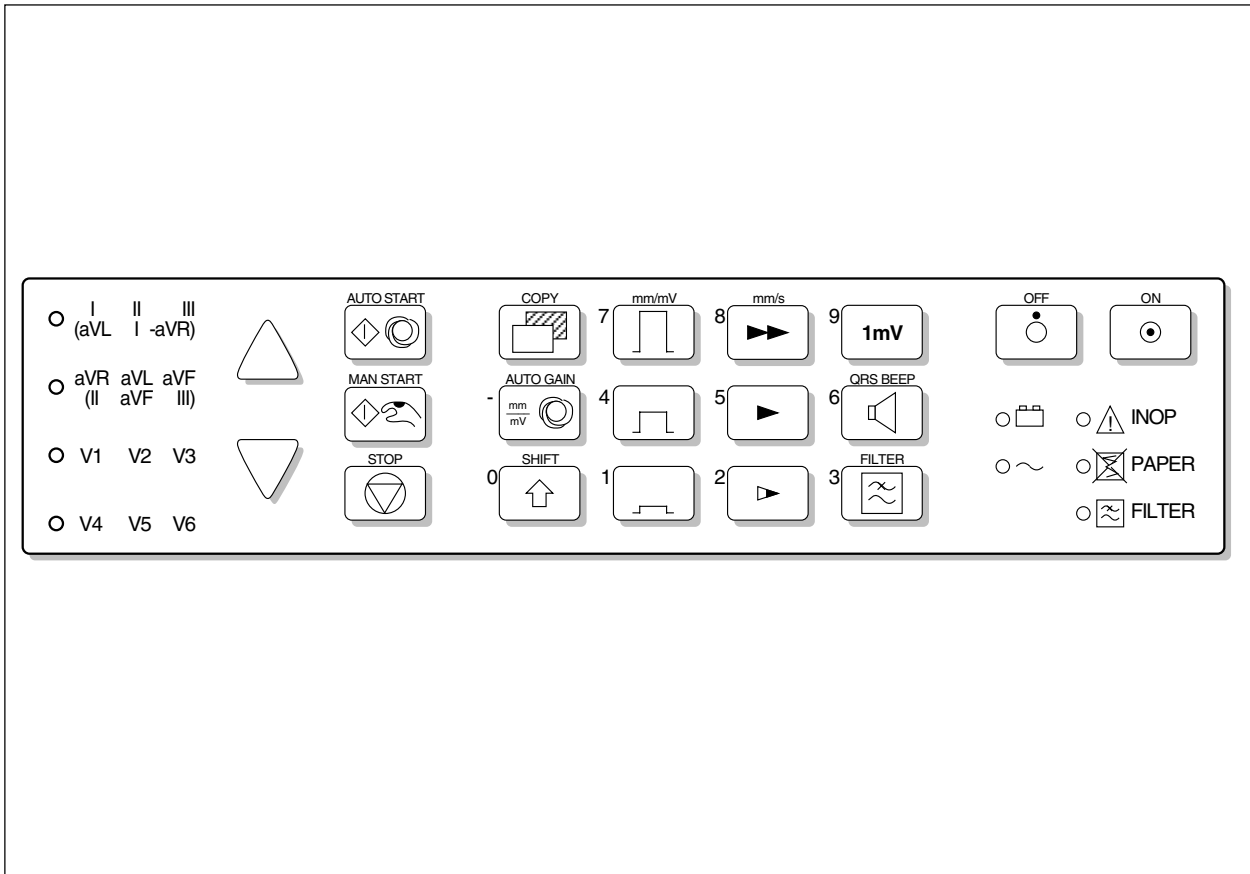
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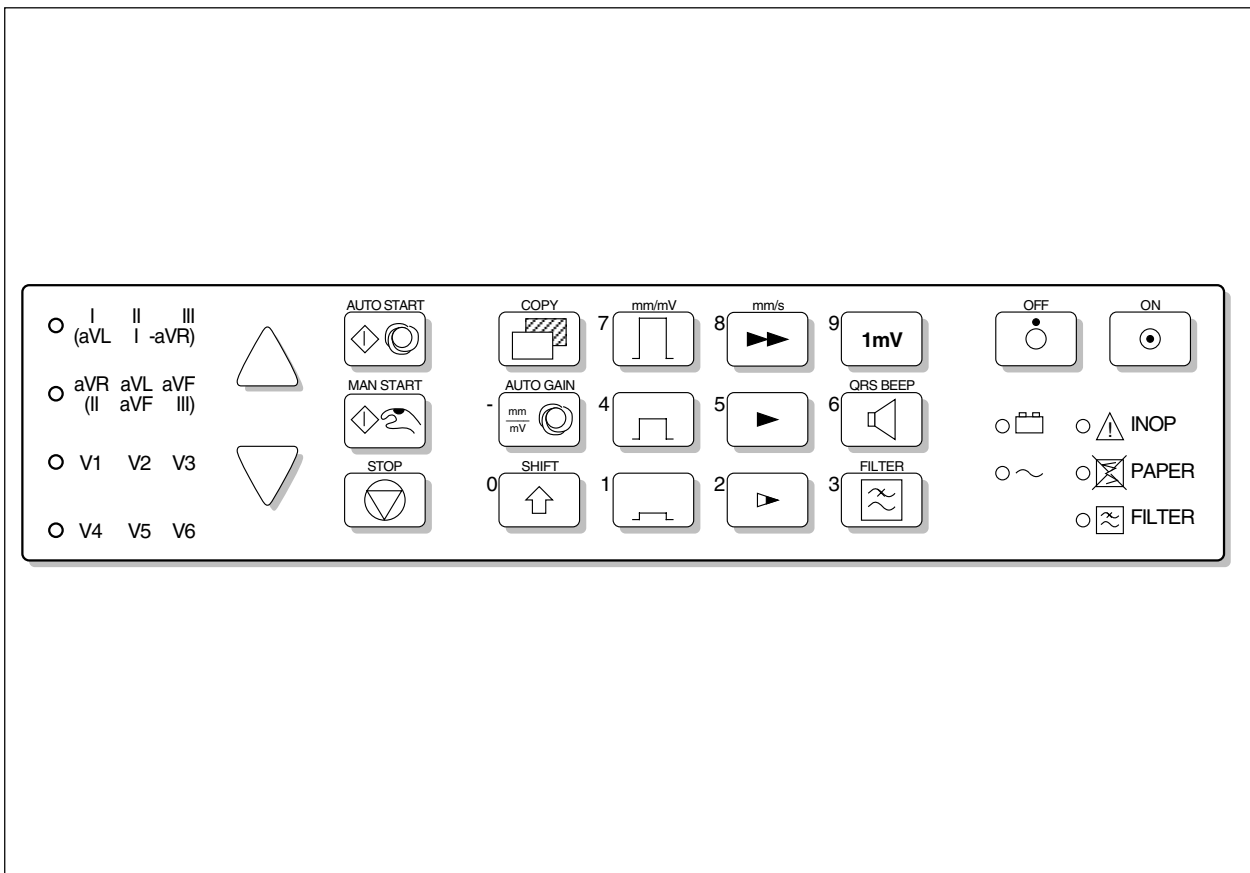
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Keyboard


















Keyboard




Keyboard

	Switch unit on		Cancel or enable QRS beeper
	Switch unit off		Automatic ECG sensitivity adjustment from 10 to 5 mm/mV in order to avoid overlapping traces in automatic mode only
	Copy stored ECG		ECG sensitivity selector (5, 10 or 20 mm/mV)
	Start automatic recording		Chart speed selector (5, 25 or 50 mm/s) for manual recording only
	Start manual recording		Key for 1 mV indication mark on output during manual recording
	Stop recording		Key for initiation of setups and selection of second format for printout
	Switch myogram filter (muscle tremor filter) on or off		
	Lead group selector (forward)		
	Lead group selector (backward)		


