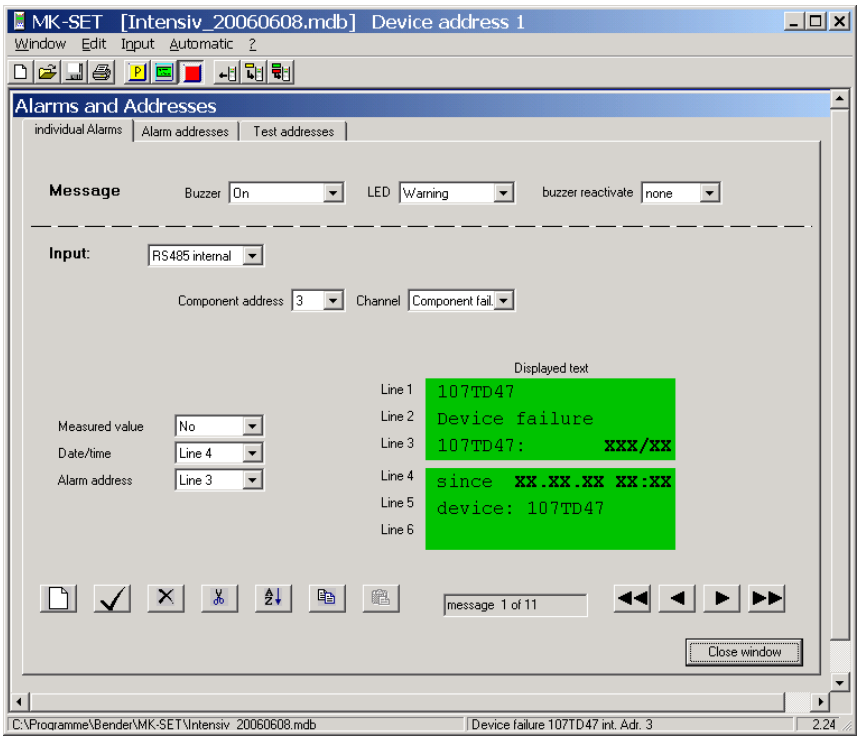
Operating Manual



MK-SET

Configuration software for MK2430

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1. How to use this operating manual effectively

1.1 How to use this manual

This operating manual describes the MK-SET configuration software, version 2.2x. The functions and processes described may vary from those featured in other versions. It is intended for specialist personnel working in electronics and electrical engineering; but in particular, for those designing, installing and operating electrical equipment in the medical sector.

Before using the software, please take the time to read this operating manual. This document must be kept in an easily accessible location where the software is used.

Should you have any further questions, we will be happy to provide further assistance. Please contact our technical sales team. We are also happy to provide on-site service. Contact our Service Department for further details.

This manual has been compiled with great care. Nevertheless, errors and omissions cannot be entirely excluded. The BENDER Group cannot accept any liability for injuries to persons or damage to equipment resulting from errors or omissions in this manual.

This operating manual is available both in printed and electronic formats. You are advised to visit the Download area of our homepage.

1.2 Explanation of symbols and notes

The following designations and symbols are used in BENDER documentation for hazards and instructions:

This symbol indicates an immediate threat of danger to life and limb.
Failure to observe the associated instructions means that death, severe bodily injury or substantial damage to property will occur if the corresponding precautions are not taken.

This symbol indicates a potential threat to life and limb.
Failure to observe the associated instructions means that death, serious physical injury or substantial damage to property may occur if the corresponding precautions are not taken.

This symbol indicates a potentially hazardous situation.
Failure to observe the associated instructions means that minor physical injury or damage to property may occur if the corresponding precautions are not taken.

This symbol denotes important information about the correct handling of the equipment.
Failure to comply with this information can lead to malfunctions in the equipment or in its environment.

This symbol guides you to application tips and particularly useful items of information. This will help you to make optimal use of all the functions on your equipment.

2. Safety information

2.1 Intended use

The MK-SET software has been designed for the configuration and parameterization of the MK2430 remote alarm indicator and test combination. It can be used for individual parameterization of the MK2430 for the purpose of adapting it to the local equipment and operating conditions.

The MK2430 is used in:

- healthcare facilities
- Industrial installations and office buildings
- Public buildings

Please note the limits of the area of application indicated in the technical data. Use deviating from or beyond the scope of this is considered non-compliant.
Observance of all instructions in this manual is also part of intended use.

2.2 General safety instructions

BENDER equipment is designed and built in accordance with the state of the art and accepted rules in respect of technical safety. However, the use of such devices may introduce risks to the life and limb of the user or third parties and/or result in damage to BENDER equipment or other property.

- Only use BENDER equipment:
  - within the scope of its intended use,
  - if in perfect working order,
  - in accordance with the accident prevention regulations and guidelines applicable in the location of use.
- Rectify any faults that may endanger safety immediately.
- Do not make any unauthorized changes and only use replacement parts and optional accessories purchased from or recommended by the manufacturer of the equipment. Failure to observe this requirement can result in fire, electric shock and injury.
- Warning notice must always be clearly legible. Replace damaged or illegible plates immediately.

2.3 Safety instructions for users of EDS systems

Instructions for using the MK2430 in conjunction with the EDS... insulation fault location system.

You must not use MK-SET to parameterize the MK2430 while the EDS is attempting to locate an insulation fault.

2.4 Qualified personnel

Only suitably qualified personnel may work on BENDER devices. Qualified means familiar with the installation, commissioning and operation of the device and appropriately trained to carry out the work. Personnel must have read and understood the safety section and warning information in this operating manual.

2.5 Conditions of sale and delivery, guarantee, warranty and liability

The conditions of sale and delivery set out by BENDER shall apply.

For software products, the "Softwareklausel zur Überlassung von Standard-Software als Teil von Lieferungen, Ergänzung und Änderung der Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie" (software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry) set out by the ZVEI (Zentralverband Elektrotechnik- und Elektronikindustrie e. V., the German Electrical and Electronic Manufacturers' Association) also applies.

Conditions of sale and delivery along with a copy of the software clause can be obtained from BENDER in printed or electronic format.

3. System description, installation and connection

3.1 MK-SET features

The MK-SET software V 2.x has been designed for the configuration and parameterization of the MK2430 remote alarm indicator and test combination.
It supports:

- The modification of basic settings
- The entry of standard information for the LC display
- The entry of warning and alarm messages
- The semi-automatic creation of alarm messages
- The entry of test addresses
- Scanning of the BMS bus

The MK parameter settings can be generated from a new or existing template or even read out from the device and adapted in accordance with project requirements.

3.2 System requirements

In order to be able to use MK-SET, your system must meet the following minimum criteria:

- IBM-compatible PC
- 20 MB of free hard disk space
- Serial RS-232 interface and/or USB interface
- Microsoft Windows 2000/Windows XP operating system

The software can be installed from a CD-ROM or downloaded from the Internet.

For information about the cables and adapters required to connect your PC to the MK2430, please refer to the ordering information and Chapter “Connection options” on page 14.

3.3 Ordering information

Description	BENDER Art. No.
MEDICS software: USB driver for MK2430 MKSET V 2.x for MK2430 MEDISET V1.x, for TM panel: only with activation code, for PRC1470: no activation code, MediHistory V 1.x for MK2430, TM panel and PRC1470	B 9602 0087

Description	BENDER Art. No.
DI-3-SET, interface converter set consisting of: DI-2 interface converter RS-485/RS-232, 230 V AC power supply unit for DI-2, Cable for connecting DI-2 to BMS bus RS-232 interface cable for connecting DI-2 to PC	B95012028

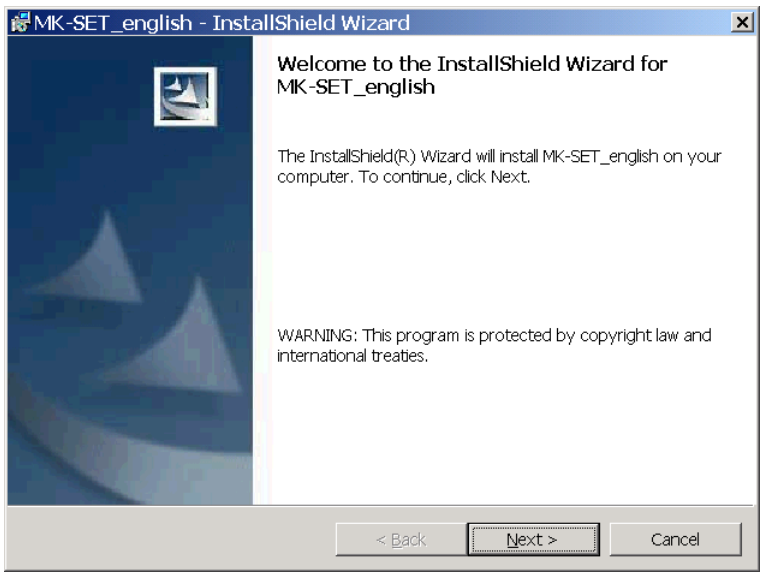
3.4 Installing MK-SET

3.4.1 Prior to installation

1. Quit all active programs.
2. If the installation file is located on a CD:
   Insert the "MEDICS-Software" CD into the CD drive. Open directory: "\Software\English". The installation file is also available from the "Download" area on our homepage (http://www.bender-de.com). Save the installation file to your computer.

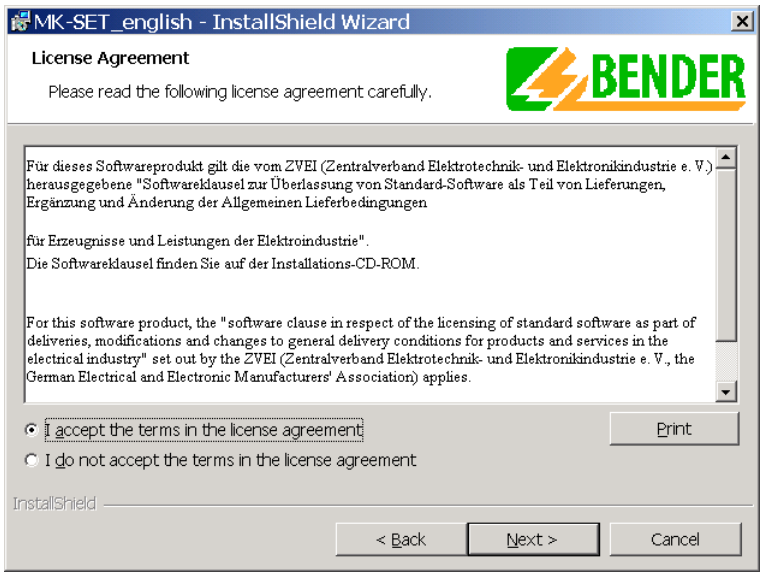
3.4.2 The installation process

1. Launch installation file "MK-Set _setup_de_Vxxx.exe". - The installation process starts up (InstallShield Wizard).



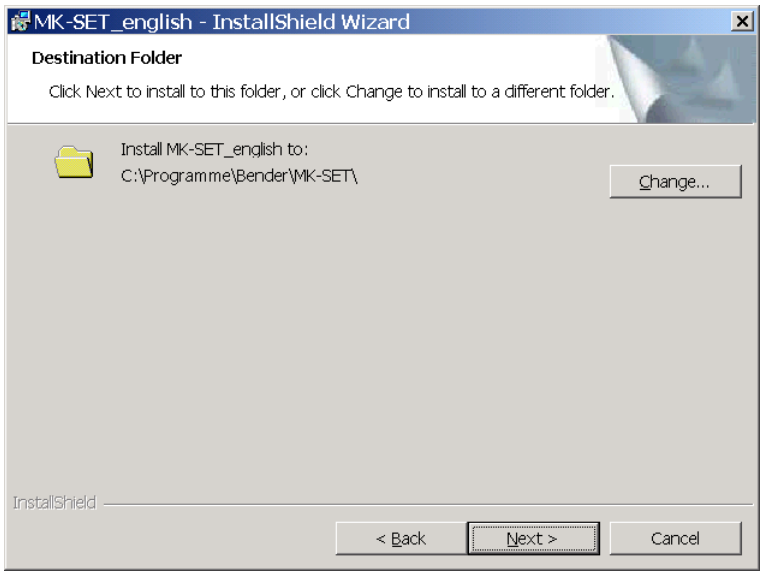
Click on "Next".

2. Read and accept the licence agreement.



Read the licence agreement. Click on "I accept..." and then "Next".

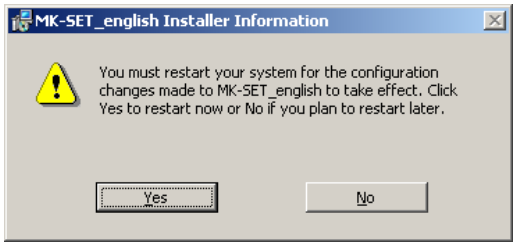
3. Select the folder for the purpose of installing the files.



- Click on "Next" to install the files inside the default folder.
- Click on "Change…" to select an alternative folder for installing the files.

The files will now be installed. A progress bar will appear, so you can monitor the installation process. Once you have completed all the steps in the InstallShield Wizard , click on "Finish".

4. Complete the installation process. If a restart is necessary, then the following information appears.



Click on "Yes". - Your computer will power down and then restart.

3.5 Installing an MK-SET update

An up-to-date installation file is also available from the "Download" area on our homepage (http://www.bender-de.com). Save the installation file to your PC.
If MK-SET has already been installed on the PC, this will be detected by the installation utility. Launch installation and follow the instructions provided by the installation utility.

3.6 Uninstalling MK-SET

To access the symbolic link for uninstalling the MK-SET software, go to "START -> PROGRAMS -> BENDER -> MK-SET -> Uninstall MK-SET".
Click on this link to uninstall MK-SET from your PC.

3.7 Installing the USB driver

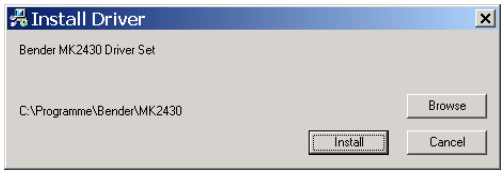
You will need to install the USB driver, if you intend to connect your PC to the MK2430 via a USB interface for programming purposes.

3.7.1 Prior to installation

1. Quit all active programs.
2. If the installation file is located on a CD:
   Insert the "MEDICS-Software" CD into the CD drive. Open directory: "\Software\English".
   The installation file is also available from the "Download" area on our homepage (http://www.bender-de.com). Save the installation file to your computer.

