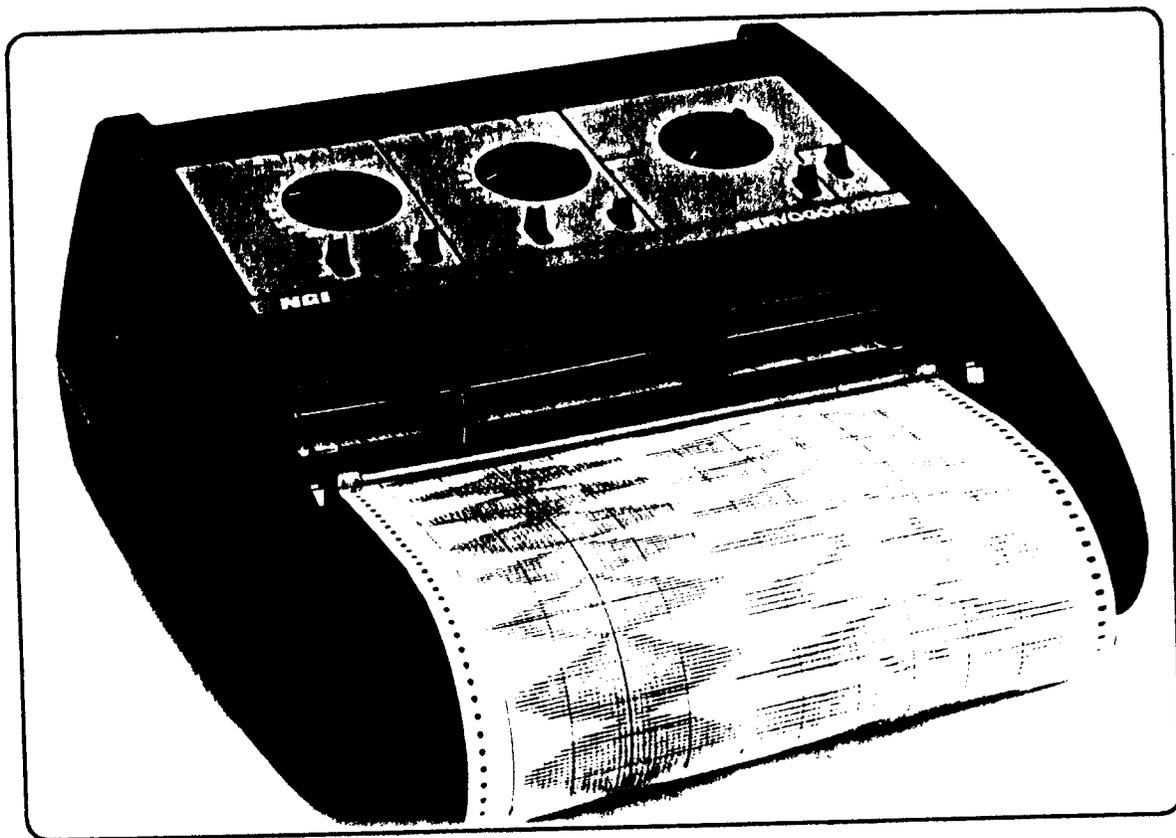


FLATBED RECORDER SERVOGOR 102

Single Pen 157-9838

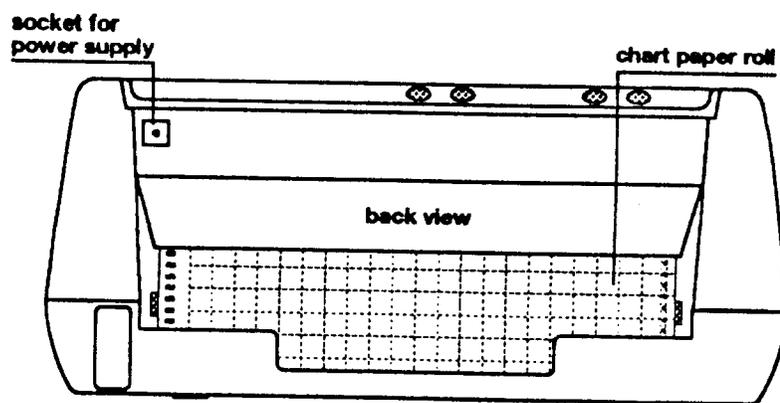
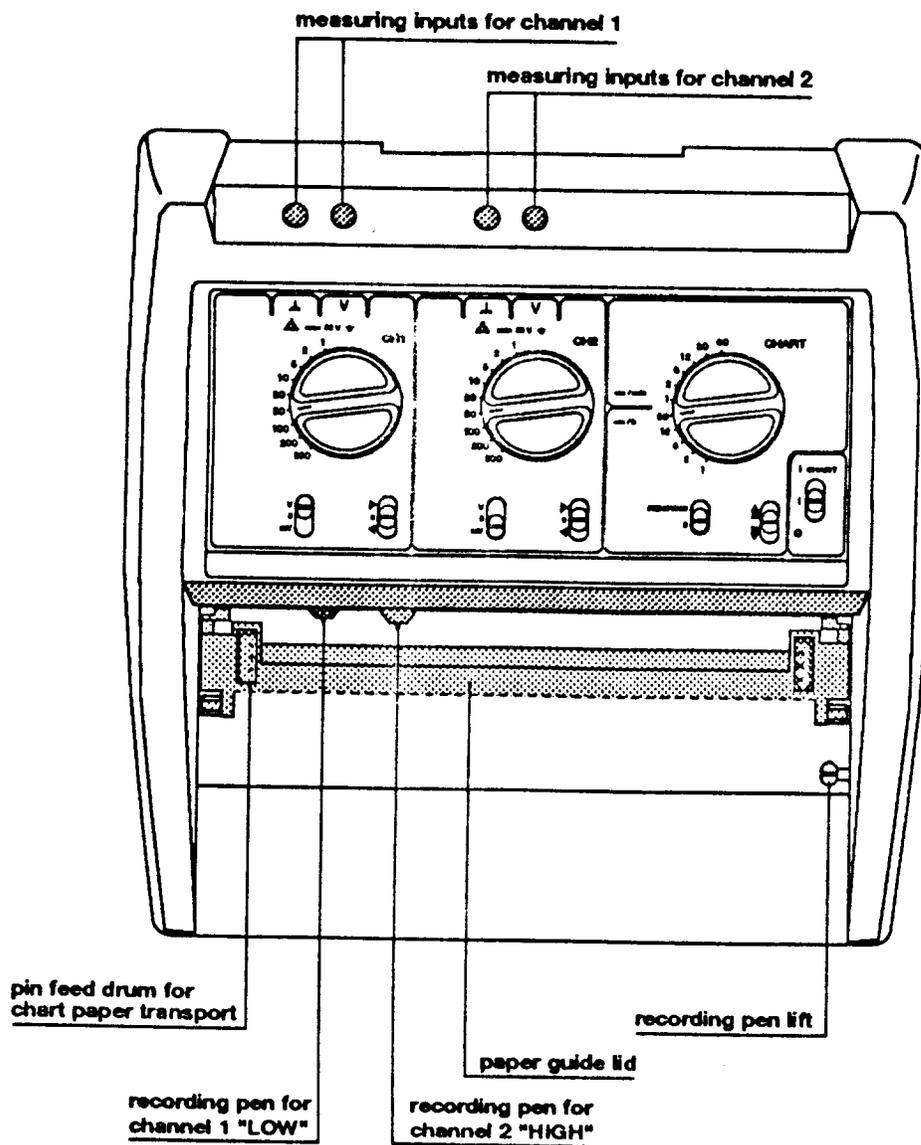
Dual Pen 157-9850

Operating Instructions



Order No.: A 2510 01 GA 1E

NGI
NORMA GOERZ INSTRUMENTS



Flatbed Recorder

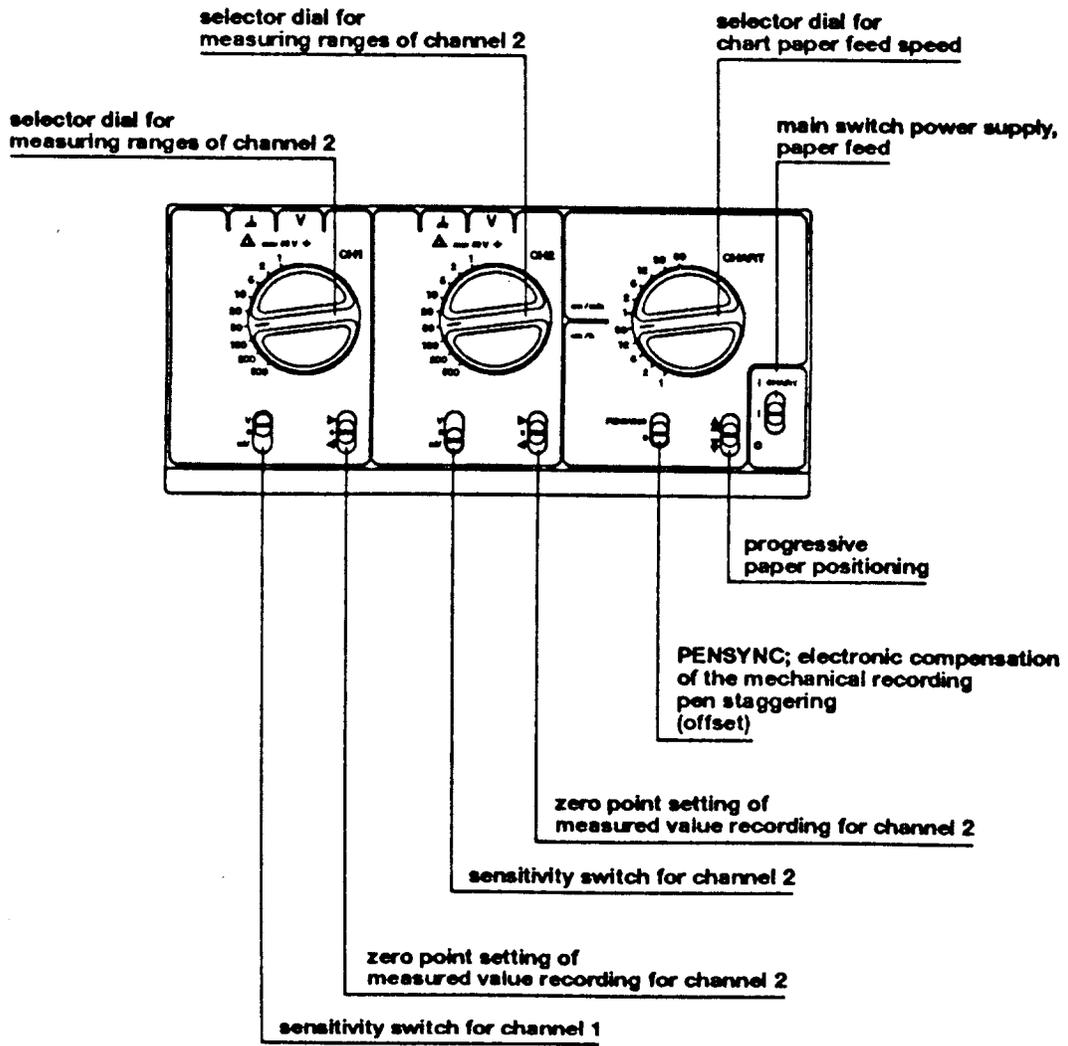


Table of Contents

Safety Regulations	3
Qualified Personnel	4
Summary of Warning Notices	5
Notes on the Operating Instructions	7
Short Description of Instrument	7
1 Installation	9
1.1 Unpacking	9
1.2 Checking of Delivery	9
1.3 Operating Conditions	9
1.4 Operating Positions	9
1.5 Power Supply	10
1.6 Insertion of Chart Paper	11
1.7 Mounting of the Recording Pens	12
2 Technical Data	13
2.1 Standards and Regulations Applied	13
2.2 Test Voltages	14
2.3 Operating-, Transport- and Storage Specifications	14
2.4 Physical Dimensions, Package and Weight Specifications	15
2.5 Power Supply Specifications	16
2.6 Instrument Specifications	16
2.7 Time Unit Specifications and Paper Feed	17
2.8 Measuring Unit Specifications	17
3 Operation	19
3.1 Switching On the Instrument	19
3.2 Lowering the Recording Pen to the Chart Paper	20
3.3 Zero Setting	21
3.3.1 Setting of Different Formats with Zero Point in 2 - Channel Instruments	22
3.4 Setting of DC Voltage Measuring Ranges	23
3.5 Connecting Measuring Signals to the Measuring Inputs	25
3.6 Positioning of Chart Paper	27
3.7 Activation of Chart Paper Feed	28
3.8 Working with PENSUNC	29

