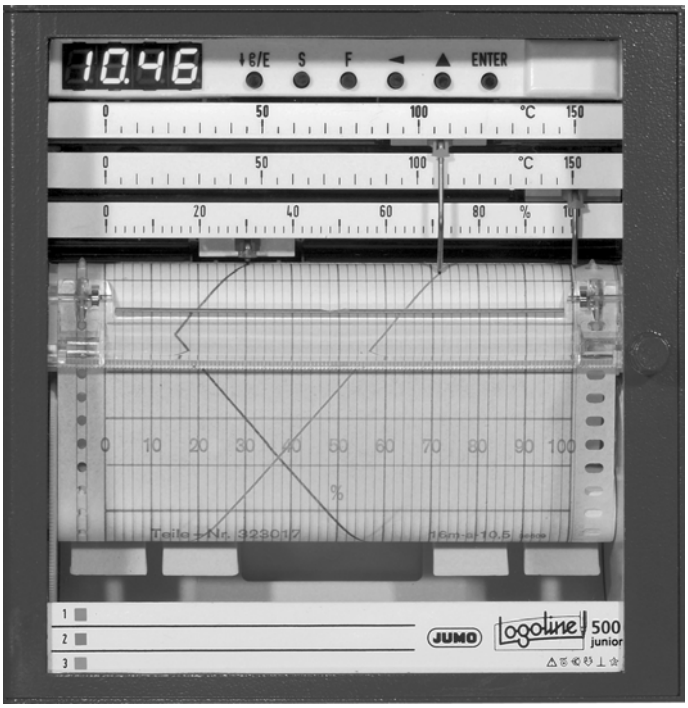


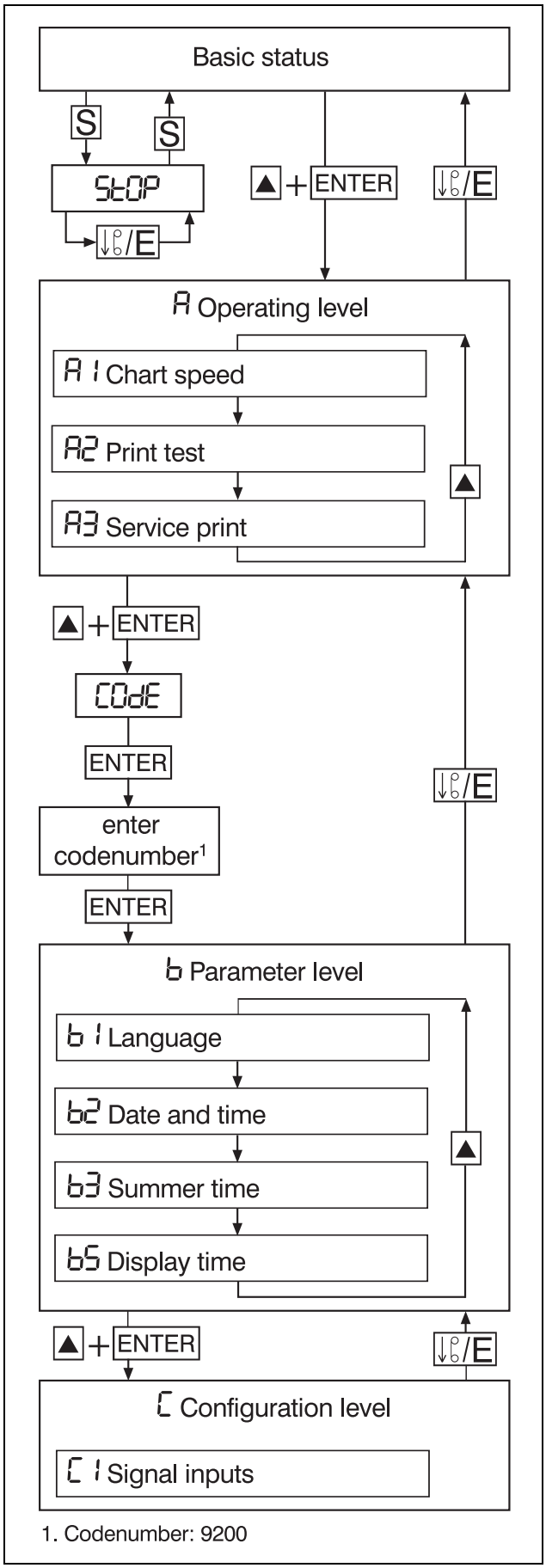
Logoline 500 junior

Pen recorder with text printing

B 95.3535
Operating Manual

08.04/00351782

Levels and key functions



1. Codenumber: 9200

Key functiones

↓P/E	- Chart fast forward when recording is stopped - Abort parameter input (**E**xit) - Level change backwards
S	- **S**tart/**S**top recording - Decimal place selection during value input
F	- not used
◀	- Move cursor to the left (select digit)
▲	- Parameter selection - Channel selection - Value selection from value table - Increment current digit
ENTER	- Initiate parameter input - Enter input - Acknowledge error message
▲ + ENTER	- Level change forwards

Contents

Contents

1 About this Manual

1.1 Preface

Please read this Operating Manual before commissioning the instrument. Keep the manual in a place which is accessible to all users at all times.

Please assist us to improve this manual, where necessary.

Your suggestions will be welcome.

Phone
Germany (0661) 6003-727
abroad +49 661 6003-0
Fax
Germany (0661) 6003-508
abroad +49 661 6003-607

All necessary settings and, where appropriate, alterations inside the instrument are described in this manual. If any difficulties should still arise during start-up, you are asked not to carry out any prohibited manipulations. You could endanger your rights under the instrument warranty!

Please contact the nearest JUMO subsidiary or the head office.

When returning chassis, modules or components, the regulations of EN 61340-5-1 and EN 61340-5-2 “Protection of electronic devices from electrostatic phenomena” must be observed. Use only the appropriate **ESD** packaging material for transport.

Please note that we can not be held liable for any damage caused by ESD (electrostatic discharge).

1.2 Arrangement of the documentation

This Operating Manual is supplied with the instrument. It is addressed to the OEM (original equipment manufacturer) and users with appropriate technical know-how.

In addition to installation and electrical connection, it contains all the information on instrument start-up, operation and parameter setting.

1.3 Typographical conventions

1.3.1 Warnings

The signs for **Danger** and **Warning** are used in this manual under the following conditions:

Danger This symbol is used when there may be **danger to personnel** if the instruction is disregarded or not followed accurately.

Warning This symbol is used when there may be **damage to equipment or data** if the instruction is disregarded or not followed accurately.

Warning This symbol is used where precautions have to be observed during the handling of components which may be damaged by electrostatic discharges.

1.3.2 Notes

Note This symbol is used if your **special attention** is drawn to a remark.

Reference This symbol refers to additional information in other handbooks or sections.

abc[1] **Footnote** Footnotes are notes which refer to certain points in the text. Footnotes consist of 2 parts:

Markings in the text and the footnote text.

The markings in the text are arranged as continuous superscript numbers.

* **Action** This sign indicates that an action to be performed is described.

The individual steps are indicated by this asterisk, e.g.:

* press key ▲

* enter with ENTER

1.3.3 Presentation

▲ + ENTER **Keys** Keys are shown as boxes. Both symbols and texts are possible. Where a key has multiple functions, the text shown is the one corresponding to the actual function discussed.

2 Identifying the instrument version

2.1 Instrument description

The pen recorder provides up to three channels for recording measurements, which are isolated from each other by optocouplers. Channel 1 can be used to write text in addition to the signal trace. All channels are zeroed using Hall sensors. The measurements can be indicated by pointers against scales.

A 4-digit 7-segment display is available for programming. Operation is by six keys on the instrument front. The configuration data are stored permanently in EEPROM.

Input signals include current and voltage signals (standard signals). The watchdog monitors the recorder function and triggers a restart in the event of a fault. On a power failure, the real-time clock is supplied by a lithium battery.

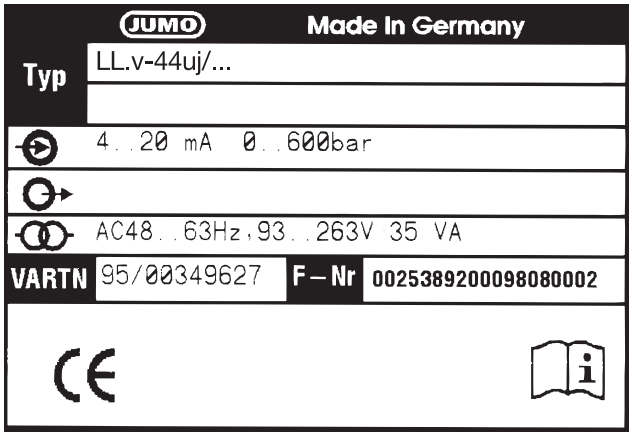
An overview of all the parameters of the pen recorder is given in the Appendix (⇨ Section 12.4).

2.2 Type designation

The label is affixed to the housing. The instrument version can be identified from the type designation.

The extra Codes are listed in sequence and separated by a comma.

The voltage of the supply must correspond to the voltage indicated on the label.



LL. v-44uj/...	Pen recorder with scales
1	1 channel with text writing
2	2 channels (channel 1 with text writing)
3	3 channels (channel 1 with text writing)
v	amplifier
-44	bezel 144 mm x 144 mm
u	convertible chart cassette

Extra Codes

sk	special scales, e. g. in m^3/h, bar etc. (to calibration curve if non-linear)
fp	cassette for fanfold chart 16 m long
r32	roll chart 32 m long
ab	housing for wall mounting. The panel-mounting instrument is fitted in a carrier and can be swung out through 90°.
tm	housing with carrying handle, rubber feet and terminal cover, also 3 m mains supply cable with grounding plug
TG-35	portable recording station

ts	door with lock (IP54)
IP65	IP65 seal, wide mounting brackets
061	UL approval

Ordering example

(1) (2) (3) (4) (5) (6)

LL 3 v-44uj/ts, fp, tm

(1), (3) pen recorder

(2) 3 channels

(3) bezel 144mm x 144mm

(4) door with lock (IP54)

(5) fanfold chart cassette

(6) housing with carrying handle

Standard accesssories

1	Operating Manual B 95.3535
2	mounting brackets
1	fibre pen, disposable, for each channel
2	chart rolls 16m long
	or
1	chart roll 32m long (with Code r32)
	or
1	fanfold chart pack 16m long (with Code fp)

3.1 Location and climatic conditions

The instrument location should as far as possible be free from shock and vibration. Stray electromagnetic fields, e.g. from motors, transformers etc., should be avoided.

The ambient temperature at the location may be between -10 and +50°C at a relative humidity not exceeding 75%, without condensation.

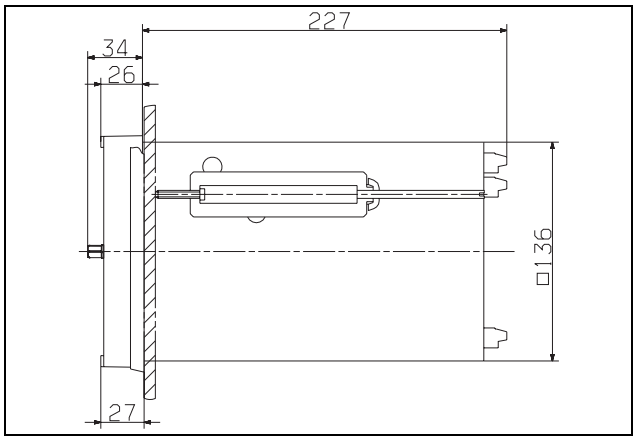
Corrosive air and fumes may interfere with the function and life of the recorder.