3.7.2 The installation process

1. Launch file "MK2430_USBPreinstaller.exe".

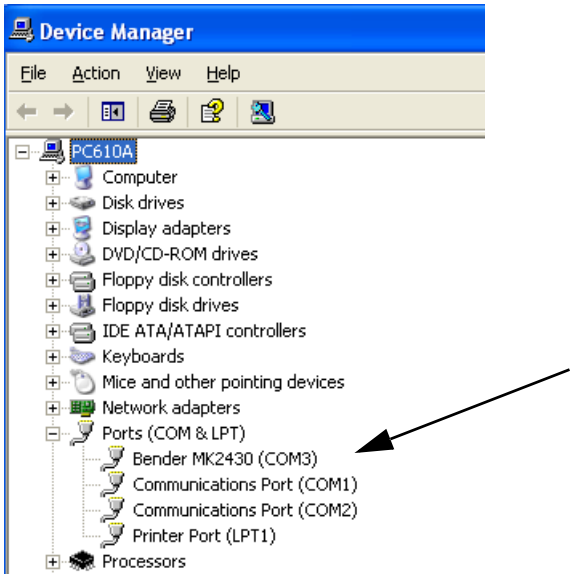


Click on "Install". - The required files are copied to the MK-SET program directory.

2. Do **not** connect the PC to the MK2430 via the USB cable at this point! Connect the MK2430 to the power supply.
3. You can now connect the PC to the MK2430 using the USB cable. The PC will detect a new device and start the actual installation process. Follow the on-screen instructions.
4. Once installation is complete, MK-SET will possess a new, virtual COM interface (e.g. COM3) for the USB connection. Make the relevant settings under "Settings -> PC-interface". For further information about setting up the PC interface, see “SETTINGS menu” on page 37.
5. Test that data transfer is working properly by reading out the data from the MK2430 (see “Read data from device” on page 34).

You must always proceed in the order given below (even after a RESET or power failure):
- First, connect the MK2430 to the power supply;
- then plug in the USB cable.
You must observe this order; otherwise it will not be possible to transfer data between MK-SET and the MK2430.
Remedy: Repeat the steps in the correct order.

The new, virtual COM interface will also appear in the Windows Device Manager under "Ports (COM & LPT)".



If necessary, you can assign a different name to the COM interface. Right-click on "Bender MK2430 (COM_)" and select "Properties". Enter the desired COM port number under "Port Settings -> Advanced".

3.8 Connecting your PC to the MK2430

3.8.1 Connection options

- For the purpose of programming an MK2430, a USB device cable is all you need for the connection between the PC and the relevant MK2430. However, you will need to install the USB driver for the MK2430 on the PC (see “Installing the USB driver” on page 12).
- If, on the other hand, a number of devices are to be programmed from one location or a BMS bus scan is to be performed, you will need to establish a connection between the PC and the BMS bus. The BMS bus hardware is based on the RS-485 standard. A serial PC interface (RS-232/ USB) to RS-485 converter will therefore be required (you may also need the required driver). The converters you use must have either been supplied or approved by BENDER.

For further connection information, please see the "MK2430 remote alarm indicator and test combination" manual.

3.8.2 Setting addresses

Successful data exchange depends on the following conditions being met:

- The address specified in MK-SET must always match the one set on the MK2430.
- A device with the address 1 (= master) must always be present on the BMS bus.
  Tip: If, for example, the default setting is a single MK2430 which has not yet been connected to the BMS bus, you should set the MK2430 address to "1" for the duration of programming.

3.8.3 Password

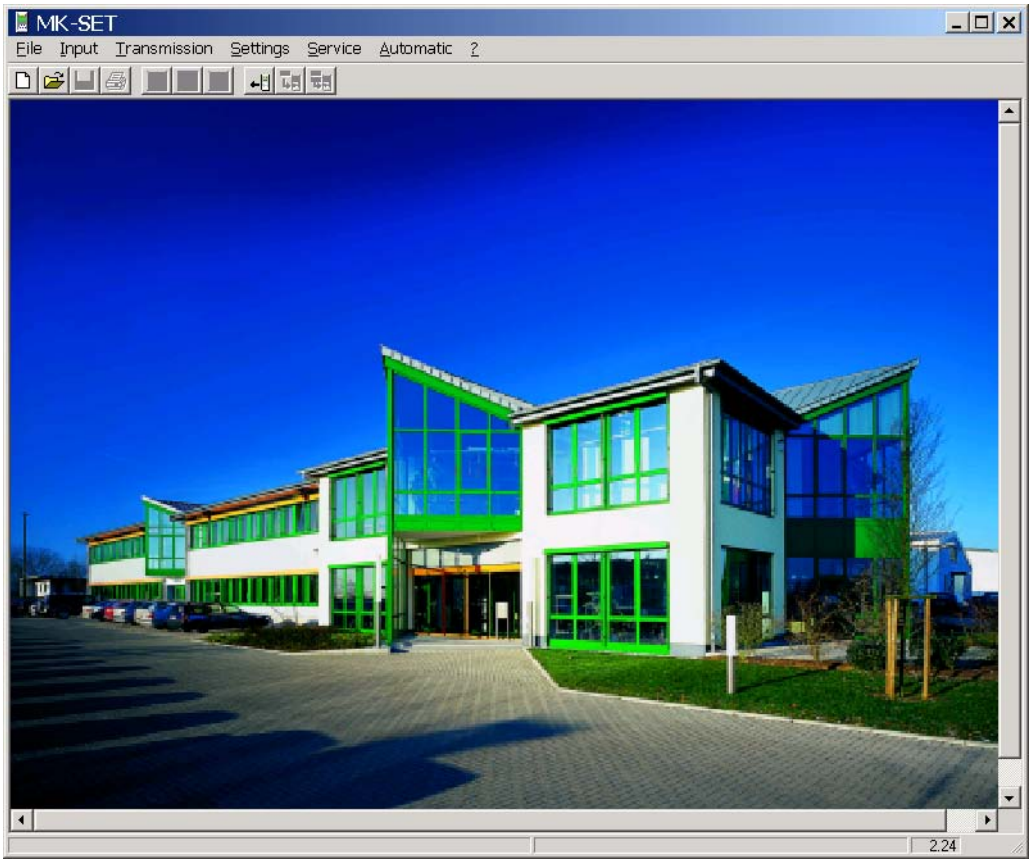
Even if the password prompt function is activated on an MK2430, you can still read out data from it. However, if you wish to transfer data to the MK2430, MK-SET will ask for the password first.

4. Operating and configuring MK-SET

4.1 Starting the program

To access the symbolic link for starting the MK-SET software, go to "START -> PROGRAMS -> BENDER -> MK-SET -> MK-SET".
Click on this link to launch MK-SET.

You will then be able to call the individual software functions via menus (File, Input etc.) or by clicking on the relevant buttons. If you use the mouse button to hover over a button without clicking on it, a tooltip will appear.



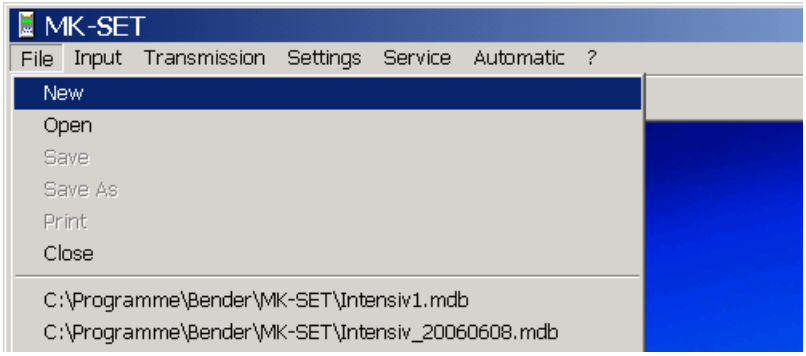
4.2 The ten MK2430 programming steps

To program an MK2430 using MK-SET, proceed as follows:

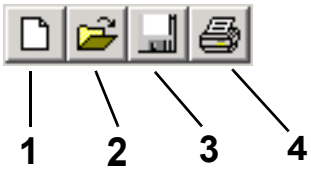
	Step	Chapter and page
1.	Configure PC interface	“SETTINGS menu” on page 37
2.	Create new project file	“FILE menu” on page 17
3.	Make basic settings	“Basic device settings” on page 20
4.	Program standard display	“Programming the standard display” on page 25
5.	Program alarm addresses	“Programming alarm addresses” on page 27
6.	Set individual alarms semi-automatically	“Alarm messages semi-automatic setup” on page 39
7.	Program test addresses	“Programming test addresses” on page 33
8.	Save project file	“FILE menu” on page 17
9.	Send basic device settings to device	“Send basic device settings to device” on page 35
10.	Send messages and alarms to device	“Send messages and alarms to device” on page 36

4.3 FILE menu

The MK2430 settings are stored in project files. You use the FILE menu to manipulate these files.



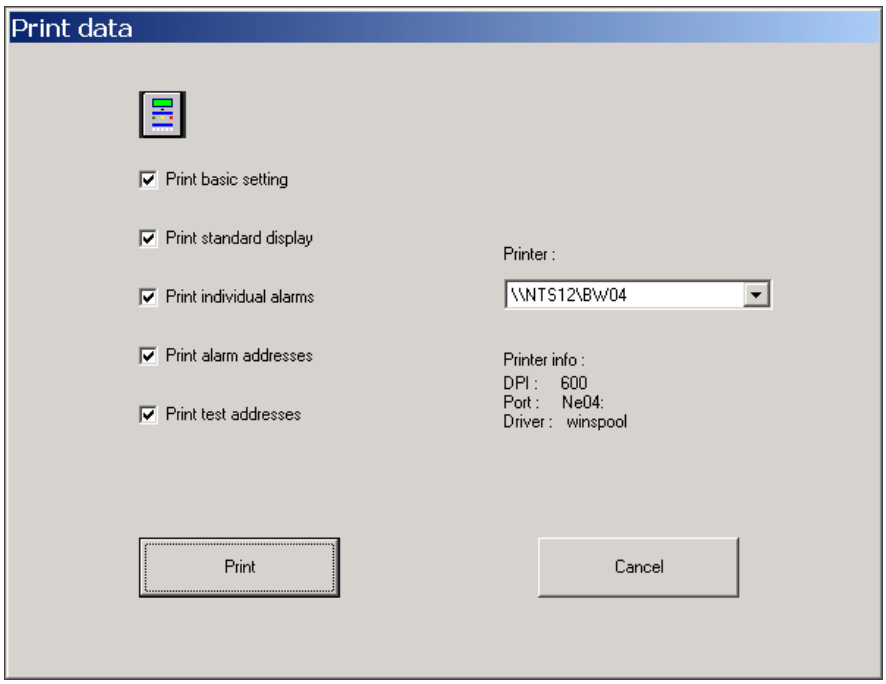
For the purpose of manipulating a project file, the File, Open, Save and Print functions are also accessible via the following buttons:



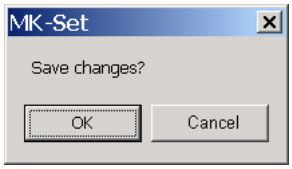
1 New
2 Open
3 Save
4 Print

In the FILE menu, select:

New	To create a new project (all data relating to an MK2430). Once you have clicked on this menu item, a window will open in which you can enter the text for the standard display. After configuring the standard display, you need to make the message, address and basic settings. These settings are made via the "Input" menu (see page 19) Now save the project under a name of your choice.
Open	If you want to open an existing project file. All the project files located in the subdirectory selected under "Settings -> Project path" will be displayed. Use the mouse to select the desired project file and click on the "Open" button to open it.
Save	To save a project file that has been edited or modified in some way. If the file you want to save already has a name, it will be saved under this name. If it has not yet been assigned a name, you will be asked to enter one.
Save As	To save a project file with a different name, in a different location or on a different data medium.

Print	To print out the settings and texts associated with the current project file. You can decide whether you want the basic settings, standard display, individual alarms, alarm addresses or test addresses to be printed out. In order for settings to be printed out, the relevant box must be checked. All the boxes are checked by default.  If you have a number of printers installed and registered under your Windows system, you can decide which printer is to be used for outputting the data.
Close	To exit MK-SET. If the current file has changed since you last saved it, before exiting the program, you will be prompted to save the modified project file.

In the first instance, MK-SET will save all the settings to a temporary file. If settings are changed or added, you will get the message:



However, if you click OK the changes will only be saved in the temporary file. If you want the changes to be saved in the project file itself, you will need to select "File -> Save".

Whenever messages and basic settings are sent to the MK2430, it is always the settings in the temporary file that are transferred.

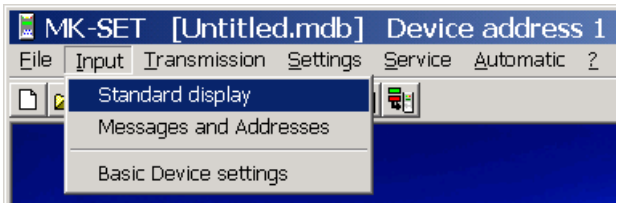
4.4 INPUT menu

As far as settings relating to the BMS bus are concerned, you will need to know how your MEDICS network is set up and also know the associated device addresses. Incorrect settings can result in malfunctions. For general information about the BMS bus, please refer to the "BMS bus" instruction leaflet and the "MK2430" manual.
A list of device bus addresses can be created and printed out by selecting "Service -> Bus scan".

*Always remember to set the language for your message texts **before** you start programming them. This will ensure that any special characters is displayed properly in the relevant language. You can access a table of the special characters used via the*
"? -> Help" menu. Simply select "Index -> Special characters".

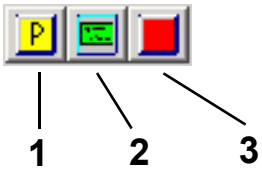
Save recent settings: MK-SET provides numerous options for programming the MK2430. If you are programming on quite a large scale, we recommend that you save your settings every so often. This will protect your settings in the event of an operating system crash. Simply select "Save" from the "File" menu.

You use the "Input" menu to make all the settings for an existing project.



4.4.1 Button functions

Buttons for toggling between menus
In the course of programming an MK2430, you may need to switch frequently between the standard display, messages and addresses and the basic settings. To facilitate this, buttons for each of these functions are provided in the menu bar.



1 Basic device settings
2 Standard display
3 Messages and addresses

If you use the mouse button to hover over a button without clicking on it, a tooltip will appear. By clicking on the buttons you can switch quickly between the various types of setting.

4.4.2 Basic device settings

Basic settings are stored in the project file. You can define new basic settings or modify an MK2430's current basic settings. The default settings proposed by MK-SET are the same as those supplied with a brand new MK2430.