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Keyboard

- ~ Mains indicator (*lit when mains connected*)
-  Battery lamp (lit when running on battery power - mains not connected)
(blinking when battery capacity is limited)
- PAPER Warning lamp for end of paper or paper jam
- INOP Warning lamp for loose electrode connection
- FILTER Myogram filter (lit when filter ON)
- $\begin{matrix} \text{I} & \text{II} & \text{III} \\ (\text{aVL} & \text{I} & -\text{aVR}) \end{matrix}$ Indicator lamp for selected lead group I, II, III (Standard) (*Cabrera: aVL, I, -aVR*) **in manual mode only**
- $\begin{matrix} \text{aVR} & \text{aVL} & \text{aVF} \\ (\text{II} & \text{aVF} & \text{III}) \end{matrix}$ Indicator lamp for selected lead group aVR, aVL, aVF (Standard) (*Cabrera: II, aVF, III*) **in manual mode only**
- V1 V2 V3 Indicator lamp for selected lead group V1, V2, V3 **in manual mode only**
- V4 V5 V6 Indicator lamp for selected lead group V4, V5, V6 **in manual mode only**

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- V1 V2 V3 Indicator lamp for selected lead group V1, V2, V3 **in manual mode only**
- V4 V5 V6 Indicator lamp for selected lead group V4, V5, V6 **in manual mode only**

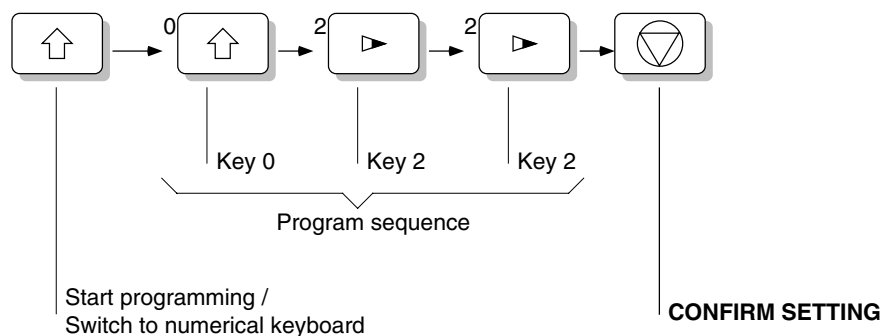
General Settings

Each parameter is set by means of a code. This code comprises a combination starting with the **SHIFT** key followed by a number of keys and is always confirmed with the **STOP** key.

As soon as the **SHIFT** key is pressed, the keyboard is dedicated to the programming function.

The setting is remembered and the keyboard is only released for other functions when the **STOP** key is pressed. Once the settings have been confirmed, they are stored in the memory even when the unit is switched off.

As an example, if you want to set the language on your P80 to English, proceed as follows:



On the following pages the programmable parameters and the programming sequences are described in detail.

NOTE THAT THE SETTINGS ARE ALWAYS CONFIRMED BY PRESSING THE  KEY.

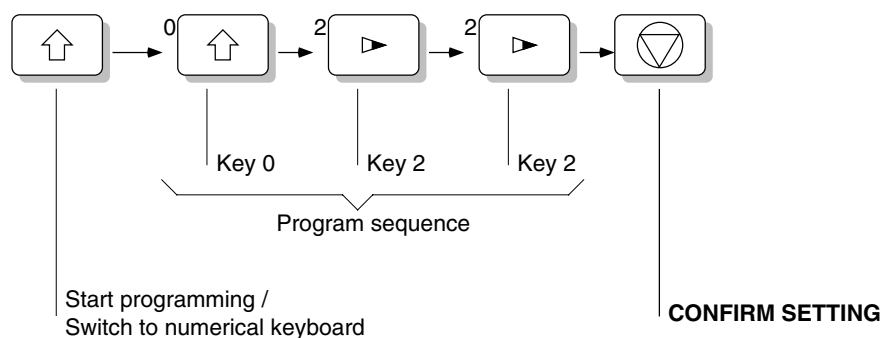
General Settings

Each parameter is set by means of a code. This code comprises a combination starting with the **SHIFT** key followed by a number of keys and is always confirmed with the **STOP** key.

As soon as the **SHIFT** key is pressed, the keyboard is dedicated to the programming function.

The setting is remembered and the keyboard is only released for other functions when the **STOP** key is pressed. Once the settings have been confirmed, they are stored in the memory even when the unit is switched off.

As an example, if you want to set the language on your P80 to English, proceed as follows:



On the following pages the programmable parameters and the programming sequences are described in detail.

NOTE THAT THE SETTINGS ARE ALWAYS CONFIRMED BY PRESSING THE  KEY.

General Settings

Defaults

The default settings are as follows:

Default Settings		
Setting	P80	P80 with Measurement Option
Language	English	English
Leads	Standard (S)	Standard (S)
Format 1	ECG: 25 mm/s, Short (o)	ECG: 25 mm/s, Short (o)
		MECG: 6*2 (50 mm/s)+1
		Measurements: Suppressed (-)
		Marks: Enabled (+)
Format 2	ECG: 25 mm/s, Long (ooo)	ECG: 25 mm/s, Long (ooo)
		MECG: none (-)
		Measurements: Suppressed (-)
		Marks: Enabled (+)
Rhythm Leads	V1, II	V1, II
Autom. Centering	Enabled (+)	Enabled (+)
Paper Type	Z-Folded	Z-Folded
Printout of Signals	Sequential	Sequential
Baseline Filter Setting	0.05 Hz	0.05 Hz
Mains Filter Setting	50 Hz	50 Hz
Myogram Filter Setting	35 Hz, OFF	35 Hz, OFF

General Settings

Defaults

The default settings are as follows:

Default Settings		
Setting	P80	P80 with Measurement Option
Language	English	English
Leads	Standard (S)	Standard (S)
Format 1	ECG: 25 mm/s, Short (o)	ECG: 25 mm/s, Short (o)
		MECG: 6*2 (50 mm/s)+1
		Measurements: Suppressed (-)
		Marks: Enabled (+)
Format 2	ECG: 25 mm/s, Long (ooo)	ECG: 25 mm/s, Long (ooo)
		MECG: none (-)
		Measurements: Suppressed (-)
		Marks: Enabled (+)
Rhythm Leads	V1, II	V1, II
Autom. Centering	Enabled (+)	Enabled (+)
Paper Type	Z-Folded	Z-Folded
Printout of Signals	Sequential	Sequential
Baseline Filter Setting	0.05 Hz	0.05 Hz
Mains Filter Setting	50 Hz	50 Hz
Myogram Filter Setting	35 Hz, OFF	35 Hz, OFF

General Settings

Check Settings

The defined formats and settings can be checked as follows:

Setup Printout				
Entry Key Sequence				Action
SHIFT	0	1	any number	Printout of programmed setting.

A printout of the defined settings will be produced and gives the following information, depending on the installed software:

- Unit designation (P80), Software option installed (M = Measurement) and Software version
- Serial number (Service use)
- Leads: Standard (S) or Cabrera (C)
- ECG Format: Long (ooo), Short (o) or Suppressed (-)
- MECG: Average cycles as defined in auto ECG recording setup (e.g. 4 * 3 (25 mm/s))
- Measurements: Enabled (+) or Suppressed (-)
- Marks: Enabled (+) or Suppressed (-)
- Selected Rhythm leads: Leads selected for R1, R2 resp.
- Automatic Centring: Enabled (+) or Suppressed (-)
- Paper Type: Z-Folded or Roll
- Printout of signals: Sequential or Simultaneous
- Baseline Filter: 0.05, 0.15 or 0.30 Hz
- Mains Filter: 50, 60 Hz or OFF (-)
- Myogram Filter: 25 or 35 Hz, ON (+) or OFF (-)

General Settings

Check Settings

The defined formats and settings can be checked as follows:

Setup Printout				
Entry Key Sequence				Action
SHIFT	0	1	any number	Printout of programmed setting.