⇨ Section 4.1

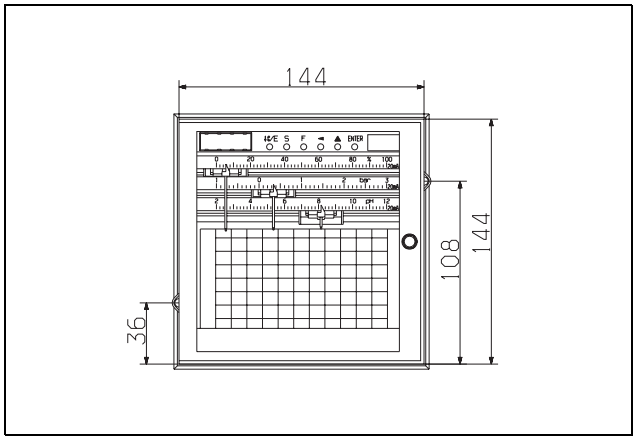
3.2 Fitting in position

Side view

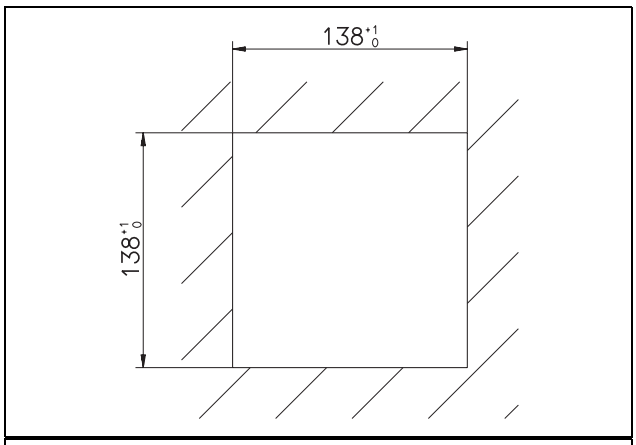
(when using the IP65 seal, dimension 26 increases to 27)



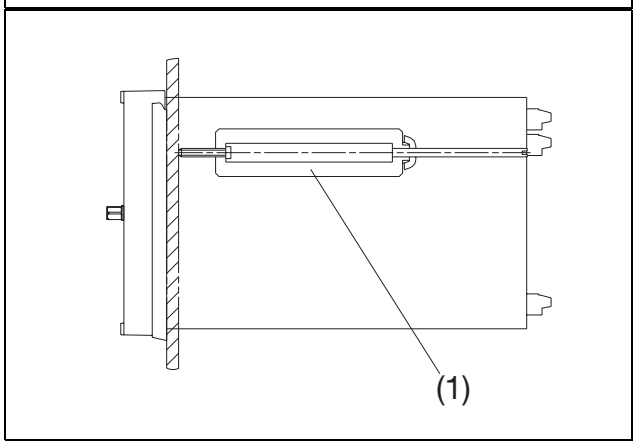
Front view



Panel cut-out



* Insert the pen recorder from the front into the panel cut-out.
* From the back of the panel, hook the mounting brackets (1) into the cut-outs in the sides of the housing. The flat bracket faces must lie against the housing.
* Place the brackets against the rear of the panel and tighten them evenly.



4 Electrical connection

4.1 Notes on installation

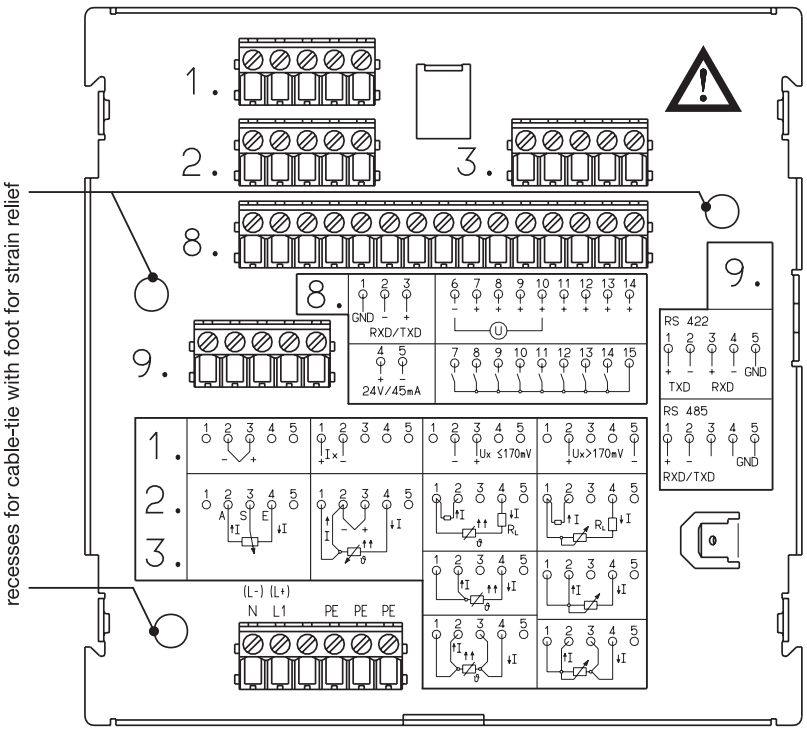
- ❏ The choice of cable, the installation and the electrical connection of the instrument must conform to the requirements of VDE 0100 “Regulation on the Installation of Power Circuits with nominal voltages below 1000V” or the appropriate local regulations.
- ❏ Work inside the instrument must only be carried out to the extent described and, like the electrical connection, only by properly qualified personnel.
- ❏ If contact with live parts is possible when working on the instrument, it has to be isolated on both poles from the supply.
- ❏ Electromagnetic compatibility (EMC) conforms to the standards and regulations listed under Technical Data.
- ❏ Run input, output and supply lines separately and not parallel to each other.
- ❏ All input and output cables without connection to the supply network must be arranged as screened and twisted cables. The screen must be grounded to the earth potential on the instrument side.
- ❏ Earth the instrument at the PE terminal to the earth conductor. This line should have at least the same cross-section as the supply lines. Earth lines should be run in a star layout to a common earth point which is connected to the earth conductor of the supply. Do not loop the earth connections, i.e. do not run them from one instrument to another.
- ❏ Do not connect any additional loads to the supply terminals of the instrument.
- ❏ The instrument is not suitable for installation in hazardous areas.
- ❏ Inductive loads in the neighbourhood of the instrument, such as contactors or solenoid valves, should be fitted with RC modules for interference suppression.
- ❏ The supply of the instrument must additionally be fused. Depending on the supply voltage, the following fuse values apply:

  20 — 53V AC/DC, 48 — 63Hz
  fuse 2A slow

  93 — 263V AC, 48 — 63Hz
  fuse 1A slow

4.2 Connection diagram

The electrical connection must only be carried out by qualified personnel.



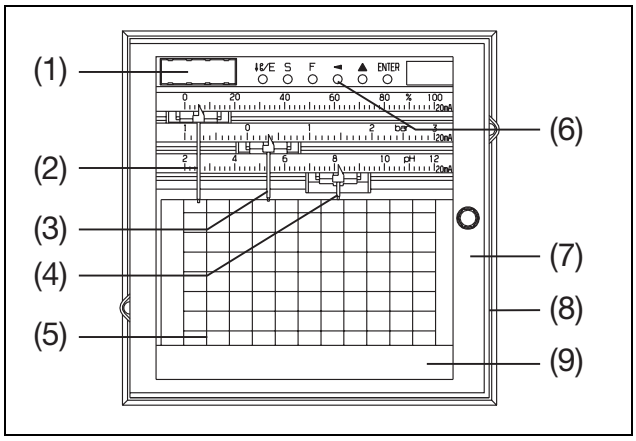
Rear view with screw-clamp connectors

Terminals				
Supply as on label	N neutral L1 line PE protective earth		N (L-) L1 (L+) PE	(L-) (L+) N L1 PE PE PE 1 2 3 4 5 6
Analogue inputs	**Input 1**	**Input 2**	**Input 3**	
	Field	Field	Field	
Voltage input up to 170 mV	1.	2.	3.	1 2 3 4 5 Ux ≤170mV
Voltage input above 170 mV				1 2 3 4 5 Ux>170mV
Current input				1 2 3 4 5 Ix

Inputs 8 and 9 are not available for LOGOLINE 500 junior.

5 Starting up

5.1 Display and controls



(1) 4-digit 7-segment LED display

(2) fibre pen, channel 3, green

(3) fibre pen, channel 2, red

(4) fibre pen, channel 1, blue

(5) chart

(6) keys for operation and programming

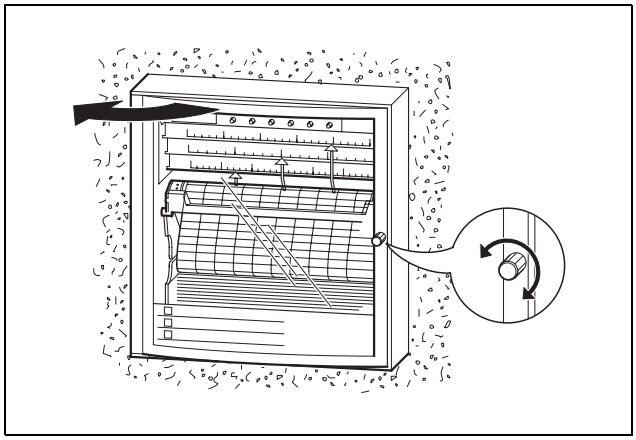
(7) door

(8) housing to DIN 43700 for flush-panel mounting, galvanised steel

(9) channel marker label

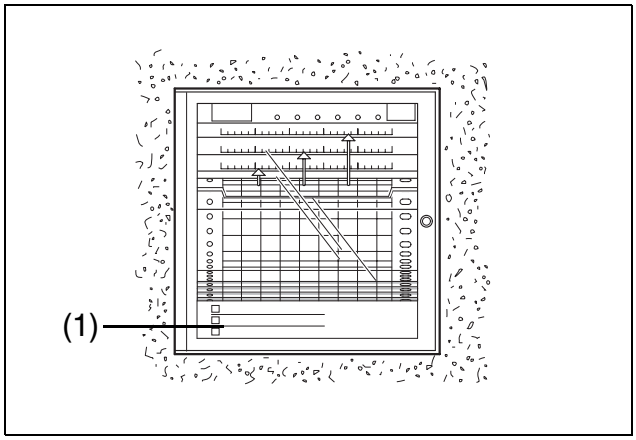
5.2 Opening and closing the door

Turn the knob in order to open or close the door.

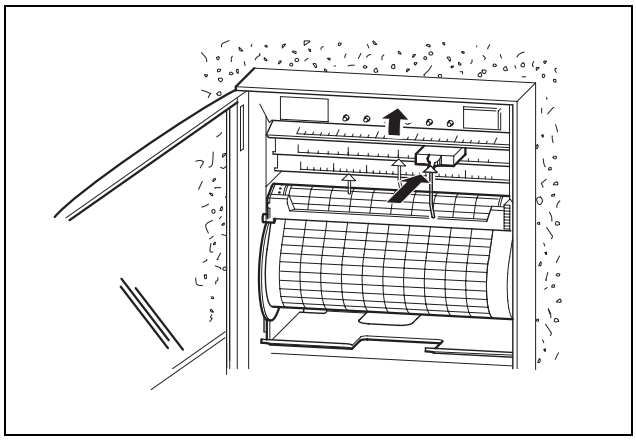


5.3 Marking the channel label

Please mark the channel label (1) with the measurement channel designation and the corresponding range.



5.4 Fitting the fibre pens



* Open the recorder door
* Stop recording
  (press S key)
* Swing scale upwards
* Slide the fibre pen into the holder
  up to the stop
* Swing scale down again

6.1 Operating modes and status

Operating mode/status	Notes
Basic status	Basic status of the pen recorder with signal acquisition and processing. The display shows - time (can be switched off via the parameter *parameter level* ➔ *display time*) - and system error messages, where appropriate. In the stop status the display flashes "StOP". If there is a system error message, it is shown flashing at regular intervals instead of the time.
Stop	
Stop by key	Recording is stopped and continued using key S. In the stop status, the display flashes "StOP".
Chart speeds	
Normal chart speed	The chart is advanced with the speed programmed under chart speed. ⇨ Section 8.3

6.2 Operating principle

The individual parameters and functions are divided into four levels for clearer operation of the recorder.

