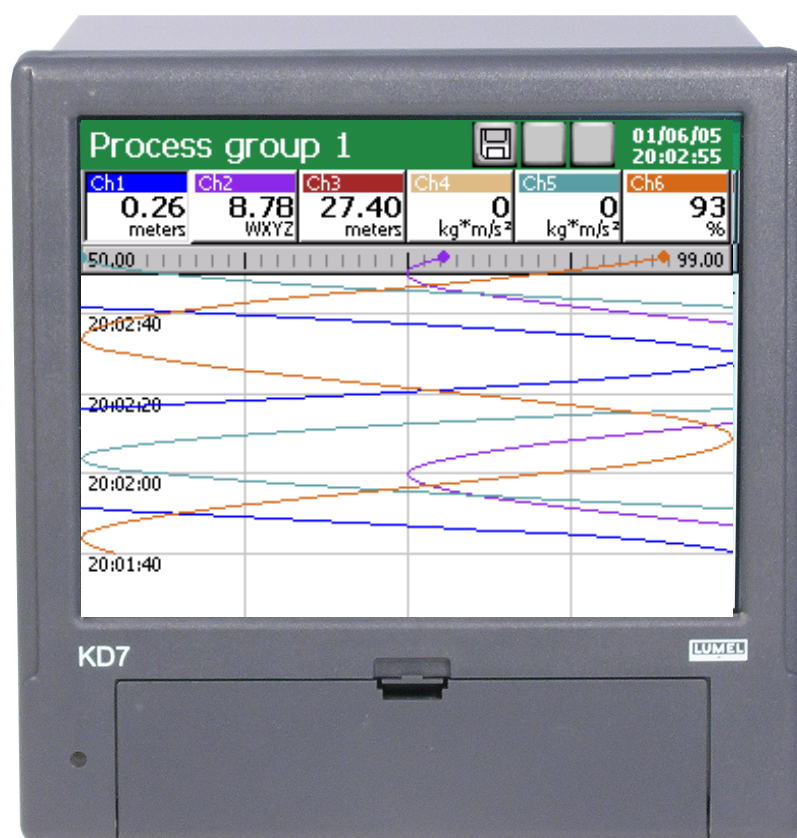


SCREEN RECORDER

KD7 TYPE



USER'S MANUAL

CE

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1. INTRODUCTION

1.1 Recorder applications

The KD7 screen recorder is applied as a data acquisition station in measuring and control systems. It finds application to measure, visualize and supervise technical process parameters in various industrial branches, e.g. pharmacy, food, chemical and papermaking industries.

It can be also used as an autonomous measuring and recording device.

The KD7 screen recorder is adapted to measure voltage, current, temperature, resistance changes and other quantities converted into a signal or electrical parameter. The source of measuring data can be also communication interfaces (ETHERNET, RS-485).

All processes suitable for a measuring system can be realized in this recorder: measurement of input signals, and their conversion, visualization, and archiving of data, signalling and communication with the environment.

Converted measuring data are stored in the internal memory and on the CompactFlash card.

1.2 Recorder features

- QVGA HIGH COLOR 3.7" screen, 320 x 240 pixels, with a touch panel for the recorder service,
- Exchangeable CompactFlash internal memory with capacity from 16 MB up to 4 GB,
- Communication interfaces: Ethernet 10 Base-T, USB 1.1 Device, RS-485 Modbus Slave and Master, RS-232,
- Measuring inputs for the direct connection of thermocouples, voltage, current and resistance,
- Visualization, archiving of measuring data transmitted to the recorder from other devices through the RS-485 Modbus Master interface or Ethernet,
- Linearization of sensor characteristics,
- Programmable current, voltage and resistance inputs,
- Programming of recorder parameters,
- Programming of screens and choice of screen configurations,
- Storage of data in the internal 8 MB buffer with data support (for before damage and after damage states)
- Structure programming of functions converting measuring quantities into output quantities and structures of alarm functions, destined to be exposed on the screen and written on the data carrier,
- Settlement of the set of data for the current exposition on the screen.

Note:

Software updates for KD7 Recorder and other files are available on the following web site: <http://www.lumel.com.pl/en/download/recorders/kd7>

2. GENERAL INFORMATION

2.1 Warning and information signs

One or more of presented symbols can be used in the recorder.



Caution: one must pay attention to the description in the recorder user's manual.



Terminal of the protection lead



Earth terminal



Protection of sensitive electrostatic systems (ESD)

2.2 Safety of service

The KD7 recorder fulfils requirements related to safety of electrical measuring instruments for automation, acc. to EN 61010-1 standard and requirements concerning the resistance against interference occurring in industrial environment acc. to EN 61000-6-2 and EN 61000-6-4 standards.

The connection of supply, communication interfaces and measuring signal, and the use of equipment inconsistent with the description included in the present user's manual and standards as above can cause serious weakening of the recorder protection against interference.

2.2.1 Remarks concerning the recorder installation

Various sources of interference occurring in practice, interact with the recorder in a continuous or impulse way from the supply network side (as the result of the action of other devices) and also overlap on the measured signal or auxiliary circuits of the recorder.

In particular, strong impulse interference is dangerous for the operation of devices since they can cause sporadic erroneous measurement results or accidental operations of alarms, despite of the use of suitable filters in the recorder. The level of this interference should be reduced to a value lower than the resistance threshold of the recorder, first of all through a suitable installation of the recorder in the object.

In this scope, it is recommended to observe following recommendations:

- Do not supply recorders from networks near devices generating high impulse interference in the supply network and do not use common grounding circuits with them,
- Use network filters for the group of recorders servicing the same object,

- Use metallic shields in the shape of tubes or braids to lead supplying wires (phase, zero), in which one can also lead the earth conductor and eventually network wires supplying contacts of alarm relays of the given recorder,
- Lead individually connections of logic input circuits in shields as above, by means of twisted wires,
- Lead individually connections of communication interface circuits in shields as above and by means of twisted wires,
- Wires leading measuring signals for each measuring recorder channel should be twisted in pairs, and for resistance sensors in 3-wire connection, twisted of wires of the same length, section and resistance, and led in shields as above. Wires leading measuring signals to the same recorder can be led in the same shield (if it is possible),
- All shields should be earthed unilaterally near the recorder,
- One must avoid a common earth conductor with other devices,
- Apply the general principle, that wires (group of wires) leading different signals should be led in the longest possible distance between them and crossings of such groups of wires made at a 90° angle,
- Set on the supply cable (near the recorder) a ferrite filter ZCAT 2035-0930A (TDK) being in the recorder accessory set.

2.2.2. Precautions in the scope of ESD protection



Semiconductor elements or packages marked with the sign as above, can become damaged in result of electrostatic discharges (ESD).

In order to prevent this, one must observe following recommendations during service works.

- Disassemble instruments only in the area protected against electrostatic discharges,
- Use conductive materials to dissipate electrostatic charges in the working area,
- Use only antielectrostatic packings to store electronic elements,
- Do not touch elements and packages with hands,
- Do not keep materials susceptible to generate electrostatic charges in the working area.



CAUTION: Repairs and modifications in the recorder equipment should be carried out by authorized service workshops or with the manufacturer.

3. RECORDER PREPARATION TO WORK

The recorder with accessories is delivered in packing fulfilling requirements of environment protection regulations.

The recorder in the packing can be transported and stored in the temperature:
-20 ...+60°C (-4 ...140°F).

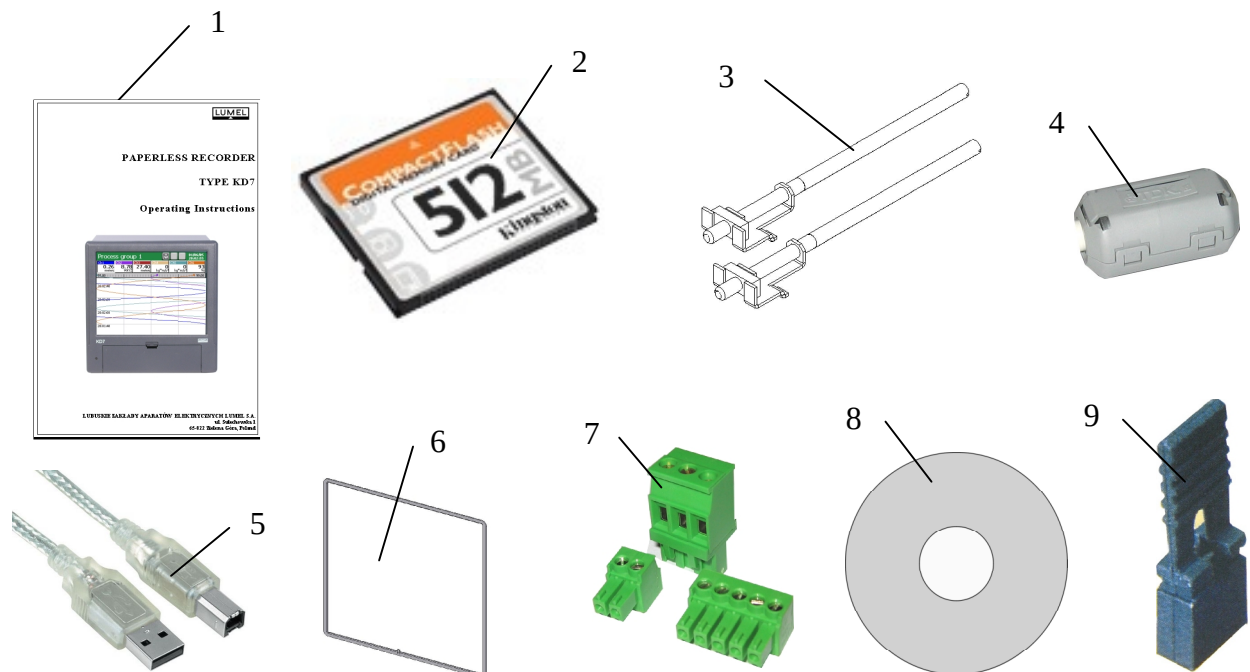
3.1 Unpacking

- **Take the KD7 recorder out from the shipping packing**

The data plate with the version code, factory number and supply parameters is placed on the recorder housing. Before unpacking, check the conformity of the recorder version with the order.



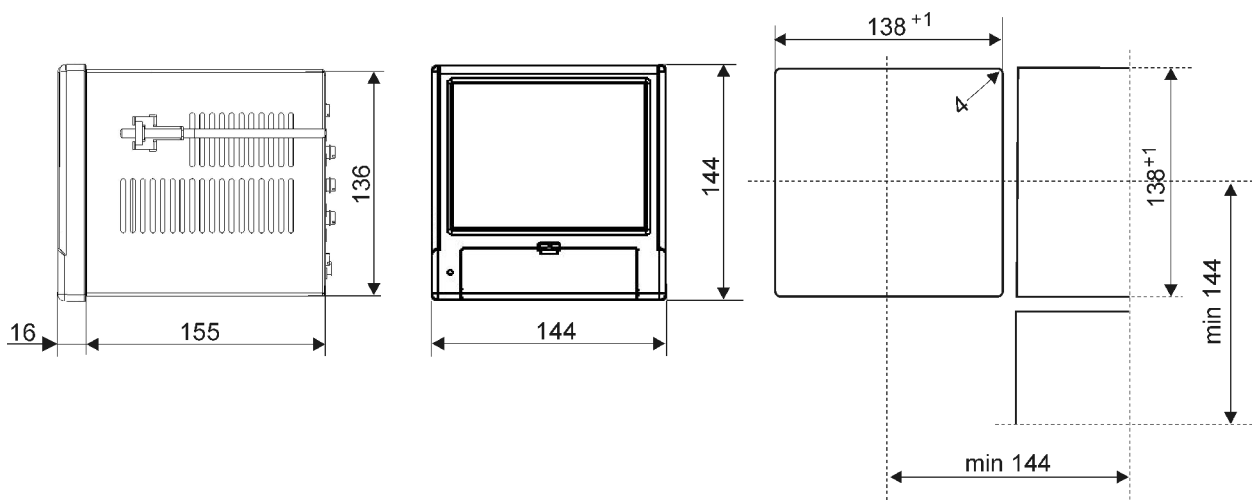
- **Take recorder accessories out from the packing.**



1. User's manual (printed version or on a CD disk)	1 pc
2. CF 128MB memory card ¹⁾	1 pc
3. Mounting brackets	2 pcs
4. Ferrite core ZCAT 2035-0930A (TDK)	1 pc
5. USB cable 1.8 m (shielded)	1 pc
6. Seal (KD7 housing– panel)	1 pc
7. Set of plugs ²⁾	1 set
8. CDR disk ³⁾	1 pc
9. Current test links ⁴⁾	6 or 12 pcs
10. Warranty card	1 pc

- 1) Or other, according to ordered CompactFlash card from SanDisk ® company or Kingston ®, with capacity up to 4GB.
- 2) The set is accommodated to the ordered recorder version
- 3) Following documents are recorded on the CDR: user's manual of the KD7 recorder, KD7 CONNECT program for the communication with KD7 through the USB interface, USB drivers for the KD7 recorder and, according to the order version, KD7 SETUP and KD7 ARCHIVING programs. (*NOTE: the KD7 ARCHIVING program will be available soon*).
- 4) Current test links are added to accessories for the KD7 version with programmable measuring inputs.

3.2 . Installation into the panel



Put the seal from standard accessories on the housing (see p.3.1.). After mounting the recorder into the panel, the seal protects the part behind the panel against the influence of risks appearing from the frontal part of the panel, resulting from the IP65 protection degree.

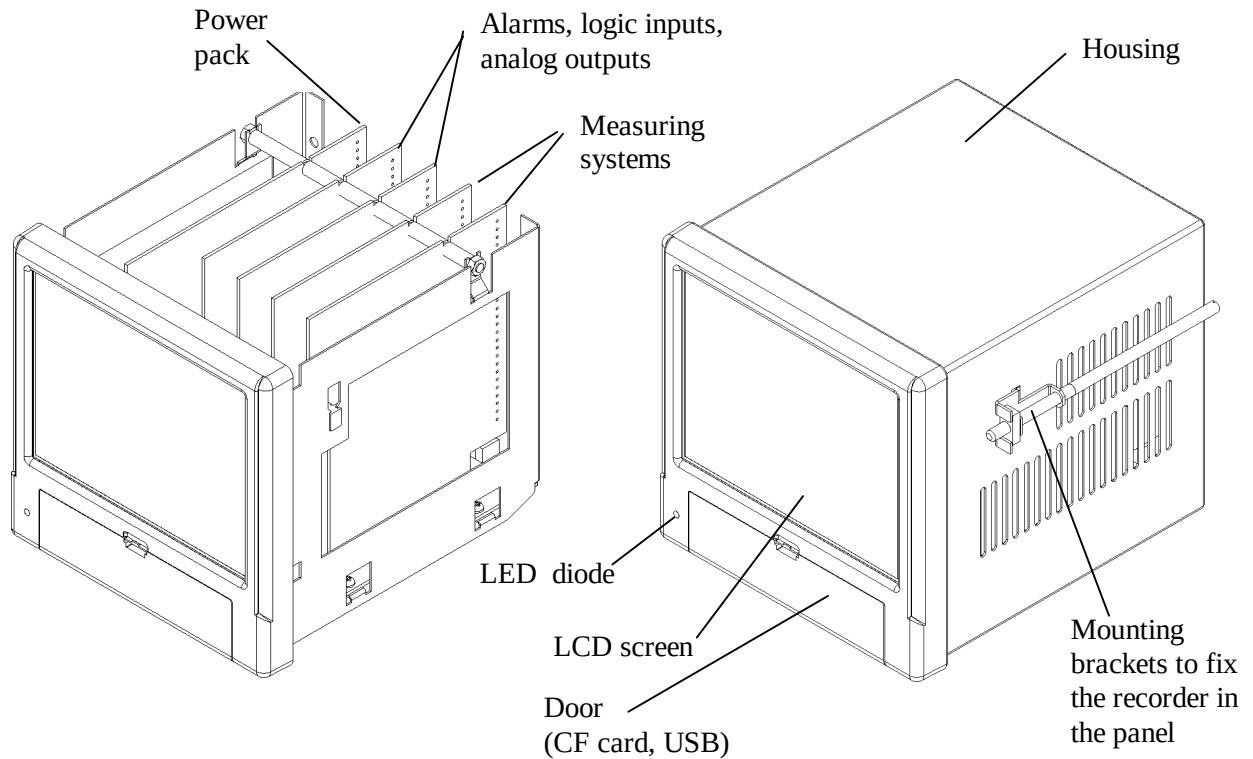
The recorder is fixed to the panel by means of two screwed mounting brackets from the recorder accessories (see p. 3.1.).

Basic fixing and panel cut-out dimensions are presented above.

3.3. Operating conditions of the recorder

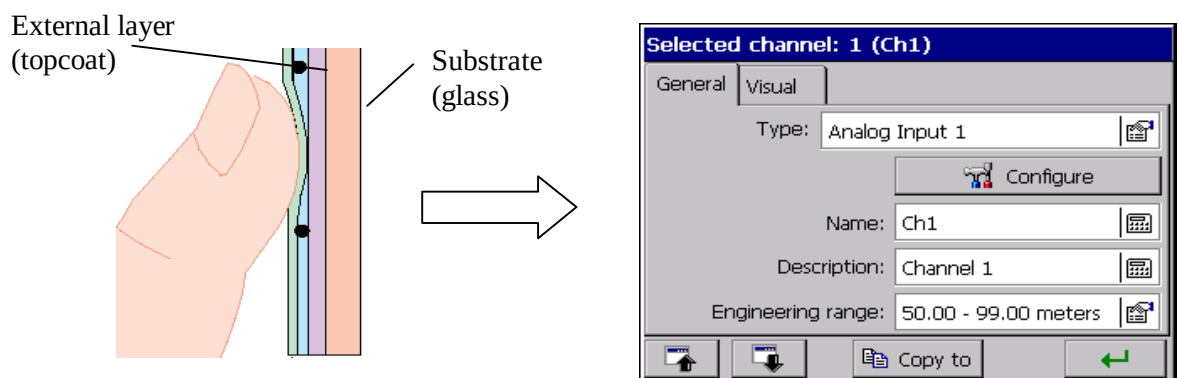
The recorder can work at ambient temperature: 0...+50°C (32 ...122°F) and max.75% of relative air humidity without condensation.

4. RECORDER CONSTRUCTION



4.1. LCD screen with touch screen

For the visualisation of measuring data and the configuration of recorder, an LCD TFT 5,7" graphical screen integrated with the touch screen is applied.



All elements of the user's interface (windows, icons, buttons) have dimensions adapted to be serviced by fingers – They do not require special tools.

After installing the recorder into the panel, remove the foil protecting the external flexible layer of the touch screen from the LCD screen.

Considering the sensibility of the touch screen to dirt and external damages of its surface and the substrate, one must observe following recommendations:

- protect against surges, they can damage the external surface or the glass substrate of the touch screen,
- protect against fluids, grease and aggressive chemical agents,
- touch only with fingers, do not use hard and sharp objects which can damage the flexible surface of the touch screen,
- clean softly with a cotton cloth impregnated with a detergent destined to clean LCD monitors (not containing alcohol, petrol or ammonia) or by using water with soap,
- observe the given temperature range of the recorder operation.

4.2. CompactFlash memory card, USB interface, LED diode

A CompactFlash card with capacity from 16 MB up to 4 GB is foreseen for the measuring data storage in the KD7 recorder.

In high-speed recorders, it is recommended to apply CF cards produced by Kingston Technology Company, Inc. or SanDisk.

Current measuring data, archive data and recorder configuration files are stored on the CF card

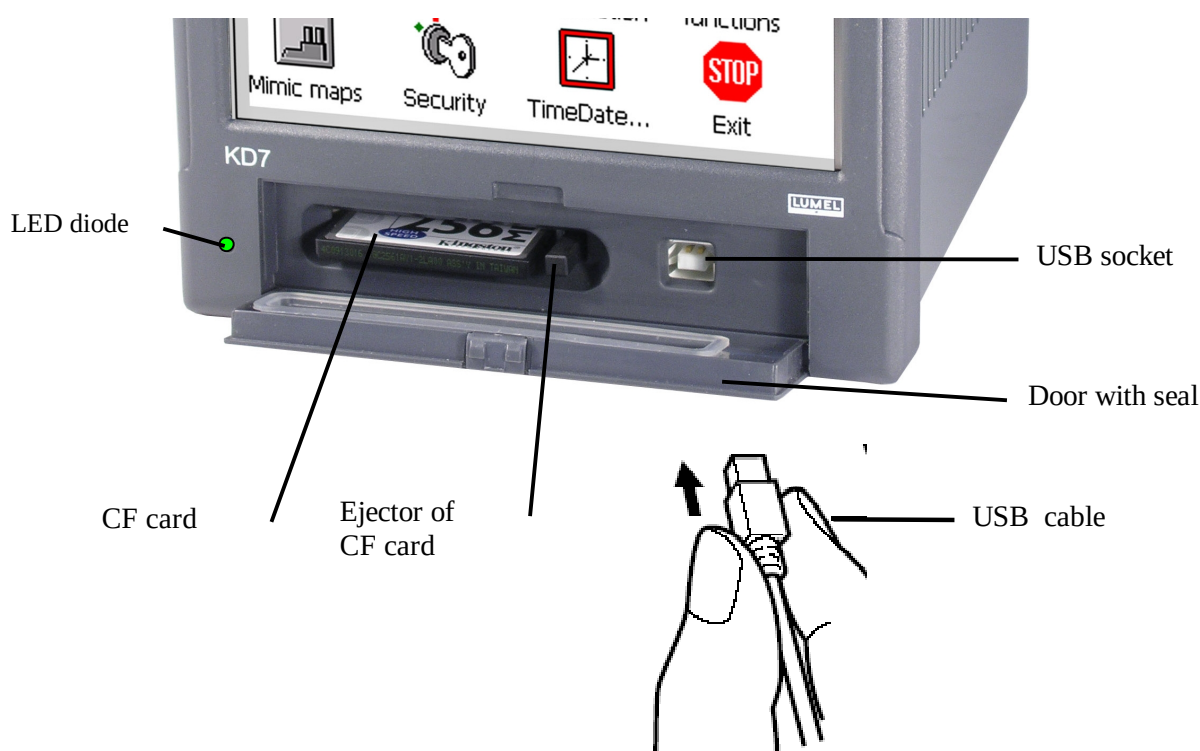


Fig. Frontal view of the recorder after opening the door

One can upload data stored on the CF card to a PC and record or delete selected files on the CF card through the USB interface. To connect the computer to the recorder through USB socket, use delivered in standard accessories, the shielded USB AM-BM cable of 1.8 m long or another similar one of 5 m long. the USB bus operates correctly without amplification at the distance up to 5 m)

In order that the KD7 recorder was seen in a PC with MS Windows operating system and serviced through USB, one must install drivers and the **KD7 Connect** program from the delivered CDR being in the recorder accessories (for description and program installation see, p.9.1.)

The LED diode placed on the left side of the door signals the recorder operating conditions:

- Green colour of the diode – the recorder is set working, normal operating conditions
- Red colour of the diode – signals the storage of data on CompactFlash memory card. In these operating conditions, one must not take out the card from the seat.

Risk of loss of measuring data!

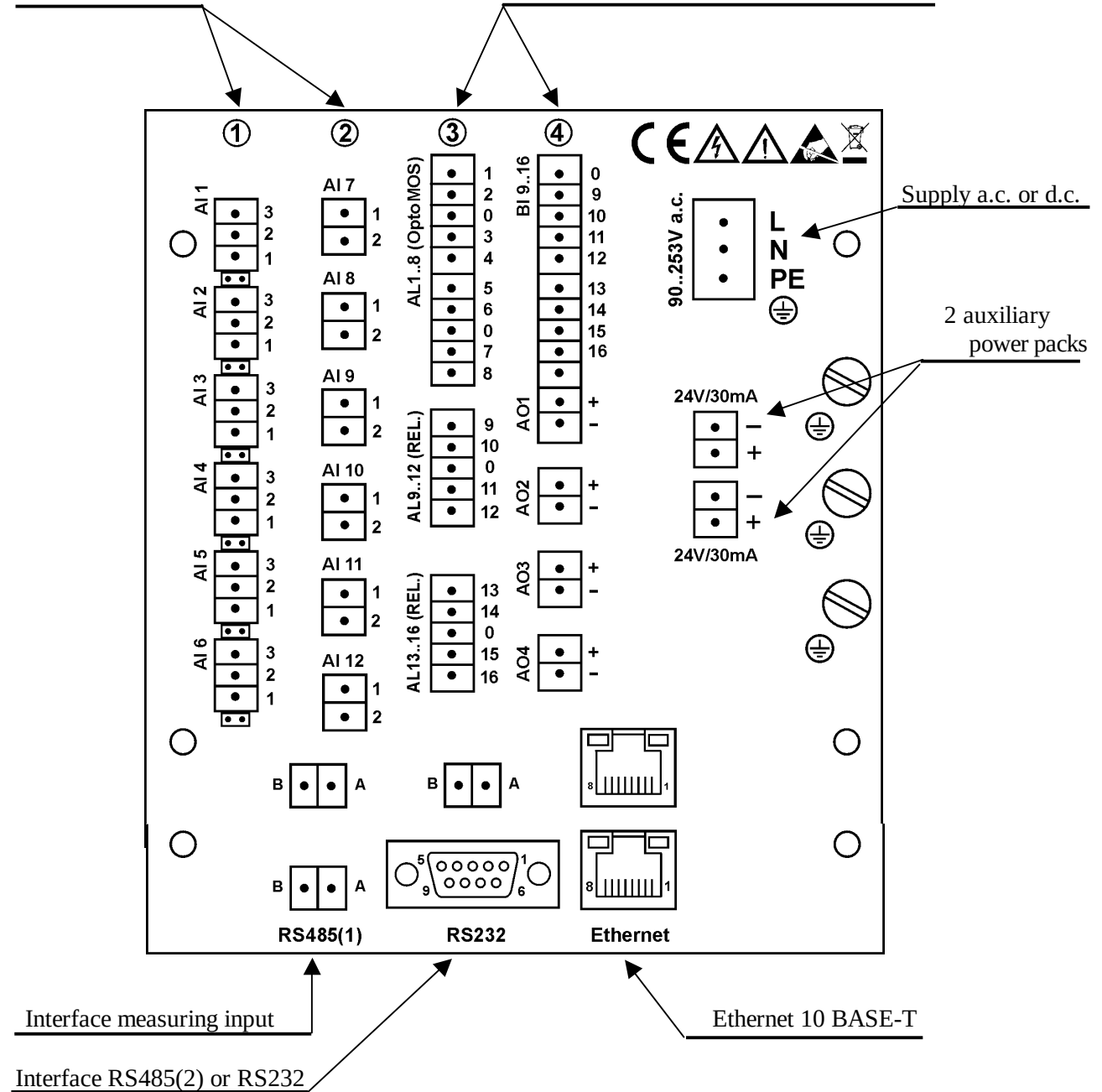


4.3 . Terminal plate

Programmable

and/or standard measuring inputs

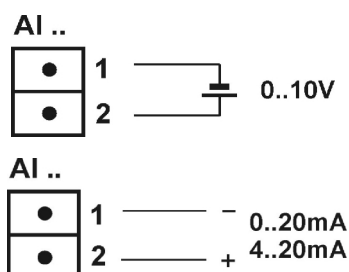
Alarms, Logic inputs, Analog outputs



Symbol of terminal group	Terminal description
1 and 2	Connecting sockets of measuring packages (AI 1..12) - 6 or 12 standard measuring inputs - 6 or 12 programmable measuring inputs
3 and 4	Connecting sockets of alarm packages (AL 1..32) (8 or 16 electromechanical relays and 8 or 16 semiconductor OptoMos relays) and/or Packages of digital inputs (BI1..16) <i>Note: 2 digital inputs are presently available to control the data storage on the CF card and control the alarms, other functions will be accessible soon.</i> and analog outputs (AO1..8) (4 or 8 analog outputs at ranges according to the order)
RS485(1)	Modbus Master interface measuring input (CI 1..24) (1..24 interface inputs) - is accessible in each version of the recorder
RS485(2) / RS232	RS-485 or RS-232 communication interface.
Ethernet	Connecting socket for Ethernet 10 Base-T
L, N, PE  L+, L-, 	Connecting sockets for supply voltage: 90... <u>230</u> ...253 V a.c. or 18... <u>24</u> ...30 V d.c.
24Vd.c. / 30mA	2 × auxiliary supplies to control external devices
	Functional earth terminal (to connect screens from signalling wires)

4.3.1 Connection of analog signals.

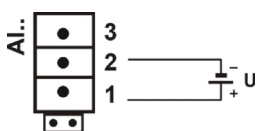
4.3.1.1 Standard measuring inputs AI 1..12



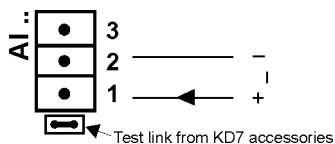
Kinds of ranges, input signals and their parameters are given in section 10 “Technical data”.

4.3.1.2 Programmable measuring inputs AI 1..12

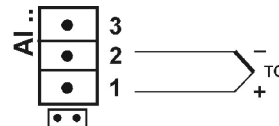
Connection of voltage source



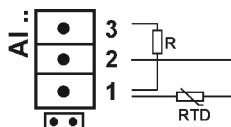
Connection of current source



Connection of thermocouple TC

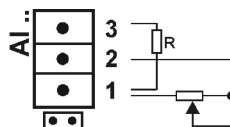


- Resistance thermometer RTD



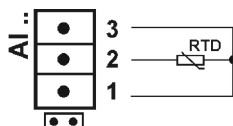
Two-wire connection:

- Resistance transmitter



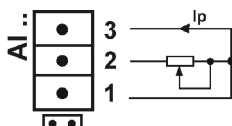
Note: the balancing resistance R should have a resistance equal to the total resistance of both connecting wires of RTD and transmitter with terminals

- Resistance thermometer RTD

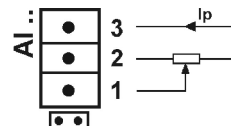


Three-wire connection:

- Resistance transmitter

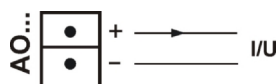


- Potentiometric transmitter



Note: wires connecting RTD with terminals 2 and 3 should have the same resistance

4.3.1.3 Analog outputs AO 1..8

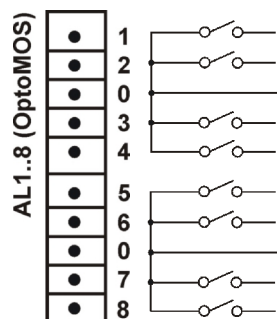


Parameters of analog output signals are given in the section 10 "Technical data"

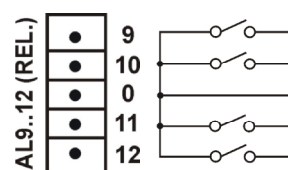
4.3.2 Connection of digital signals

4.3.2.1 Alarm outputs AL 1..32 and logic inputs BI 1..16

- Connection to terminals of the alarm system with semiconductor relays:
AL1..16(OptoMOS) and to terminals of the alarm system with electromechanical relays
AL1..16(REL.)



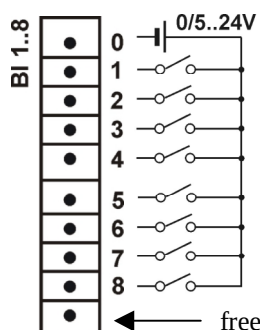
Input parameters for the alarm system with electromechanical (REL.) and semiconductor relays (OptoMOS) are given in the section 10 "Technical data".



Alarms with electromechanical relays can be ordered with make and break contacts (see section 11: Order code). As standard they are set on the package as make contacts.

(...)

