



PANEL DIGITAL RECORDER N30B TYPE



**PROGRAMMING
USER'S MANUAL**



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1 INTRODUCTION

The N30B software allows the configuration of all N30B recorder functions, readout and analysis of archival data from many recorders. In the software, we have foreseen the service of stored files by the recorder in the memory card and the readout possibility of the archive through the recorder interface. The software enables the co-operation with the data base and the storage of archive parameters in the data base. The N30B software possesses implemented functions of the user's data base MySQL®. Functions available from the programming level are presented below.

2 SOFTWARE FUNCTIONS

The N30B software enables:

- Configuration of all N30B recorder parameters.
- Readout of the current configuration from the recorder.
- Configuration readout from the file.
- Record of the whole configuration in the recorder.
- Record of the configuration in the file (e.g. in order to copy it).
- Monitoring of the recorder current state – monitoring of systemic recorder parameters such as status registers, alarm state, current time and date, memory card state and state of the communication with added devices (work in the master mode).
- Configuration of the recorder time and date with the possibility of the automatic summer/winter time change.
- Change of transmission parameters by means of RS-485 interfaces.
- Configuration of archiving and data readout from added devices.
- Archive readout from the recorder.
- Archive readout from the recorder with the automatic function of archive erasing in the recorder (after each readout, data will be stored on the disk).
- Archive readout from the recorder with the automatic function to erase the archive in the recorder and locate the read out data in the MySQL® base.
- Export of archive files to a format accepted by office softwares.
- Export of archive files to the MySQL® data base.
- Connection configuration with the data base.
- Automatic creation of a table in the MySQL® data base destined to the data accumulation from N30B recorders (in the configuration window MySQL®, section 3.2.5.)
- Import of files located in the memory card to the MySQL® data base.
- Automatic archive downloading from N30B recorders (service up to 32 tasks). For each task , the device address is definite individually, what gives the possibility to the archive readout from many N30B recorders.
- Optional configuration of the automatic archive readout from N30B recorders.

- Global switching of periodical tasks on/off.
- Monitoring of current measured values, alarm states, transmission states, etc. on one software panel together with the visualization of their changes in time.
- Graphical archive analysis with the possibility to choice the data source: files or data base. The user can create a report (maximally 10 diagrams) for any optional number of N30B recorders. During the creation, one can use the available dictionary function and see values located in the file or in the data base related to the given series.

3 SERVICE

The N30B software possesses an intuitive user's interface. Prompts have been implemented in the software, which appear after directing the mouse index on the given panel element.

The view of the main software window is presented on the fig. 1.