Basic status

Basic status of the pen recorder with signal acquisition, recording and processing.

The display shows:

- the time (can be switched off via the parameter *parameter level* ➔ *display time*)
- and system error messages, where appropriate.

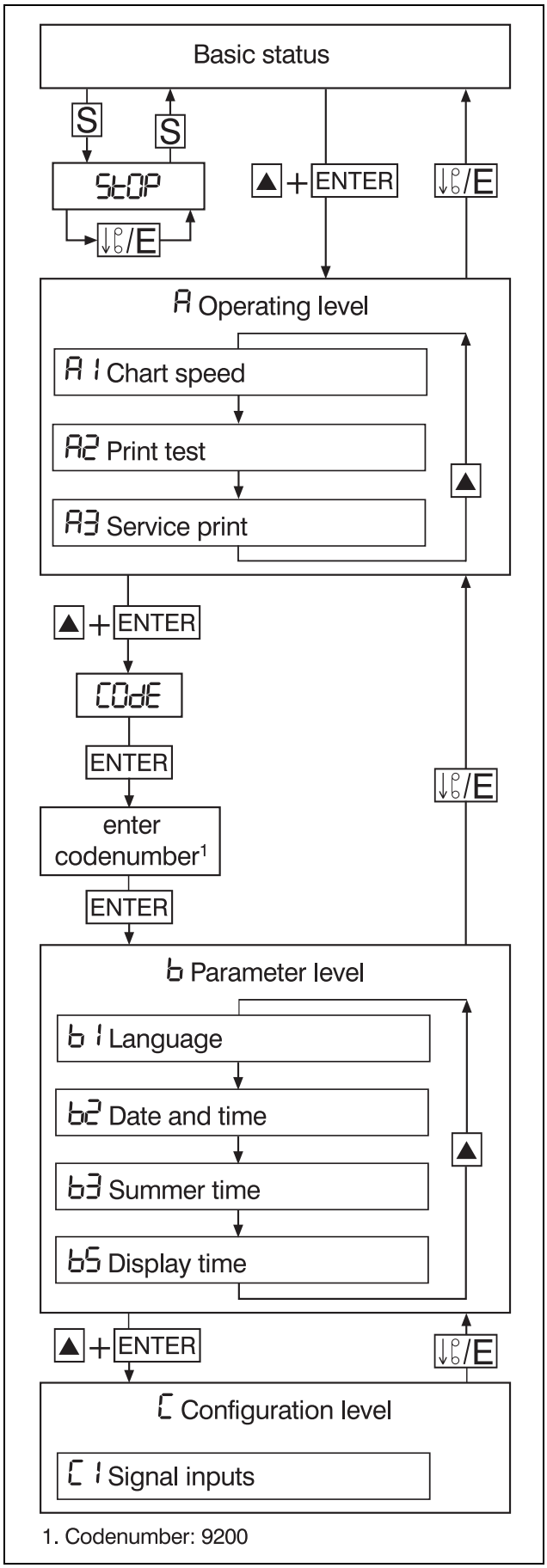
If there is a system error message, it is shown flashing at regular intervals instead of the current display.

Operating level

At this level, signal acquisition and processing remain activated.

The following parameters can be activated at the operating level:

- chart speed
- print test
- service print



1. Codenumber: 9200

Parameter level

The parameter level and the subsequent configuration level are protected by a code-number to prevent unauthorised access.

The codenumber is: 9200.

⇨ Section 8.6

If a wrong codenumber is input, the individual parameters can be viewed, but can not be programmed.

Following input of the correct codenumber, signal acquisition and recording are interrupted at this level.

The following parameters are altered at the parameter level:

- language
- date and time
- summer time
- display time

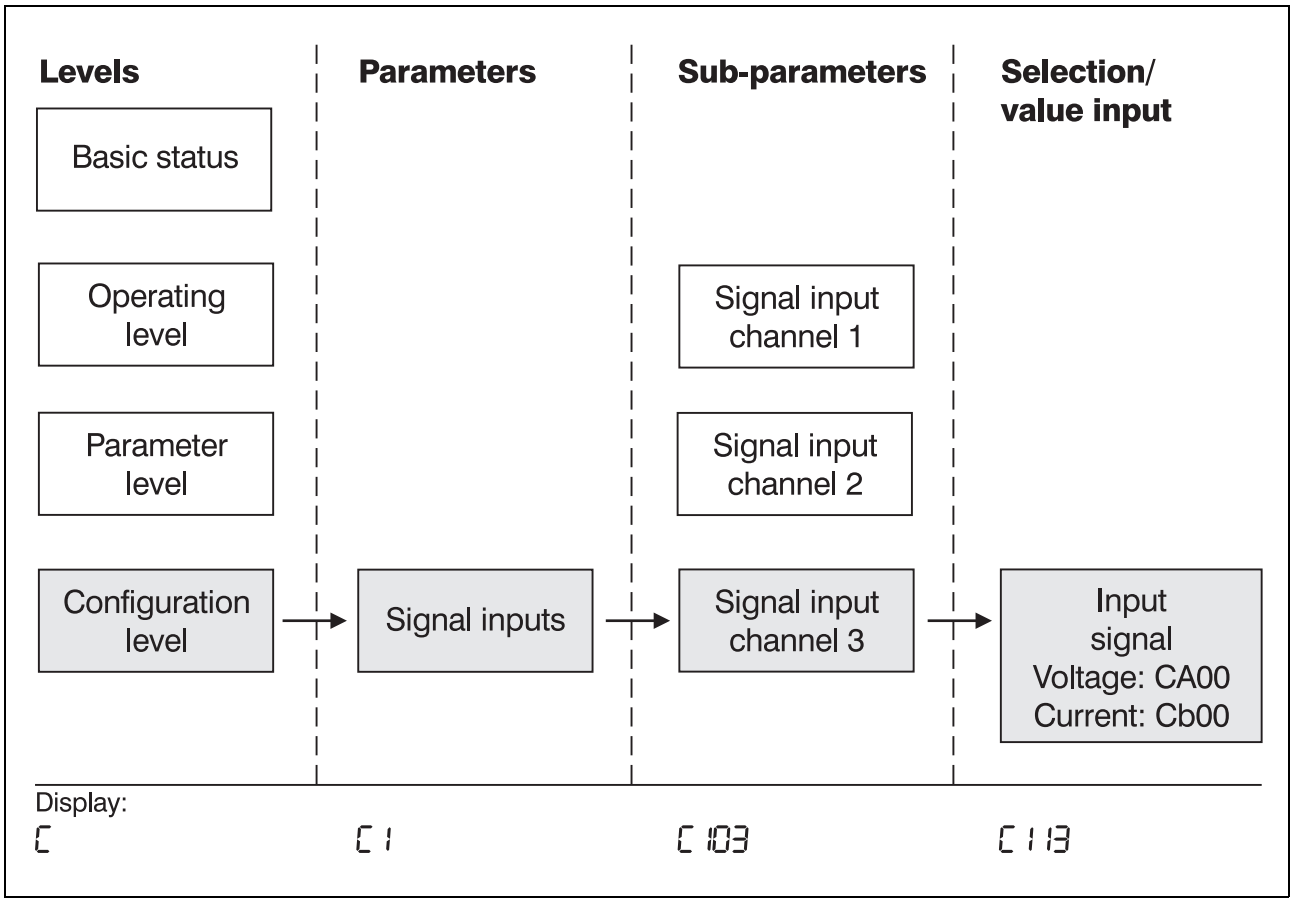
Configuration level

At the configuration level, the following parameters are altered:

- signal inputs

An overview of all parameters of the recorder is given in the Appendix.

⇨ Section 12.4



The levels, parameters and sub-parameters are arranged in a tree structure. Starting from the basic status, the program branches out into the individual levels, and from there into the corresponding parameters and, if there are any, into the sub-parameters.

To alter a specific parameter, run through the relevant levels up to this parameter.

The editing process is started with ENTER.

If a parameter has several sub-parameters, these are reached with ENTER.

Coding the parameters

The parameters and sub-parameters are indicated in code form on the 7-segment display. Coding involves up to four digits. The first digit is a letter, the others are numbers.

Digit	Notes
1	A = operating level b = parameter level C = configuration level
2	indicates the parameter
3	indicates the sub-parameter
4	channel number

Entering parameters

If there are no further sub-parameters, [ENTER] transfers all the data of the parameter to the memory.

Aborting programming

Programming can be aborted within a parameter by pressing the key [↓P/E].

☞ If the last sub-parameter has not yet been entered, the parameter data which have already been edited are rejected. The old contents of the sub-parameters are retained.

Error messages during programming

If there are error messages during programming due to incorrect inputs, these have to be acknowledged with [ENTER] before programming can be repeated.

Key functions

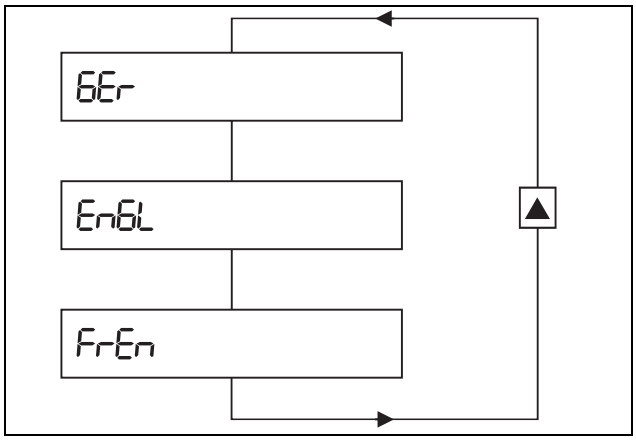
[↓P/E]	- Chart fast forward when recording is stopped - Abort parameter input (**E**xit) - Level change backwards
[S]	- **S**tart/**S**top recording - Decimal place selection during value input
[F]	- not used
[◀]	- Move cursor to the left (select digit)
[▲]	- Parameter selection - Channel selection - Value selection from value table - Increment current digit
[ENTER]	- Initiate parameter input - Enter input - Acknowledge error message
[▲] + [ENTER]	- Level change forwards

Selection

Selection consists of a list of several options.

Two keys are used to select an option:

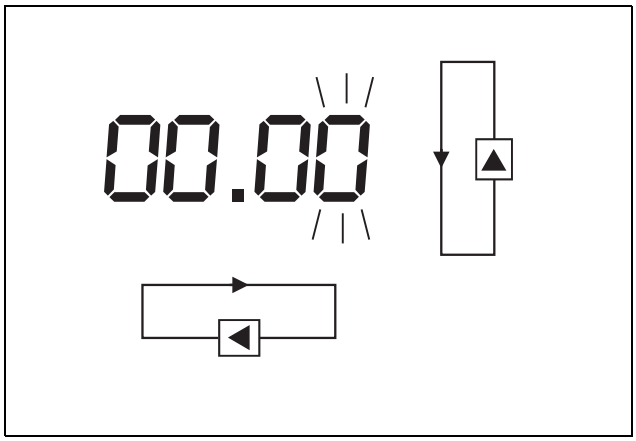
* select option with the ▲ key
* enter selection with ENTER



Value input

Three keys are used to input values:

* select the digit to be altered with the ◀ key
* increment the selected digit with the ▲ key
* shift the decimal point with the S key
* enter value input with ENTER



☞ An incorrect input produces an error message on the display.

⇨ Section 12.1

The error message must be acknowledged with ENTER.

The value can then be entered again.

7 Text printing

The pen recorder can print text in addition to the trace using the fibre pen of channel 1. Text printing is used for comments on the trace and for event recording. The characters are written in dots on a 7 x 9 matrix.