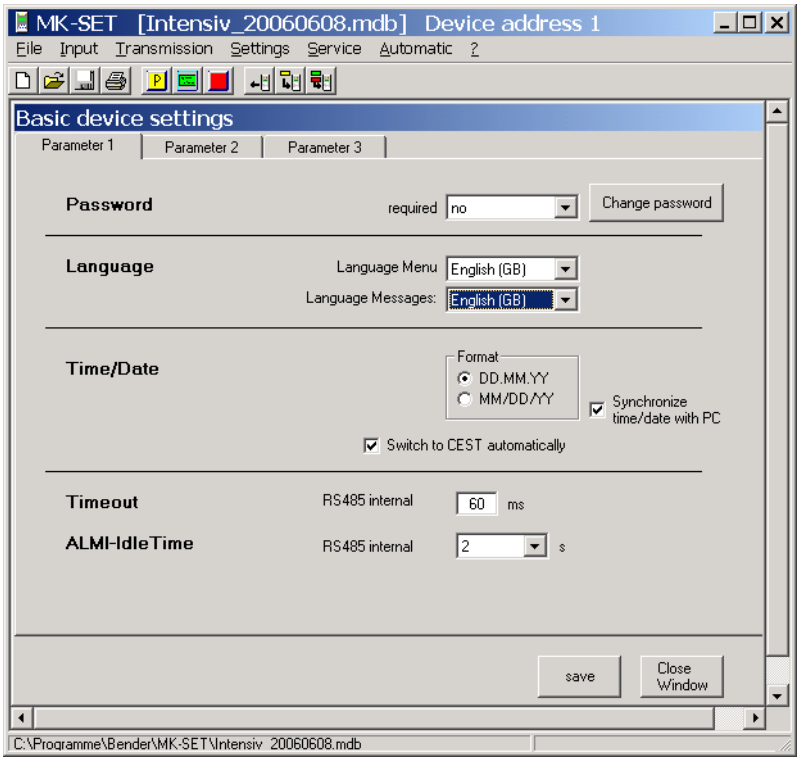
How to modify an MK2430's current basic settings

1. Connect your PC to the MK2430
2. Read out the MK2430 using the selected address: "Transmission -> Read data from device".
3. MK-SET will ask you whether you want to "Save changes in the file?" Click on "Yes" and then enter a name in order to save the project file.
4. Modify the basic settings that have been read out: "Input -> Basic device settings".
5. Click on "Transmission -> Send basic device settings to device" to transfer new basic settings to the device.

If you are creating a new project file, MK-SET will propose some basic settings, which you can modify in accordance with your requirements.

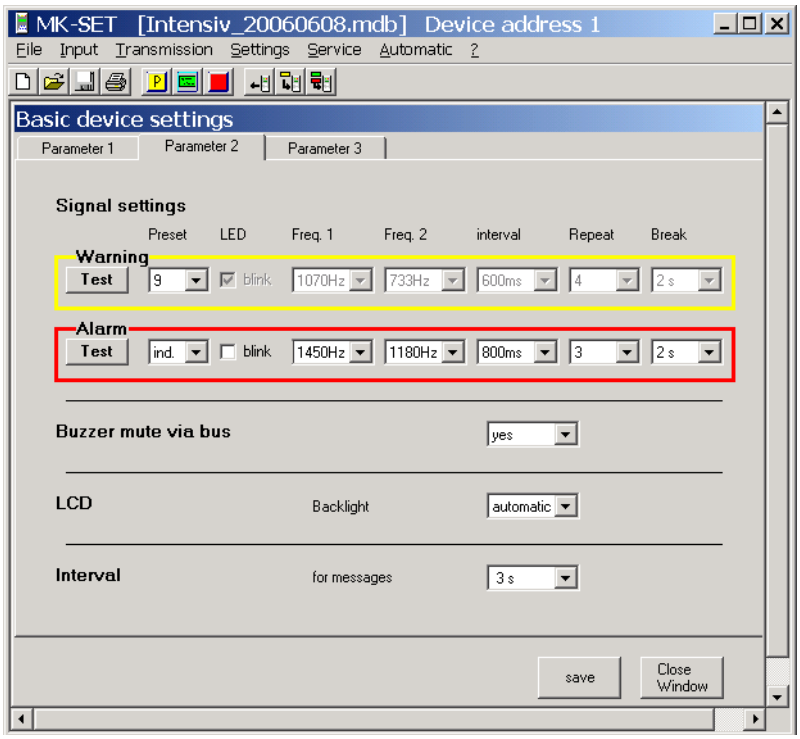
An MK2430's basic settings are configured under Parameter 1, Parameter 2 and Parameter 3.

4.4.2.1 Parameter 1



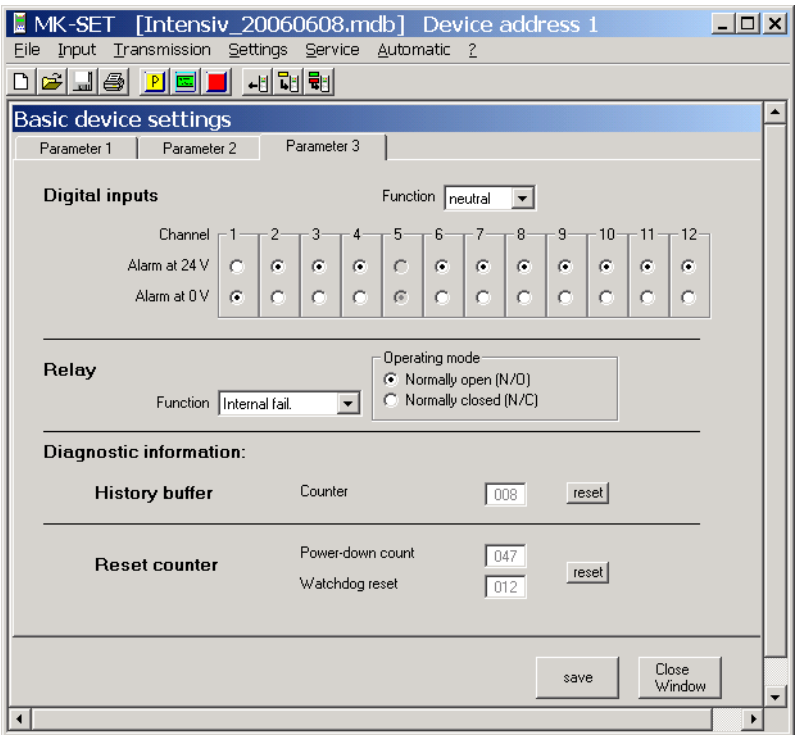
Password	**Password required:** Setting that determines whether a password needs to be entered before changes can be made to the basic settings. Default setting: "No". Settings directly at the MK2430 and settings via PC and interface can be password protected. **Change password:** Set and confirm a new password. This setting will only be available if the password prompt is"ON". The default MK2430 password is "807".
Language	**Language menu:** Here you can select the language for using the menus. **Language messages:** Here you can select the language for MK2430 message texts. These standard message texts are available in 20 languages. The associated character set is activated (special characters) for individual message texts.
Time/Date	**Date format:** DD.MM.YY European format MM/DD/YY US format **"Synchronize time/date with PC" box:** ☑ The time and date are transferred from the PC. ☐ The boxes for entering the time and date appear. When an MK2430 is read out, the time and date displayed here will be that of the MK2430 on read-out. When the basic settings are sent, the time and date entered/stored in these fields is transferred to the MK2430. **"Switch to CEST automatically" box:** Setting for automatic switchover to Central European summer time. ☑ Automatic switchover. ☐ No switchover.
Timeout	The factory setting may only be changed in consultation with Bender Service.
ALMI-Idle Time	The factory setting may only be changed in consultation with Bender Service.

4.4.2.2 Parameter 2



Signal settings	In the event of warning or alarm messages, the buzzer will sound and the relevant LED lights up. The "Warning" and "Alarm" signals are configurable. When you make the buzzer settings, please ensure that there is no danger of the buzzer tone being confused with that set for other devices. **"Test" button:** The configured buzzer tone is simulated using the PC's loudspeaker. **Preset:** 1 ... 9 Various default LED and buzzer settings ind. Individual LED and buzzer setting. **The following settings are only possible, if "ind" has been selected:** "blink LED" box (setting only possible if break > 0 s): ☑ LED flashes in the event of a message. ☐ LED lights up in the event of a message. **Freq. 1 and Freq. 2:** For specifying the frequency of the two consecutive buzzer tones (1 and 2). Interval, Repeat and Break For specifying the frequency rate and break for the buzzer tone.
Buzzer mute via bus	How this MK2430 responds to message acknowledgements received via the BMS bus (set buzzer to mute). Yes MK2430 responds to acknowledgement; buzzer muted. No MK2430 ignores acknowledgement; buzzer not muted.
LCD Backlight	For setting the backlight response: always on Backlight remains permanently on. automatic Backlight only comes on when a message is pending.
Interval for messages	**Interval:** If several warning and alarm messages occur simultaneously, they will be displayed consecutively. You use the "Interval" box to specify the amount of time between messages.

4.4.2.3 Parameter 3

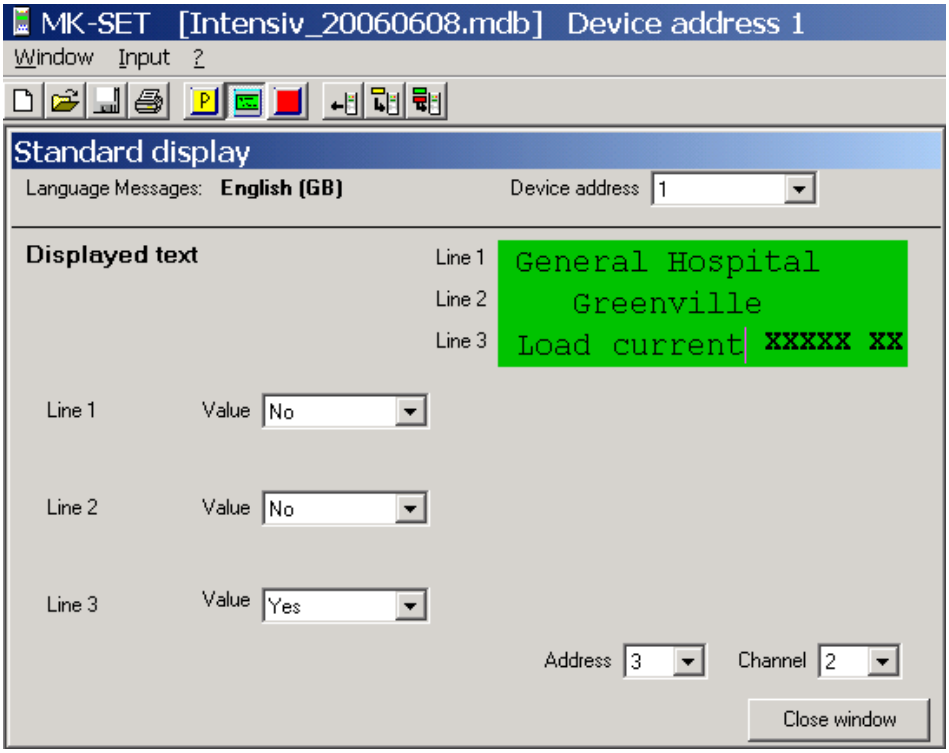


Digital inputs (MK2430-11 only)	Neutral alarm messages or messages that relate specifically to medical applications can be assigned to the digital inputs (see the MK2430 manual or MK-SET Help for details). These alarm messages are sent to other MK.... or TM panels via the BMS bus and displayed there in plain text format. If freely programmable alarm messages need to be displayed on a different MK2430 or a TM panel, the same alarm messages must have been programmed in the displaying device. **"Function" box:** neutral The alarm, channel and address of the device that is responsible for triggering the alarm are all signalled. medical A set function is assigned to each output. Preprogrammed alarm messages are signalled. In the event of an alarm, the following is displayed: **Input** / **Function: neutral** / **Function: medical** IN1 Alarm: Address/channel XXX/01 Alarm: Oxygen IN2 Alarm: Address/channel XXX/02 Alarm: Vacuum IN3 Alarm: Address/channel XXX/03 Alarm: Nitrous oxide IN4 Alarm: Address/channel XXX/04 Alarm: Compressed air 5 bar IN5 Alarm: Address/channel XXX/05 Alarm: Compressed air 8 bar IN6 Alarm: Address/channel XXX/06 Alarm: Nitrogen IN7 Alarm: Address/channel XXX/07 Alarm: CO2 IN8 Alarm: Address/channel XXX/08 Alarm: UPS battery operation IN9 Alarm: Address/channel XXX/09 Alarm: UPS overload IN10 Alarm: Address/channel XXX/10 Alarm: UPS converter failure IN11 Alarm: Address/channel XXX/11 Alarm: UPS fault IN12 Alarm: Address/channel XXX/12 Alarm: UPS test run

Digital inputs (MK2430-11 only)	Channels 1...12: Select **"Alarm at 24 V"** or **"Alarm at 0 V"**. If an individual alarm has already been programmed for a digital input (channel) (see “Programming individual alarms” on page 29), this will take priority. This channel setting is grey-shaded out and cannot be modified here (in the above example, the setting for channel 5). Default settings for alarm LEDs: In the case of messages relating to medical gases, the "ALARM" LED lights up; in the case of UPS messages the "WARNING" LED lights up. If the "neutral" function is selected, the "WARNING" LED will light up for all messages. You can modify the settings for each individual channel in the "Individual alarms" window.
Relay (MK2430-11 only)	**"Function" box:** You can select which events should trigger switching of the alarm relay: Device fault, common error message, device failure or test (Isometer). **Operating mode (alarm relay):** N/O operation — During normal operation relay is deenergized; energized in the event of an alarm. N/C operation — During normal operation, relay is deenergized; energized in the event of an alarm.
Diagnostic information (for Bender Service)	History memory — Displays the number of entries in the history memory (with reset option). The history memory is also cleared whenever message texts are sent to the MK2430. Reset counter — Displays the number of power-down and watchdog resets (with reset option).

4.4.3 Programming the standard display

Programming of the texts which appears in lines 1..3 of the LC display on the MK2430 during normal (fault-free) operation.

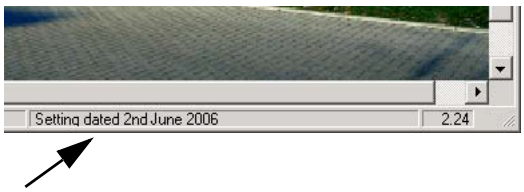


1. First, specify the device address of the MK2430 you wish to program. If you are changing the existing address, enter the new address here.
2. Now enter the text that is to be displayed on the first three lines of the display during normal, fault-free operation.
3. As well as general text, measured values can also be displayed (e.g. insulation resistance, load current). Simply click "Yes" in the relevant "Value" field and then select the address and channel of the device whose measured value is to be displayed.