Table of Contents

4 Measuring Direktions	31
4.1 Earthing and Noise Voltage	31
4.2 Dependence of Accuracy on Source Resistance	32
4.3 Dynamic Behaviour	33
4.4 Expansion of Measuring Capabilities	34
5 Terminology and Explanatory Notes	35
6 Upkeep and Maintenance	41
7 Service	43
Certificate of Conformity	
Service Card	

Safety Regulations



This measuring device is only to be installed and operated by **qualified personnel** and according to the technical data in compliance with the safety precautions and regulations set forth below. Additionally, the use of this equipment requires compliance with all legal and safety regulations pertaining to each specific application. Similar regulations apply to the use of accessories.



Operating electrical devices implies that parts of the device carry dangerous voltages. Disregarding warning notices may lead to serious physical injury and material damage.

Fault-free and safe operation of this device requires suitable transport and storage, setting up and assembly as well as careful operation and maintenance.

If there is reason to believe that safe operation is no longer possible, the device has to be put out of operation immediately and must be protected against accidental restarting.

It can be assumed assumed that safe operation is no longer possible if the device

- * shows visible damage,
- * has been exposed to unfavourable conditions (e.g. storage beyond the permissible climatic limits without adaption to the ambient climate, dewing etc.) or to
- * has been exposed to major strain during transport (e.g. been dropped from some height without visible external damage etc.).



No measurements must be performed on unprotected measuring circuits.

Safety Regulations

Qualified Personnel

are persons familiar with the setting up, installation, starting off and operation of the device and possesses a formal qualification required for such activities, such as

- * training, instruction or authorization to switch on and off, isolate, earth/ground or label electric circuits and instruments/systems according to the safety engineering standards
- * training or instruction in maintenance and use of adequate safety equipment according to the safety engineering standards
- * training in rendering first aid

Summary of Warning Notices



Upper Side of Instrument

In all voltage ranges (also in the yellow marked ranges 100 V, 200 V and 500 V) the applied measured voltage must not exceed 50 V gegen towards earth.

Bottom Side of Instrument



WARNING - TO AVOID ELECTRIC SHOCK DISCONNECT POWER PLUG AND MEASURING TERMINALS BEFORE SERVICING. INSTRUMENT TO BE SERVICED BY QUALIFIED PERSONNEL ONLY.

FOR CONTINUED PROTECTION AGAINST FIRE, REPLACE ONLY WITH FUSE OF THE SPECIFIED VOLTAGE AND CURRENT RATINGS.

Rear Side of Instrument



POWER 12V \approx 0,5 A

WARNING: CH1 ELECTRICALLY CONNECTED TO POWER INPUT.

Power Supply

12 V DC / 0.5 A (jack plug see chapter 2.5)

Mains Adapter



protective insulation as per DIN 40014 and IEC 117.

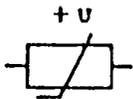


to be operated in closed rooms only !

u 130 °C



encapsulated transformer;
company;
thermal protection+ 130 °C.



short circuit proof PTC.

Notes on the Operating Instructions

These operating instructions have been written in compliance with DIN 43750.



This sign indicates that special attention has to be given to certain texts.

- * This sign always precedes an enumeration.
- After this sign a certain action is required.

Short Description

This compact flat bed recorder has been manufactured and tested according to the latest technology complying with Quality Assurance System **DIN ISO 9001**.

The compliance with the currently applicable **EMC** (electromagnetic compatibility) is documented by the **CE** sign attached to the instrument.

The recorder is used to record DC voltages up to 50 V in dependence on time, as well as all physical quantities that can be converted with transducers.

Thanks to the **10 to 18 V DC voltage supply** the recorder can be alternatively used as a stationary instrument or as a portable instrument.

Notes to the Operating Instructions / Short Description of the Instrument

1 Installation

1.1 Unpacking

While unpacking check instrument for any damage that might have occurred during transport. In case of damage keep packing material till complaint has been settled.

For a possible later transport keep the packing material.

1.2 Checking Delivery

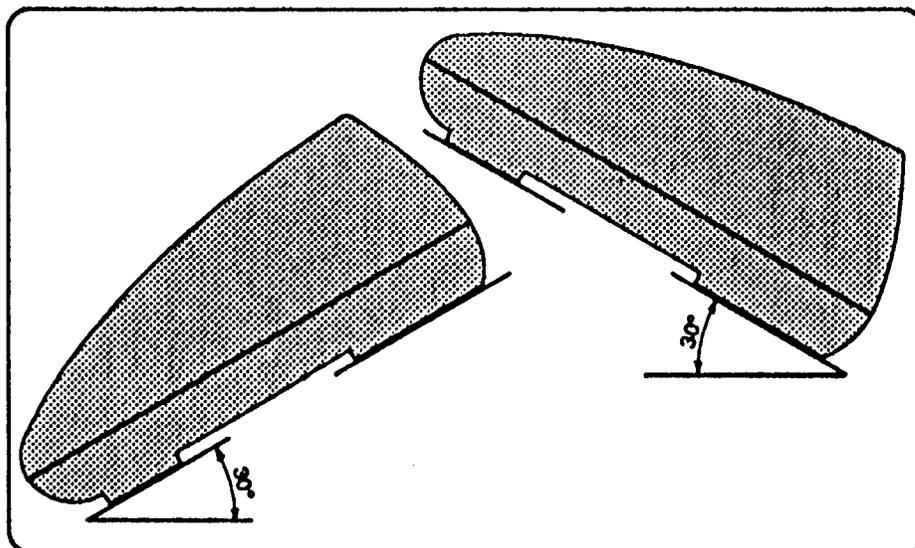
Check accessories for missing parts immediately after unpacking. A list of supplied accessories can be found on front inside cover.

1.3 Operating Conditions

The instrument should only be put into operation in places where the ambient conditions remain within the stated specifications (see chapter 2 "Technical Data").

1.4 Operating Position

Possible
Operating Position
 $+30^\circ$ to -30°
maximum



1.5 Power Supply

(Specifications for power supply see chapter 2.5)

To ensure fault-free operation of the instrument the **supply voltage range of 10V to 18V** has to be strictly observed

power input of the Instruments:

One channel instrument approx. 0.3 A / 12 V;

Two channel instrument approx. 0.4 A / 12 V.

Power supply on the connection socket for
3.5 mm Ø jack alternatively

- with country specific mains adaptor from the mains or
- with any batteries.



1 - channel instrument

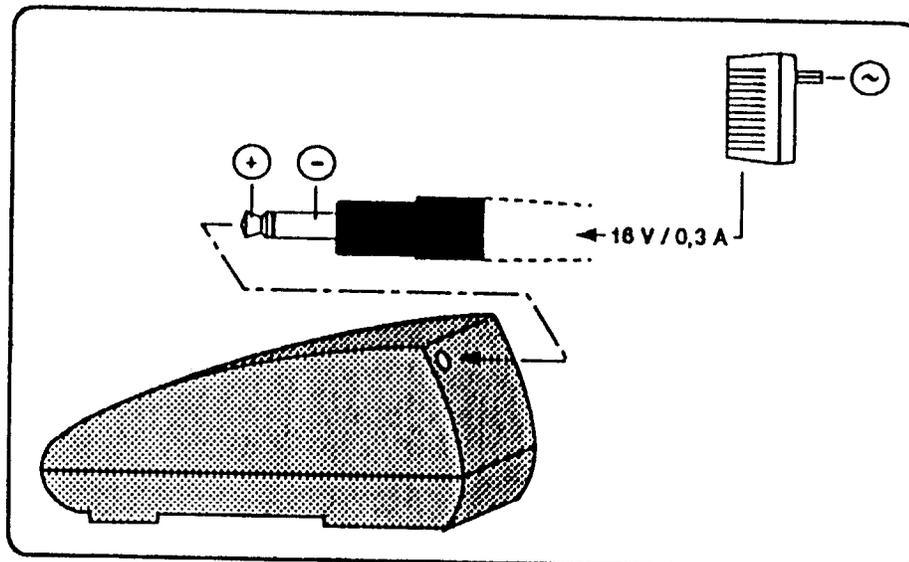
The "- pole" of the supply voltage is connected to the "⌚ - socket" of the measuring input.

2 - channel instrument

The "- pole" of the supply voltage is connected to the "⌚ - socket" of the measuring input of channel 1.

Always connect the mains adaptor to the recorder first and only thereafter to the mains socket.

Polarity and Position
of Jack Plug



Note The ordering reference for the country specific mains adaptor can be found on the inside of the front cover. The adapter cable for NiCad operation can be supplied upon request.