7.1 Printing priorities

There are various types of text with different priorities. These priorities determine abort criteria where printing of several texts is requested simultaneously.

The printing of text with low priority is aborted when text with high priority is to be printed.

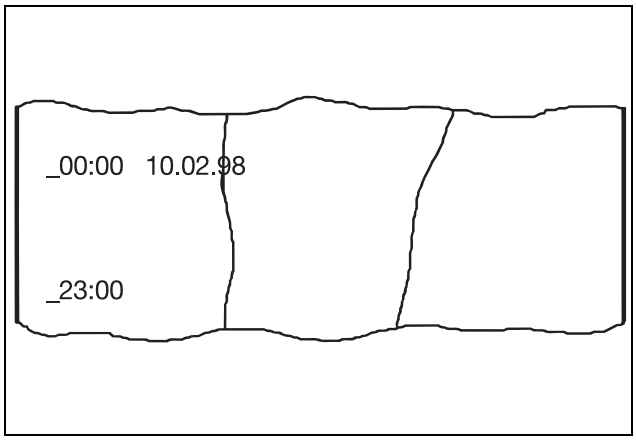
List of priorities:

Priority	Text
higher   lower	- Stop by key [S], no chart, configuration by keys, end-of-recording text - Service print - Print test - start-of-recording text - chart speed change - time

All printing requests which are still present are rejected and fresh ones ignored in the following events:

- Pen recorder moves to stop status
- Print test is started
- Service print is started
- Pen recorder is switched off

7.2 Time



Printing is performed cyclically at intervals of approx. 4 cm. Since time is not printed at “irregular” times, the interval mentioned above is only an approximation.

With every fourth time printing, the current chart speed, the instrument name or the date are printed alternately following the time.

At a change of date, the date is generally included in the printing at 00:00 hours.

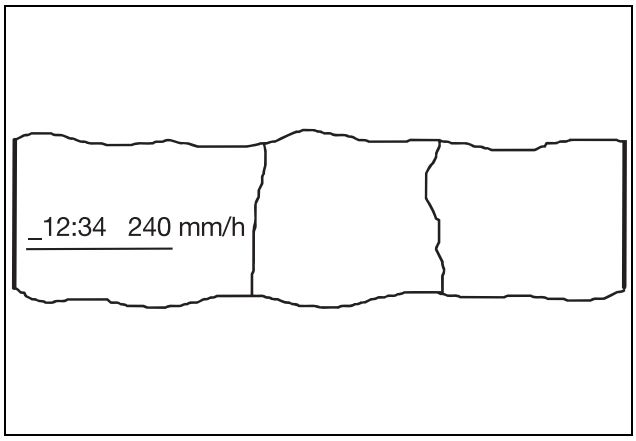
In order to obtain an exact time reference on the chart, the time is preceded by a time reference mark (“_”).

☞ If a “?” is printed after the time, the time has to be checked and, if necessary, freshly programmed. (⇨ Section 8.9).

☞ Time printing only occurs when the chart speed is in the range of 5 — 360 mm/h.

7.3 Change of chart speed

Every change of chart speed is reported by printing a line, the current time and the new chart speed.



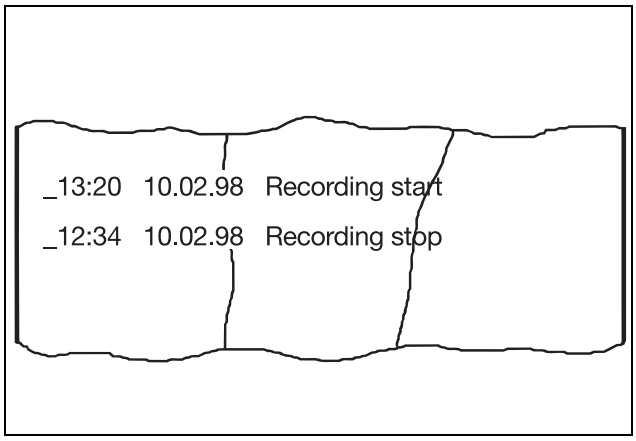
☞ Setting the printing priorities (⇨ Section 7.1) affects not only the printing of the chart speed change marking, but also the change itself.

There is no chart speed change as long as a text with a higher priority is being printed.

☞ The line for marking the chart speed change is always printed, the text (time and new speed) only when the chart speed is in the range of 5 — 360 mm/h.

7.4 Recording start and end

Recording start and end are reported by a start and end text.

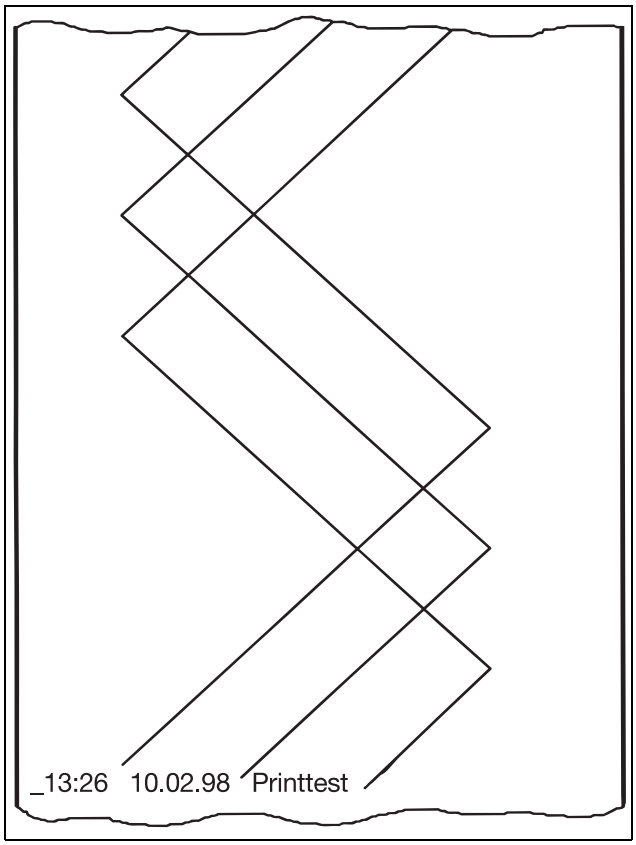


☞ Printing the end text is omitted when the chart sensor recognises “end of chart”.

☞ Printing the end text is aborted by pressing the ⇩/E key.

7.5 Print test

The print test can only be initiated on the recorder using the keys (operating level). It is used to check the function of the writing system and the fibre pens.



☞ Section 8.4

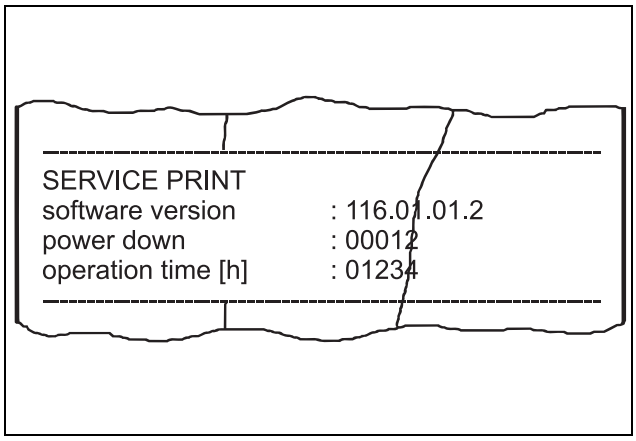
☞ Started text printing is aborted and not continued after the print test.

☞ All text printing requests arriving during the print test are rejected.

7.6 Service print

The service print can be initiated on the recorder using the keys (operating level).

It prints the software version, the number of supply interruptions and the total operating time of the recorder in hours.

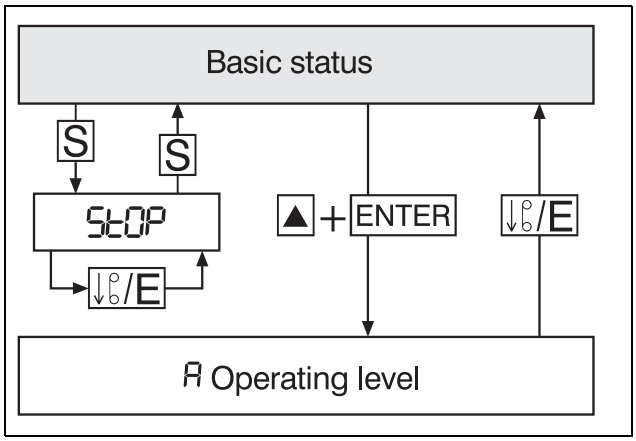


☞ Section 8.5

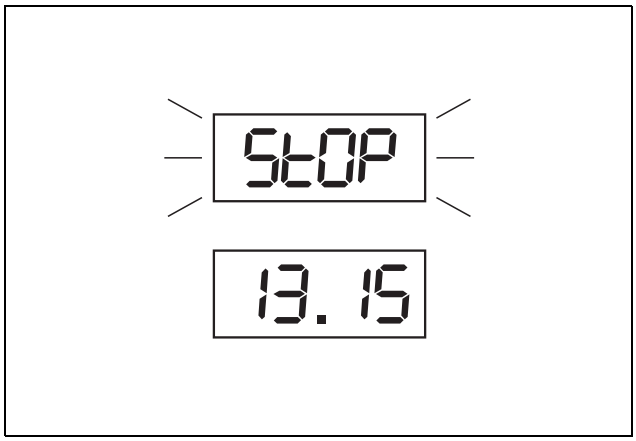
☞ Started text printing is aborted and not continued after the service print.

☞ All text printing requests arriving during the service print are rejected.

8.1 Basic status



The recorder is in the basic status after the supply has been applied, and it has been initialised. The measurement signals are acquired, processed and recorded.



In the basic status the following are indicated:

- the clock time and
- status/error messages, as appropriate.

Status and error messages are flashing regularly instead of the current display.

Using the S key, the recording is stopped and re-started. In the stop status, the display flashes "StOP".

Pressing the ↓/E key in the stop status activates the chart fast forward.

It is possible to change into the operating level by simultaneously pressing the ▲+ENTER keys.

8.2 Operating level

The operating level serves for performing simple operating actions.

It is reached from the basic status by pressing the ▲+ENTER keys simultaneously, from the parameter level by pressing the ↓/E key.

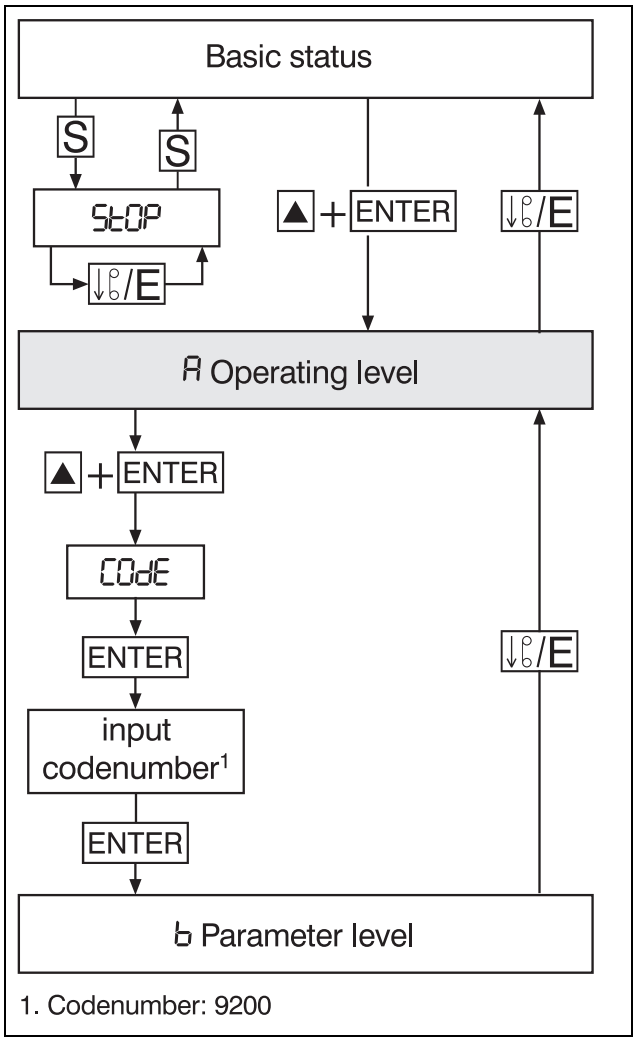
The operating level is identified in the display by the letter "A".