Example 1: Insulation monitoring device with load and temperature monitoring 107TD47:

Channel	Information	Note
1	Insulation OK	The insulation resistance is higher than the response value. The current insulation resistance is transferred in the form of a measured value.
2	Load current measurement OK	The load current is below the response value. The current utilization rate of the IT system transformer (in relation to the set rated current) is transferred as a percentage.

For documentation purposes, an info text (max. length 256 characters) can be entered in a memo field. This will appear when you position the mouse pointer on the free area in the "Standard display" window and right-click. The info text will continue to be displayed in the status bar (on the left next to the version number) for as long as the "Standard display" window remains open.



An info text can be assigned to the "Messages and Addresses" window in exactly the same way.
The info texts are only saved to the project file. They are not transferred to the MK2430.

4.4.4 Programming messages and addresses

You use this window to configure individual alarms, alarm addresses and test addresses.

Buttons available in the "Messages and Addresses" window

The "Messages and Addresses" menu features the following buttons for programming various functions:

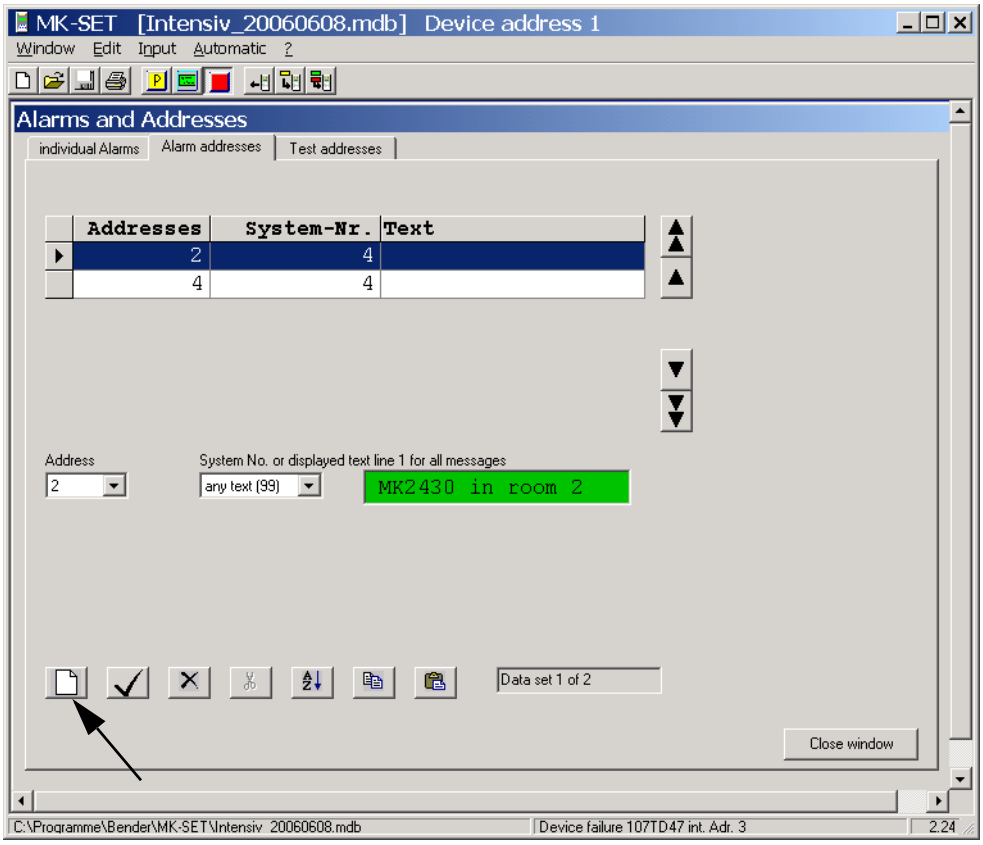
If you move the mouse to a button without clicking on it, a tooltip will appear. The buttons have the following functions:

	New data record	Use this button to create a new data record for programming purposes.
	Close window	Use this button to exit programming for the function called. The settings are applied.
	Delete data record	Use this button to delete the data record currently on display.
	Cut data record	Use this button to cut the current data record (i.e. copy it to the clipboard and delete it).

	Sort data records	Use this button to sort all data records that have been programmed thus far for the called function. The main criterion for sorting is the device address.
	Copy data record	Use this button to copy the data record currently on display to the clipboard.
	Paste data record	Use this button to paste a data record that has been copied or cut into the current data record.
	Scroll through data records	Use these buttons to scroll to the previous or next data record (click and hold the mouse button for rapid scrolling). Use these buttons to jump to the first or last data record.

4.4.4.1 Programming alarm addresses

Setting of bus addresses for devices whose alarm messages are to be displayed as standard texts on the MK2430 that is being programmed.
The alarm messages relating to the digital inputs of the MK2430 that is being programmed do not have to be programmed. These alarm messages are always displayed.



1. Press  to create a new data record or use  or  to select an existing data record for editing.

2. Select the address of the device whose alarm messages are to be displayed. Selected addresses are monitored for presence on the BMS bus; if a device cannot be found on the bus, a corresponding message will appear.
3. All the alarm messages for the selected device will appear on the MK2430's display. Select the text that you want to appear in the first line of the display. If a number of systems or areas (e.g. several operating theatres) are connected to the MK2430, the numbers 1...4 can be assigned to them. Alternatively, you can enter text in accordance with your requirements.
4. Press ✓ to save your settings (temporary file).

To program additional alarm addresses, repeat steps 1...4.

Deleting alarm addresses

Press ✕ to delete the current data record. If a test address has been programmed for this data record, you will need to delete this address first.

Save recent settings

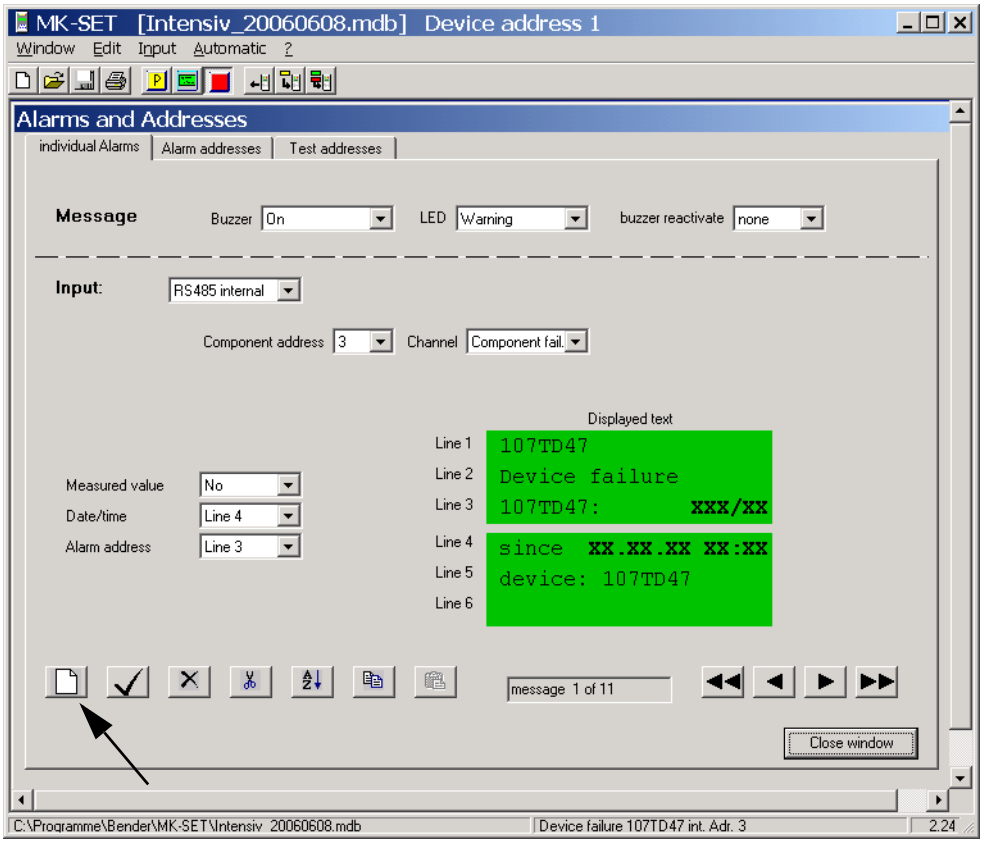
Once you have finished programming all the alarm addresses, click on "Close window". If you have made any recent changes, you will be prompted to save them (temporary file). We also recommend that you save the latest version of the project file ("File -> Save").

The settings in the "Individual alarms" window always take priority over those in the "Alarm addresses" window. If an "individual alarm" has been configured for an address channel, the associated message text will be displayed in its entirety (including blank lines) in the event of an alarm. The settings in the "Alarm addresses" window will be ignored in respect of this channel.

4.4.4.2 Programming individual alarms

Here you can configure how and where individual alarms (warnings and alarm messages) are to be displayed. Individual alarms can:

- trigger a buzzer message,
- be output to an LED,
- be displayed as message text/additional text on the LC display,
- display measured values, the time and date and/or the alarm address on the LC display.



Creating or selecting a data record

You can create a new data record in the "Individual alarms" window by pressing the  button (indicated by an arrow in the above screenshot) or select the data record you wish to edit using  .

Programming a message

A buzzer signal and LED can be assigned to each individual alarm:

Buzzer	Setting indicating whether the buzzer should be activated for this warning and alarm message. Select: On Buzzer will sound in the event of this alarm unchanged This alarm will not have any effect on the buzzer. If the buzzer was silent before the alarm, it will remain silent.
LED	Setting indicating whether the "WARNING" or "ALARM" LEDs (or neither of them) should light up in the event of this warning and alarm message.

buzzer reactivate	If an alarm message is triggered, you can use the "Buzzer OFF" key on the MK2430 to deactivate the buzzer. However, just in case you forget about the pending message, the buzzer will sound again once the time specified in the "Buzzer repetition field" has elapsed.

Programming an input

Select the "Input" connected to the device whose warning and alarm messages are to be displayed. You may select:

RS-485 internal	Internal BMS bus. In the "Device address" field, enter the address of the device whose warning and alarm messages are to be displayed. In the "Channel" field, select the alarm message channel (see "BMS device channel assignment" instruction leaflet).
MK2430 digital inputs	Under "Operating mode", set the operating mode (alarm at 24 V/0 V) and type of signal (pulse/continuous) and under "No." set the number for the digital input. The settings in the "Individual alarms" window take priority over those in the "Basic settings" window (see “Parameter 3” on page 23).

Warning and alarm messages received via the BMS bus

Example 1: Insulation monitoring device with load and temperature monitoring 107TD47:

Channel	Information	Note
0	Device failure	107TD47 failure.
1	Insulation fault*	The insulation resistance is lower than the response value.
2	Overcurrent*	The load current has exceeded the response value.
3	Overtemperature	The transformer temperature has exceeded the response value.
4	Connection fault	Test lead wire break.
5	PE connection fault	PE wire break
6	Transformer short-circuit	The transformer connection for measuring the current has been short-circuited.
7	Connection fault	Transformer connecting cable wire break
8	Operating theatre lights alarm	Insulation fault in the IT system for the operating theatre lights. This message originates from the NC contact of an external insulation monitoring device.
9	Device error	Internal 107TD47 error. See documentation relating to the 107TD47.

** As far as these messages are concerned, measured values can also be displayed.*

Example 2: PRC487 control and display device:

Channel	Information	Note
0	Device failure	PRC487 failure
1	Failure line 1	The voltage on line 1 is below the response value.
2	Failure line 2	The voltage on line 2 is below the response value.
3	Failure distribution panel	The voltage downstream of the switchover equipment is below the response value.
4	Failure N-conductor	The line 1 neutral conductor has failed.
5	Failure K1	The switching unit in the preferred infeed has failed (K1 or Q1).
6	Failure K2	The switching unit on the second line has failed (K2 or Q2).
7	Failure K3	The K3 relay has failed (internal component of the SUE487 voltage monitor).
8	Device error	Internal PRC487 error.
9	K1/2 manual mode	Contactor control has been changed to manual mode. Automatic switchover will no longer be performed!
10	Short-circuit distribution panel	Short-circuit downstream of switchover equipment.

Programming message and additional texts

You can assign message text and additional text to each warning and alarm message for display on the MK2430's display. Configure the following:

Measured value	If a measured value is to be output for this warning and alarm message, the value can be displayed on a line of your choice. If no measured value is to be displayed, enter no in this selection box.
Date/time	The date and time an event occurred can be displayed in any line for warning and alarm messages.
Alarm address	As an aid to in-house technical personnel, the alarm address of the device responsible for triggering this warning and alarm message can be displayed in any line of your choice. We recommend that the additional text is used for this purpose in order to avoid burdening medical personnel with this technical information.
Message text (lines 1...3)	Click into the relevant text line and enter your text. In the event of a warning and alarm message, this text will appear on the MK2430's display.
Additional text (lines 4...6)	Click into the relevant text line and enter your text. Whenever a warning and alarm message is pending, you can press the "Add. text" key on the MK2430 to display this associated additional text.

The settings in the "Individual alarms" window always take priority over those in the "Alarm addresses" window. If an "individual alarm" has been configured for an address channel, the associated message text will be displayed in its entirety (including blank lines) in the event of an alarm. The settings in the "Alarm addresses" window will be ignored in respect of this channel.

Programming more individual alarms

Press ☑ to save the settings made thus far (temporary file). To program additional alarm addresses, repeat the steps from "Chapter " onwards.

Deleting individual alarms

Press ☒ to delete the current data record. If a test address has been programmed for this data record, you will need to delete this address first.