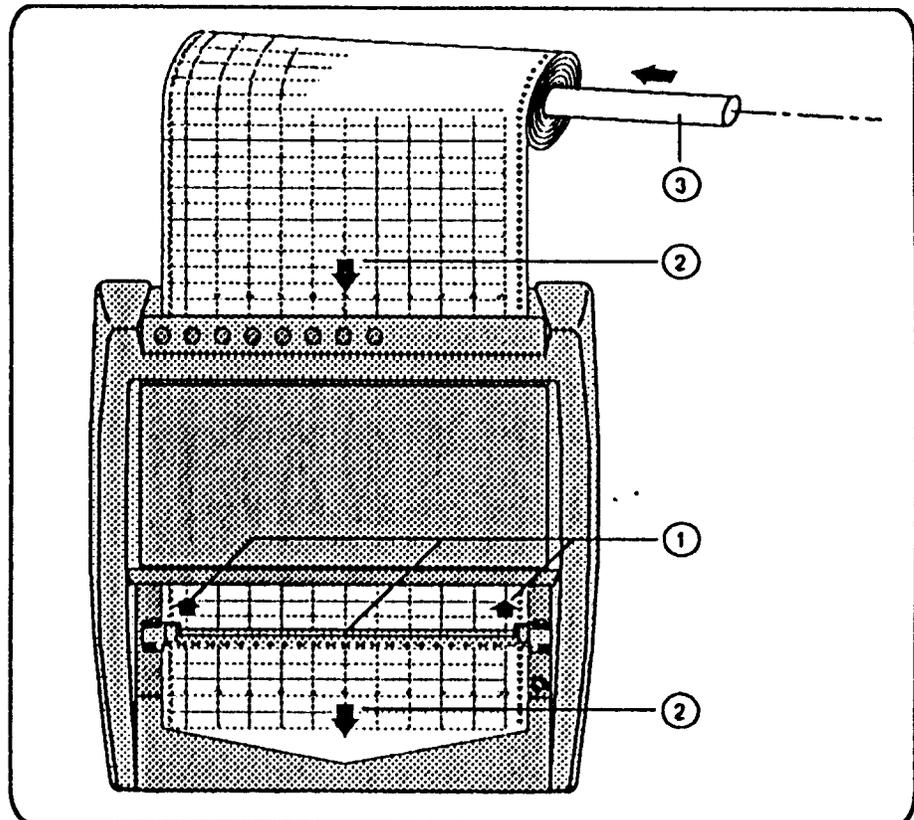
1.6 Insertion of Chart Paper

The ordering reference can be found on the inside of the front cover.

Technical specifications of the chart paper: see chapter 2 "Technical Data".

- Open the paper guide lid (1).
- Insert the chart paper (direction of arrow (2)) into the instrument.
- It has to be observed that paper is adjusted to the pin feed drum so that pins match the perforation
- close the paper guide lid (1).
- attach the chart take-up rod (3) to the chart paper.
- click the take-up tube (3) into the snap lock mechanism at the rear side of the instrument.

Insertion of Chart Paper



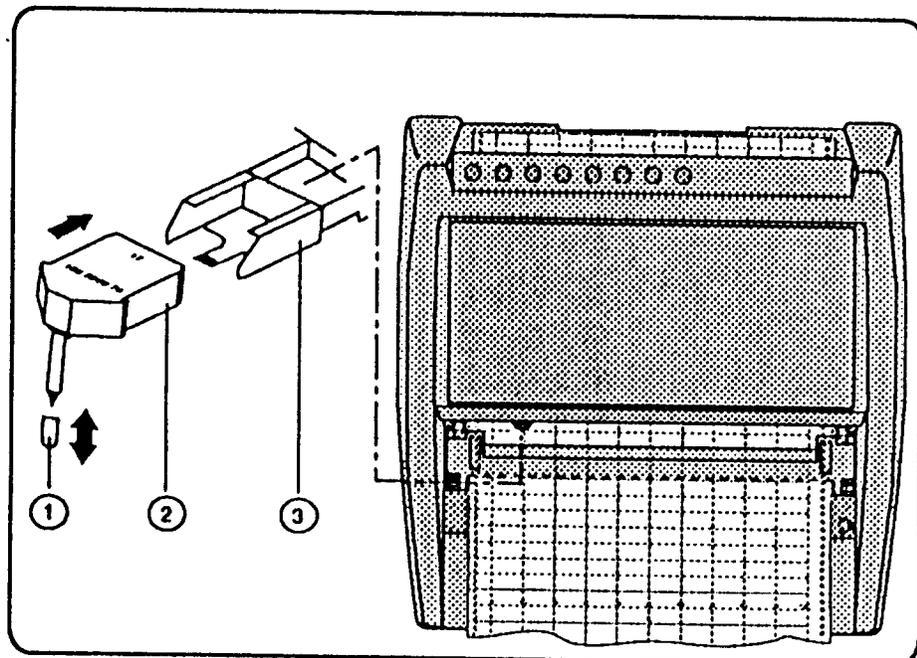
Note 1.5 meters before the end, the paper carries a red signal line.

1.7 Mounting of the Recording Pens

The ordering reference can be found on the inside of the front cover.

- remove pen cap ① from the recording pen ② and keep it in a safe place
- insert pen into pen holder ③ until limit stop is reached

Insertion of Pens



Disposable Felt Pen (already filled)

Advantage no ink clotting
Recording Expectancy approx. 1000 m in continuous recording.

Ink Pen (refillable)

Advantage refillable
Recording Expectancy approx. 1500 m in continuous recording.

The recording expectancy depends on

- humidity (alters the absorbent capacity of the paper)
- recording speed / paper speed and
- duration of recording sequence.

Note To prevent pens from drying-out cap the pens immediately if recording is paused for a longer period.

2 Technical Data

2.1 Standards and Regulations Applied

IEC654-1 as per Climatic Class B3	Operating regulations for electrical equipment and systems
IEC359	Storage and transport condition.
IEC68-2-6	mechanical strain: vibration, shock, permanent shock.
IEC1010-1, UL244, CSA C22 No.231	Safety standards for electronic measuring instruments.
VDE 0411 Part 1 DIN/IEC66E	Protection Class II. Overvoltage Category II. Pollution level II.
DIN 41662/UL198G	Specification and standards for fuse-links.
IEC 801 Part 1	electromagnetic susceptibility.
VDE 0871/6.78	Stipulation for radio interference suppression on electrical equipment and systems.
FCC CLASS B	radio interference suppression B.
Quality Standard	developed, constructed and manufactured to comply with DIN ISO 9001.

2.2 Test Voltages

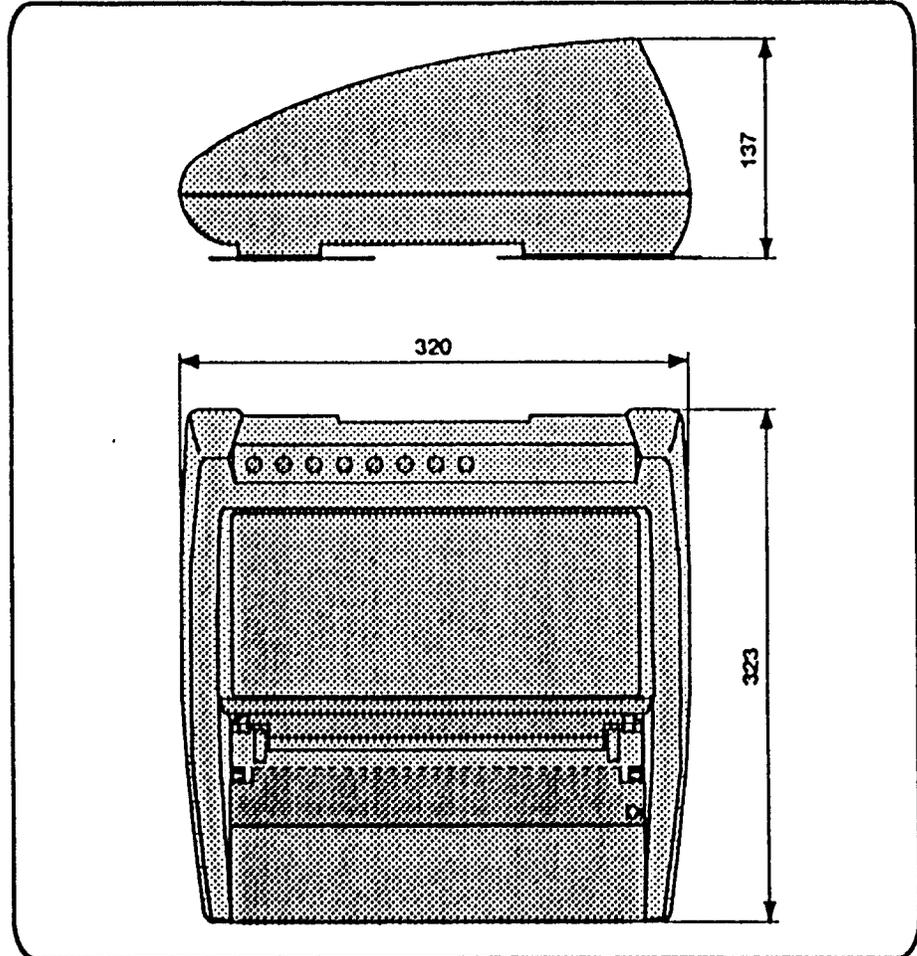
750 V AC	measuring input channel 2 against casing
750 V AC	measuring input channel 1 against measuring input channel 2

2.3 Operating-, Transport- and Storage Specifications

Operating Position	horizontally up to $\pm 30^\circ$ tilted
Climatic Class	B3 according to IEC 654-1
Reference Temp. Range	$23 \pm 2^\circ \text{C}$
Operating Temp. Range	0 to $+50^\circ \text{C}$
Storage and Transport- Temperature Range	-20 to $+70^\circ \text{C}$
rel. Humidity	10 to 95%
abs. Humidity	1 to 15 g/m^3

2.4 Physical Dimensions, Package and Weight Specifications

Physical-Dimensions



Mass	1 channel instrument without accessories and package	2440 Grams
	2 channel instrument without accessories and package	2560 Grams
Original Wrapping	Accessories for 1 channel instrument	770 Grams
	Accessories for 2 channel instrument	780 Grams
Transport Case	for 1 and 2 channel instrument 470 (L) x 270 (D) x 490 (W) mm	1200 Grams
	for 1 und 2 channel instrument 405 (L) x 365 (D) x 165 (W) mm	2620 Grams



Wrapping material and plastic parts are labeled with the corresponding disposal instructions. During manufacturing of all parts special attention was directed to environmentally friendly production cycles.