A printout of the defined settings will be produced and gives the following information, depending on the installed software:

- Unit designation (P80), Software option installed (M = Measurement) and Software version
- Serial number (Service use)
- Leads: Standard (S) or Cabrera (C)
- ECG Format: Long (ooo), Short (o) or Suppressed (-)
- MECG: Average cycles as defined in auto ECG recording setup (e.g. 4 * 3 (25 mm/s))
- Measurements: Enabled (+) or Suppressed (-)
- Marks: Enabled (+) or Suppressed (-)
- Selected Rhythm leads: Leads selected for R1, R2 resp.
- Automatic Centring: Enabled (+) or Suppressed (-)
- Paper Type: Z-Folded or Roll
- Printout of signals: Sequential or Simultaneous
- Baseline Filter: 0.05, 0.15 or 0.30 Hz
- Mains Filter: 50, 60 Hz or OFF (-)
- Myogram Filter: 25 or 35 Hz, ON (+) or OFF (-)

General Settings

To reset the unit to the basic default settings, proceed as follows:

Reset Setup				
Entry Key Sequence				Action
SHIFT	0	6	any number	Reset to default base settings.

Select Language

The language is selected as follows:

Select Language				
Entry Key Sequence				Language
SHIFT	0	2	1	German
			2	English
			3	French
			4	Swedish
			5	American
			6	Italian
			7	Spanish
			8	Portuguese
			9	Dutch
			0	Russian

Confirm the selection by pressing **STOP**.

General Settings

To reset the unit to the basic default settings, proceed as follows:

Reset Setup				
Entry Key Sequence				Action
SHIFT	0	6	any number	Reset to default base settings.

Select Language

The language is selected as follows:

Select Language				
Entry Key Sequence				Language
SHIFT	0	2	1	German
			2	English
			3	French
			4	Swedish
			5	American
			6	Italian
			7	Spanish
			8	Portuguese
			9	Dutch
			0	Russian

Confirm the selection by pressing **STOP**.

General Settings

There are three different filters which can be set individually as follows:

- Baseline filter
- Mains filter
- Myogram filter

The setting for each filter is given on the setup printout.

Baseline Filter

The digital **Baseline filter** suppresses excessive baseline drifts

The setting options are as follows:

Baseline Filter			
Entry Key Sequence		Filter Setting	
SHIFT	5	0	0.05 Hz (Default)
		1	0.15 Hz
		3	0.30 Hz

The set value is the lower limit of the frequency range and is normally set to 0.05 Hz. The settings 0.15 and 0.30 Hz should only be used when absolutely necessary, as the possibility exists that they could affect the original ECG signal, especially the ST segments.

Confirm the selection by pressing **STOP**.

General Settings

There are three different filters which can be set individually as follows:

- Baseline filter
- Mains filter
- Myogram filter

The setting for each filter is given on the setup printout.

Baseline Filter

The digital **Baseline filter** suppresses excessive baseline drifts

The setting options are as follows:

Baseline Filter			
Entry Key Sequence		Filter Setting	
SHIFT	5	0	0.05 Hz (Default)
		1	0.15 Hz
		3	0.30 Hz

The set value is the lower limit of the frequency range and is normally set to 0.05 Hz. The settings 0.15 and 0.30 Hz should only be used when absolutely necessary, as the possibility exists that they could affect the original ECG signal, especially the ST segments.

Confirm the selection by pressing **STOP**.

General Settings

Mains and Myogram Filter

The **Mains filter** is an adaptive digital interference filter designed to suppress AC interference without attenuating or distorting the ECG.


The **Myogram filter** suppresses disturbances caused by strong muscle tremor. The set value will be the new upper limit of the frequency range as soon as the **FILTER** key is switched on or programmed as default when the unit is switched on. When the filter is active the '**FILTER**' lamp on the unit is lit.

Select the mains frequency and myogram filter settings as follows:

Mains Filter			
Entry Key Sequence		Filter Setting	
SHIFT	8	5	Mains Filter 50 Hz
		6	Mains Filter 60 Hz
		9	Mains Filter off

Myogram Filter			
Entry Key Sequence		Setting	
SHIFT	8	2	Myogram Filt. 25 Hz
		3	Myogram Filt. 35 Hz
		1	Myo. Filt. ON when switching on unit (marked on printout with +)
		8	Myo. Filt. OFF when switching on unit (marked on printout with -)

Confirm the selection by pressing **STOP**.

The myogram filter is switched on and off manually with the  key. As the ECG is stored in Automatic mode unfiltered, it is therefore possible to print the stored ECG either with or without passing the myogram filter. Filter ON is indicated by the control lamp marked '**FILTER**'. When the **FILTER** key is pressed again, the filter is switched off and the indicator lamp goes out. The cutoff frequency of the myogram filter is set to either 25 or 35 Hz.

General Settings

Mains and Myogram Filter

The **Mains filter** is an adaptive digital interference filter designed to suppress AC interference without attenuating or distorting the ECG.


The **Myogram filter** suppresses disturbances caused by strong muscle tremor. The set value will be the new upper limit of the frequency range as soon as the **FILTER** key is switched on or programmed as default when the unit is switched on. When the filter is active the '**FILTER**' lamp on the unit is lit.

Select the mains frequency and myogram filter settings as follows:

Mains Filter			
Entry Key Sequence		Filter Setting	
SHIFT	8	5	Mains Filter 50 Hz
		6	Mains Filter 60 Hz
		9	Mains Filter off

Myogram Filter			
Entry Key Sequence		Setting	
SHIFT	8	2	Myogram Filt. 25 Hz
		3	Myogram Filt. 35 Hz
		1	Myo. Filt. ON when switching on unit (marked on printout with +)
		8	Myo. Filt. OFF when switching on unit (marked on printout with -)

Confirm the selection by pressing **STOP**.

The myogram filter is switched on and off manually with the  key. As the ECG is stored in Automatic mode unfiltered, it is therefore possible to print the stored ECG either with or without passing the myogram filter. Filter ON is indicated by the control lamp marked '**FILTER**'. When the **FILTER** key is pressed again, the filter is switched off and the indicator lamp goes out. The cutoff frequency of the myogram filter is set to either 25 or 35 Hz.

General Settings

Defining Lead Sequence, Printout & Paper

The required settings can be selected as follows:

Sequences, Print & Paper			
Entry Key Sequence		Definition	
SHIFT	7	1	Standard Lead Sequence
		2	Cabrera Lead Sequence
		3	Simultaneous Print
		4	Sequential Print
		5	Auto-Centering ON
		6	Auto-Centering OFF
		7	Z-Fold Paper
		8	Paper Roll

Confirm the selection by pressing **STOP**.

- The selectable lead groups are:

Standard				Cabrera			
I	aVR	V1	V4	aVL	II	V1	V4
II	aVL	V2	V5	I	aVF	V2	V5
III	aVF	V3	V6	-aVR	III	V3	V6

General Settings

Defining Lead Sequence, Printout & Paper

The required settings can be selected as follows:

Sequences, Print & Paper			
Entry Key Sequence		Definition	
SHIFT	7	1	Standard Lead Sequence
		2	Cabrera Lead Sequence
		3	Simultaneous Print
		4	Sequential Print
		5	Auto-Centering ON
		6	Auto-Centering OFF
		7	Z-Fold Paper
		8	Paper Roll

Confirm the selection by pressing **STOP**.