The operating level includes the following parameters:

- chart speed
- print test
- service print

☞ While the operating level is activated, signal acquisition, processing and recording are continuing.

A summary of all parameters of the recorder is given in the Appendix (⇨ Section 12.4).



1. Codenumber: 9200

Display	Edit	Selection/input	with keys	Enter	Continue with
A					▲ forwards

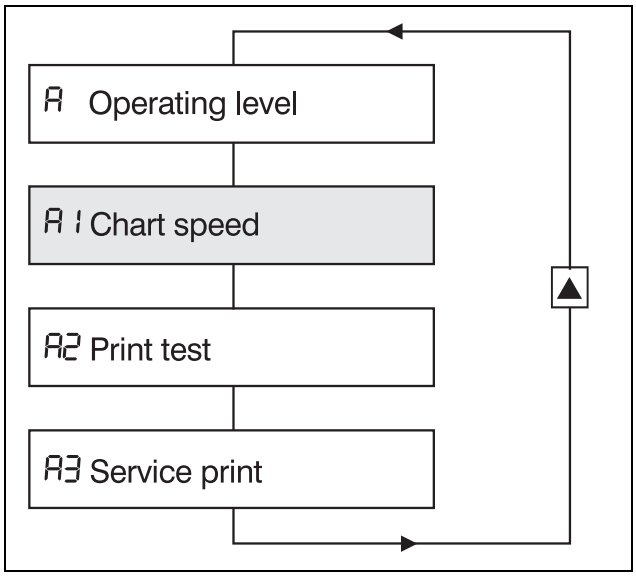
8.3 Chart speed

The chart speed for recording the measurement is set here.

The chart speed is selected from a table.

The chart speeds are:

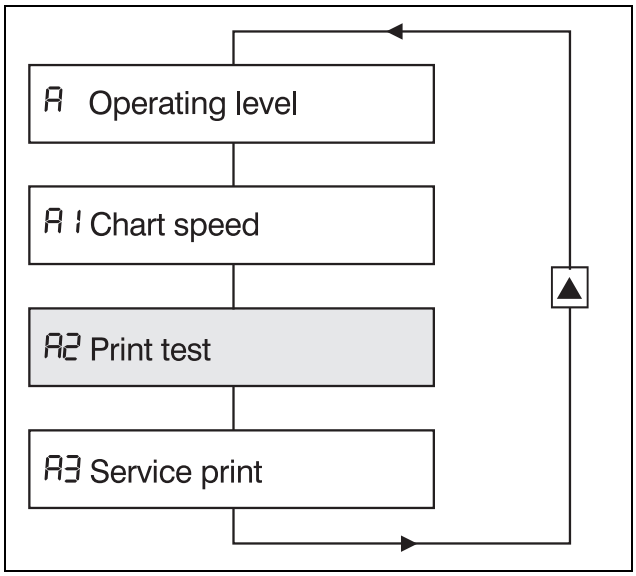
0, 5, 10, 20, 60, 120, 240, 300, 360, 600, 720, 1800, 3600 und 7200 mm/h.



Display	Edit	Selection/input	with keys	Enter	Continue with
A1	ENTER	240 Select chart speed: 0, 5, 10, 20, 60, 120, 240, 300, 360, 600, 720, 1800, 3600, 7200 mm/h	▲	ENTER	▲ forwards

8.4 Print test

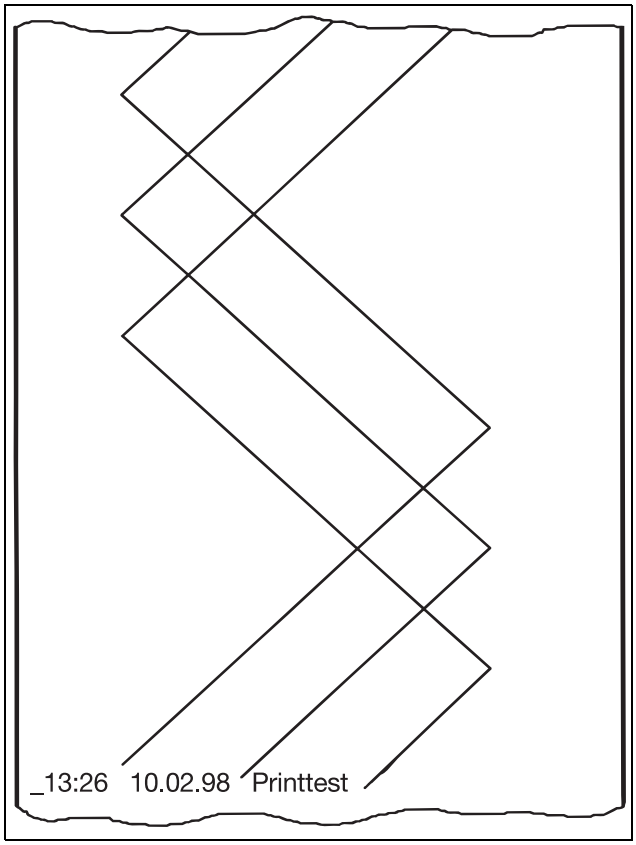
Print test is used to check the function of the writing system and the fibre pens.



☞ PRINTTEST = On continues until it is terminated by PRINTTEST = OFF.

☞ Started text printing is aborted and not continued after the print test.

☞ All text printing requests arriving during the print test are ignored or rejected.



Display	Edit	Selection/input	with keys	Enter	Continue with
A2	ENTER	OFF, On Select status of print test	▲	ENTER	▲ forwards

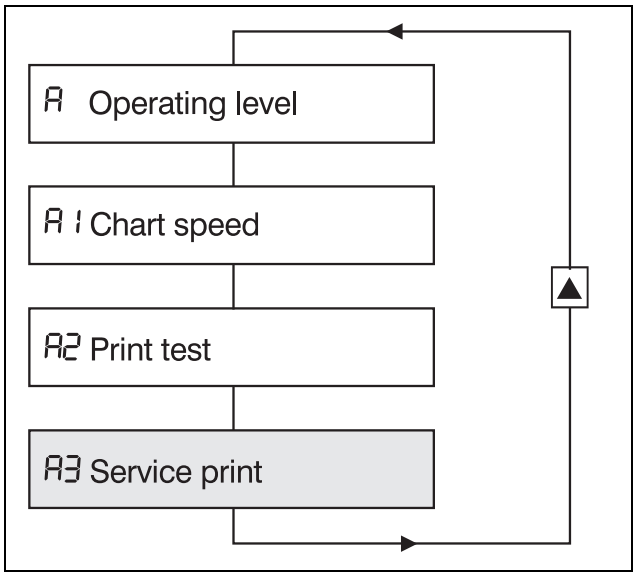
8.5 Service print

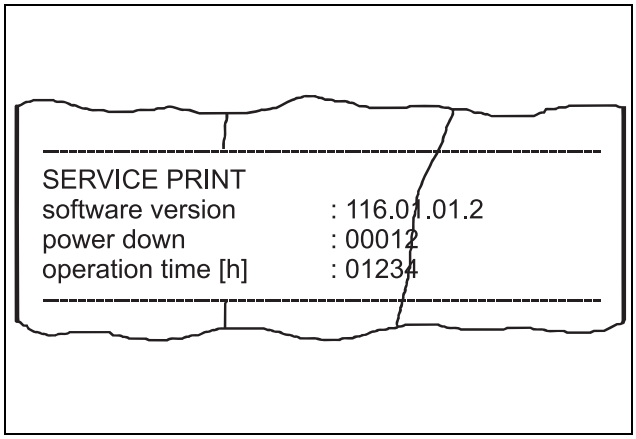
The service print informs about the software version, the number of supply interruptions and the total operating time of the recorder.

.

☞ Started text printing is aborted and not continued after the service print.

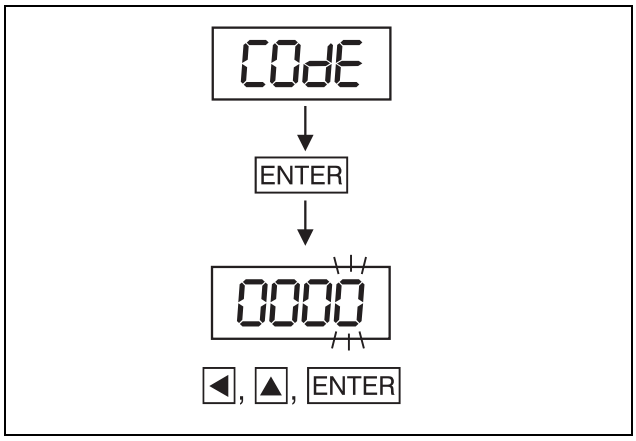
☞ All text printing requests arriving during the service print are ignored or rejected.





Display	Edit	Selection/input	with keys	Enter	Continue with
A3	ENTER	no, YES Service print no, yes	▲	ENTER	▲ forwards

8.6 Level inhibit and code request



The parameter level is protected by a 4-digit codenumber.

The codenumber is: 9200.

If the codenumber is entered, the following are interrupted:

- signal acquisition and
- recording.

The parameters can now be programmed.

☞ If an incorrect codenumber has been entered, the recorder remains in normal operation. Signal acquisition, processing and recording remain activated.

The parameters can be viewed, but not programmed.

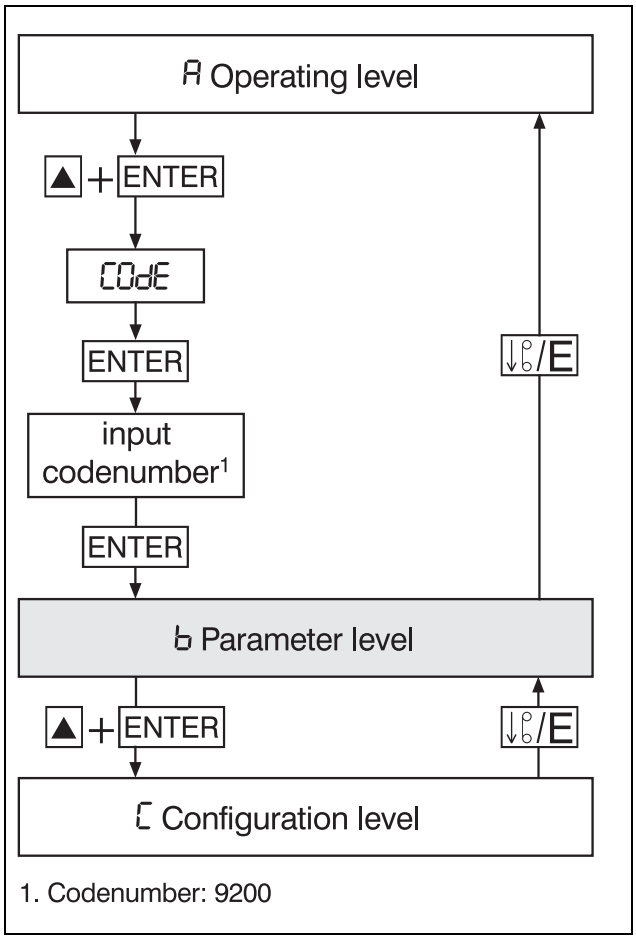
8.7 Parameter level

At the parameter level, it is possible to configure general parameters.