2.5 Power Supply Specifications

Mains Adaptor	primary voltage and mains plug according to country; frequency 50 / 60 Hz; secondary 16 V / 0.3 A (open circuit voltage 26 V) jack connector DIN 45318 SG 3.5 power consumption 4.8 W
External Supply	10 to 18 V DC

2.6 Instrument Specifications

Design	Flatbed
Channels	1 or 2 depending on type
Recording Width	200 mm
Recording Paper	Roll, width 200 mm, length 25 m; for normal climate 23/50-0.5 DIN 50 014
Graph Grid on Paper	Y: division 0 to 100, 100 steps t: division in cm
Recording Pens	disposable felt pen, channel dependent, recording length approx. 1000 m. ink pen, channel dependent, recording length approx. 1500 m. mechanical pen offset from channel 1 to channel 2 approx. 2.5 mm.
Pen Lift	mechanical
Dead Zone	0.3% of full scale value
Linearity	0.2% of full scale value
Response Time	<0.5 s
Damping	as per DIN 43 782, overshoot and rounding $\leq 1\%$ of recording width
Recording Speed	40 cm/s
Servo System	
Cut-off Frequency	≥ 1.5 Hz (-3dB)

2.7 Time Unit Specifications and Paper Feed

Paper Feed	quartz-clocked
Paper Positioning	progressive motor control with switch activated forward and reverse feed.
Feed Speed	11 chart feed speeds to be selected with switch 1 - 2 - 6 - 12 - 30 cm/h and 1 - 2 - 6 - 12 - 30 - 60 cm/min.
Step Width	0.078 mm (128 steps/cm)
Feed Accuracy	0.01%
Temperature Influence	0.01% / 10° C

2.8 Measuring Unit Specifications

Zero Point	continuously variable
Measuring Ranges (calibrated)	1 - 2 - 5 - 10 - 20 - 50 - 100 - 200 - 500 mV and 1 - 2 - 5 - 10 - 20 - 50 V
Accuracy	0,5% of the full scale value + 5 μ V
Temperature Influence	0.2% / 10° C + 5 μ V / 10° C
Interference of External Field	< 0.5% (0.5 mT at 50 / 60 Hz)
Measuring Input	floating, asymmetrical; 4 mm \varnothing safety jacks
Difference of Potentials between Input and Earth	max. 50 V
Max. Overloading	250 V AC for all measuring ranges
Input Resistance	1 M Ω
Source Resistance	100 Ω max. 1 k Ω
Interference Voltage Rejection	AC SMRR: \geq 40 dB from 50 Hz upwards AC CMRR: \geq 60 dB at 50 / 60 Hz DC CMRR: \geq 90 dB

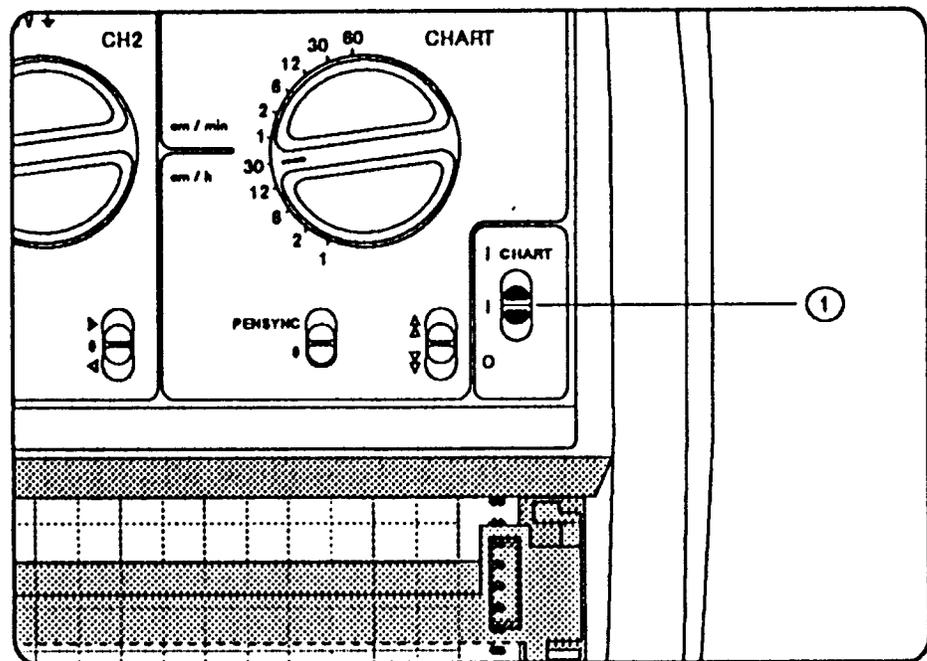
Technical Data

3 Operation

3.1 Switching On the Instrument

- Move the switch ① to position I (mid-position).

Switching
the Instrument
On and Off



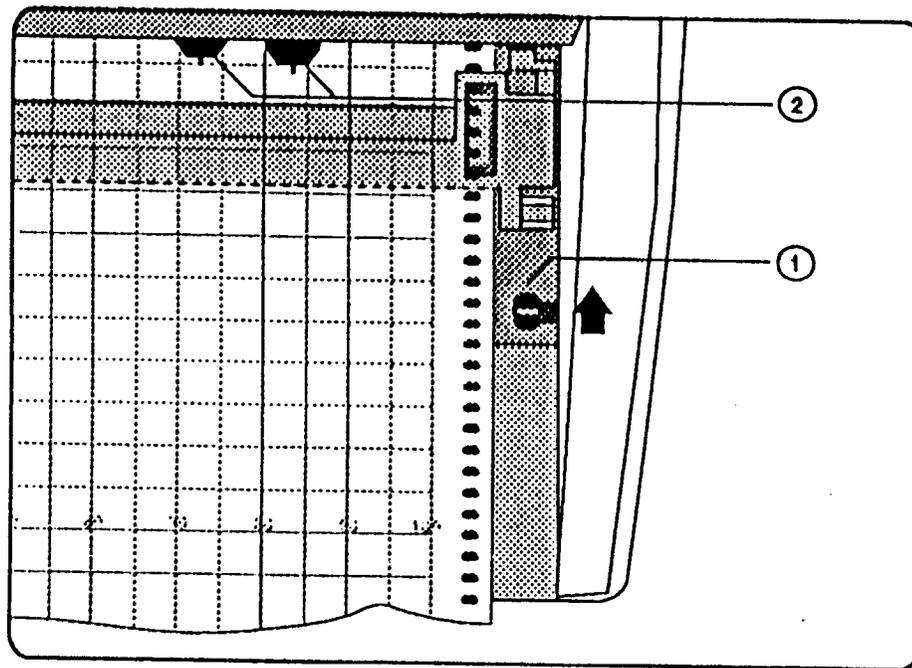
Additional information referring to
Power Supply
Power Supply Specifications

Can be found in
chapter 1.5
chapter 2.5

3.2 Lowering the Recording Pen to the Chart Paper

- Push the pen lift ① in direction of the arrow.
The recording pen(s) ② is (are) lowered to the chart paper by a mechanism.

Lowering the Recording Pen to the Chart Paper



Note If the recording is paused lift the recording pen(s) from the recording paper with pen lift ① to avoid ink bleeding.
If the recording is paused for a longer periods cap the recording pen(s) to prevent them from drying out.

Additional information referring to
Mounting the Recording Pens

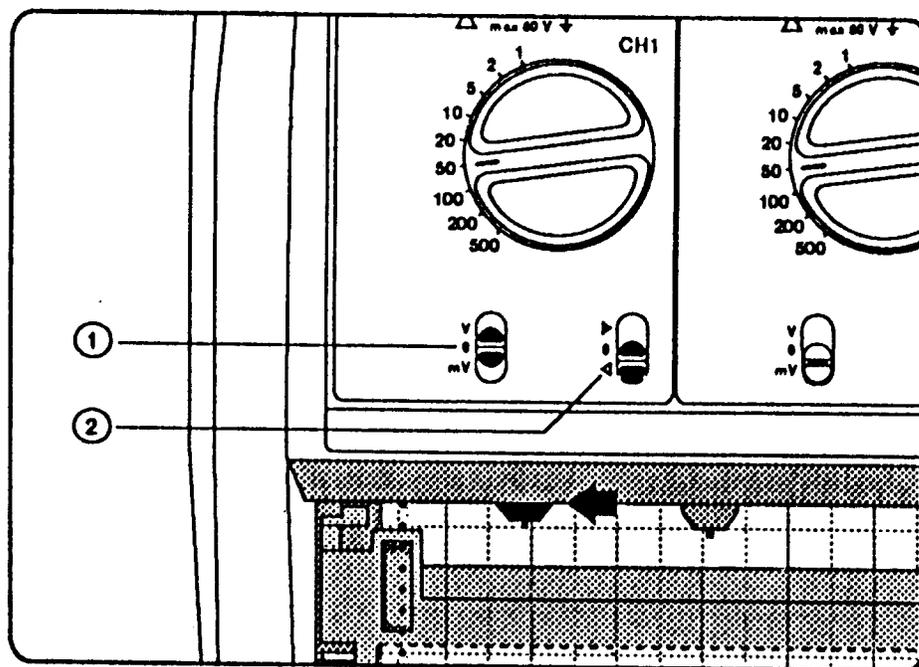
Can be found in
chapter 1.7

3.3 Zero Setting

On 2 channel instruments the procedure described below has to be carried out for the second channel similarly.

- **Set the shift selector ① to position 0.**
Internally the measuring input is connected to earth and one side of the measuring signal is disconnected. Only the zero setting is displayed without influence by the measuring signal connected.
- **Press the shift selector ② in the desired direction.**
The corresponding recording pen moves in the selected direction with a progressive speed.

Zero Setting

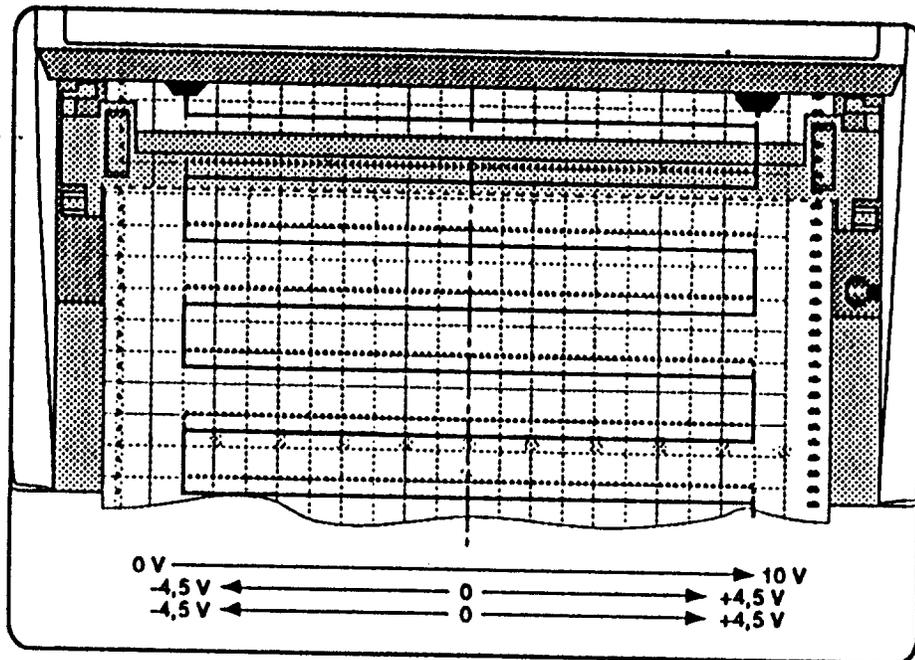


3.3.1 Setting of Different Formats with the Zero Point in 2 - Channel Instruments

Example Two square wave signals each with ± 4.5 V shall be displayed.