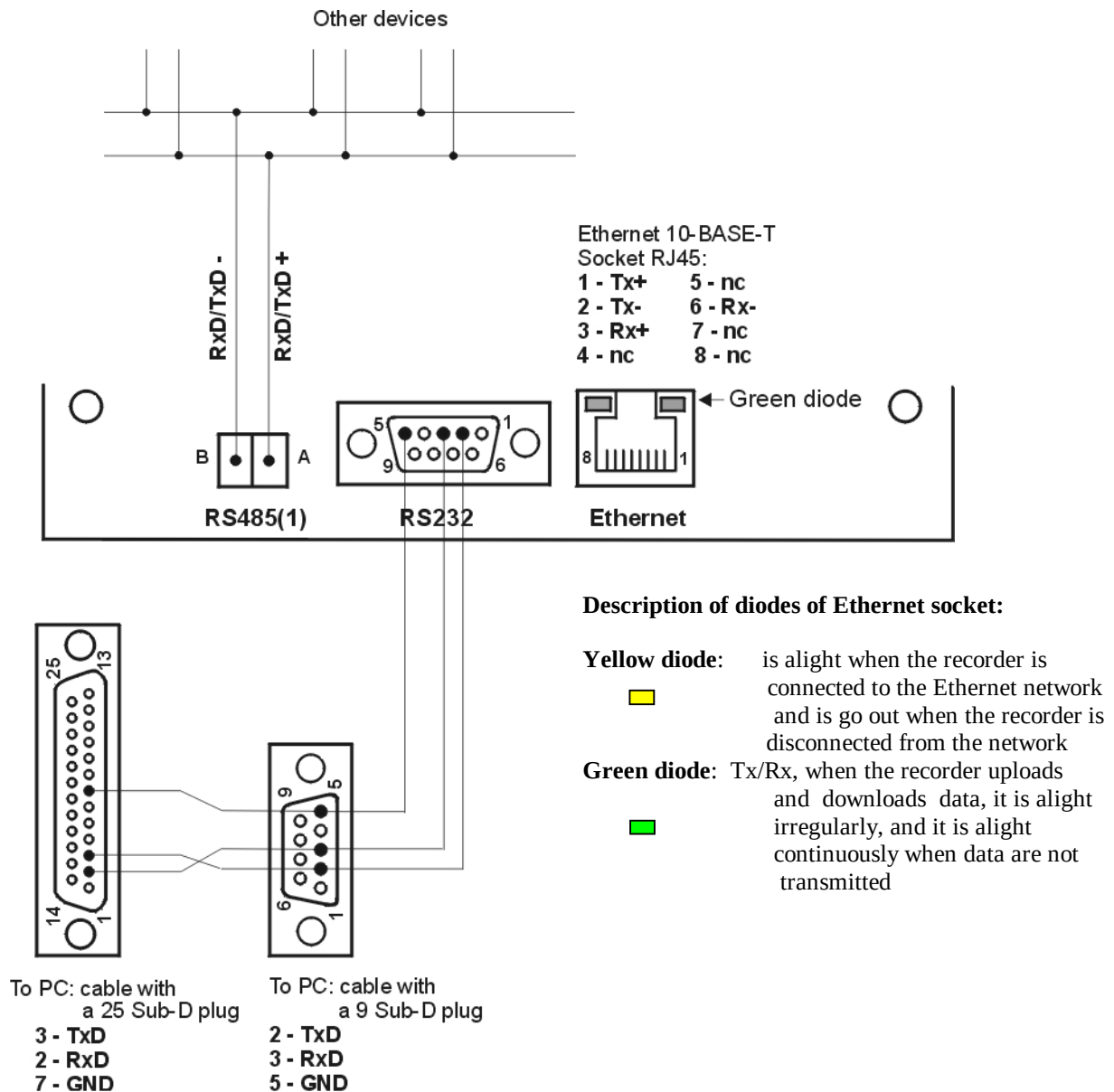
- Connection of the control signal to terminals of the logic input system BI 1...16



Available 2 logic inputs destined to:

- BI 1** - control of the measuring data storage on the CF card (0V – data storage is turned on, +5...24 V - data storage is turned off)
- BI 2** - control of the alarm system. (0V – all active alarms are turned on, +5...24V – All active alarms are turned off)

4.3.2.2 RS485(1), RS485(2), RS232, Ethernet 10-BASE-T interfaces



Description of the Ethernet 10-Base-T interface connection

Functions of the RJ45 socket leads are in compliance with the EIA/TIA 568A/B (AT&T258) standard.

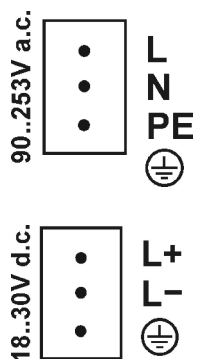
To connect the recorder with the hub (concentrator) or the switch, one must use a cable with leads 1:1 acc. to the description as on the drawing above.

To a direct KD7 recorder connection with the PC, one must use a crossover cable:

KD7		PC	
Tx +	1	3	Rx +
Tx -	2	6	Rx -
Rx +	3	1	Tx +
Rx -	6	2	Tx -

The cable length should not exceed 100 m

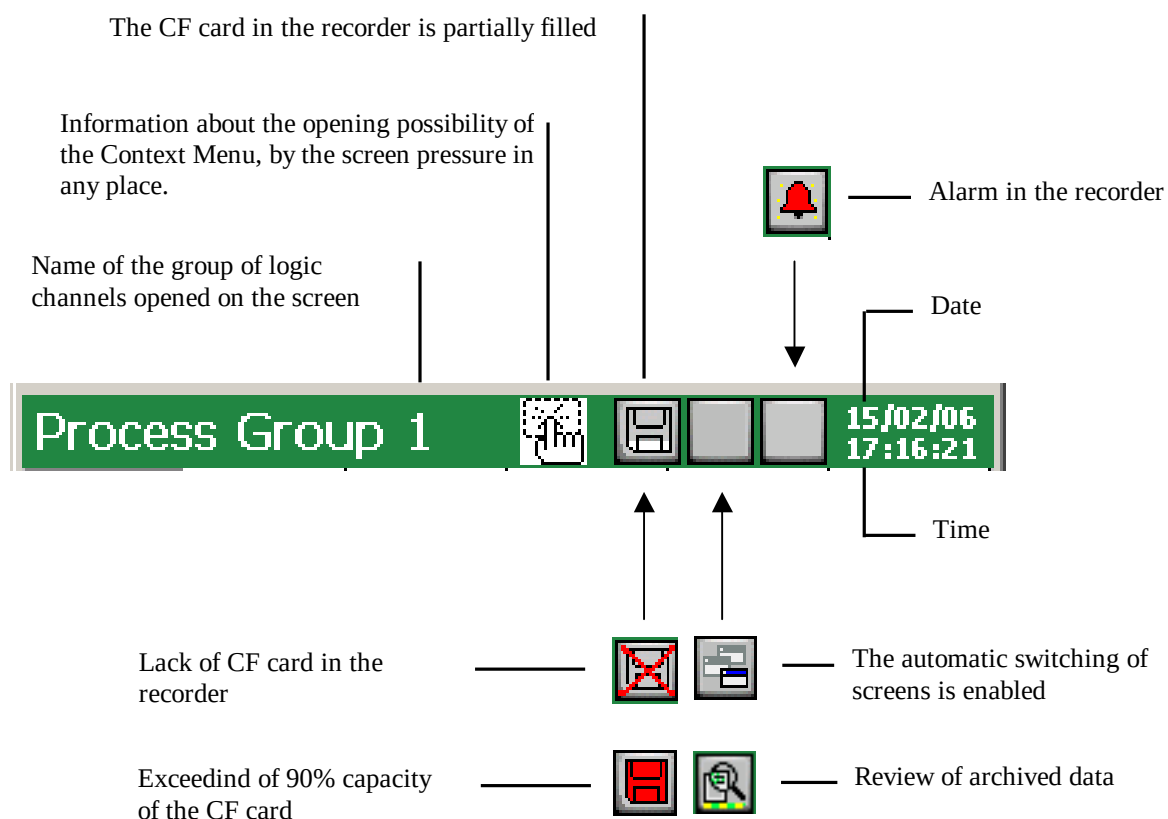
4.3.3 Recorder supply (AC or DC)



Caution: The recorder must be earthed or zeroed.

5. GRAPHICAL SIGNS ON THE RECORDER SCREEN

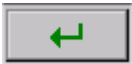
5.1 Status bar



5.2 Measuring views

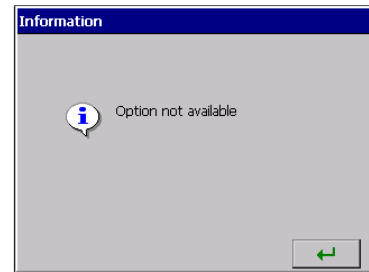
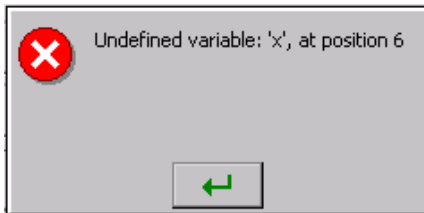
	Range overflow in the channel over the upper limit, alarm state in the channel.
	Range overflow in the channel under the lower limit
	Signalling of the alarm occurrence in the recorder.

5.3 Service menu

	selection approval, introduction of changes.
	Cancellation without introduction of changes
	Buttons for global navigation
	Buttons for navigation on accessible options
	Buttons for global copying of settings between menu windows
	
	Introduction of a number or a character string.
	Option selection from the list or the dialogue

5.4 Information messages

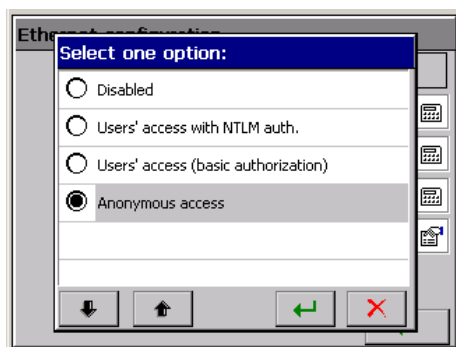
	Warning
	Symbol of error occurrence
	request
	Information icon



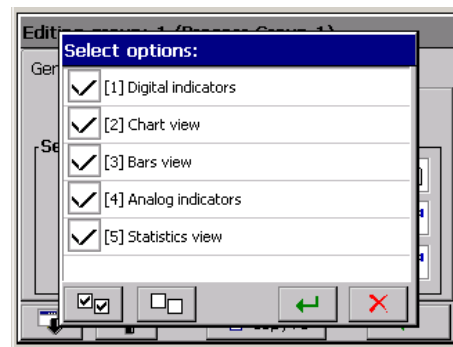
5.5 Dialogues

- Selection:

Single:

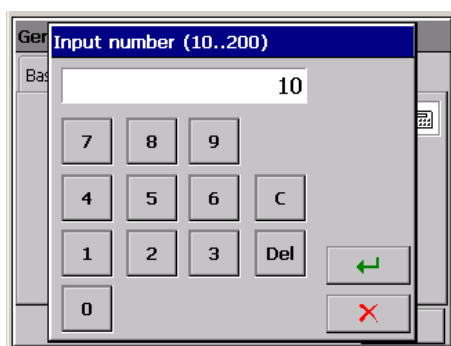


Multiple:

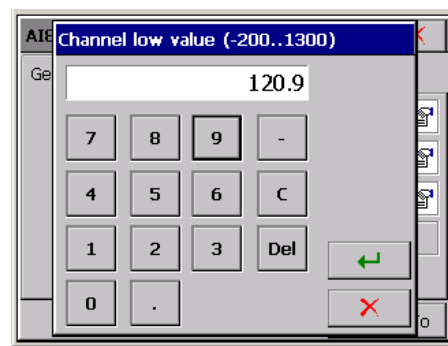


- Introduction of numbers

with constant decimal point:



with variable decimal point:



- Introduction of a character string (small and capital letters, numbers and special characters, password)

Small and capital letters

Numbers and special characters:



Password (replaced by dots) :



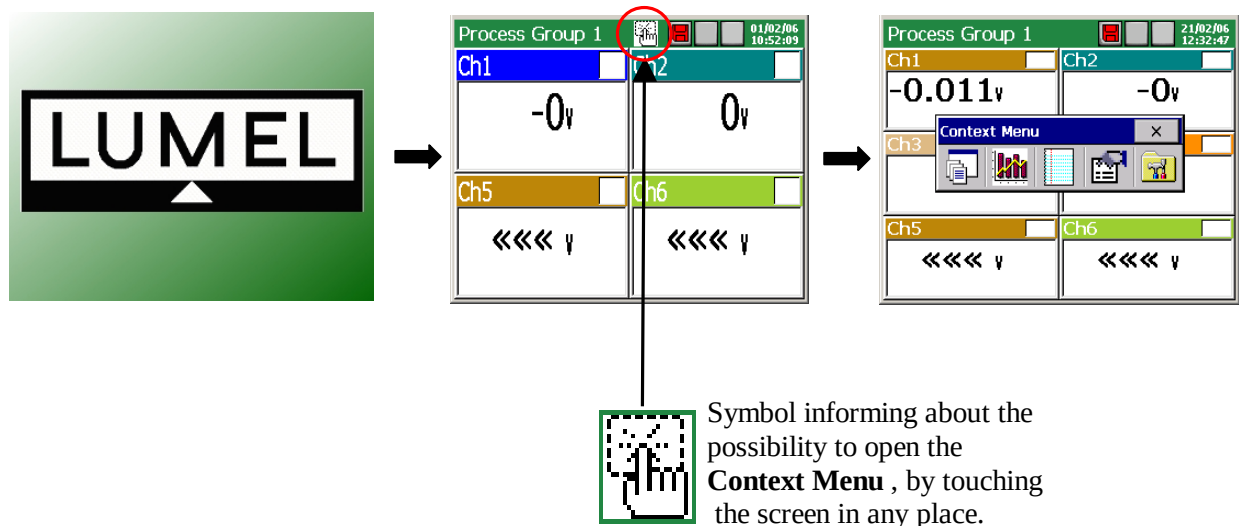
6. STARTING THE RECORDER

After connecting the supply, the start screen with the “LUMEL” logo appears.

The logo is displayed during the time necessary for the initialization of recorder processes.

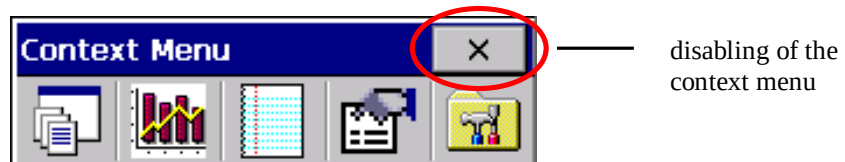
Next, the screen of data visualization appears, which was displayed at the last recorder disconnection from the network.

After the touch of the screen in any optional place, the **Context Menu** appears.



6.1 Context Menu

After **pressing the screen by a finger** (during the visualization of the measuring data) the **Context Menu** is displayed.



In the standard option, the basic set of functions necessary for the current service of the KD7 recorder is accessible in the menu.

	Selection for the edition of the next group from programmed 1...4 measuring groups on the screen.
---	---

One can edit up to 4 measuring groups in the recorder.

In each group, one can program up to 6 logic channels, from 32 channels accessible in the recorder. Programming of group parameters (see p 8.7.).

	Switching of successive screens in the selected measuring group.
---	--

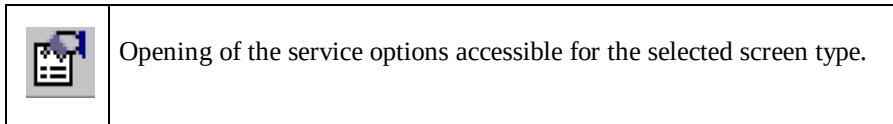
Channels programmed in the given group can be displayed on 1...5 screen types: **digital, linear, bargraph, analog, and statistic.**

Description and programming of visualization parameters (see p. 8.2.).



Information concerning events occurring during the recorder operation is recorded in the diary of audits. After exceeding the programmed capacity, new data are recorded. Entry into the diary are deleted after turning the recorder supply off.

Setting of parameters of the audit diary.



Following options are accessible for screens: digital, bargraphs, analog, and statistic.

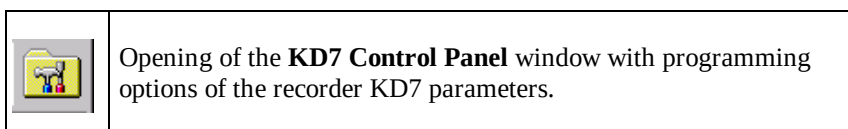
- turn on/off the switching of screens , (automatic switching), see p. 8.1.6.
- recording of archive data on CF, see p.8.1.6.
- removal of the CF card, see p.8.1.6.

Following options are accessible for the linear screen:

- time scale (for the screen),
- visualized signals,
- zoom signals, see p 8.2.8.,
- transition to the archive mode, see p.8.9,
- turning on/off the switching of screen, p. 8.2.7.
- storage of archive data on CF, p. 8.1.6.,
- removal of the CF card, see p. 8.1.6.

For the opened audit diary the following option is accessible:

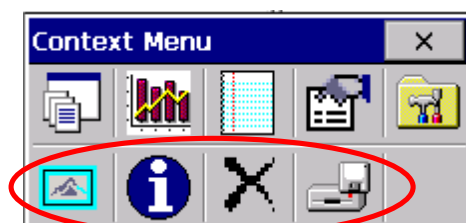
- zeroing of the audit diary.



- transition to the configuration of recorder parameters in the “**KD7 Control Panel** “ window, see p 6.2.

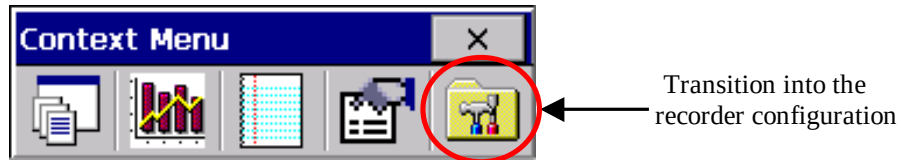
The contents of the **Context Menu** can be extended (see p. 7.10.) by extra options:

- screen image thrown on the CF card (in the format: *.bmp) ,
- access to the browser of files stored on the CF card,
- access to systemic information about the KD7 recorder,
- big closing button of the Context Menu window.



6.2. Entry into the configuration of KD7 parameters “KD7 Control Panel” Window

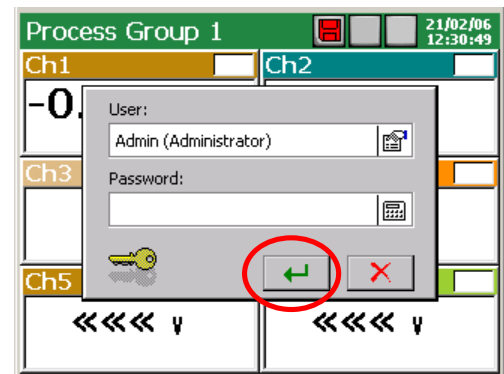
In order to transit into the recorder configuration, one must select the **KD7 Control Panel** symbol in the **Context Menu**:



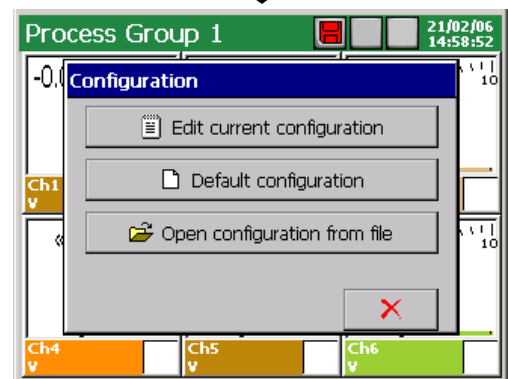
The window of the user's selection appears, which will carry out the given configuration.

At first start, there is only the **Administrator** user. The login follows without the password, after approving the window.

The **Administrator** after transition into the **KD7 Control Panel**, can edit remaining users of the recorder and change all settings concerning them, see p. 8.8.



Next, one must choose the kind of the recorder parameter configuration in the **Configuration** window.



Default Configuration

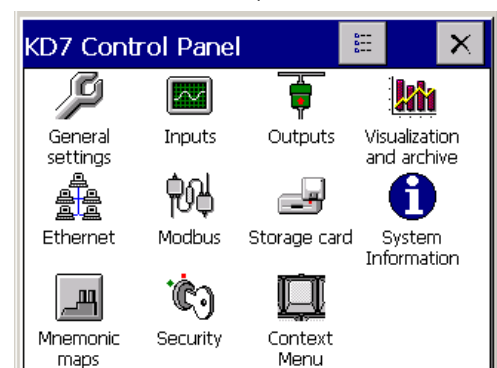
- They are factory settings or given requirements concerning individual recorder settings.

Edit current configuration

- At first start, it is the default configuration, at next starts, the changed configuration by the user in the KD7 Control Panel (see p. 6.2).

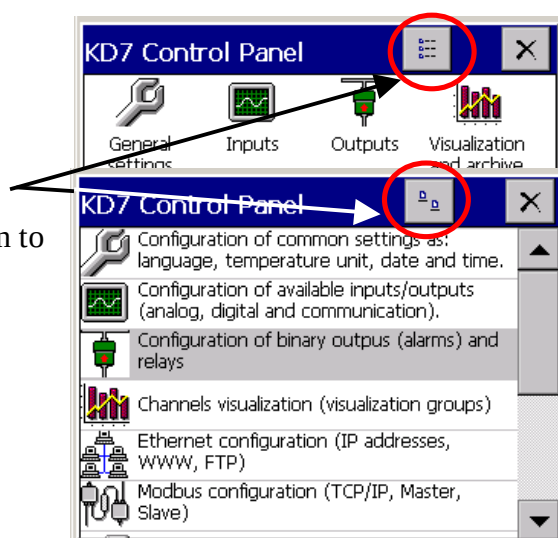
Open the configuration from file – selection of the configuration file from the recorded on the CompactFlash card.

The **KD7 Control Panel** appears. It is the initial point for carrying out the full configuration of the KD7 recorder.



Pressing the button of the panel view change, one can switch the **KD7 Control Panel** into the description panel.

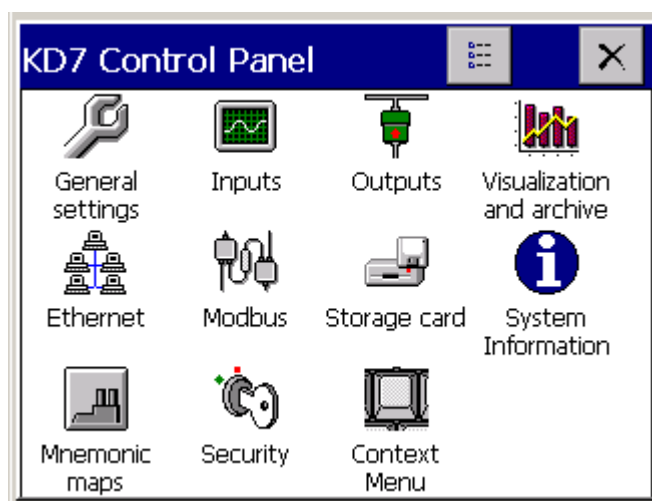
A renewed pressure of the button causes the return to the classical view.



7. CONFIGURATION OF KD7 PARAMETERS

The **KD7 Control Panel** is the window in which we obtain the direct access to the KD7 servicing menu:

- general settings of the recorder,
- configuration of measuring inputs and mathematical functions,
- configuration of outputs (alarms, analog outputs),
- setting of visualization and archiving parameters,
- setting of communication interface parameters
- readout of information about the recorder,
- servicing the CF card and browse files,
- configuration of the Context Menu
- configuration of access principles to recorder configuration changes,
- *configuration of mnemonic maps (presently, out of service)*



- Note:**
1. In descriptions of the KD7 control Panel menu, exemplary data are written in inclined printing.
 2. During the recorder configuration, the measurement and data storage last according to hitherto existing settings. When we transit to new settings, after accepting changes, a break in storage, initialization of changes and starting of recording with new data follows. Only in case of the data change, the change is immediately introduced and the storage lasts acc. to the new setting.

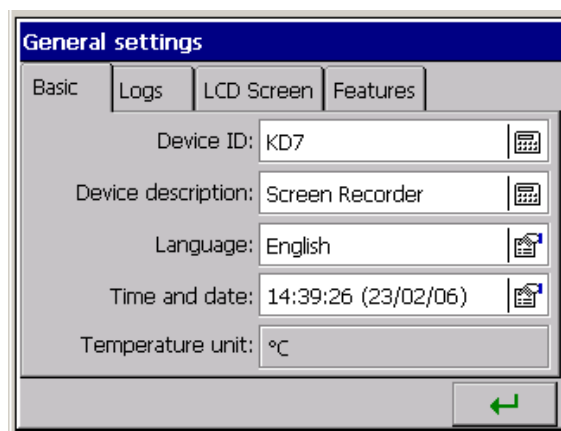
7.1 General settings



After pressing the  icon, The configuration of general parameters is coming open: recorder description, selection of the menu language, setting of the date and time, selection of the temperature unit, capacity of the event diary (audits), time of screen blanking, setting of screen brightness.

The procedure of the touch screen calibration is also accessible (see p. 8.10.).

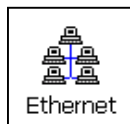
Programming menu of general settings.



Basic	Device symbol:	<i>KD7</i>		Description edition
	Device description:	<i>Screen Recorder</i>		Description edition
	Language:	<i>Polish</i>		Selection: - Polish - English
	Date and time:	<i>12:00:00 (24/01/06)</i>		Transition to the edition of date and time
	Temperature unit:	<i>°C</i>		Selection: - °C - °F (not accessible)
LCD screen	Screen saver:	<i>Disabled</i>		Selection: - Disabled - 5,10,15,30 min. - 1,6,12 hours
	LCD highlighting :	<i>100%</i>		Setting of the screen brightness
	Calibration of the touch screen:			See p. 8.10.
CompactFlash	Selection: fast formatting of the CF card / full formatting of the CF card.			
Diaries	Size of the audit diary:	<i>10</i>		Edition of the parameter value
Extension	Mathematical function:	<i>Disabled</i>		Selection : - Disabled - Activate (activation procedure see p. 7.11.6)

Note: Date and time – automatic servicing of the summer/winter time change will be available soon.
°F - will be available soon.

7.2 Ethernet

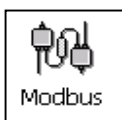


After pressing the Ethernet icon, the window of parameter configuration of the Ethernet interface is coming open.

Programming menu of Ethernet interface parameters .

Enable DHCP	☐	☒	Mark the selected function
Device IP	10.0.2.26	10.0.2.26	Address edition
Sub-network mask	255.0.0.0	255.0.0.0	Address edition
Default frame	10.0.0.1	10.0.0.1	Address edition
WWW Server	Anonymous access	Anonymous access	Selection: Disabled Access with NTLM Authorisation Users' access Anonymous access

7.3 Modbus



After pressing the Modbus icon, The configuration window of the Modbus communication protocol is coming open.

Programming menu of Modbus Master and Modbus Slave interface parameters:

Master	Mode:	<i>RTU 8N2</i>		Selection: ASCII 8N1, ASCII 7N2, ASCII 7N1, ASCII 7O1, RTU 8N2, RTU 8E1, RTU 8O1, RTU 8N1,
	Transmission:	<i>28800</i>		Selection: 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600, 115200, 128000, 256000
	Timeout (ms):	<i>500</i>		Edition of the parameter value
	Connection mode:	RS485		
Slave	Mode:	<i>RTU 8N2</i>		Selection: ASCII 8N1, ASCII 7N2, ASCII 7N1, ASCII 7O1, RTU 8N2, RTU 8E1, RTU 8O1, RTU 8N1,
	Baud rate:	<i>28800</i>		Selection: 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600, 115200, 128000, 256000
	ID:	<i>1</i>		Edition of the parameter value
	TCP/IP protocol:	<i>Disabled</i>		Selection: Disabled / Enabled
	TCP/IP port:	<i>502</i>		Edition of the parameter value

- Note:** 1. The register map is accessible in the user's manual of the Modbus communication protocol.
2. For the Modbus Slave protocol, the access is presently accessible only up to actual values of measurements (32 registers).

7.4 Mnemonic maps

Note: This option

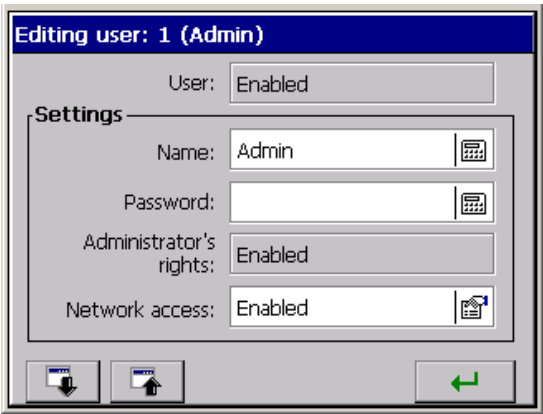


will be accessible soon.

7.5 Security



After pressing the icon, the edition window 1...8 of recorder users and settings principles of their access to the recorder configuration (see p.8.8.) is opening. One must establish the password for each user to protect against the access and introduction of non-authorised changes in the recorder configuration.



Programming menu of access principles to KD7 configuration.

Edited user:   Selection: 1 (Admin), 2 (User 1)...8 (User 7)				
User	1 (Admin)		Enabled (access to all settings)	
	2 (User 1)...8 (User 7)		Enabled	 Selection: Disabled/ Enabled
Settings	Name:		User 1	 Name edition
	Password:			 Password edition
	Administrator rigths:		Disabled	 Selection: Disabled/ Enabled
	Access to the network:		Disabled	 Selection: Disabled/ Enabled

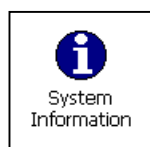
Scrolling of the users' list.

Note:

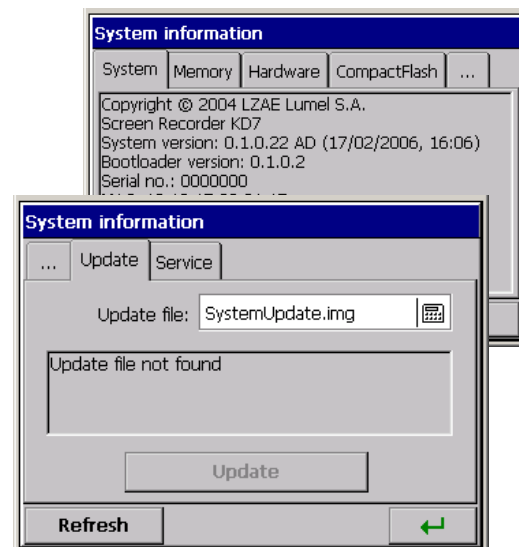
Access to the network – Access to the recorder in Ethernet network

Administrator rights – User 1 (Admin) can edit other users and change all their settings.

7.6 Systemic information



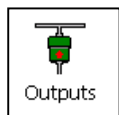
After pressing the icon, the window with information about the recorder system is opening. It informs about the hardware installed in the recorder and the state of the CompactFlash card. There is also the system updating servicing tab (see p. 8.11.) and the access for servicing personnel (the servicing of the recorder is only accessible for the manufacturer and distributors).

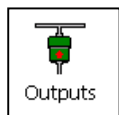


Systemic information and menu of system visualisation:

Systemic information	System:	Information about the recorder: Name: KD7 touch screen recorder System version: 0.1.0.18 (21/12/2005,15:57) Bootloader version: 0.1.0.2 Serial number: 00000000 MAC: 12.13.17.28.31.1A IP: 0.0.0.0 (the network is not connected)	
	Memory:	Memory fulfilling: 35% Accessible physical memory: 5.00 MB (5124 KB) Total memory capacity: 7.68 MB (7864 KB)	
	Hardware:	Slot 1: empty or the name of introduced card Slot 2: empty or the name of introduced card Slot 3: empty or the name of introduced card Slot 4: empty or the name of introduced card	
	CompactFlash:	The Compact Flash card is not introduced or information about the introduced card CompactFlash card: introduced Fulfilling of the CF card: 85% Free space on the CF card: 2,31MB (2364 KB) total capacity of the CF card: 15,28 MB (15648 KB)	
	Updating:	Update file:	 Selection: file browser – selection from the stored configuration files on the CF card.
		Updating:	Start of the system updating procedure
	Servicing:	Menu accessible for authorised users	

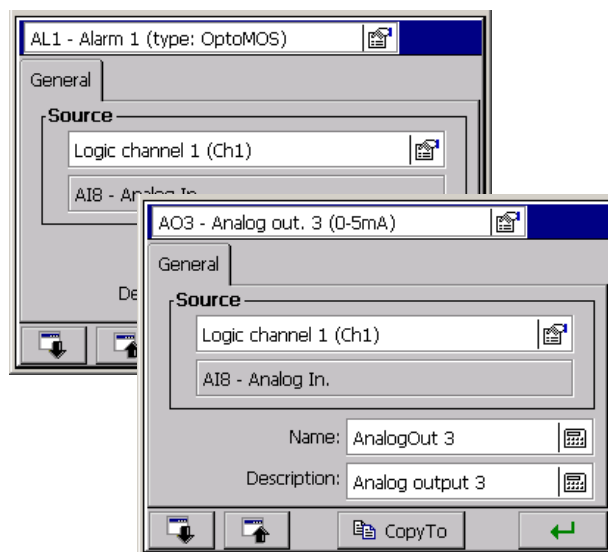
7.7 Outputs



After pressing the  icon, the output configuration window or the analog output is opening.