Save recent settings

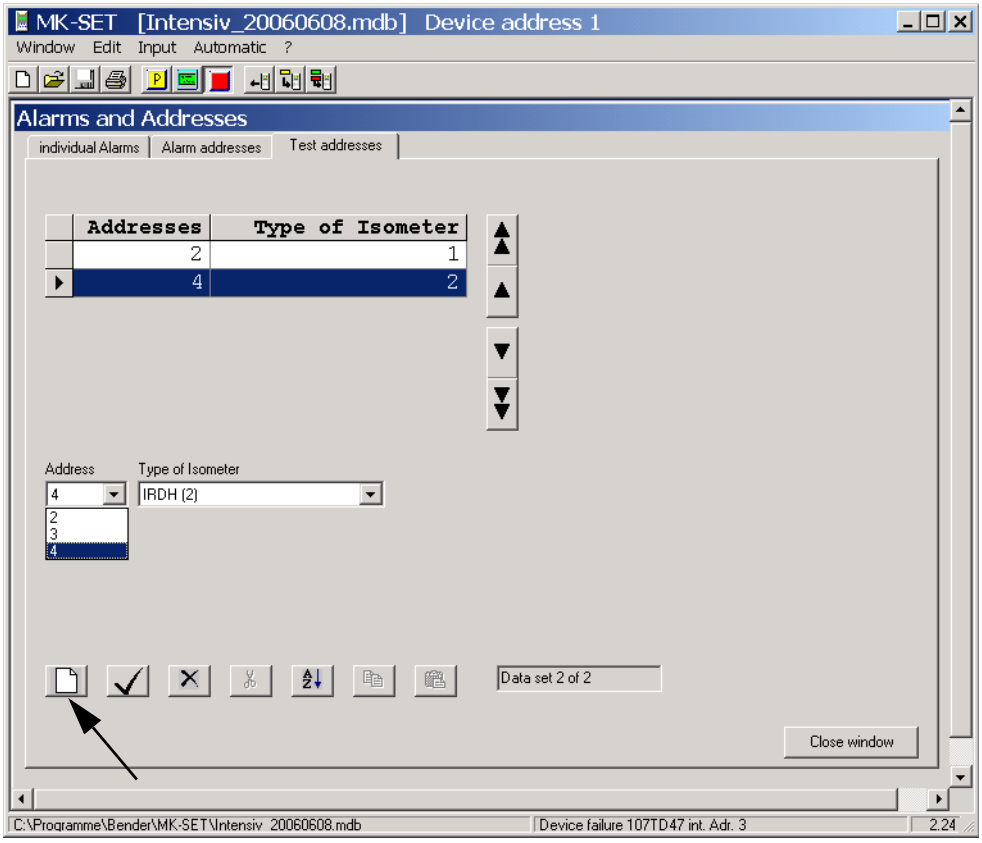
Once you have finished programming all the individual alarms, click on "Close window". If you have made any recent changes, you will be prompted to save them (temporary file). We also recommend that you save the latest version of the project file ("File -> Save").

4.4.4.3 Programming test addresses

This is where you specify the BMS bus addresses of the insulation monitoring devices that are to be tested by pressing the "TEST" button on the MK2430. You can specify up to 30 addresses. The test is carried out sequentially and evaluated automatically.
The setting can only be made for devices which have also been activated in the "Alarm addresses" window and/or programmed for individual alarm texts.

Individual alarm texts are a minimum requirement for:

- Channel 1...3 (setting "107TD47")
- Channel 1 (setting "IRDHxxx")



1. Press [ ] to create a new data record or use [▲] or [▼] to select an existing data record for editing.
2. Select the address of the device you want to run the test on.
3. Select the type of insulation monitoring device.
4. Press [✓] to save your settings (temporary file).

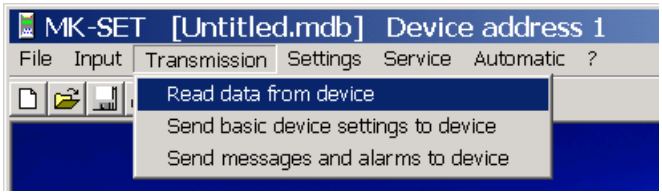
To program additional test addresses, repeat steps 1...4.

Save recent settings

Once you have finished programming all the test addresses, click on "Close window". If you have made any recent changes, you will be prompted to save them (temporary file). We also recommend that you save the latest version of the project file ("File -> Save").

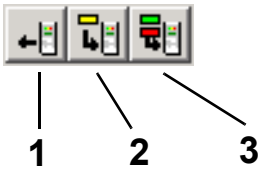
4.5 TRANSMISSION menu

The "Transmission" menu is used for data transfer between the PC running MK-SET and an MK2430.



Buttons

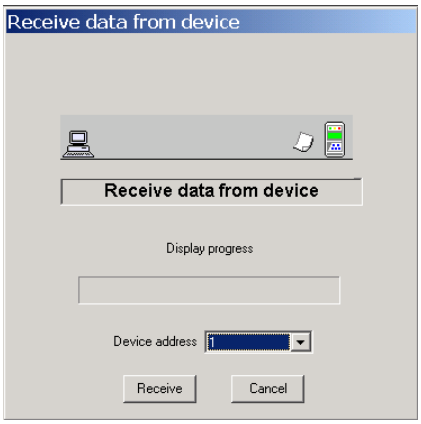
As an alternative to the "Transmission" menu, you can also use the following buttons to read out and program the MK2430.



1 Read data from device
2 Send basic device settings to device
3 Send messages and alarms to device

4.5.1 Read data from device

MK-SET downloads the settings from an MK2430 that has already been programmed to your PC and displays all the texts and parameters. If required, changes can be entered in MK-SET or the configuration file can be used to program another MK2430 with an identical or similar function.



1. Select "Transmission -> Read data from device".
2. Select the address of the MK2430 whose data you want to read out.
3. Click on the "Receive" button.

Data will now start to be downloaded from the MK2430 to your PC. The progress bar will tell you when transmission is complete.

4.5.2 Send data to device

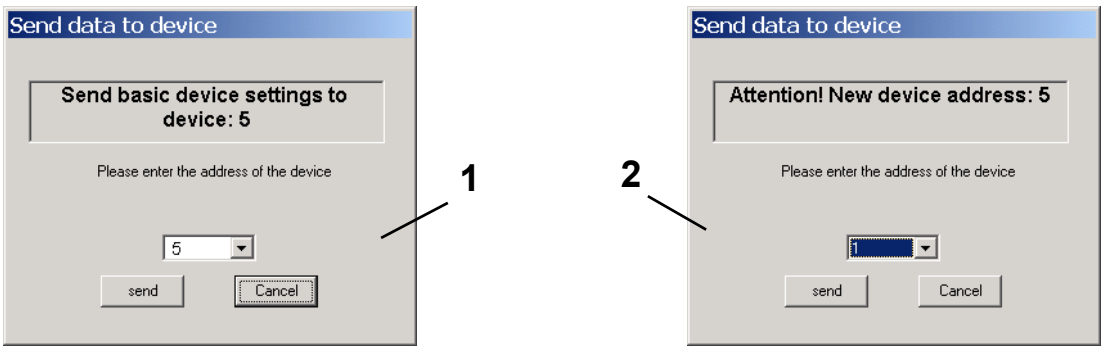
During data transfer, the interface cable must remain connected at all times. Unplugging it will result in incomplete parameterization of the MK2430. If the USB interface cable is unplugged, there is also a risk of the MK-SET software crashing.

Data is transferred to the MK2430 in two stages. The basic settings are sent to the MK2430 first. These are then followed by the messages and alarms. It is always the data from the current temporary file that is used for transmission purposes.

4.5.2.1 Send basic device settings to device

MK-SET sends the basic settings to the address configured under "Standard display" (1).

If the same basic settings are to be used for other MK2430s, enter the new address under "Standard display". In the "Send data to device" window (2), select the old device address. Once the data has been sent, the new device address will apply to the MK2430.

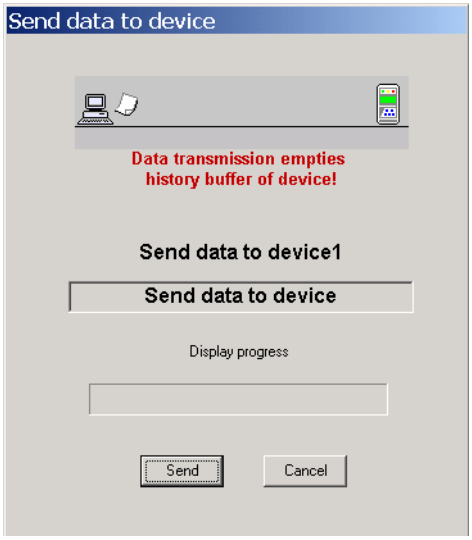


1. Select "Transmission -> Send basic device settings to device".
2. Click on the "Send" button.

The basic settings will now start to be transferred from your PC to the MK2430. Once transfer is complete, MK-SET will display a message telling you that data transfer was successful.

4.5.2.2 Send messages and alarms to device

MK-SET sends the messages (message texts) to the address configured under "Standard display".
Whenever you send settings, the messages stored in the MK2430's history memory will be deleted, so remember to save any messages that are still required before you send the settings (e.g. using the MediHistory software).

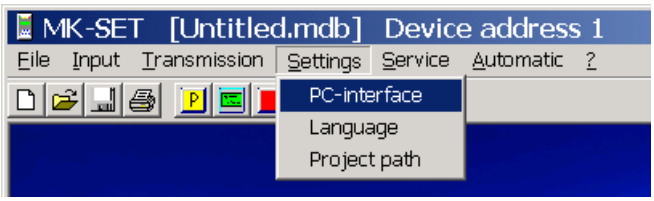


1. Select "Transmission -> Send messages and alarms to device".
2. Click on the "Send" button.

The data will now start to be transferred from your PC to the MK2430. The progress bar will tell you when transmission is complete.

4.6 SETTINGS menu

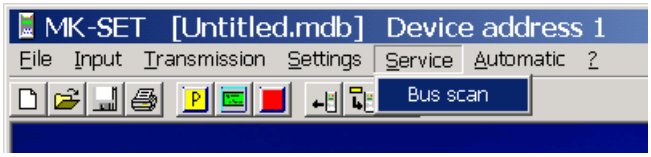
This menu is used to configure the PC interface, set the language for using the MK-SET menus and select the directory in which project files are to be saved.



PC interface	**Interface:** Select a serial interface ("COM1" ... "COMx") for data transfer with the MK2430. Only if you are using a USB interface: The number of an unassigned COM interface will be allocated to the USB interface. Example: If the computer has a COM1 and COM2 interface, a virtual COM3 interface will be displayed. Select this virtual setting in order to transfer data via a USB interface. Interfaces will only be displayed if they exist **and** are available (not being used by another program). **Baud rate:** Please ensure that the baud rate value in MK-SET is identical to that set on the MK2430. Data transfer can only be performed if the two settings match.
Language *	Select whether MK-SET is to run in English or German.
Project path	Under "Drive" and "Project path", specify where the MK2430 settings are to be stored.

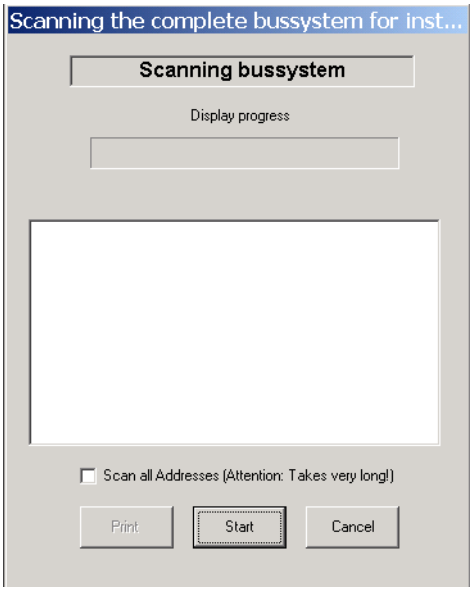
** Please remember to select the required language before carrying out semi-automatic programming. If you switch the language in the middle of semi-automatic programming, your texts will appear in a mixture of German and English.*

4.7 SERVICE menu



The "Bus scan" function is used to scan the entire MEDICS network. All detected devices are displayed with their device addresses and version numbers. This overview makes the programming process easy. You can also use this function to check that all devices have been connected correctly and their bus addresses have been set correctly.

The "Bus scan" function will only be available if there is a connection between MK-SET and the BMS bus (RS-485 interface). If the USB interface is being used for the connection with the MK2430, the function cannot be used.



1. The bus scanning process stops as soon as the system detects a series of unassigned consecutive addresses. If you want to scan the entire BMS bus, select "Scan all Addresses".
2. Click on the "Start" button. Bus scanning will now commence. The progress bar will tell you when the process is complete.
3. At the end of the process, you will be presented with the address, type and firmware version of the devices detected during the scan. Click on the "Print" button if you want to print out the list.

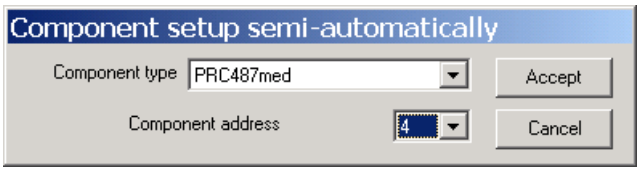
4.8 AUTOMATIC menu

The "Automatic" menu can be used for semi-automatic programming of the MK2430. This menu is only available when a project file is open.

4.8.1 Alarm messages semi-automatic setup

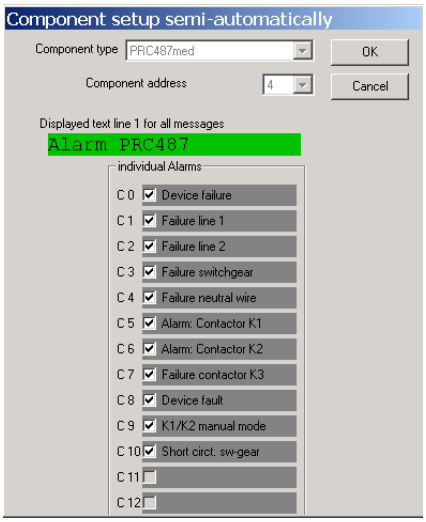
This menu item will assist you in programming alarm messages. MK-SET will make suitable suggestions in respect of device selection and appropriate individual message texts. However, semi-automatic setup is of course no substitute for your knowledge of the MEDICS network and its bus devices: Such knowledge is a prerequisite for programming!

After you call semi-automatic setup, a window will open in which you can select the first device for the purpose of programming individual messages.



1. Under "Device type", select the device that you want to program first.
2. The first free device address within the address range (e.g. address 4 for the PRC487 control and display device) is suggested. Compare the default settings with your actual MEDICS network and modify the suggested device address if necessary.
3. Click on the "Accept" button.

Semi-automatic programming of the selected device



Programming alarm messages

1. Enter the message text that you want to be displayed in the first line for all warning and alarm messages.
2. With the mouse, check the boxes for any alarm messages you want to appear on the MK2430's display.

Confirming your programming settings

- When you have finished making all the necessary settings for this device, click on the "OK" button.

Programming additional devices

- Configure each device on the MEDICS network as described above.
- When you have finished configuring all the devices, click on the "Exit" button.

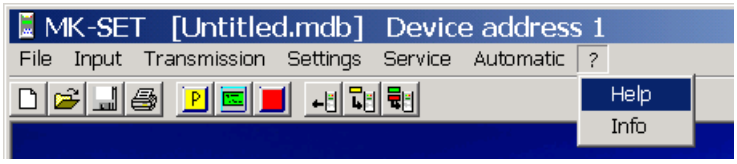
If you need to carry out any fine-tuning or if you need to program switching commands, select the relevant settings from the "Input" menu.

Saving your settings and transferring them to the MK2430

- Save the project file to your PC (File -> Save).
- Transfer the settings to your MK2430 (Transmission -> Send messages and alarms to device).