- The selectable lead groups are:

Standard				Cabrera			
I	aVR	V1	V4	aVL	II	V1	V4
II	aVL	V2	V5	I	aVF	V2	V5
III	aVF	V3	V6	-aVR	III	V3	V6

General Settings

- The selectable printout forms are:
 - **Simultaneous** All 12 ECG leads are printed as 4 groups of 3 leads. All ECG leads are printed in the same time segment (**in automatic mode only**).
 - **Sequential** All 12 ECG leads are printed as 4 groups of 3 leads. Each group is a contiguous time segment of approximately 2.5 or 5 seconds (**in automatic mode only**). When the long form is selected for the printout, the ECG traces are organised as follows:
 - 0s - 5s (I, II, III)
 - 5s - 10s (avR, avL, avF)
 - 0s - 5s (V1, V2, V3)
 - 5s - 10s (V4, V5, V6)
 - **Auto-Centering ON** All ECG traces are centred dynamically for optimal use of paper width.
 - **Auto-Centering OFF** ECG traces are set to a fixed baseline position and may possibly overlap.
- The selectable paper types are:
 - **Z-folded** Z-folded paper, 90 mm wide, with black marks
 - **Roll** Paper roll, 90 mm wide, without black marks


Acoustic QRS Indication

The acoustic QRS indication can be switched on or off at any time by pressing the  key.

General Settings

- The selectable printout forms are:
 - **Simultaneous** All 12 ECG leads are printed as 4 groups of 3 leads. All ECG leads are printed in the same time segment (**in automatic mode only**).
 - **Sequential** All 12 ECG leads are printed as 4 groups of 3 leads. Each group is a contiguous time segment of approximately 2.5 or 5 seconds (**in automatic mode only**). When the long form is selected for the printout, the ECG traces are organised as follows:
 - 0s - 5s (I, II, III)
 - 5s - 10s (avR, avL, avF)
 - 0s - 5s (V1, V2, V3)
 - 5s - 10s (V4, V5, V6)
 - **Auto-Centering ON** All ECG traces are centred dynamically for optimal use of paper width.
 - **Auto-Centering OFF** ECG traces are set to a fixed baseline position and may possibly overlap.
- The selectable paper types are:
 - **Z-folded** Z-folded paper, 90 mm wide, with black marks
 - **Roll** Paper roll, 90 mm wide, without black marks

Acoustic QRS Indication

The acoustic QRS indication can be switched on or off at any time by pressing the  key.

Settings for Automatic Mode

Two separate formats for the automatic ECG output can be selected as follows:

Automatic ECG Format		
Entry Key Sequence		Setup Format
SHIFT	1	Setup Format 1
	2	Setup Format 2

With this the 2 automatic mode formats are defined as detailed in the following pages.

The ECG format is set as follows:

ECG Format				
Entry Key Sequence				Output Format
SHIFT	1 or 2	1	5	No leads are printed
			6	Leads are printed in short form (4 sheets)
			7	Leads are printed in long form (8 sheets)
			8	Chart speed is 25 mm/s
			9	Chart speed is 50 mm/s

Confirm the selection by pressing **STOP**.

Settings for Automatic Mode

Two separate formats for the automatic ECG output can be selected as follows:

Automatic ECG Format		
Entry Key Sequence		Setup Format
SHIFT	1	Setup Format 1
	2	Setup Format 2

With this the 2 automatic mode formats are defined as detailed in the following pages.

The ECG format is set as follows:

ECG Format				
Entry Key Sequence				Output Format
SHIFT	1 or 2	1	5	No leads are printed
			6	Leads are printed in short form (4 sheets)
			7	Leads are printed in long form (8 sheets)
			8	Chart speed is 25 mm/s
			9	Chart speed is 50 mm/s

Confirm the selection by pressing **STOP**.

Settings for Automatic Mode

The Average cycles are defined as follows:

Average Cycles (Measurement Option only)				
Entry Key Sequence			Output Format	
SHIFT	1 or 2	2	5	No average cycles are printed.
			6	4 * 3 (25 mm/s) The average complexes are printed out in four groups of three leads at a chart speed of 25 mm/s.
			7	4 * 3 (50 mm/s) The average complexes are printed out in four groups of three leads at a chart speed of 50 mm/s.
			8	6 * 2 (50 mm/s) + 1 * Rhy The average complexes are printed out in six groups of two leads with one rhythm lead at a chart speed of 50 mm/s.
			9	12 * 1 (25 mm/s) + 2 * Rhy The average complexes are printed out for all 12 leads individually with two rhythm leads at a chart speed of 25 mm/s.

Confirm the selection by pressing **STOP**.

Note: Lead selection for the 2 rhythm leads are defined on page 24.

Settings for Automatic Mode

The Average cycles are defined as follows:

Average Cycles (Measurement Option only)				
Entry Key Sequence			Output Format	
SHIFT	1 or 2	2	5	No average cycles are printed.
			6	4 * 3 (25 mm/s) The average complexes are printed out in four groups of three leads at a chart speed of 25 mm/s.
			7	4 * 3 (50 mm/s) The average complexes are printed out in four groups of three leads at a chart speed of 50 mm/s.
			8	6 * 2 (50 mm/s) + 1 * Rhy The average complexes are printed out in six groups of two leads with one rhythm lead at a chart speed of 50 mm/s.
			9	12 * 1 (25 mm/s) + 2 * Rhy The average complexes are printed out for all 12 leads individually with two rhythm leads at a chart speed of 25 mm/s.

Confirm the selection by pressing **STOP**.

Note: Lead selection for the 2 rhythm leads are defined on page 24.

Settings for Automatic Mode

To define the measurements and markings proceed as follows:

Measurements and Markings (Measurement Option only)				
Entry Key Sequence				Output Format
SHIFT	1 or 2	3	5	Detailed table of measurement results is omitted. However, the values of electrical axes, intervals, and heart rate are not suppressed.
			6	Detailed table of measurement results is printed.
			7	Reference markings (beginning and end of P wave and QRS as well as end of T wave) are omitted.
			8	Reference markings (beginning and end of P wave and QRS as well as end of T wave) are added to the ECG cycles.

Confirm the selection by pressing **STOP**.

To print or suppress the patient data on the printout proceed as follows:

Patient Data (not with Measurement Option)				
Entry Key Sequence				Output Format
SHIFT	1 or 2	4	5	Patient data page is omitted.
			6	Patient data page is printed.

Confirm the selection by pressing **STOP**.

Settings for Automatic Mode

To define the measurements and markings proceed as follows:

Measurements and Markings (Measurement Option only)				
Entry Key Sequence				Output Format
SHIFT	1 or 2	3	5	Detailed table of measurement results is omitted. However, the values of electrical axes, intervals, and heart rate are not suppressed.
			6	Detailed table of measurement results is printed.
			7	Reference markings (beginning and end of P wave and QRS as well as end of T wave) are omitted.
			8	Reference markings (beginning and end of P wave and QRS as well as end of T wave) are added to the ECG cycles.

Confirm the selection by pressing **STOP**.

To print or suppress the patient data on the printout proceed as follows:

Patient Data (not with Measurement Option)				
Entry Key Sequence				Output Format
SHIFT	1 or 2	4	5	Patient data page is omitted.
			6	Patient data page is printed.

Confirm the selection by pressing **STOP**.

Settings for Automatic Mode

Selecting Rhythm Leads (Measurement Option only)

The rhythm leads are printed out in the last two average cycle selections. Two separate rhythm leads can be selected. The following formats can be set:

Rhythm Leads (Measurement Option only)		
Entry Key Sequence		Setup Lead
SHIFT	3	Setup Rhythm Lead 1
	4	Setup Rhythm Lead 2

The 2 rhythm leads are defined as follows:

Extremity Leads				
Entry Key Sequence				Lead
SHIFT	3 or 4	8	1	I
			2	II
			3	III
			4	aVR
			5	aVL
			6	aVF

Precordial Leads				
Entry Key Sequence				Lead
SHIFT	3 or 4	9	1	V1
			2	V2
			3	V3
			4	V4
			5	V5
			6	V6

Confirm the selection by pressing **STOP**.