For each of them, one must select one of the logic channel as the source of the input signal (see p. 8.5. and 8.6.), introduce the name and description.

Note: the level of the signal which activates the selected alarm is set when configuring the logic channel (see p. 8.4.).



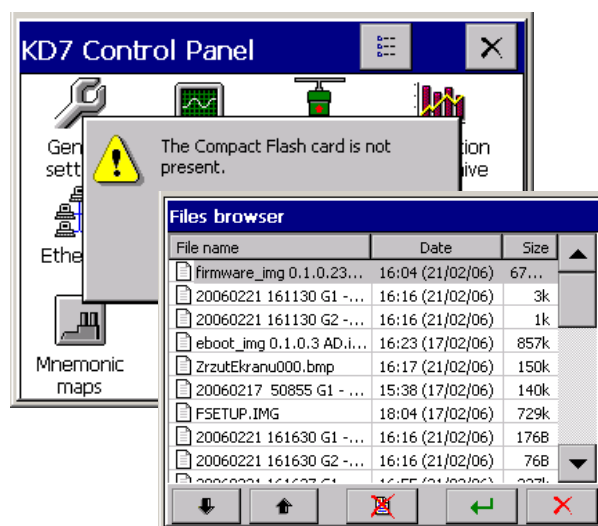
Menu to program alarms and analog outputs:

AL1 – Alarm 1 (type: OptoMOS)		  		Selection: selection of the alarm or analogue output from the list of accessible outputs in the recorder.
General	Source:	Logic channel 1 (Ch1)		Selection: Disabled / Selection of the logic channel (1...32)
		AI6 – Analog input 4-20mA	Information about the measuring input assigned for the selected logic channel (see point: Inputs)	
	Name:	AlarmOut 1		Name edition
	Description	Alarm output 1		Description edition

7.8 CF card



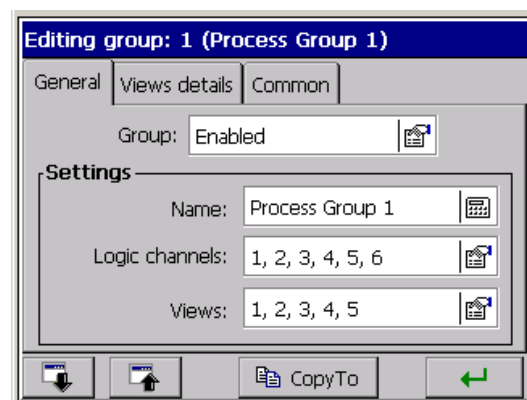
After pressing the  icon, when the CF card is set in the recorder, the file browser window is opening. When there is no card, an information message about it appears.



7.9 Configuration, visualization and archiving of the channel group



After pressing the  icon, the window of programming and visualization of 1...4 groups of channels is opening. One must define the group name, select 1..6 logic channels for the group and the period of automatic switching of these channels (when this function will be selected) and select the storage period (recording) of measuring results in the memory.



Programming menu of the group of channels:

Edited group:   Selection of the group: 1 (Process Group 1) ... 4 (Process Group 4)				
General	Group:	<i>enabled</i>		 Selection: disabled / enabled
	Settings:	Name:	<i>Process Group 4</i>	 Name edition
		Logic channels:	<i>1,2,19,21,22</i>	 Selection: Ch1 ... Ch32
		Type of screen:	<i>2,4,5</i>	 Selection of the screen type : 1. Digital screen 2. Linear diagram 3. Bargraph 4. Analog screen 5. Statistic screen
View details	Orientation:	<i>horizontal</i>		 Selection: Horizontal Vertical
	Line thickness:	<i>1</i>		 Selection: Selection of line thickness
	Tlo:	<i>Black</i>		 Selection: Black White
	☒	Common settings for all groups (mark if common)		
Common	Switching period:	<i>10 s</i>		 Edition of the parameter value
	Storage period:	<i>10 s, 20 ms</i>		 Edition of the parameter value

Where:

Storage period – storage period of data in the memory, minimal storage period 0.1 sec.

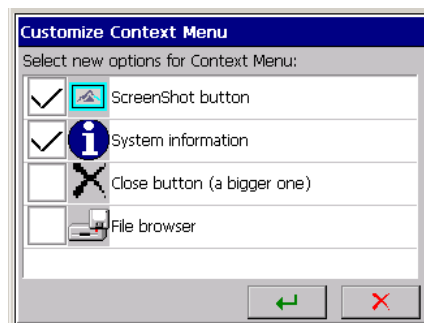
Note: presently, it is common for all groups !

Switching period - period of screen switching in the group.

Orientation: vertical/horizontal – concerns the data visualization in the shape of linear charts and bargraphs.

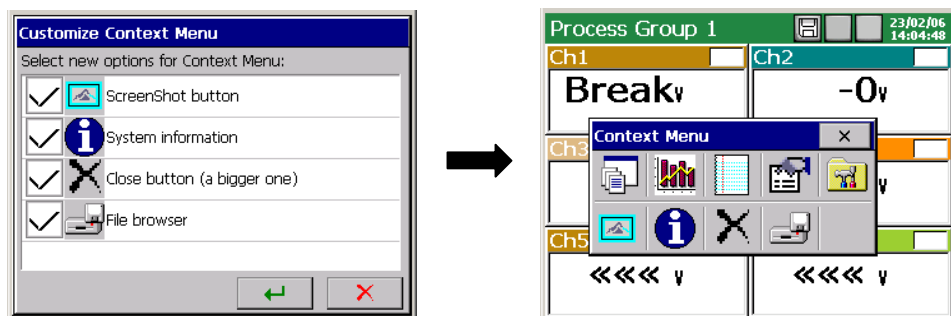
7.10 Context menu

After pressing the  icon, the window of the extra option selection for the context menu is opening.



	Storage of the image of the presently displayed screen on the CF card (in *.bmp format) .
	Access to the systemic information window.
	Big button to close the Menu context window
	Opening the Files Browser window to review files stored in the CF card

In the **Customize context Menu** window, one can mark selected functions for the context menu. The new version of the context menu will be accessible after confirming the selection, exiting from the KD7 Control Panel, storage and setting the changed recorder configuration.

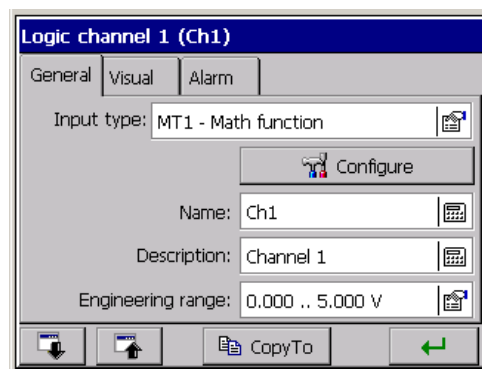


7.11 Inputs (logic channels)

After pressing the  icon, the programming window 1...32 logic channels is opening.

For each selected logic channel, one can:

- select and configure the input type,
- describe the channel, set the output type, the chart color, the signal zoom and alarm parameters.

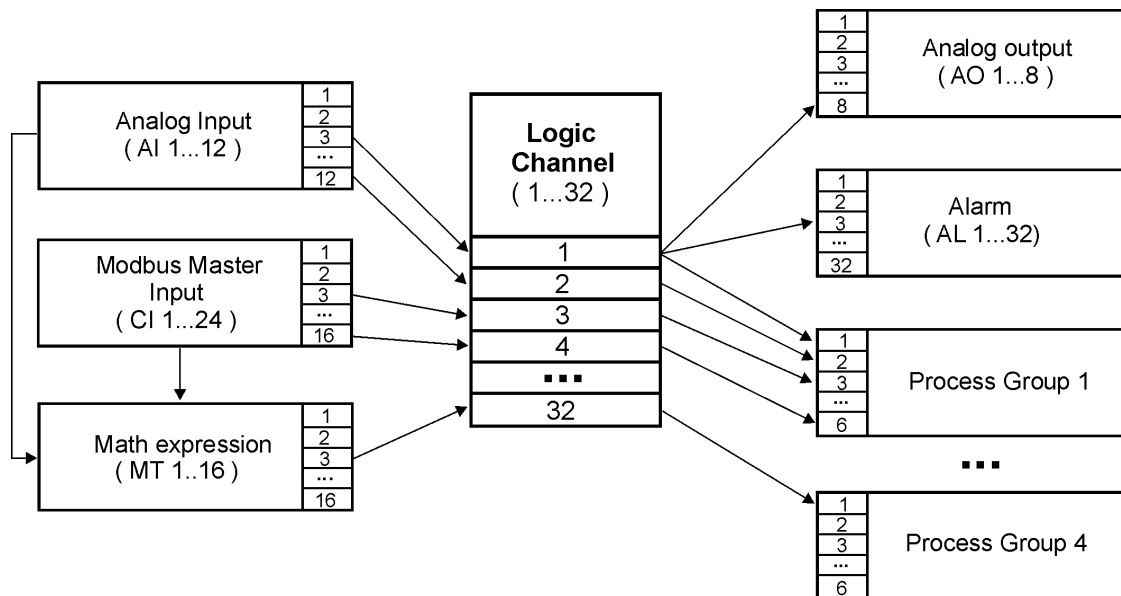


7.11.1 Definition of the logic channel in KD7

Logic channels are medium elements between inputs (see p. 7.11.) and outputs (see p. 7.7.) allowing to a flexible creation of connexions between them.

Analog inputs (**AI 1..12**), interface inputs (**CI 1..24**) and mathematical functions (**MT 1..16**) are inputs for logic channels.

We understand as outputs, recording and measurement visualization, analog outputs (**AO 1..8**) and alarms (**AL 1..32**).



Exemplary possibilities resulting from the application of the medium element in the form of logic channels:

- In successive logic channels, one can group inputs related with a defined process (independently of the kind of these inputs), what facilitates the configuration of outputs.
- During the output configuration, the knowledge of input configuration is not required but only the connexion of individual logic channels with elements monitored by the process recorder.
- The change of the input configuration (e.g. from the measurement by the recorder analog input into the measurement obtained from another device through the communication interface) at the unchanged process does not involve the necessity to renew the configuration of outputs.

7.11.2 Menu of logic channels programming

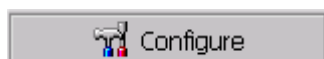
Logic channel  Selection : Ch1 ... Ch32			
General	Input type:	AI1-Analog input ,0-10V	Selection:  Disabled / Select the type of input from the list of accessible inputs.
		 Configure	Menu of the selected input configuration (Analog, Modbus, Master, configure mathematical functions)
	Name:	Ch2	 Name edition
	Description:	Channel 32	 Name edition
	Output range:	0 – 100%	 Edition of parameters: Precision, Min, Max, Unit
Visualization	Color:	C=255, Z=140, N=0	 Selection of the diagram line colour for the logic channel on the screen
	Zoom :	50 – 100%	 Edition of parameters Min, Max
Alarm	Alarm type:	Max.	 Selection: Disabled, Min, Max.
	Alarm value:	10	 Edition of the parameter value
	Alarm hysteresis:	0.5%	 Edition of the parameter value

Where:

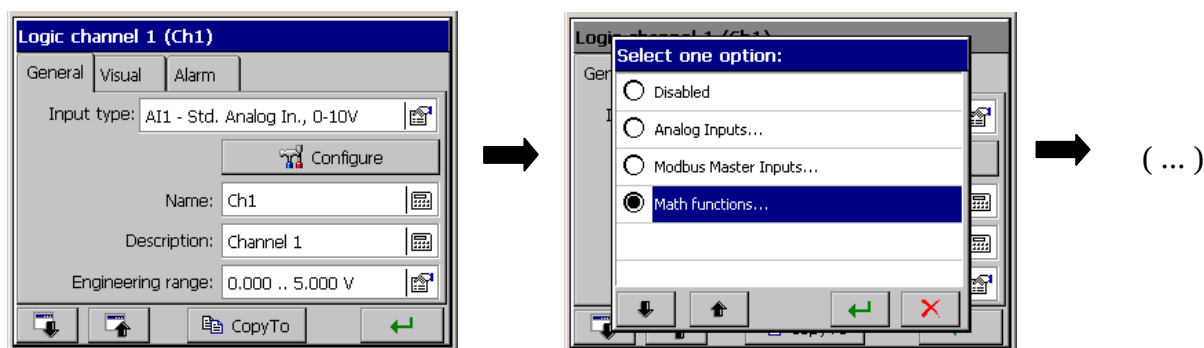
Input range – During measurements of the input quantity, the proportional output value in limits defined by this parameter is displayed on the screen.

Zoom of signals - during the display of the analog screen (linear chart), after opening the context menu and selecting the option **Zoom of signals** in it, the selected channel is displayed on the analog screen, in limits defined by this parameter (see p. 8.2.8.)

7.11.3 Selection and configuration of an input for a logic channel.

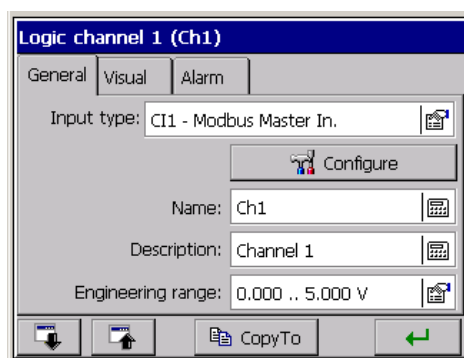


In the selection menu and configuration of inputs, for the logic channel following options are accessible: the option of the disabled logic channel or entry into the configuration of analog measuring inputs (programmable or standard), interface measuring inputs, edition of mathematical functions (when these functions are activated in the recorder, see p. 7.11.6.).



The window of the measuring input configuration, in dependence on the kind and signal type, assumes various forms:

7.11.4 Modbus Master inputs CI 1...24



Programming menu of interface inputs (Modbus Master)

CI1 - Modbus Master inputs			
General	State:	<i>enabled</i>	Selection: Disabled/ enabled
	ID of Modbus device:	<i>1</i>	Parameter edition
	Range:	<i>0.0 – 100.0</i>	Edition of parameter values: Min and Max of the range
	Description:		Description edition
Registers	Register address:	<i>0</i>	Parameter edition
	Register type:	<i>int</i>	Selection: char, int, long, float, float (bytes:1234), float (bytes:2143), float (bytes:4321), float (bytes:3412)
	Readout function	<i>Function 3</i>	Selection : Function 3, Function 4

Note: set Modbus Master input parameters acc. to the specification of the connected device.

7.11.5 Analog inputs AI 1..16

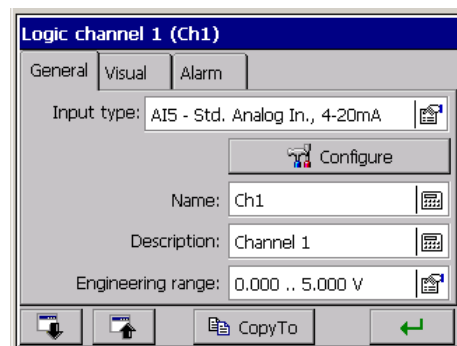
a. Standard measuring inputs AI 1 ... AI16:

AI1 – Analog inputs 0...20mA			
General	Range:	0.00 ... 20.mA	Selection:  Opening the menu of range programming

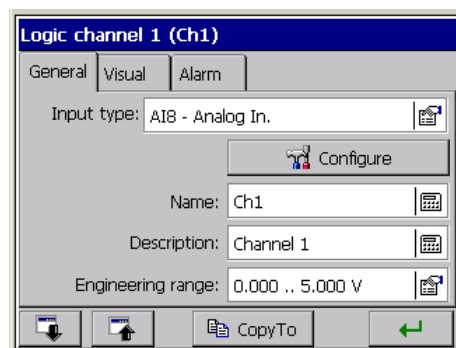


Range	Precision:	Auto	
	Min:	5.00	 Edition of the parameter value
	Max:	10.00	 Edition of the parameter value
	Units:	mA	

Note: The setting of the analog input range another than the nominal (voltage or current magnifier) leads to a decrease of measurement accuracy.



b. Programmable measuring inputs: AI 1 ... AI 16:

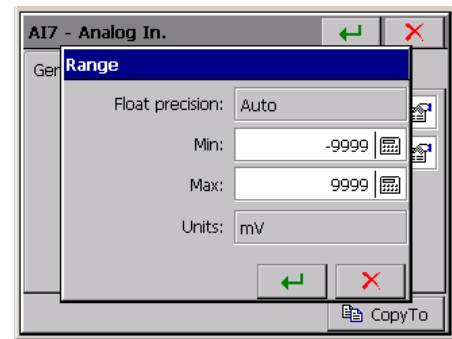


AI8 – Analog inputs			
General	Type of input signal:	Voltage	Selection of signal type
	Range:	-9999...9999	Range edition

- Selection of signal type:
- Parameters of the measuring inputs for the signal: voltage and current:

Input signal	Signal symbol in the menu	Measuring range	Minimal sub-range
Voltage	mV	0... ± 9999 mV	5 mV
Current	mA	0...± 20 mA	1 mA

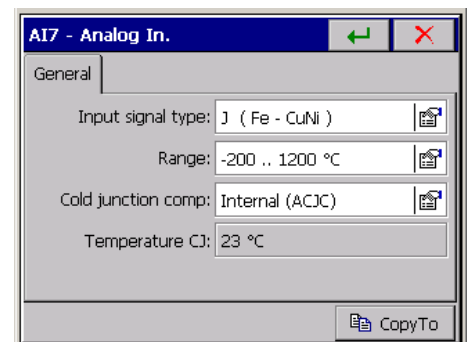
After selecting the signal type, set the upper (Max) and lower (Min) limit of the input signal. The value of the upper range limit (Max) must be higher than the value of the lower limit value (Min), preserving its minimal span acc. the table as above. The float precision and the unit are set automatically.



- **Parameters of the measuring inputs for temperature measurement through a thermocouple (TC):**

Input signal	Signal symbol in the menu	Measuring range	Minimal sub-range
J (Fe – CuNi)	TC J	-200...1200 °C (-328...2192 °F)	100 °C (212 °F)
K (NiCr – NiAl)	TC K	- 200...1370 °C (-328...2498 °F)	130 °C (266 °F)
N (NiCrSi – Ni Si)	TC N	-200...1300 °C (-328...2372 °F)	200 °C (392 °F)
E (NiCr-CuNi)	TC E	-200...1000 °C (-328...1832 °F)	100 °C (212 °F)
R (PtRh13 - Pt)	TC R	0...1760 °C (32...3200 °F)	540 °C (1004 °F)
S (PtRh10 - Pt)	TC S	0...1760 °C (32...3200 °F)	570 °C (1058 °F)
T (Cu- CuNi)	TC T	-200...400 °C (-328...752 °F)	110 °C (230 °F)
B (PtRh30 - PtRh6)	TC B	400...1820 °C (752...3308 °F)	1000 °C (1832 °F)

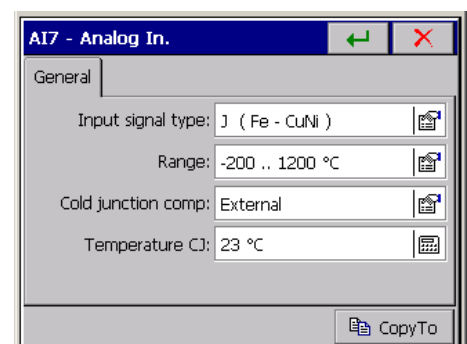
After selecting the signal type, set the upper (Max) and lower (Min) limit of the input signal. The value of the upper range limit (Max) must be higher than the value of the lower limit value (Min), preserving its minimal span acc. the table as above. The float precision and the unit are set automatically.



Cold junction compensation:

Defines the way of the thermocouple cold junction

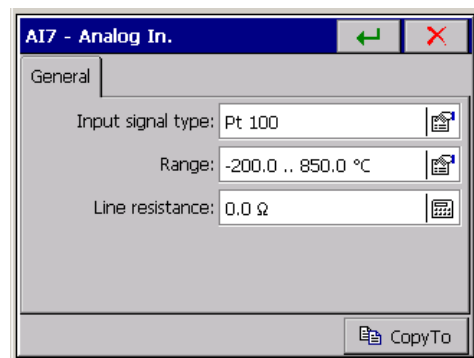
- **Internal (ACJC):** Set the self-acting cold junction compensation by the temperature sensor placed on the measuring package.
- **External:** the temperature of cold junction, set as a standard 23°C, can be changed.



- **Parameters of the measuring inputs for temperature measurement through a resistance thermometer (RTD)**

Input signal	Signal symbol in the menu	Measuring range	Minimal sub-range
Resistance thermometer (RTD):			
Pt 100	Pt 100	- 200...850 °C (-328...1562 °F)	50 °C (122 °F)
Pt 500	Pt 500	- 200...850 °C (-328...1562 °F)	
Pt 1000	Pt 1000	- 200...850 °C (-328...1562 °F)	
Ni 100	Ni 100	- 60...180 °C (-76...356 °F)	
Cu 100	Cu 100	-50... 180 °C (-58...356 °F)	

After selecting the signal type, set the upper (Max) and lower (Min) limit of the input signal. The value of the upper range limit (Max) must be higher than the value of the lower limit value (Min), preserving its minimal span acc. the table as above. The float precision and the unit are set automatically.



The way of the **Line Resistance** parameter programming depends on the way of the sensor connection.

- in a three-wire and two-wire connection with a balancing resistance, one must program the **0 Ω** value. Each of another value will be treated as the line resistance and taken into consideration when calculating the measurement, what causes the error uprising.
- in a two-wire connection with an important resistance of the connecting line, one must introduce a fixed-decimal value from the **000.0 ... 100.0 Ω**. Interval.

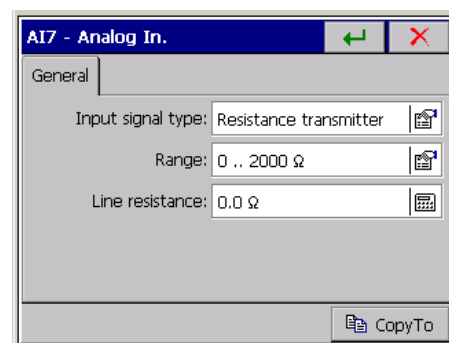
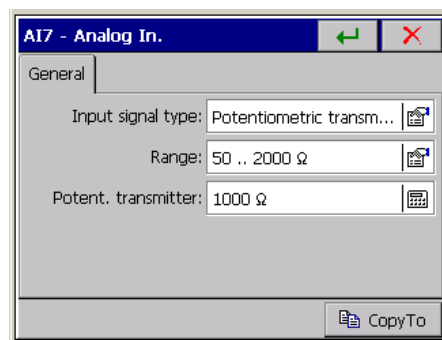
- **Parameters of the measuring system for resistance measurement through a resistance transmitter and potentiometric transmitter:**

Input signal	Signal symbol in the menu	Measuring range	Minimal sub-range
Potentiometric transmitter	Pot. transm.	50...2000 Ω	50 Ω
Resistance transmitter	Res. transm.	0...2000 Ω	50 Ω

After selecting the signal type, set the upper and lower input signal limit. The value of upper range limit (Max) must be higher than the lower limit value (Min) preserving its minimal span acc. to the table as above.

The precision and the unit are set automatically.

- For the **Potentiometric transmitter** range, program the true value of the transmitter resistance.
- For the **Resistance transmitter** range the programming way of the **Line resistance** parameter depends on the way of the transmitter connection.



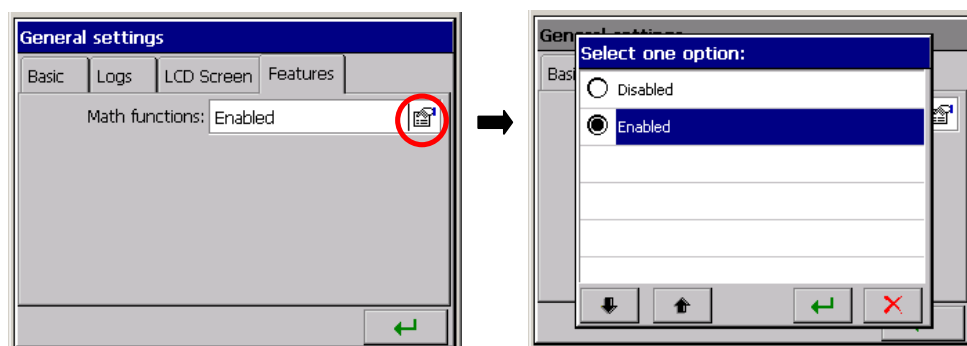
- in a three-wire and two-wire connection with a balancing resistance, one must program the **0 Ω** value. Each of another value will be treated as the line resistance and taken into consideration when calculating the measurement, what causes the error uprising.
- in a two-wire connection with an important resistance of the connecting line, one must introduce a fixed-decimal value from the **000.0 ... 100.0 Ω** interval.

7.11.6 Mathematical functions MT 1..16, activation and configuration

The edition and servicing of mathematical functions are accessible in recorders ordered in versions with these functions (Ordering codes, see section 11)

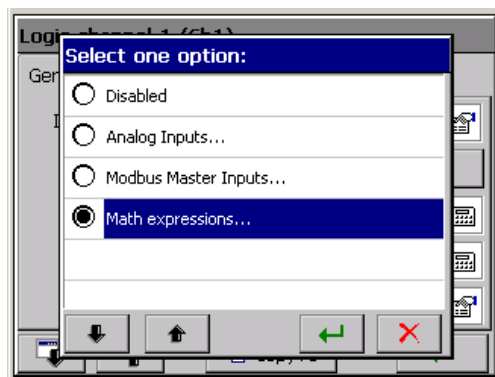
In recorders ordered without mathematical functions, the edition and servicing of these functions are accessible after the previous activation of the unique code for the given recorder. One can buy this code with LUMEL S.A. or with the distributor of recorders.

In the recorder version with mathematical functions, one can **enable (or disable)** them in the **KD7 Control Panel** → **General settings** → **Extensions** menu:

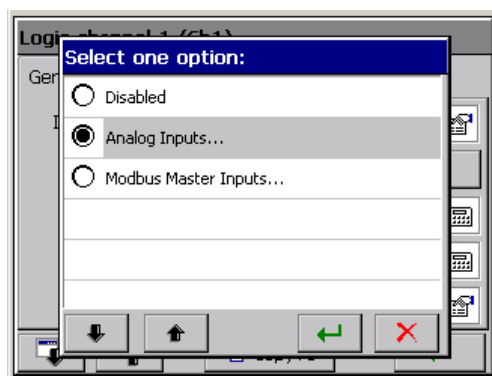


Enabled/Disabled servicing of mathematical functions follows after the configuration storage.

The selection of the mathematical function edition option is accessible in the **KD7 Control Panel** → **Inputs** menu.



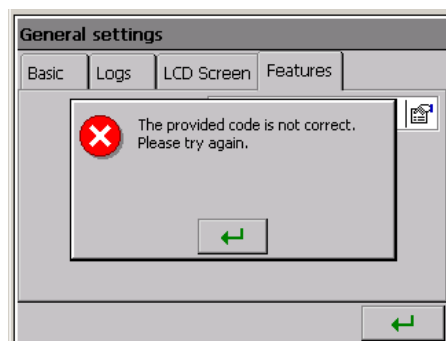
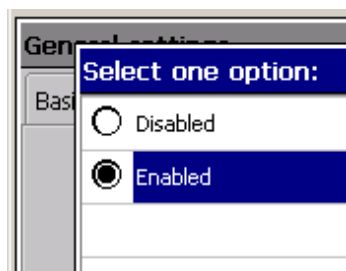
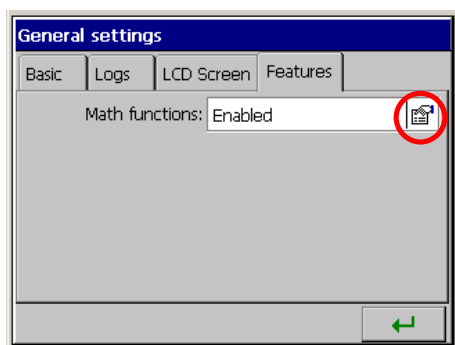
The option of the mathematical function edition is not visible in **KD7 Control Panel** → **Inputs** menu of the logic channel configuration when functions are disabled.



- **Activation of mathematical functions in the recorder**



After selecting the **General settings** icon in the **KD7 Control Panel**, the access to mathematical functions in the **Extensions** tab is disabled. After selecting the **Active** option and confirming the selection, one must introduce the delivered activation code in the open edition window.



After writing an incorrect code and accepting it, the window with a message about the erroneous code appears and after accepting this information, the return to the activation procedure of mathematical functions will succeed.

- **Configuration of mathematical functions**

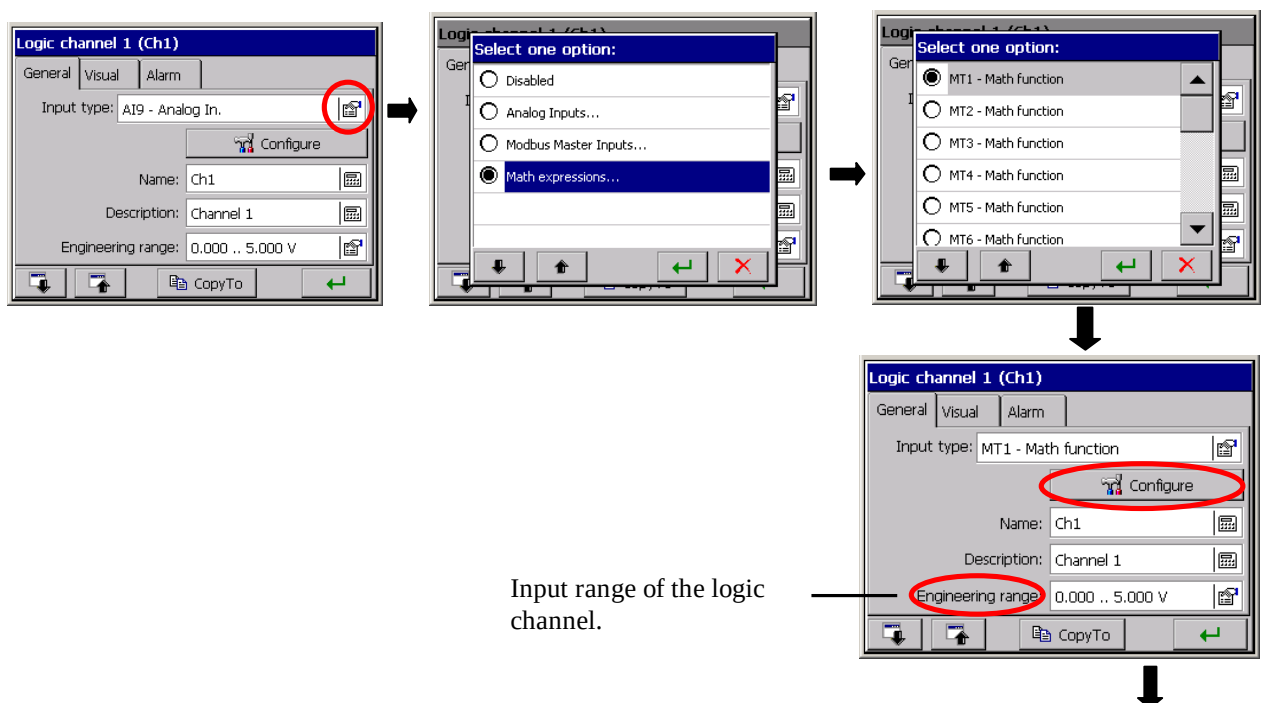
For each logic channel of the recorder, one can select as the input signal source, one of 16 previously programmed mathematical functions, each with its proper name and a defined output range.

