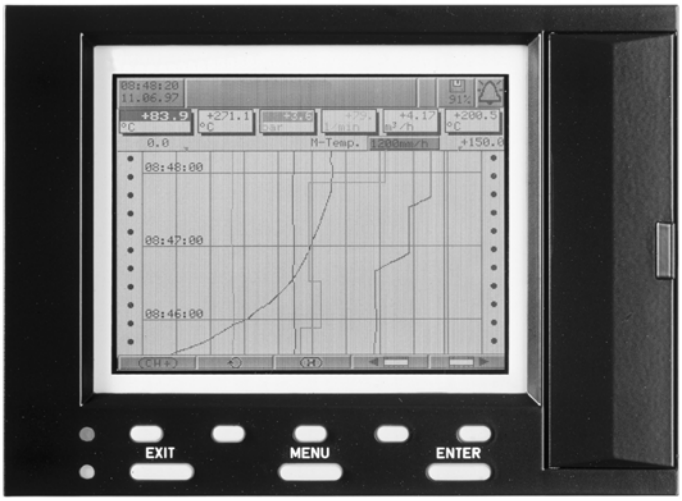


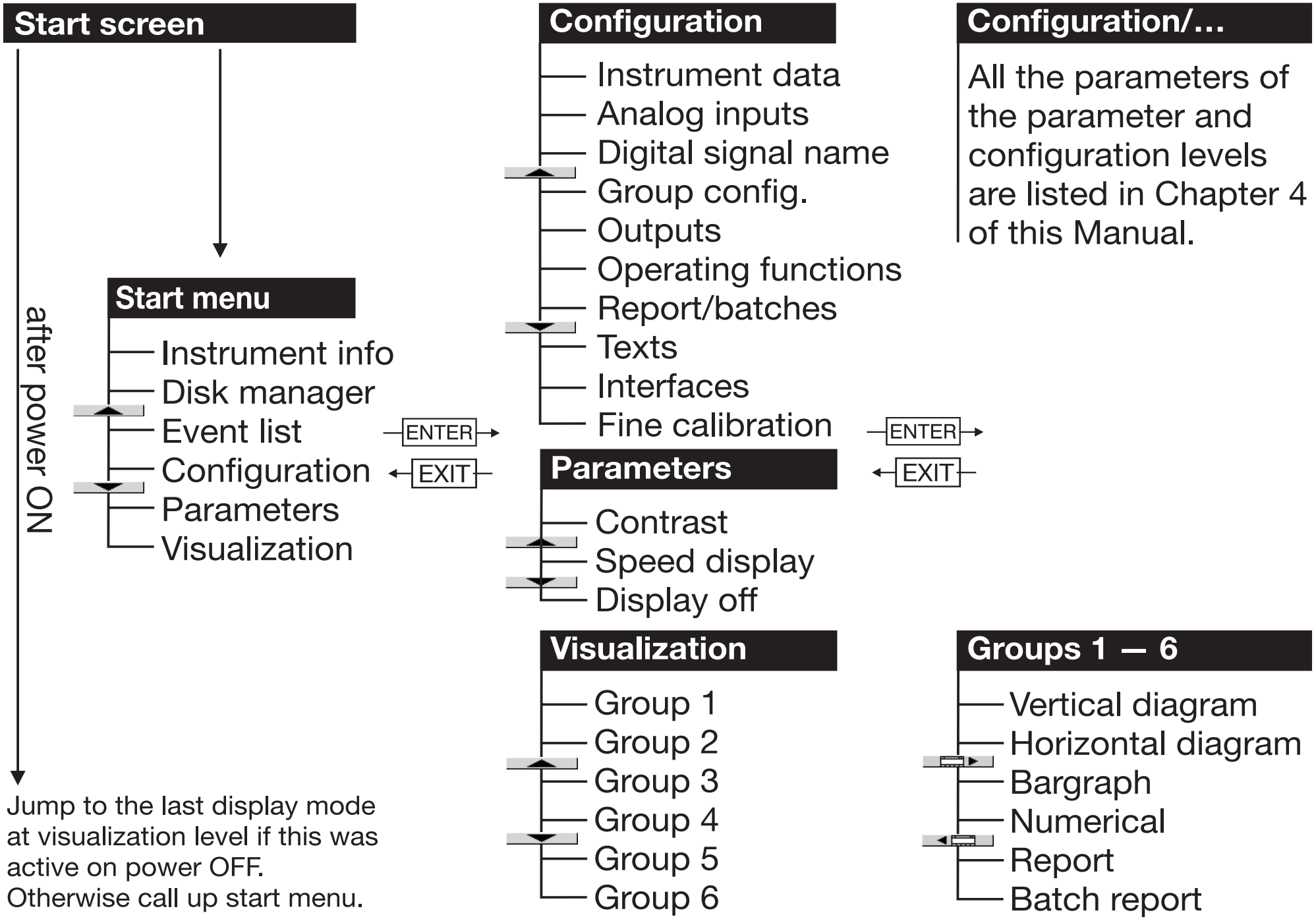
LOGOSCREEN®

Paperless Recorder

B 70.6550.0.2

Operating Manual

06.05/00384413


Start screen
after power ON
Start menu
Instrument info
Disk manager
Event list
Configuration
Parameters
Visualization
ENTER
EXIT
Configuration
Instrument data
Analog inputs
Digital signal name
Group config.
Outputs
Operating functions
Report/batches
Texts
Interfaces
Fine calibration
ENTER
EXIT
Configuration/...
All the parameters of the parameter and configuration levels are listed in Chapter 4 of this Manual.
Parameters
Contrast
Speed display
Display off
Visualization
Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Groups 1 — 6
Vertical diagram
Horizontal diagram
Bargraph
Numerical
Report
Batch report
Jump to the last display mode at visualization level if this was active on power OFF.
Otherwise call up start menu.

Contents

Contents

1.1 Preface

Please read this manual carefully before starting up 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 appreciated.

Phone +49 661 6003-0
Fax +49 661 6003-607

All necessary setttings are described in this manual. If any difficulties should still arise during start-up, you are asked not to carry out any manipulations that could endanger your rights under the instrument warranty!

Please contact the nearest subsidiary or the head office in such a case.

When returning modules, assemblies or components, the regulations of EN 61340-5-1 and EN 613040-5-2 “Protection of electronic devices from electrostatic phenomena” must be observed. Use only the appropriate **ESD** packaging material for transport.

Please note that we cannot accept any liability for damage caused by ESD (electrostatic discharge).

1 Introduction

1.2 Arrangement of the documentation

The documentation for this instrument consists of the following parts:

Operating Manual B 70.6550.0.2

This operating manual is supplied with the instrument. It is addressed to the equipment manufacturer (OEM) and to the user with the appropriate technical expertise.

In addition to installation and electrical connection, it contains information on commissioning, operation and setting of parameters on the instrument, as well as on the setup program for PC (available as an option) and the optional PC evaluation program.

Interface description B 70.6550.2.2

It provides information on the communication (RS232; RS422/RS485) with higher-level systems. This operating manual is supplied with the instrument.

Interface description B 70.6550.2.1

Here you will find information on the connection and the use of modules in the "JUMO mTRON automation system" series. This manual is included in the delivery when the extra code "LON interface" has been ordered.

Interface description B 70.3560.2.1

Information is provided here on the connection of the paperless recorder to a bus system through PROFIBUS-DP. These operating instructions are included in the delivery package, if the PROFIBUS-DP interface has been ordered.

Online help

The online help is part of the setup program for PC. It is a Windows[1] online help.

1.2.1 Structure of the Operating Manual

This operating manual is so arranged that the user can enter directly into the operation and configuration of the instrument. Chapters dealing with items which normally arise only once are placed at the end of the manual, for instance instrument description, type designation, installation and electrical connection.

1. Microsoft and Windows are registered trademarks of the Microsoft Corporation

1.3 Typographical conventions

1.3.1 Warning signs

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

Danger

This sign is used when there may be **danger to personnel** if the instructions are not followed accurately or disregarded.

Warning

This sign is used when there may be **damage to equipment or data** if the instructions are not followed accurately or disregarded.

Warning

This sign is used where special care is required when handling **components liable to damage through electrostatic discharge**.

1.3.2 Note signs

Note

This symbol is used when your attention is drawn to a **specific remark**.

Reference

This symbol refers to **additional information** in other handbooks, chapters or sections.

abc[1]

Footnote

Footnotes are notes which refer to **certain points** in the text. Footnotes consist of two parts:

The text marking and the footnote text.

The text markings are arranged as continuous superscript numbers.

Action

*

This sign refers to an **action to be performed**.

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

* Press ▲ key

* Confirm with ENTER

1.3.3 Presentation

Keys

▲ + ENTER

Keys are **shown in a frame**. Both **symbols or text** are possible. Where a key has multiple functions, the text shown corresponds to the function which is **currently active.**

Screen texts

Program manager

Texts displayed in the setup program are shown **in italics**.

Menu items

Edit ➔ instrument data

Menu items of the setup program which are referred to in this operating manual are shown in italics. Menu name, menu or sub-menu items are separated by the sign "➔".

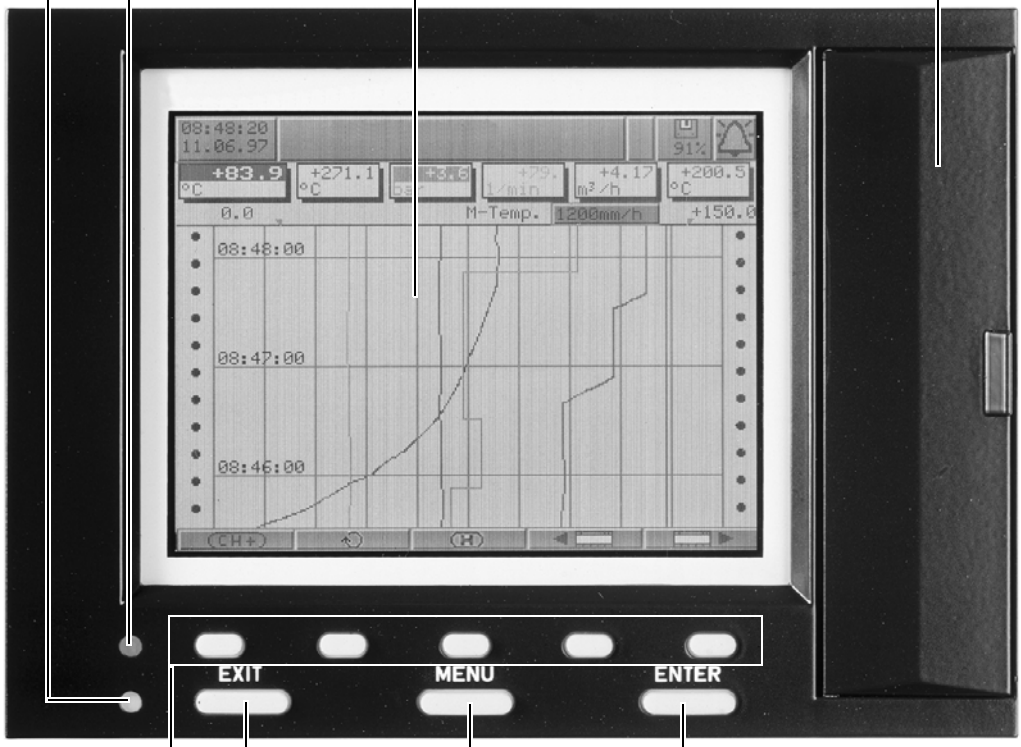
2.1 Indications and controls

Power LED (green)
lights up continuously while power is applied,
flashes while the screen saver is activated.
Pressing any key will deactivate the screen saver.

Status LED (red)
lights up continuously while an alarm is present

Color display
320 x 240 pixels, 27 colors

Cover
of the disk drive
and the setup connector



Enter
- selects menu item
- enters the input

Menu
back to the start menu[1]

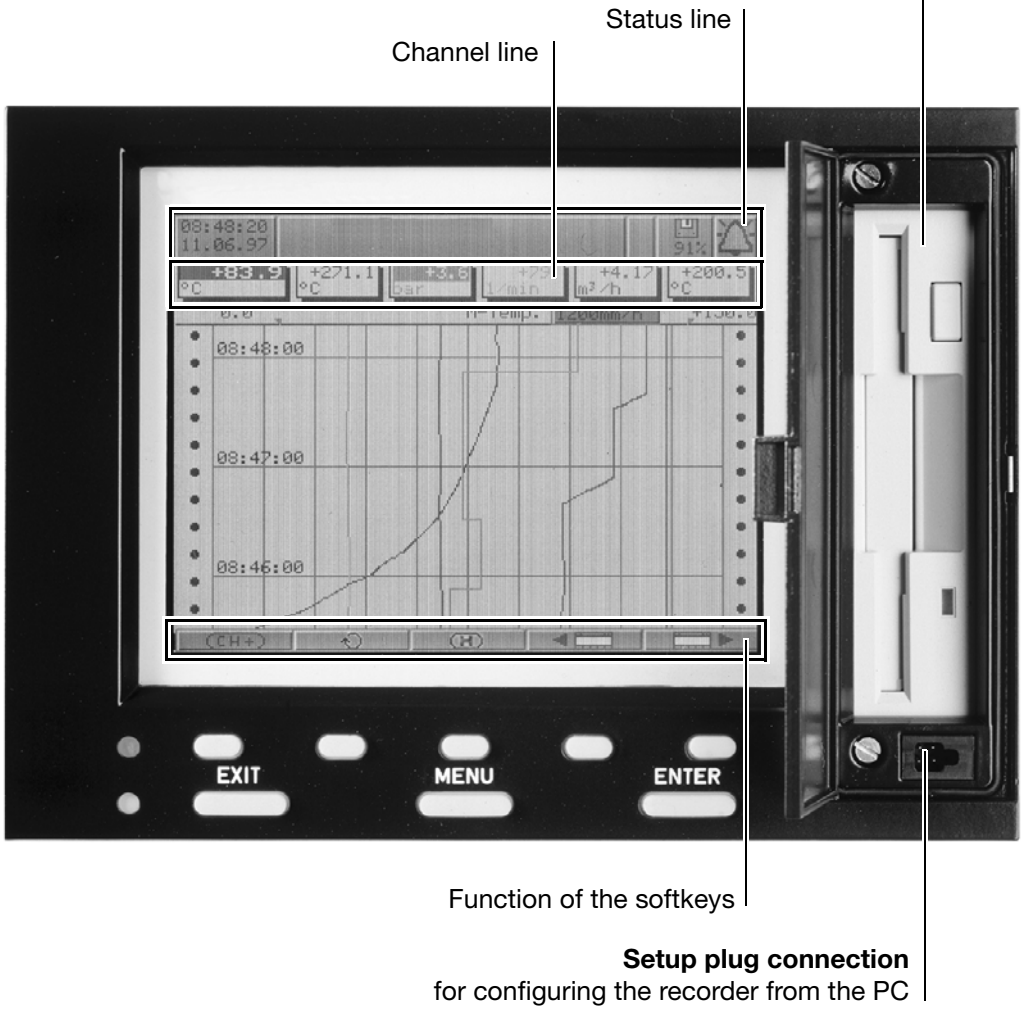
Exit
- previous window
- abort the current action

Softkeys
screen-dependent function, represented by text or symbols

1. not from the configuration level,
if a parameter has already been altered there.

Disk drive and setup plug connection

Disk drive
for storage and to transfer the measurements to the PC
(1.44 MB HD diskette)



☞ The life of the background lighting can be extended by using the display-off facility.

⇨ Chapter 4 “Configuration parameters”
Parameters ➔ Display off

2.2 Operating principle and graphic elements

Keys

The paperless recorder is operated with eight keys. Three of these have fixed functions, the other five (softkeys) have functions as shown on the screen.

⇨ Section 2.1 “Indications and controls”

Softkeys

The function of the softkeys are shown in the bottom line of the display, either as symbols or in plain language.

Status line

The status line appears in the upper part of the display. It provides information on important actions and states.
The status line is always shown, irrespective of the level (operation, parameter, configuration).

Alarm
If there is an alarm (e. g. out-of-limit), the (alarm) bell flashes in this field

Diskette/Memory
Shows the free storage capacity of the diskette (of the memory) in percent. If there is a diskette error, the diskette symbol flashes. The error report can be checked in the disk manager.
⇨Section 3.6 “Disk manager”

Storage capacity of diskette 

, free memory 

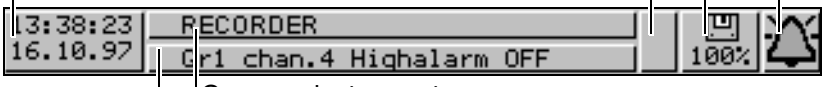

The egg timer appears when the instrument performs an action and therefore can not be operated

The “H” shows that the indicated measurements are derived from the past (historical). Data from the RAM are indicated.


If there is an error, this position flashes “i”. The cause of the error can be read out in the instrument info window (⇨ Section 3.7 “Instrument info”).


If the keys are inhibited, a key flashes at this position

Time & Date
Indication of the current time and the current date

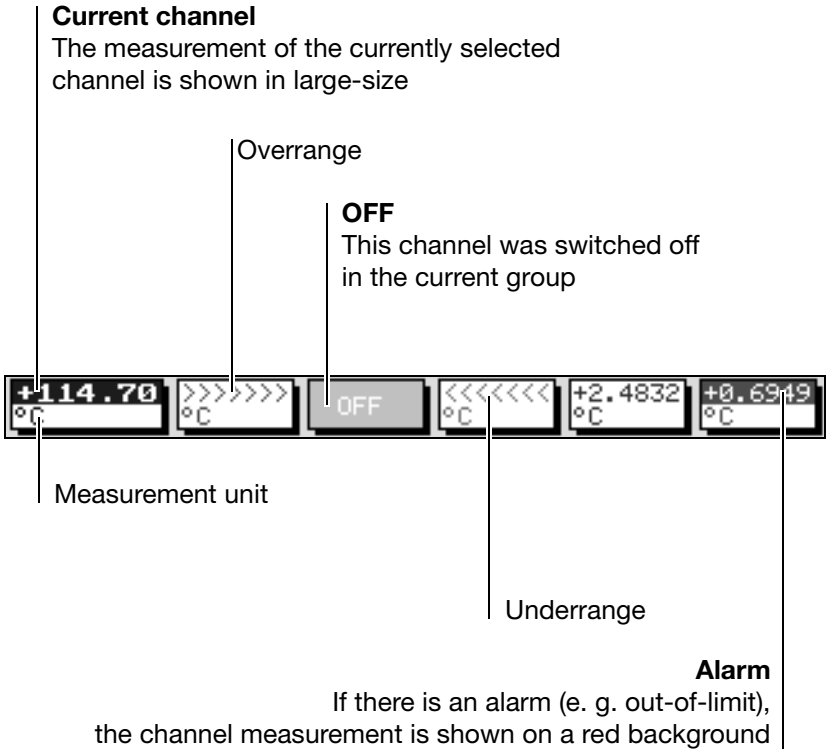


Group or instrument name
(depending on the operating level)

Indication of the last entry in the event list

Channel line

The channel line shows the active channels of the group and their unit. Alarms and out-of-range conditions are also made directly visible in this line.



2.3 Analog inputs

Internal analog inputs

The paperless recorder can be internally equipped with 6 or 12 analog inputs.

When configuring the analog inputs (Section 4.2 “Table of configuration parameters”) they are designated **Analog input 1 — 12.**

In addition to the internal analog inputs, external analog inputs can also be connected to the recorder.

External analog inputs

External analog inputs can be connected to the paperless recorder in two different ways:

JUMO mTRON modules

External analog inputs in the form of modules of the “JUMO mTRON automation system” (e.g. analog input module) can be connected in conjunction with the LON interface, which is available as an extra code.

When configuring the external analog inputs (Section 4.2 “Table of configuration parameters”) they are designated **External input 1 — 24**.

Additional information on using the LON interface in conjunction with the JUMO mTRON automation system can be obtained from the Operating Instructions B 70.6550.2.1.

Serial interface (MODbus)

The measured values of the external inputs can also be transmitted to the paperless recorder via the serial interface. In this case, there is no need for either the mTRON modules, or the extra code “LON interface”.

When configuring the external analog inputs (Section 4.2 “Table of configuration parameters”) they are designated **External input 1 — 36**.

Further information on using the serial interface is provided in the Operating Instructions B 70.6550.2.2.

PROFIBUS-DP

This requires the PROFIBUS-DP interface, which is available as an extra.

When configuring the external analog inputs (Section 4.2 “Table of configuration parameters”) they are designated **External input 1 — 36**.

Further information on using the PROFIBUS-DP interface can be found in the Operating Instructions B 70.3560.2.1.

2 Instrument description

2.4 Digital signals

Signal types

In addition to the seven logic inputs, digital signals also include those generated by the instrument itself.

Digital signal	Description
Logic input 1 — 7	Seven logic inputs available in hardware (extra Code)
Alarm group 1 — 6	OR linking of all out-of-limits on the channels of a group
Combination alarm	OR linking of all group alarms
Memory alarm	Alarm is triggered when the residual capacity of a diskette, or the available memory space in the RAM, falls below a certain value. Section 3.6 “Disk manager”
Error	Alarm when battery is empty or when the clock time has to be set. Section 3.7 “Instrument info”
Modbus flag	Control flag which can be activated through the serial interface.
External input 1 — 6	External inputs which can be programmed via the serial interface, or which are available in the form of the modules of the “JUMO mTRON automation system” series (extra code).