Settings for Automatic Mode

Selecting Rhythm Leads (Measurement Option only)

The rhythm leads are printed out in the last two average cycle selections. Two separate rhythm leads can be selected. The following formats can be set:

Rhythm Leads (Measurement Option only)		
Entry Key Sequence		Setup Lead
SHIFT	3	Setup Rhythm Lead 1
	4	Setup Rhythm Lead 2

The 2 rhythm leads are defined as follows:

Extremity Leads				
Entry Key Sequence				Lead
SHIFT	3 or 4	8	1	I
			2	II
			3	III
			4	aVR
			5	aVL
			6	aVF

Precordial Leads				
Entry Key Sequence				Lead
SHIFT	3 or 4	9	1	V1
			2	V2
			3	V3
			4	V4
			5	V5
			6	V6

Confirm the selection by pressing **STOP**.

Patient Cable Connections

The accessory kit of the electrocardiograph includes a 10-lead patient cable. This cable is plugged into the patient cable socket on the right-hand side of the unit and secured with the two screws.

The P80 is CF rated. The patient connection is fully isolated and defibrillation protected. Protection against defibrillation voltage is however only ensured, if the original ESAOTE patient cable is used. Make sure that during ECG recording neither the patient nor the conducting parts of the patient connection or the electrodes (including the neutral electrode) come into contact with other persons or conducting objects (even if these are earthed).

The standard accessories include four stainless steel limb electrodes and 6 precordial suction electrodes. The limb electrodes are first spread with electrode gel and then attached with the respective clamps to the arm and foot pick-up sites.

The six suction electrodes are also moistened with gel and placed in their corresponding positions.

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The six suction electrodes are also moistened with gel and placed in their corresponding positions.

Patient Cable Connections

The quality of the ECG is dependent on the preparation and the resistance between the skin and the electrode. To ensure a good quality ECG and minimise the skin/electrode resistance, remember the following points:

1. Ensure that the patient is warm and relaxed.
2. Shave electrode area before cleaning.
3. Thoroughly clean the area with alcohol.
4. When applying the electrodes ensure that a layer of gel is between the electrode and the skin.
5. Place the **C4** electrode first - in the fifth intercostal space on midclavicular line.
Then place:
 - **C1** in fourth intercostal space at the right sternal border
 - **C2** in fourth intercostal space at the left sternal border
 - **C3** between, and equidistant to, C4 and C2
 - **C6** on left midaxillary line on the same level as C4
 - **C5** between, and equidistant to, C4 and C6

Following these simple guidelines will ensure good results every time.

Patient Cable Connections

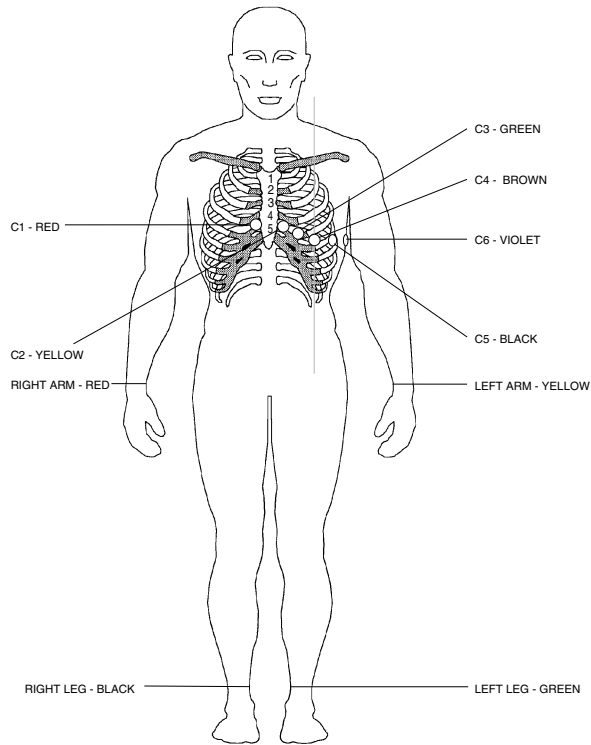
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 - **C3** between, and equidistant to, C4 and C2
 - **C6** on left midaxillary line on the same level as C4
 - **C5** between, and equidistant to, C4 and C6

Following these simple guidelines will ensure good results every time.

Patient Cable Connections

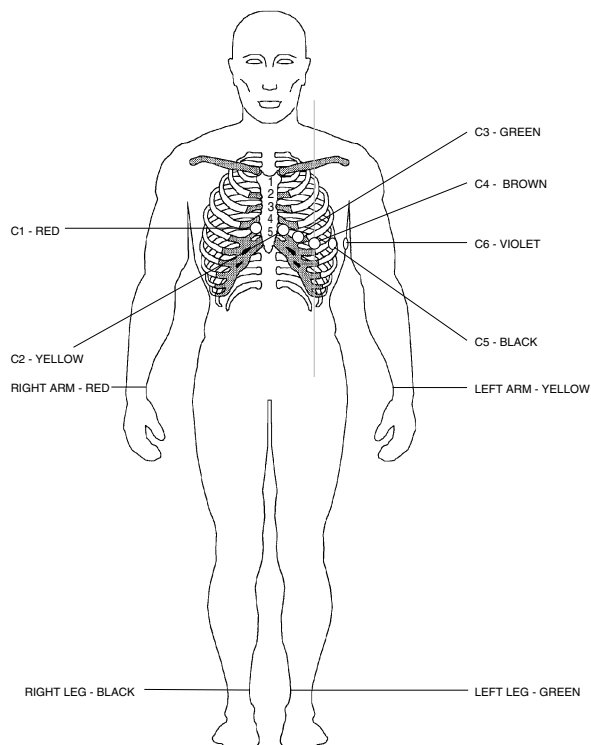
Standard Leads



IEC		AHA	
N	Black	RL	Green
R	Red	RA	White
C1	White/Red	V1	Brown/Red
C2	White/Yellow	V2	Brown/Yellow
C3	White/Green	V3	Brown/Green
C4	White/Brown	V4	Brown/Blue
C5	White/Black	V5	Brown/Orange
C6	White/Violet	V6	Brown/Violet
L	Yellow	LA	Black
F	Green	LL	Red


Patient Cable Connections

Standard Leads





IEC		AHA	
N	Black	RL	Green
R	Red	RA	White
C1	White/Red	V1	Brown/Red
C2	White/Yellow	V2	Brown/Yellow
C3	White/Green	V3	Brown/Green
C4	White/Brown	V4	Brown/Blue
C5	White/Black	V5	Brown/Orange
C6	White/Violet	V6	Brown/Violet
L	Yellow	LA	Black
F	Green	LL	Red

Recording an ECG in Automatic Mode

In **automatic mode**, a full 12-lead ECG is printed in one of two predefined formats with a sensitivity of 10 mm/mV. These two formats are selected by the user to suit his specific needs and requirements (as detailed previously). When the  key is pressed before recording in automatic mode, the unit detects very large waveform amplitudes and sets the sensitivity for the extremity and/or precordial leads to 5 mm/mV to reduce the overlapping of traces.


=> To start the automatic ECG recording in Format 1, simply press  .

=> To start the automatic recording in the second format, press  followed by  .



The printout provides you with the following information:

- ECG recording of all leads in either Standard or Cabrera format according to selection
 - Sensitivity
 - Heart Rate
 - Speed
- and if set:
- Patient Data field to manually insert patient data (Standard version only)
 - Average Cycles (M version only)
 - Intervals (M version only)
 - Axis (M version only)
 - Detailed Measurement Table (M version only)

Recording an ECG in Automatic Mode

In **automatic mode**, a full 12-lead ECG is printed in one of two predefined formats with a sensitivity of 10 mm/mV. These two formats are selected by the user to suit his specific needs and requirements (as detailed previously). When the  key is pressed before recording in automatic mode, the unit detects very large waveform amplitudes and sets the sensitivity for the extremity and/or precordial leads to 5 mm/mV to reduce the overlapping of traces.




=> To start the automatic ECG recording in Format 1, simply press  .

=> To start the automatic recording in the second format, press  followed by  .