During the design process of a function, one must take care about the logic structure correctness of this function and take into consideration recounting coefficients for input units in the designed structure, in order to obtain function values in desirable output units. The output range of the function should be defined at least in the range of its variability. (if this condition is not fulfilled, obtained results of the function recount will be erroneous).

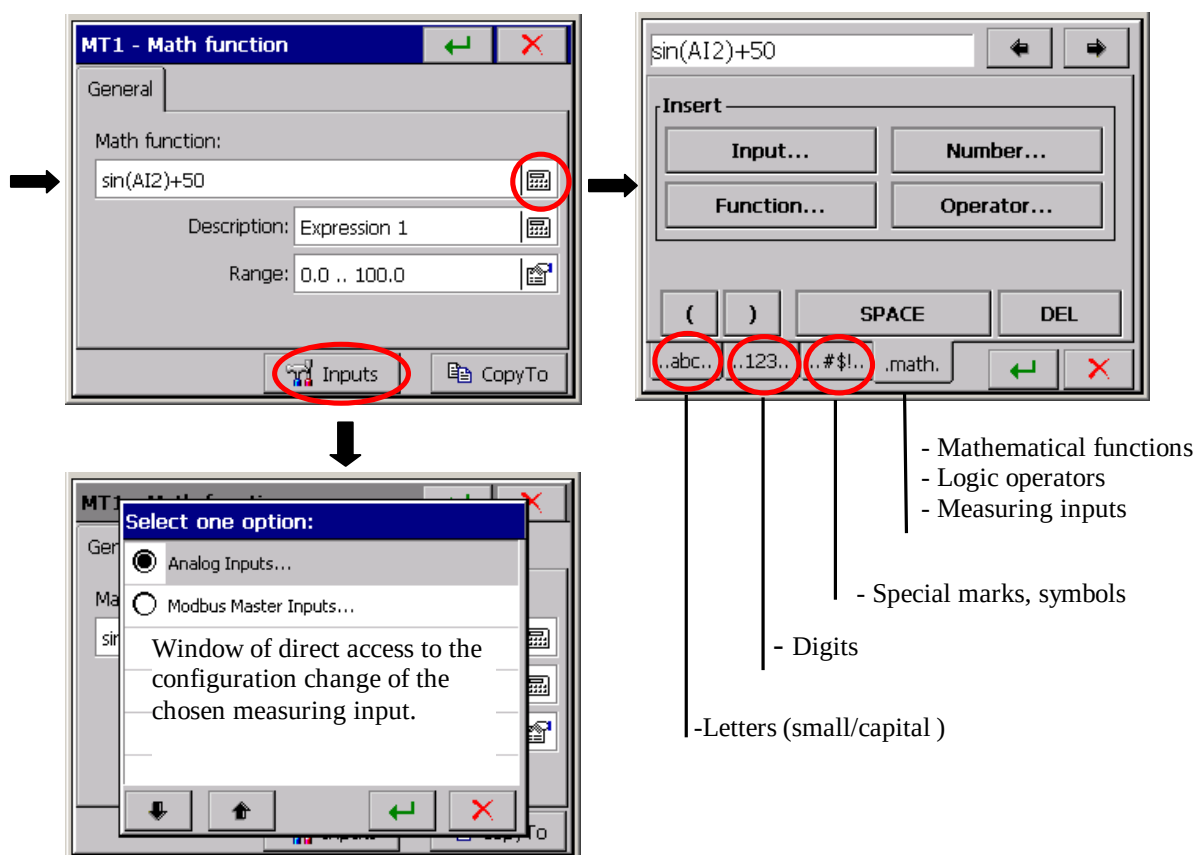
Functions should be continuous and designed using accessible functors in minimized form, in the respect of the number of arithmetical operations. Symbols of these same inputs can occur repeatedly in the structure of the created function. The edited function can be composed maximally of 64 characters. When the output range of the logic channel (for which the given mathematical function is the signal source) is another than the output range set for the mathematical function, data displayed on the screen will be proportionally rescaled. Each from logic channels can be disabled.

- **Configuration menu of mathematical functions**

After entry into **KD7 Control Panel** → **Inputs** → **Mathematical functions (MT1..16)**, one can start to the configuration of the selected function:



Analog inputs and Modbus Master, mathematical operators, function and logic operators are the data source for the configuration of a mathematical function.



Edition examples of mathematical function structures, see p. 8.14

Accessible functions in the KD7 recorder:

Function	Description
round(x)	Returns the value x rounded to the nearest integer
sin(x)	Sine of number x
asin(x)	Arc sine of number x
sinh(x)	Hyperbolic sine of number x
cos(x)	Cosine of number x
acos(x)	Arc cosine of number x
cosh(x)	Hyperbolic cosine of number x
tan(x)	Tangent of number x
atan(x)	Arc tangent of number x (in radians)
tanh(x)	Hyperbolic tangent of number x
sqrt(x)	Square root of number x
min(v1,v2,v3,...)	Minimal value from numbers v1,v2,v3...
max(v1,v2,v3,...)	Maximal value from numbers v1,v2,v3...
abs(x)	Absolute value
rand()	Return random number between 0 and 1
rand(min, max)	Return random number between min and max

ceil(x)	Returns the smallest integer higher or equal x
floor(x)	Returns the highest integer smaller or equal x
log(x)	Natural logarithm from the number x
log10(x)	Decimal logarithm from the number x
avg(v1,v2,v3,...)	Mean value of numbers v1,v2,v3...
sum(v1,v2,v3,...)	Sum of numbers v1,v2,v3...
if(condition, v1, v2)	Conditional expression. If the condition is true , the function returns V1 , in the contrary it returns v2 .
isNaN(x)	Returns 1 when x has an indefinite value (NaN)
isFinite(x)	Returns 1 when x has an infinite value and is not NaN
hex(hexNumber)	Conversion of a hexadecimal number into a decimal number, e.g. (F0) returns the value 240
bin(binNumber)	Conversion of a logic number into a decimal number, e.g. bin(0100) returns the value 4
isErr(value)	Returns 1 if the value is erroneous (e.g. measuring error)
date(year, month, day)	Returns the date_time value corresponding to the given date
time(hour, minute, second)	Returns the date_time value corresponding to the given time
day(value_time)	Returns the day of the month corresponding to the given date_time
hour(value_time)	Returns the hour corresponding to the given date_time
minute(value_time)	Returns the minute corresponding to the given date_time
second(value_time)	Returns the second corresponding to the given date_time
year(value_time)	Returns the year corresponding to the given date_time
month(value_time)	Returns the month corresponding to the given date_time
weekday(value_time)	Returns the day of the week corresponding to the given date_time
nowdate()	Returns the date_time value corresponding to the current date
nowtime()	Returns the date_time value corresponding to the current time.

Operators accessible in the KD7 recorder:

Operator	Function	Description
+	$x + y$	Addition
-	$x - y$	Subtraction
*	$x * y$	Multiplication
/	x / y	Division
^	$x ^ y$	Raising to a power
-	-x	Negation of the number sign
%	$x \% y$	Modulo
>	$x > y$	Logic operator higher than. Returns 1 if true and 0 if false
<	$x < y$	Logic operator smaller than. Returns 1 if true and 0 if false
>=	$x >= y$	Logic operator higher or equal. Returns 1 if true and 0 if false
<=	$x <= y$	Logic operator smaller or equal. Returns 1 if true and 0 if false
!=	$x != y$	Different logic operator. Returns 1 if true and 0 if false .

= =	x = y	Equal logic operator. Returns 1 if true and 0 if false .
&	x & y	Logic product (conjunction). Returns 1 if true and 0 if false .
	x y	Logic sum (alternative). Returns 1 if true and 0 if false .
!	!x	Logic negation. Returns 1 if x equal 0, in the contrary, returns 0.

Notes:

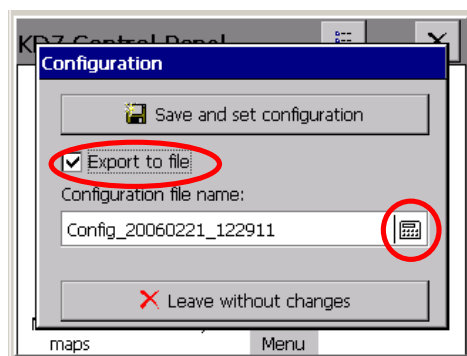
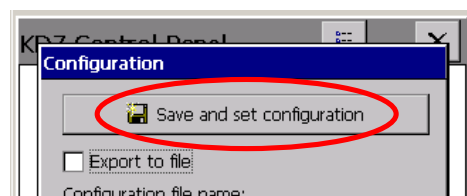
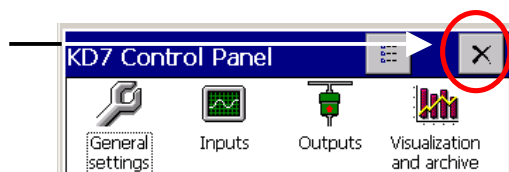
- Trigonometric functions operate on radians,
- The **date_time** value is the representation of the date and time in the „OLE Automation date” format. In this format, the date and time are represented as the number of seconds since 30 December 1899 divided by 86400 (number of seconds in a day).
- Logic values **true** and **false** – a value different from zero is treated as the logic value **true**. a value equal 0 is treated as the logic value **false**.
- Functions **min**, **max**, **sum**, **avg**, and all others operate on actual values, e.g. the **sum** functions gives in result the sum of actual values given as parameters and not the sum of these value in time.

7.12 Exit from the recorder configuration, closing the “KD7 Control Panel” window.

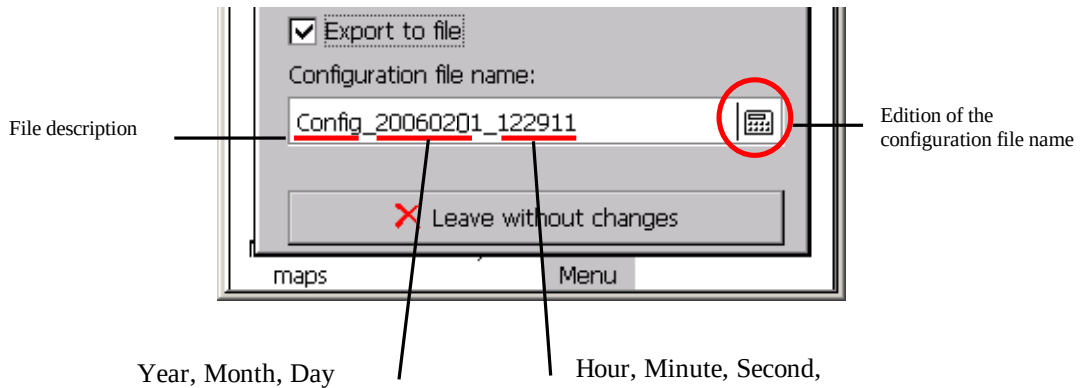
After finishing the recorder configuration one must close **KD7 Control Panel**.

After pressing the button output of exit from the configuration, the window to select the option of configuration the file recording selection is opening:

- After selecting the **Save and set configuration** button.
- When simultaneously the **Export to file** option is marked, the configuration file will be stored in the recorder memory and in the CF card, in the file with the given name in the window. The name can be changed into another, after the entry into this edition.
- After selecting the **Leave without changes** button, changes carried out in the control panel menu are not recorded, the recorder programming state remains without changes.



Structure of the default name of the configuration file:



Note:

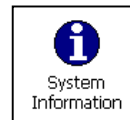
1. The configuration file is unique for the given recorder hardware configuration and cannot be transferred into another recorder with another equipment.
2. One can set in the recorder, the configuration of parameters for various technological processes and record for them proper configuration files (with proper names). Applying them, one can quickly adapt the recorder to current user's needs.
3. One can also prepare in the PC computer through the KD7 Setup program (see p. 9.2) configuration files for the given KD7 recorder, using another configuration file from the same recorder to introduce changes.

8. CURRENT SERVICING OF THE KD7 RECORDER

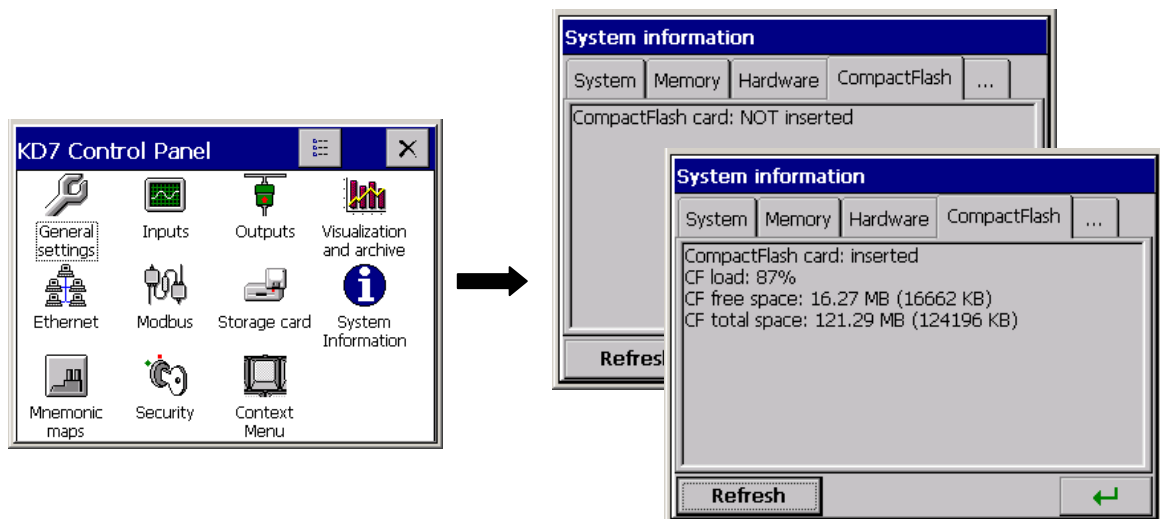
8.1 CompactFlash memory card in the recorder

For the data storage in the KD7 recorder, one can use CompactFlash memory cards with a capacity from 16 MB up to 4 GB. It is recommended to use CompactFlash cards from SanDisk ® or Kingston ® company.

8.1.1 Information about the CF memory card.



After selecting in the **KD7 Control Panel** window, the **System information** – **CompactFlash** tab, the information is given about the lack of the card in the recorder or when it is introduced into the recorder, data about the current filling state of the card, free place to store and total card capacity.

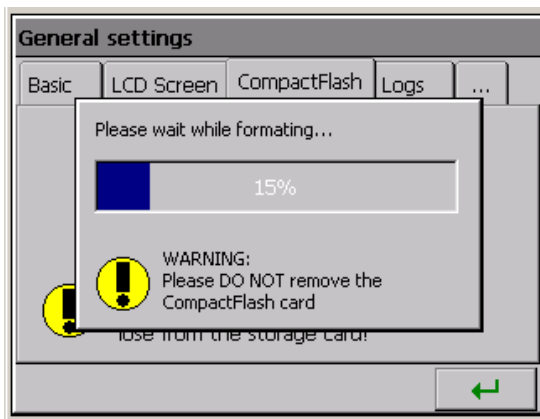
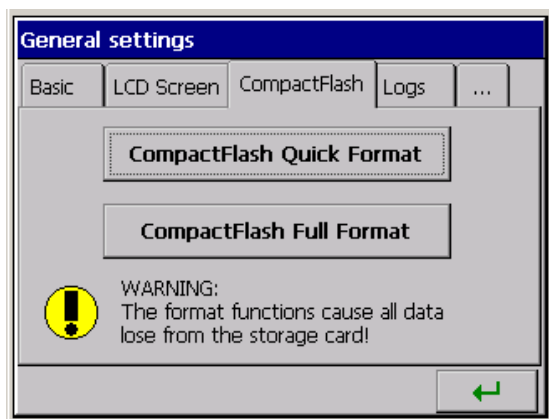


8.1.2 Formatting of the compactFlash card



After selecting the  icon in the KD7 Control Panel, in the **CompactFlash** tab of the **General Settings** window, one can start the CF Formatting function.

After confirming the selection, the formatting procedure of the CompactFlash memory card will begin.



QUICK FORMATTING OF THE PC CARD – deletes all files from the card, but do not scan cards in order to search damaged sectors. Quick formatting options must be selected when the card has been already formatted and we have the certainty that it is not damaged.

FULL FORMATTING OF THE CF CARD – deletes all files from the card and prepare the card to store information in it. This is followed by the check of the actual card state, physical and logic division of the card area into sectors, appropriate markings are given to them and a file system is created.

During the CF card formatting, the LED diode on the frontal plate changes its color from green into red (see p. 8.1.3.).

Note: The formatting of the CompactFlash card causes the loss of all data stored on it.



8.1.3 Data storage on the CompactFlash memory card (card capacity) for measuring data

During the recorder operation, when measuring data are stored in the recorder memory, the LED diode placed on the KD7 frontal panel, lights in green. When data from the recorder memory are reproduced on the CT card, the LED diode placed on the KD7 frontal plate changes the color from green into red.

During data recording on the CF card, one must not pull it out from the recorder. The removal of the card can cause an irreversible loss of all data stored on the memory card. One can remove the card only after finishing the data recording (green color of the LED diode).



Data are stored on the CF card in successive files, each file of 8 MB capacity. Files are generated separately for each logic channel group.

When introducing changes in the recorder configuration all data from the buffer (recorded in the old configuration) are rewritten into the hereto open files of logic channel groups and new data, obtained already after introducing changes in the configuration, are stored in new files.



After exceeding 90% of the CF card capacity storage level, the CF card (icon on the KD7 screen has the red color).



It is recommended to transfer data from the memory card to the PC computer as fast as possible, format the card or replace for another, not recorded and not formatted

After exceeding the nominal capacity of the CF card, measuring data will be stored in the KD7 buffer. During the data storage into the buffer, one must replace the CF card by another, formatted card. If the card will not be replaced on time after filling the buffer, data will be overwritten.



The minimal working time of the recorder after which the buffer filling follows, is equal ca 9 minutes, for the set storage period 1 sec. (it will be suitably 90 minutes for 10 sec.)

Note:

From the level of the **KD7 Connect** program (see p. 9.1.), data stored on the CF card placed in the recorder can be copied on a PC and deleted from the card, releasing its capacity.

8.1.4 Visualization of the CF card storage state on the screen

- Lack of CF card in the recorder



Lack of CF card in the recorder

- The CF card is inserted in the recorder



Index of CF card presence, the card is not filled.

- Exceeding of the 90% recording level of the CF card capacity



Red color, exceeding of the 90% storage level of the CF card capacity .

- Approximate time necessary for the CF card full recording

Depending on:

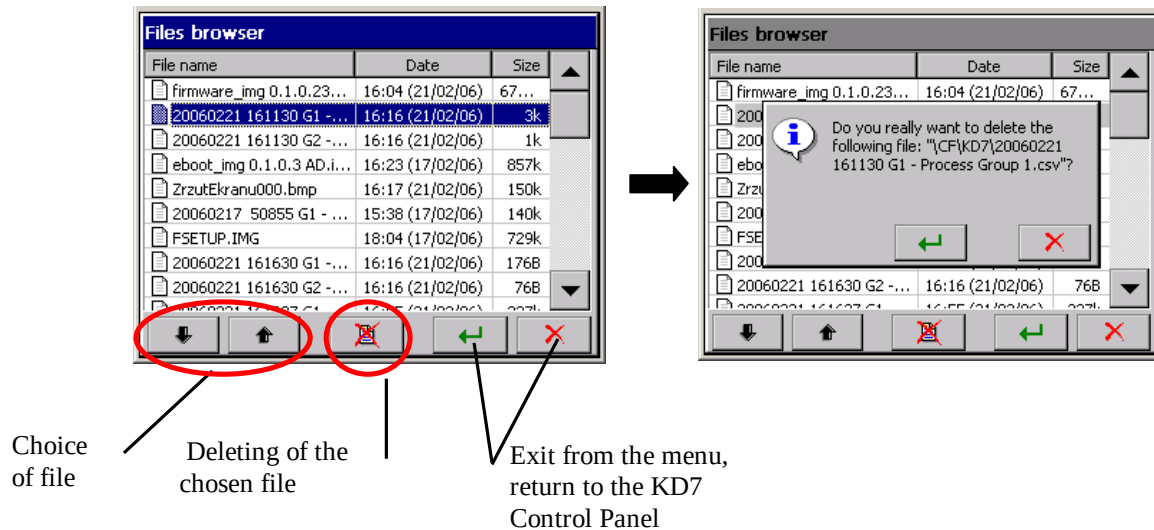
- nominal capacity of the CF card,
- parameters of data recording (storage period, number of groups, number of channels in the group)

Card capacity	Number of groups	Number of active channels in the group	Storage period	Filling time of the card (hours/days)
128 MB	4	6	1 s	70 / 3
			5 s	350 / 14
			10 s	700 / 29
			1 min	4200 / 175
246 MB	4	6	1 s	140 / 6
			5 s	700 / 29
			10 s	1400 / 59
			1 min	8400 / 350
512 MB	4	6	1 s	560 / 24
			5 s	1400 / 59
			10 s	2800 / 117
			1 min	16900 / 700

8.1.5 Review and deleting of files from the CF memory card

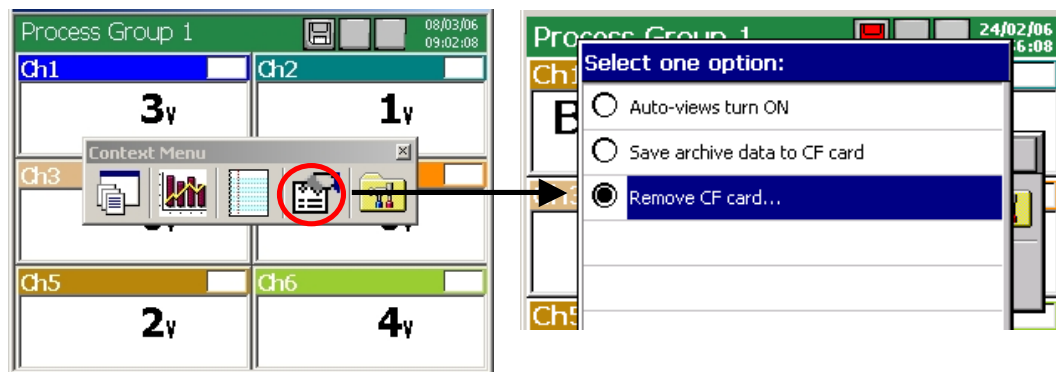


After selecting the **Storage card** icon in the **KD7 Control Panel** window, names of files stored on the CF memory card are displayed in the **Files Browser** window. After selecting the given file and confirming the selection, this file is deleted from the CF card.

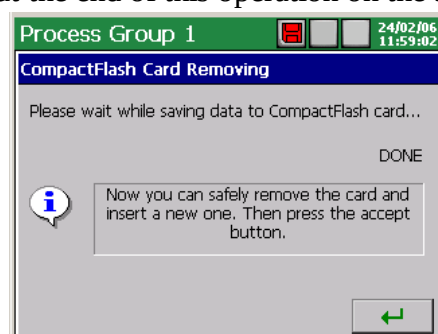


8.1.6 Safe removal of the CF memory card

In order to take out safely the CF card from the recorder (without the threat of the measuring data loss), one must open the **Context menu** window, (by pressing the screen with a finger), press the icon of the option selection in it, and mark **Remove CF card** in the open **Select one option** window.



Then, all stored data in the recorder internal memory are transferred on the CF card. After displaying the message about the end of this operation on the screen, one can take the CF card out.



The option **Save archive data to CF card** starts the re-recording of data from the recorder internal memory on the data card

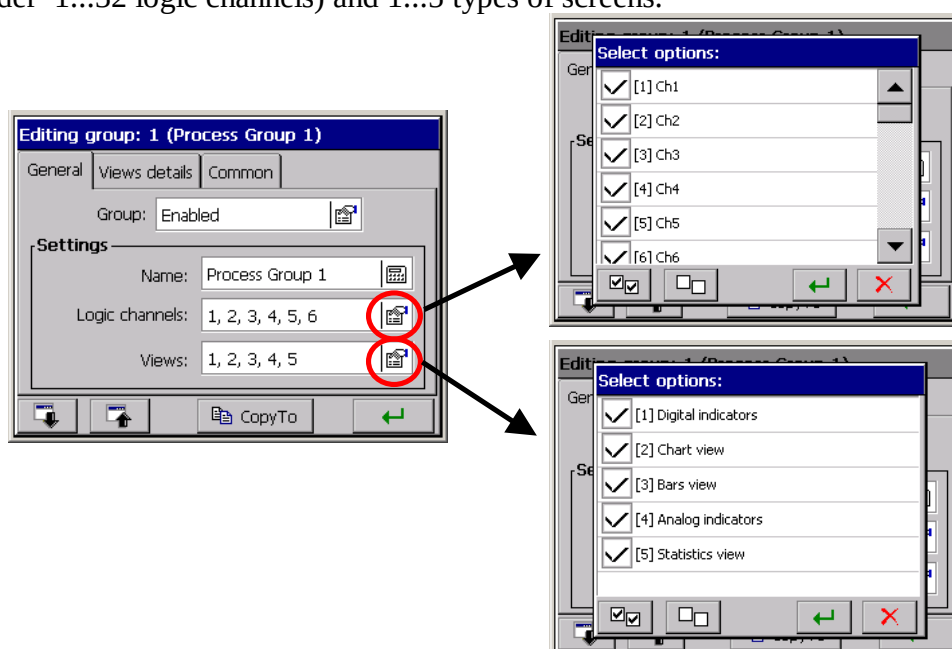
The removal of a CF card without the previous execution of described above procedures can cause the loss of all measuring data.



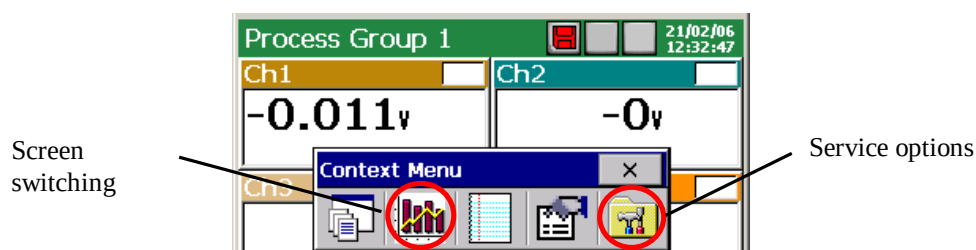
8.2 Visualization of measuring data and events.

8.2.1 Programming and servicing of screens

For each edited group of logic channels (see p. 8.7) (... **KD7 Control Panel** → **Visualization and Archiving** → **Edited group**), one can select 1...6 channels (from programmed in the recorder 1...32 logic channels) and 1...5 types of screens.

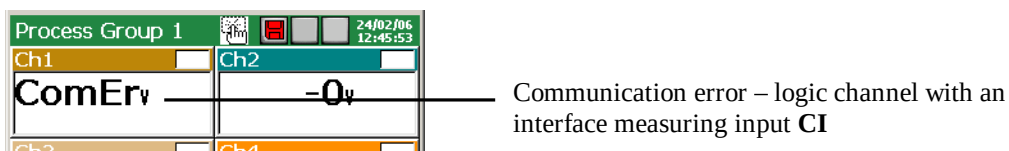
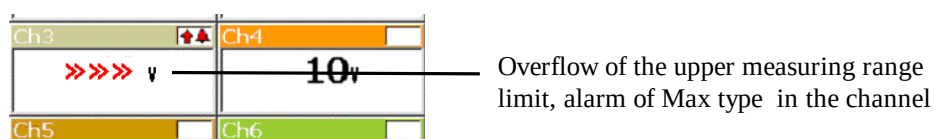
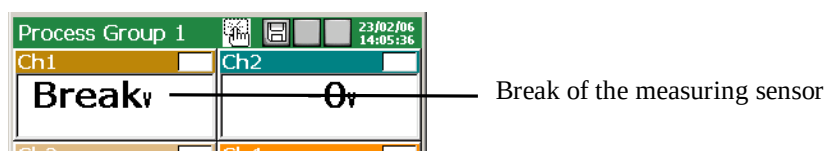
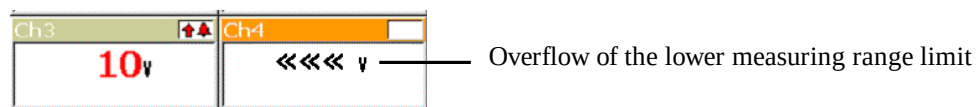
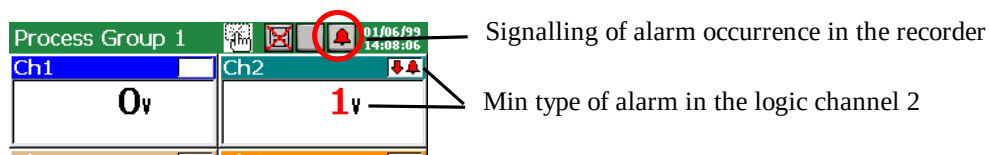


During the measuring data display, one can switch screen views manually through a successive pressure on view icons in the Context menu. One can also enable in the option window, the previously (see p. 8.2.7) programmed automatic cycle of their switching.



On recorder screens, following information about the current recorder state is displayed: actual measuring values, information about alarms, range overflows, sensor breaks, communication errors (interface inputs), lack of data on statistic screens and bargraphs, and information about minimal and maximal measurements values in the current working period of the recorder.

8.2.2 Digital view of channel groups



The type and the alarm value, in the given logic channel, can be read out in the **KD7 Control Panel**, in the menu of the **Input** icon.

8.2.3 Linear chart of the channel group

The chart orientation (horizontal or vertical), the thickness of the signal line and the screen background (black or white) are selected in the edition menu of the logic channel group.

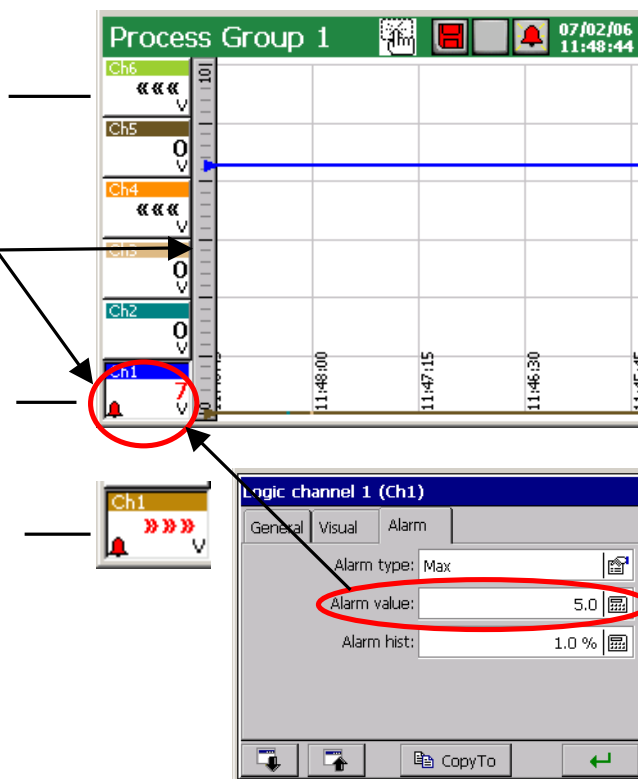
- Horizontal chart:

Overflow of the lower measuring range limit

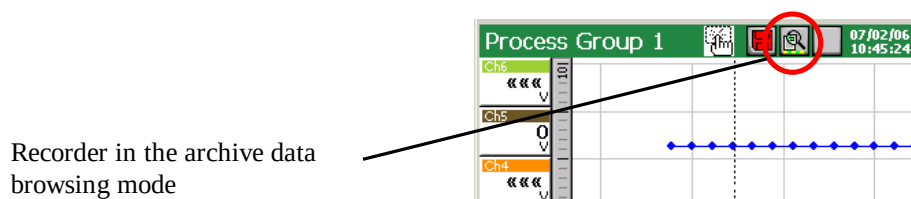
After pressing the field of the selected channel, the description of the analog scale is switched on the programmed output range in this channel

Alarm in the logic channel 1

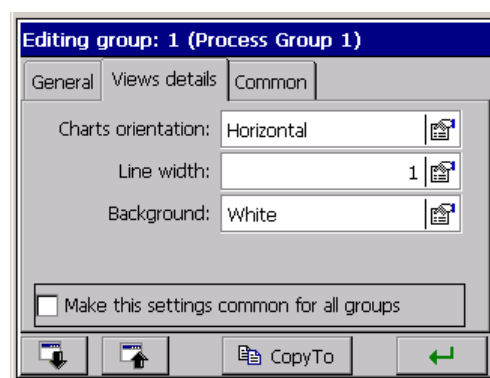
Overflow of the upper measuring range limit, alarm in the channel.