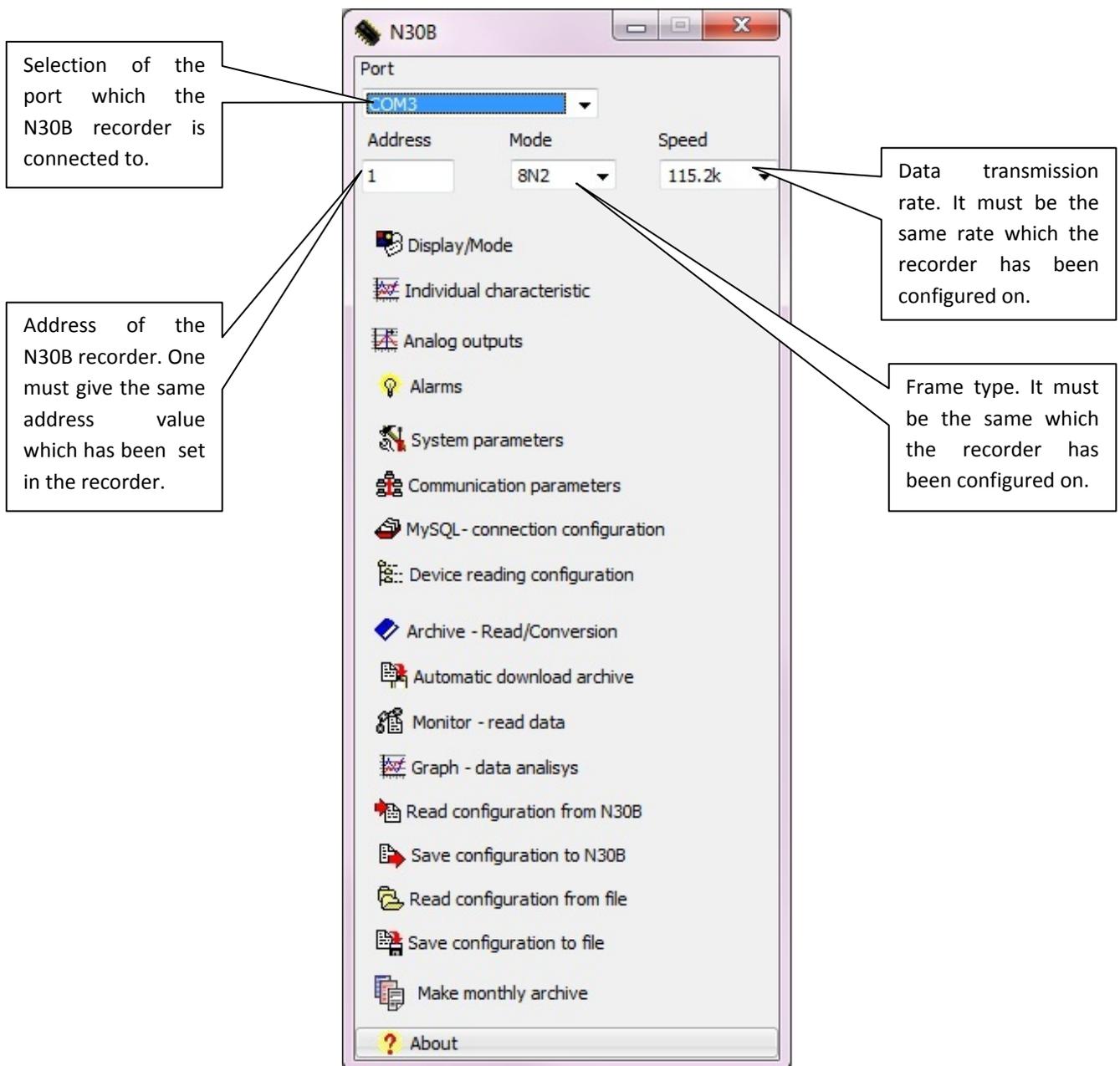


Fig. 1 Main software window

For a correct work, the user must configure connection parameters with the recorder through:

- Selection of the serial port which the N30B recorder has been connected to.
- Giving the N30B recorder address. One must give the value which has been programmed in the recorder on (the manufacturer's address has the value 1).
- Selection of the transmission frame type. One must select the same frame type which the recorder has been configured on (as RTU 8N2 by the manufacturer).
- Selection of the transmission rate. One must select the rate consistent with the current recorder configuration (set as 9600 bit/s by the manufacturer).

Notice: In case of a recorder version without the port 2, it is necessary to set the recorder on the SLv or SLvA working mode. In the version with the port 2, there is no need to change the working mode, since the port 2 interface always works in the slave mode.

3.1 Recorder Configuration

3.1.1 Display and Working Mode

Notice! : One must remember during the mode configuration, that for the recorder without the port 2, its switching into the master work mode will cause a lack of communication with the recorder – it will be necessary to transpose the working mode in the recorder menu.

For this reason, the working mode change must be carry out in the end of the recorder configuration. The configuration of display parameters is made after selecting the option *Display/Working mode*. After selecting this option, the dialogue window presented on the fig. 2 appears.

The screenshot shows the 'Display / Mode' configuration window with the following settings and callouts:

- Display value:** Device 0 register 0 (Callout: Select the recorder register which the value will be displayed)
- Measurement time [s]:** 1 (Callout: Averaging time of the displayed value.)
- Display format:** 0000.0 (Callout: Display format – number of places after comma.)
- Work mode:** STOP (Callout: Recorder working mode.)
- Unit backlight on:** (Callout: Switch the backlight of the unit placed on the recorder)
- Color and range:**
 - Upper value: 99999.0000 (Callout: Upper displayed value. Overflow of this value causes the display of the upper overflow)
 - Color change thresholds: 80.0000 (red to yellow), 50.0000 (yellow to green) (Callout: Values of the color change thresholds.)
 - Lower value: -19999.0000 (Callout: Lower display value. For values smaller than this value, the symbol of the displayed value will be displayed.)
- Buttons:** Read configuration, Save configuration