From the operating level, the parameter level is reached by simultaneously pressing keys ▲+ENTER, from the configuration level by pressing the ↓/E key at the parameter level.

The parameter level comprises the following parameters:

- language
- date and time
- summer time
- display time



1. Codenumber: 9200

☞ If an incorrect codenumber is entered, the recorder remains in normal operation. Signal acquisition, processing and recording are activated.

The parameters can be viewed, but not programmed.

☞ Following entry of a correct codenumber, the normal operation is interrupted.

There is no signal acquisition, processing or recording.

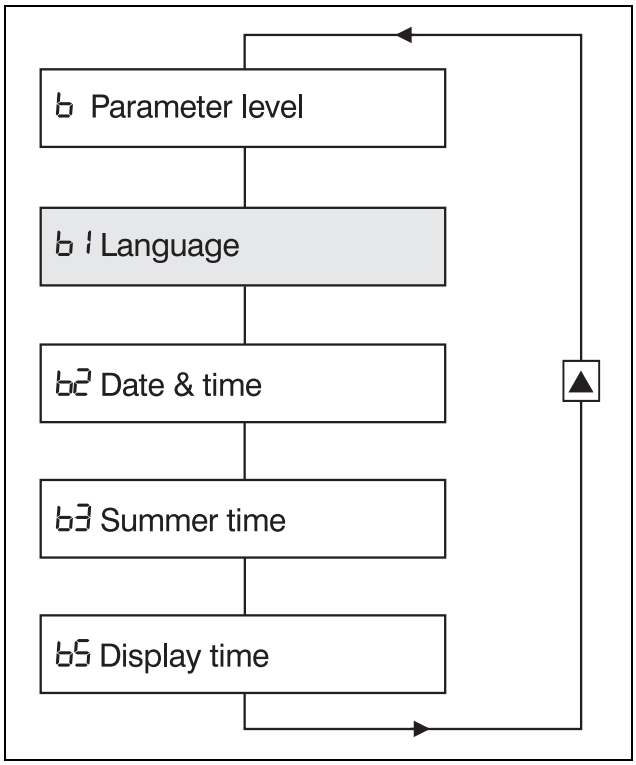
Display	Edit	Selection/input	with keys	Enter	Continue with
CodE	ENTER	0000 Input codenumber	▲, ◀	ENTER	⇒ 2
⇒ 2 b					▲ forwards

8.8 Language

The following languages can be selected:

- English
- German
- French

The language setting affects the texts which are printed.

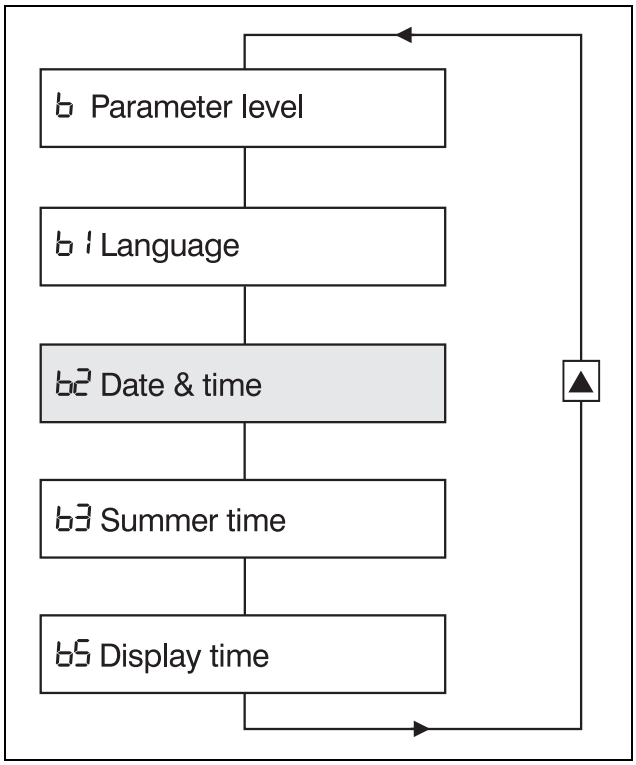


Display	Edit	Selection/input	with keys	Enter	Continue with
b1	ENTER	Select language: GEr (GERMAN) EnGL (ENGLISH) FrEn (FRENCH)	▲	ENTER	▲ forwards

8.9 Date and time

Programming the system clock of the recorder. The following are programmed: day, month, year, weekday, hour and minute.

The current clock time is printed at certain events and is shown on a 7-segment display in the basic status.



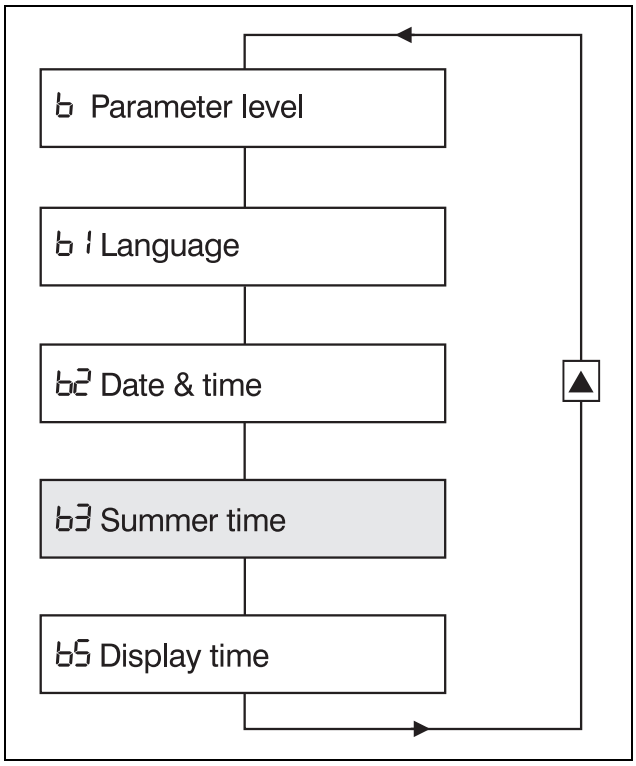
☞ Date and time are checked for plausibility after input. An error message is output, when appropriate.

The error message is acknowledged with ENTER and the data can then be re-entered.

Display	Edit	Selection/input	with keys	Enter	Continue with
b2	ENTER				⇒ 2
⇒ 2 b21	ENTER	09.02. Input day and month: DD.MM.	▲, ◀	ENTER	⇒ 3
⇒ 3 b22	ENTER	98 Input year: YY	▲, ◀	ENTER Check date	⇒ 4
⇒ 4 b23	ENTER	1 Select weekday: 1 Monday 2 Tuesday 3 Wednesday 4 Thursday 5 Friday 6 Saturday 7 Sunday	▲	ENTER	⇒ 5
⇒ 5 b24	ENTER	00.00 Input clock time: hh.mm	▲, ◀	ENTER Check time	▲ forwards

8.10 Summer time

Input of a time period during which the system clock of the recorder is changed to summer time.



Example:

Summer time start: 29.03.98, 2:00 hrs
Summer time end: 25.10.98, 3:00 hrs

On 29.03.98 at 2:00 hrs the system clock is put forward automatically by an hour to 3:00 hrs.

On 25.10.98 at 3:00 the clock is put back automatically by an hour to 2:00 hrs.

☞ The time interval for the summer time always applies only to the period indicated.

It has to be re-programmed for each year.

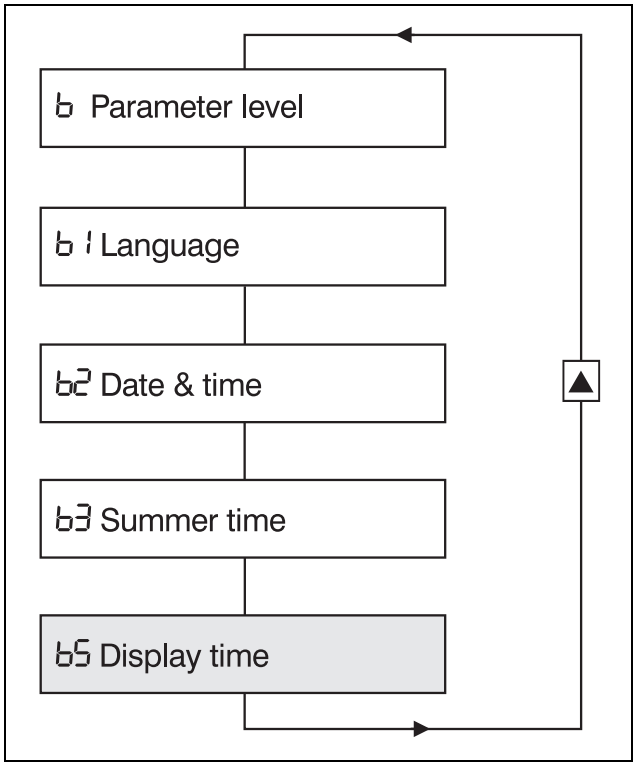
Display	Edit	Selection/input	with keys	Enter	Continue with
b3	ENTER				⇒ 2
⇒ 2 b31	ENTER	Off, On Input status	▲	ENTER	On ⇒ 3 Off: ▲ forwards
⇒ 3 b32 (On)	ENTER	29.03. Input day and month of start date: DD.MM.	▲, ◀	ENTER	⇒ 4
⇒ 4 b33	ENTER	98 Input start year: YY	▲, ◀	ENTER Check date	⇒ 5
⇒ 5 b34	ENTER	02.00 Input time for start: hh.mm	▲, ◀	ENTER Check time	⇒ 6
⇒ 6 b35	ENTER	25.10. Input date and month of end date: DD.MM.	▲, ◀	ENTER	⇒ 7
⇒ 7 b36	ENTER	98 Input year of end date: YY	▲, ◀	ENTER Check date	⇒ 8
⇒ 8 b37	ENTER	03.00 Input time for end: hh.mm	▲, ◀	ENTER Check time	▲ forwards

8.11 Display of time

The parameter “Display time” has been added to the parameter level with effect from the instrument version 116.01.02.2.

The time is indicated on the display when the recorder is in the basic status. The time display can be suppressed (status = OFF) by using this parameter.

☞ The instrument version can be determined by the parameter *Operating level* ➔ *Service print*.

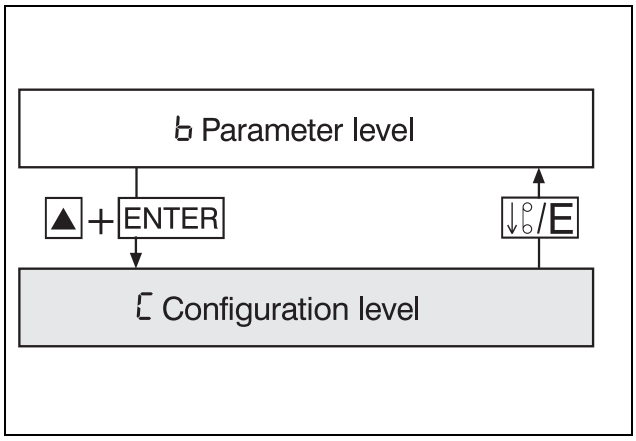


Display	Edit	Selection/input	with keys	Enter	Continue with
b5	ENTER	Off, ON Select status	▲	ENTER	▲ forwards

8.12 Configuration level

The signal inputs are configured at the configuration level.

It can be reached from the parameter level by simultaneously pressing the ▲ + ENTER keys.



☞ If an incorrect codenumber has been entered, the recorder remains in normal operation. Signal acquisition, processing and recording remain activated.

The parameters can be viewed, but not programmed.