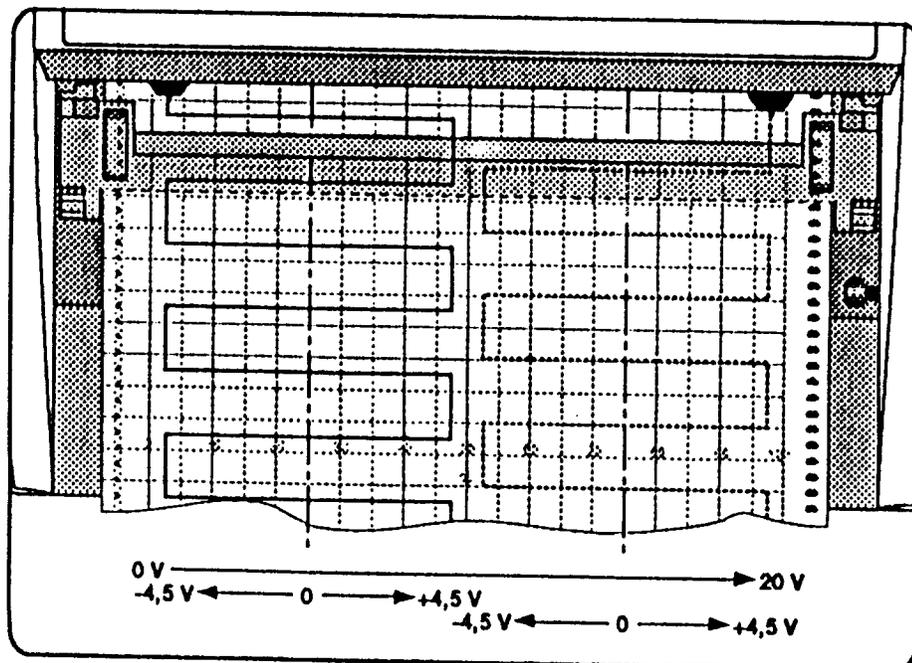
Measuring Range 10V Zero setting of channel 1 and 2 to 50%.

Format 2 x 100 %



Measuring Range 20V Zero setting of channel 1 to 25%; of channel 2 to 75%.

Format 2 x 50 %



3.4 Setting of DC Voltage Measuring Ranges



To protect against hazardous voltages:

The measuring voltage must not exceed 50 V towards earth.



Overload protection of the measuring ranges:

All measuring ranges from 1 mV to 50 V are protected against destruction by high voltages up to 250 V AC.

The following measuring ranges can be selected:

1 - 2 - 5 - 10 - 20 - 50 - 100 - 200 - 500 mV

1 - 2 - 5 - 10 - 20 - 50 V

All measuring ranges are calibrated. That means that the value of the selected measuring range corresponds to 100% of the upper range limit at a zero setting of 0% on the recording paper.

Decide upon the following questions before selecting the measuring range:

- * does the measuring signal exceed 50 V to earth ?
- * which signal amplitude can be expected ?

Note If the magnitude of the measuring signal is not known exactly, **select the highest measuring range.**

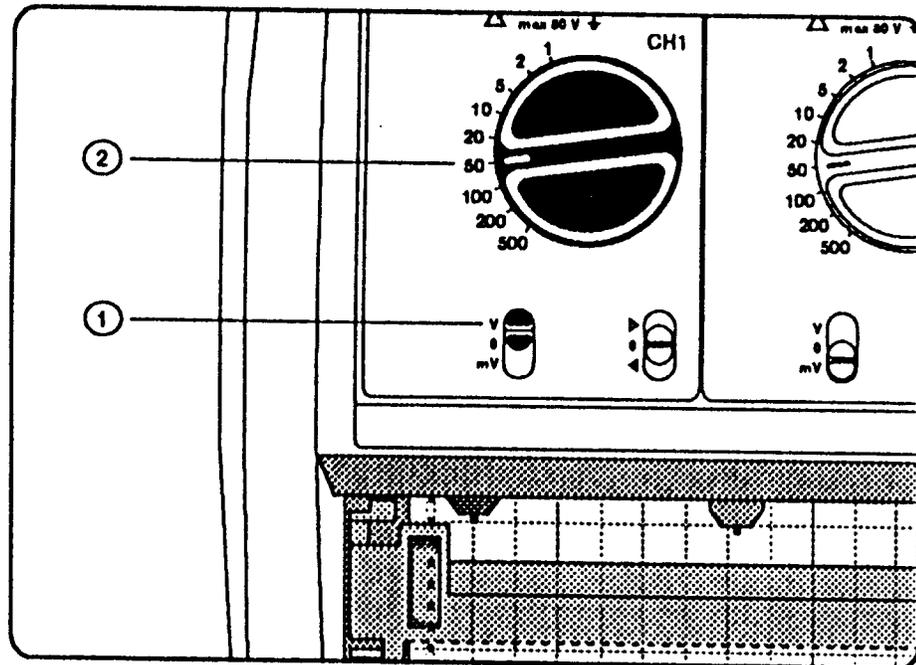
After the measuring signal has been applied to the measuring input the measuring range can be gradually decreased until the desired resolution is reached.

On 2 channel instruments the procedure described below has to be carried out for the second channel similarly.

Operation

- Set the shift selector ① to position "mV" or position "V".
- Set dial selector ② to the desired measuring range.

Setting of the Measuring Range



Additional information referring to	Can be found in
Instrument Specifications	chapter 2.6
Measuring Unit Specifications	chapter 2.8
Earthing and Interference Voltage	chapter 4.1
Dependence of Accuracy on Source Resistance	chapter 4.2
Dynamic Behaviour	chapter 4.3
Expansion of Measuring Capabilities	chapter 4.4

3.5 Connecting Measuring Signal to the Measuring Inputs



To protect against hazardous voltages:
The measuring voltage must not exceed 50 V towards earth.



Overload protection of the measuring ranges:
All measuring ranges from 1 mV to 50 V are protected against destruction by high voltages up to 250 V AC.



1- channel instruments

The measuring input "1" is connected to "pin negative" of the supply voltage.

2 - channel instruments

The measuring input "1" of channel 1 is connected to "pin negative" of the supply voltage.

Design of Measuring Inputs

The measuring inputs have \varnothing 4 mm safety sockets. In 2 - channel instruments the measuring inputs are isolated from each other.

As has been described in chapter 3.4 "Setting of DC Voltage Measuring Ranges", the following questions have to be answered before a measuring signal can be applied:

- * does the measuring signal exceed 50 V to earth ?
- * which signal amplitude can be expected ?



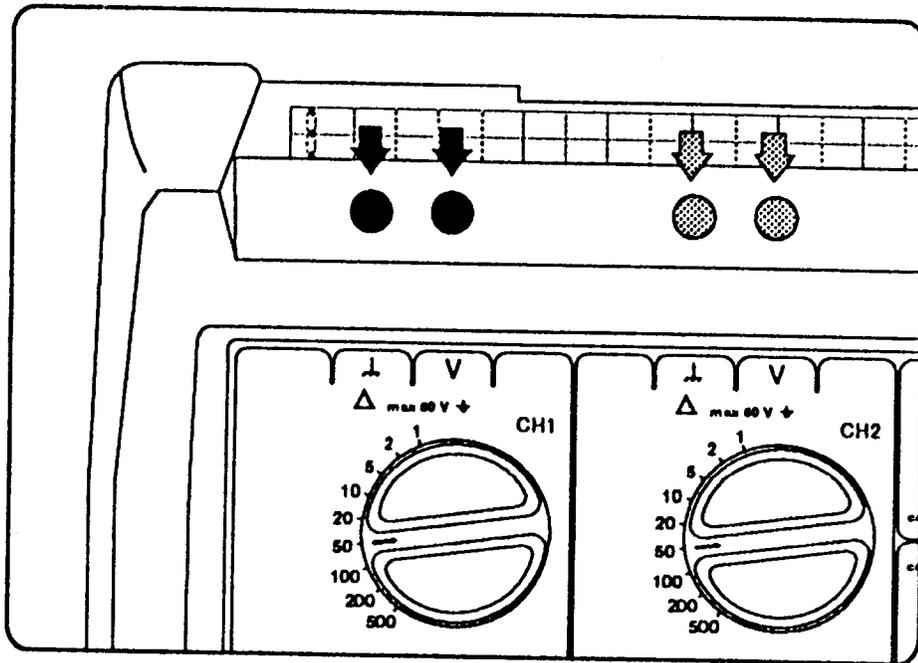
For your own safety always connect the measuring cable to the instrument first and only after that to the signal source.

Note The measuring input \ominus is nearer to earth and should therefore be connected with that measuring signal's potential which is nearer to earth.

In 2 channel instruments the procedure described below has to be carried out for the second channel similarly.

- Connect the measuring cables to the measuring inputs.

Connection of Measuring Signals



Additional information referring to
Instrument Specifications
Measuring Unit Specifications
Earthing and Interference Voltage
Dependance of Accuracy
on Source Resistance
Dynamic Behaviour
Expansion of Measuring Capabilimes

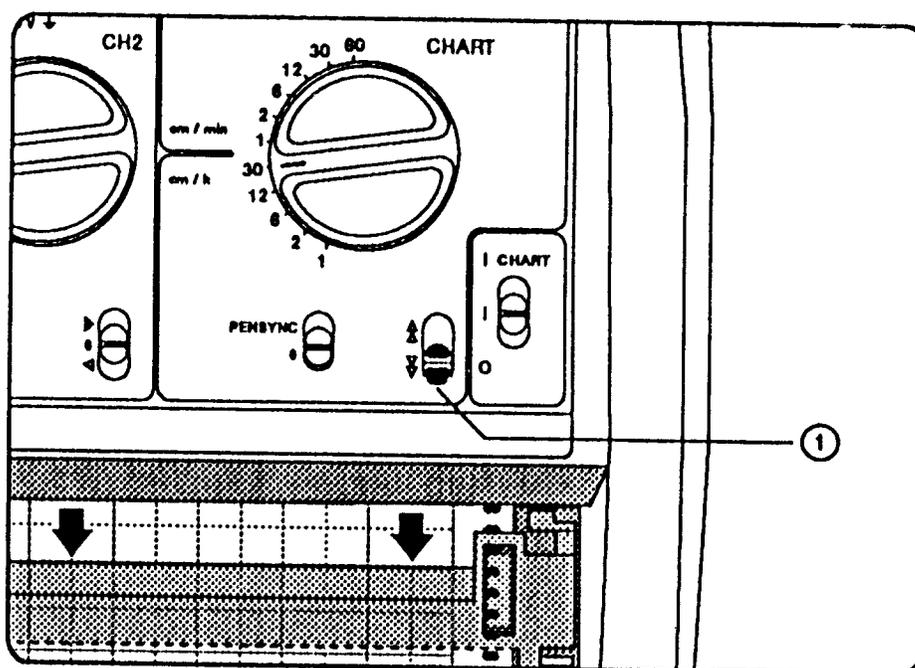
Can be found in
chapter 2.6
chapter 2.8
chapter 4.1
chapter 4.2
chapter 4.3
chapter 4.4

3.6 Positioning of Chart Paper

- Press the shift switch ① to the desired paper feed direction.
- Hold the shift switch ① until the desired paper position is reached.

For approx.. 3 s the recording paper advances at a speed of 2 cm/min and after that with a speed of 60 cm/min.

Positioning of Chart paper



Note The positioning of the chart paper is possible with the paper feed on or off.