4.9 Help menu

You can access the following information via the "?" menu:



Help	Online user help
Info	Software version

4.10 Example of how to program an MK2430

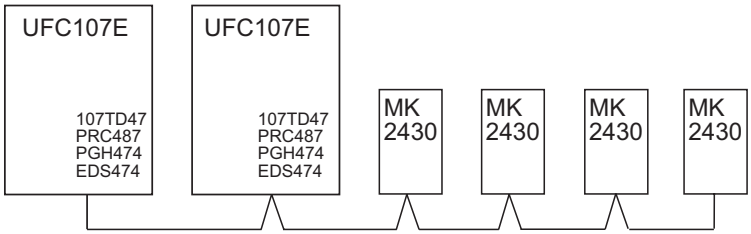
4.10.1 Essential information

MK-SET makes light work of programming an MK2430 on a MEDICS network. However, in order to carry out programming you will still need a sound knowledge of the MEDICS network and all the network components. You will need to know:

- How the network is structured. Which devices are connected via the internal interface?
- The addresses of all the devices on the network. Addresses have to be assigned uniquely.
- Which messages are to be displayed where? Is there a central MK2430 installed in the central instrumentation and control room which is set up to receive messages from all the devices?
- Is any additional technical equipment included in the system via the digital inputs or interface converter?

4.10.2 Example

An intensive care unit with two IT systems is supplied via two switchover and monitoring modules with MEDICS® UFC107E-.. insulation fault location system. As an alternative to the EDS474 insulation fault evaluator, the EDS461 can also be used.



4.10.2.1 Address settings

Device	Parameter	Address settings
First UFC107E switchover and monitoring module		
107TD47	Address	3
PRC487	Address	4
PGH474	Address	111
EDS474-12	Address	61
Second UFC107E switchover and monitoring module		
107TD47	Address	5
PRC487	Address	6
PGH474	Address	112
EDS474-12	Address	62
Remote alarm indicator and test combinations		

Device	Parameter	Address settings
First MK2430...	Address	1
	Test address	3, 5
	Alarm address	2, 3, 4, 5, 6, 7, 8, 61, 62, 111, 112
Second MK2430...	Address	2
	Test address	3, 5
	Alarm address	1, 3, 4, 5, 6, 7, 8, 61, 62, 111, 112
Third MK2430...	Address	7
	Test address	3, 5
	Alarm address	1, 2, 3, 4, 5, 6, 8, 61, 62, 111, 112
Fourth MK2430...	Address	8
	Test address	3, 5
	Alarm address	1, 2, 3, 4, 5, 6, 7, 61, 62, 111, 112

Configure all devices (including the MK2430) with the addresses shown in the table. Each device must have its own unique address.

4.10.2.2 Preliminary steps for connection via BMS bus

The four MK2430s can be programmed consecutively via the BMS bus.

1. Connect all the MK2430s to your PC via the BMS bus.
2. Start MK-SET.
3. Call the "Bus scan" function by selecting it in the "Service" menu and print out the result. You will need this list for subsequent programming, so please keep it to hand.

4.10.2.3 Preliminary steps for connection via USB interface

1. Connect the MK2430 that has the address 1 to your PC via a USB interface.
2. Start MK-SET.

You cannot access the "Bus scan" function via a USB interface. Check that the addresses of the individual devices have been set as per the table above.

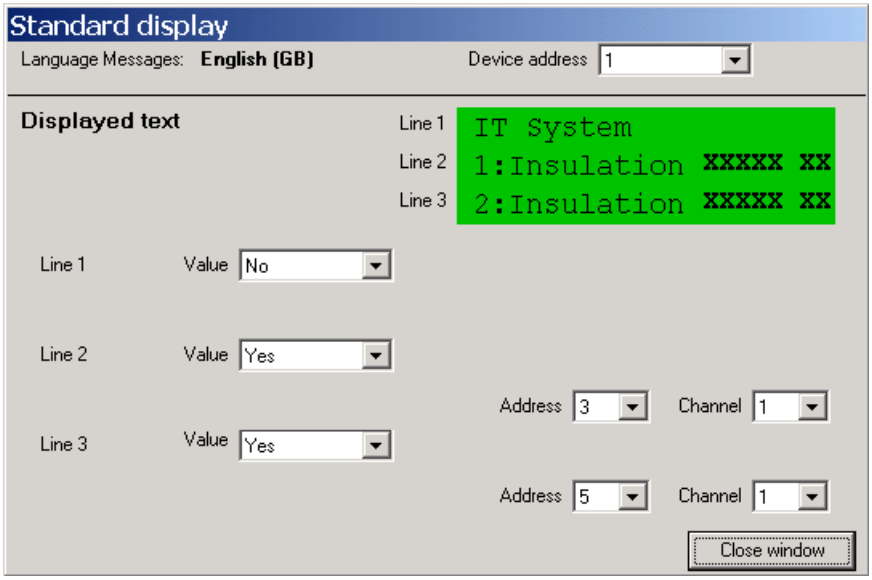
4.10.2.4 Creating a new project file for the first MK2430

*By default, the language used for menus and message text is set to "German". If you want to use a different language, please remember to set the language for message texts **before** you start programming them. This will ensure that any special characters are displayed properly in the relevant language.*

Select "New" from the "File" menu. - This will open a window for programming the standard display.

4.10.2.5 Programming the standard display

This section describes how to program the texts that are to appear on the LC display of the MK2430 that has the address 1 during normal (fault-free) operation.

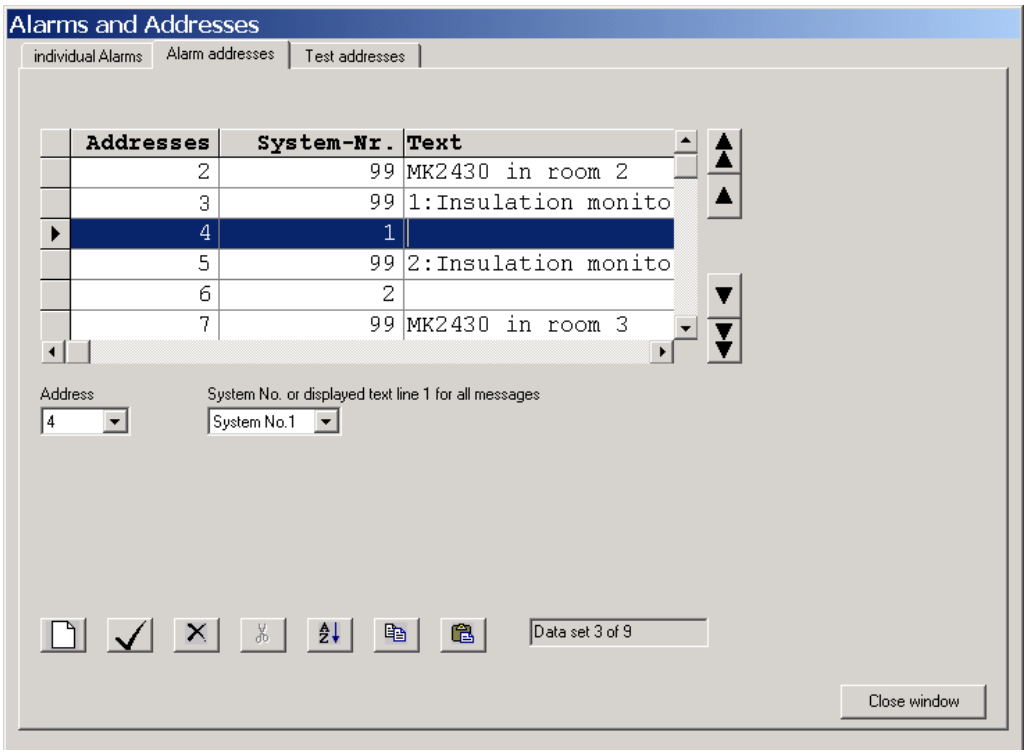


1. First, specify the device address of the MK2430 you wish to program. If you are changing the existing address, enter the new address here. This MK2430 should be assigned address 1.
2. Enter display texts:
   - In line 1: "IT System"
   - In line 2: "1: Insulation"
   - In line 3: "2: Insulation"
3. The IT system's insulation resistance should be displayed continuously in line 2. Select:
   - "Yes" in the "Value" field for line 2
   - "3" in the "Address" field. The address of the first 107TD47 is 3.
   - "1" in the "Channel" field. Information about the insulation resistance message being sent on channel 1 appears in Chapter "Programming an input" on page 30 and on the "BMS device channel assignment" instruction leaflet.
4. The insulation resistance of IT system 2 should be displayed continuously in line 3. Select:
   - "Yes" in the "Value" field for line 3
   - "3" in the "Address" field. The address of the second 107TD47 is 5.
   - "1" in the "Channel" field.
5. Click on the "Close window" button to exit the window for programming the first MK2430's standard display. Save your settings (temporary file).
6. Your data is always at risk of being lost because of potential computer failures and maloperation. Therefore, please remember to save the latest version of the project file at regular intervals even if you have not yet finished making all the settings.
   - Simply select "Save" from the "File" menu.
   - We are going to call our project file "Intensive care unit - example". Enter this name in the "File name" field.

4.10.2.6 Programming alarm addresses

Setting of bus addresses for devices whose alarm messages are to be displayed as standard texts on the MK2430 that has the address 1.

Within the context of MK2430 programming, the "Alarm addresses" function ensures that the standard message texts are actually displayed on the relevant device. For each device, a message text can be entered for the first line (150 addresses = 150 texts, each with 20 characters).
You can use the "Individual alarms" or "Automatic" functions to generate individual alarm messages. The MK2430 is capable of storing up to 200 individual alarm messages.
In our example, we are going to program the messages for the two EDS474' using the "Automatic" function and the messages for all the other devices using the "Alarm addresses" function.



1. Select to create a new data record.
2. Messages relating to the MK2430 in room 2 are to be displayed on the MK2430 that is being programmed. Select:
   - "2" in the "Address" field.
   - "free text (99)" in the "System No." field.
   - In the "Message text in line 1..." field, enter: "MK2430 in room 2".
   - Press to save your settings (temporary file).
3. Messages relating to the first 107TD47 are to be displayed on the MK2430 that is being programmed. Select:
   - "3" in the "Address" field.

- "free text (99)" in the "System No." field.
- In the "Message text in line 1..." field, enter: "1:Insulation monitoring".
- Press  to save your settings (temporary file).

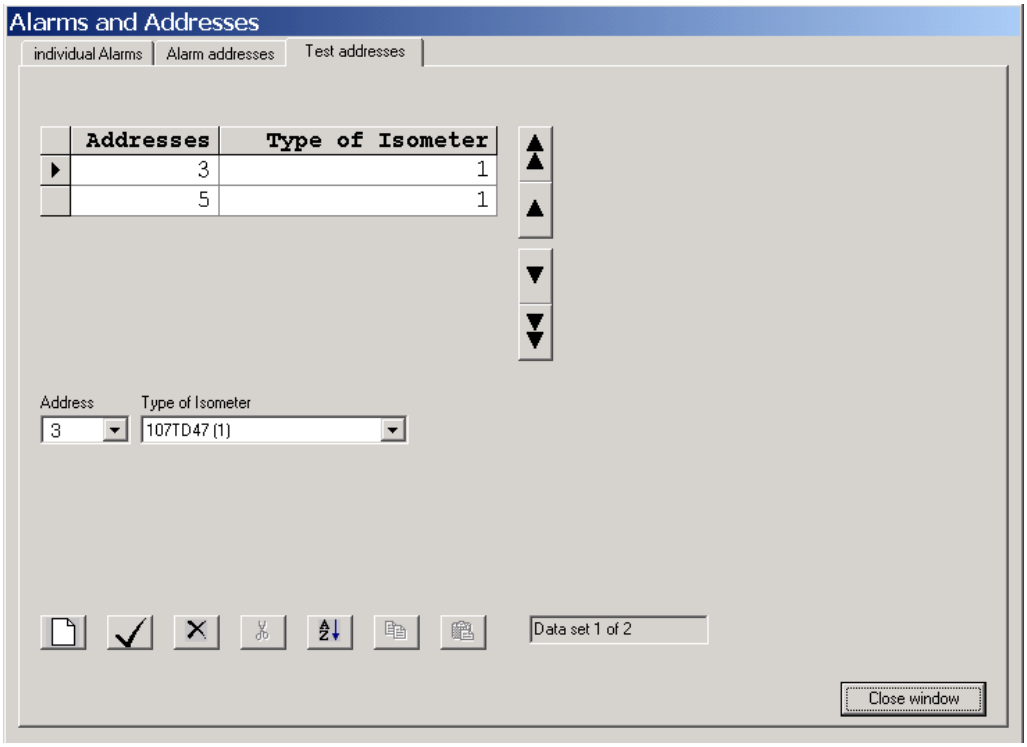
4. Messages relating to the first PRC487 are to be displayed on the MK2430 that is being programmed. Select:
   - "4" in the "Address" field.
   - "System No." in the "System No." field. 1".
   - Press  to save your settings (temporary file).
5. Messages relating to the second 107TD47 are to be displayed on the MK2430 that is being programmed. Select:
   - "5" in the "Address" field.
   - "free text (99)" in the "System No." field.
   - In the "Message text in line 1..." field, enter: "2:Insulation monitoring".
   - Press  to save your settings (temporary file).
6. Messages relating to the second PRC487 are to be displayed on the MK2430 that is being programmed. Select:
   - "6" in the "Address" field.
   - "System No." in the "System No." field. 2".
   - Press  to save your settings (temporary file).
7. Messages relating to the MK2430 in room 3 are to be displayed on the MK2430 that is being programmed. Select:
   - "7" in the "Address" field.
   - "free text (99)" in the "System No." field.
   - In the "Message text in line 1..." field, enter: "MK2430 in room 3".
   - Press  to save your settings (temporary file).
8. Messages relating to the MK2430 in room 4 are to be displayed on the MK2430 that is being programmed. Select:
   - "8" in the "Address" field.
   - "free text (99)" in the "System No." field.
   - In the "Message text in line 1..." field, enter: "MK2430 in room 4".
   - Press  to save your settings (temporary file).
9. Messages relating to the first PGH474 are to be displayed on the MK2430 that is being programmed. Select:
   - "111" in the "Address" field.
   - "free text (99)" in the "System No." field.
   - In the "Message text in line 1..." field, enter: "1:Insulation test device".
   - Press  to save your settings (temporary file).
10. Messages relating to the second 107TD47 are to be displayed on the MK2430 that is being programmed. Select:
    - "112" in the "Address" field.
    - "free text (99)" in the "System No." field.
    - In the "Message text in line 1..." field, enter: "2:Insulation test device".

– Press ✓ to save your settings (temporary file).

11. Click on the "Close window" button to exit the window for programming the first MK2430's alarm addresses.
12. Save the latest programming settings to the project file.