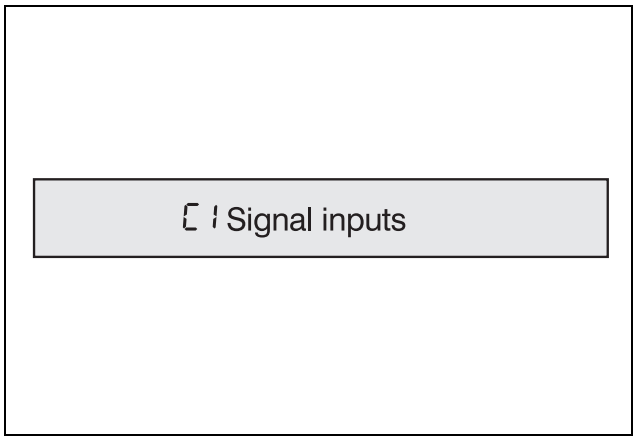
☞ If a correct codenumber is entered, the normal operation is interrupted.

There is no signal acquisition, processing or recording.

Display	Edit	Selection/input	with keys	Enter	Continue with
C					▲ forwards

8.13 Signal inputs

The input signal is selected, and the ranges as well as the filter constants for each signal input are determined here.



Display	Edit	Selection/input	with keys	Enter	Continue with
C 1	ENTER	C101 Select input channel: C101 channel 1 C102 channel 2 C103 channel 3	▲	ENTER	⇒ 2n with n = 1 — 3
⇒ 2n C 1 1 1 C 1 1 2 C 1 1 3	ENTER	CA00 Select input signal: CA00 voltage Cb00 current	▲	ENTER	Voltage ⇒ 31n Current ⇒ 41n
Voltage: ⇒ 31n CA 1 1 CA 1 2 CA 1 3	ENTER	1 Select unit: 0 (mV) 1 (V)	▲	ENTER	⇒ 32n
⇒ 32n CA2 1 CA22 CA23	ENTER	0.000 Enter range start	▲, ◀, S	ENTER check range start (–10.0V ≤ range start < 10.0V or 0.0V ≤ range start < 22.0V)	⇒ 33n

Display	Edit	Selection/input	with keys	Enter	Continue with
⇒ 33n CA31 CA32 CA33	ENTER	1.000 Input range end	▲, ◀, S	ENTER Check (–10.0V < range end ≤ 10.0V or 0.0V < range end ≤ 22.0V) span ≥ 5mV	⇒ 5n (FILTER)
Current: ⇒ 41n Cb11 Cb12 Cb13	ENTER	0.000 Input range start	▲, ◀, S	ENTER Check range start (–20.5mA ≤ range start < 20.5mA or 0.0mA ≤ range start < 45.0mA or –4.0mA ≤ range start < 21.0mA)	⇒ 42n
⇒ 42n Cb21 Cb22 Cb23	ENTER	020.0 Input range end	▲, ◀, S	ENTER Check range end (–20.5mA < range end ≤ 20.5mA or 0.0mA < range end ≤ 45.0mA or –4.0mA < range end ≤ 21.0mA) span ≥ 0.5mA	⇒ 5n (FILTER)
⇒ 5n C121 C122 C123	ENTER	0.800 Input filter constant (value range: 0.0 — 10.0sec)	▲, ◀, S	ENTER Check value range 0.0 — 10.0sec	▲ forwards

9 Consumables

9.1 Summary of consumables

Fibre pens, disposable

blue, Part No.: 00309750
red, Part No.: 00309751
green, Part No.: 00309753

Roll chart

overall width: 120mm

no name, % graduation, linear
overall length: 16m
Packing unit: 5 rolls
Part No.: 00331497

no name, % graduation, linear
overall length: 32m
Packing unit: 5 rolls
Part No.: 00331499

no name, special graduation
(printing as order specification)
overall length: 16m/32m

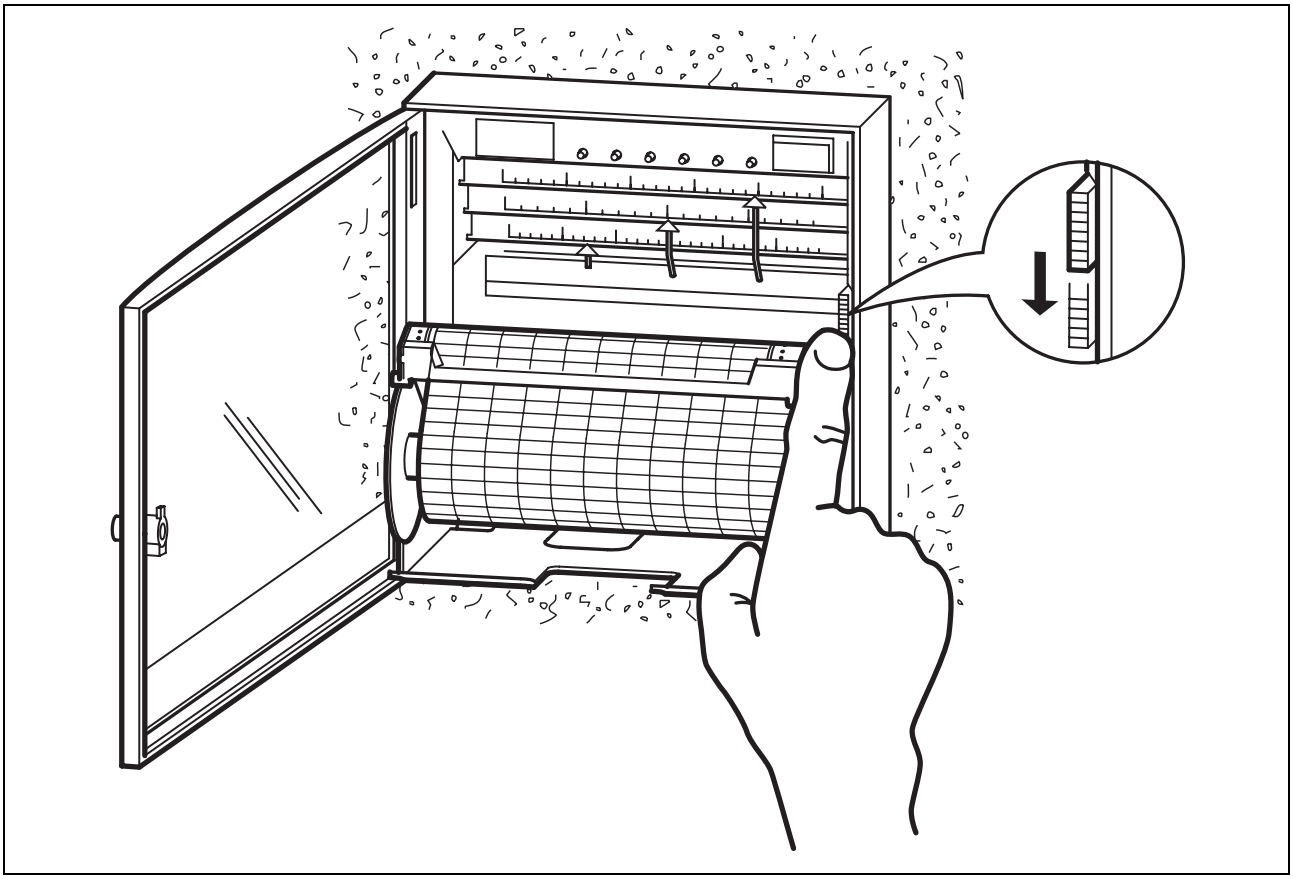
Fanfold chart

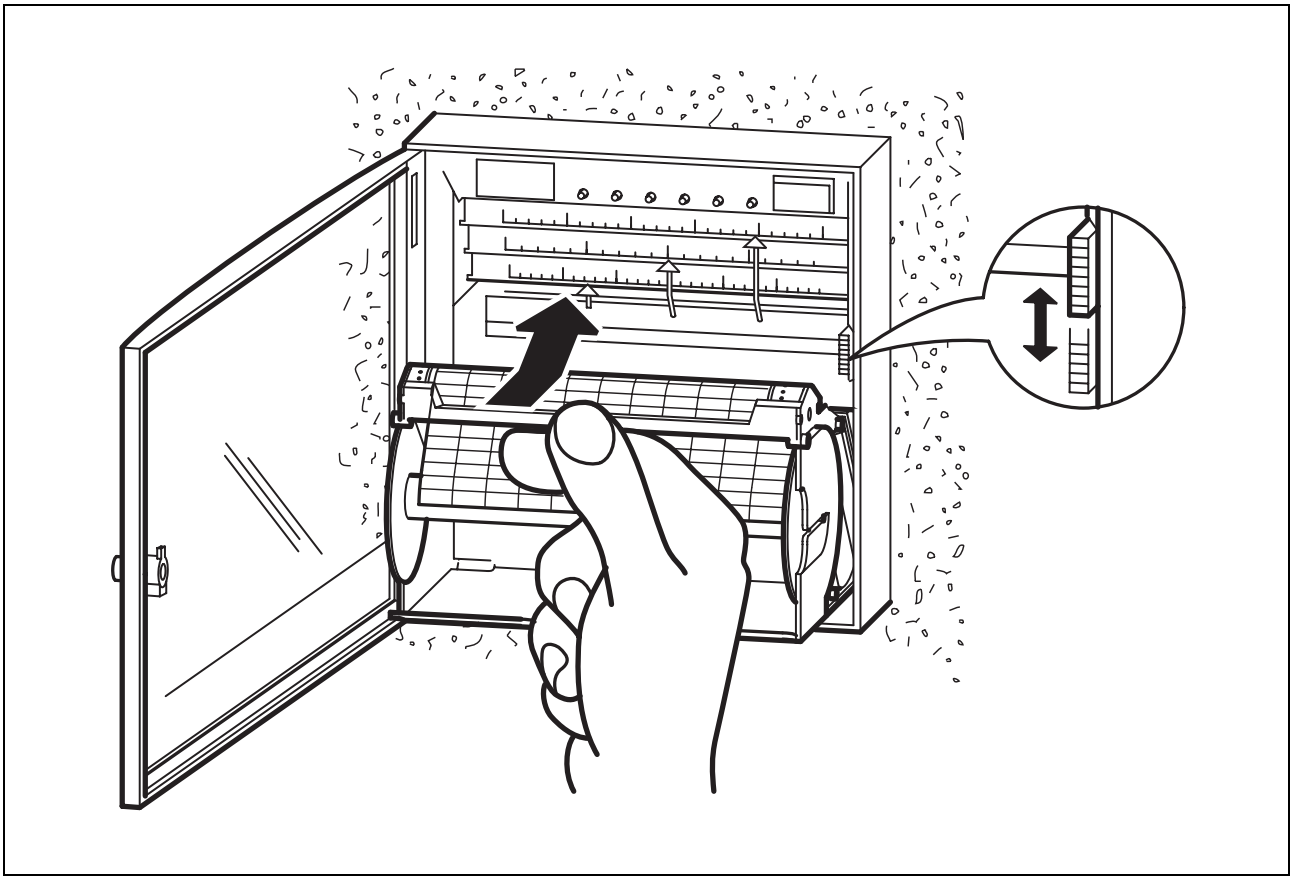
overall width: 120mm
overall length: 16m

no name, % graduation, linear
Packing unit: 5 packs
Part No.: 00331490

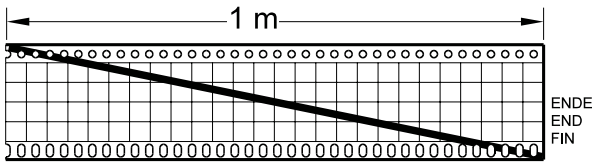
no name, special graduation
(printing as order specification)