Presentation

Each of the digital signals can be assigned to a digital channel within a group. The presentation appears in various diagrams on the screen.

Diagram	Presentation
Group manager	On/off presentation as switch: 
Horizontal diagram	Presentation as timing: 
Bargraph	On/off presentation as switch
Numerical presentation	On/off presentation as switch

Outputs

The digital signals can be used to operate the five relays and the open collector output. The action can be configured as n.c. (break) or n.o. (make). (*Configuration* ➔ *Outputs*).

Counters

Digital signals can be configured as operating signals for counters under *Configuration* ➔ *Operating functions* ➔ *Counters* (⇨ Chapter 4 “Configuration parameters). If a counter text is configured, it is possible, for example, to count how often and when a group alarm has been triggered.

External texts

So-called external texts can be arranged through the seven logic inputs. Either a *standard text* or one of the 36 texts, which can be defined, can be used. The instrument automatically supplements the texts in order to distinguish between incoming and outgoing signals. The external texts are configured on the instrument under *Operating functions*.

⇨ Section 3.5 “Event list”

External report /batches

Start and end of the external reports, as well as of the batch reports, are operated through one of the digital signals. The external report and, if required, the batch report are made from the instant at which the operating signal becomes active. It is continued until the *Operating signal* becomes inactive again. The operating signal is selected through the parameter *Configuration* ➔ *Report/Batches* ➔ *Ext. report/Batches* ➔ *Operating signal*.

Event operation

The digital signals can be used to activate event operation. During event operation, the measurements are stored at a different storage rate from normal operation.

Example

When the residual capacity of the diskette falls below 30 %, the storage rate (of the measurements) in group 1 has to be reduced to 20 sec.

The following have to be configured:

Parameter	**Unit/setting**
Configuration ➔ Instrument data ➔ Disk reserve ➔ Memory alarm	30 [%]
Configuration ➔ Grp configuration ➔ Group 1 ➔ Event operation ➔ Operating signal	Memory alarm
Configuration ➔ Grp configuration ➔ Group 1 ➔ Event operation ➔ Storage rate	20 [sec]

2.5 Counters

The paperless recorder has two internal counters which can count 10 000 steps.

Operating signal

At the configuration level, the following are configured under *Configuration* ➔ *Operating functions* ➔ *Counters* ➔ *Counter 1 — 2*

- the *operating signal*,
- the *start value*,
- the *counting direction*
- and the *text* for the event list.

Possible operating signals for the two counters are:

- a logic input,
- a group alarm,
- the combination alarm,
- the “Memory alarm” signal,
- the “Error” signal,
- the “Modbus flag” signal
- or an external input.

Start value

The start value can be input anywhere between -99.999 and +99.999, for instance it can be reset to “0”!

Counting direction

Counting can take place upwards or downwards.

Text

The text for the entries in the event list are configured through the setup program or from the keys of the instrument. The current count is automatically added as extension text.

⇨ Section 3.5 “Event list”

Presentation

Like the analog channels, the counters are represented as curves in the diagrams. For this to happen, the counter must be assigned as input signal to an analog channel in the group configuration.

The numerical range to be shown (10 000 steps max.) is configured through the parameters *Configuration* ➔ *Analog inputs* ➔ *Counter 1 — 2* ➔ *Scaling start* and *Scaling end.*

External counters

The paperless recorder can be expanded by two external counters through the JUMO mTRON automation system. The counters are configured using the parameter *Configuration* ➔ *Operating functions* ➔ *Counters* ➔ *External counter 1 — 2*. Since the counters are operated through mTRON, the sub-parameter “Operating signal” is not applicable during configuraton.

2.6 Integrator

In addition to minimum, maximum and average value of an (analog) channel in a group, the report can include an integrator.

Activate integrator

An integrator time base has to be specified at configuration level under *Configuration ➔ Analog inputs ➔ Analog input 1 — 12 ➔ Additional parameters* or *Configuration ➔ Analog inputs ➔ External input 1 — 36 ➔ Additional parameters*. If no time base is given (*Off*), the indication of the integrator in the reports is suppressed.

The integrator can be used to determine a total flow volume or a liquid level, for instance, and to present it on the diagram.

Example

A sensor at analog input 1 provides a signal that is proportional to a flow rate (m^3/h). The quantity (m^3) which has passed through is to be measured using the integrator.

The following settings are required:

Parameter	Unit/selection	Description
Configuration ➔Analog inputs ➔ Analog input 1 ➔ Addit'l parameters ➔ Unit	m^3/h	Sensor signal proportional to the flow rate in m^3/h
Configuration ➔Analog inputs ➔ Analog input 1 ➔ Addit'l parameters ➔ Integrator time base	hour	The flow is measured in m^3/hour (h).
Configuration ➔Analog inputs ➔ Analog input 1 ➔ Addit'l parameters ➔ Integrator unit	m^3	In the reports, the quantity which has passed through is indicated in m^3. The maximum integrator value is 99999.

2 Instrument description

2.7 Operating modes

3 operating modes

The instrument has 3 operating modes:

- normal operation
- timed operation
- event operation

The following settings can, for instance, be made for each of the three operating modes:

- stored value
- storage rate

Stored value

The stored value determines whether the average, minimum or maximum value of the time interval between two storage cycles or the instantaneous value is stored.

Storage rate

The storage rate determines the time interval between 2 stored values. The diagram speed corresponds to the storage rate, i. e. at a storage rate of 5 sec, for example, the stored value is entered in the diagram every 5 sec.

Normal operation

Normal operation is active if no event or timed operation is active.

Timed operation

For timed operation, a period of time can be determined (24 hours max.) within which a specific stored value and a specific storage rate are active.

Event operation

Event operation is active as long as its operating signal (⇨ page 64) is active. Event operation can be used, for instance, to shorten the storage rate if a combination alarm is present.

Priority

The respective priorities of the operating modes are allocated as follows:

Operating mode	Priority
Normal operation	3
Timed operation	2
Event operation	1

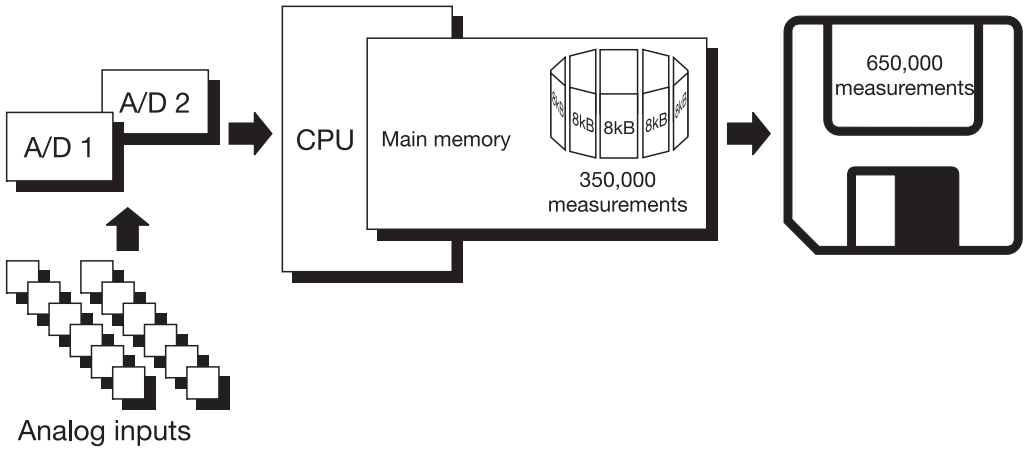
Active operating mode

The active operating mode is indicated in the horizontal and vertical diagrams by the background color of the display for the diagram speed:

Operating mode	Color
Normal operation	gray
Timed operation	blue
Event operation	orange

⇨ Section 3.2.1 “Vertical diagram”
Section 3.2.2 “Horizontal diagram”

2.8 Data storage



Recording capacity

- RAM: approx. 350, 000 measurements
- diskette: approx. 650, 000 measurements

Storage rate

Different storage rates, ranging from 125 msec to 32767 sec, can be configured for normal, event and timed operation under group configuration.

The storage rate determines the time interval at which measurements are stored.

Stored value

The value to be stored (average, minimum or maximum of the last storage period or instantaneous) is configured separately for normal, event and timed operation under this parameter.

Recording format

The data are recorded in encoded form in a company-specific format.

Recording duration

The recording duration depends on several factors:

- number of analog and digital channels being recorded
- storage rate
- number of events in the event list
- number of reports running

☞ The setup program (extra code) calculates the recording duration for the preset configuration.

Saving to diskette

The paperless recorder has been factory-configured for automatic saving of the measurement data to diskette. This can be switched off, if required.

⇨ For further important information, please see next page.

By altering the parameter *Configuration* ➔ *Grp configuration* ➔ *Group 1 — 6* ➔ *Event operation* ➔ *Operating mode,* saving to diskette can be deliberately prevented.

Parameter "*Operating mode*"	Effect
Event oper. 1	Data are saved to diskette irrespective of the active operating mode (normal/event/timed operation).
Event oper. 2	Data are saved to diskette only with the active operating mode "Event operation". The last data block before the activation of event operation will also be saved. The history leading up to the event is thus recorded.

The factory default setting is "Event oper. 1", which means that the most recently filled 8kB block is written to diskette.

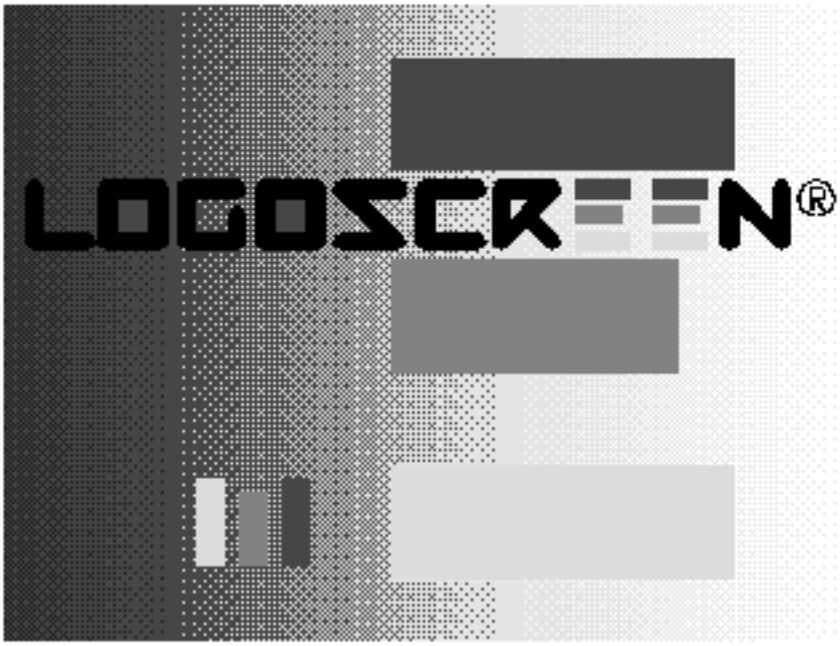
Optimization of recording duration

The recording duration can be optimized by process-oriented selection of the storage rate.

During normal operation (no fault, no alarm, ...) a storage rate as high as possible should be selected (e. g. 60sec, 180sec, …), depending on the specific application.

In the event of an alarm or a fault, the storage rate can be shortened via event operation, which ensures that the measurement data are recorded with a high degree of accuracy.

After starting up the paperless recorder by applying the supply voltage (power ON), the start logo appears (company logo).



During the screen build-up, the recorder is initialized with the data of the most recent configuration. The start logo can be blanked out using the so-called “undocumented parameter” of the setup software (extra code). A customer-specific logo can be implemented on request.

☞ After the initialization phase, the presentation at visualization level that was selected last is shown, if this was active before disconnecting the instrument from the supply (power OFF).

Otherwise the start menu is displayed.

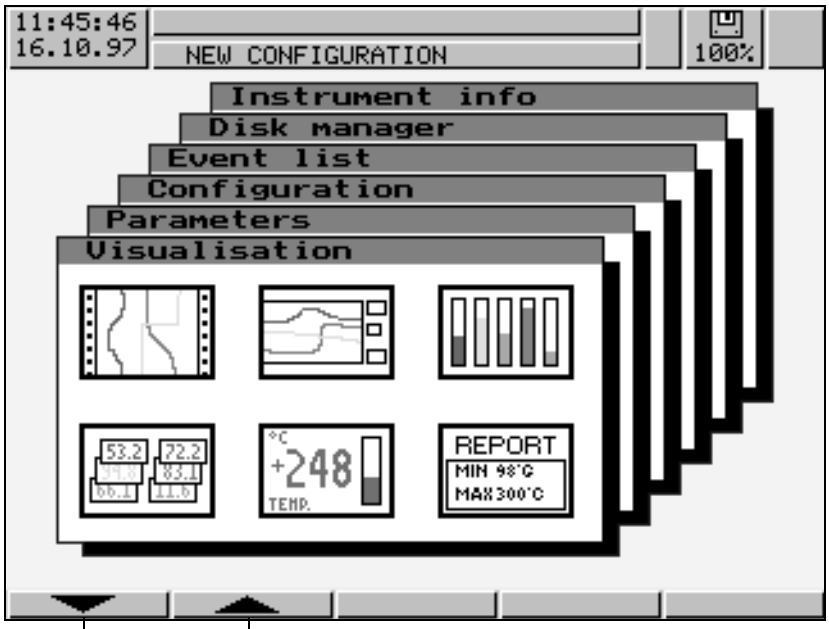
3 Operation and visualization

3.1 Start menu

The start menu is the central point from which the various levels of the instrument branch out.

The following levels are available:

- Visualization
- Parameter setting
- Configuration
- Event list
- Disk manager
- Instrument info



* Select required level
* Confirm selection with ENTER

The start menu is displayed

- on pressing the MENU key[1]
- on (repeatedly) pressing the EXIT key.

1. not from the configuration level,
   if a parameter has already been altered there.

3.2 Visualization

Start menu ➔ visualization

On selecting the level *Start menu* ➔ *Visualization*, the group manager appears.

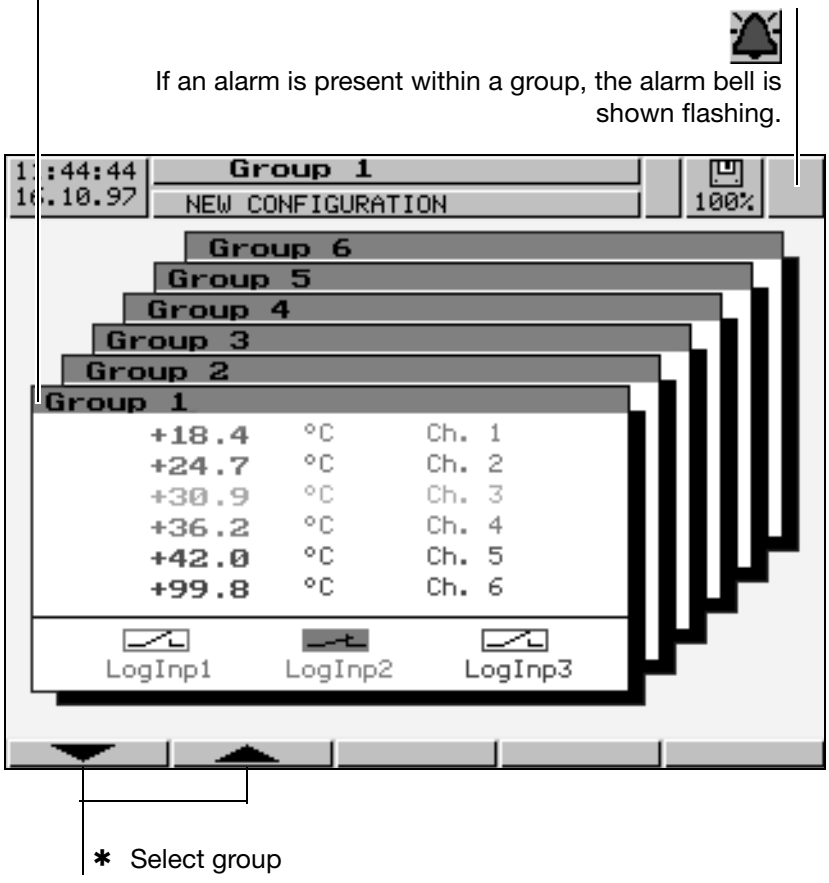
Group manager

The instrument manages six visualization groups of measurement inputs. Each group can consist of up to six analog and three digital channels.

Operation within the visualization level is always group-oriented.

Group window
The current analog and digital measurements,
as well as the channel name are displayed here.
The group name is shown on a red background in the window title if an alarm is present within the group. The measurement of the channel which triggered the alarm is also shown on a red background.

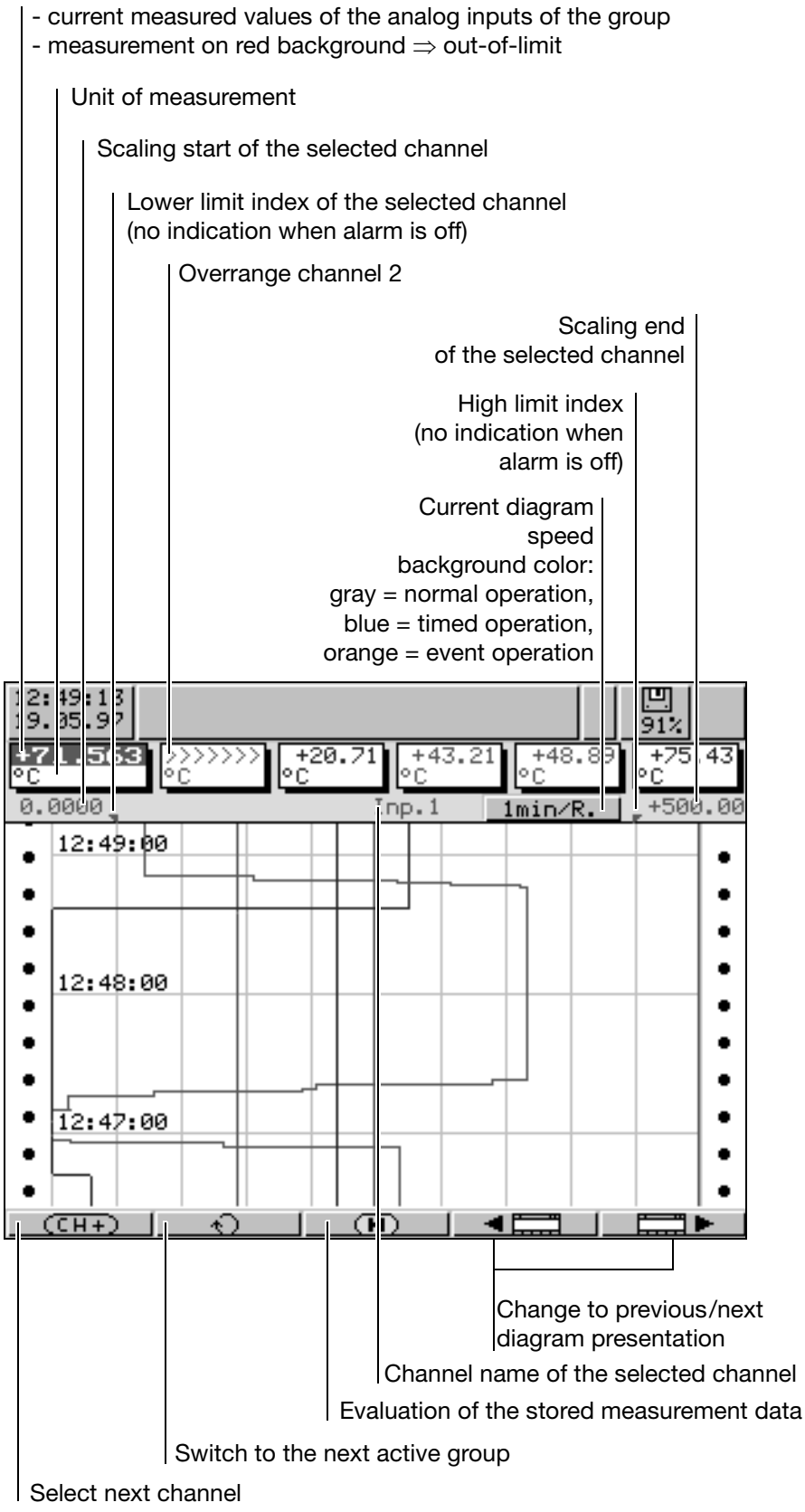
If an alarm is present within a group, the alarm bell is shown flashing.



☞ Confirmation of a group with ENTER is followed by a switch to vertical diagram presentation.