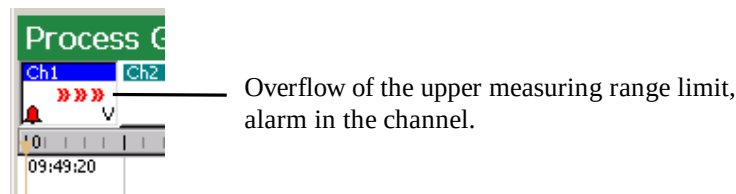
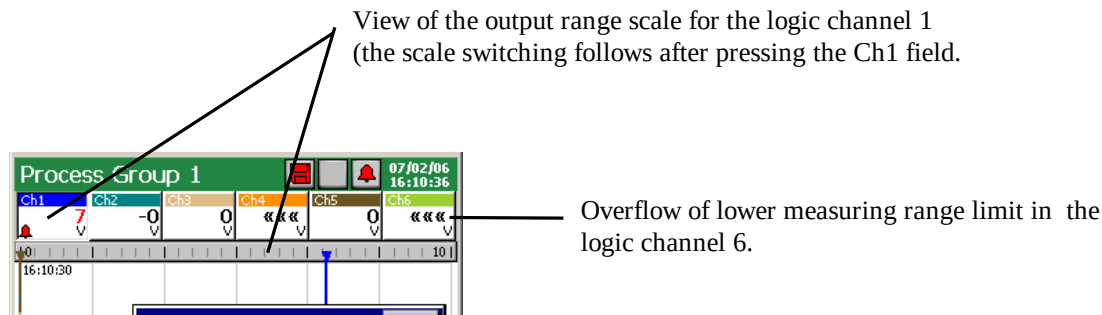
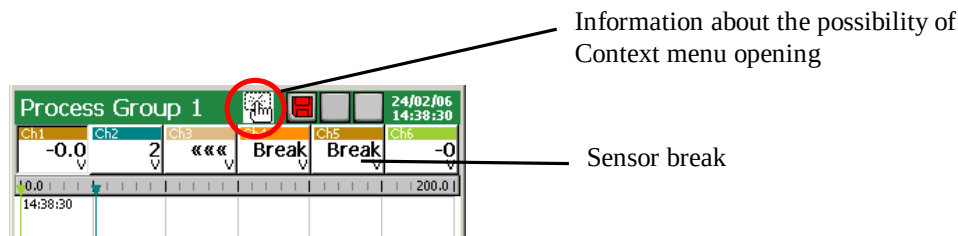
The entry to the option **Servicing of archive data** (see p. 8.9) is accessible during the display of the screen with the linear chart (horizontal or vertical). When browsing archive data, the icon informing about the operation in this mode is displayed on the screen.



To change the screen view from horizontal into vertical (concerns the linear screen and bargraph), one must choose the vertical chart orientation in the **KD7 Control Panel – Visualization and archiving** (see p. 8.2.1), in the **Views details** tab. For the linear chart (horizontal and vertical), one can select the view background and thickness of the chart line.



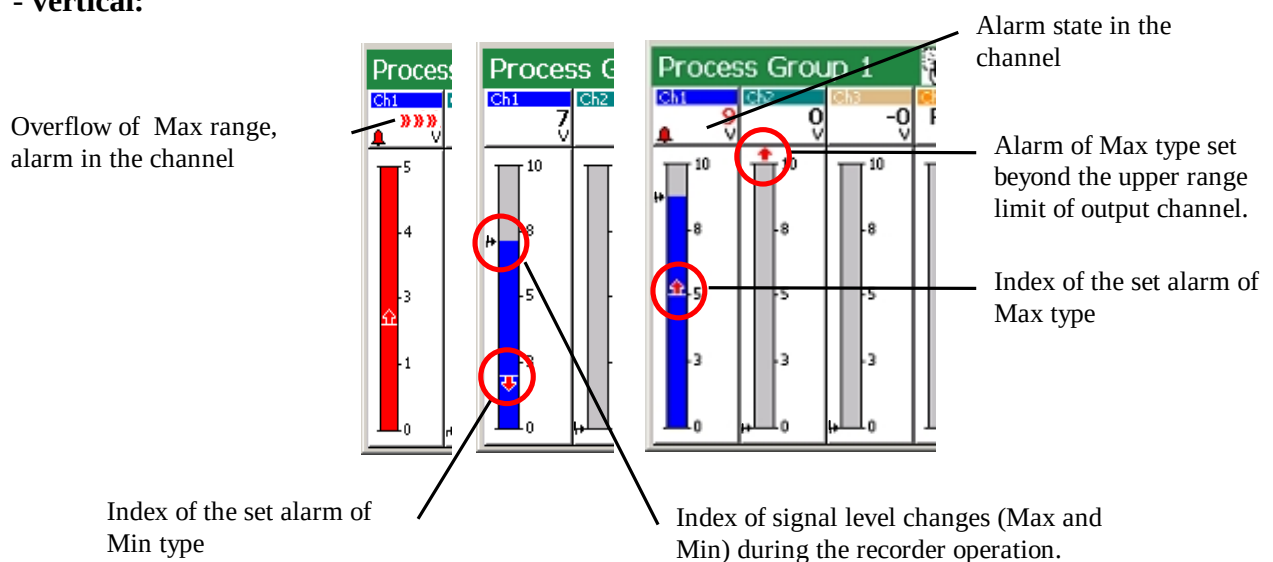
- Vertical chart:



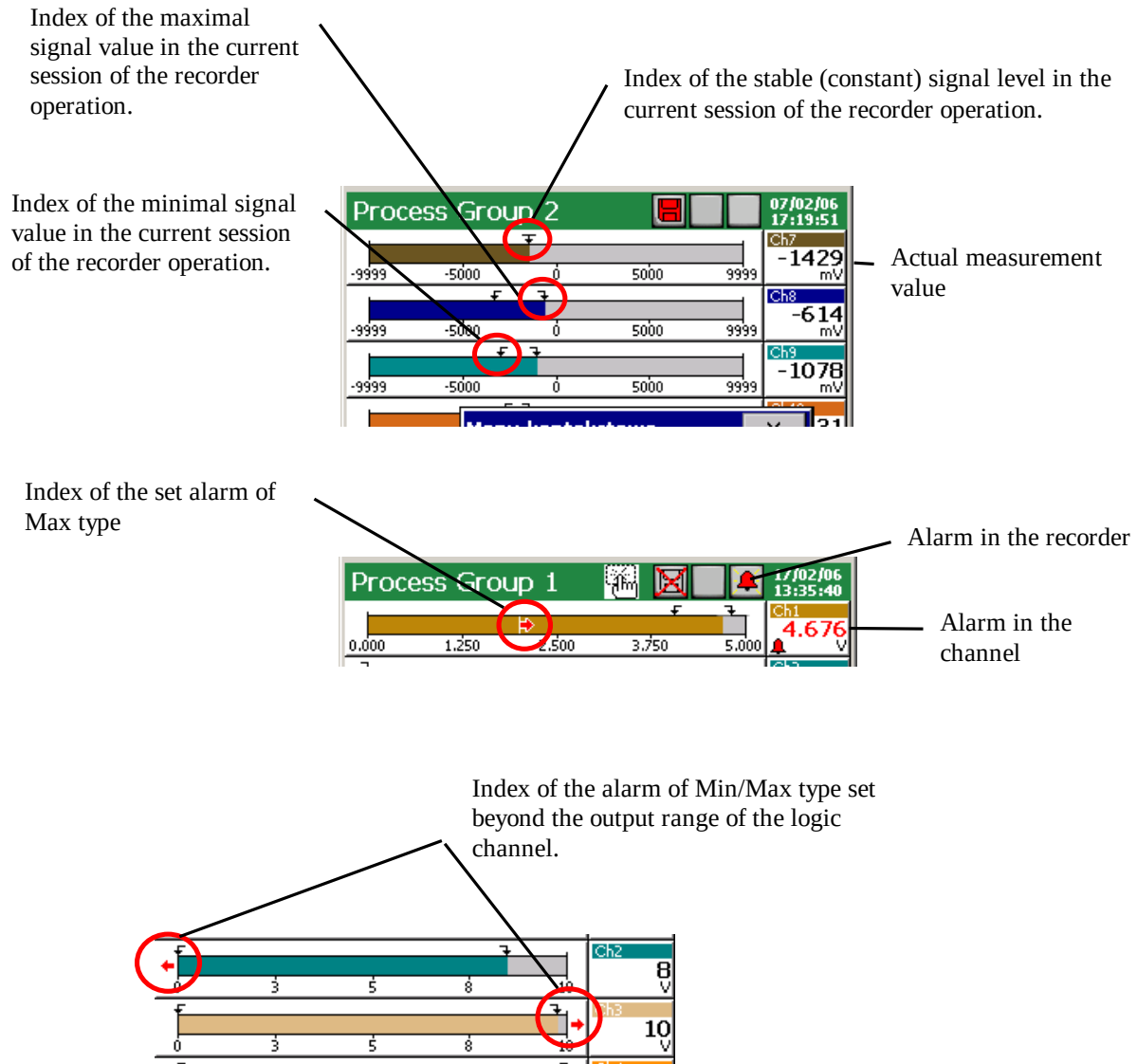
The setting of the type and alarm value in the selected logic channel can be read out in the KD7 **Control Panel channel**, in the **Output** icon menu , **Alarm** tab.

8.2.4 View of the channel group in the shape of bargraphs

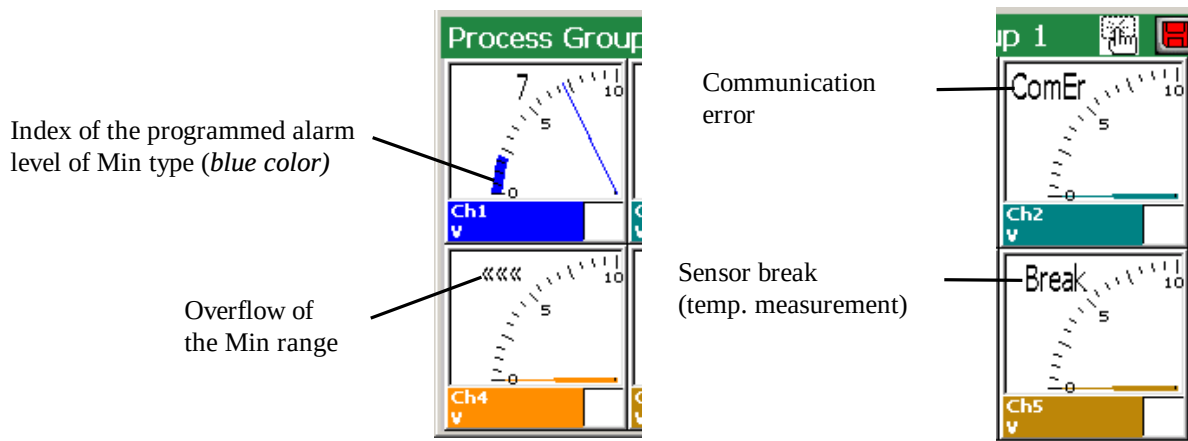
- vertical:



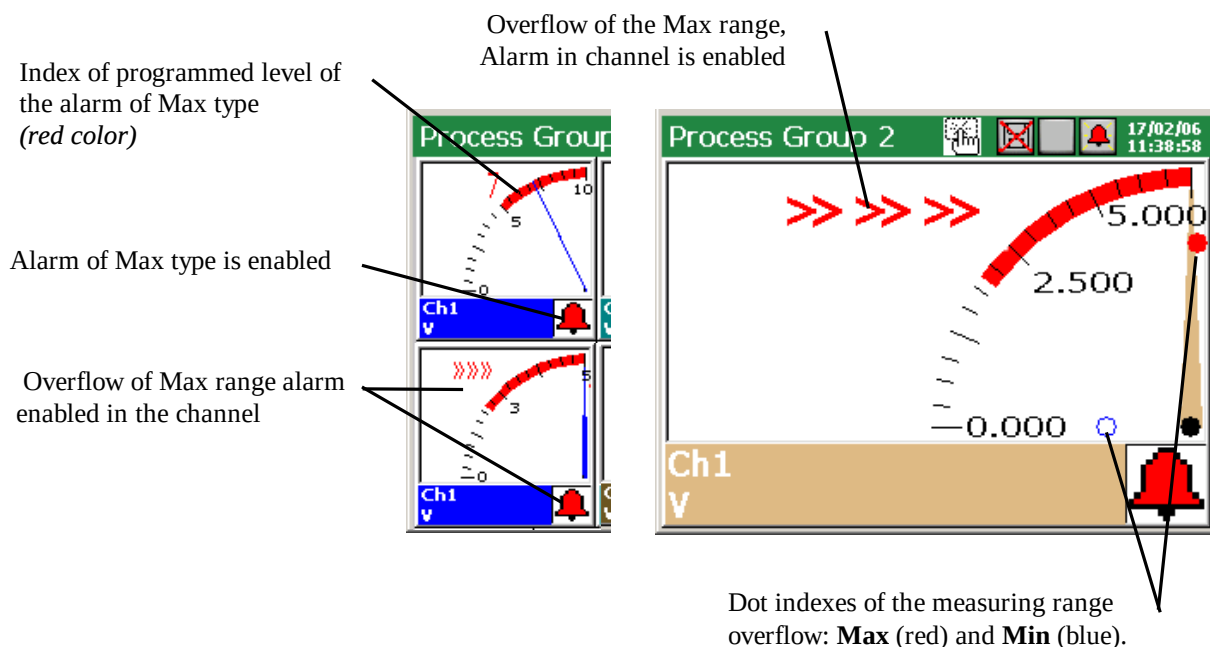
- Horizontal:



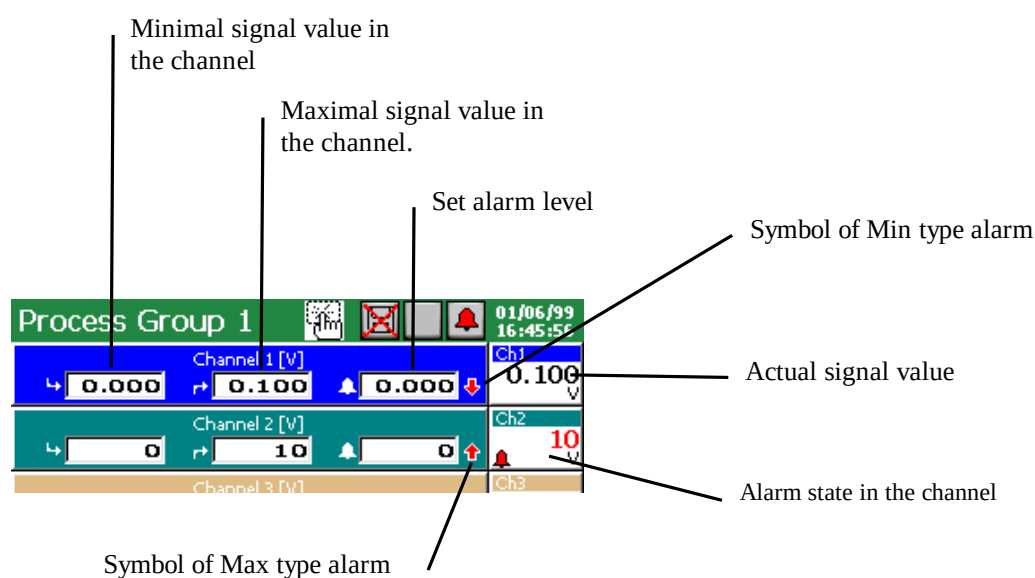
8.2.5 Analog view of the channel group



The set area of the alarm of Min type is marked in blue color on the analog indicator
 The set area of the alarm of Max type is marked in red color on the analog indicator.



8.2.6 Statistic view of channel group

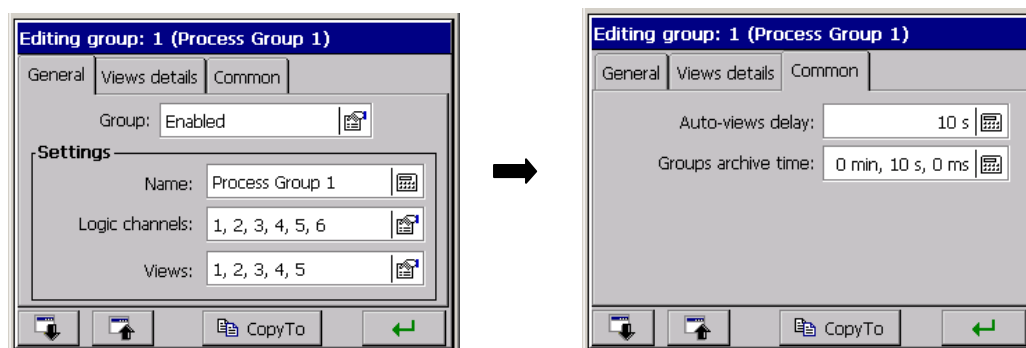


On the statistic screen following values are displayed: minimal values of the measured value in the period of the current session of the recorder operation, maximal values, programmed level of the alarm signaling and messages about the overflow of the range and sensor break.

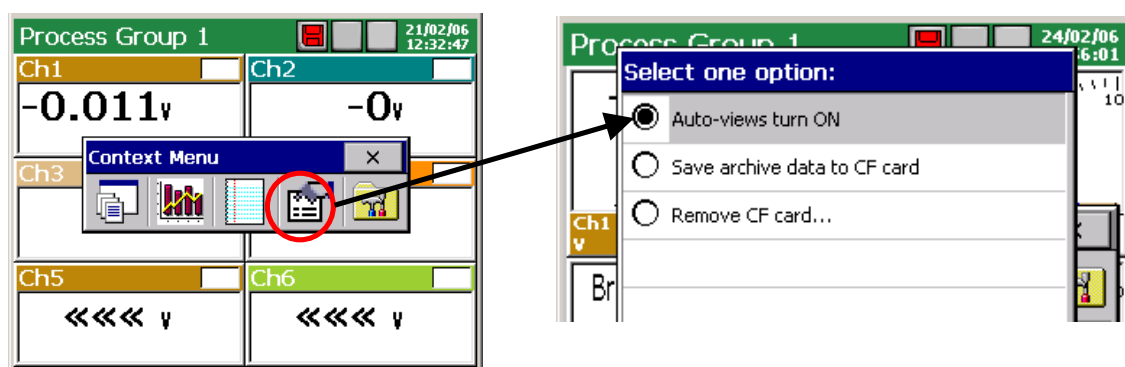
8.2.7 Auto-view turning on/off

During the recorder operation, types of screens programmed in the **KD7 Control Panel** → **Visualization and Archiving** → **Edited group** → **General** menu are displayed.

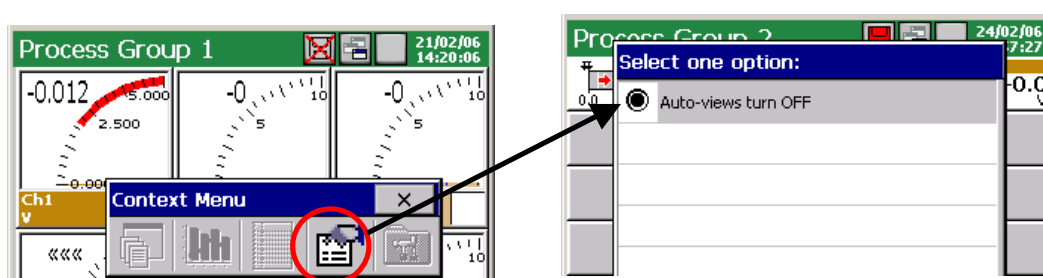
After programming in the edition group window, in the **Common** tab, the time of changing the screen views (the screen is common for all measuring groups), one can enable or disable during the visualization, the option of automatic screen switching without the necessity to enter into the **KD7 Control Panel**.



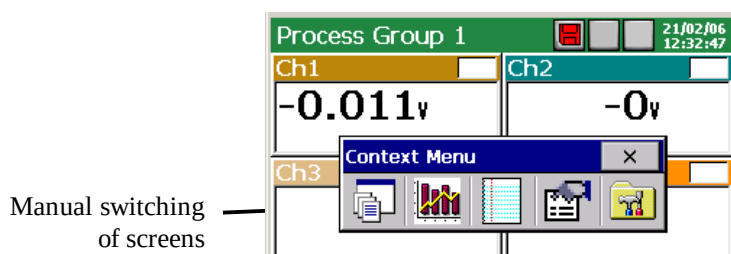
To enable the automatic switching of screens , one must mark and accept the **Auto-views turn on** function in the selection window of the Context menu option.



To enable the automatic switching of screens, one must mark and accept the **Auto-views turn off** function in the selection window of the Context menu option.



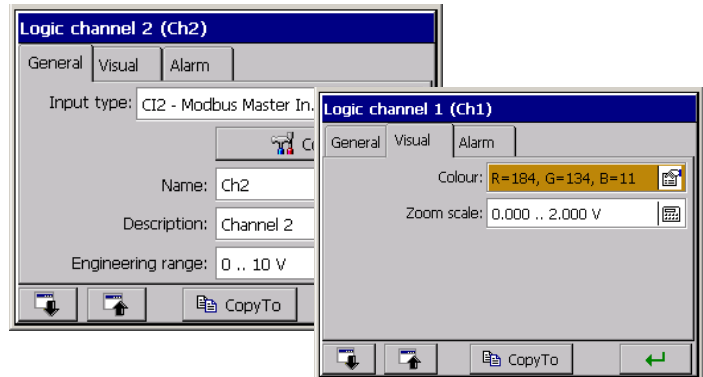
When the automatic switching is disabled, one can switch manually the screens through touching the icon of the screen selection in the Context Menu field, with a finger.



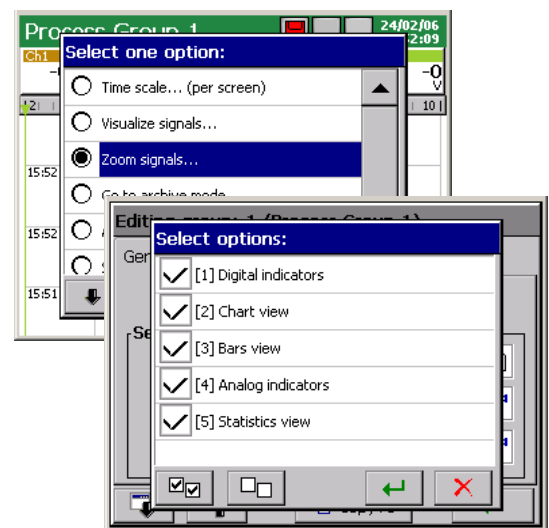
8.2.8 Zoom function of the signal (measuring magnifier)

The **Zoom** function of signals concerns and is accessible only during the display of a linear screen. The activation of this function causes the display switching of the selected logic channel in output range limits, into the display in limits of the set range by the parameter **Zoom** (see p. 8.2.8.)

... KD7 Control Panel →Inputs:



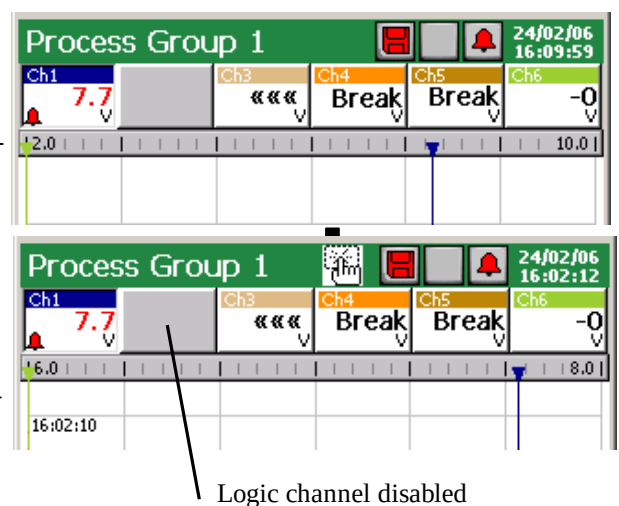
After programming the Zoom parameter for signals, one can enable the display of the measurement result in limits of this parameter. Select the **Zoom** function for signals in the **Context menu** option window, mark in the open selection window which channels this function is to concern and accept settings.



Output range of the logic channel 1

The display switching of the measurement result of selected channels follows into the view in limits defined by the parameter **Zoom** for signals.

Zoom for signals enabled

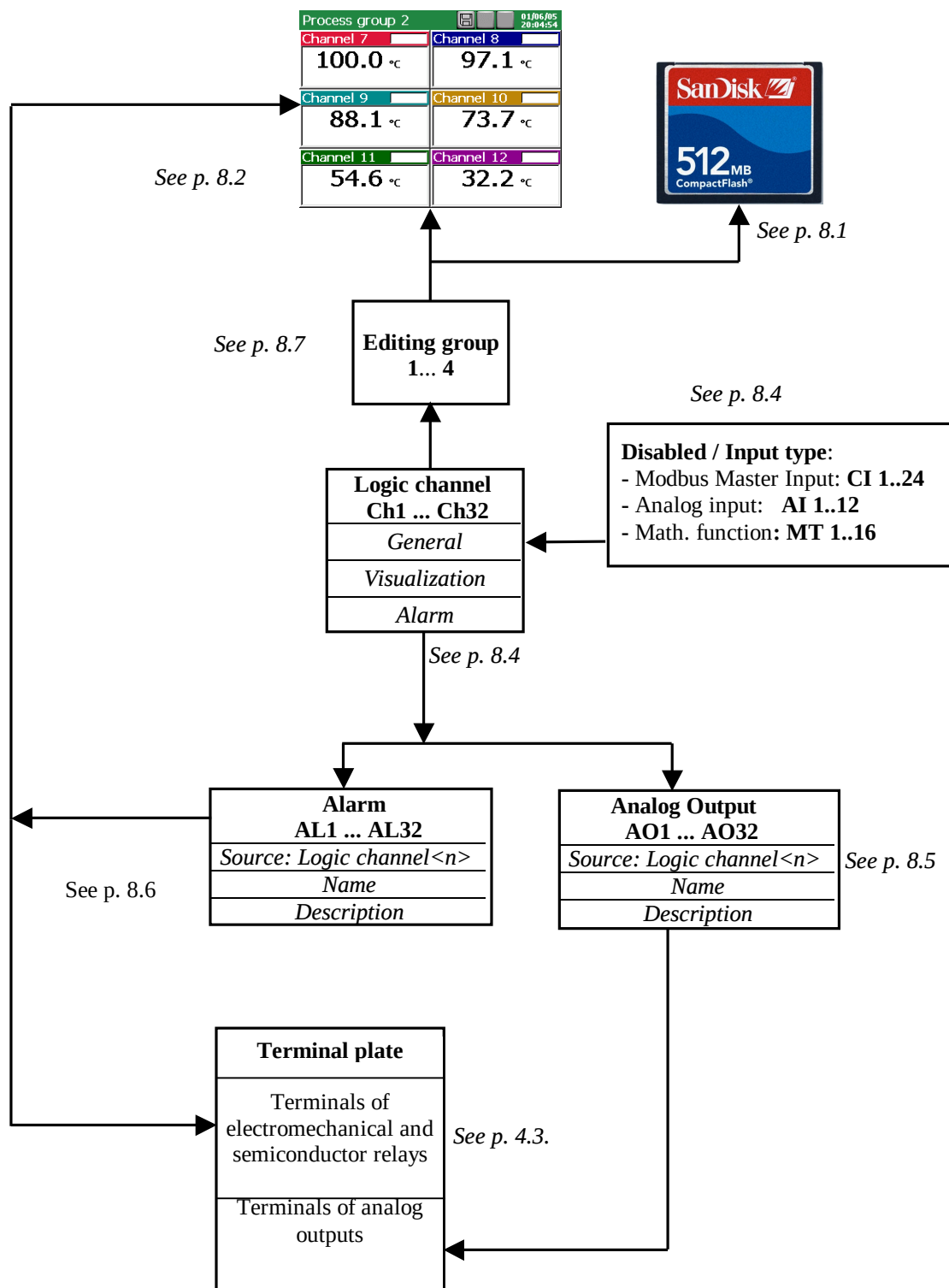


To enable the **Zoom** function for signals, one must in the option window of the **Context menu**, during the display of the linear screen, select again the function **Zoom** for signals and in the **Select options** window, disable marked previously channels (through tapping the screen by a finger in the given channel field).

8.3 Structure of the data flow in the KD7 recorder

After selecting in the **KD7 Control Panel** the **Inputs** icon, the selection window and programming the logic channel (programming and explanation of the logic channel notion (see p.7.11.1)).

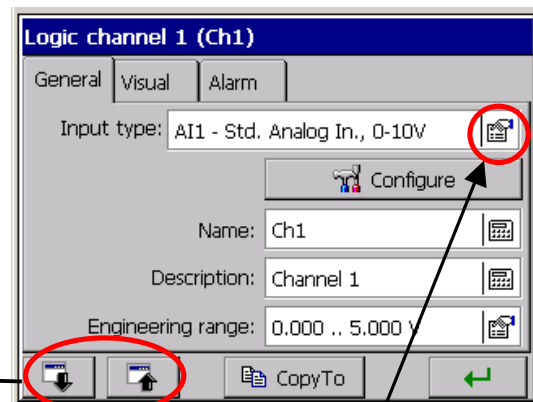
The logic channel is the signal source for the system of alarms and the system of analog outputs, and is the element of the channel group configuration. Measuring data for each group are displayed on the screen and stored in the CompactFlash memory card.



8.4 Programming of a logic channel

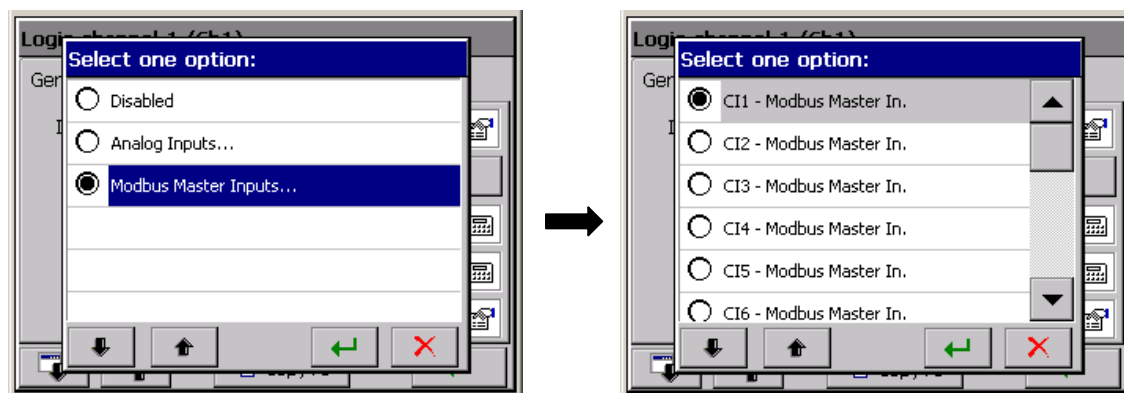
After selecting the **Input** icon, in the **General** tab, in the **KD7 Control Panel** window, select one of the 32 accessible logic channels for configuration.