4.10.2.7 Programming test addresses

This is where you specify the BMS bus addresses of the insulation monitoring devices. You should test the addresses by pressing the "TEST" button on the MK2430 that has the address 1.



1. When the test is initiated on this MK2430, a response should be triggered on the 107TD47 insulation monitoring device that has the address 3. Select:
   – "3" in the "Address" field.
   – "107TD47 (1)" in the "Type of Isometer" field.
2. Select ☐ to create this data record.

3. When the test is initiated on this MK2430, a response should be triggered on the 107TD47 insulation monitoring device that has the address 5. Select:
   – "5" in the "Address" field.
   – "107TD47 (1)" in the "Type of Isometer" field.
4. Select ☐ to create this data record.
5. Press ✓ to save your settings (temporary file).

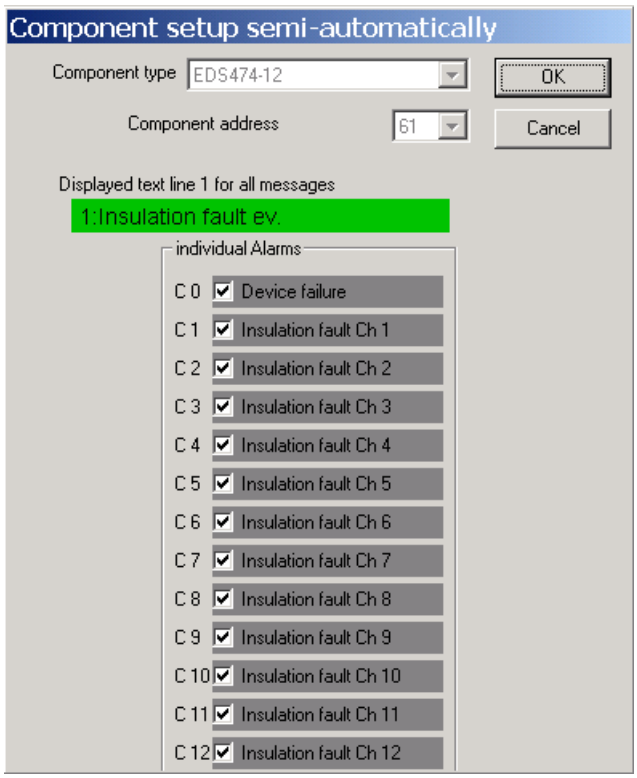
4.10.2.8 Alarm messages semi-automatic setup

The individual alarm messages relating to both EDS474-12 insulation fault evaluators are to be displayed on the MK2430 that is being programmed.

1. Select "Alarm messages semi-automatic setup" from the "Automatic" menu.
2. Under "Device type", select EDS474-12 and 61 for the "Device address".

3. Click on the "Accept" button.

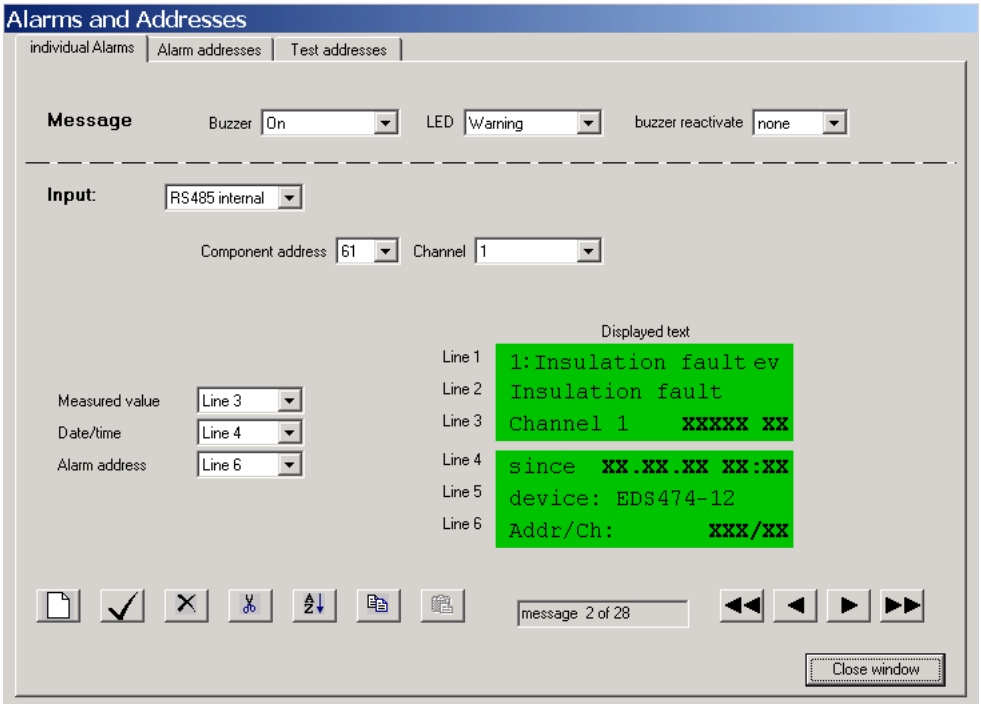
You can then use the next window to select the messages that are to be displayed for the EDS474-12.



4. In the "Displayed text line 1 for all messages" window, enter "1:Insulation fault ev.".
5. In the left-hand column select all the alarm messages as shown above.
6. Click on the "OK" button to apply the message texts for the EDS474-12.
7. You configure the message texts for the second EDS474-12 (with address 62) in exactly the same way as you did for the first EDS474-12.
8. Save the latest programming settings to the project file.

4.10.2.9 Intermediate check

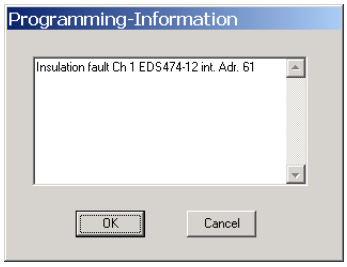
You have now finished programming the individual alarm messages for the EDS474-12. You should now check what you have done up to this point. Open the "Input -> Messages and Addresses -> Individual alarms" window and check all the alarm messages one by one.



Use the ◀ ▶ buttons to scroll through all the alarm messages in sequence. Check all the settings for each alarm message, especially the addresses, channels and alarm texts. You should also ensure that the messages are correctly assigned to the "Warning" or "Alarm" LEDs as appropriate.

You can continue to edit the message text, if required. In our example, we need to replace line 3 "Channel 1" with the room information and information about the "Room1 Cir.1" socket outlet circuit where an insulation fault was located by the EDS474-12.

An information text is stored for the standard display and for each individual alarm. If the message was generated semi-automatically, a text will already exist. Right-click inside the message field.



You will then be able to edit the text or enter a new one.

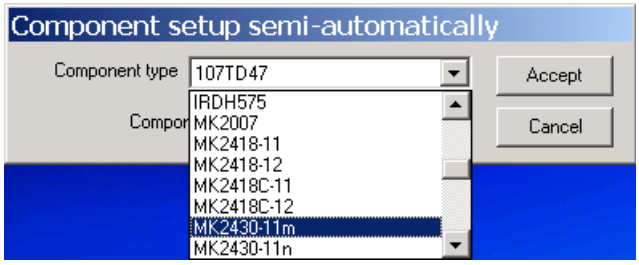
4.10.2.10 Programming digital inputs

Digital inputs are preferably programmed under "Parameter 3" in the basic device settings. There you select the function "medical" to activate the messages that relate specifically to medical applications (see “Parameter 3” on page 23). If alarm texts are to be adapted, then the function "Automatic" facilitates creating of "individual alarms":

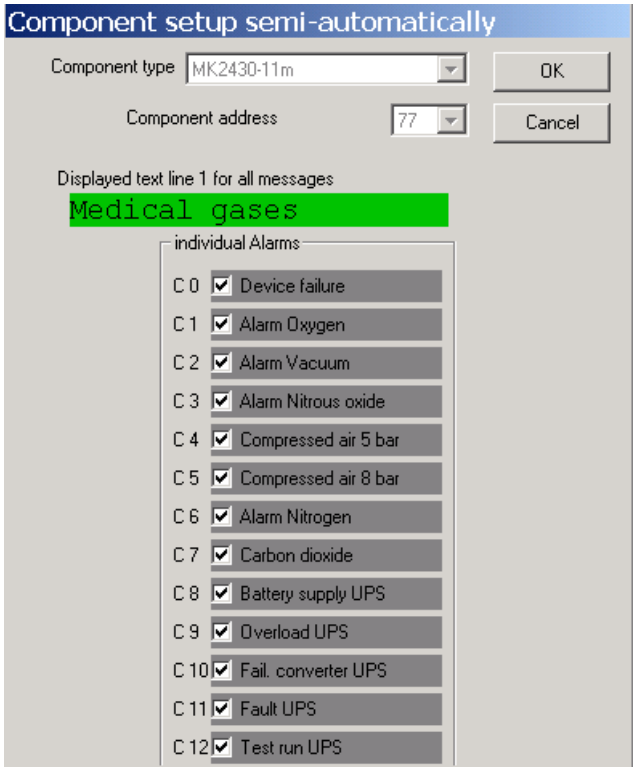
1. Program the inputs using the "Automatic" function.
2. Then use the "Individual alarms" function to make any necessary modifications.

The alarm messages that relate to the medical gases oxygen and nitrous oxide need to be assigned to digital inputs 1 and 2 of the MK2430 that is being programmed.

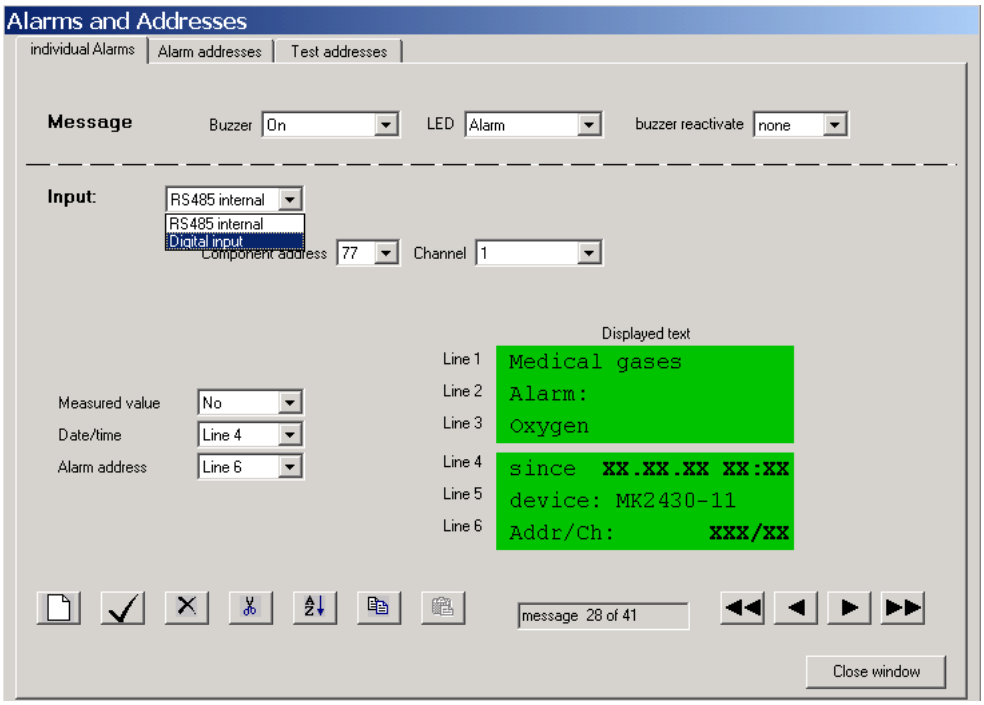
1. Select "semi-automatic device setup" from the "Automatic" menu.
2. Under "Device type" select "MK2430-11m" (settings for medical gases).



3. As the specific digital inputs cannot be addressed directly, we shall select a random address for our purposes, e.g. "77". Click on the "Accept" button.
4. A window will now appear in which you can select the messages that are to be displayed.



5. In the "Displayed text line 1 for all messages" window, enter "Medical gases".
6. In the left-hand column select both alarm messages as shown above.
7. Click on the "OK" button to apply the message texts. Exit the window for generating message texts semi-automatically.
8. Open the "Input -> Messages and Addresses -> Individual alarms" window. - The two new alarm messages will now be added to the existing ones.
9. Change the "Input" field setting to "Digital input". There is no need to change the channel setting as "1" is already appropriate for our example.

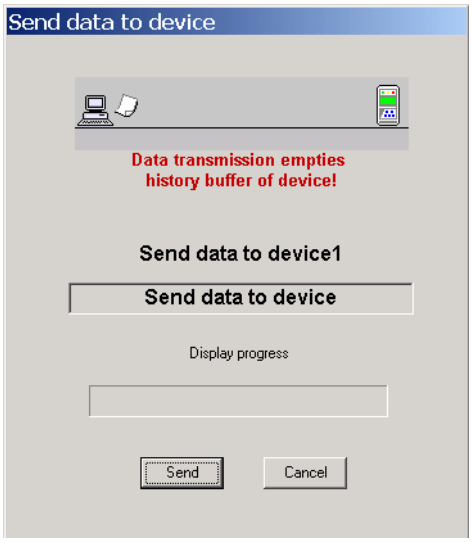


10. Press ✓ to save your settings (temporary file).
11. You modify the message text settings for the second digital input in exactly the same way: Change the "Input" field setting to "Digital input". This time you will need to change the channel setting to "2" for the purpose of our example.
12. Press ✓ to save your settings (temporary file).

4.10.2.11 Completing the programming process

That is the end of the programming process as far as the first MK2430 in our example is concerned.

1. Now save the project file.
2. Send the data to the MK2430:
   - Connect the MK2430 to your PC.
   - Select "Send messages and alarms to device" from the "Transmission" menu.
   - Click on the "Send" button.



After a few seconds the data transmission is completed. Once it is complete, the MK2430 is fully programmed. Before using it, please check that all the settings are correct. For additional information, please refer to the MK2430 manual.

Now program the three remaining MK2430s in exactly the same way.

5. Troubleshooting

In order to operate correctly, the MK2430 requires a bus system that has been assembled and configured correctly. Please refer to the corresponding documentation.

A list of possible errors and suggestions for rectification appears below. This error list does not claim to be exhaustive.