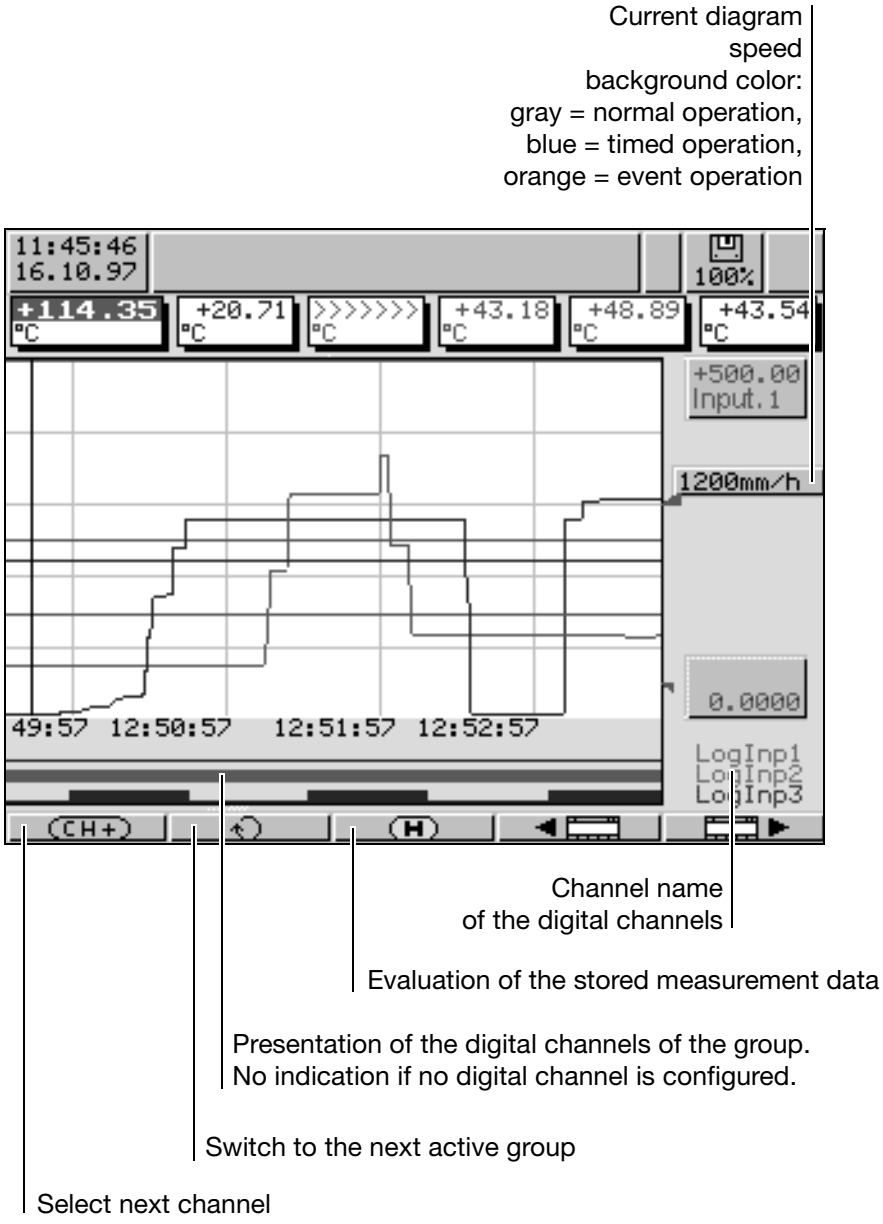
3.2.1 Vertical diagram

The vertical diagram presentation can be reached from the group manager after a group has been selected.



3.2.2 Horizontal diagram

In the horizontal diagram, the analog and, in addition, the digital channels of a group are registered horizontally from left to right.



3.2.3 Evaluating the stored measurement data

☞ It is possible to evaluate the measurement data of a group if the status of the group *(Group status*) has been configured as *Displ.+store*.

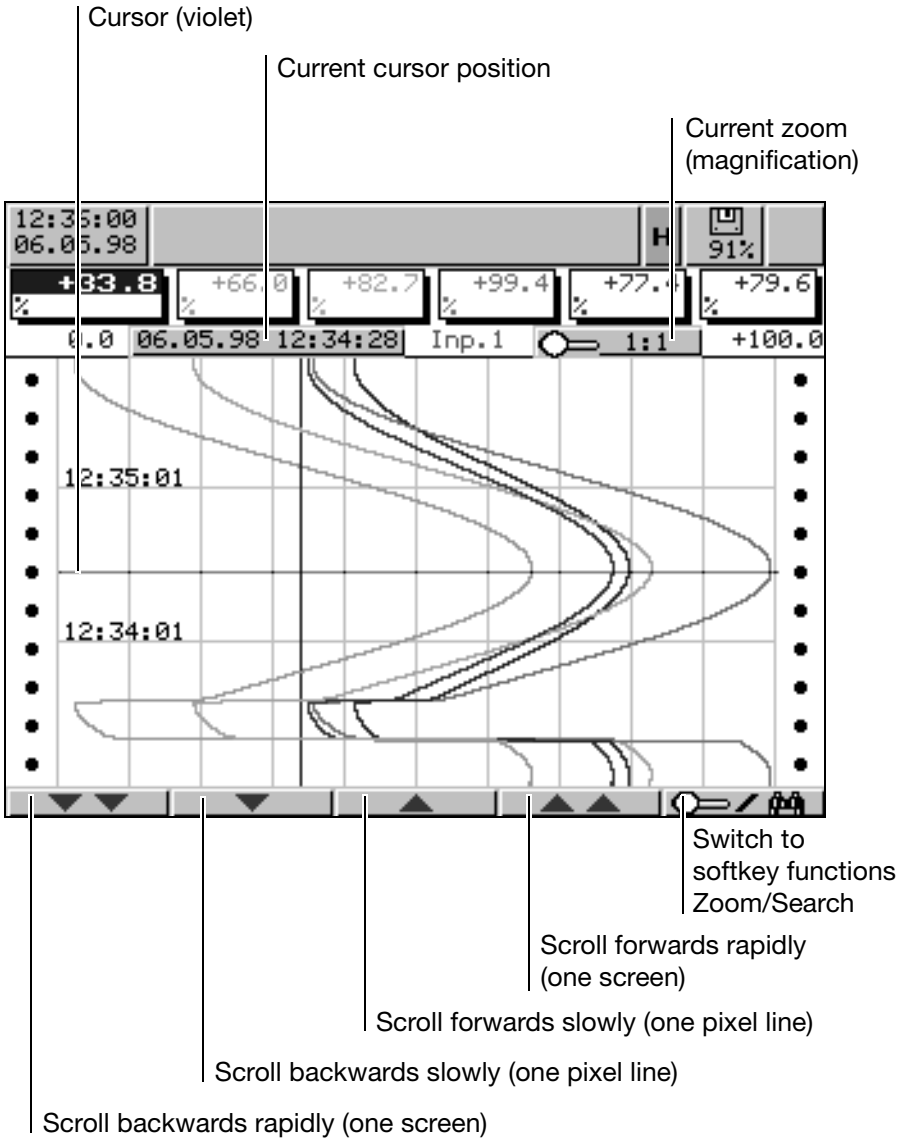
History

The measurement data can be evaluated in the horizontal and vertical diagrams.

Since the same principle applies to both presentation types, the example describes the vertical presentation.

During evaluation the function of the softkeys changes, the current zoom factor and the position of the cursor (date and time) are also indicated.

Scroll operation



The presentation of the measurement data on the screen can be scrolled (shifted) within the measurement data stored in SRAM.

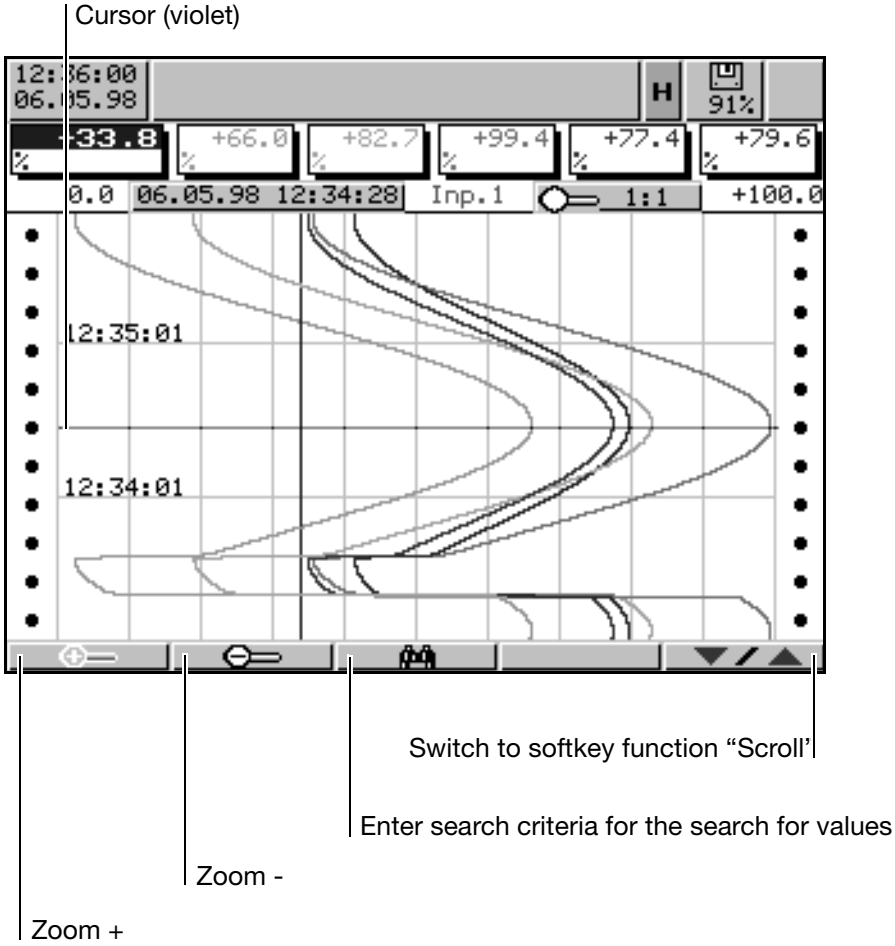
Zoom

If the zoom factor is to be altered or values are to be searched for, then the softkey functions must be switched.

* Press softkey 

The degree of compression of the measurement data on the screen is indicated in steps (1:1, 1:2, 1:5, 1:10, 1:20, 1:50 and 1:100).

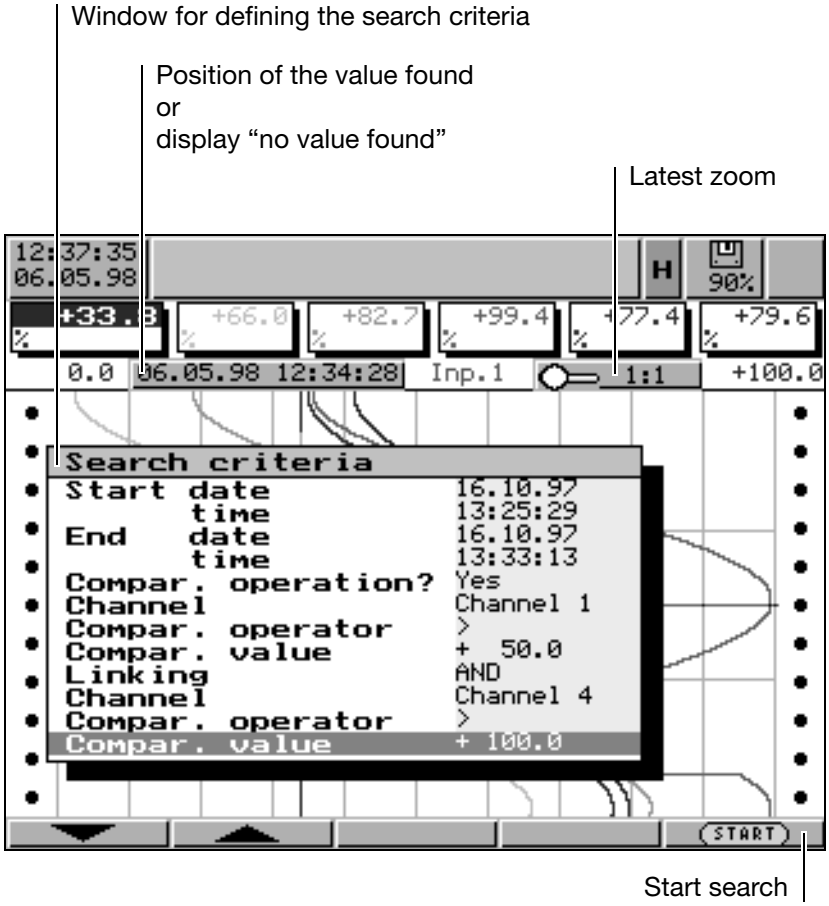
For instance, 1:100 means that 1 pixel on the screen equals 100 measured values.



Search criteria

Several search criteria can be employed in the search for values:

- Limitation to a time period within the stored measurement data.
  Without input of a comparison operator, a search is made for the set instant of time. The measurements of the set instant of time are displayed, if they exist.
- Comparison of the measurements of a channel against a comparison value. If the search has been successful, the position is shown in the centre of the screen below the cursor.
- Linkage (AND, OR) of the measurement test of a channel with a second measurement test of the same or another channel.



The example above shows the search for the first occurance of the measurment above 50 on channel 1 on 06.05.98 in the time period from 12:18:15 to 12:37:28 hours.

Search result

Two results are possible:

- no (further) value is found
  (display “no value found”)
- a value which fulfils the search criteria is found

“no value found”

If no (further) value was found, the text “no value found” is shown in the cursor position field.

Value found

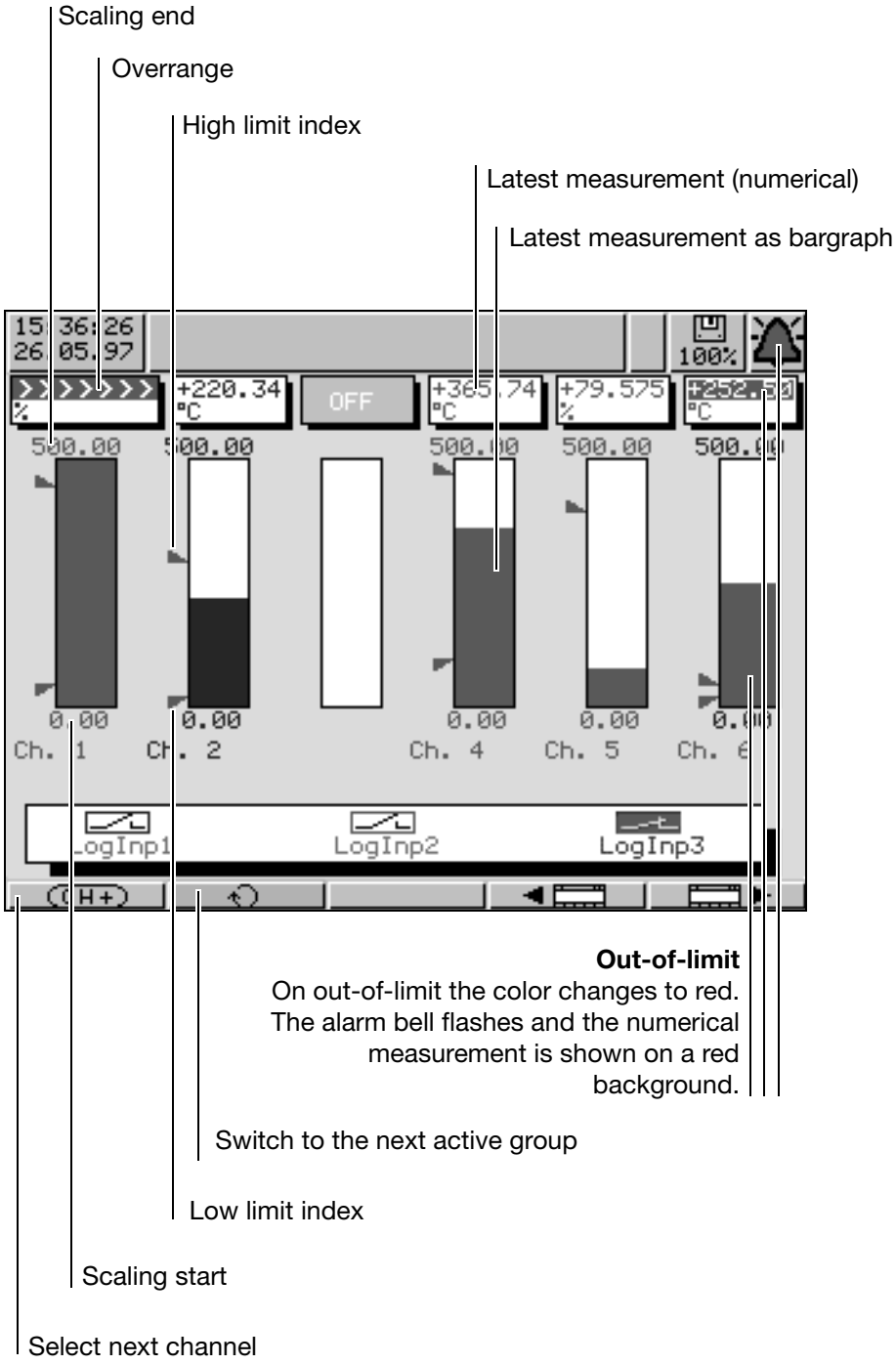
If a (further) value was found, the presentation of the measurements is shifted in such a way that the value which was found is shown in the centre of the displayed range. The cursor (violet line) is positioned there.

Continue search

If a (further) value which meets the search criteria was found, this softkey can be used to search for further values until no further value is found.

3.2.4 Bargraph presentation

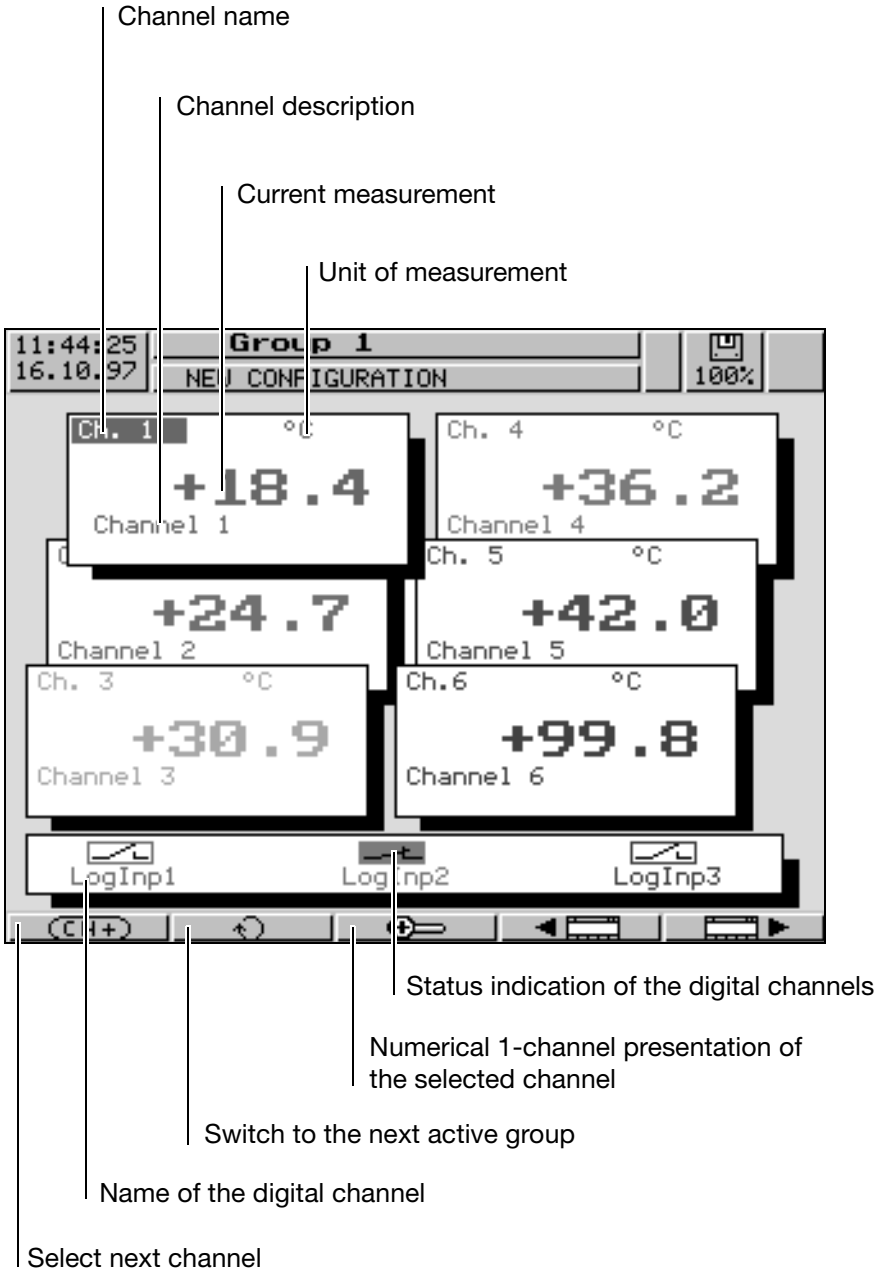
In the bargraph presentation, the latest measurements of the group are shown as bargraph in addition to the numerical display.



3.2.5 Numerical presentation

In the numerical presentation, the currently measured values of a group are shown in large characters. The exact measurements can then be read easily from a distance of several metres.