Selection of the logic channel

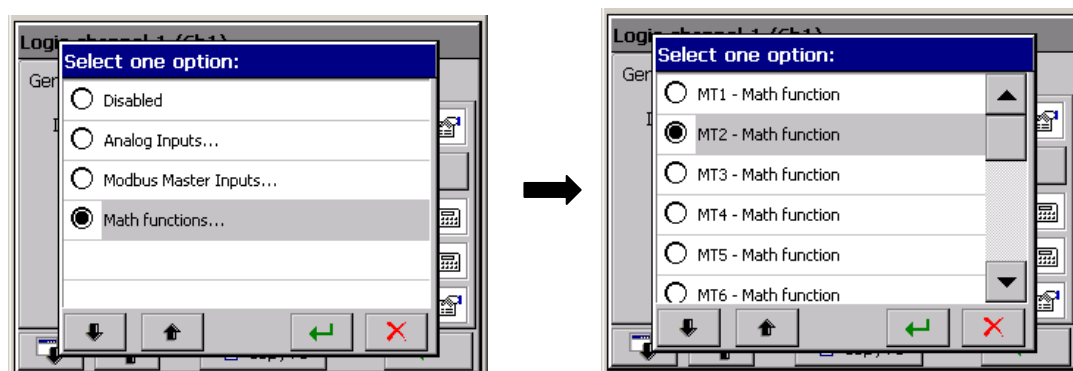


Next, transit to the selection and configuration of the measuring input (see p 7.11.2. in the set up logic channel.

1. When the recorder is arranged in the version without mathematical functions or is with these functions, but they were disabled (see. p. 7.11.6), analog measuring inputs **AI 1..12** (see p. 7.11.5). and interface Modbus Master inputs **CI 1..24** (see p. 7.11.4) are accessible for the configuration.

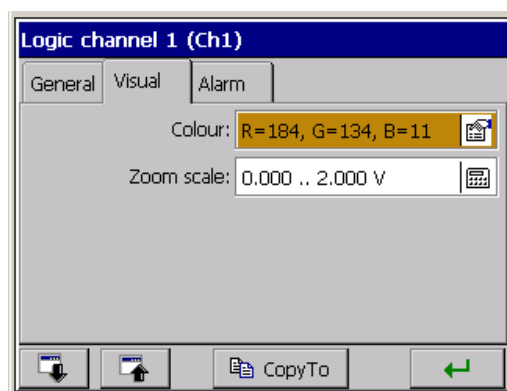


2. When the recorder is arranged in the version with mathematical functions and these functions are enabled (see p. 7.11.6), analog measuring inputs **AI 1..12** (see p.7.11.5), interface Modbus Master inputs **CI 1..24** (see p.7.11.4) and mathematical functions (see p. 7.11.6) are accessible for the configuration..



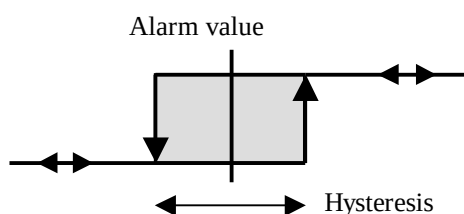
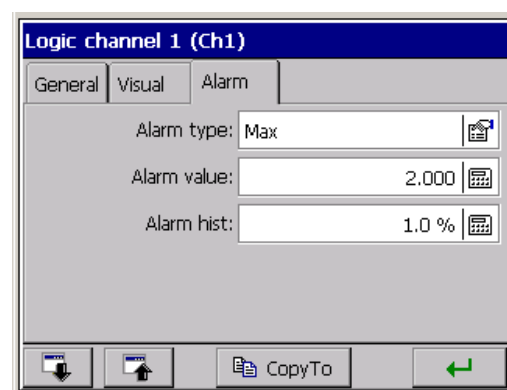
In the **General** tab of the logic channel window, one must write the name and channel description and set up its output range (input measuring data are proportionally converted into values in programmed limits of the output range and are stored on the CF card , and displayed on the screen, in output values).

In the **Visualization** tab, select the color of data visualization on the screen of the selected logic channel and set limits for the **Zoom** function (measuring magnifier), see p. 8.2.8.



In the Alarm tab (see p. 8.6), set up the alarm type and parameters of the system of alarms:

- **Alarm Type:**
Disabled , Min, Max
- **Alarm value:**
Set up the level of alarm occurrence,
- **Alarm hysteresis:**
The constant decimal point number in the range 0.5...10.0%.



Note: One alarm of Min or Max type can be set up in the channel

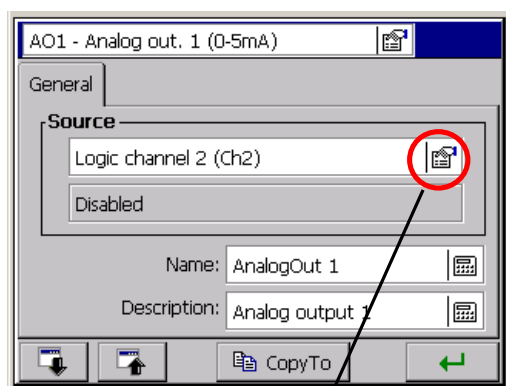
Logic channels can be selected as the signal source for the alarm system and for analog outputs, and after configuration in the 1...4 groups (see p.8.7), they are displayed on the screen and stored in the recorder memory and in the CompactFlash card.

8.5 Programming of analog outputs

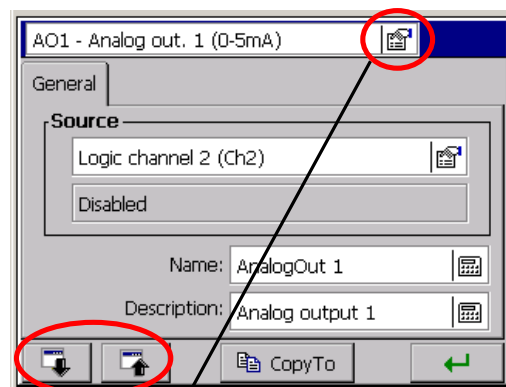
After selecting the **Outputs** icon in KD7 Control Panel, the window for the signal source selection is opened (**of the logic channel 1...32**) for analog outputs (or alarms).

Select the analog output (AO 1...8) from accessible outputs in the recorder, and assign the input signal source (**logic Channel 1..32**) to it, in the **General** tab. The same logic channel can be the signal source for many analog outputs.

If the signal source (logic channel for the given analog output is set up as disabled, this output will be inactive.



Selection of the signal source



Selection of analog output

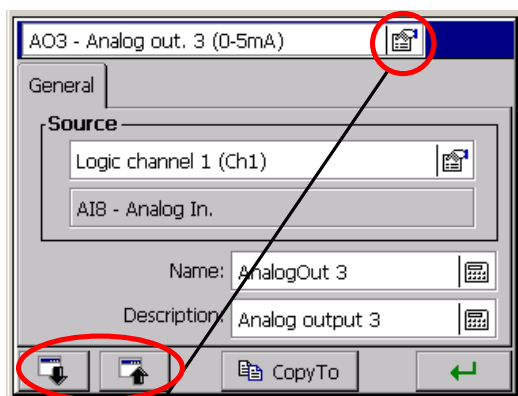
After the name and description edition, the programming of the selected analog output is ended.

8.6 Programming of alarms.

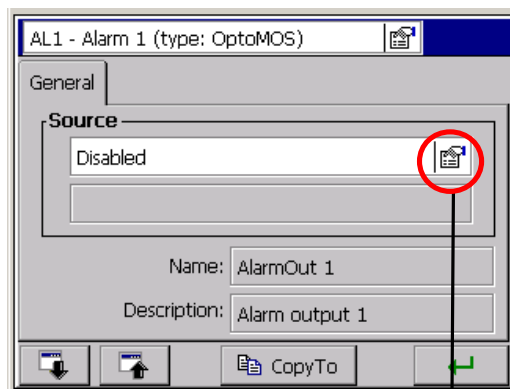
After selecting the **Outputs** icon in **KD7 Control Panel**, the window of the signal source selection (**Logic channel 1...32**) is open for the selected alarm (or analog output).

Select, from alarms accessible in the recorder, the alarm (AL 1..32) and assign to it the input signal source (**Logic channel 1..32**), in the **General** tab. The same logic channel can be the signal source for many alarms.

If the signal source (logic channel) for the given alarm is set up as disabled, then this alarm will be inactive.



Select Alarm



Select the alarm source or disable it.

After the edition of the name and description, the programming of the selected alarm is ended.

Note:

The alarm type (Min or Max) and the output signal level in the selected logic channel (signal source) at which the alarm activation follows, are set when configuring the logic channel (see p. 8.4.).

8.7 Edition of a logic channel group

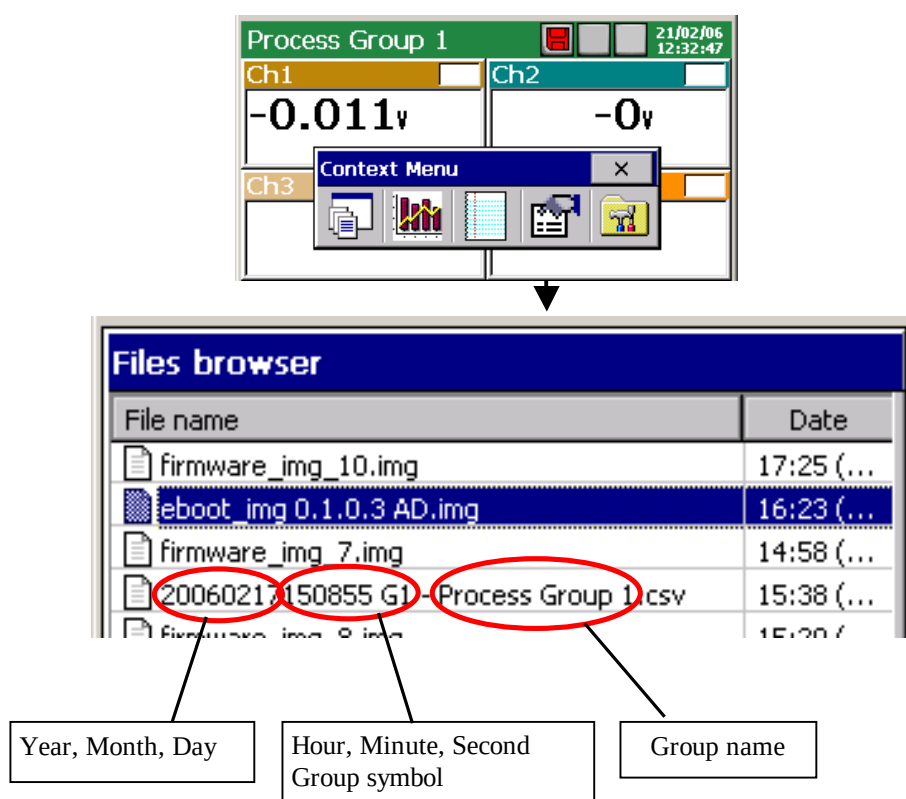
For the visualization and analysis of measuring data related, e.g. with the defined technological process, one can connect logic channels in groups, which an individual set of parameters is set for.

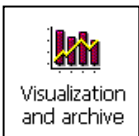
One can program 1...4 groups in the KD7 recorder, each with:

- the own name of the group,
- 1...6 logic channels from 32 accessible channels in the recorder,
- 1..5 types of screens,
- a programmed period of automatic screen switching,
- a programmed period of measuring data storage in the memory (*presently it is common for all groups*).

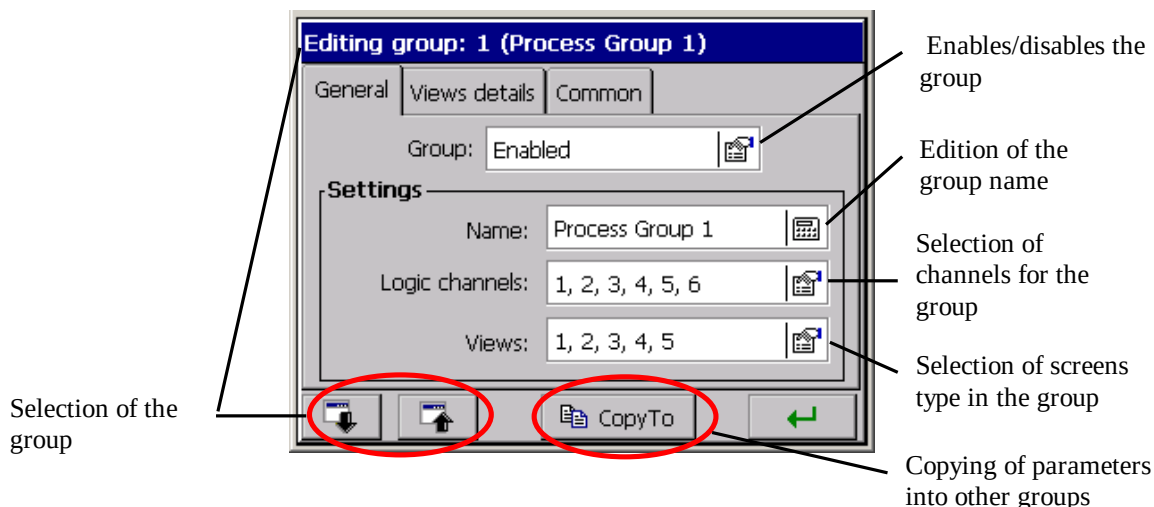
Each of the channel group can be disabled. Measuring data from individual groups are stored on the CF memory card in files with capacity up to 8 MB, in the *.csv format (the textual file is serviced , among other by the Excel program).

The structure of the channel group file stored on the CF card, with measuring data:

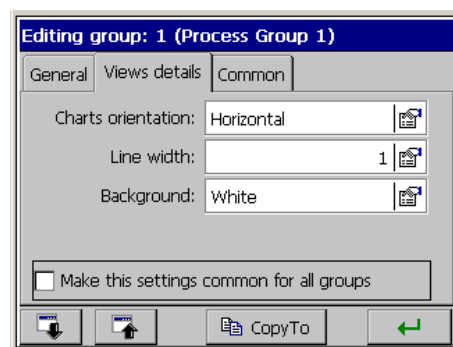


After selecting the  icon in the KD7 Control Panel window, the edition window of the channel group is opening.

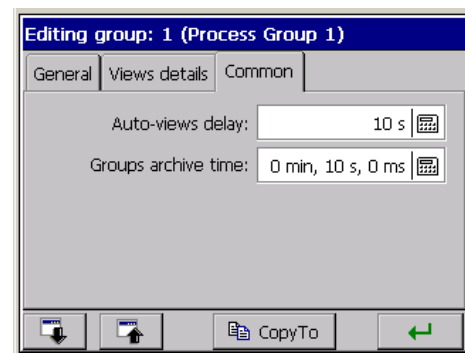
Parameters of the group and settings, acc. to the description of the recorder configuration menu, (see p. 7.9.).



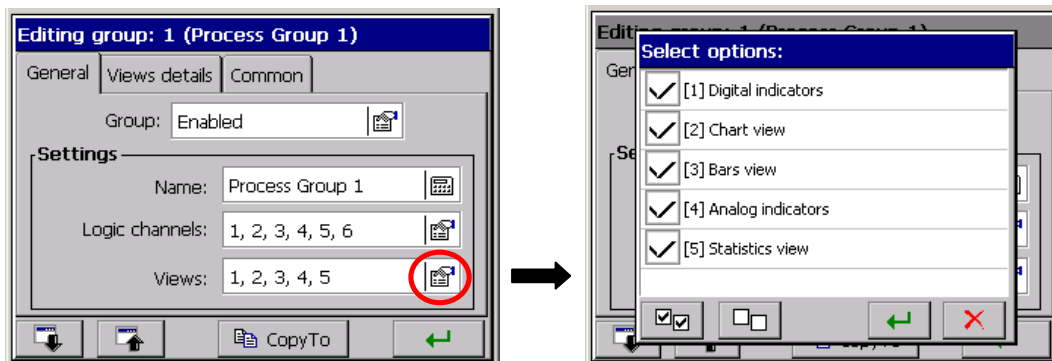
The orientation of line screens and bargraphs, background color and the line thickness for linear charts are set in the **Views details** tab



Set up the change time of displayed types of screens and the data period storage into the memory. These parameters are presently common for all groups.

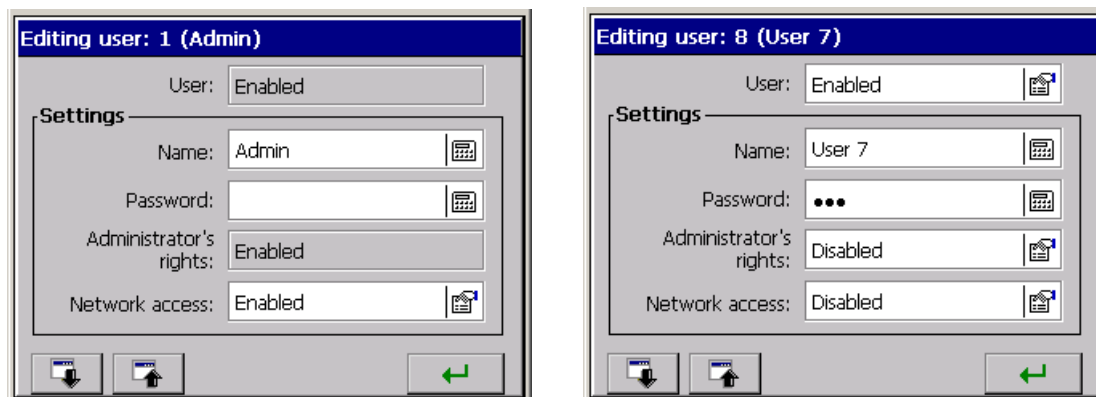


- Selection of the type of screens for the edited group (description of screens, see p. 8.2.1.):



8.8 Edition of recorder users

After selecting the security icon in the **KD7 Control Panel**, one can set up parameters for individual recorder users in the **Editing user** window.



In KD7, 1...8 users can have access to configuration settings. The user 1 (**Admin**) has assigned for good administrator's authorizations.

Only he, can edit other users and change all settings related to them.

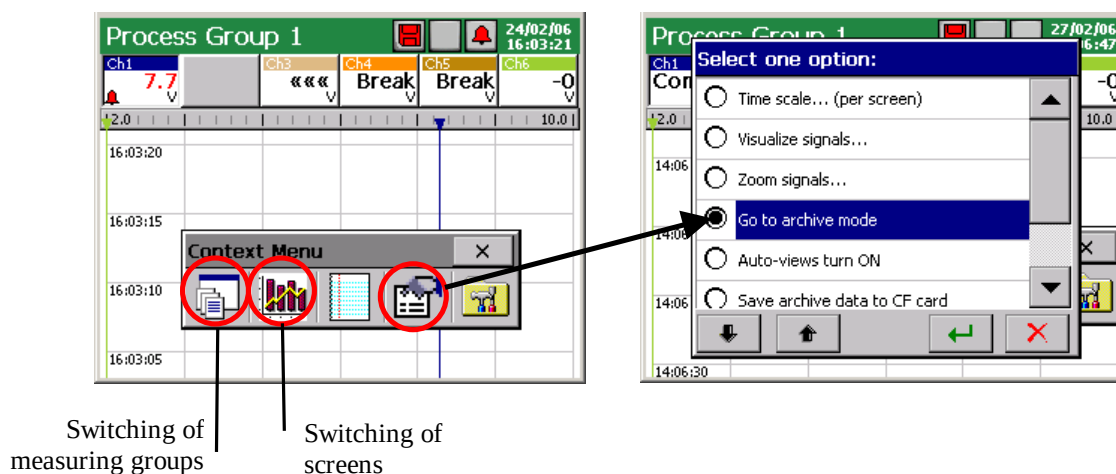
The user (User1..7) does not have administrator's rights and can change only the access to the network, the name and the password in the edition window.

Only the **administrator** and **logged users** have access, after giving the password, to the option of recorder parameter configuration in the **KD7 Control Panel**.

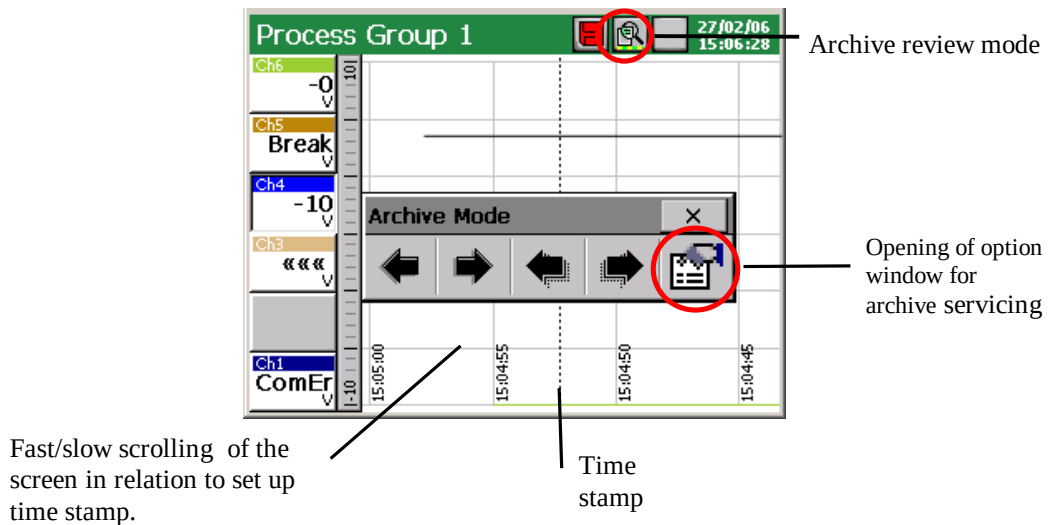
When writing the password, it is recommended to use only Latin alphabet and numbers without local signs (after changing the recorder menu language, one must preserve the possibility to introduce particular password signs).

8.9 Review of archived data

The menu of the archive data review option is accessible after switching the screen view into linear in the **Context Menu**, and opening the selection window of currently accessible options and selecting **Go to archive mode** in it.

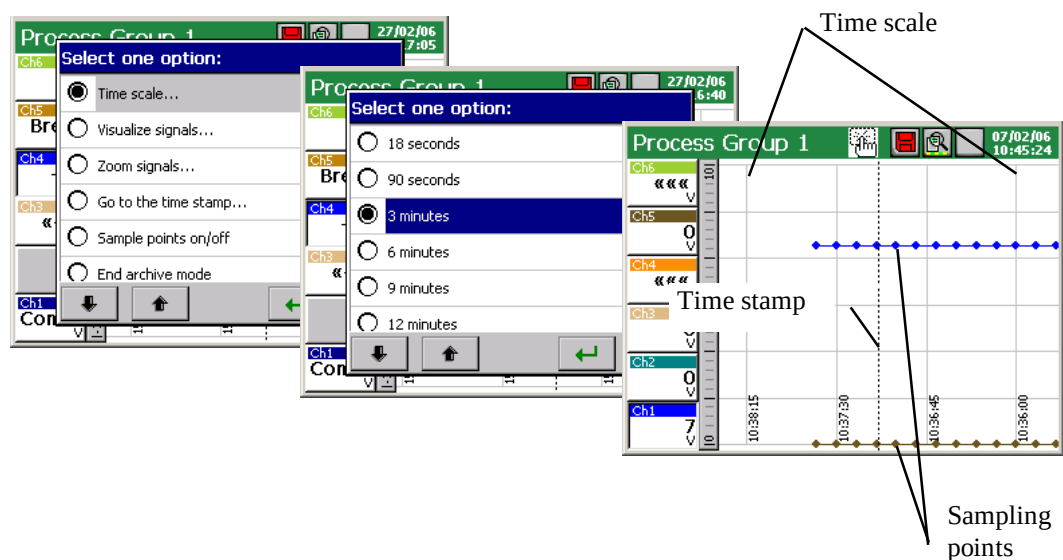


In the archive mode, after tapping the  icon or the screen in any place, the **Archive review mode** (arrows of slow and fast scrolling of the chart and the option icon for servicing archived data).



Following archive servicing options are accessible in the **Select one option** window:

- selection of the time scale for the archive chart,
- selection of visualized logic channels on the archive screen,
- *enabled/disabled Zoom scale parameter (set up in the menu: ...KD7 Control Panel→Inputs – Logic channel 1..32→Visual →Zoom scale)*
- setting of time stamp parameters on the archive screen,
- enabled/disabled sampling points (- points corresponding to the data storage time)
- end of the archive review and exit to the visualization window of current measuring data.



Note: The archive service concerns only data stored in the recorder buffer till the entry moment in the function of their review. During the archive review, current measuring data are stored into the buffer and will be serviced at the renewed entry into the archive.

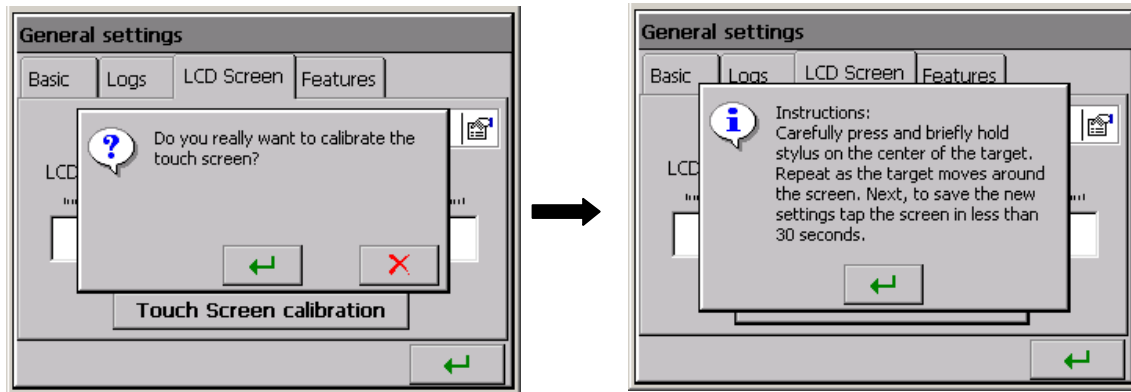
The exit from the archive data review follows after selecting and accepting the option of archive review end. The return to the current measurement visualization follows.

8.10 Calibration of the touch screen



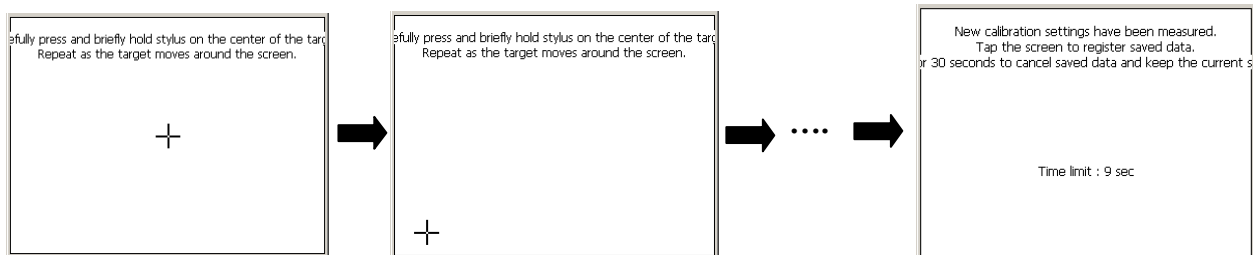
After selecting the **General settings** icon in the **KD7 Control Panel** window, on the **LCD screen** tab of the **General settings** window, the **Touch screen calibration** procedure is accessible.

One must carry out the touch screen calibration in case of incorrect reaction occurrence when pressing icons/buttons in displayed windows on the LCD screen.



After pressing the calibration button and confirming the selection and take cognizance with the instructions, the window in which one must confirm (by pressing) successive settings of the calibration mark is opening.

To write introduced changes in the touch screen calibration, one must tap the screen (in any place) in less than 30 seconds since the setting of the mark in the exit point.



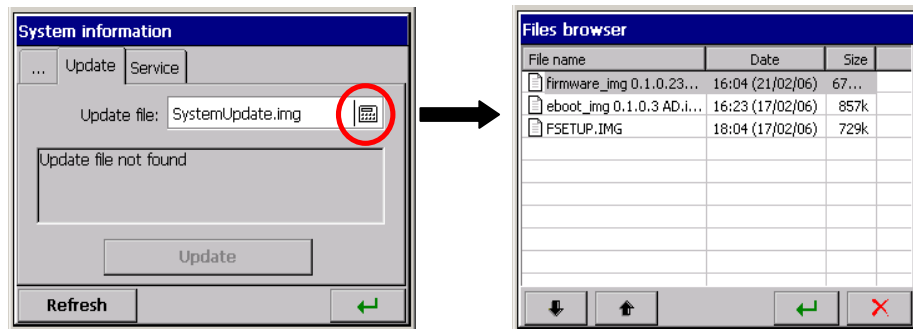
If the screen is not pressed within 30 seconds, changes in calibration will not be introduced.

8.11 Updating of the KD7 program

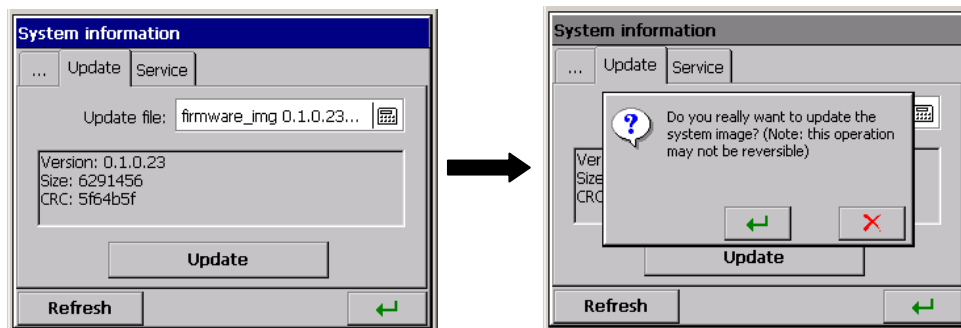
After selecting the **System information** icon in the **Update tab** of the **KD7 Control Panel** window, the updating procedure of the KD7 recorder is accessible. Taking into consideration users' opinions about the KD7 recorder, and as development works will be conducted in the company, the KD7 software will be updated. New software versions, in the form of updated files will be rendered accessible for users on the following Web page: <http://www.lumel.com.pl/en/download/recorders/kd7> .

After recopying the file on the CF memory card (e.g. using the KD7 Connect program, see p. 9.1.), one can update the recorder program. In order to do that, one must carry out following operations:

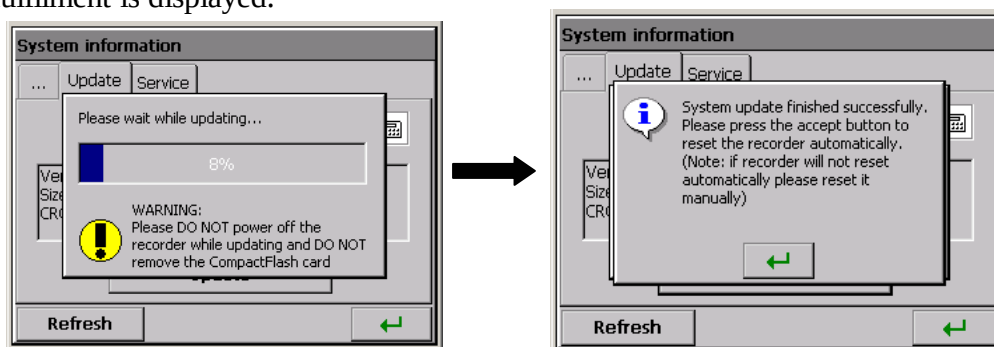
- a. Select the update file in the **Files Browser** window.



- b. Accept the selection and press the updating button:



- c. After confirming the selection, the updating begins and after its end, a message confirming its fulfilment is displayed.