9.2 Removing and replacing the chart cassette

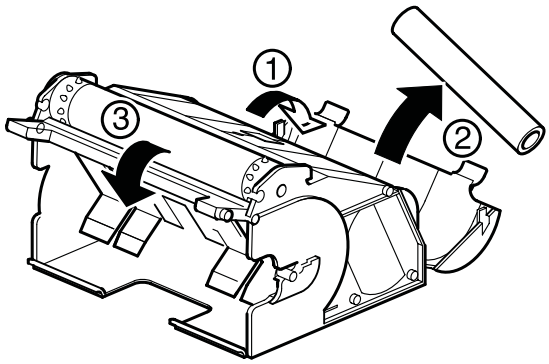




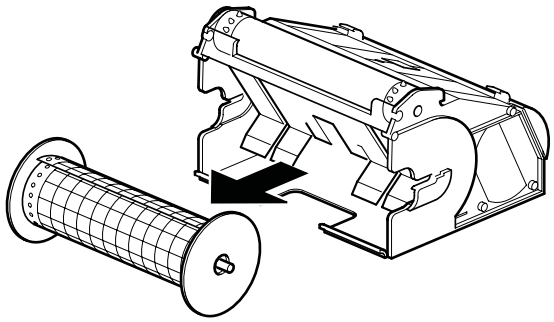
9.2.1 Changing the roll chart



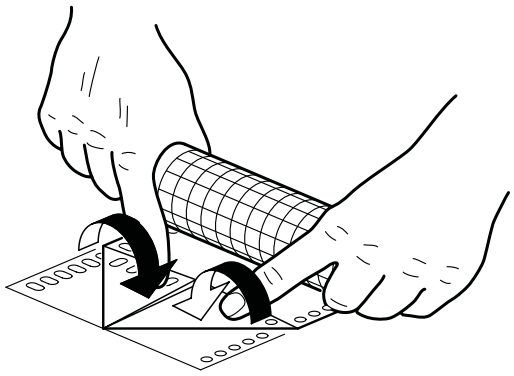
1



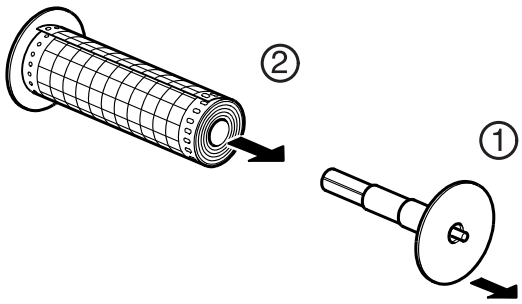
5



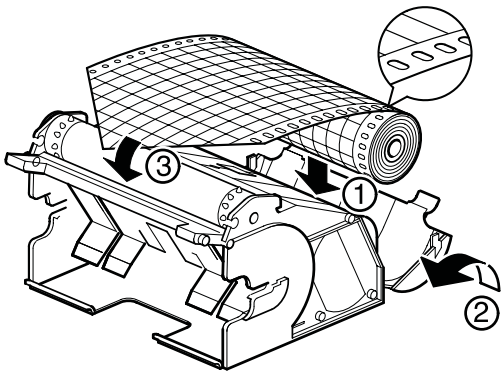
2



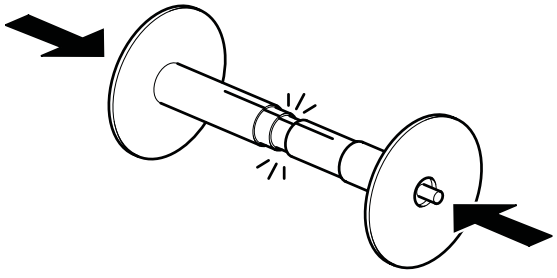
6



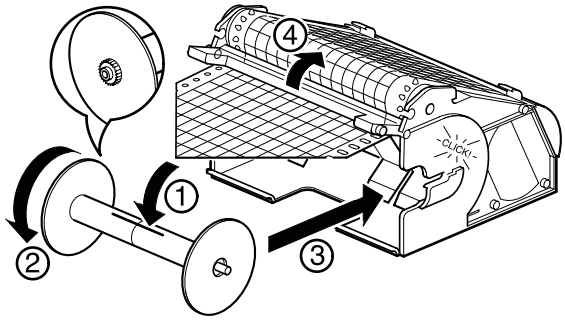
3



7

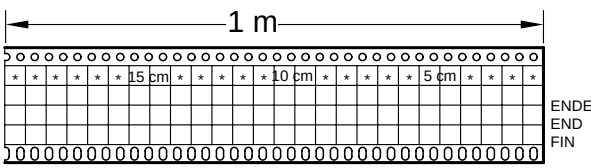


4

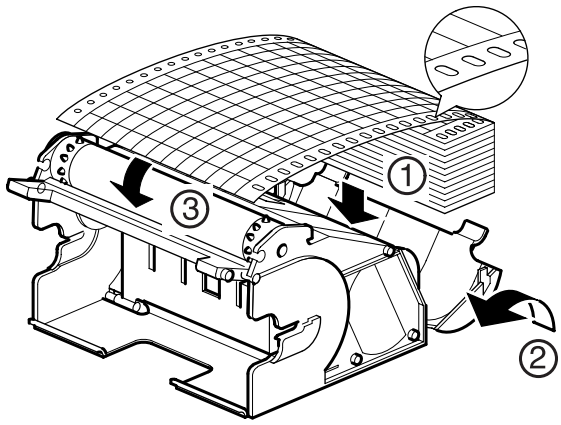


8

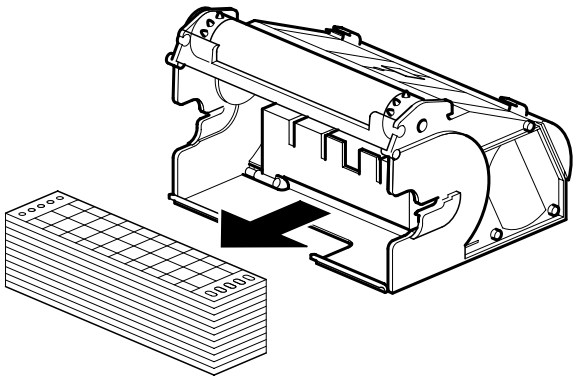
9.2.2 Changing the fanfold chart



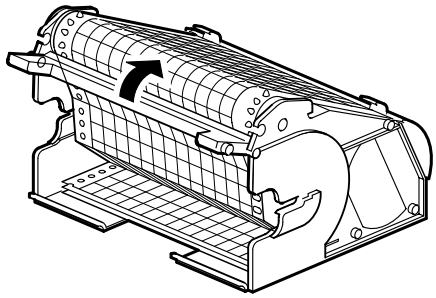
1



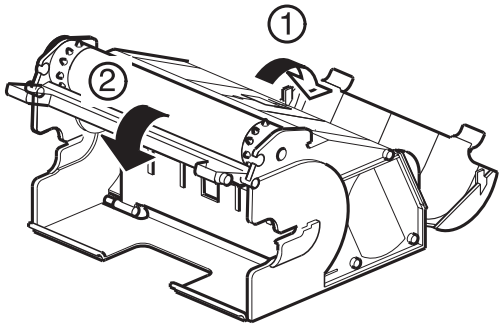
4



2

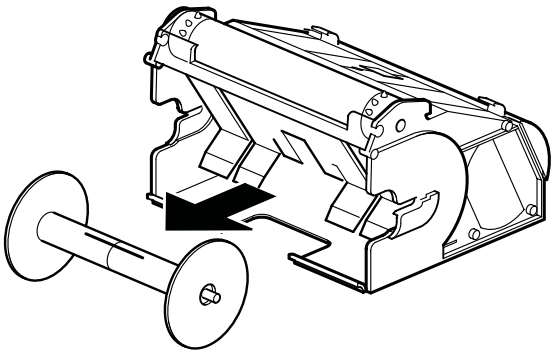


5

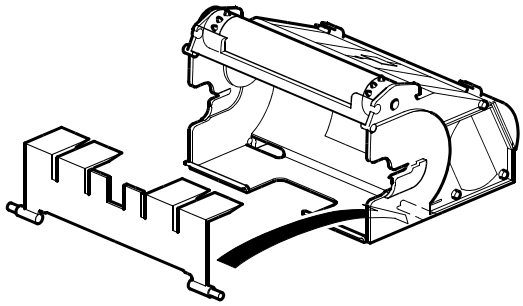


3

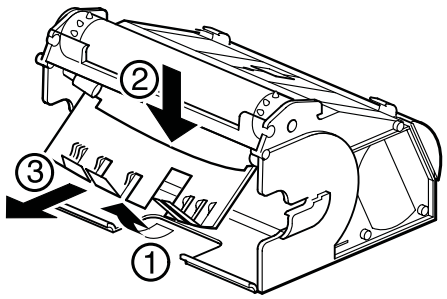
10.1 Converting the chart cassette



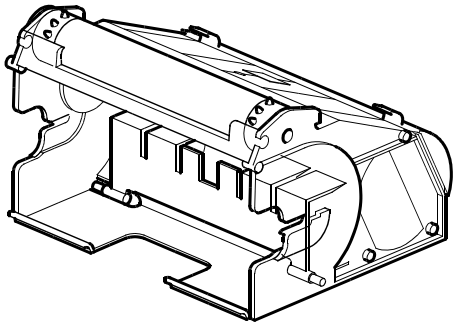
1



3



2



4

11 Fault finding

11.1 What to do if...

Fibre pens on 0%	- The value is outside the measuring range (Out Of Range) - The transducer has been connected incorrectly - The signal inputs are configured incorrectly - Sensor break
No recording	- Key S has been pressed ⇨ Section 6.1 - The chart cassette has not been fitted correctly ⇨ Section 9.2 Caution: Insert the chart cassette by applying light upwards pressure - The take-up roll has not properly engaged with the chart cassette ⇨ Section 9.2.1 - The end of the chart has been reached ⇨ Section 9.2.1, Section 9.2.2 - The chart speed has been programmed as 0 mm/h ⇨ Section 8.3
Fibre pen does not write	- The fibre pen has not been fitted correctly ⇨ Section 5.4 - The fibre pen has run out of ink
No chart feed	- The chart cassette has not been fitted correctly ⇨ Section 9.2 - The chart has not been fitted correctly - The chart speed has been programmed as 0mm/h - The pin roller does not engage with the chart perforations - The tear-off edge in not correctly engaged - The pen recorder is in the STOP status
Measurements are not recorded	- Check that the connecting terminals are tightened properly - Check the supply - Check the input configuration (range) - Check the transducers and their cables, measure them where appropriate

12 Appendix

12.1 Error messages

All error messages flash on the 7-segment display at regular intervals.
All other instrument functions remain unaffected as far as possible.

Display	Cause / Remedy
Status message	
Er 13	The chart cassette has been removed or the end of the chart has been reached; a fresh chart must be fitted. ⇨ Section 9.2 ff
Error or fault on module	
Er 10	The battery for the real time clock and for RAM backup is discharged. Please contact the nearest office or the factory.
Errors on parameter input	
Err	- Date is invalid An invalid date has been input. The input must be repeated. - Time is invalid An invalid time has been input. The input must be repeated. - Error in value input The input is outside the range of values. The input must be repeated.

12.2 Hardware fault

If one of the following faults occurs, the recording is aborted and the error message flashes on the display.

The recorder does not react to any event and can not be operated.

Please contact the nearest office or the main factory.

Display	**Cause / Remedy**
Er 12	The EEPROM in the recorder is faulty, the configuration date can no longer be stored.
Er 17	The A/D converter of the recorder is faulty.
Er 18	One of the Hall sensors in the recorder is faulty.

12.3 Status messages

The following status messages are indicated on the 7-segment display:

Display	Description
In It	The recorder is being initialised. Please wait.
StOP	The recorder is in the Stop status, because the S key has been pressed.
bUSY	The configuration data are being written to the EEPROM. During this time the recorder does not respond to any inputs.

12.4 Overview of the parameters

Parameter	Description
Chart speed	Chart speed in mm/h
Language	Language (for printing)
Date and time	System clock of the recorder
Summer time	Start and end of summer time
Display time	Switch on/off display of time in the basic status
Signal inputs	Selection of the analogue input signals

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