The printout provides you with the following information:

- ECG recording of all leads in either Standard or Cabrera format according to selection
 - Sensitivity
 - Heart Rate
 - Speed
- and if set:
- Patient Data field to manually insert patient data (Standard version only)
 - Average Cycles (M version only)
 - Intervals (M version only)
 - Axis (M version only)
 - Detailed Measurement Table (M version only)

Recording an ECG in Automatic Mode

- To obtain an extra printout of the ECG recording in Format 1, simply press  .
- To obtain an extra printout of the second format, press  followed by  .



Recording an ECG in Automatic Mode

- To obtain an extra printout of the ECG recording in Format 1, simply press  .
- To obtain an extra printout of the second format, press  followed by  .

Recording an ECG in Manual Mode

Manual mode provides a direct printout of the real-time ECG with full control of parameter selection.

The following can be freely chosen during or before the recording:




- Lead Group (by means of the  and  keys)

The following lead groups are selectable:

- I, II, III (Cabrera: aVL, I, -aVR)
- aVR, aVL, aVF (Cabrera: II, aVF, III)
- V1, V2, V3
- V4, V5, V6

- V1, II, V5 by pressing  and 



- Chart Speed (by means of the ,  and  keys)

- Sensitivity (by means of the ,  and  keys)

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Manual mode provides a direct printout of the real-time ECG with full control of parameter selection.

The following can be freely chosen during or before the recording:




- Lead Group (by means of the  and  keys)

The following lead groups are selectable:


- I, II, III (Cabrera: aVL, I, -aVR)
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
- Sensitivity (by means of the ,  and  keys)


Recording an ECG in Manual Mode

=> To start the manual recording of a real-time ECG, press the  key.

The printout provides you with the following information:

- The group of the three selected leads with lead identification.
- On the lower edge chart speed, sensitivity and filter settings (if on) are given.
- At the top, the heart rate as current average of 4 beats is shown.

To re-centre the ECG traces, press the  key during operation.

=> Finish the recording by pressing the  key.

WARNING:


After heavy artefacts or lead off, the indication of the heart rate may not be reliable.


Recording an ECG in Manual Mode

=> To start the manual recording of a real-time ECG, press the  key.

The printout provides you with the following information:

- The group of the three selected leads with lead identification.
- On the lower edge chart speed, sensitivity and filter settings (if on) are given.
- At the top, the heart rate as current average of 4 beats is shown.

To re-centre the ECG traces, press the  key during operation.

=> Finish the recording by pressing the  key.

WARNING:

After heavy artefacts or lead off, the indication of the heart rate may not be reliable.

Optional Measurement Program (M)

Heart rate (HR)

Average heart rate calculated on the basis of the entire recording (10 seconds) and is shown as number of beats per minute.

Intervals

- RR:** Average time interval between two consecutive ventricular complexes, computed on the basis of the average heart rate.
- P:** Duration of P wave.
- PR:** P-R interval, i.e. period of time between beginning of P wave and beginning of QRS complex.
- QRS:** Duration of QRS complex.
- QT:** Interval between beginning of QRS (beginning of ventricular depolarisation) and end of T wave (end of repolarisation phase).
- QTC:** Normalized QT interval. As the QT interval is dependent on the heart rate, it is often converted into the normalized QTC interval (i.e. the QT of the patient would show at a HR of 60/min). Usually, the QTC amounts to 390 ± 40 msec. The conversion is achieved according to the following formula:

$$QTC = QT * \sqrt{\frac{1000}{RR}}$$

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Average heart rate calculated on the basis of the entire recording (10 seconds) and is shown as number of beats per minute.

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Optional Measurement Program (M)

Electrical axes

The electrical axes of the heart are determined separately for the P, T and QRS waves. They indicate the main spreading direction of the electrical vector in the *frontal plane*.

The ESAOTE measurement program calculates the axes on the basis of the maximal deflection of the relevant waves in leads I and aVF. The following formula is used for the calculation:

$$\text{axis a} = \text{arc tan} \left(\frac{(R+R') + (S+S') \text{ [aVF]}}{(R+R') + (S+S') \text{ [I]}} \right)$$

Please note that large discrepancies may be found between two measurements if the P and T waves are indistinct. It is also a known fact that breathing and the position (supine or standing) of the patient produce changes in the electrical axes.

Detailed Measurements for Each Lead

The ESAOTE measurement program prints a table with lead-specific measurements results.

In 12 columns, i.e. for each standard lead, the amplitude values of the P, Q, R, S, R', S', T, and T' waves, the J point and the ST integral are listed in millivolts (mV). The amplitude measurements relate to a reference value that corresponds to the signal value immediately before the beginning of the QRS complex .

The duration of the Q, R, S, R' and S' waves is indicated in milliseconds (ms) (see illustration on next page).