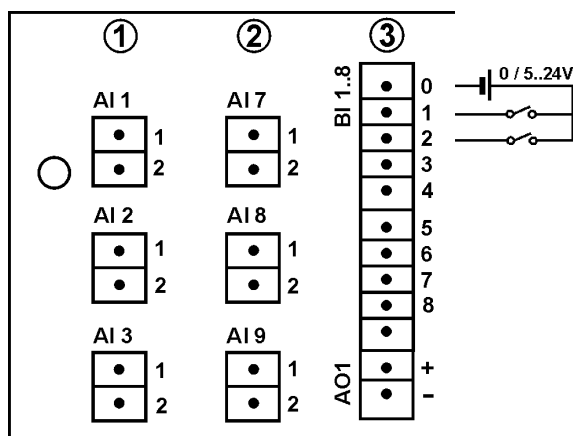
After the achievement of the KD7 program updating from the new file, default settings are set up in the recorder. However, after the renewed updating from the current systemic file, settings are not subject to changes.

During the system updating, one **must not turn the recorder off** and **must not take the CompactFlash out**.



8.12 Servicing of logic inputs

In the current version of the KD7 recorder, there are two logic inputs (**BI**) with assigned constant functions to them:



BI 1 – (5...24V d.c.) disabled / (0V) enabled data recording on the CF memory card.

BI 2 – (5...24V d.c.) disables the alarm system control (output state preserved after disabling the system) / (0V) enables the alarm system.

View of the terminal plate

8.13 Servicing of data stored on the CF memory card, visualization

Measuring data, separately for each group of logic channel, are stored in textual files (*.csv) with maximal capacity up to 8 MB. The limitation of the file capacity enables the direct review and visualization of data, e.g. in the Excel program.

	A	B	C	D	E	F	G	H
1	Time	Ch7	Ch8	Ch9	Ch10	Ch11	Ch12	
2	2006-02-07 08:31:00	-969	-1172	-1204	-1182	-1259	-1334	
3	2006-02-07 08:31:00	-1219	-1278	-1319	-1332	-1370	-1400	
4	2006-02-07 08:31:00	-1387	-1396	-1418	-1428	-1453	-1482	
5	2006-02-07 08:31:00	-1512	-1486	-1492	-1526	-1544	-1556	
6	2006-02-07 08:31:00	-1588	-1582	-1579	-1612	-1624	-1620	
7	2006-02-07 08:32:00	-1662	-1662	-1653	-1669	-1679	-1667	
8	2006-02-07 08:32:00	-1726	-1717	-1704	-1731	-1737	-1717	

No of the logic channel in the group G7

Data from the memory card can be recopied into a PC computer using the memory card reader servicing cards of CompactFlash type or taking advantage from features of the **KD7 Connect** program added to each delivered recorder.

The **KD7 Connect** program (see p. 9.1) is destined for the communication between the PC computer and the KD7 recorder by means of the USB interface.

It enables to carry out following operations:

- 1) copying files from the CompactFlash card, directly from the recorder on the PC computer (e.g. data files, screen dumps)
- 2) uploading of files from the PC computer on the CompactFlash card in the recorder (e.g. file with the updated KD7 software)
- 3) removal of accumulated files from the CompactFlash card in the recorder,
- 4) collection of current systemic information of the KD7 recorder (among others: system version, current configuration, degree of CompactFlash card fulfilling)

8.14 Edition of mathematical functions, examples

For each of the logic channels, one can select as the input signal source in the recorder, one from 16 (MT1..16) mathematical functions, each of them with its proper name and set up output range.

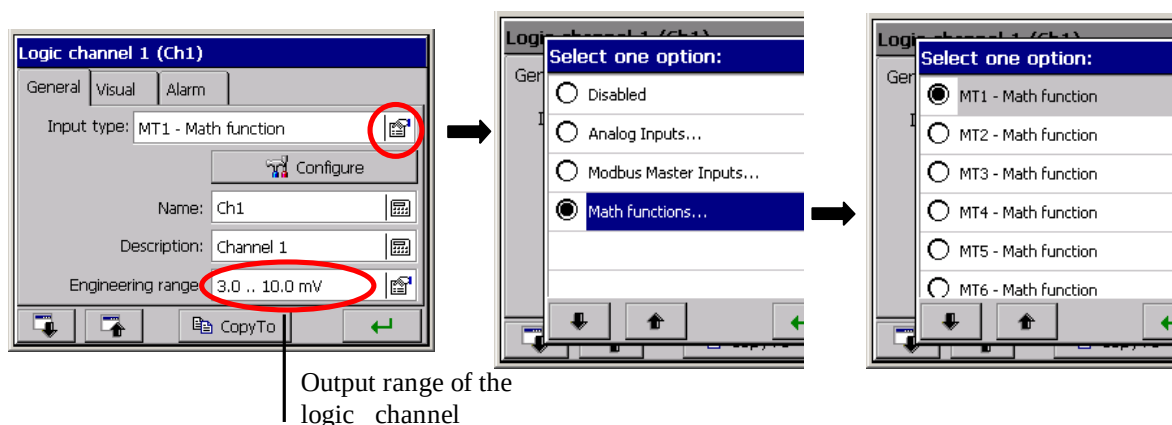
During the function design, one must look after the logic correctness of its structure and take into consideration in the designed structure, recounting coefficients for input units in order to obtain function values in desired output units.

Functions should be continuous and designed by using accessible functors in the minimized form in respect of the number of arithmetical operations. The edited function can be maximally of 64 characters.

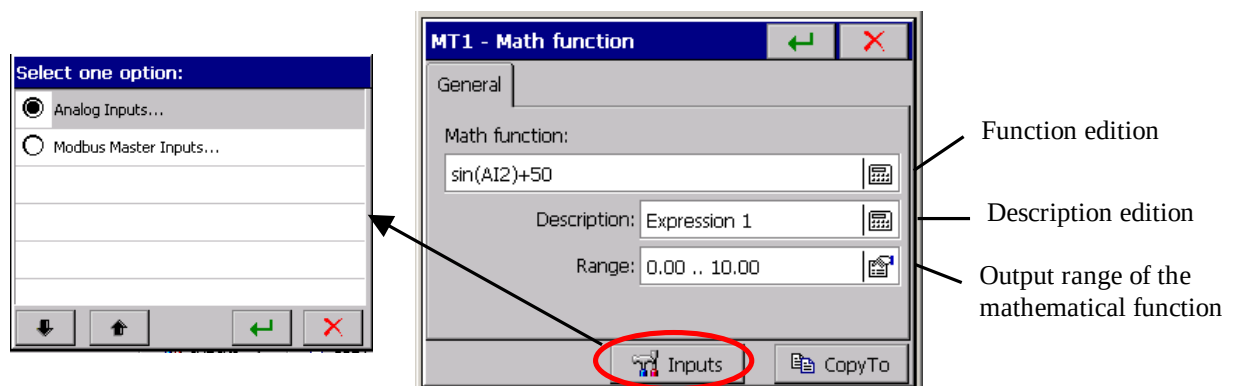
When the output range of the logic channel (for which the given mathematical function is the signal source) is different than the output range set up for the mathematical function, data displayed on the screen will be proportionally rescaled.

- **Function edition**

In options of input type selection for the given logic channel, select one from 16 accessible mathematical functions (MT1..16).



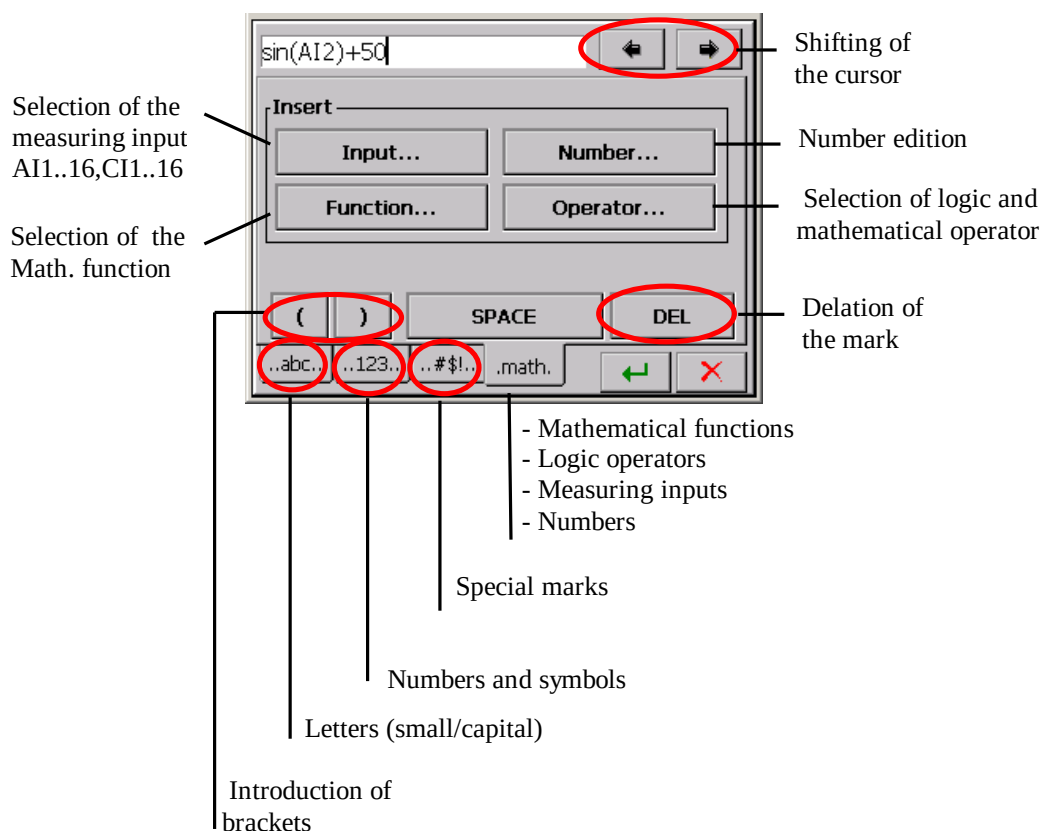
Next, write the name of the logic channel, description and output range. After pressing the configuration button, the window of the edited mathematical function is opening.



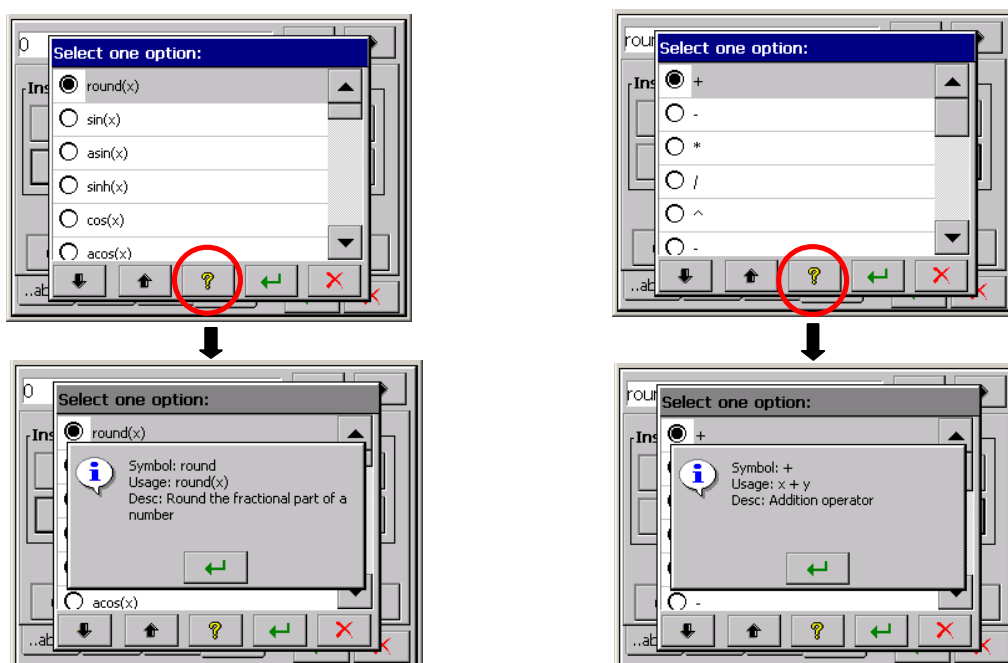
In this window, after programming the function, one must describe and write the output range. The function output range should be set up at least in the area of its variability (if this condition is not fulfilled, obtained results from the function recounting will be erroneous).

In case of necessity to introduce changes in measuring input parameters (AI 1..16, CI 1..24) e.g. to change the function output range, the option of direct input into their configuration, is accessible.

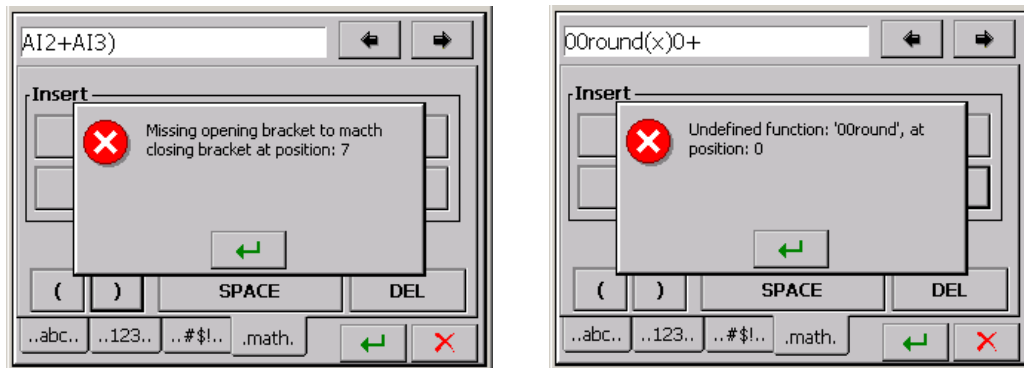
After selecting the button of the function edition, the window in which all indispensable mechanisms for the correct configuration of mathematical functions are accessible.



When selecting functions and mathematical or logic operators, the help option with the description of the introduced symbol is accessible.



In case of an erroneous writing of the edited function, messages informing about that, appear with the indication of the wrong position (the character position is counted from zero)



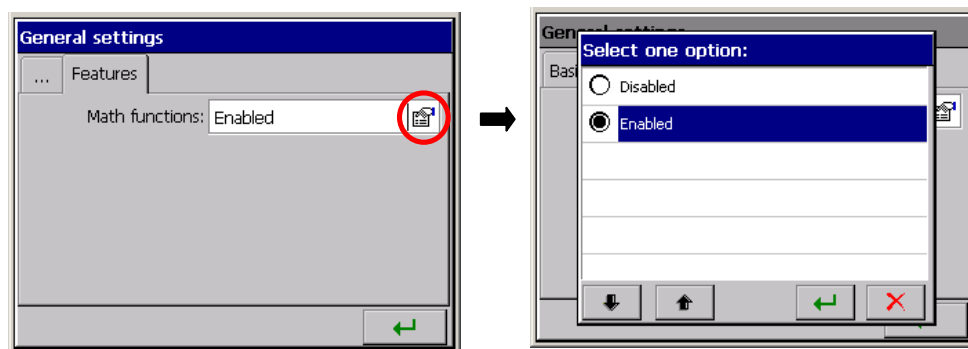
After the correct programming of the function structure and closing the window of its configuration, write its description and the output range in the window of the edited function.

The output range of the function should be set up at least in the area of its variability (if this condition is not fulfilled, obtained results from the function recounting will be erroneous).

In case of the necessity to introduce changes in measuring input parameters (AI 1..16, CI 1..24) e.g. for changing the output range of the function, the option of the direct entry into their configuration is accessible.

Enabling/disabling mathematical functions

In the recorder version with mathematical functions, one can **enable** (or disable) them in the **KD7 control Panel** → **General settings** → **Extensions** :



Enabling/disabling the service of mathematical functions follows after the configuration recording.

9. PROGRAMS FOR PC

9.1 KD7 Connect Program

The **KD7 Connect** program is destined for the communication between the PC computer and the KD7 recorder by means of the USB interface.

The **KD7 Connect** program enables to carry out following operations:

- 1). copying of files from the CompactFlash card, directly from the recorder into the PC computer (e.g. data files, screen dumps),
- 2) uploading of files from the PC computer into the CompactFlash card in the recorder (e.g. file with the updated KD7 software)
- 3) deletion of stored files in the recorder CompactFlash,
- 4) sampling of current systemic information of the KD7 recorder (among others: system version, current configuration, degree of the CompactFlash completion)

9.1.1 Installation of the USB driver for KD7 recorder

One must install the driver in order to see correctly the KD7 touch screen recorder under the operating system MS Windows:

1. After connecting the recorder with the USB cable (delivered in the KD7 accessory set) to the free port in the computer, information about the detection of a new hardware appears in the computer.
Next, the creator to detect the new hardware will be started.
2. One must insert the CD disk delivered with the KD7 recorder into the CD-ROM drive.
3. (This point concerns the XP system from SP2). When asking: “**Can the Windows system be connected with the WEB page ...**” One must mark the option “**No, not this time**”
4. The dialogue “ Creator of hardware updating” appears.
5. One must select the option “ **Install the software automatically**” and click “ **Next**”.
6. One must select the found driver from the list and press “**Next**” to install the driver by the creator. When the creator inform about the lack of driver compatibility tests with Windows, one must answer “**Continue none the less**”. Next, click the button “**End**”.

After the correct driver installation (a restart of the system is not required) one can transit to the installation of the program delivered with the KD7 screen recorder.

Select the catalogue with the **KD7 Connect** program on the annexed CD disk and start the **setup.exe** program.

The program installation creator will started. One must proceed in compliance with instructions displayed on the screen.

9.1.2 Installation of the KD7 Connect program

Program requirements:

- Operating system: MS Windows 2000 or a newest one,
- Installed dedicated drivers for KD7 recorders,
- About 3 MB of free capacity in the hard disk,
- Other requirements equal to requirements makes demands of the operating systems.

The program installation is typical for applications destined for the MS Windows environment. The program installation is in the annexed CD disk, in the “**KD7 Connect** “ catalogue.

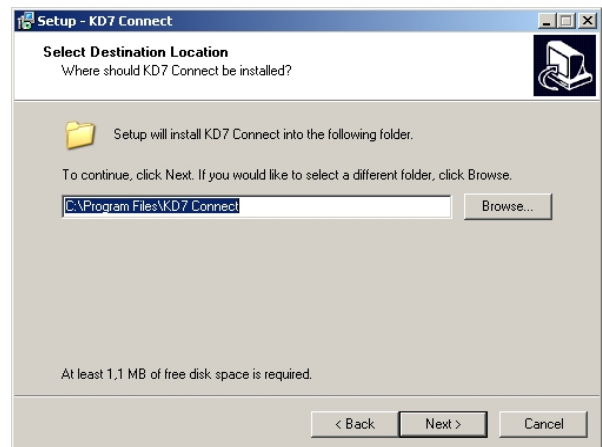
To begin the installation, one must start the Setup program being in the indicated catalogue. Next, one must proceed according to messages appearing on the screen.

The standard installation process has the following course:

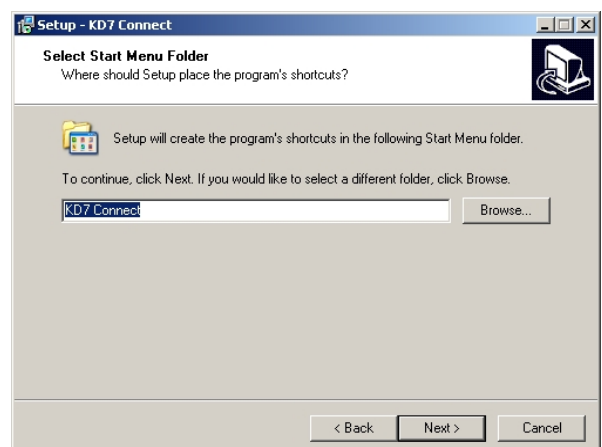
1. Welcoming window of the application installator



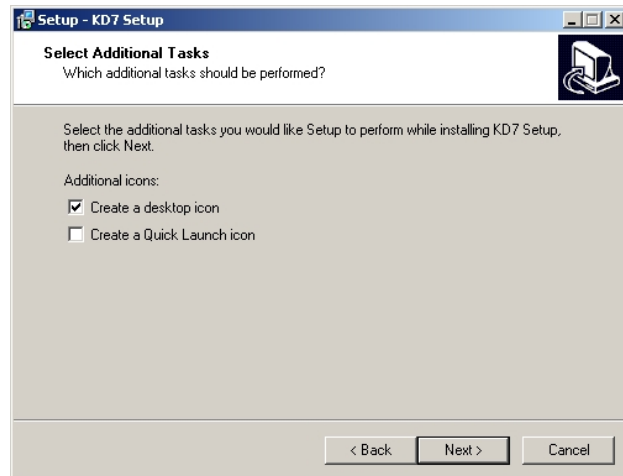
2. Selection of the in-coming catalogue for the application (**Note:** the installation in the default catalogue indicated by the installator is recommended)



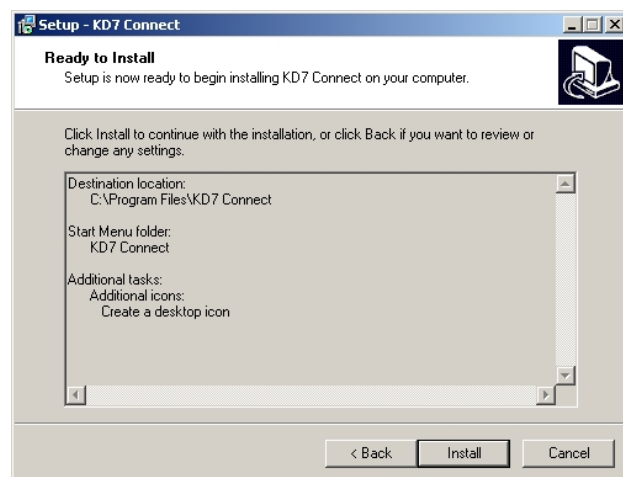
3. Selection of the group name for the Start menu



4. Possibility to insert shortenings into the program in different places of the desktop



5. Summary of carried out selections before the program installation.



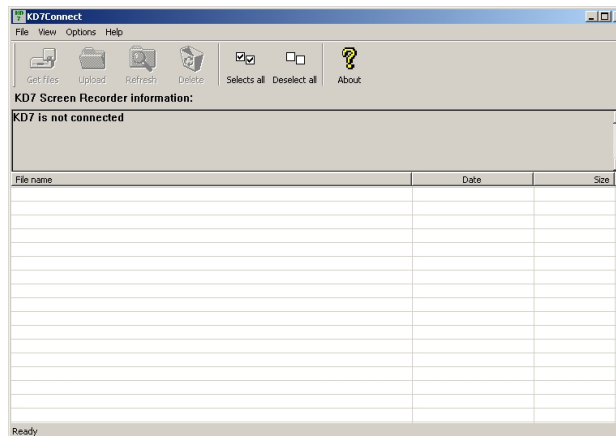
6. Window informing about the successfull ending of the installation.



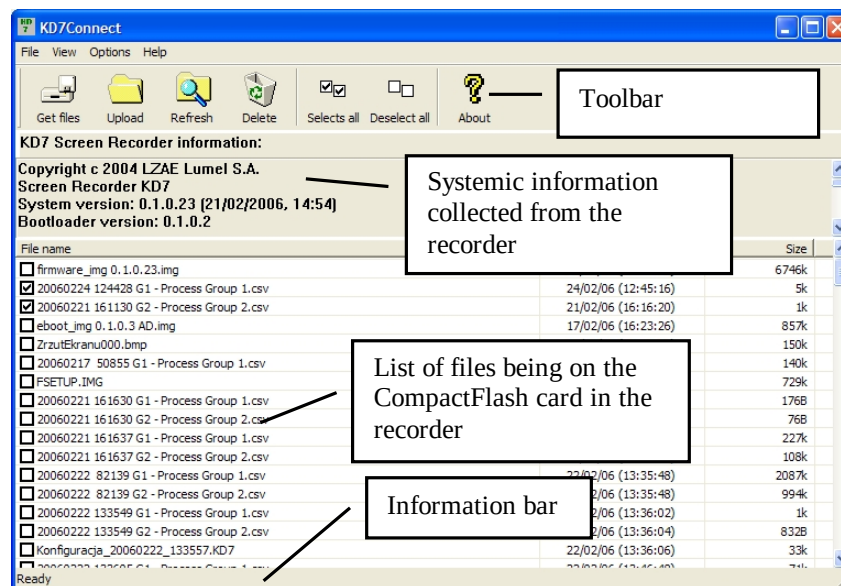
9.1.3 Program servicing

- **Main application window**

The view of the main application window when the KD7 recorder is not connected (through the USB interface) to the PC computer, informs about this, the message in the information window and blanked icons on the toolbar



View on the main application window with the connected KD7 recorder.



- **Toolbar**

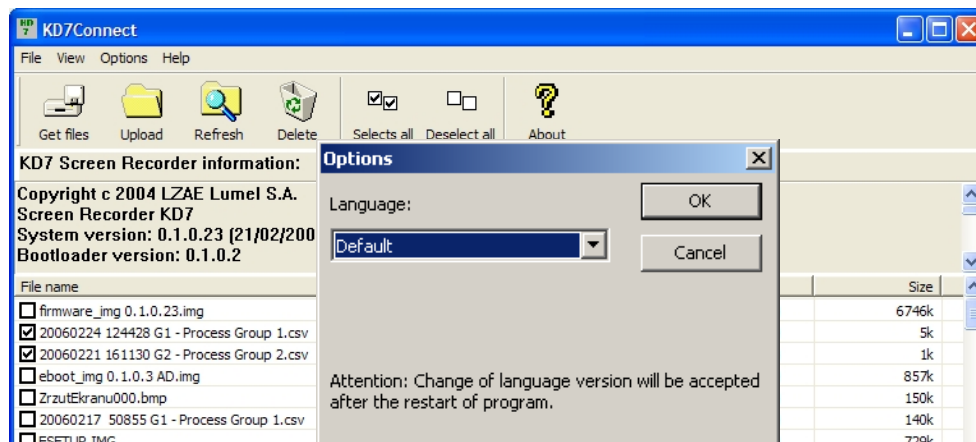
The application toolbar is situated on the upper part of the window and allows to a quick access to the most important program options.

Explanations of symbols are given below.



	Call of the collection option of marked files from the recorder into the PC computer.
	Upload the file from the PC computer into the CompactFlash installed in the recorder.
	Renewed collection of basic data from the recorder (systemic information and the list of files).
	Removal of marked files from the CompactFlash card installed in the recorder.
	Selects all files on the list of files
	Deselects all files on the list of files
	Shows the program information window.

- **Program settings (Application menu è Options è Settings...)**

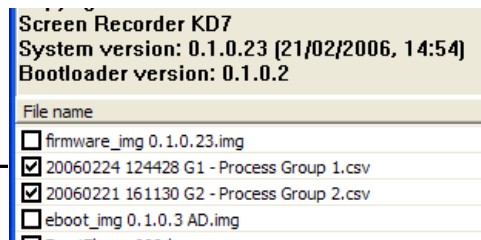


Program options allow to the change of application language settings. The selection of the language as default means the application start in the language consistent with the language of the operating system if it is serviced by this program. In the contrary, the default language of the application is English.

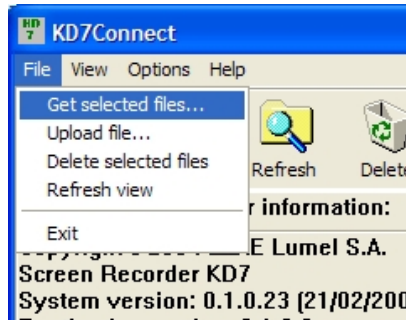
- **Collecting function of files from the recorder (Application menu è files è Collect marked files...)**

To collect defined files from the recorder, one must mark them on the list of files (in the square, next to the file name, the tick of marking appears).

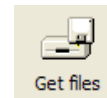
Marked file for collecting



Next one must call the option **Refresh marked files....**from the application menu.

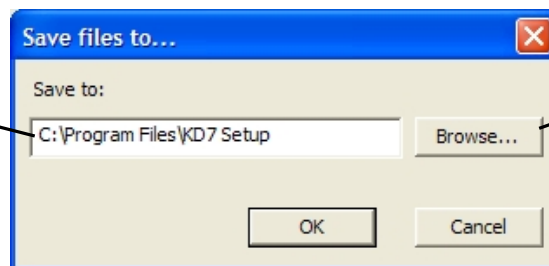


or from the toolbar:



The window appears with the selection of the path for files recording in the PC computer :

In-coming path for collecting files

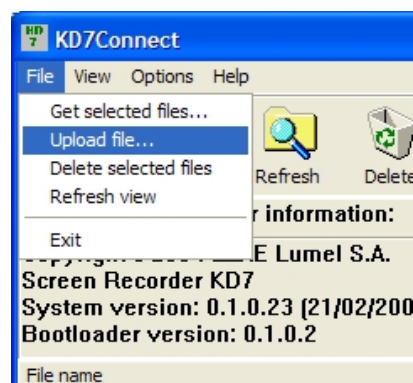


Possibility to indicate another localisation for collecting files

After confirming the in-coming path, the copying of files begins.

To collect the defined file and start it with a default servicing program, one can click twice on the file name.

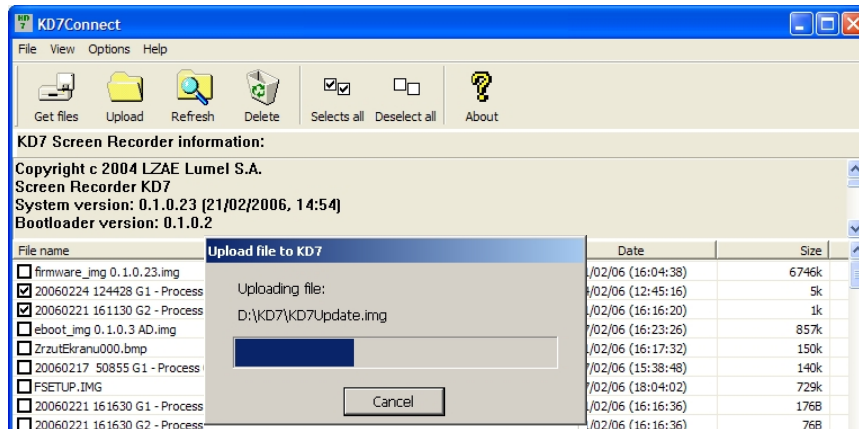
- The function of uploading files to the recorder (**Application menu è Files è Upload files ...**) . The option allows to upload any file from the PC computer into the CompactFlash card installed in the recorder.
- . The command can be selected from the application menu.



or from the toolbar:

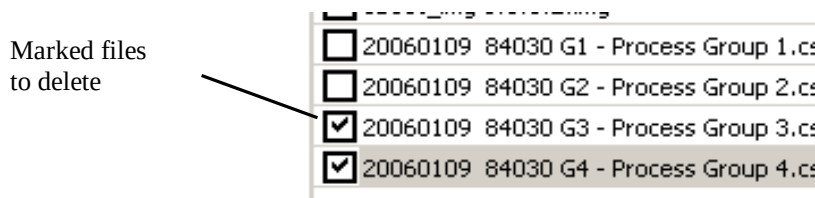


After selecting the file from the selection window, the data uploading begins ;

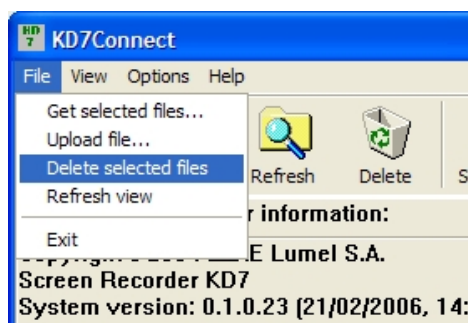


Note: The function is also serviced through the mechanism “Drag&Drop” For this aim, one must drag the selected file, e.g. from the Explorer Windows on the area of the file lists of the **KD7 Connect** program.