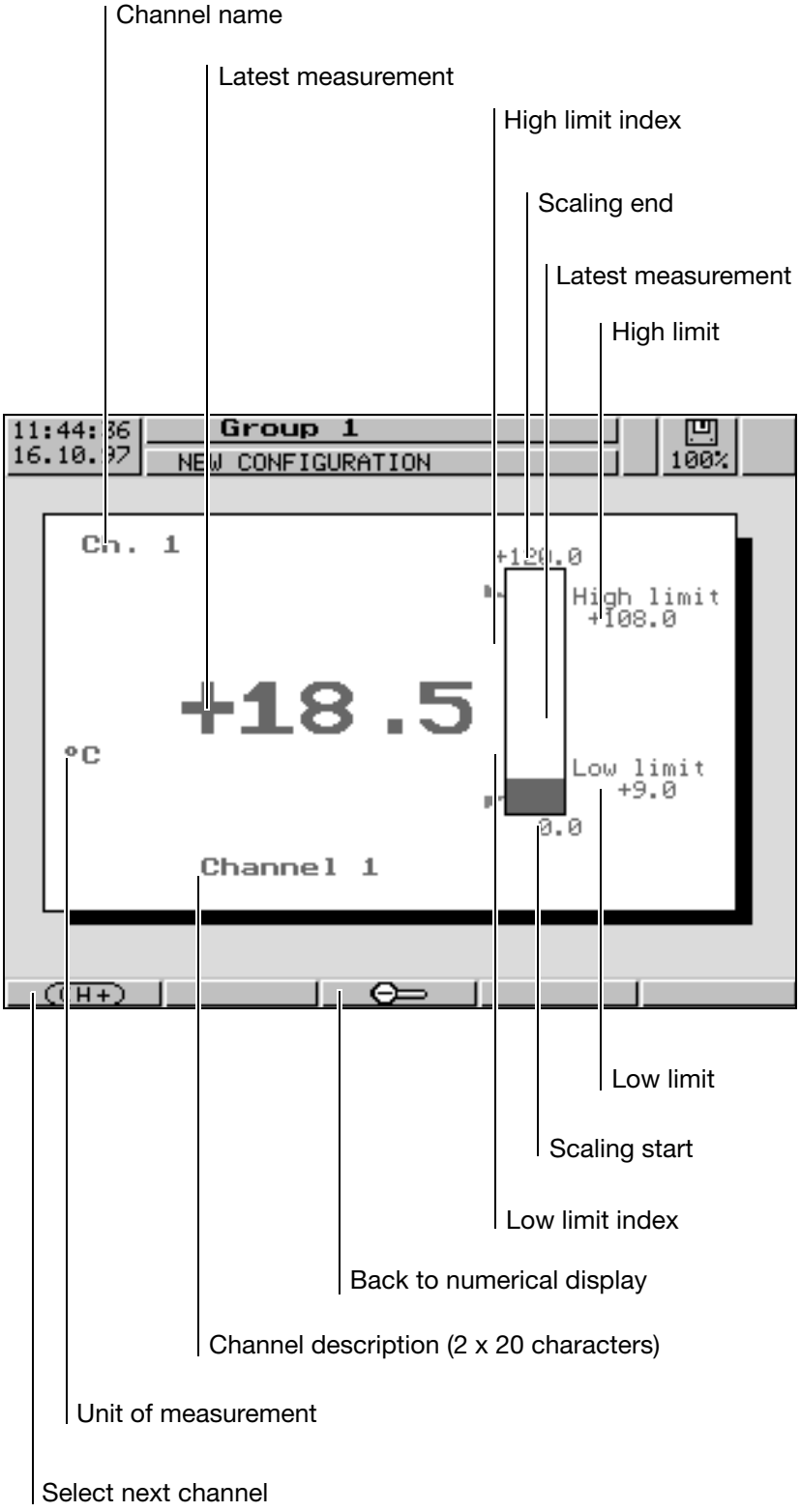
The window of the selected channel is in the foreground so that the channel name, description and unit can be seen.



3.2.6 Numerical 1-channel presentation

The numerical 1-channel presentation is called up from the numerical presentation through the softkey  .

In the numerical 1-channel presentation, the latest measurement of a channel is shown in large letters both numerically and as a bargraph.



3.2.7 Reports

Definition

A report is a set of statistics covering a specific period of time which contains the minimum, maximum, average and, if appropriate, the integration value.

Types

The recorder can run five different types of report:

- Period report
  (a report of a specific length of time which is repeated periodically)
- External report/batches
  (a report which is activated by an operating signal, e.g. logic input, alarm, fault, memory alarm, …).
- Daily report
- Monthly report
- Annual report

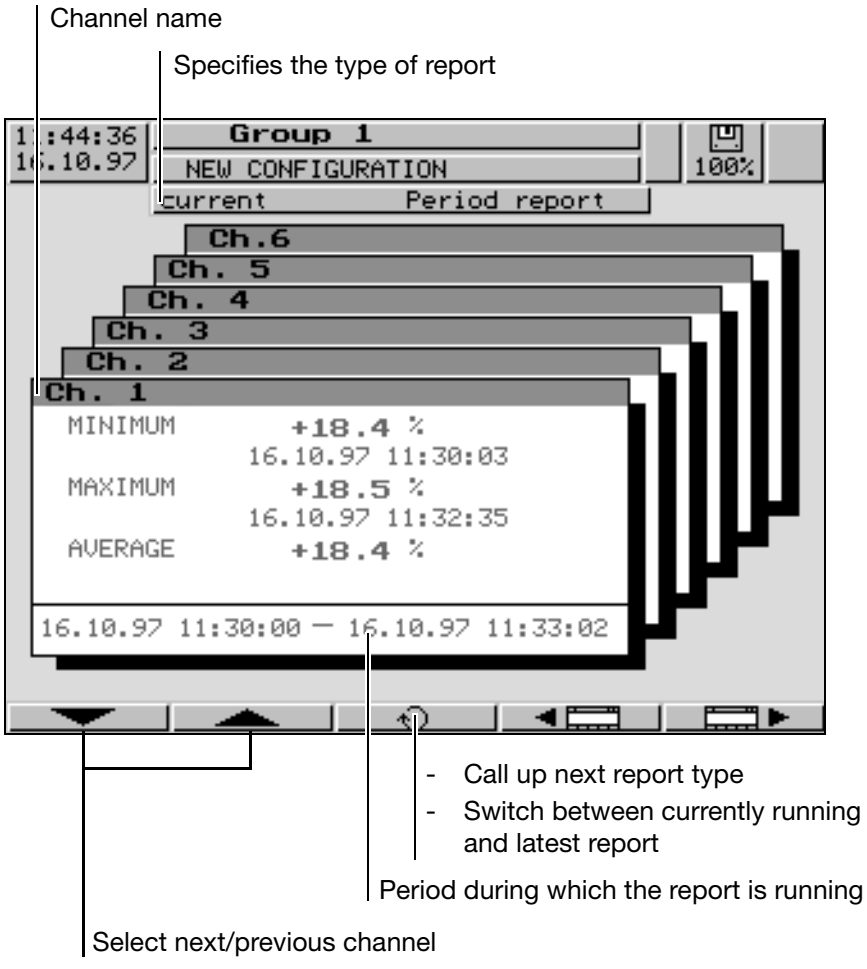
Synchronization time

All reports, apart from the external report, will be repeated according to a synchronization time which can be configured (⇨ page 66ff).

Current/completed report

For each type of report, the currently running report and the latest completed report can be displayed.

⇨ Section 2.6 “Integrator”



3.2.8 Batch reports

Batch reporting enables the creation of a flexible form to describe a batch process within the recorder. It can only be made parallel to an external report and is active when the parameter *Configuration* ➔ *Report/Batches* ➔ *Ext.Report/Batches* ➔ *Status* has been configured to “E.R.+batches” .

Batch reporting (external report) can be operated through

- the internal logic inputs 1 — 7,
- the external logic inputs 1 — 6,
- the alarms of the groups 1 — 6,
- the combination alarm and the
- Modbus flag.

The selection is made using the parameter *Configuration* ➔ *Report/Batches* ➔ *Ext.Report/Batches* ➔ *Operating signal*.

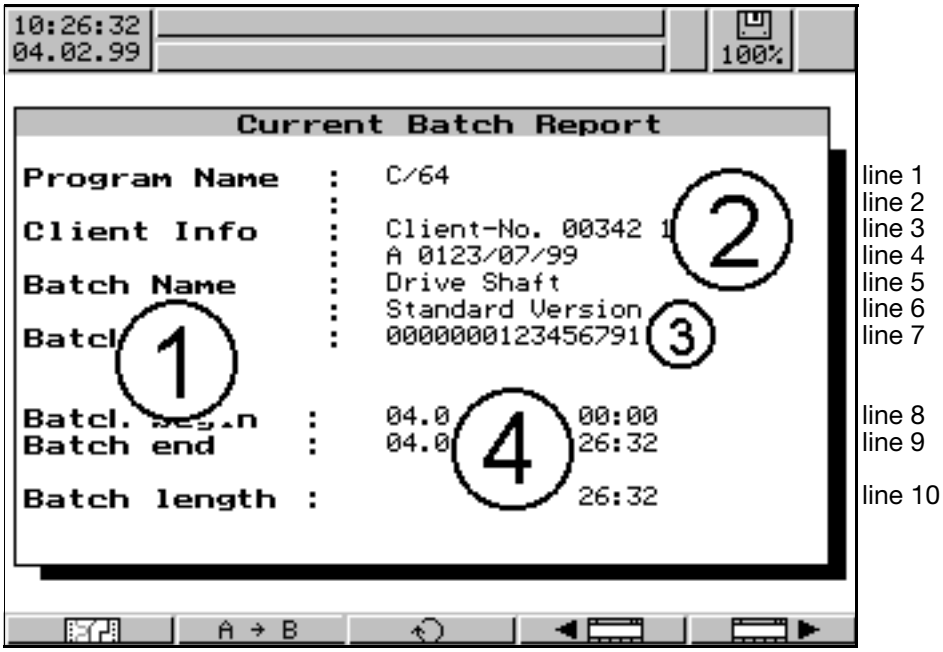
Two different screen presentations are available for batch reporting:

- Current batch report
- Completed batch report

The batch reporting function is described more fully on the following pages.

3 Operation and visualization

General



The screen arrangement is identical for both batch reports. It consists of 10 screen lines and 2 columns.

The left column “Text field (1)” contains text which describes the text in the right column “Text fields (2), (3) and (4)”. Text field (2) is used for “general batch texts”, text field (3) for the designation of the “batch number”, and text field (4) defines the “time report”.

The table below describes by which means the individual text fields can be configured.

Text field	Setup program	Text editor	automatic	Serial interface
(1)	yes	yes		
(2)		yes		yes
(3)		yes	yes	
(4)			yes	

Text field (1)

Text field (1) has to be set up before starting up the system. Each line consists of a maximum of 15 characters. If a line is completely filled with empty spaces, then the entire line is inactive.

Text field (2)

Text field (2) “lines 1 — 6” can be written in as long as the batch is not completed. Each line can hold text with a maximum of 20 characters.

The lines 1 — 4 are programmed using the text editor that is integrated in the paperless recorder (key A → B) or via the serial interface.

The text in line 5 is selected by calling the key A → B from the internal text list of the recorder. This requires that the parameter *Configuration* ➔ *Report/Batches* ➔ *Ext.Report/Batches* ➔ *Batches* ➔ *Number of list texts* has been selected greater than 0, and that the texts (*Configuration* ➔ *Texts*) have been adapted to suit, if necessary. The parameter “Number of list texts” always refers to the beginning of the list. For example, if the parameter is set to 4, the texts “Text 1” to “Text 4” can be selected in line 5.

The text in line 6 is selected from the internal text list of the recorder through linkage of the internal logic inputs. The parameter *Configuration* ➔ *Report/Batches* ➔ *Ext.Report/Batches* ➔ *Batches* ➔ *Binary-linked text* is available for this purpose.

Parameter *Configuration … Binary-linked text*	Number of possible texts
Off	0
Logic inp1-2	4
Logic inp1-3	8
Logic inp1-4	16
Logic inp1-5	32

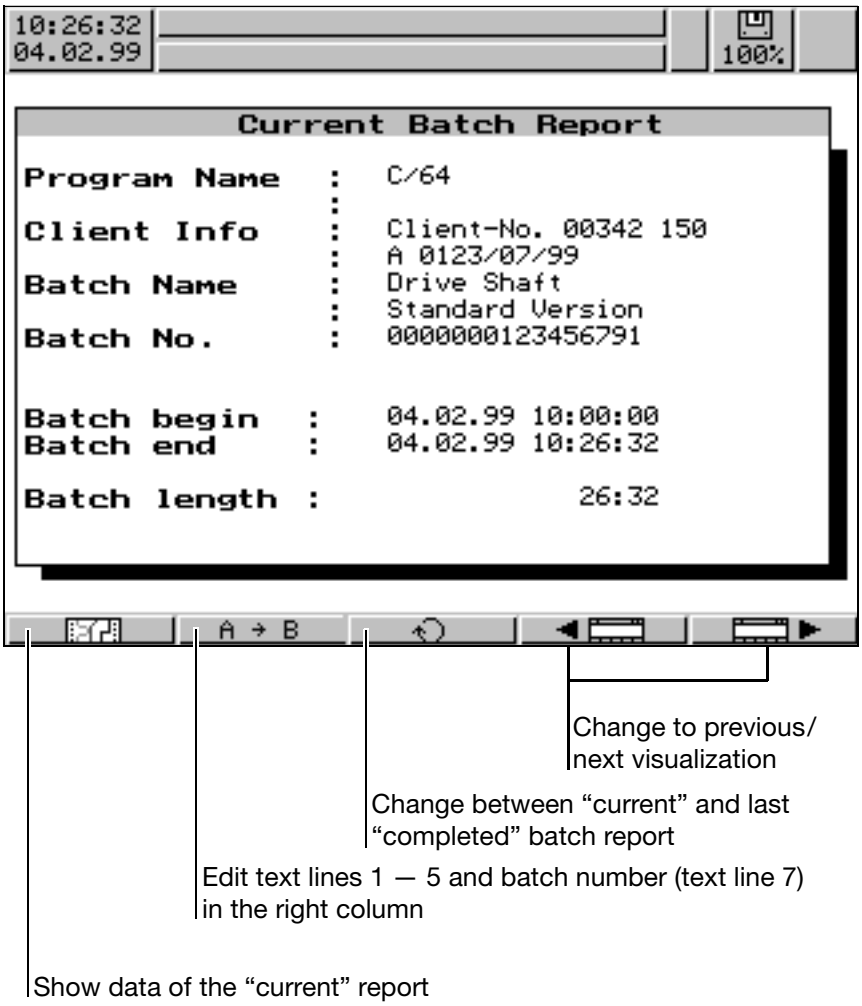
Text field (3)

Text field (3) (line 7) can be written in as long as the batch has not been completed. The internal text editor (key A → B) can be used to input any number of up to 16 characters. After the batch has been completed, the batch number is automatically incremented.

Text field (4)

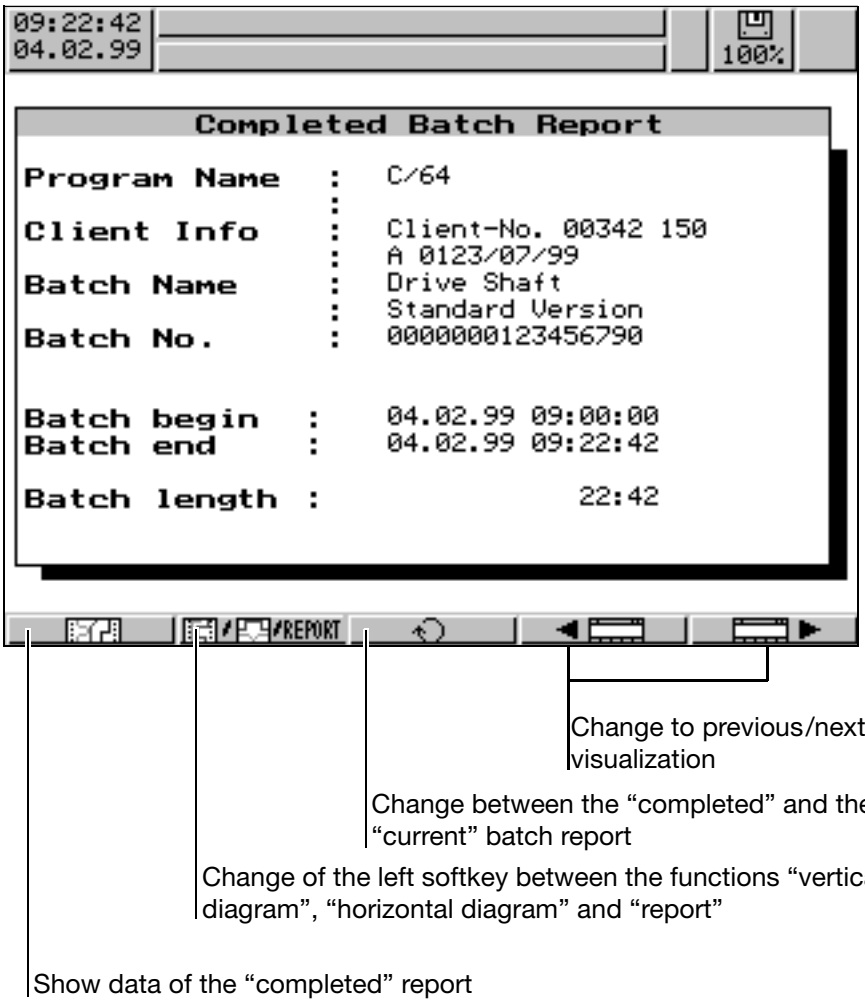
Text field (4) is filled in automatically by the paperless recorder and cannot be altered.

Current batch report



Only here, in the current batch report, can the texts in the right column be edited.

Completed batch report



/REPORT

By pressing the softkeys, the functional assignment of the left softkey changes between

- vertical diagram ,
- horizontal diagram and
- report REPORT.

The softkey function selected here also applies to the presentation of the current batch report.

REPORT

By pressing the left softkey, the data of the “completed” or “current batch report” are shown in accordance with the currently assigned function.
Section 3.2.3 “Evaluating the stored measurement data” provides information on how to operate the “vertical” and “horizontal diagram“ presentation. Pressing the EXIT key calls up the batch report again.

3.3 Parameter setting

At the parameter level, the following can be set:

- Contrast
- Speed indication
- Display off

Contrast

The contrast of the screen can be set here. This makes it easier to read the screen, even in poor lighting conditions.

Speed indication

Here, the speed indication in the vertical and horizontal diagrams can be set to “Time/div” or “mm/h”.

Example: A speed of 1 h/div corresponds to 22 mm/h.

Display off

To save the screen, a time (0 — 32767 min) can be set here. If no key is operated during the period which was set, then the display goes dark. The power LED blinks during screen saving.

When 0 min is set, screen saving is inactive.

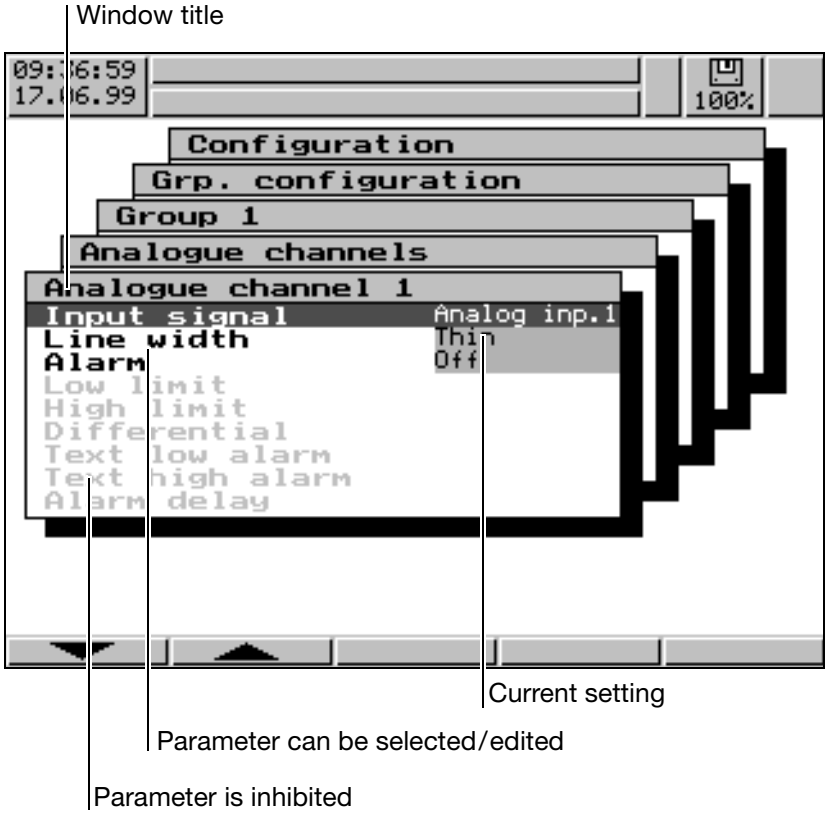
☞ All the parameters are selected using the keys ▼ and ▲. When *Display off* is entered, the keys ▼ and ▲ are required in addition.