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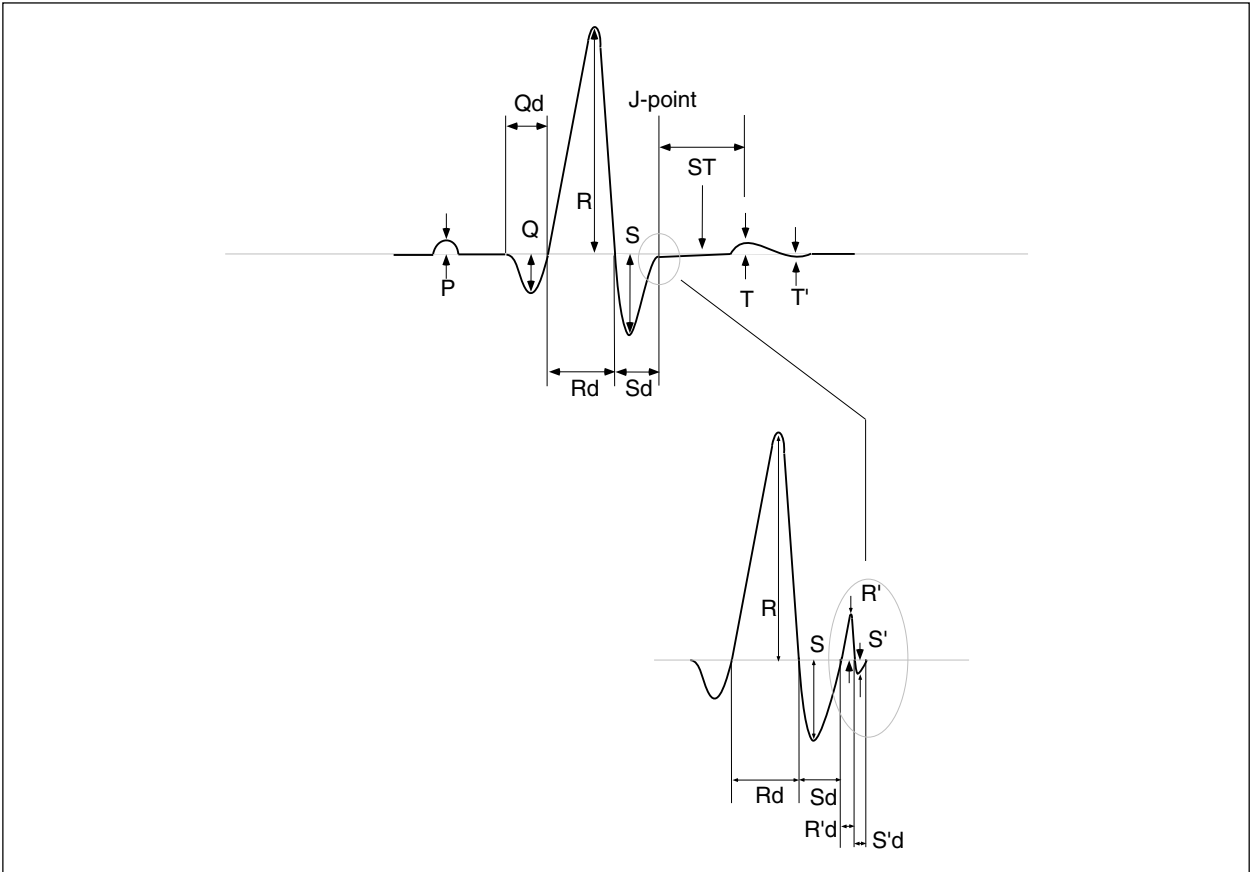
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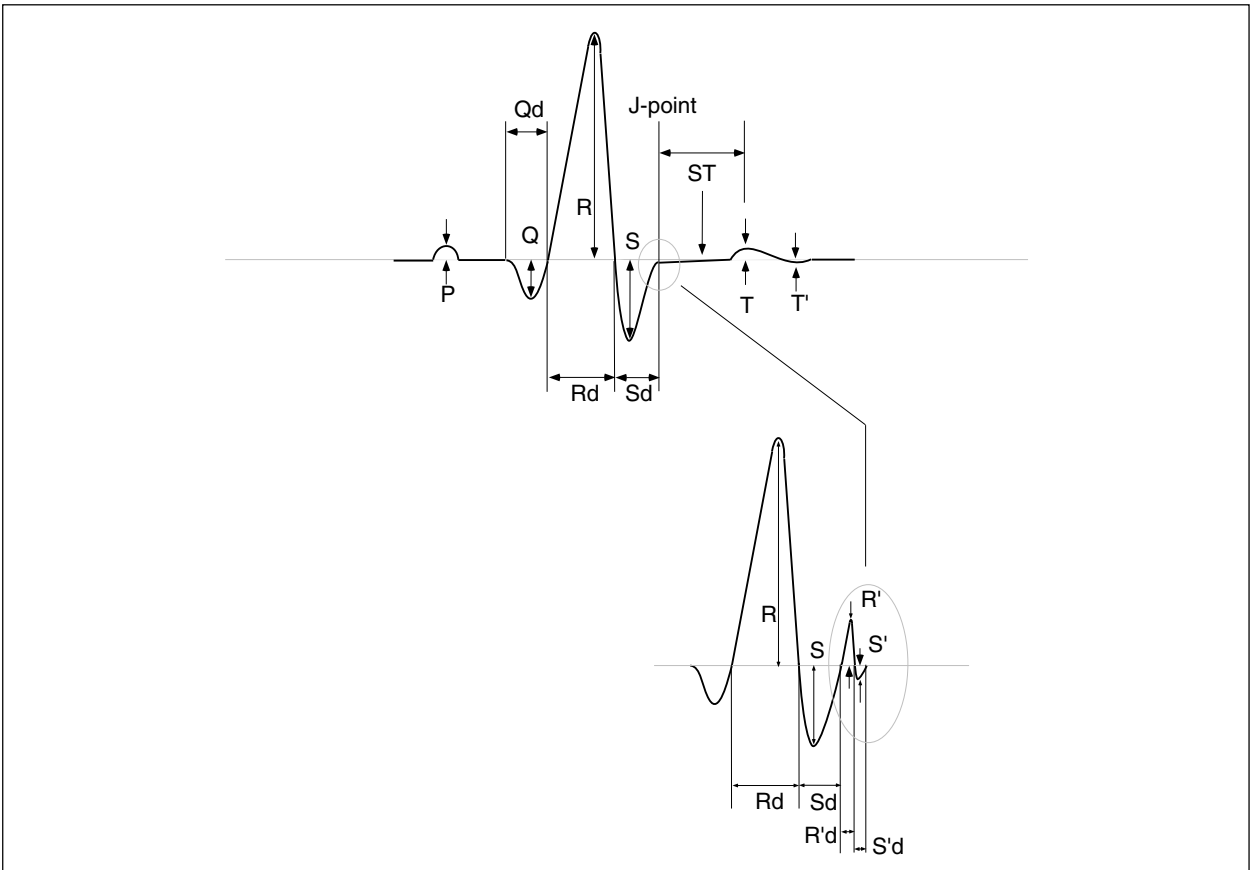
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Optional Measurement Program (M)



Optional Measurement Program (M)



Optional Measurement Program (M)

PARAMETER	DESCRIPTION	MEAS'MT UNIT
P:	amplitude of P wave	mV
Q:	amplitude of Q wave	mV
Qd:	duration of Q wave	ms
R:	amplitude of R wave	mV
Rd:	duration of R wave	ms
S:	amplitude of S wave	mV
Sd:	duration of S wave	ms
R':	amplitude of R' wave	mV
R'd:	duration of R' wave	ms
S':	amplitude of S' wave	mV
S'd:	duration of S' wave	ms
J:	amplitude of J point	mV
ST:	ST integral: averaged amplitude of ST segment (from J point to half the distance between J-point and T wave maximum)	mV
T:	amplitude of T wave	mV
T':	amplitude of T' wave (in case of a diphasic T wave)	mV

Optional Measurement Program (M)

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T':	amplitude of T' wave (in case of a diphasic T wave)	mV

Care & Maintenance

Care of your P80

The **patient cable** should not be exposed to excessive mechanical stress. Whenever disconnecting the leads, hold the plugs and not the cables. Store the leads in such a way as to prevent anyone stumbling over them or any damage caused by the wheels of instrument trolleys. The cable can be wiped with soapy water. Sterilization, if required, should be done with gas only and not with steam. To disinfect, wipe the cable with any standard hospital disinfectant.

The **electrodes** can be cleaned after every use with soapy water. Make sure that no water is left in the suction cup of the suction electrodes. Sterilization can also be performed with gas or with Alhydex or Vygon.

The **casing** of the P80 should be cleaned with a soft cloth on the surface only. **Disconnect the unit before cleaning.**

Do not, under any circumstances, immerse the apparatus into a cleaning liquid or sterilize with hot water, steam, or air.

Self-test

Initiate a self-test of the P80 as follows:

Initiate Self-Test				
Entry Key Sequence				Action
SHIFT	0	3	any number	Printout of Self-test

A table giving information for the service staff is printed out.

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Care & Maintenance

Maintenance

At 12 monthly intervals, the unit should undergo a technical safety check. The extent of this check should include the following:

- Visual inspection of the unit and cables.
- Electrical safety tests according to IEC 601-1 and IEC 601-2-25.
- Functional tests according to the Service Handbook.

The test results must be documented.

Replacing the Recording Paper

The recording paper must be replaced as soon as the end of the paper is indicated by a red stripe on the lower edge. After the indication first appears, there are about 8 pages left. However, we recommend that the paper be replaced immediately.

If no paper is left, the printing process is interrupted and the paper warning lamp starts to blink. After the paper has been replaced, the printout is started again by pressing **COPY** or **MAN START** or **AUTO START**.

A step-by-step description of how to change the paper is given on the next page.

NOTE: If changing from Z-folded paper to a paper roll (or vice versa), be sure that the settings are corrected as follows:

Paper Settings			
Entry Key Sequence		Definition	
SHIFT	7	7	Z-Fold Paper
		8	Paper Roll

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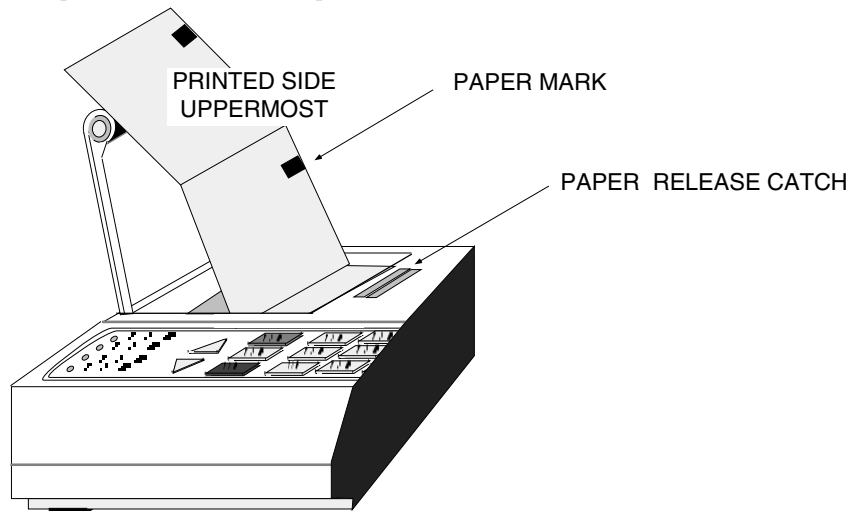
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Paper Settings			
Entry Key Sequence		Definition	
SHIFT	7	7	Z-Fold Paper
		8	Paper Roll

Care & Maintenance

- Push paper compartment release and lift up cover.