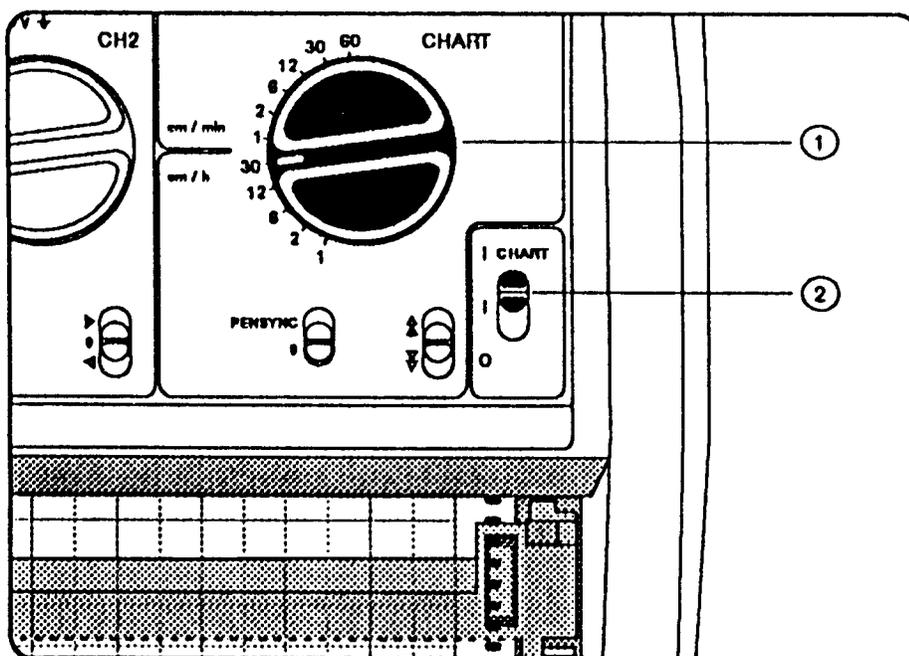
3.7 Activation of Chart Paper Feed

11 chart feed speeds can be selected:

1 - 2 - 6 - 12 - 30 cm/h und
 1 - 2 - 6 - 12 - 30 - 60 cm/min.

- Turn the dial switch ① to the desired chart feed speed.
- Set the shift switch ② to position I CHART.

Selection of Chart-Feed Speed



Maximum recording time with a full 25 m chart paper roll at different chart feed speeds:

Chart feed speed	Max. recording time	Chart feed speed	Max. recording time
1 cm/h	104 days + 4 hrs.	1 cm/min	41 hrs. + 40 min
2 cm/h	52 days + 2 hrs.	2 cm/min	20 hrs. + 50 min
6 cm/h	17 days + approx. 8.5 hrs.	6 cm/min	6 hrs. + approx. 56 min
12 cm/h	8 days + approx. 16 hrs.	12 cm/min	3 hrs. + approx. 28 min
30 cm/h	3 days + approx. 11 hrs.	30 cm/min	1 hrs. + approx. 23 min
		60 cm/min	approx. 41 min

Additional information referring to Time Unit Specifications and Paper Feed chapter 2.7 Can be found in

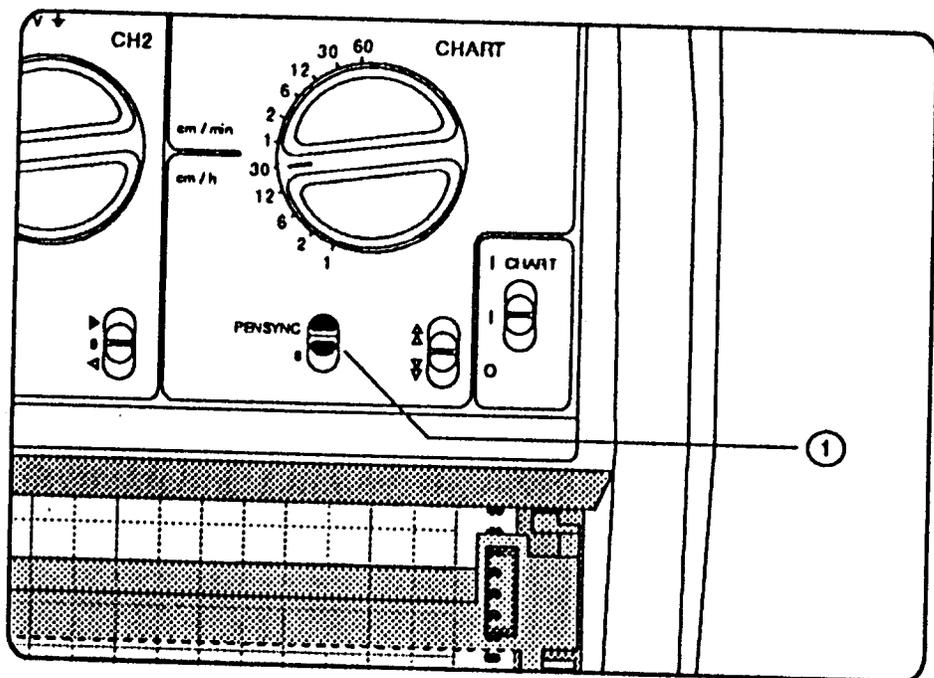
3.8 Working with PENSYNC

In the 2 - channel instruments the recording pens are staggered (offset) by 2.5mm on the time axis (chart paper feed direction). This allows them to pass each other.

The PENSYNC compensates this mechanically staggered arrangement of the recording pens in effect, "time - aligning" the two inputs on the chart. With that, synchronous sequences are represented synchronously.

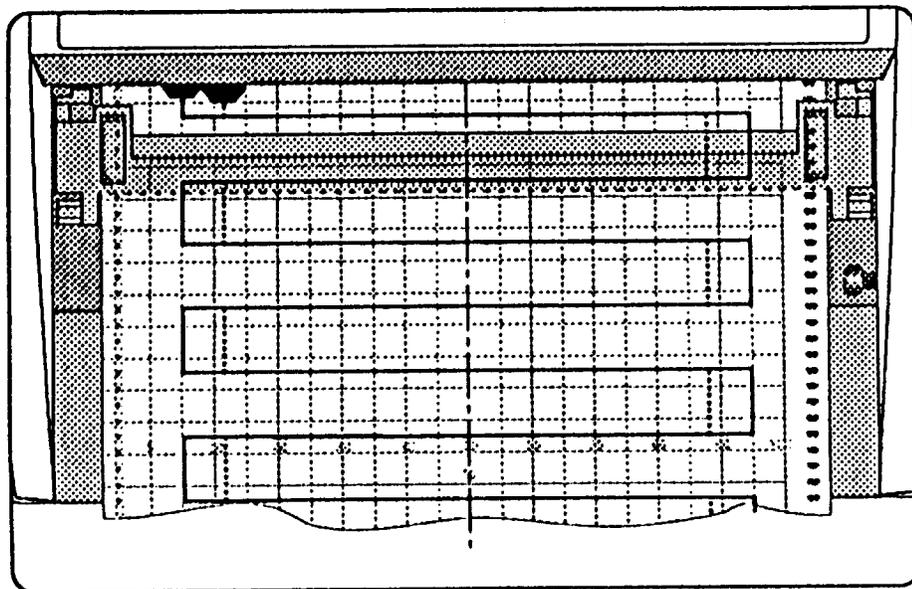
- Set the shift switch ① to position PENSYNC.

Switch On PENSYNC



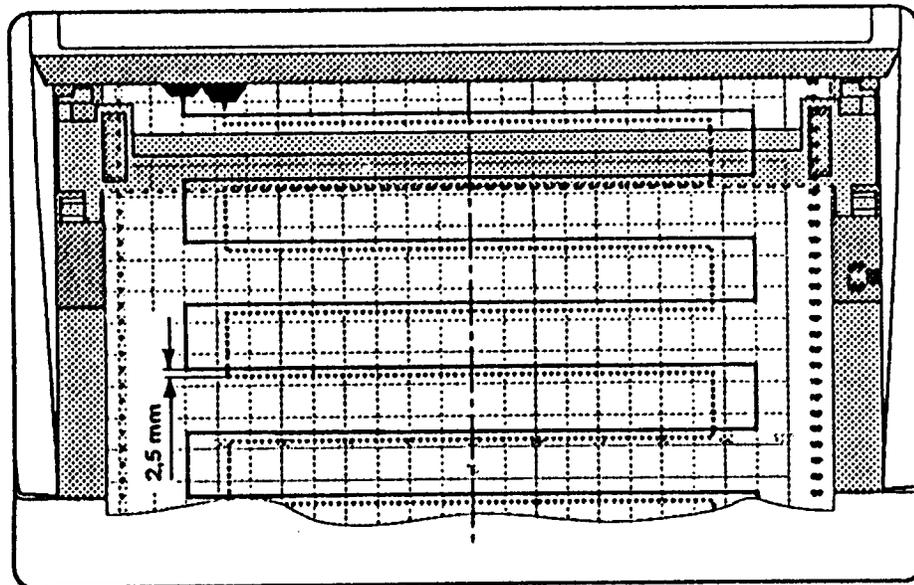
Note Channel 1 records without delay. The measured value of channel 2 is buffered / delayed to align with channel 1. Channel 2 only starts after the paper has advanced by 2.5 mm.

PENSYNC
Switched On



With PENSYNC switched on synchronous sequences are recorded fully synchronized.

PENSYNC
Switched Off



With PENSYNC switched off synchronous sequences are recorded as staggered curves.

2.5 mm mechanical staggering (offset) corresponds to a delay in the second recording pen dependent on the chart paper feed speed:

0.25 seconds

at an advance speed of 60 cm/min;

15 minutes

at an advance speed of 1 cm/h.

4 Measuring Direktions

4.1 Earthing and Noise Voltages

When positive pole of measured voltage is connected to the "⌚" input nearer to earth, the zero reference of the instrument must be set to a full scale value of 100%. Then the upper range limit corresponds to the lower limit of scale of 0 %.

The appearance of noise voltage in the measuring circuit may cause wrong measuring results. Often these errors are not directly recognizable. In case of high amplitudes of a noise voltage signal, however, a jittering of the measured signal can be observed. The limits of the maximum amplitude of a noise voltage inbetween which tolerable errors are not exceeded can be found in chapter "Technical Data".

Unfavourable grounding of the measuring circuit may also cause noise voltages. Even if the inputs of the recorder are floating, the "⌚" terminal is nearer to the earth potential because of its connection to the shielding. This shielding protects the electronics against leakage currents and interferences. Therefore the "⌚" terminal of the recorder input should be connected to the pole of the measured signal which is nearer to earth and, if possible, should be connected to earth either directly or by means of a capacitor.

The signal-to-noise ratio "A(dB)" states the formula

$$A = 20 \lg \frac{\text{noise voltage [Vss] at the input terminals}}{\text{displayed noise voltage [Vss]}}$$

Example Determine the maximum allowed noise voltage at the input terminals in the 500 mV range at a series mode rejection (SMR A = 40dB at 50hz) so that the expansion of the recording width does not exceed 1 mm.