- Data deletion from the recorder (**Application menu è Files è Delete selected files**)
To delete selected files from the CompactFlash card situated in the recorder, one must mark them previously (a tick mark appears in the square next to the file name):



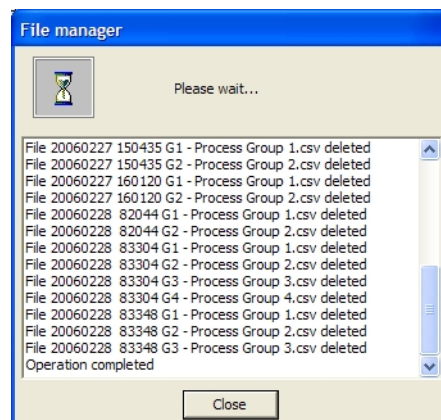
Next , one must choose the option **Delete selected files** from the application menu.



or the icon from the toolbar:



After selecting the command, the dialogue informing about the operation progression and its end will be displayed.

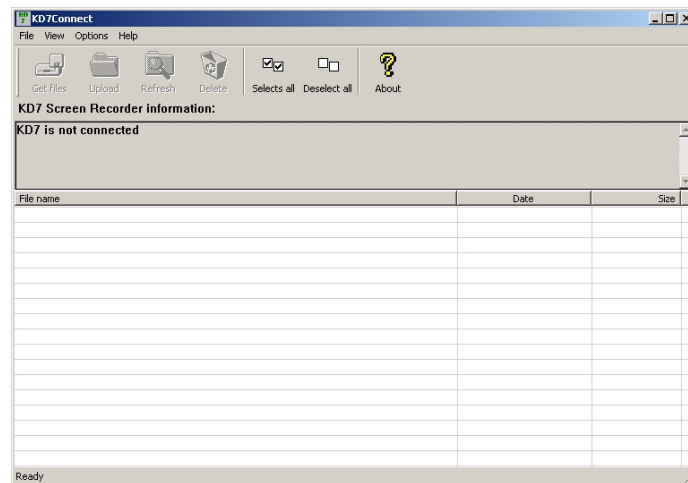


9.1.4. Example of the KD7 Connect program application.

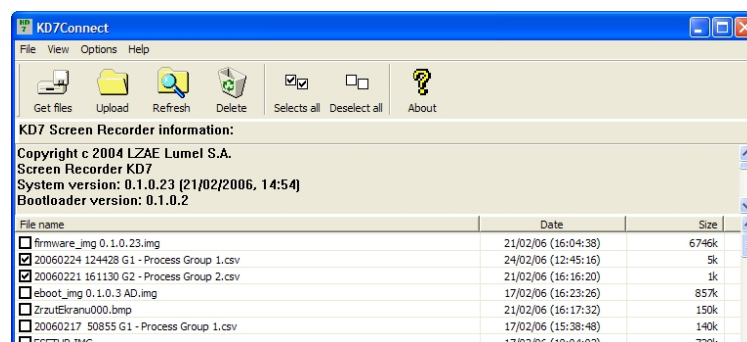
An example of the **KD7 Connect** program application for collecting archive data stored in the recorder is presented below, installed in the recorder.

To get all data from the KD7 recorder into the PC computer, one must carry out following steps:

- Start the **KD7 Connect** program in the PC computer, which it was installed on,



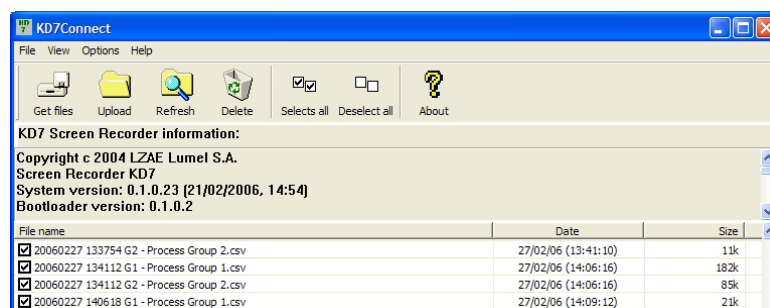
- Connect the KD7 recorder through the delivered USB cable to the free port in the PC computer. Then, information about the recorder and files stored on the CompactFlash card will be get. The application will update its view.



- One must select the **Selects all** option from the program toolbar:



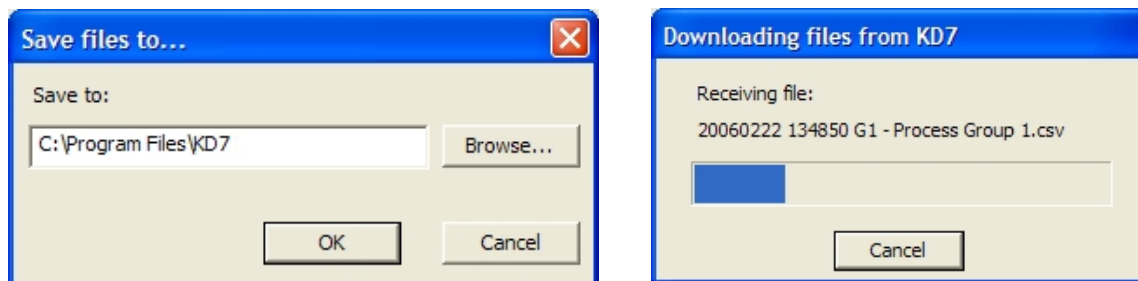
Then, all elements will be marked on the file list as files to get:



- Next one must select from the program toolbar the **Get files** option:



- The dialogue informing where the files will be stored is displayed. At this moment, one can also change the in-coming folder



- After accepting the in-coming folder, the copying of files begins.
- In case of a successfull end of the file collecting operation, the application transits to the information collection about the recorder and files being on the CF card. In case of error transmission, appropriate messages will be displayed.

9.1.5. Messages about errors

Most often error messages which can occur during the work with the program are presented below:

<i>Message about error</i>	<i>Proposed solution</i>
Communication error with the device (error code: 101)	[1] One must check the correctness of the KD7 recorder physical connection to the PC computer through the USB cable. [2] Make the restart of the computer and the recorder.
Error: the notification recording does not succeed (error code: 102)	Systemic error occurred. One must start the computer again.
Error: the communication does not succeed (error code : 103)	During the communication an error occured. It is recommended to proceed like in the case of the error code 101.
Input/output error of the host (recording/creation of file)) Be sure that appropriate recording rights are set up and there is a lot of capacity in the in-coming catalogue.	There is an error on the PC computer side. It is probably related with input/output operations. One must be sure that there is sufficiently of capacity on the in-coming disk for data from the recorder.
The device breaks the uploading	The device was disconnected or broke the uploading because of errors.
General error code (error code:987)	A critical error occurred. One must proceed according to the error code 101.
Device error: lack of capacity on the CompactFlash support.	Error from the recorder side. Lack of capacity on the CompactFlash card for uploaded data.
Device error: lack of the CompactFlash support in the device!	Error from the recorder side. Lack of CompactFlash card. One cannot upload data in the recorder

9.2 KD7 Setup program

KD7 Setup is a program enabling to prepare a configuration file in the PC computer for the KD7 recorder.

After recopying the configuration on the CF memory card, it can be used for reprogramming of settings in the given KD7 recorder.

9.2.1 Installation

The software installation is typical for application destined for the MS Windows environment. The installation program is situated on the annexed CD disk to the recorder, in the “**KD Setup**” catalogue. To begin the program installation, one must start the installation program *Setup.exe* being in the indicated catalogue.

Next, one must proceed according to messages appearing on the screen (like in the description of the **KD7 Connect** program installation).

9.2.2 Program servicing

The appearance and servicing of the **KD7 Setup** program is the same from the servicing menu of the recorder described in the user’s manual. However, one must observe occurring differences:

- For servicing the **KD7 Setup** program, the mouse and the PC computer keypad are used,
- Dialogues of file selection allow to browse the contents of computer disks,
- The language of the **KD7 Setup** program is in compliance with the language of lately edited configuration,
- The appearance of dialogue windows depends notably on the system personalization (e.g. the size of systemic character types)

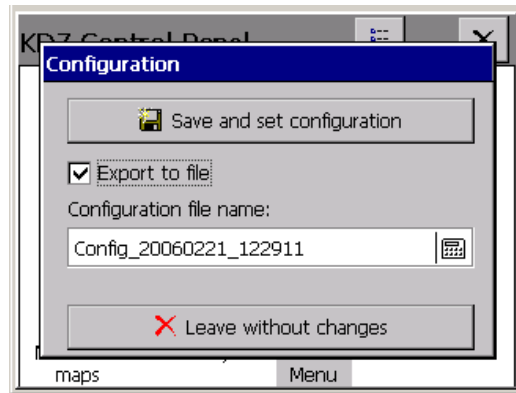
The result of work with the **KD7 Setup** program is the configuration file for the recorder with a defined hardware configuration (kinds and number of cards, settlement of slots). One cannot install this file in a recorder with another hardware configuration.

An example of the **KD7 Setup** application, in order to configure the KD7 recorder on a PC computer is presented below. This allows to acquaint with successive steps in order to obtain a successful configuration.

In the instruction below, one must differentiate operations made in the recorder and operations made in the PC computer.

- On the KD7 recorder side

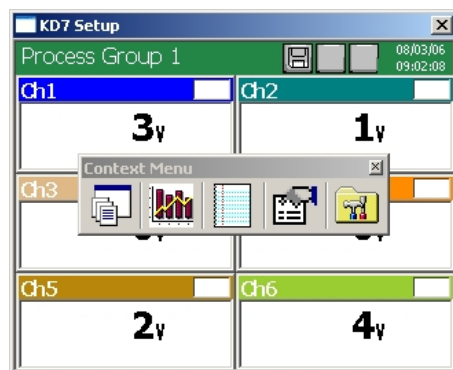
- a. Record the current KD7 configuration file on the CompactFlash card.
Mark the option **Export to file** in the output dialogue from the **KD7 Control Panel** and give the appropriate name to the file (or remain the proposed name). Next, record the configuration (option: **Save and set configuration**).



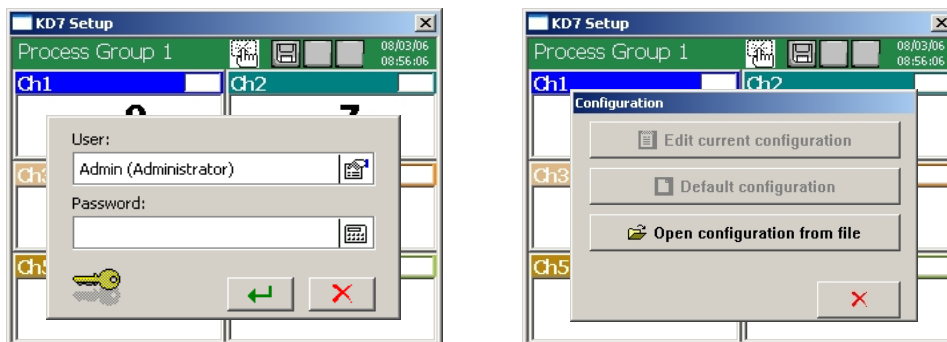
- b. Upload the recorded configuration file to the PC computer by means of one of the recorder communication interfaces. One can do this by means of the USB interface program and the **KD7 Connect** program (see the description of the **KD7 connect** program), or through the Ethernet interface.

- On the PC computer side

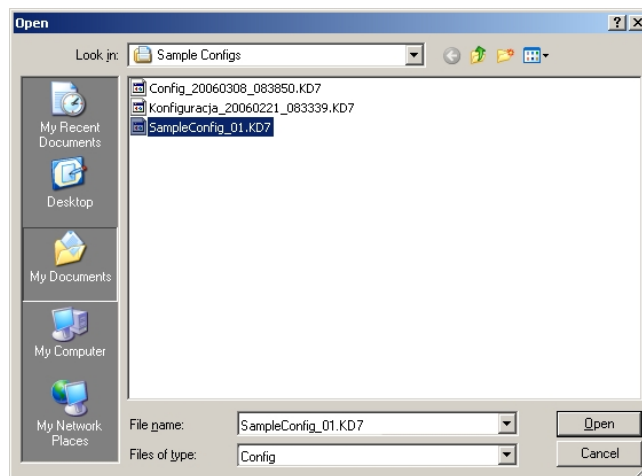
- a. Start the **KD7 Setup** program, call the context menu (tap on the area of the recorder screen), and next press the input icon to enter into the **KD7 Control Panel**.



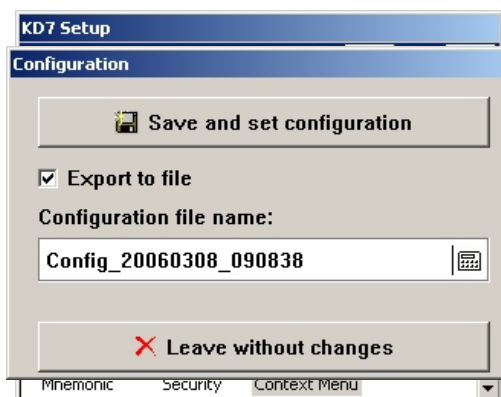
- b. The login dialogue appears. One must transit into the configuration dialogue.



- c. At the first configuration, only the option **Open configuration from file** is accessible. The standard dialogue of the Windows system appears to open the files. One must select the previously recorded configuration file.



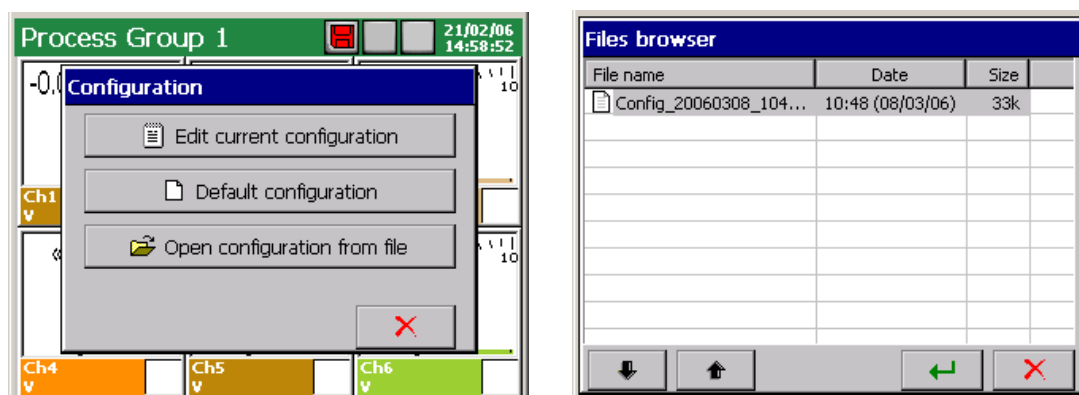
- d. After reading in the configuration file, the transition into the **KD7 Control Panel** follows. At this moment, one can perform the recorder configuration.
- e. After finishing configuration operations, give a name to the new configuration file and save it in the PC computer disk (choosing suitable name for the configuration and the in-coming file).



- f. Next, one must such saved configuration upload from the PC computer to the recorder. One can do that, e.g. by means of the **KD7 Connect**. program or through the CompactFlash card. (to save the file in the CF card, one can use a standard commercial reader of memory card).

- **On the KD7 recorder side**

- a. On can get the saved configuration in KD7 from the CF card and open after transiting to the **KD7 Control Panel** – option **Open configuration from file**.



- b. After reading out the configuration, it is edited on the recorder screen.

9.3 WWW server servicing

The KD7 recorder renders accessible its own WWW server for the remote monitoring of measuring values and the device state. In particular, the recorder side allows:

- to obtain information about the device (serial number, device number and others),
- to browse current measuring values with or without the partition into groups (list of all channels),
- to access to data being in the CompactFlash card,
- to set up the interval of the information updating,
- to select the language for the side (it can be independent from recorder language settings)

Note:

The recorder WWW page is compatible with the majority of internet browsers accessible on the market. However it is recommended to browse it with a minimal resolution: 1024 x 768. The connection of JavaScript. Service is recommended.

9.3.1 General view

Channel No.	Name	Description	Value	Unit	State
1	Ch1	Channel 1	-0	V	
2	Ch2	Channel 2	-0	V	
3	Ch3	Channel 3	-0	V	
4	Ch4	Channel 4	-0	V	
5	Ch5	Channel 5	-0	V	
6	Ch6	Channel 6	-0	V	
7	Ch7	Napiecie zasilania	213.7	V	
8	Ch8	Channel 8	---	%	
9	Ch9	Channel 9	---	%	

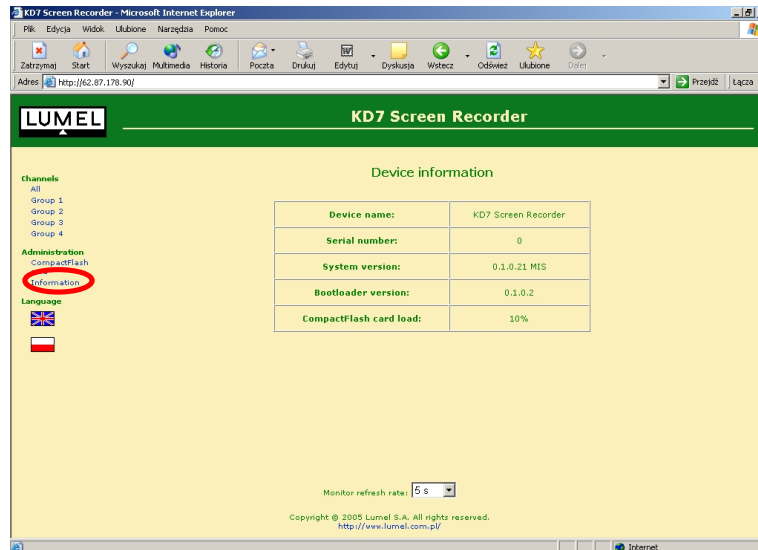
9.3.2 View of the window to browse data from the memory card

ScreenRecorder - /StorageCard/KD7/

[To Parent Directory]

2/10/2006	12:00	AR	138 20060210_170752_G1 - Process_Group_1.csv
2/10/2006	12:00	AR	72 20060210_170752_G2 - MIKRNIX.csv
2/10/2006	12:00	AR	2038 20060210_172352_G1 - Process_Group_1.csv
2/10/2006	12:00	AR	1530 20060210_172352_G2 - MIKRNIX_N12.csv
2/10/2006	12:00	AR	33792 PUBLIC_H07_H07
2/13/2006	12:00	AR	60384 20060213_88750_G1 - Process_Group_1.csv
2/13/2006	12:00	AR	46190 20060213_88750_G2 - MIKRNIX_N12.csv
2/13/2006	12:00	AR	8403978 20060213_123410_G1 - Process_Group_1.csv
2/13/2006	12:00	AR	7988972 20060213_123410_G2 - MIKRNIX_N12.csv
2/16/2006	12:00	AR	2188832 20060216_231110_G1 - Process_Group_1.csv
2/10/2006	12:00	AR	6907904 firmware_mn_web_slave.img

9.3.3 View of the window with information about the KD7 recorder.



9.3.4 Configuration

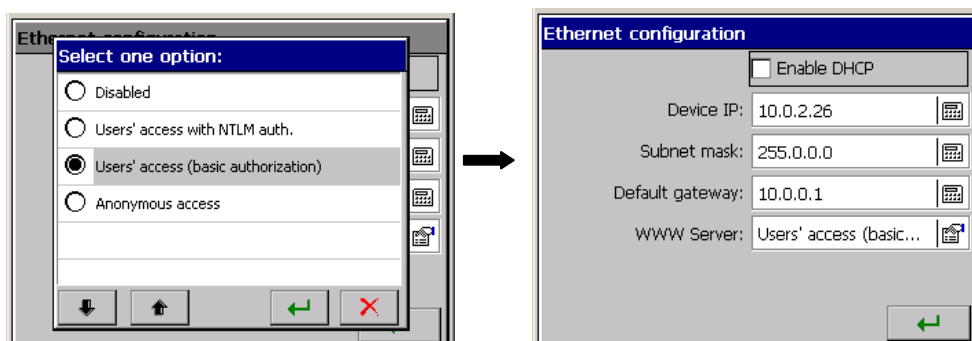
To obtain the access to the server, it is necessary to connect the recorder to the Ethernet network working in compliance with the TCP/IP protocol and carry out a suitable configuration in the **KD7 Control Panel** (Ethernet icon).

We obtain the access to the server after writing the device IP in the internet browser, e.g.: <http://10.0.1.2> (where 10.0.1.2 is the defined device address or the address defined by the server in case of using the DHCP service).

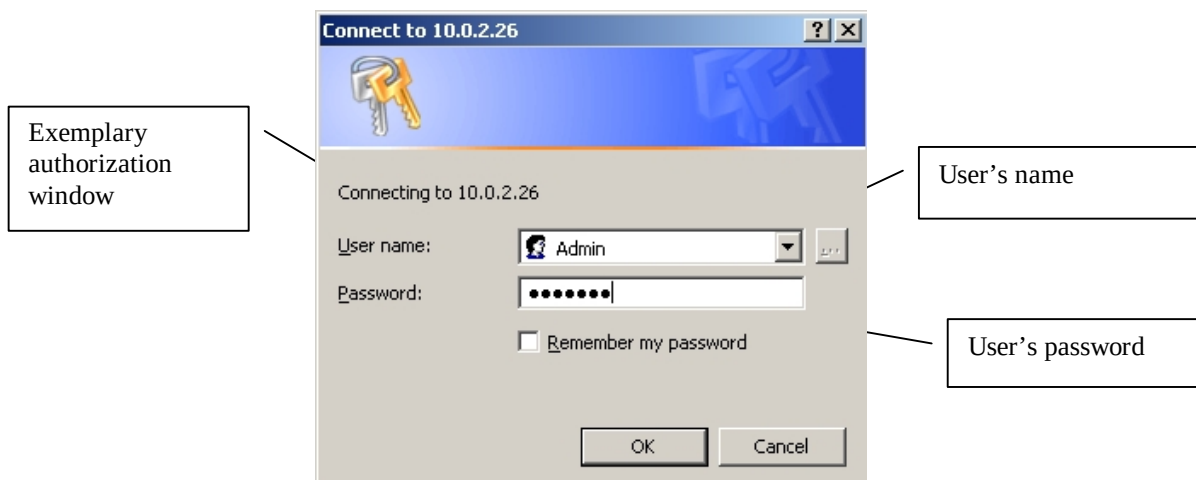
Note:

1. Check the Ethernet configuration correctness of the KD7 recorder through giving the command **'ping adres_of_the_device'** in the PC system (**Start menu – Run – ping ...**). In order to obtain precise information about the action of the **ping** command, one must look into the command description in the system.
2. Depending on the configuration, in Ethernet options and in users' edition options of the recorder (see section 11), the access to WWW page can be properly secured.

If the access to KD7 is authorized (for a current user, the access password is set for the KD7 configuration) and in Ethernet configuration options, the access is selected from the NTLM or from the basic authorization.



The login window appears, in which, one must give user's data.



9.3.5 Symbols on WWW page of KD7 recorder

Following marks are used by the recorder WWW page.

<i>Symbol</i>	<i>Meaning</i>
	Overflow of the upper range
	Overflow of the lower range
	Alarm occurrence
	Language symbol

10. TECHNICAL DATA

▪ Programmable measuring inputs:

- number of measuring channels 6 (or 12)
- input resistance > 10 MΩ
- sampling rate 250 ms (for 1 measuring place)
- measurement accuracy 0.25% (0.5% for Pt500, Pt1000)
- isolation between measuring places 100 V d.c.
- isolation measuring place-housing 500 V d.c.

Measuring ranges

Input signal	Signal symbol in the menu	Measuring range	Minimal subrange
1	2	3	4
Voltage	mV	0... ± 9999 mV	5 mV
Current	mA	0...±20 mA	1 mA
Thermocouple (TC):			
J (Fe - CuNi)	TC J	-200...1200 °C (-328...2192 °F)	100 °C (212 °F)
K (NiCr - NiAl)	TC K	- 200...1370 °C (-328...2498 °F)	130 °C (266 °F)
N (NiCrSi - Ni Si)	TC N	-200...1300 °C (-328...2372 °F)	200 °C (392 °F)
E (NiCr-CuNi)	TC E	-200...1000 °C (-328...1832 °F)	100 °C (212 °F)
R (PtRh13 - Pt)	TC R	0...1760 °C (32...3200 °F)	540 °C (1004 °F)
S (PtRh10 - Pt)	TC S	0...1760 °C (32...3200 °F)	570 °C (1058 °F)
T (Cu- CuNi)	TC T	-200...400 °C (-328...752 °F)	110 °C (230 °F)
B (PtRh30 - PtRh6)	TC B	400...1820 °C (752...3308 °F)	1000 °C (1832 °F)
Resistance thermometer (RTD):			
Pt 100	Pt 100	- 200...850 °C (-328...1562 °F)	50 °C (122 °F)
Pt 500	Pt 500	- 200...850 °C (-328...1562 °F)	
Pt 1000	Pt 1000	- 200...850 °C (-328...1562 °F)	
Ni 100	Ni 100	- 60...180 °C (-76...356 °F)	
Cu 100	Cu 100	-50... 180 °C (-58...356 °F)	
Potentiometer transmitter	Pot. Transm.	50...2000 Ω	50 Ω
Resistance transmitter	Res. Transm.	0...2000 Ω	50 Ω

Characteristics of thermocouples: acc. to EN 60584-1

Characteristics of resistance thermometers: acc. to IEC 755+A1+A2

▪ **Standard measuring inputs (version acc. to the ordering code):**

- number of measuring channels 6 (or 12)
- measuring ranges:
 - voltage measurement 0...10 V, input resistance >1 MΩ
 - current measurement 0...20 mA / 4...20 mA
input resistance <10 Ω
- isolation between measuring channels: 500 V d.c.
- isolation between measuring channels and the housing: 500 V d.c.
- measurement accuracy 0.25 % of the measuring range
- measurement time of each input minimum 100 ms

▪ **Admissible overload in the measuring system** acc. to EN 60051-8

- **Logic inputs:** 8 (or 16), with a common mass
 - control signal 0/5...24 V d.c.
 - isolation to the housing 500 V d.c.

▪ **Analog outputs**

- Current:** 4 (or 8) galvanically isolated
- output signal 0...5 mA or 0...20 mA or 4...20 mA
 - additional error 0,2%
 - load resistance < 500 Ω
 - isolation to the housing 500 V d.c.
- Voltage:** 4 (or 8) galvanically isolated
- output signal 0...5 V, 1...5 V, load resistance ≥ 250 Ω
or 0...10 V, load resistance ≥ 500 Ω
 - additional error 0,2%
 - isolation to the housing 500 V d.c.

▪ **Alarms**

Electromagnetic relays:

- load capacity for resistance load 8 (or 16), programmable
AC max: 125 V a.c., 0.5 A
DC max: 30 V d.c., 0.5 A

OptoMOS relays:

- load capacity for resistance load 8 (or 16), programmable
≤ 85 V d.c., 100 mA
≤ 60 V a.c., 70 mA
 - current peak value 300 mA/10 ms
 - OptoMOS resistance ca 8 Ω
 - protection against a too current, excessive internal fuse
- SMD type F 125 V/125 mA (SIBA)
For the current accretion rate:
≤ 5 A/s – from the 0 mA value
≤ 1.5 A – from the 100 mA value
- protection against an excessive voltage when switching an inductive load external system
(varistor, transil, triac)

▪ **Interfaces:**

- RS-232

transmission protocol: MODBUS
 baud rate: 300....256000 bit/s
 transmission mode: ASCII/RTU
 D-Sub 9 connector

- RS-485 (Modbus Master) and RS-485 Modbus Slave

baud rate: 300...256000 bit/s
 transmission mode: ASCII/RTU

- Ethernet

10 Base-T, Modbus TCP/IP,
 Server WWW, Socket RJ45

- USB

V.1.1 Device, Socket USB-B

General recorder parameters:

- frontal face dimensions

144 x 144 mm
 - length behind the panel

155 mm
 - colour graphical screen

LCD 5.7" of TFT type, 320 x 240 pixels
with a touch screen
 - external data carrier

CompactFlash: 128MB
(or another, acc. to the order)
 - internal memory (buffer)

7 MB *)
 - built-in operators and functions

arithmetical, logic, integral
 - working temperature

0...23...50°C
 - supply voltage

90...230...253 Va.c. or 18...24...30 Vd.c.
 - Power consumption (max)

< 30 VA
 - protection of the power pack supply

Fuse RFS 1.6 A, 250 V (for a.c. supply)
 - Housing protection class:
 - from frontal side

IP65, acc. to EN 60529
 - from terminal side

IP00, acc. to EN 60529
-
- **Operational safety:**
- installation category

acc. to EN 61010-1
II
 - pollution level

2
-
- **Electromagnetic compatibility:**
- noise emissions

acc. to EN 61000-6-4
 - noise immunity

acc. to EN 61000-6-2
-
- **Weight**

ca 2 kg

*) These functions will be available soon

11. ORDER CODES

Screen Recorder KD7 -		X	X	X	X	X	X	X	X	X	X	X
Measuring inputs (Slot 1):												
Without measuring inputs	0											
6 programmable measuring inputs	1											
6 standard measuring inputs: 0..10 V,	2											
6 standard measuring inputs: 0..20 mA,	3											
6 standard measuring inputs: 4..20 mA,	4											
6 standard measuring inputs: 3 × 0..10V + 3 × 0..20mA	5											
6 standard measuring inputs: 3 × 0..10V + 3 × 4..20mA	6											
Measuring inputs (Slot 2)												
Without measuring inputs	0											
6 programmable measuring inputs	1											
6 standard measuring inputs ... ¹⁾	2..6											
Interface measuring input:												
with RS-485(1) interface measuring input		1										
Digital signals/analog outputs (Slot 3)												
Without digital signals and analog outputs					0							
8 alarms (N.O. relays) + 8 alarms (OptoMos)					1							
8 alarms (N.C. relays) + 8 alarms (OptoMos)					2							
8 digital inputs ⁴⁾ + 4 analog outputs: 0..5mA					3							
8 digital inputs ⁴⁾ + 4 analog outputs: 0..20mA					4							
8 digital inputs ⁴⁾ + 4 analog outputs: 4..20mA					5							
8 digital inputs ⁴⁾ + 4 analog outputs: 0..5V					6							
8 digital inputs ⁴⁾ + 4 analog outputs: 0..10V					7							
Digital signals/analog outputs (Slot 4)												
Without digital signals and analog outputs					0							
8 alarms (N.O. relays) + 8 alarms (OptoMos)					1							
8 alarms (N.C. relays) + 8 alarms (OptoMos)					2							
8 digital inputs ⁴⁾ + 4 analog outputs... ²⁾					3..7							
Interfaces:												
USB						1						
USB + Ethernet + RS485(2)						2						
USB + Ethernet + RS232						3						
Memory for measuring data:												
With a 128 MB CF card							1					
As per order ³⁾							2					
Supply:												
90...253Va.c.								1				
18...30Vd.c. ⁴⁾								2				
Recorder firmware:												
Without mathematical functions ⁵⁾									0			
With mathematical functions									1			
Softwares servicing the recorder from PC:												
KD7 CONNECT										1		
KD7 CONNECT + KD7 SETUP + <i>KD7 ARCHIVING</i> ⁴⁾										2		
Acceptance tests:												
Without an extra quality inspection certificate											0	
With an extra quality inspection certificate											1	
According to user's agreements											2	

¹⁾ Write the range code from the item 2...6 as above : (slot 1)

²⁾ Write the range code from the item 3...7 as above : (slot 3)

³⁾ After agreeing with the manufacturer (the recorder services the 4 GB CompactFlash card)

⁴⁾ These functions will be available soon

⁵⁾ One may buy extra mathematical functions in future

Note: When ordering, one must specify the name and the version code of the recorder.

12. MAINTENANCE AND WARRANTY

The KD7 recorder does not require any periodical maintenance.
In case of some incorrect operations:

1. After the dispatch date and within the period stated in the warranty card

One should return the instrument to the Manufacturer's Quality Inspection Dept.
If the instrument has been used in compliance with the instructions, the
Manufacturer warrants to repair it free of charge.
The disassembling of the housing causes the cancellation of the granted warranty.

2. After the warranty period:

One should send the instrument to repair it in an authorized service workshop.
Spare parts are available for the period of five years from the date of purchase.

Our policy is one of continuous improvement and we reserve the right to make changes in design and specifications of any products as engineering advances or necessity requires and revise the above specifications without notice.

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