Error	Possible cause
Error transferring the messages or basic settings via the USB interface.	a) Incorrect MK2430 address setting (menu); b) MK2430 address does not match the setting in the MK-SET configuration software; c) USB cable faulty or not assembled correctly; d) Incorrect PC interface (COM interface) set in MK-SET; e) USB driver not installed correctly.
Error transferring the messages or basic settings via the BMS bus.	a) Incorrect MK2430 address or baud rate setting (menu); b) MK2430 address does not match the setting in the MK-SET configuration software; c) Incorrect setting of address of connected BMS bus devices; d) Project file created using an incompatible version of MK-SET; e) Interface cables A/B mixed up; f) BMS bus terminated incorrectly or not at all; g) Incorrect PC interface set in MK-SET. h) Function not supported by BMS master firmware version.
The bus scan is not picking up some devices even though the addresses, bus cable and termination are correct.	The device addresses have not been assigned in consecutive order. Addresses have not been assigned uniquely.
Error in respect of function of digital inputs.	a) Digital inputs not programmed correctly with MK-SET. b) Connection fault.
Error transferring data via USB interface (e.g. Read data from device).	The correct sequence has not been observed: "First, connect the MK2430 to the power supply, then connect the USB cable".
Bus scan not working. "Error transferring data to master"	a) Function not supported by BMS master firmware version. b) PC not connected via RS-485.

6. Programming template

The MK2430 can be configured in numerous ways. In the interest of maintaining a better overview, we recommend that you make a note of which parameters need to be set before you start programming. Please keep this list so that you have a record of any settings made.

The following programming template can be used for recording your parameters should you wish to make use of BENDER's programming service, which is available for a fee. Alternatively, you can use the template to help you plan any programming that you intend to undertake yourself on the basis of MK-SET.

Parameter setting of MK2430 alarm texts

Company	
Street	
Zip code/ City	
Project	
Person responsible	
Date	
Order No.	
Type MK2430....	

The programming of the MK2430 P-version comprises a maximum of 20 alarm addresses to be activated. The texts can be programmed according to their groups.
More alarm addresses can be programmed subject to an additional fee (approx.€ 4.- / text message).

MK2430 BMS-bus address:

Addresses for device test:

Enter the alarm addresses to be activated (max. 150) for standard messages and the associated texts to be displayed in the first line of the message.
This text specifies the group assignment (system no., room no. etc.).

Example:
Standard display
(without alarm messages)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Line 1	*	*	*	*		S	y	s	t	e	m		i	s			*	*	*	*
Line 2	*	*		R	E	A	D	Y		T	O		O	P	E	R	A	T	E	*
Line 3	B	E	N	D	E	R		G	m	b	H		G	r	ü	n	b	e	r	g
Line 4	Status line (The content is non-modifiable, it cannot be programmed)																			

Your specifications:

Line 1																				
Line 2																				
Line 3																				
Line 4	Status line (The content is non-modifiable, it cannot be programmed)																			

Enter the alarm addresses to be activated (max. 150) for standard messages and the associated texts to be displayed in the first line of the message.
This text specifies the system or equipment assignment (system no., room no. etc.)

Example:
Page 1

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Line 1	3	I	N	T	E	N	S	I	V	E		C	A	R	E		U	N	I	T	3
Line 2	Alarm text	I	n	s	u	l	a	t	i	o	n		f	a	u	l	t				
Line 3	Alarm text	M	e	a	s	u	r	e	d		v	a	l	u	w		3	0		k	Ohm
Line 4	Status line	0	1	/	0	3											1	4	:	2	0

Page 2 (additional text)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Line 5	3	s	i	n	c	e	:	2	5	.	0	8	.	0	5		1	6	:	0	8
Line 6	Additional text	D	e	v	i	c	e	:							1	0	7	T	D	4	7
Line 7	Additional text	A	d	d	r	/	c	h	a	n	n	e	l			0	0	3	/	0	1
Line 8	Status line	0	1	/	0	3											1	4	:	2	0

Your specifications:

	Alarm address (1...150)	1.Line alarm text (group assignment)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Parameter setting of MK2430 digital inputs

Company	
Street	
Zip code/City	
Project	
Person responsible	
Date	
Order No.	
Type MK2430....	

Enter the alarm addresses to be activated for standard text messages (max. 150) and their associated texts to be displayed in the first line of the message.
This text specifies the group assignment (system no., room no., etc.).

Input	Neutral alarm messages Function: "Neutral"	Individual alarm messages Function: "Medical"	Your specifications:
IN1	Alarm:	Alarm:	
	Address/channel xxx/01	Oxygen	
IN2	Alarm:	Alarm:	
	Address/channel xxx/02	Vacuum	
IN3	Alarm:	Alarm:	
	Address/channel xxx/03	Nitrous oxide	
IN4	Alarm:	Alarm:	
	Address/channel xxx/04	Compressed air 5 bar	
IN5	Alarm:	Alarm:	
	Address/channel xxx/05	Compressed air 8 bar	
IN6	Alarm:	Alarm:	
	Address/channel xxx/06	Nitrogen	
IN7	Alarm:	Alarm:	
	Address/channel xxx/07	CO2	
IN8	Alarm:	Alarm:	
	Address/channel xxx/08	UPS insulation fault	
IN9	Alarm:	Alarm:	
	Address/channel xxx/09	UPS overload	
IN10	Alarm:	Alarm:	
	Address/channel xxx/10	UPS failure converter	
IN11	Alarm:	Alarm:	
	Address/channel xxx/10	UPS fault	
IN12	Alarm:	Alarm:	
	Address/channel xxx/11	UPS test run	

Select the appropriate function:	"Neutral"		"Medical"	

Add more pages, if required.

Parameter setting of individual MK2430 alarm texts

Company	
Street	
Zip code/City	
Project	
Person responsible	
Date	
Order No.	
Type MK2430....	

The programming of the MK2430 P-version comprises a maximum of 20 alarm addresses to be activated. The texts can be programmed according to their groups.
More alarm addresses can be programmed subject to an additional fee (approx.€ 4.- / text message).

MK2430 BMS-bus address:

The parameter setting of individual alarm texts are subject to an additional fee and is not included in the scope of services of the"P" version!

Create individual message texts (max. 200) as illustrated in the example below.
If already an alarm address for standard messages has been activated for an alarm message, here you have the possibility to overwrite the message for a certain channel (individual texts take priority over standard texts)

Example:

Individual alarm text

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address range: 1..150)	14																				
Channel / digital input range: 1..12)	9																				
Alarm text	Line 1	O	P	E	R	A	T	I	N	G		T	H	E	A	T	R	E	0	2	9
	Line 2	I	n	s	u	l	a	t	i	o	n		f	a	u	l	t				
	Line 3				S	o	c	k	e	t						F	0	2	8		
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5	D	e	v	i	c	e	:	E	D	S	4	6	1							
	Line 6	A	d	d	r	/	c	h	a	n	n	e	l		0	1	4	/	0	9	
	Line 7	M	e	a	s	.		v	a	l	u	e	:	x	x	x	x	x		y	y
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

If you wish to display measured values, use the columns 13 to 20: Value xxxxx, unit: yy.

Your specifications:

Individual alarm text

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input(range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

Your specifications:

Individual alarm text

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
Alarm text	Line 1																				
	Line 2																				
	Line 3																				
	Line 4	Status line (the content is non-modifiable, it cannot be programmed)																			
Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

Your specifications:

Individual alarm text

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Alarm address (range: 1..150)																					
Channel / digital input (range: 1..12)																					
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	Line 2																				
	Line 3																				
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Additional text	Line 5																				
	Line 6																				
	Line 7																				
	Line 8	Status line (the content is non-modifiable, it cannot be programmed)																			

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Add more pages, if required.

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Channels of BMS devices

BMS slaves make available alarm- and operating messages as measuring values and/or operating states. Over which channel the BMS master can request this data?

107TD47
Insulation Monitoring Device with transformer monitoring

Alarm messages:

Channel	Meaning
1	Insulation resistance below the response value 1, $R_F < R_{an1}$
2	Load current above response value (indicating in %)
3	Transformer temperature below the response value
4	Connection fault system (U_n)
5	Connection fault PE
6	Short circuit CT input
7	Connection fault CT
8	Insulation fault operating theatre lamp, from N.C. contact of an external insulation monitoring device
9	Internal device error

Operating messages:

Channel	Meaning
1	Current value of insulation resistance R_F
2	Current value of load current in %

EDS470-12, EDS470E-12, EDS470E2-12, EDS473-12, EDS474-12
Insulation fault location system

Alarm messages:

Channel	Meaning
1	Insulation fault with residual current .... on channel 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8
9	„ 9
10	„ 10
11	„ 11
12	„ 12

Operating messages:

none

IRDH375B/275/575
Insulation Monitoring Device

Alarm messages:

Channel	Meaning
1	Insulation resistance below the response value 1, $R_{F1} < R_{an1}$
2	Insulation resistance below the response value 2, $R_{F2} < R_{an2}$
3	Connection fault system (U_n)
4	Connection fault PE
5	Internal device error
6	Standby
7	Starting EDS system in continous operation with 5 minutes pause (IRDH575 only)
8	Starting EDS system for one cycle (IRDH575 only)
9	Starting EDS system in continous operation without pause (IRDH575 only)

Operating messages:

Channel	Meaning
1	Current value of insulation resistance R_{F1}
2	Current value of insulation resistance R_{F2}
3	Current value of leakage capacitance C_e

FTC470XDP
Protocol converter PROFIBUS DP <===> BMS

Alarm messages:

Channel	Meaning
1	Free programmable alarm message by PROFIBUS DP-Master
2	„
3	„
4	„
5	„
6	„
7	„
8	„
9	„
10	„
11	„
12	„

Operating messages:

Channel	Meaning
1	Free programmable operating message by PROFIBUS DP-Master
2	"
3	"
4	"
5	"
6	"
7	"
8	"
9	"
10	"
11	"
12	"

FTC470XMB
Protocol converter Modbus RTU <===> BMS

Alarm messages:

Channel	Meaning
1	Free programmable alarm message by Modbus RTU-Master
2	"
3	"
4	"
5	"
6	"
7	"
8	"
9	"
10	"
11	"
12	"

Operating messages:

Channel	Meaning
1	Free programmable operating message by Modbus RTU-Master
2	"
3	"
4	"
5	"
6	"
7	"
8	"
9	"
10	"
11	"
12	"

IMS480
Scanning system for LIM2000-1NL

Alarm messages:

Channel	Meaning
1	Insulation fault in the IT system of channel 1
2	„ channel 2
3	„ channel 3
4	„ channel 4
5	„ channel 5
6	„ channel 6

Operating messages:

Channel	Meaning
1	None insulation fault in the IT system of channel 1
2	„ channel 2
3	„ channel 3
4	„ channel 4
5	„ channel 5
6	„ channel 6

MK2418C
Remote indicator and control panel

Alarm messages:

Channel	Meaning
1	Alarm on digital input 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8

Operating messages:

None

PGH47x
Insulation fault test device

Alarm messages:

Channel	Meaning
1	When input IN1 is set: Start of insulation fault location until IN1 is reset
2	When input IN2 is set: Start of insulation fault location for 1 cycle (approx. 5 Minutes)
3	Operation of the device switched down (rejection)
4	Start/stop insulation fault location via push button
5	Internal device error

Operating messages:

None

PRC487
Control device for switchover modules

Alarm messages:

Channel	Meaning
1	Failure Line 1
2	Failure Line 2
3	Failure distribution board
4	Failure N conductor Line 1
5	Failure switching element Line 1
6	Failure switching element Line 2
7	Failure contactor relay K3
8	Internal device error
9	Manual mode
10	Short circuit behind the switchover device

Operating messages:

Channel	Meaning
1	Line 1 ready for operation
2	Line 2 ready for operation
3	Switching element Line 1 is switched on
4	Switching element Line 2 is switched on
5	Automatic mode
6	Manual mode

RCMS470-12, RCMS470E-12
Residual current evaluator

Alarm messages:

Channel	Meaning
1	Residual-, over-, undercurrent fault with measuring value ... on channel 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8
9	„ 9
10	„ 10
11	„ 11
12	„ 12

Operating messages:

Channel	Meaning
1	Measuring value: Residual-, over-, undercurrent on channel 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8
9	„ 9
10	„ 10
11	„ 11
12	„ 12

SMI471-12
Converter for digital inputs ==> BMS

Alarm messages:

Channel	Meaning
1	Alarm on digital input 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8

Operating messages:

Channel	Meaning
1	Digital input 9 is set
2	„ 10 „
3	„ 11 „
4	„ 12 „

SMI472-12
Converter, digital inputs ==> BMS

Alarm messages 0...12,
Quantity dependend of the preset ratio of alarm messages / operating messages.
In the following example the ratio has been set to 12 alarm messages and 0 operating messages:

Channel	Meaning
1	Alarm on digital input 1
2	„ 2
3	„ 3
4	„ 4
5	„ 5
6	„ 6
7	„ 7
8	„ 8
9	„ 9
10	„ 10
11	„ 11
12	„ 12

Operating messages 0...12,
Quantity dependend of the preset ratio of alarm messages / operating messages.
In the following example the ratio has been set to 0 alarm messages and 12 operating messages:

Channel	Meaning
1	Digital input 1 is set
2	„ 2 „
3	„ 3 „
4	„ 4 „
5	„ 5 „
6	„ 6 „
7	„ 7 „
8	„ 8 „
9	„ 9 „
10	„ 10 „
11	„ 11 „
12	„ 12 „

SMO480-12
Converter, BMS ==> digital outputs

Alarm messages:

None

Operating messages:

Channel	Meaning
1	Relay 1 has switched (binary 1) or has not switched (binary 0)
2	„ 2 „
3	„ 3 „
4	„ 4 „
5	„ 5 „
6	„ 6 „
7	„ 7 „
8	„ 8 „
9	„ 9 „
10	„ 10 „
11	„ 11 „
12	„ 12 „

SMO481-12
Converter, BMS ==> digital outputs

Alarm messages:

None

Operating messages:

Channel	Meaning
1	Relay 1 has switched (binary 1) or has not switched (binary 0)
2	„ 2 „
3	„ 3 „
4	„ 4 „
5	„ 5 „
6	„ 6 „
7	„ 7 „
8	„ 8 „
9	„ 9 „
10	„ 10 „
11	„ 11 „
12	„ 12 „

SMO482-12
Converter, BMS ==> digital outputs

Alarm messages:

None

Operating messages:

Channel	Meaning
1	Relay 1 has switched (binary 1) or has not switched (binary 0)
2	„ 2 „
3	„ 3 „
4	„ 4 „
5	„ 5 „
6	„ 6 „
7	„ 7 „
8	„ 8 „
9	„ 9 „
10	„ 10 „
11	„ 11 „
12	„ 12 „

Alarm messages

depending on the device occur when the measured value falls below or exceeds the response value or when status changes to alarm. Alarm messages are provided by BMS devices and are requested by the BMS Master.

Operating messages

are measuring values and/or information which is constantly provided by BMS devices and that are requested from the BMS Master via the bus. Some BMS devices (EDS47x) do not provide operating messages, they only provide alarm messages.

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