1 mm deflection in the 500 mV measuring range corresponds to a measured signal of 2.5 mVss (0,0025Vss)

$$40 \text{ dB} = 20 \lg \frac{\text{noise voltage at the input terminals [Vss]}}{0.0025 \text{ Vss}}$$

$$\text{noise voltage} = 0.0025 \text{ Vss} \times 10^{40/20} = \underline{0.25 \text{ Vss}}$$

4.2 Dependence of Accuracy on Source Resistance

The accuracy of the measuring result depends on the value of the source resistance (the higher the value the higher the error). To stay inside the tolerable accuracy the value of the source resistance must not be higher than indicated.

$$\left(\frac{R_s}{R_s + R_{in}} \right) \times 100\% = \text{error in \%}$$

R_s . . . source resistance

R_{in} . . . input resistance

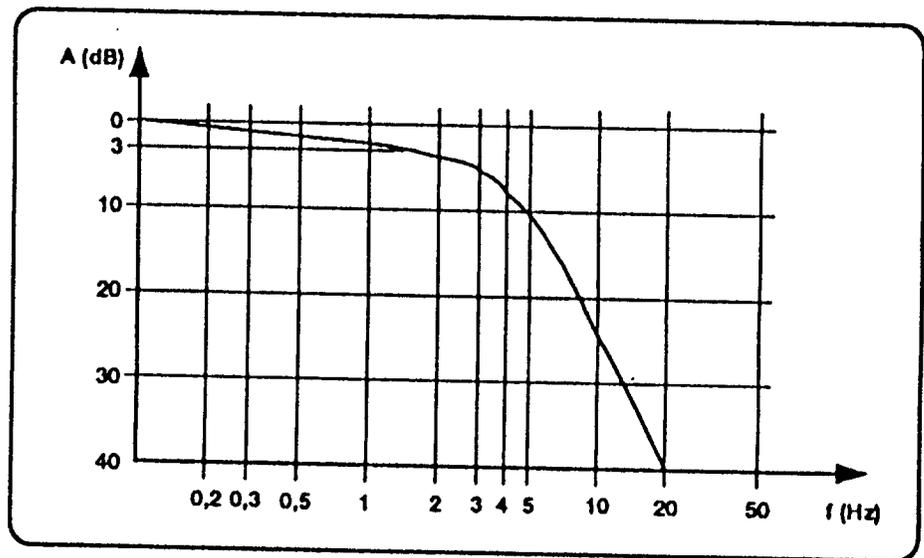
4.3 Dynamic Behaviour

At the recording of relatively fast changing signals dynamic measuring errors may occur. The value of such an error depends on the frequency, shape and amplitude of the measured signal and on the output impedance of the measuring circuit (source resistance). A cut-off frequency of 1.5 Hz serves as a point of reference (see chapter 2 "Technical Data").

The setting time of the servo system of the instrument (recording pens) remains relatively constant. Therefore dynamic errors become smaller as the amplitude of the measured signal becomes smaller. In some cases switching to a less sensitive measuring range can provide a more accurate recording of the signal shape.

Typical frequency response of the recording pen amplitude A dB in dependence on the frequency f (Hz) of the input signal.

Frequency Response



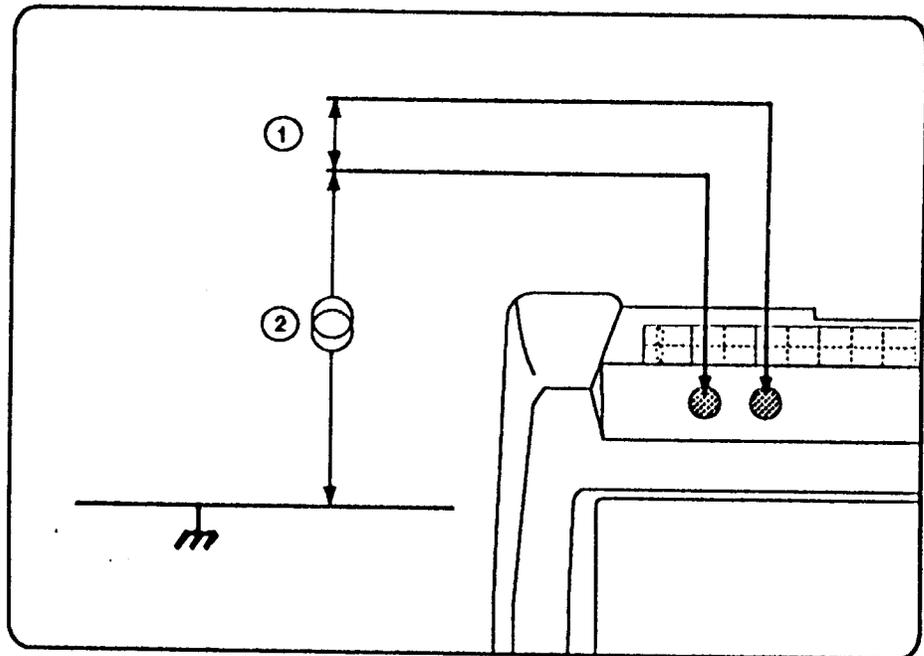
4.4 Expansion of Measuring Capabilities

Possible with accessories to be supplied.
A list of accessories can be found on the front inside cover.

5 Terminology and Explanatory Notes

AC alternating current
(V AC) (AC voltage).

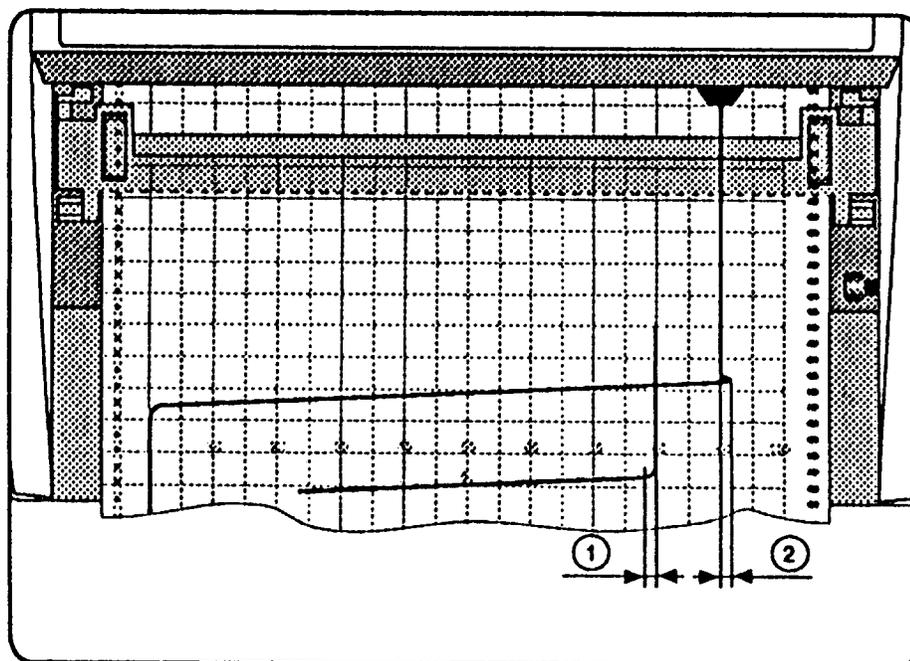
CMRR common mode rejection ratio.



- ① measured signal (measured voltage).
- ② noise voltage.

Terminology

damping



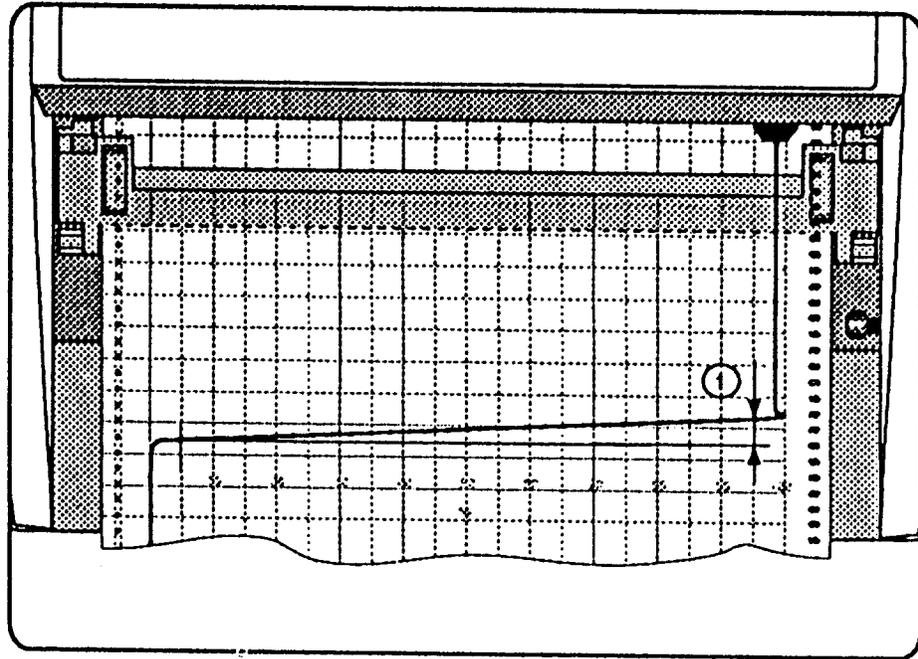
① rounding

② overshoot

DC direct current
(VDC) (DC voltage).

Terminology

Response time The time the servosystem (the recording pen) needs to switch from 5% to 95% recording width at a immediate change of the measured signal.

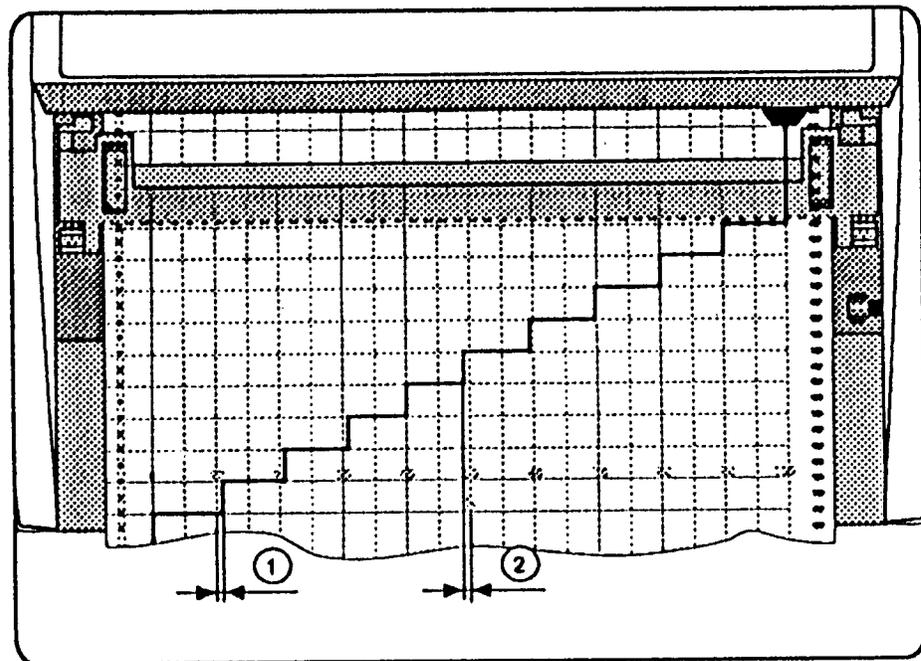


① response time

Accuracy deviation from the desired value in percent of the full scale value (to determine the total error the dead zone error and the linearity error have to be added to the accuracy of the measuring unit).

Cut-Off Frequency If with sinusoidal measured signals the cut-off frequency of the instrument is reached the recording amplitude is reduced by 3 dB.