3.4 Configuration

Calling up the configuration level is followed by a password query. This prevents unauthorized alteration of the configuration, for example.

Window technology

As for the other levels, the configuration principle is based on menu-guided window technology. Individual menu items can be selected in the windows. The window title describes the contents of the window.
When a menu item has been selected, a further window is opened with new menu items until the required parameter is finally reached. If several windows are open, the window titles assist in orientation.



The configuration of the paperless recorder is divided into the following sublevels:

- Instrument data
- Analog inputs
- Digital signal name
- Group configuration
- Outputs
- Operating functions
- Report/batches
- Texts
- Interface

The individual parameters are listed in Section 4.2 “Table of configuration parameters”.

3 Operation and visualization

3.5 Event list

Events

Various events can initiate texts in the instrument which are included in the event list and saved in RAM or on diskette. Events may be:

- Alarms triggered by out-of-limits on individual channels,
- External texts triggered through logic inputs,
- System messages (e.g. power ON/OFF, summer/winter time changeover),
- Incrementing/decrementing an (event) counter (usually triggered through a logic input).

Event definition

For all events, except for system messages, it is possible to configure whether:

- the message text is to be included in the event list,
- the standard text internal to the instrument
- or one of the texts (see below) is used.

Text assignment

The texts (standard texts including 36 texts which can be freely defined) are assigned to the events at the operating level “Configuration” (⇨ Chapter 4 “Configuration parameters”).

Freely definable texts

36 texts belonging to the group of standard texts can be freely defined up to a length of 20 characters.

Standard texts

The instrument offers standard texts as listed in the following table:

Standard text	Note
Gr*x* Chann*y* low alarm ON Gr*x* Chann*y* low alarm OFF Gr*x* Chann*y* high alarm ON Gr*x* Chann*y* high alarm OFF Logic input x ON Logic input x OFF	*x* = group number *y* = channel number
Power ON Power OFF Data lost Summer time start Summer time end New configuration	
Counter 1: +*xxxxx* Counter 2: +*xxxxx*	5 digits plus sign, no decimal place
“Text 1 — 36” In the case of digital signals and alarms, the extension text ON or OFF is added automatically, on counters the current count is added.	36 freely definable texts with 20 characters each

Extension text

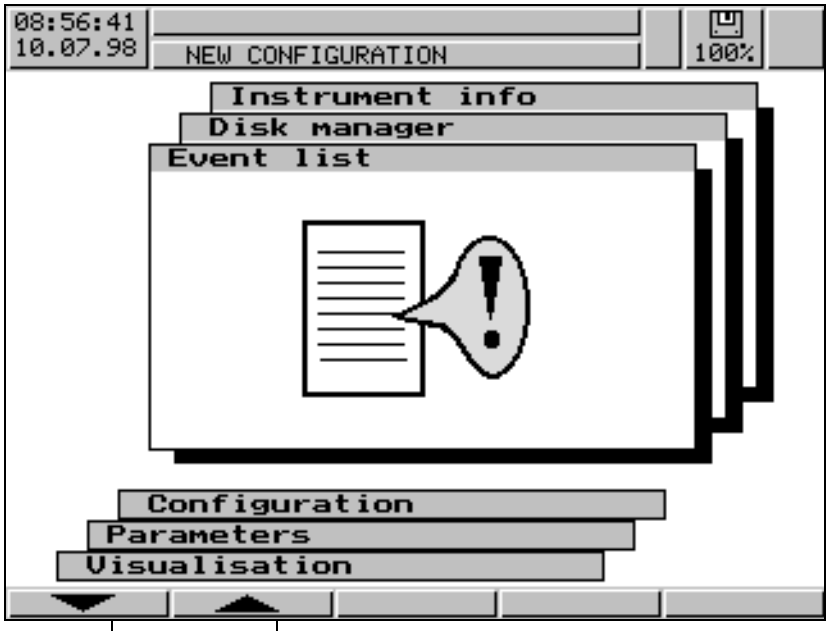
The instrument automatically supplements the texts by ON or OFF so that it is possible to distinguish between the incoming and the outgoing signals.

Example:

Standard text	Extension text	Entry in the event list
Logic input 2	ON	Logic input 2 ON
Logic input 2	OFF	Logic input 2 OFF

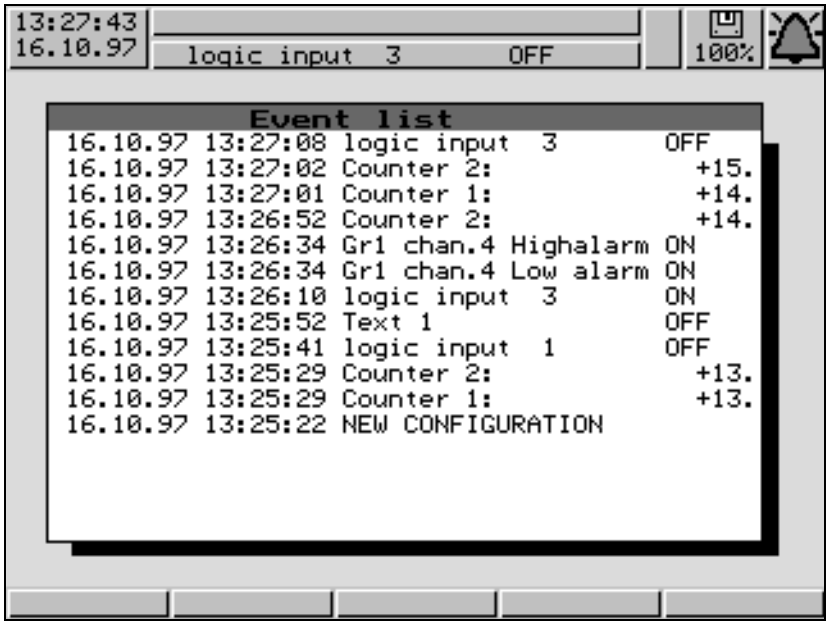
Start menu → Event list

The event list is called up from the start menu:



* Select operating level *Event list*
* Confirm selection with ENTER

Event list



3.6 Disk manager

Automatic storage of the measurement data

As a standard feature, the data stored in the measurement data memory (SRAM) of the paperless recorder are saved at regular intervals to the diskette of the recorder. The evaluation program of the PC (⇨ Chapter 6 “PC evaluation program”) reads the data from a diskette and provides convenient functions for the evaluation.

The stored data on the diskette and in SRAM are erased when the configuration is changed.

If the parameter *Configuration* ➔ *Grp configuration* ➔ *Group 1—6* ➔ *Event operation* ➔ *Operating mode* has been changed to “Event oper. 2”, the measurement data are saved to diskette in the “Event operation” mode only.

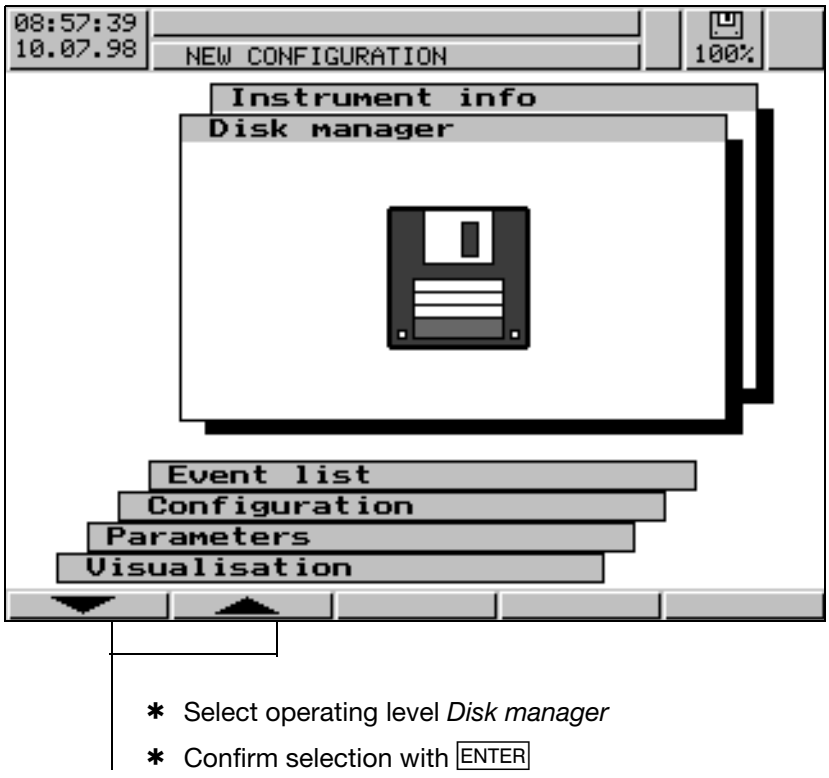
Loading and saving the configuration data

The configuration data can be loaded from and saved to diskette. A configuration can thus be copied from one instrument to another.

When the configuration data are stored, the inserted diskette will be overwritten. Measurement data which are already stored, or other data on the diskette, will be lost.

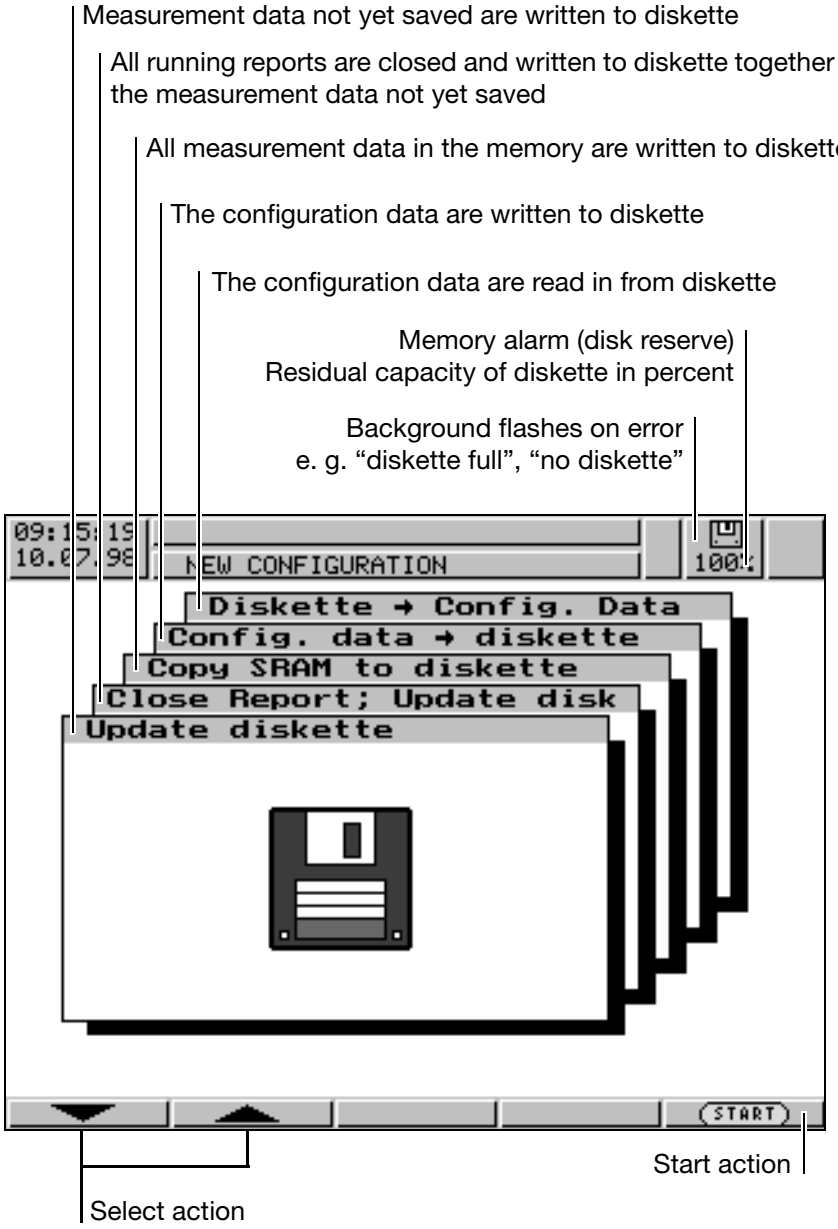
Start menu ➔ disk manager

The disk manager is called up via the start menu:



* Select operating level *Disk manager*
* Confirm selection with ENTER

Disk manager



☞ The function “copy SRAM to diskette” is available for salvaging data when the orignal diskette is no longer available.

Status messages

Status messages of the disk manager are displayed in the corresponding action window. The following status messages are possible:

Status messages	Description
DISKETTE UPDATED	Directly before removing the diskette from the instrument, it is necessary to call up *Update diskette* so that all the measurement data up to the time of the removal are contained on the diskette. The data not yet saved since the last automatic save are written to diskette.
DISKETTE NOT UPDATED	An error has occured during updating. This message may have several causes. Remedy: repeat procedure
INITIALIZING DISKETTE	The instrument recognizes when new or foreign diskettes are inserted.  New or foreign diskettes are overwritten **without** a confirmation query.
NO DISKETTE	If there is no diskette in the instrument, the diskette symbol flashes in the status line.
DISKETTE WRITEPROTECTED	Cannot write to the inserted diskette because it is write protected. Remedy: remove write protection
DISKETTE FAULTY	An error has occured while writing to diskette. The diskette is faulty. Remedy: insert new (DOS-formatted) diskette.
DISKETTE FULL	If the diskette is full, the diskette symbol in the status line flashes. No more data are written to diskette. Remedy: insert an empty diskette before the measurement data memory of the recorder is also full. If this is not done, measurement data will be lost.

Memory alarm

At the configuration level, a percentage can be defined under *Instrument data* ➔ *Memory alarm.* When the remaining capacity of the inserted diskette or the internal memory (RAM) reaches this percentage, the signal “Memory alarm” is activated. It can be used for operating a relay, or for switching over to event operation.

Using the parameter *Instrument data* ➔ *Memory upload,* you can define how the measurement data are read.

(Diskette reserve)

Upload memory = with diskette

The value programmed under *Memory alarm* is only effective for the disk reserve with this setting. A diskette is shown in the status line of the paperless recorder.

(Memory reserve)

Upload memory = via RSxxx

Using this setting, the memory alarm is triggered by the free memory space in the internal RAM, and not by the available space on the diskette. “Free memory space” means the memory space that is available before data are overwritten which have not yet been uploaded to the communications server via the serial interface.
A RAM block appears in the status line of the paperless recorder.

Further notes can be found under:

⇨ Section 2.8 “Data storage”
Section 2.4 “Digital signals”
Chapter 4 “Configuration parameters”

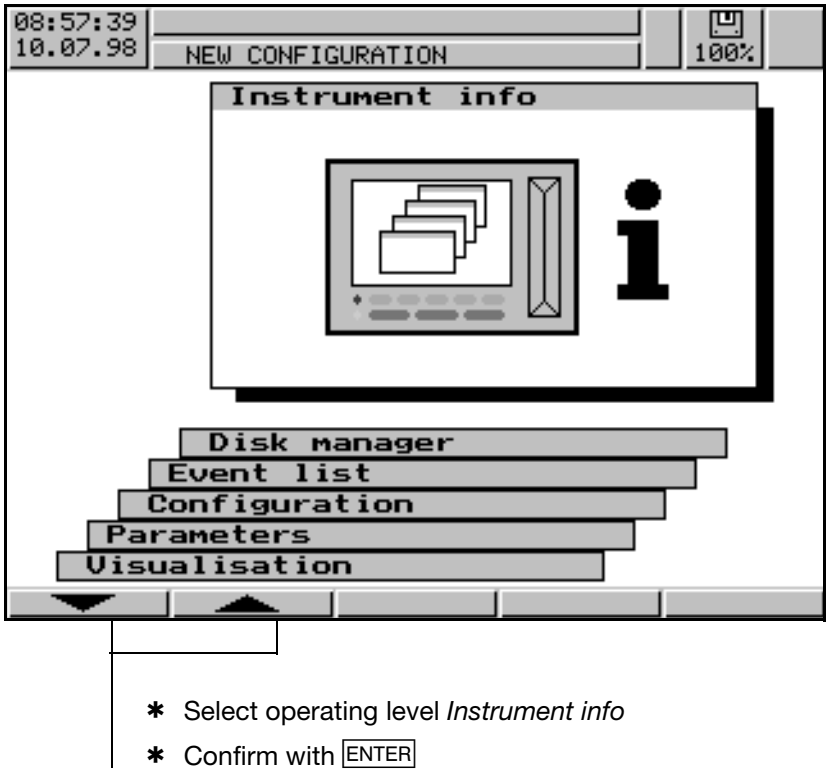
3 Operation and visualization

3.7 Instrument info

The instrument info window displays general information about the instrument. It also includes errors “battery \x83” and “Data lost”. If one of these instrument errors is present, the info symbol in the status line flashes.

Start menu → Instrument info

The instrument info is called up from the start menu:



* Select operating level *Instrument info*
* Confirm with ENTER

Instrument info

Error

The following errors are possible:

Error	Description
none	Instrument o.k.
Data lost	A discharge of the lithium battery/storage capacitor occured during the last lengthy mains interruption. This results in the loss of the measurement data stored in SRAM. The clock is set to 01.01.97, 00:00:00 hrs. Remedy: For instruments with a storage capacitor: reset the time (⇨ page 54). For instruments with a lithium battery: return instrument to the supplier for a change of battery
Battery ↓	The lithium battery is discharged. Remedy: Return instrument to the supplier for a change of battery.

☞ Data can be lost after separating the instrument from the mains voltage: after more than 4 years on instruments with a lithium battery, and after more than 2 days on instruments with a storage capacitor (ambient temperature 15 — 25°C)

3 Operation and visualization

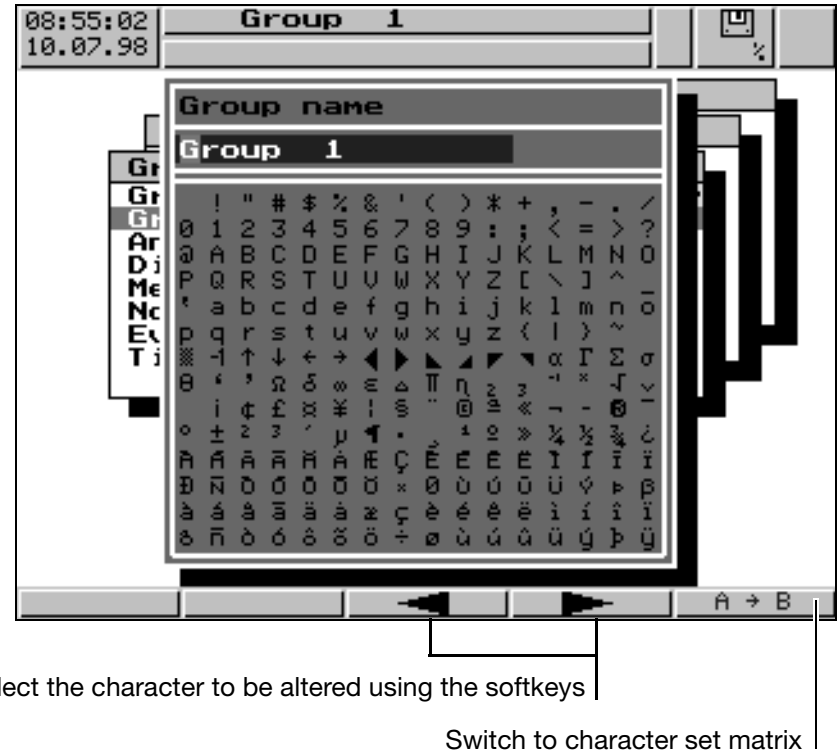
3.8 Text input

Input options

The configurable texts can be input either through the setup program or directly on the instrument. This section describes the input on the instrument.

Character selection

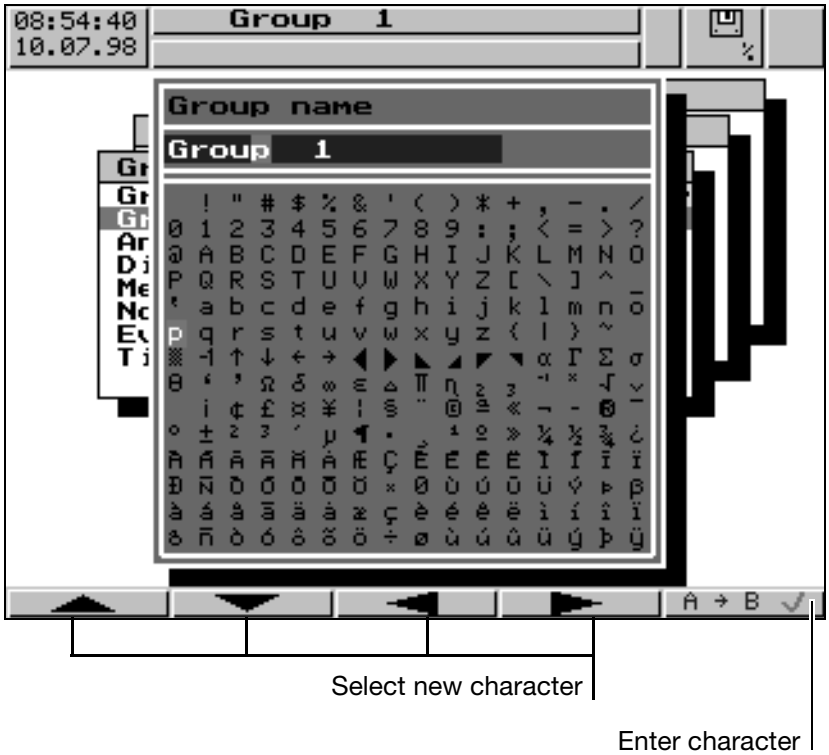
The display below is shown when a text (e. g. *Configuration* ➔ *Grp configuration* ➔ *Group 1* ➔ *Group name*) is selected at the configuration level for editing using ENTER.