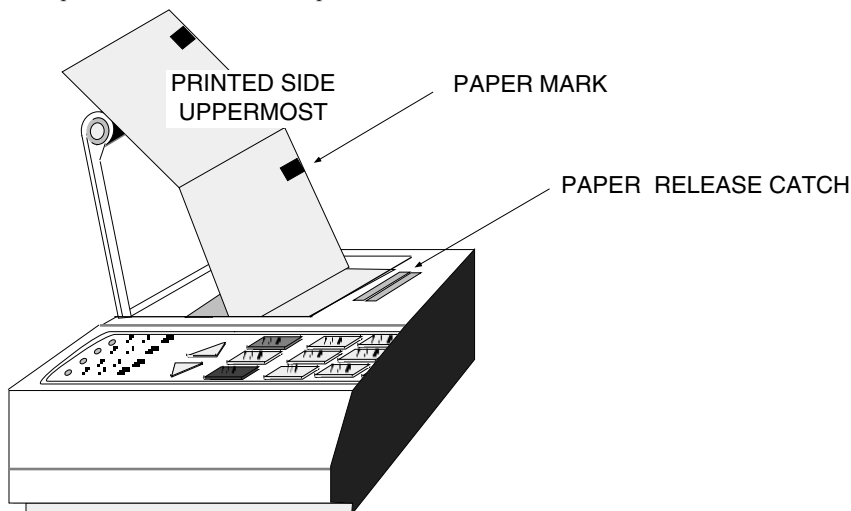


- Remove the remaining paper.
- Place a new paper pack into the drawer.
- Check that the printed (grid) side is facing upwards, and place the beginning of the paper over the guide roller.
- Close lid and press firmly until release catches.
- Press **STOP** to transport the paper to the start position.

NOTE: ESAOTE can only guarantee an excellent printout if ESAOTE original chart paper or a chart paper of the same quality is used.

Care & Maintenance

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Trouble Shooting

Problem	What to Check
Unit does not switch On/ Mains Indicator Lamp is not lit	Check if mains cable is plugged in. Call your local ESAOTE dealer if problem is still present.
"Noisy" traces	CHECK ELECTRODE CONTACT. As much as possible, ensure that patient is relaxed and warm. Activate myogram filter to reduce muscle tremor. Set mains filter to 50 or 60 Hz according to local power supply.
ECG trace "wanders" away from centre	Baseline drift - check electrode contact. Activate baseline filter.
No printout	Check if paper compartment is closed tight. Check paper level. Check paper settings.

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Ordering Information

Your local representative stocks all the disposables and accessories available for the P80. In case of difficulty or to obtain the address of your local dealer, please contact the head office. Our staff will be pleased to help process your order or to provide any details for all products.

The address for advice is:

ESAOTE SPA
Service Department
Via di Caciolle 15
I-50127 Florence
Italy
Phone Number: + (39) 55 42 291
Fax Number: + (39) 55 42 29 208

When ordering, state that the order is for a P80 unit and provide the following:

- * Part Title
- * Part Number
- * Contact name and Address

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Ordering Information

Complete Units

P80 Basic, 230 V; Complete with standard accessories	9840400010
P80 Measurements, 230 V; Complete with standard accessories	9840400020
Standard Accessories:	
Patient cable EURO colours; pack of paper; set of ten electrodes	
ECG gel; User Guide	
P80 Basic, 115 V; Complete with standard accessories	9840400011
P80 Measurement, 115 V; Complete with standard accessories	9840400021
Standard Accessories:	
Patient cable USA colours; pack of paper; set of ten electrodes	
ECG gel; User Guide	

Accessories

- 10-lead Patient Cable, Euro	9740410001
- 10-lead Patient Cable, USA	9740410002
- 4 Extremity clamp-electrodes	9610020000
- 4 Extremity clamp-electrodes, USA colour	9610020001
- 6 Suction electrodes	9610054000
- ECG electrode cream (100 ml)	99210091133
- Recording Paper, Z-folded (1 Pack)	9690029000
- Carrying Case	9100048000
- Recording Paper, Roll (Pack with 20 Rolls)	9690029020
- Trolley	9704250100
- Patient Cable Holder	9101341000
- User Guide (French / German / Italian)	9740440001
- User Guide (English / Spanish / Portuguese)	9740440002

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- ECG electrode cream (100 ml)	99210091133
- Recording Paper, Z-folded (1 Pack)	9690029000
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- Recording Paper, Roll (Pack with 20 Rolls)	9690029020
- Trolley	9704250100
- Patient Cable Holder	9101341000
- User Guide (French / German / Italian)	9740440001
- User Guide (English / Spanish / Portuguese)	9740440002

Technical Data

Technical data subject to change without notice.

Dimensions (l/w/h):	296 x 220 x 72.5 mm
Weight:	2.9 kg
Mains Supply:	115 / 230 VAC, 50/60 Hz
Battery:	Built-in 12 V lead-acid battery (rechargeable)
Power Consumption:	Recording: 28 VA max.
Leads:	Standard / Cabrera
Paper Speed:	5 / 25 / 50 mm/s (direct)
Sensitivity:	5 / 10 / 20 mm/mV, either automatically adjusted or manually selected
Chart Paper:	Thermoreactive - Z-folded, 90 mm wide, perforation 70 mm or - Roll, 90 mm wide
Printing Process:	High-resolution thermal print head, 8 dots per mm
Recording Tracks:	3 channels, positioned at optimal width on 80 mm, automatic baseline adjustment
Automatic Lead Programs:	3 channel representation of 12 simultaneously acquired standard leads
Data Record:	- Listing of ECG recording data - <i>Version M:</i> <i>ECG measurement results (intervals, amplitudes, electrical axes), average complexes with optional measurement reference markings.</i>

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Technical Data

ECG Storage:	- Memory for 10 s, 12-lead ECG - Circular input memory for 10 s, 12-lead ECG.
Frequency Range of Digital Recorder:	- 0 to 150 Hz (IEC) - 0 to 150 Hz (AHA)
ECG Amplifier:	- Simultaneous, synchronous registration of all 9 active electrode signals (= 12 standard leads) - Sampling frequency: 1000 Hz - Digital resolution: 5 μ V - Dynamic range: \pm 9 mVAC - Max. electrode potential: \pm 300 mVDC - Time constant: >3.2 s - Frequency response: 0.05 to 150 Hz (-3 dB) - Input impedance: >10 M Ω
Myogram Filter (muscle tremor filter):	25 Hz or 35 Hz, programmable (not active on averaged waveform). The stored ECGs can be printed with or without filter.
Line Frequency Filter:	Distortion-free suppression of superimposed 50 or 60 Hz sinusoidal interferences by means of an adaptive digital filter.
Patient Input:	Fully floating and isolated, defibrillation protected
Patient Leakage Current:	<5 μ A
Safety Standard:	CF according to IEC 601-1 and IEC 601-2-25
Safety Class:	I according to IEC 601-1

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Technical Data

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Technical Data

Environmental Conditions:	- Temperature, Operating:	10° to 40° C
	- Temperature, Storage:	-10° to 55° C
	- Relative humidity:	25 to 95% (non condensing)
	- Atmospheric pressure:	700 to 1060 hPa

Control Panel: Rubber keys

Technical data subject to change without notice.

Available Configurations

The P80 is available in two different versions:

Standard Version: Unit with ECG recording and printout capabilities.

Version M: Unit with additional ECG measurement program.

Technical Data

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