Linearity



- ① positive linearity error
- ② negative linearity error

Protection Class II protection insulated - no connection to earth.

SMRR serial mode rejection ratio;
If an AC voltage is superimposed to a measured signal an error inside the stated limits occurs.

Dead Zone the range inbetween which the measured signal can be changed without causing a movement of the servosystem (the recording pens).

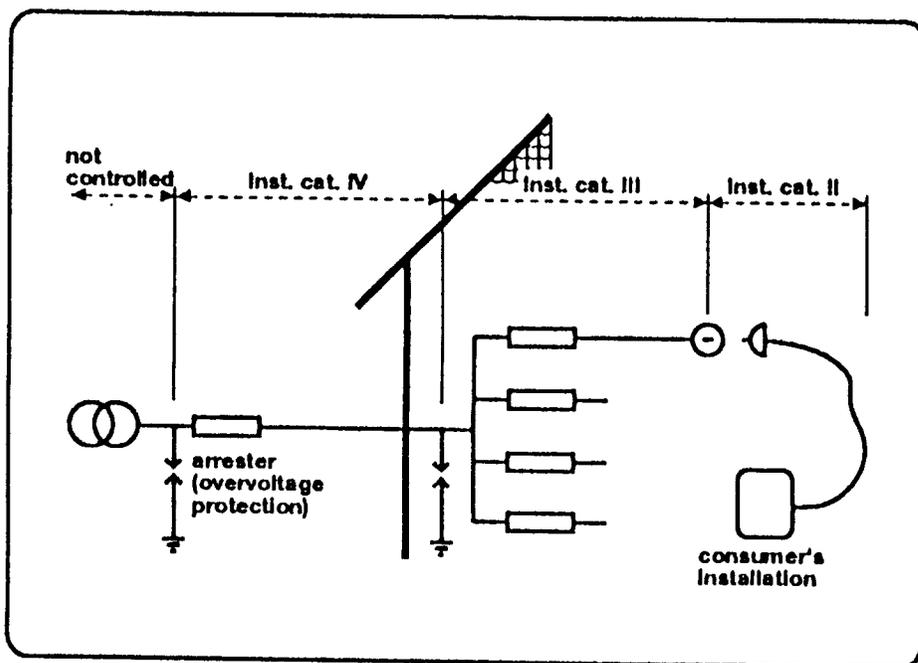
Overvoltage Category

(Installation category):

Installation categories state the peak voltages of voltage pulses which can be superimposed to the nominal voltage rating of each mains voltage or more generally of each voltage source. The pulse cycle can be statically distributed but can also be periodical.

Structural components and safety air paths of electrical equipment operated with mains voltage might be exposed to extraordinary strain by these voltage pulses. For this reason, every instrument that has to be connected to voltage sources for reasons of power supply or measuring must be defined and specified in accordance to an installation category. For reasons of safety, operations on mains supplies with a higher category than the one stated are therefore not allowed.

The figure shows the typical distribution of categories in a house installation.



The category is reduced with overvoltage conductors inside the distributor installation reaching up to the socket area category 3 must be assumed. The socket with a switched on electrical device connected is grouped into category 2.

**Pollution level
(dirt collection
resistance):**

The environmental conditions strongly influence the electrical behaviour of an instrument. Soiling by moisture and dust is able to make safety determining leakage paths ineffective and can therefore jeopardize faultless functioning. To avoid such conditions the casing of an instrument must be designed and constructed according to the expected operational cases; vital areas inside the instrument have to be additionally protected. According to the IEC regulations 664 the soiling degrees are divided into classes:

Pollution level1:

Non-conductive negligible soiling which has no influence on the functioning and the safety determining parameters of the instrument. Examples are laboratories, climatized rooms, instruments are not moved.

Pollution level2:

The dust to be found in such environments is non-conductive either; it is nevertheless possible that these dust deposits develop a temporary conductivity in case of dewing. Examples for such environments are testing fields, workshops for electrical devices, clean workshops and the transport of instruments with the unavoidable temperature changes.

The higher degrees 3 and 4 already deal with conductive dust deposits as for instance can be found in electromotors. This kind of soiling is not included into the considerations of the safety regulations for electronic measuring- and controlling instruments IEC 1010 for operation inside closed rooms.

6 Upkeep and Maintenance

If the instrument is operated and handled properly it does not need specific maintenance and service. To clean the instrument always use a slightly moistened cloth and some rinsing agent. Avoid aggressive cleaning detergents and solvents (Tri, Chloroethene etc.). Do not allow liquid to get inside the instrument.

Maintenance work must only be undertaken by trained and qualified staff. In all repair and reconditioning works it has to be observed that the instrument's design parameters are not modified to the detriment of safety, that assembled parts correspond to the original spares and that these parts are reassembled properly (factory state).



Before any maintenance, repair or replacement of parts the instrument must be disconnected from all voltage sources.

Upkeep and Maintenance

7 Service

Dear customer,

This Instrument has been manufactured and tested according to the latest technological innovations and in compliance with the **quality assurance system DIN ISO 9001**.

If there should still be reason for complaint please refer to your nearest service centre, giving a **detailed description of the defect** and including a copy of the invoice or the delivery note.

Packing Use for shipping the original packing only. If the original packing is no longer available, our service centre will advise you with pleasure.

The manufacturer doesn't accept any granting security for damage that might have been formed by an inappropriate packing.

Note For reasons of clarity this manual does not contain every detailed information about all models of this product and therefore cannot comprise every imaginable way of use, operation or maintenance.

For additional information or if any problems should be evolving which have not been dealt with extensively enough in the manual, ask for the required information at your local agent's.

Please also note that the contents of this manual neither constitutes part of nor modifies any earlier or existing agreement, promise or contract. All obligations result from the pertinent contract of purchase which also contains the sole and comprehensive warranty regulations. These contractual warranty regulations are neither extended nor limited by compliance with this manual.



Certificate of Conformity

according to EC guideline 89/336/EWG 73/23/EWG

Manufacturer: **NGI** Norma Goerz Instruments

Address: A-2351 Wr.Neudorf - Palmersstraße 2

Product: **SERVOGOR 102**

meet the following standards

EMC:

Emissions

EN 55011

Class B

Immisions

EN 50082-1 Groupstandard

pr EN 60 1000-4-2 IEC 801-2 8 kV

pr EN 60 1000-4-3 IEC 801-3 3V/m

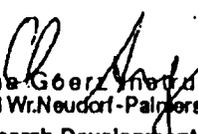
pr EN 60 1000-4-4 IEC 801-4 0,5 kV

pr EN 60 1000-4-5 IEC 801-5 1 kV

Safety standard:

IEC 1010-1

Signature:


NGI Norma Goerz Instruments
A-2351 Wr.Neudorf - Palmersstraße 2
Research Development

Order Reference

SERVOGOR 102 - 1 Channel Instrument
 SERVOGOR 102 - 2 Channel Instrument

Order No.

A 2510 11000 00
 A 2510 12000 00

Supplied Accessories

1 mains adapter country specific (one of the following)	
230 V/CEE-7 VI/SEV 1011	A 6403 92002 03
Europe (except the UK) and other countries not specifically listed	
120 V/NEMA 5-15 P	A 6403 92001 03
USA, Canada, Japan, Mexico, Taiwan, Latin America	
240 V/BS 1363 A	A 6403 94001 03
UK, Commonwealth, (with the exception of Canada, Australia, New Zealand)	
240 V/AS C 112	A 6403 94002 03
Australia, New Zealand	
1 chart paper, 200mm wide, numbered 0 to 100	195 2710 00
1 red disposable felt pen for 1 channel instrument or for channel 1 in 2 channel instrument	195 5360 74
1 blue disposable felt pen for channel 2 in 2 channel instrument	195 5360 75
1 operating instructions country specific (one of the following)	
German	A 2510 01 GA 1D
English	A 2510 01 GA 1E
French	A 2510 01 GA 1F
1 folding box	Z 2510 29101 00
1 PE frame for folding box	Z 2510 29201 00
1 Carrying case (option)	Z 2510 99002 00

Accessories

refillable red ink pen set for 1 channel instrument or for channel 1 in 2 channel instrument	195 7070 00
refillable blue ink pen set for channel 2 in 2 channel instrument	195 7070 74
chart paper	
chart paper, 210mm wide, numbered 0 to 100	195 2710 74
transport case with moulded plastic inlay	A 2510 99002 00
shunt resistors	
1 to 10 A / 100 mV	999 2015 00
2 to 20 A / 200 mV	A 6802 00501
10 to 20 mA	999 2016 00
measuring cables	
safety measuring cable set with test probe (PVC)	A 6003 14204
safety measuring cable set with test probe (silicon)	A 6003 14205
measuring cable set banana plug / safety plug incl. alligator clip	A 6045 10211

Thank you for buying an NGI product.
 For safety reasons and optimum use of this instrument
 read through the operating instructions very carefully.

Service

- Austria**
NGI Norma Goerz Instruments GmbH
Palmersstraße 2
A-2351 Wr. Neudorf
Tel.: (02236) 691 - 0 Fax: (02236) 691 - 300
- Germany**
NGI Norma Goerz Instruments GmbH
Andernacher Straße 18
D-90411 Nürnberg ·
Tel.: (0911) 955 75-0 · Fax: (0911) 955 75 30
- M T K Meßtechnik Hamburg GmbH & Co. KG**
Service für Meßgeräte, Testgeräte und Kalibrierdienst
Zitadellenstraße 10
D-21079 Hamburg
Tel.: (040) 77 13 11 Fax: (040) 77 13 13
- Siemens AG ANL TD FSZ 3**
Reparatur-, Ersatzteil- und Kalibrierdienst
Tübinger Straße 1-5
D-80686 München
Tel.: (089) 9221-6315 Fax: (089) 9221-6560
- Switzerland
and
Liechtenstein**
NGI Norma Goerz Instruments Vertriebs GmbH
Einsiedlerstraße 535
CH - 8810 Horgen
Tel.: (01) 726 05 00 Fax: (01) 726 07 27
- Italy**
RICCARDO BEYERLE S.p.A.
Via Monte S, Genesio 21
I- 20158 Milano
Tel.: (02) 6680 1681 Fax: (02) 6889 427
- United Kingdom**
NGI Norma Goerz Instruments Ltd.
3 Crossford Court, Dane Road, Sale
Manchester M33 1BZ, UK
Tel.: (061) 969 3612 Fax: (061) 969 3613
- U S A**
NGI Norma Goerz Instruments Inc.
1711 Elmhurst Road
Elk Grove Village, IL 60007
Tel.: (708) 437-6444 Fax: (708) 437-6466

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Printed in Austria

AUSTRIA

NGI
NORMA GOERZ INSTRUMENTS

A-2351 Wr. Neudorf · Palmersstraße 2 · Tel.: (02236) 691-0 · Fax: (02236) 62474
D-90411 Nürnberg · Andernacher Straße 18 · Tel.: (0911) 955 75-0 · Fax: (0911) 955 75 30
CH-8813 Horgen · Einsiedlerstraße 535 · Pf. 77 · Tel.: (01) 726 05 00 · Fax: (01) 728 07 27