After the character to be altered has been selected and the switch made to the character set matrix, the cursor is positioned on the current character in the character set matrix.

Character input

The softkeys change their function, as can be seen from the picture below.



After the entire text has been input, it can either be entered or all alterations can be cancelled.

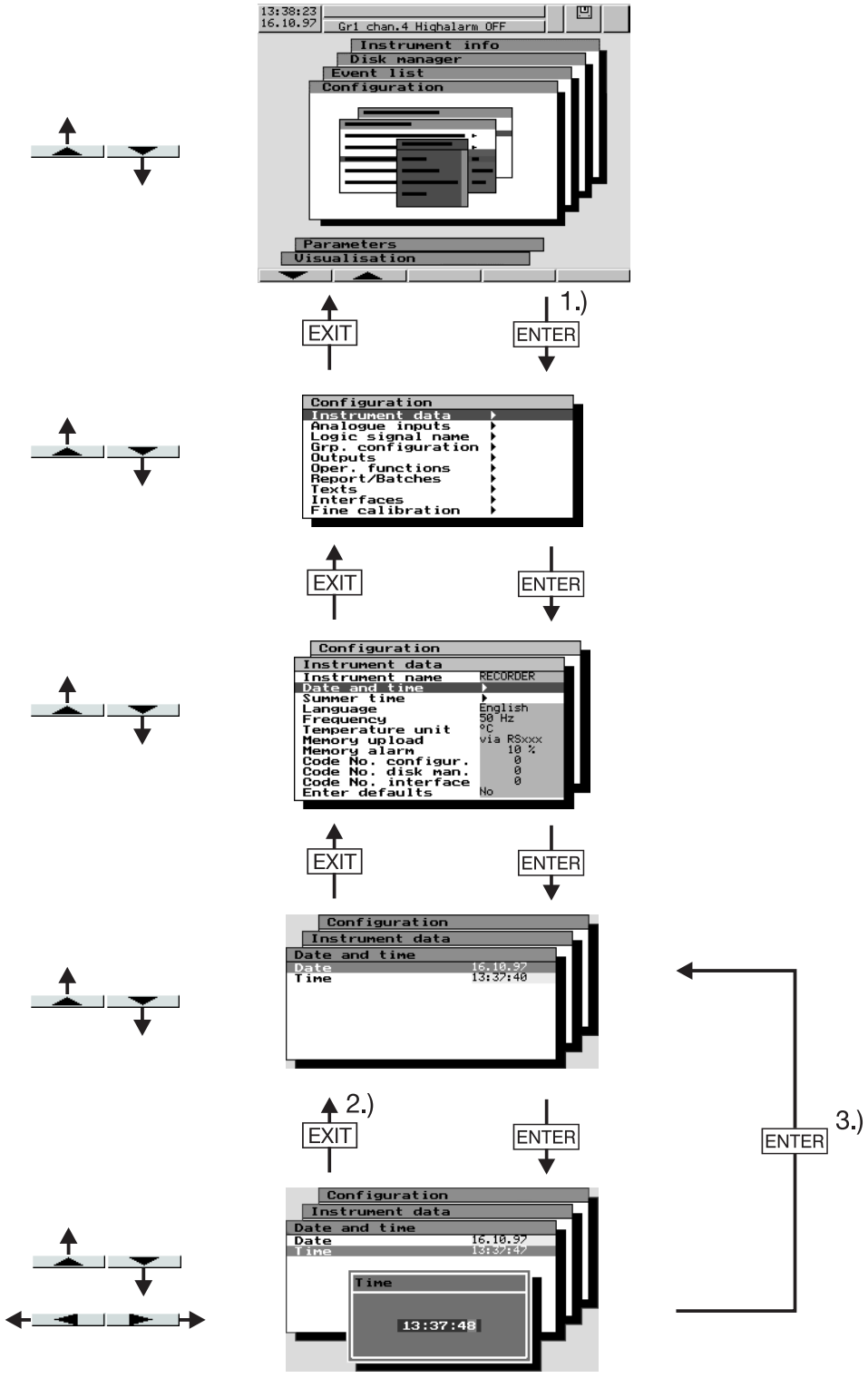
* Enter text with ENTER

or

* Quit text input with EXIT (Cancel)

3 Operation and visualization

4.1 Operating example



1.) if required, the code number must also be entered here (factory-set: 9200)
2.) cancel entry; the old settings are retained
3.) confirm entry

4 Configuration parameters

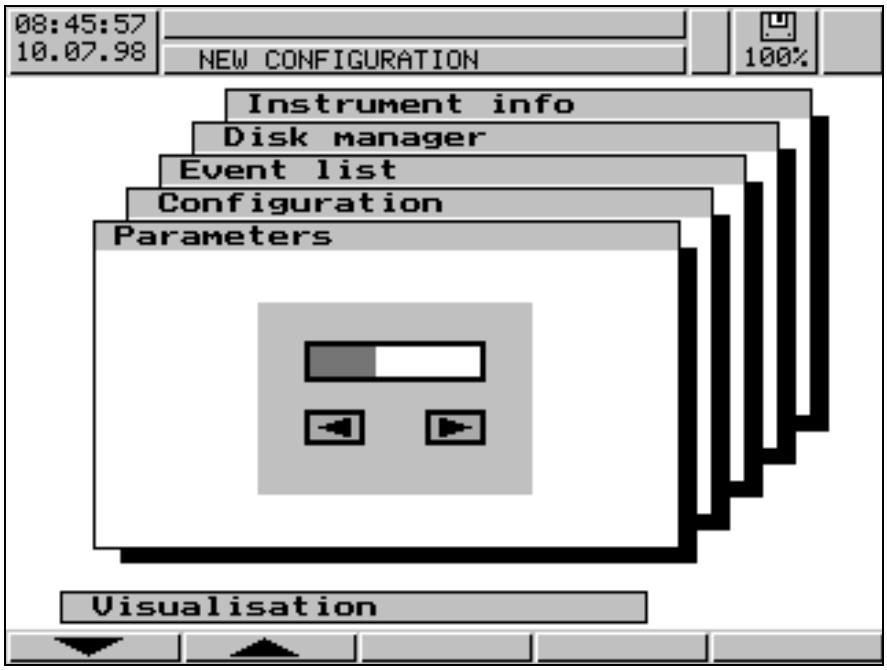
4.2 Table of configuration parameters

The table below lists all the parameters of the instrument. The order in which the parameters are explained corresponds to the order in which they appear on the instrument (in the menu structure).

The first column describes the “path” through the menus and windows to the particular parameter.

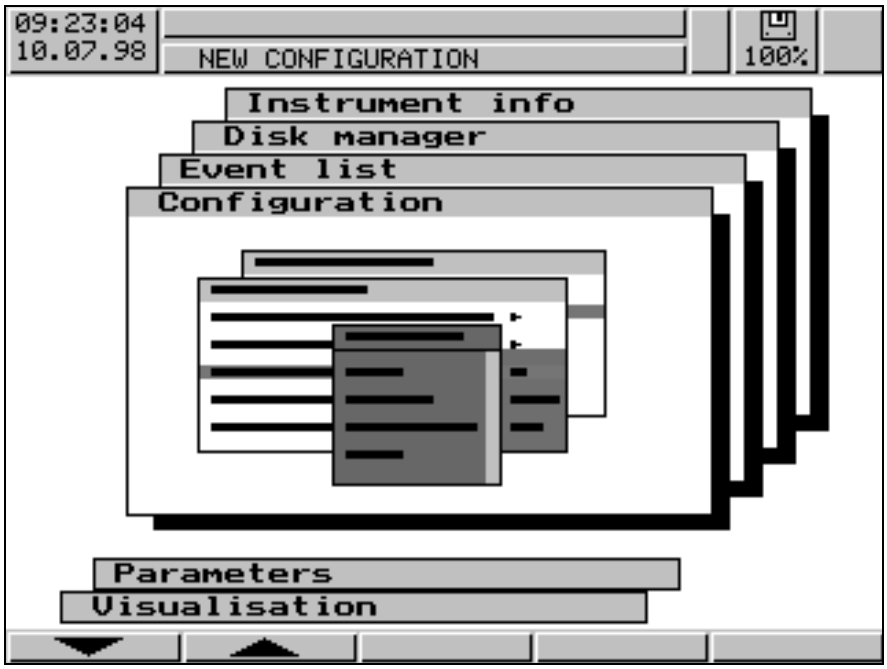
The second column lists the possible settings for the parameter or the possible selections. The factory setting in this column is always shown **bold**.

The third column contains a description of the parameter or the possible selections, if the parameter and its function or the selection is not self-evident.



Parameter setting

	Parameter	Value/selection	Description
Contrast	Parameters ➔Contrast	0 — **21** — 31	Brightness of display
Speed indication	Parameters ➔Speed indication	in mm/h, **time/div**	
Switch-off event	Parameters ➔Display off ➔ Switch-off event	**Waiting time** Operating signal	The way the display is switched off is selected here.
Waiting time	Parameters ➔Display off ➔ Waiting time	**0** — 32767 min	Time after which the display is switched off. Pressing any key will switch it on again. The parameter can only be entered if the parameter *Switch-off event* is set to “Waiting time”. 0 = no switch off
Operating signal	Parameters ➔Display off ➔ Operating signal	**Off**, LogInp 1 — 7, Al.Gr.1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	If the input or the signal that was selected is operated, the display is switched off. The parameter can only be entered if the parameter *Switch-off event* is set to “Operating signal”.



Configuration ➔ Instrument data

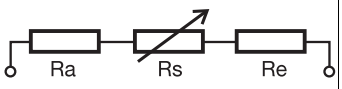
	Parameter	Value/selection	Description
Instrument name	Configuration ➔Instrument data ➔ Instrument name	16 characters	⇨ Section 3.8 “Text input”
Date	Configuration ➔Instrument data ➔ Date and time ➔ Date	any date	Input of the current date
Time	Configuration ➔Instrument data ➔ Date and time ➔ Time	any time	Input of the current time
Time synchronization	Configuration ➔Instrument data ➔ Date and time ➔ Time synchroniz.	**Off**, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	Using this parameter or function, the system clocks of several recorders can be simultaneously synchronized. If a logic input has been selected and is then operated (transition from Low to High), the time can be synchronized. The seconds are decisive in the time change. They are used to round the time up or down. Example: 12:55:29 -> 12:55:00 12:55:30 -> 12:56:00

Summer time (switch)	Configuration ➔Instrument data ➔ Summer time ➔ Switch	Off, **automatic,** user timed	Automatic: 2:00 hrs / 3:00 hrs on the last Sunday in March / October
Summer time (start date)	Configuration ➔Instrument data ➔ Summer time ➔ Start date	any date	
Summer time (start time)	Configuration ➔Instrument data ➔ Summer time ➔ Start time	any time	
Summer time (end date)	Configuration ➔Instrument data ➔ Summer time ➔ End date	any date	
Summer time (end time)	Configuration ➔Instrument data ➔ Summer time ➔ End time	any time	
Language	Configuration ➔Instrument data ➔ Language	**German**, English, French, Dutch, Spanish, Italian, Hungarian, Czech, Swedish, Polish, Danish, Finnish, Portuguese, Russian	
Supply frequency	Configuration ➔Instrument data ➔ Frequency	**50**, 60 Hz	
Temperature unit	Configuration ➔Instrument data ➔ Temperature unit	**°C**, °F	
Upload memory	Configuration ➔Instrument data ➔ Memory upload	**with diskette**, via RSxxx	Depending on the upload mode that was selected, a change of display occurs within the status line. with diskette:  via RSxxx:  The display of the percentage value is directly linked to the *Memory alarm* parameter.

	Parameter	Value/selection	Description
Memory alarm (diskette reserve)	Configuration ➔Instrument data ➔ Memory alarm	1 — **10** — 100 %	The signal becomes active when the remaining free capacity of the diskette or the memory reaches this value. The parameter *Memory upload* is used to differentiate between the diskette and the memory. ⇨ Section 2.4 “Digital signals”
Code number configuration	Configuration ➔Instrument data ➔ Code No. Config.	0000 — **9200** — 9999	Code number for configuration level; 0000 = off, i.e. no polling occurs. **The stored data on diskette and in the RAM are erased when the configuration is altered.**
Code number disk manager	Configuration ➔Instrument data ➔ Code No. Disk Man.	0000 — **9200** — 9999	Code number for certain functions of the disk manager; 0000 = off, i.e. no polling occurs
Code number interface	Configuration ➔Instrument data ➔ Code No. Interface	**0000** — 9999	Code number for reading out data via the serial interface (e.g. with the communications server); 0000 = off, i.e. no polling occurs.
Factory setting	Configuration ➔Instrument data ➔ Enter defaults	**No**, yes	always *No*, *Yes* = confirm factory setting

Configuration ➔ Analog inputs

	Parameter	Value/selection	Description
Sensor (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Sensor	Off, Res. therm., Thermocouple, **Current**, Voltage, Res. transm., Potentiom., Counter	Depending on the sensor that was selected, only the relevant parameters can be selected when configuring the analog input. ⇨ Section 2.5 “Counters”
Linearization (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Linearization	**Linear**, Pt100, Pt100 JIS, Ni100, Pt500, Pt1000, Fe-Con J, NiCrCon E, Ni-CrNi K, NiCrSi N, Cu-Con T, PtRh-PtRh B, Pt10Rh-Pt R, Pt13Rh-Pt S, Cu-Con U, Fe-Con L	

	Parameter	Value/selection	Description
Connection circuit (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Connection circuit	2 — 4 wire	
Cold junction (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Cold junction	Intern. Pt100, Extern. const	
External cold junction temperature (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Ext. CJ temp.	-50 to +150°C	External cold junction temperature for thermo-couples
Range start (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range start	any value **0mA**	
Range end (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range end	any value **20mA**	
Resistance Ra, Rs, Re (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range end ➔ Resistance Ra, Rs, Re	0 — 4000Ω	For resistance transmitter: 
Resistance Ro, Rp (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range end ➔ Resistance Ro, Rp	0 — 4000Ω	For potentiometer: 
Start temperature (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range end ➔ Start temperature	any value	Only for the sensor current, voltage with linearization for resistance thermome-ter, thermocouple. Only for signals which are not yet linearized.

	Parameter	Value/selection	Description
End temperature (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Range end ➔ End temperature	any value	Only for sensor, current, voltage with linearization for resistance thermometer, thermocouple. For signals which are not yet linearized.
Scaling start (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Scaling start	-99999 to **0** to +99999	
Scaling end (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Scaling end	-99999 to **+100** to +99999	
Filter constant (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Addit'l parameters ➔ Filter constant	0.0 — **0.1** — 10.0 sec	
Channel name (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Addit'l parameters ➔ Channel name	7 characters **Input 1**	Brief designation. It is shown on all diagram presentations. ⇨ Section 3.8 "Text input"
Channel description (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Addit'l parameters ➔ Channel description	2 x 20 characters **Input 1**	Detailed description. It is indicated in addition to the two numerical presentations. ⇨ Section 3.8 "Text input"
Unit (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Addit'l parameters ➔ Unit	5 characters **%**	⇨ Section 3.8 "Text input"
Decimal place (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12/counter 1 — 2 ➔ Addit'l parameters ➔ Decimal place	Automatic, X.XXXX, XX.XXX, XXX.XX, **XXXX.X,** XXXXX.	Automatic: presentation with maximum resolution

	Parameter	Value/selection	Description
Integrator time base (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Addit'l parameters ➔ Integr. timebase	**Off**, Second, Minute, Hour, Day	Time base for the integrator. If the time base is switched off, the indication of the integrator in the report is suppressed. ⇨ Section 2.6 "Integrator"
Integrator unit (analog inputs)	Configuration ➔Analog inputs ➔ Analog input 1 — 12 ➔ Addit'l parameters ➔ Integrator unit	5 characters	⇨ Section 2.6 "Integrator"
Sensor (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Sensor	Ext. input, Ext. counter	The sensor selection can not be edited. Here, it merely assists the overview. ⇨ Section 2.3 "Analog inputs" ⇨ Section 2.5 "Counters"
Scaling start (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Scaling start	-99999 to **0** to +99999	
Scaling end (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Scaling end	-99999 to **+100** to +99999	
Channel name (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Addit'l parameters ➔ Channel name	7 characters **Input 13**	Brief designation. It is shown in all diagram presentations. ⇨ Section 3.8 "Text input"
Channel description (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Addit'l parameters ➔ Channel description	2 x 20 characters **Input 13**	Detailed description. It is additionally shown in the two numerical displays. ⇨ Section 3.8 "Text input"

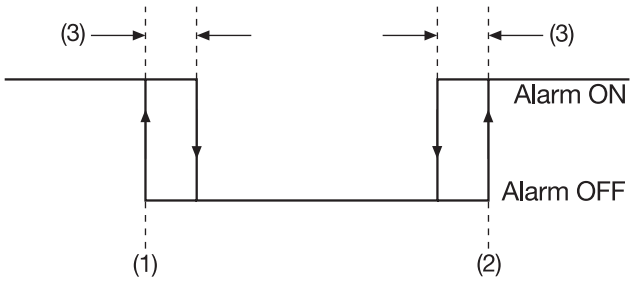
	Parameter	Value/selection	Description
Unit (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Addit'l parameters ➔ Unit	5 characters **%**	⇨ Section 3.8 "Text input"
Decimal place (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36/External counter 1 — 2 ➔ Addit'l parameters ➔ Decimal place	Automatic, X.XXXX, XX.XXX, XXX.XX, **XXXX.X,** XXXXX.	Automatic: presentation with maximum resolution
Integrator time base (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36 ➔ Addit'l parameters ➔ Integr. timebase	**Off**, Second, Minute, Hour, Day	Time base for the integrator. If the time base is switched off, the indication of the integrator in the report is suppressed. ⇨ Section 2.6 "Integrator"
Integrator unit (external analog inputs)	Configuration ➔Analog inputs ➔ External input 1 — 36 ➔ Addit'l parameters ➔ Integrator unit	5 characters	⇨ Section 2.6 "Integrator"

Configuration ➔ Digital signal name

Parameter	Value/selection	Description
Configuration ➔Digital signal name ➔ Logic input 1 — 7 ➔ Alarm group 1 — 6 ➔ Combination alarm ➔ Memory alarm ➔ Error ➔ Modbus flag ➔ External input 1 — 6	7 characters **LogInp 1 — 7** **Al.Gr.1 — 6** **Alarm** **Mem. al.** **Error** **RS flag** **ExtInp1 — 6**	⇨ Section 3.8 "Text input"

Configuration ➔ Group configuration

	Parameter	Value/selection	Description
Group status	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Group status	Off, Display only, **Displ.+store**	Displ.+store: the channels in the group are shown in the diagrams and stored on diskette.
Group name	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Group name	16 characters **Group** ***x***	⇨ Section 3.8 "Text input"

	Parameter	Value/selection	Description
Input signal (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Input signal	Off, Analog inp.1 — 12, Ext. inp. 1 — 36, Counter 1 — 2, Ext. counter 1 — 2 Group 1: **A. inp. 1 — 6** Group 2: **A. inp. 7 — 12**	Assignment of the hardware inputs to the channels of the group
Line width (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Line width	**Thin**, Thick	For diagram presentation
Alarms (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Alarms	**Off**, activated	
Low limit (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Low limit	-99999 to **0** to +99999	
High limit (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ High limit	-99999 to **0** to +99999	
Differential (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Differential	-99999 to **0** to +99999	
	(1) = Low limit (2) = High limit (3) = Differential		

	Parameter	Value/selection	Description
Text low alarm (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Text low alarm	**Standard text**, Text 1 — 36, No text	⇨ Section 3.5 “Event list” ⇨ Configuration ➔ Texts, page 53
Text high alarm (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Text high alarm	**Standard text**, Text 1 — 36, No text	
Alarm delay (analog channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Analog channels ➔ Analog channel 1 — 6 ➔ Alarm delay	**0** — 32767sec	Alarm delay is activated at the value <> 0. When it is active, an alarm is only produced if it is still present when the set time has been exceeded.
Input signal (digital channels, group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Digital channels ➔ Digital channel 1 — 3 ➔ Input signal	Off, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error Modbus flag, Ext. Inp. 1 — 6 **Logic inp.** ***x***	Assignment of the hardware inputs or of the signals generated by software to the digital channels of a group.

	Parameter	Value/selection	Description
Vertical diagram presentation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Measurement presentation ➔ Vertical diagram	Off, **On**	If a measurement presentation is *Off*, it can not be called up in the visualization. It is automatically omitted when changing the measurement presentation.
Horizontal diagram presentation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Measurement presentation ➔ Horizontal diagram	Off, **On**	
Bargraph presentation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Measurement presentation ➔ Bargraph	Off, **On**	
Numerical presentation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Measurement presentation ➔ Numerical display	Off, **On**	
Report presentation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Measurement presentation ➔ Report	Off, **On**	
Store status normal operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Normal operation ➔ Store status	Off, **On**	
Stored value normal operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Normal operation ➔ Stored value	Average val., **Instant. val.**, Minimum val., Maximum val.	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage”
Storage rate normal operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Normal operation ➔ Storage rate	0 — **60** — 32767 sec	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage” setting 0 sec = storage rate 125 msec

	Parameter	Value/selection	Description
Operating signal event operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Event operation ➔ Operating signal	**Off**, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	If the configured signal is active, the instrument switches to event operation.
Stored value event operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Event operation ➔ Stored value	Average val., **Instant val.**, Minimum val., Maximum val.	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage”
Storage rate event operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Event operation ➔Storage rate	0 — **5** — 32767 sec	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage”
Operating mode event operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Event operation ➔Operating mode	**Event oper. 1**, Event oper. 2	With the “Event oper. 1” setting, the measurement data in **all** operating modes are first saved in the RAM and then to diskette. With the “Event oper. 2” setting, the measurement data are saved to diskette in event operation only. ⇨ page 20
Start time timed operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Timed operation ➔ Start time	any clock time	Off when start time = end time
End time timed operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Timed operation ➔ End time	any clock time	
Stored value timed operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Timed operation ➔ Stored value	Average val., **Instant. val.**, Minimum val., Maximum val.	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage”
Storage rate timed operation (group 1 — 6)	Configuration ➔Grp configuration ➔ Group 1 — 6 ➔ Timed operation ➔Storage rate	0 — **5** — 32767 sec	⇨ Section 2.7 “Operating modes” Section 2.8 “Data storage”

	Parameter	Value/selection	Description
	Configuration ➔ Outputs		
Action outputs	Configuration ➔Outputs ➔ Relay K1 — K5, Open collector ➔ Action	**Off**, n.o. (make) n.c. (break)	
Operating signal outputs	Configuration ➔Outputs ➔ Relay K1 — K5, Open collector ➔ Operating signal	Off, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	The configured signal is output to the relay.
	Configuration ➔ Operating functions		
Operating signal (counter)	Configuration ➔Oper. functions ➔ Counter ➔ Counter 1 — 2 ➔ Operating signal	**Off**, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	The counter is incremented or decremented when the operating signal becomes active. ⇨ Section 2.5 “Counters”
Start value (counter)	Configuration ➔Oper. functions ➔ Counter ➔ Counter 1 — 2/ Ext. counter 1 — 2 ➔ Start value	-9999 to **0** to +9999	Sets the counter to the indicated value. ⇨ Section 2.5 “Counters”
Counting direction (counter)	Configuration ➔Oper. functions ➔ Counter ➔ Counter 1 — 2/ Ext. counter 1 — 2 ➔ Counting direction	**up**, down	⇨ Section 2.5 “Counters”
Text (counter)	Configuration ➔Oper. functions ➔ Counter ➔ Counter 1 — 2/ Ext. counter 1 — 2 ➔ Text	**Standard text**, Text 1 — 36, No text	⇨ Section 2.5 “Counters” Section 3.5 “Event list” ⇨ Configuration ➔ Texts, page 67
External texts (logic inputs)	Configuration ➔Oper. functions ➔ External texts ➔ Logic input 1 — 7/External input 1 — 6	Standard text, Text 1 — 36, **No text**	⇨ Section 3.5 “Event list” ⇨ Configuration ➔ Texts, page 67

	Parameter	Value/selection	Description
Key inhibit	Configuration ➔Oper. functions ➔ Key inhibit	**Off**, Logic inp.1 — 7, Alarm group1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	The keys are inhibited as soon as the selected logic input is closed.

Configuration ➔ Report/Batches

Period report	Configuration ➔Report ➔ Period report	**Off**, On	If a report is *Off,* it can not be called up. It is automatically omitted when switching the reports.
External report/ batches	Configuration ➔Report ➔ Ext. report/Batches ➔ Status	**Off**, Only Ext.Rep., E.R.+batches	Activates the external report and the batch report, if required. ⇨ Section 3.2.8 “Batch reports”
Operating signal Ext. report/Batches	Configuration ➔Report ➔ Ext. Report/Batches ➔ Operating signal	Logic inp.1 — 7, Alarm group.1 — 6, Comb. alarm, Memory alarm, Error, Modbus flag, Ext. Inp. 1 — 6	If the status of the external report or the batch report is not off, the report is started and ended by activating the operating signal.
Number of list texts Ext. report/Batches	Configuration ➔Report ➔ Ext. Report/Batches ➔ Batches ➔ Num. of list texts	**0** — 36	Number of recorder texts reserved for batch reporting. ⇨ Section 3.2.8 “Batch reports”
Binary-linked text Ext. report/Batches	Configuration ➔Report ➔ Ext. Report/Batches ➔ Batches ➔ Binary-linked text	**Off**, Logic inp.1-2, Logic inp.1-3, Logic inp.1-4, Logic inp.1-5	The operating signals for line 6 of the batch report can be selected here. ⇨ Section 3.2.8 “Batch reports”
Text (left column) Ext. report/Batches	Configuration ➔Report ➔ Ext. Report/Batches ➔ Batches ➔ Text (left column)	Line 1 — 10	Here the texts in the left column of a batch report are entered. ⇨ Section 3.2.8 “Batch reports” ⇨ Section 3.8 “Text input”

	Parameter	Value/selection	Description
Daily report	Configuration ➔Report ➔ Daily report	**Off**, On	If the report is *Off,* it cannot be called up. It is automatically omitted when switching reports.
Monthly report	Configuration ➔Report ➔ Monthly report	**Off**, On	
Annual report	Configuration ➔Report ➔ Annual report	**Off**, On	
Period Report	Configuration ➔Report ➔ Period	1, **2**, 3, 4, 5, 10, 15, 30 min, 1 ,2 ,3 ,4 ,6 ,8 ,12 h	only for period report
Synchronization time Report	Configuration ➔Report ➔ Synchronizing time	any clock time	All reports except external report. Example: setting: synchronizing time = 03:00 period = 6 h current time = 02:15 effect: Period report 1 = 02:15 - 03:00 Period report 2 = 03:00 - 09:00 Period report 3 = 09:00 - 15:00 Period report 4 …, daily report = 03:00 every day, monthly report = 03:00 on the first day of each month, annual report = 03:00 on 1 Jan. of each year

Configuration ➔ Texts

	Parameter	Value/selection	Description
Texts	Configuration ➔Texts	Text 1 — 36	⇨ Section 3.8 “Text input”

Configuration ➔ Interfaces[1]

	Parameter	Value/selection	Description
	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx)		Setting the parameters for the serial interface
Protocol	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx) ➔ Protocol	**MODBUS**, JBUS	

	Parameter	Value/selection	Description
Baud rate	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx) ➔ Baud rate	**9600 baud**, 19200 baud, 38400 baud	If possible, the fastest transfer rate should be selected here. The next smaller rate should only be selected if problems arise.
Data format	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx) ➔ Data format	**8-1-none**, 8-1-odd, 8-1-even, 8-2-none	
Instrument address	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx) ➔ Instrument address	**1** — 255	
Minimum response time	Configuration ➔Interfaces ➔ 20 (RS232/RS4xx) ➔ Min. response time	**0** — 500 msec	
	Configuration ➔Interfaces ➔ 21 (Profibus-DP)		Setting for the parameters of the Profibus-DP interface.
Address	Configuration ➔Interfaces ➔ 21 (Profibus-DP) ➔ Address	1 — **125** — 127	Setting the address from which the paperless recorder can be addressed in the Profibus-DP network.

1. The MODbus interface protocol and the serial interfaces (RS232, RS422, RS485) are described in detail in the Operating Instructions B 70.6550.2.2 which are supplied with the instrument.
   Further comprehensive information on the PROFIBUS-DP interface is given in the Operating Instructions B 70.3560.2.1

Configuration ➔ Fine calibration

	Parameter	Value/selection	Description
Calibration status	Configuration ➔Fine calibration ➔ Analog input 1—12 ➔ Calibration status	**Off**, On	The calibration (adjustment) of the analog measurements can be activated here. The adjustment is carried out using a line equation.
Actual start value	Configuration ➔Fine calibration ➔ Analog input 1—12 ➔ Actual start value	-99999 to **0** to +99999	Start value of the actual line. Only active when calibration status = On.
Set start value	Configuration ➔Fine calibration ➔ Analog input 1—12 ➔ Set start value	-99999 to **0** to +99999	Start value of the set line. Only active when calibration status = On.

	Parameter	Value/selection	Description
Actual end value	Configuration ➔Fine adjustment ➔ Analog input 1—12 ➔ Actual end value	-99999 to **1000** to +99999	End value of the actual line. Only active when calibration status = On.
Set end value	Configuration ➔Fine adjustment ➔ Analog input 1—12 ➔ Set end value	-99999 to **1000** to +99999	End value of the set line. Only active when calibration status = On.
Example for fine adjustment	Systematic errors, such as caused by an unsuitable probe mounting, for example, can be compensated using fine adjustment. Example: A probe covers the temperature range 200 — 300°C. It has been fitted into a tunnel kiln so unfavourably as to always indicate 10°C less than the temperature of the charge. The incorrect measurement can be corrected through fine calibration. Actual start value : 200°C Set start value : 210°C Actual end value : 300°C Set end value : 310°C		

4 Configuration parameters

5.1 Hardware and software requirements

The following hardware and software requirements for operating and installing the setup program on a PC must be met:

Minimum configuration

- IBM PC or compatible PC from 386 processor
- 4MByte main memory
- CD drive
- mouse
- one free serial interface
- 6MByte free space on hard disk
- VGA graphics
- Microsoft Windows[1] 3.11/95/98/NT4.0

In addition, the following items are required for communication between the PC and the paperless recorder:

- PC interface cable
- adapter for PC interface cable

1. Microsoft and Windows are registered trademarks of the Microsoft Corporation

5 Setup program

5.2 Installing the setup program

Running the installation program

* Start Microsoft Windows95/98/NT4.0 or 3.11

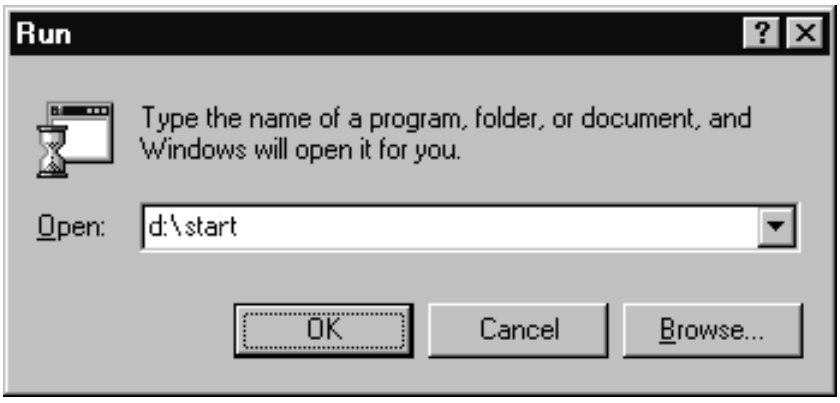
☞ If Microsoft Windows has already been started, all Windows programs have to be terminated before installing the setup program.

* Insert CD into the drive and close drive.

After inserting the CD, the installation program will start automatically. If this is not the case, then proceed as follows:

* Select *Start* ➔ *Run*…[1]

* Enter “d:\start”, for example, depending on the drive letter



* Click on *OK*

The installation program leads you through the remaining installation with screen messages.

1. On Windows 3.x select *File* ➔ *Run*…

5.3 Character set

032		080	P	0162	¢	0210	Ò
033	!	081	Q	0163	£	0211	Ó
034	"	082	R	0164	¤	0212	Ô
035	#	083	S	0165	¥	0213	Õ
036	$	084	T	0166	¦	0214	Ö
037	%	085	U	0167	§	0215	×
038	&	086	V	0168	¨	0216	Ø
039	’	087	W	0169	©	0217	Ù
040	(	088	X	0170	ª	0218	Ú
041	)	089	Y	0171	«	0219	Û
042	*	090	Z	0172	¬	0220	Ü
043	+	091	[	0173	-	0221	Ý
044	,	092	\	0174	®	0222	Þ
045	-	093	]	0175	¯	0223	ß
046	.	094	^	0176	°	0224	à
047	/	095	_	0177	±	0225	á
048	0	096	‘	0178	²	0226	â
049	1	097	a	0179	³	0227	ã
050	2	098	b	0180	´	0228	ä
051	3	099	c	0181	µ	0229	å
052	4	0100	d	0182	¶	0230	æ
053	5	0101	e	0183	·	0231	ç
054	6	0102	f	0184	¸	0232	è
055	7	0103	g	0185	¹	0233	é
056	8	0104	h	0186	º	0234	ê
057	9	0105	i	0187	»	0235	ë
058	:	0106	j	0188	¼	0236	ì
059	;	0107	k	0189	½	0237	í
060	<	0108	l	0190	¾	0238	î
061	=	0109	m	0191	¿	0239	ï
062	>	0110	n	0192	À	0240	ð
063	?	0111	o	0193	Á	0241	ñ
064	@	0112	p	0194	Â	0242	ò
065	A	0113	q	0195	Ã	0243	ó
066	B	0114	r	0196	Ä	0244	ô
067	C	0115	s	0197	Å	0245	õ
068	D	0116	t	0198	Æ	0246	ö
069	E	0117	u	0199	Ç	0247	÷
070	F	0118	v	0200	È	0248	ø
071	G	0119	w	0201	É	0249	ù
072	H	0120	x	0202	Ê	0250	ú
073	I	0121	y	0203	Ë	0251	û
074	J	0122	z	0204	Ì	0252	ü
075	K	0123	{	0205	Í	0253	ý
076	L	0124	|	0206	Î	0254	þ
077	M	0125	}	0207	Ï	0255	ÿ
078	N	0126	~	0208	Ð		
079	O	0161	¡	0209	Ñ		

Input of special characters

(Special) characters which cannot be input directly from the keyboard of the PC are entered using the Alt key and the number combination shown in the table.

Example

To input the special character ©:

* Position the cursor with the mouse or the cursor keys at the point where the character has to be inserted.
* Press the Alt key and **hold it down**
* Input the number 0169 in the number block (on the right side of the keys) (the leading zero **must** be input as well)
* Release the Alt key

The sign © is inserted at the cursor position.

6.1 Program description

The PC evaluation program (PCA) is described in detail in the Operating Instructions B 70.9708.0 and in the Windows Online Help.

The PC evaluation program (PCA) can run from Windows95 or later and is available for administration, archiving, visualizing and evaluation of the recorder data stored on diskette.

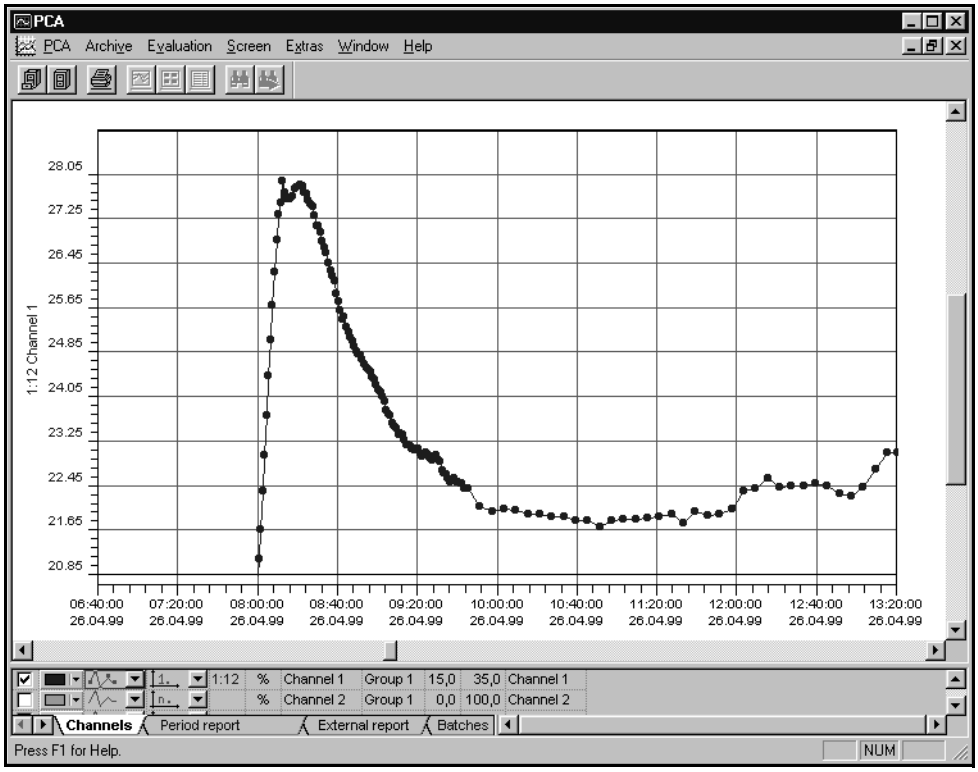
Hardware and software requirements

The following hardware and software requirements must be met for operating and installing the evaluation program:

- IBM PC or compatible PC from 486 processor
- 16 MB main memory
- 3.5" disk drive
- CD-ROM drive
  (for installation and to create a set of diskettes)
- mouse
- VGA graphics
- Windows 95/98/NT4.0

Recommended minimum configuration

- Pentium 133
- 32MB main memory
- 100MB free space on hard disk



6 PC evaluation program

Features

A few special features in brief:

- The data from differently configured instruments are recognized by PCA and stored in an archive database. The complete administration is performed automatically. Only an identifier (supplementary description) has to be provided manually by the user.
- The user has access at any time to certain data sets which can be distinguished by the identifier. In addition, the time ranges to be evaluated can be restricted.
- Any analog and digital channels of a paperless recorder can subsequently be combined into so-called PCA groups.
- Since each group is displayed in its own separate window, several groups can be shown simultaneously on the screen and compared.
- Operation by mouse and from the keys
- It is possible to export the data stored (CSV format) via the export filter for processing in other programs (Excel, …).
- The data can be read from the recorder via the serial interface (RS232/ RS422/RS485). They can be read out either manually or automatically (e.g. daily at 23.00 hrs).
- The evaluation program PCA supports the network capability, i.e. several users can, independently of each other, obtain data from the same database in the network.
- It is possible to export data. The exported data can be imported into spread-sheet programs (e. g. Excel).
- Through the rapid start function of the evaluation program, data diskettes can be read out and stored in the database. The evaluation software is automatically terminated after archiving.

PCA3000

From October 2004 you can use the new PCA3000 PC evaluation software for analyzing and archiving data from the paperless recorder. Further information on the PCA3000 software is contained in the Operating Manual B 70.9701.0.

7.1 Type designation

**Paperless recorder for capturing,
visualizing, storing and evaluating measurement data**

(1) Basic version

706550/00	paperless recorder without analog inputs
706550/01	paperless recorder without analog inputs incl. setup and PC evaluation program and interface cable/adapter
706550/10	paperless recorder with 6 analog inputs
706550/20	paperless recorder with 6 analog inputs incl. setup and PC evaluation program and interface cable/adapter
706550/11	paperless recorder with 12 analog inputs
706550/21	paperless recorder with 12 analog inputs incl. setup and PC evaluation program and interface cable/adapter

(2) Inputs 1 — 6 (programmable)

000	not used
888	factory-set

(3) Inputs 7 — 12 (programmable)

000	not used
888	factory-set

(4) Interface

51	RS232C (standard)
54	RS422/485, MODbus
66	RS232C and LON
67	RS422/485 and LON
68	RS232C and PROFIBUS-DP
69	RS422/485 and PROFIBUS-DP

(5) Supply

01	93 — 263V AC, 48 — 63Hz (not with UL approval)
23	110 — 240V AC +10/-15%, 48 — 63Hz
25	20 — 30V AC/DC, 48 — 63Hz

(6) Extra codes

020	lithium battery for memory buffering (ex-factory)
021	storage capacitor for memory buffering (on request)
061	UL approval
258	7 logic inputs, 1 open-collector output, 4 relay outputs, voltage output 24V DC/50mA
350	universal carrying case TG-35[2]

	(1)		(2)		(3)		(4)		(5)		(6)	
Order code		-		-		-		-		/		,...
Order example	706550/10	-	888	-	000	-	51	-	01	/	020[1]	

1. List extra codes in sequence, separated by commas.
2. The UL approval (061) only applies to the panel-mounting instrument.

7 Identifiying the instrument version

7.2 Standard accessories

- 1 Operating Manual B 70.6550.0.2
- 2 mounting brackets
- cable-tie with foot (can be released)
  for tension relief of the sensor connecting cables

7.3 Accessories

- setup program
- PC interface cable with TTL/RS232 converter and adapter
- PC evaluation program on CD-ROM, multilingual
- PCA communications server on CD-ROM, multilingual
- configuration of inputs to customer specification

8.1 Location and climatic conditions

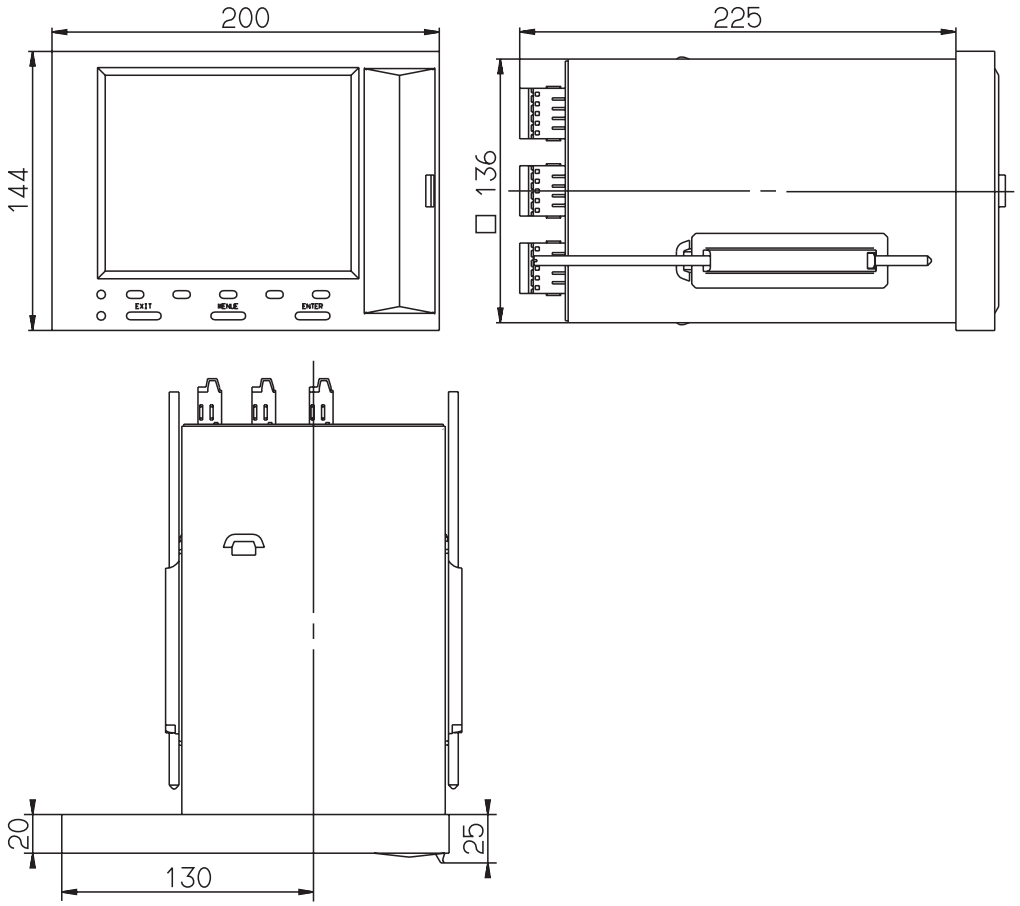
The instrument location should as far as possible be free from shock and vibration. Stray electromagnetic fields, e.g. from motors, transformers etc., should be avoided.

The ambient temperature at the location can be between 0 and +45 °C, at a relativ humidity not exceeding 75 %, no condensation.

⇨ Section 9.1 “Installation notes”

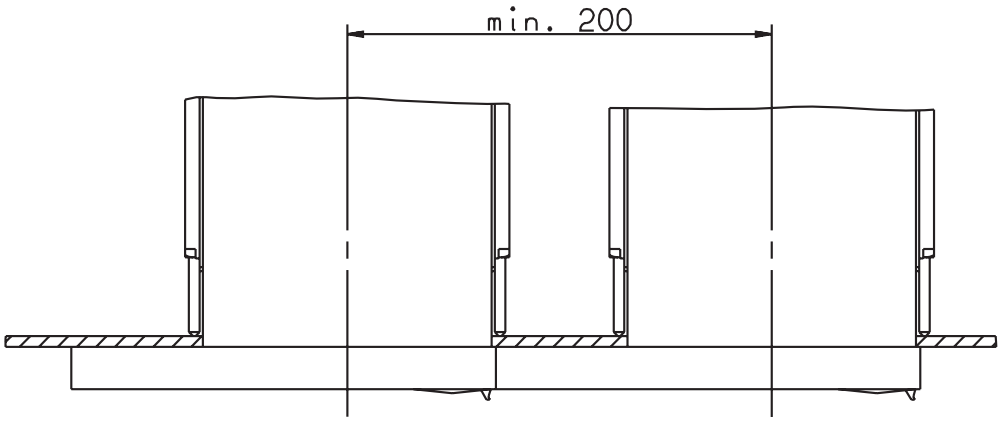
8.2 Mounting in position

Outline drawings



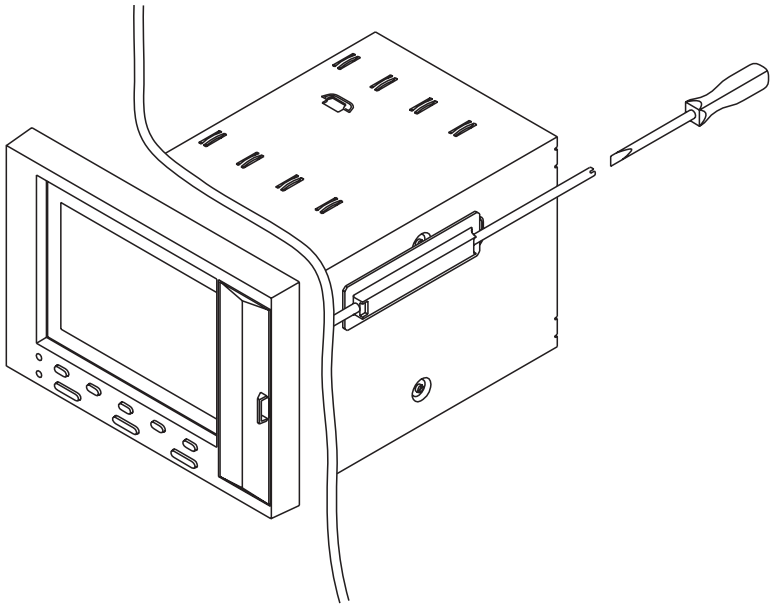
8 Installation

Fitting into the panel



Fitting in position

* Insert the recorder from the front into the panel cut-out
* From the back of the panel, hook the two mounting brackets into the recesses at the sides of the housing. The flat sides of the brackets must be against the housing.
* Place the mounting brackets against the back of the panel and tighten them evenly.



9.1 Installation notes

- The choice of cable, the installation and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with nominal voltages below 1000V” or the appropriate local regulation.
- 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 from the supply on both poles.
- The electromagnetic compatibility (EMC) conforms to the standards and regulations listed under Technical Data.

  ⇨ Data Sheet T 70.6550
- Route input, output and supply lines separately and not parallel to one another.
- All sensor and interface cables that are not connected to the supply network must be arranged as twisted and screened cables. The screen must be grounded on the instrument side.
- Earth the instrument by connecting the PE terminal on the instrument to the protective earth. This lead must have the same cross-section as the supply cable. Earthing leads must be routed in star configuration to a common earthing point which is connected to the protective earth of the supply. Do not loop the earthing leads, 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 neighborhood of the instrument, such as contactors or solenoid valves, must have RC combinations fitted for interference suppression.
- The supply to the instrument must be provided with additional fusing. Depending on the supply voltage, the following fuse values apply:

  20 — 30V AC/DC, 48 — 63Hz : fuse 2A slow

  110 — 240V AC +10/-15%, 48 — 63Hz : fuse 1A slow

  A type-G miniature cartridge fuse marked F1 is built into the instrument itself:

  20 — 30V AC/DC, 48 — 63Hz : fuse 1.6A slow

  110 — 240V AC +10/-15%, 48 — 63Hz : fuse 0.63A slow

9.2 Technical data

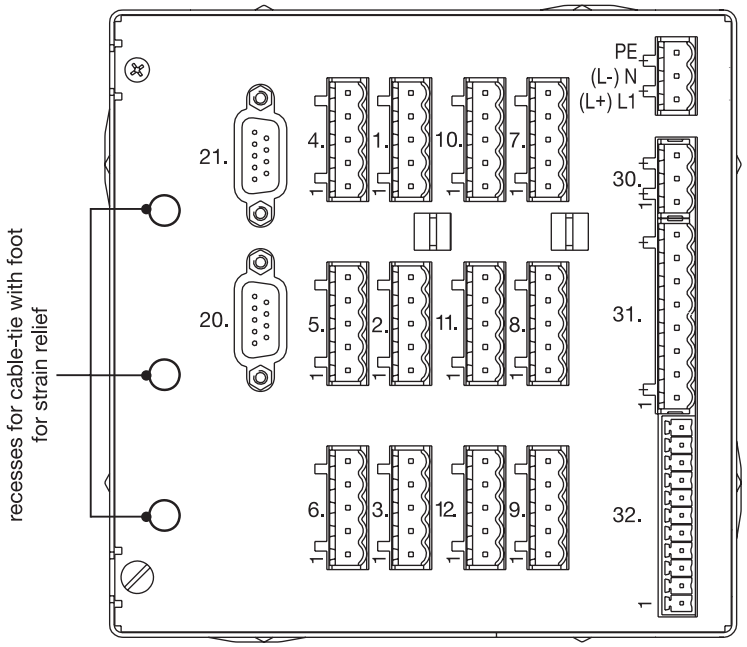
⇨ Data Sheet 70.6550

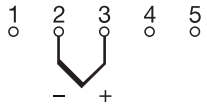
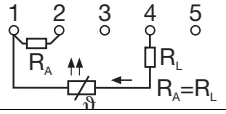
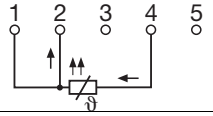
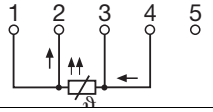
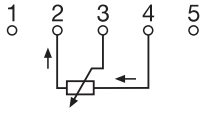
9 Electrical connection

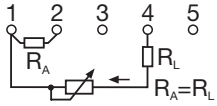
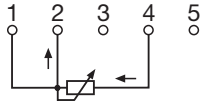
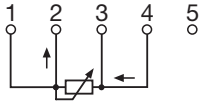
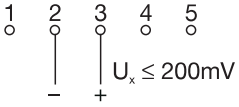
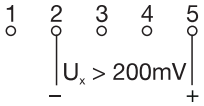
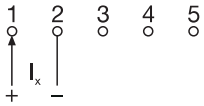
9.3 Connection diagram

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

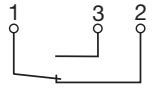
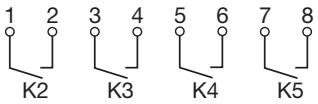
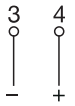
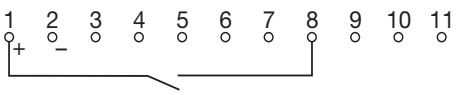
Rear view **with plug-in screw terminals**



Connections 6/12 channel version isolated, test voltage 500V		**Connection symbol**
Analog inputs	**Connector**	
Thermocouple	1 to 12	
Resistance thermometer in 2-wire circuit	1 to 12	
Resistance thermometer in 3-wire circuit	1 to 12	
Resistance thermometer in 4-wire circuit	1 to 12	
Resistance transmitter	1 to 12	

Potentiometer in 2-wire circuit	1 to 12	
Potentiometer in 3-wire circuit	1 to 12	
Potentiometer in 4-wire circuit	1 to 12	
Voltage input up to 200 mV	1 to 12	
Voltage input above 200 mV	1 to 12	
Current input	1 to 12	

Supply		
Supply	L1 (L+) N (L-) PE	
Digital interfaces		
RS232C 9-pin sub-D	20	2 RxD receive data 3 TxD transmit data 5 GND ground
RS422 9-pin sub-D (extra code)	20	3 TxD+ transmit data + 4 RxD+ receive data + 5 GND ground 8 TxD- transmit data - 9 RxD- receive data -
RS485 9-pin sub-D (extra code)	20	3 TxD+/RxD+ transmit/receive data + 5 GND ground 8 TxD-/RxD- transmit/receive data -
LON 9-pin sub-D (extra code)	21	3 Net_A 9 Net_B

<table>
<tr><td>PROFIBUS-DP
9-pin sub-D
(extra code)</td><td>21</td><td>3 RxD/TxD-P
receive/transmit data-Plus
B-cable
5 DGND
data transmission potential
6 VP
supply voltage-Plus
8 RxD/TxD-N
receive/transmit data-N
A-cable</td></tr>
<tr><td colspan="3">Relay outputs</td></tr>
<tr><td>Relay K1
(changeover,
3A, 230V AC)[1]</td><td>30</td><td> 
</td></tr>
<tr><td>Relay K2 to K5
(make/break,
3A, 230V AC)[1]</td><td>31</td><td> 
</td></tr>
<tr><td colspan="3">Digital I/O</td></tr>
<tr><td>Open-collector
output
(max. 25V,
max. 100mA)</td><td>32
3 ground
4 collector</td><td> 
</td></tr>
<tr><td>Logic inputs
voltage-
operated
LOW =
-3 to +5V DC
HIGH =
12 to 30V DC</td><td>32
1 +24V 50mA
aux. supply
not stabilized
2 GND
5 logic input 7
…
11 logic input 1</td><td> 

Example:
operate input 4 with contact
<table><tr><th>Logic input</th><th>Terminal</th></tr><tr><td>1</td><td>11</td></tr><tr><td>2</td><td>10</td></tr><tr><td>3</td><td>9</td></tr><tr><td>4</td><td>8</td></tr><tr><td>5</td><td>7</td></tr><tr><td>6</td><td>6</td></tr><tr><td>7</td><td>5</td></tr></table></td></tr>
<tr><td colspan="3">1. With resistive load.
It is not permissible to mix SELV circuits and supply circuits.</td></tr>
</table>

TÜV PRODUCT SERVICE

TECHNICAL REPORT ON DATA-MANIPULATION SECURITY

Paperless recorder series
LOGOSCREEN

Manufacturer

M.K.Juchheim
Moltkestraße 13-31
D-36039 Fulda

Report-No.: MF58870
Revision 1.0 of 11th February 2000

Test and Certification Body:

TÜV Product Service GmbH
Automation, Software and Electronics - IQSE
Ridlerstraße 65
D-80339 Munich

TÜV PRODUCT SERVICE

Technical report on the data-manipulation security of the LOGOSCREEN series of paperless recorders

Contents **Page**

1 Subject of Testing

This technical report describes the performance and the individual results of the test of the LOGOSCREEN series of paperless recorders with regard to data-manipulation security.

The test was instigated by the company M. K. Juchheim in November 1999.

2 Scope of Testing

2.1 Test specimen

The LOGOSCREEN series of paperless recorders includes the types LOGOSCREEN and LOGOSCREEN 500. These are electronic X-t recorders for the acquisition, visualization, storage and evaluation of analog and digital measurement data. The instruments are controlled by microprocessors, and can be configured through various interfaces. The instruments are intended to replace the usual pen and dot-matrix chart recorders. The design is suitable for mounting in equipment cabinets. Data are archived on diskettes, instead of on paper chart rolls. As an alternative, the data can be read out via a serial interface and archived on PCs. In this case, available media include not only diskettes, but also CDROM, magneto-optical disks etc. The measurement signals are applied to plug-in screw terminals on the back panel of the instrument, and are digitalized and stored at adjustable intervals. The further processing can be determined by configuration. For instance, a selection may be made between continuous storage, storage in a time-slot (window) and event-controlled storage.

2.2 Scope of test specimen

The test specimen comprised the following listed components:

- LOGOSCREEN instrument
- user documentation

2.3 Tests

The product was investigated in the following test stages:
- Data security
  - Definition of the security objectives
  - Threat analysis
  - Penetration tests
- Test of fault avoidance measures
- Security instructions in the product documentation

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3 Testing principles

In view of the area of application of the LOGOSCREEN series of paperless recorders and the main theme of the test – data-manipulation security – the tests performed were derived from the following guidelines:

GSH98	IT Basic Security Manual 1998 („Grundschutzhandbuch")

3.1 Quality management during the test

QSH (Version 2)	Quality Assurance Manual of TÜV Product Service GmbH
QSH IQSE (Version 1.4)	Quality Assurance Manual of IQSE
EN 45001 (05.90)	General Criteria for the Operation of Test Laboratories

4 Test material

The following documents and test samples were used as material for the test:

[U1]	LOGOSCREEN instrument type: 955010 (6-channel) SN# 0040528301099450008
[U2]	PC evaluation program (PCA Version 108.02.04, Prg.Ver. 3.02) on CD-ROM
[U3]	Operating Manual B95.5010.0.1
[U4]	Operating Manual B95.5010.2.2
[U5]	high-level data flowcharts and functional overviews
[U6]	various test plans and test records for LOGOSCREEN and the evaluation software

5 Test documentation

The following documents containing the individual test results have been prepared by the test agency:

[P1]	Report of the meeting with the company M. K. Juchheim on 8th December 1999
[P2]	Threat analysis / System-FMEA for the paperless recorder LOGOSCREEN, Version 0.2 on 3.1.2000
[P3]	Penetration tests on the paperless recorder LOGOSCREEN, Version 1.0 on 25th January 2000

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Ridlerstraße 65
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Phone: (089)5791-1797; Fax: -1396

Report No.:MF58870, Revision 1.0
Order-Nr.:10053052
Engineer: Reiner Heilmann
11th February 2000
Page 4 of 7

6 Performance and result of test

6.1 Data security

6.1.1 Definition of the security objectives

Security objectives for the LOGOSCREEN series of paperless recorders were laid down jointly with M. K. Juchheim, (see also document [P1]). These have been listed in the following table.

6.1.2 Threat analysis

A threat analysis was carried out for the defined securityobjectives, on the basis of the system structure as presented. The safety measures that were identified are divided into technical and organizational measures, as well as measures for the avoidance of errors during development.

	Security objective	Threat	Measures
1	Correct and reproducible recording of the measurement signals that are applied, in accordance with the user-defined configuration.	Data may be incorrectly recorded (e.g incorrect scaling, wrong sampling rate etc.)	A defined, practised and proven systematic software development procedure, with verification and validation steps laid down to achieve a correct implementation.
2	Recognition of gaps in the recording and/or recognition that data have been deleted.	Removal of the storage media, switch-off of the recorder, deletion of data	All recordings have a corresponding current date and time mark attached. The evaluation software permits the display of all stored data. The operator can use this software to search for gaps in the recordings. Assistance is provided by recorded events, such as power on/off.
3	Recognition that data have been altered without authorization	Data recordings may be wholy or partly manipulated at a later date.	Data are stored in an unpublished binary format. Intentional alteration is therefore not possible. A blockwise signature secures all stored data.
4	Protection of the instrument configuration from unobserved changes.	Unauthorized changes to protocol parameters or the date.	A 5-character password protects access to the configuration menu. The instruments are delivered with a preset active access protection. All changes to the configuration are recorded.

Test result:

The threat analysis showed that measures are identified to protect against each of the threats to the defined security objectives and that the measures are sufficient to secure the correctness of the implementation and provide effective security against manipulation of data. The results are recorded in the document [P2].

6.1.3 Penetration tests

The technical measures were investigated for vulnerabilities by penetration tests on an series instrument in working condition, see [U1]. The extensive master test plans and test records provided by M. K. Juchheim were inspected.

Test result:

The performed penetration tests revealed no vulnerabilities in the data format and the corresponding error-detection routines. These results are recorded in document [P3]. The tests that were carried out and documented by M. K. Juchheim also failed to show any indication of a deficiency.

6.2 Testing of fault avoidance measures

The European methodology for certificates of conformity (93/465/EEC „Decision of the Council on 22nd July 1993 on the modules to be applied in the technical harmonization guidelines for the various phases of the conformity evaluation procedure, and the rules for application and use of the CE-conformity mark") attach importance to the manufactuer's quality ensurance in production and maintenance. The company M. K. Juchheim fulfils these requirements through a certified and monitored quality management system according to (DIN) ISO 9001. Furthermore, the company operates an accredited calibration laboratory.

The documentation [P3] that has been presented testifies that the quality management system is applied to the LOGOSCREEN and includes the measures required for the first security objective.

6.3 Security instructions in the product documentation

The inspection of the technical documentation was made on the Operating Manual (see document [U3]) and the Interface Description (see document [U4]). Only the data security aspect was considered. The documentation does not include explicit notes on data security. The use of the password protection for the configuration is described. Details on the significance of diskette characteristics and diskette storage for data integrity are not provided.

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7 Summary

The concept and properties of the LOGOSCREEN series of paperless recorders make them into a possible electronic replacement for pen or dot-matrix chart recorders, with additional mechanisms to ensure the integrity of the data and security against manipulation. The effectiveness of the implemented mechanisms secures the envisaged application reliably, provided that the storage conditions and archive duration for diskettes or the selected backup media are respected. The user must take care that the evaluation software to read the measurement data and the operating system that is required are available for the required duration of the archiving of his measurement data.

on behalf of

TÜV PRODUCT SERVICE GMBH
Automation, Software and Electronics - IQSE
Project manager

R. Heilmann

Reiner Heilmann

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