Fig. 2 Display/ Working mode

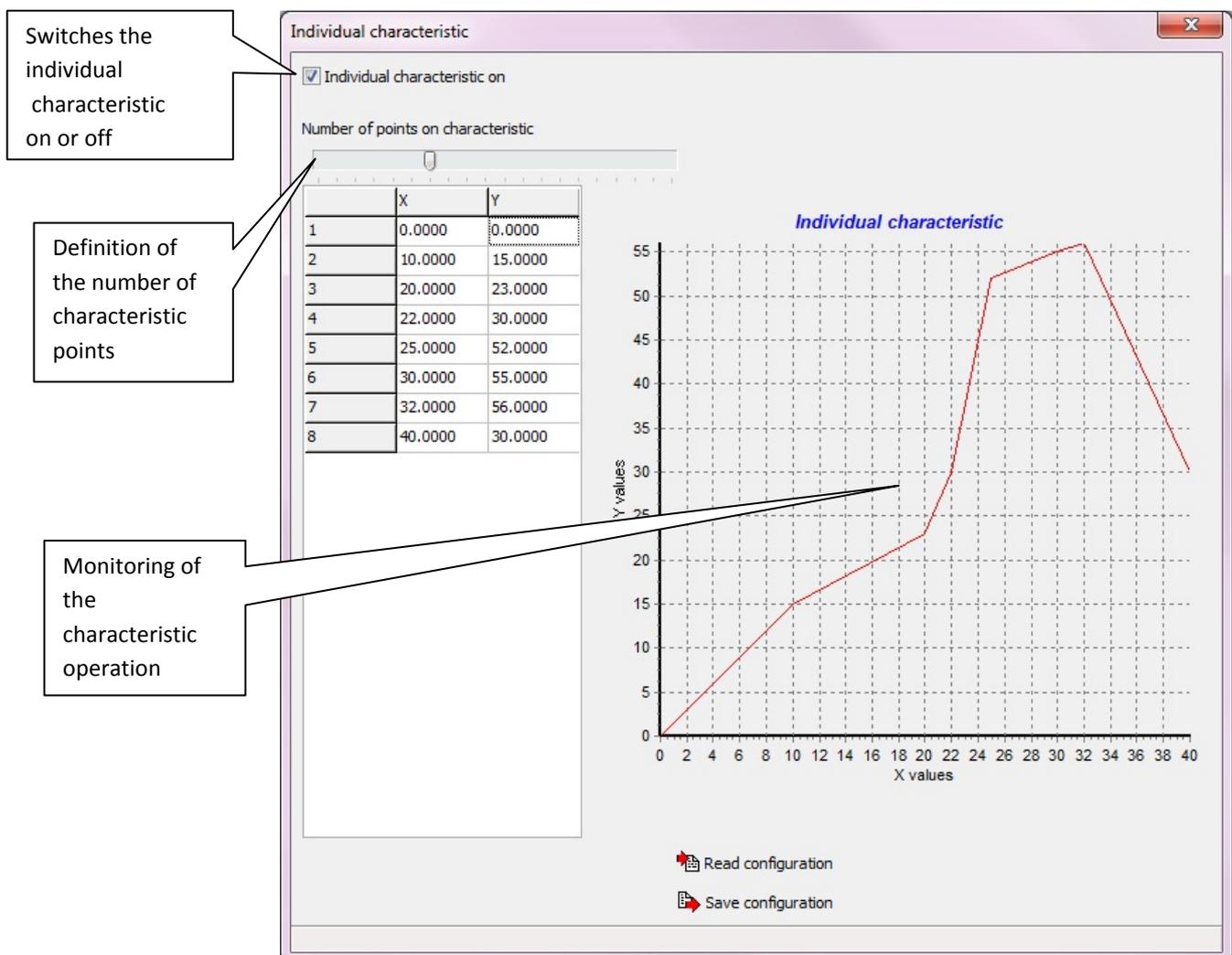
Additionally, there are push-buttons on the dialog window enabling the readout and the configuration record. The change of display colours is carried out through clicking on the selected interval, what causes the change of colours. One must in this way, set required colours, colour change thresholds and overflow of the displayed value.

After finishing the configuration by means of the *configuration record* push-button, one can make the configuration record in the N30B recorder.

3.1.2 Individual Characteristic

The individual characteristic enables the user to rescale values of the input quantity. In order to rescale the quantity before its display and placement in recorder registers, one must configure parameters of the individual characteristic. The configuration consists of giving the number of points (number of segments) which will serve to realize the rescaling function. Then, one must define characteristic points (X) and assign for them values corresponding to given points (Y).

The configuration of the individual characteristic is performed after selecting the option *individual characteristic*. The view of the configuration window is presented on the fig. 3.

**Fig. 3 Individual characteristic.**

After finishing the configuration, one must record the characteristic in the recorder. One must remember, that the change of the displayed value can cause the change of alarm operation and the analog output if they have been configured for the operation on the displayed value.

3.1.3 Analog Output

The configuration of the analog output is made after the selection of the *Analog Output*. In order to configure the analog output, one must define the quantity steering the output, choose the output type and define for which value of the steering quantity, the signal on the analog output has to accept the value 0%, and for which it has to accept the value 100%.

Additionally, a diagram presenting the operation of the analog output is situated on the panel. The axis X of the diagram is the steering quantity, however the axis Y is the value on the analog output

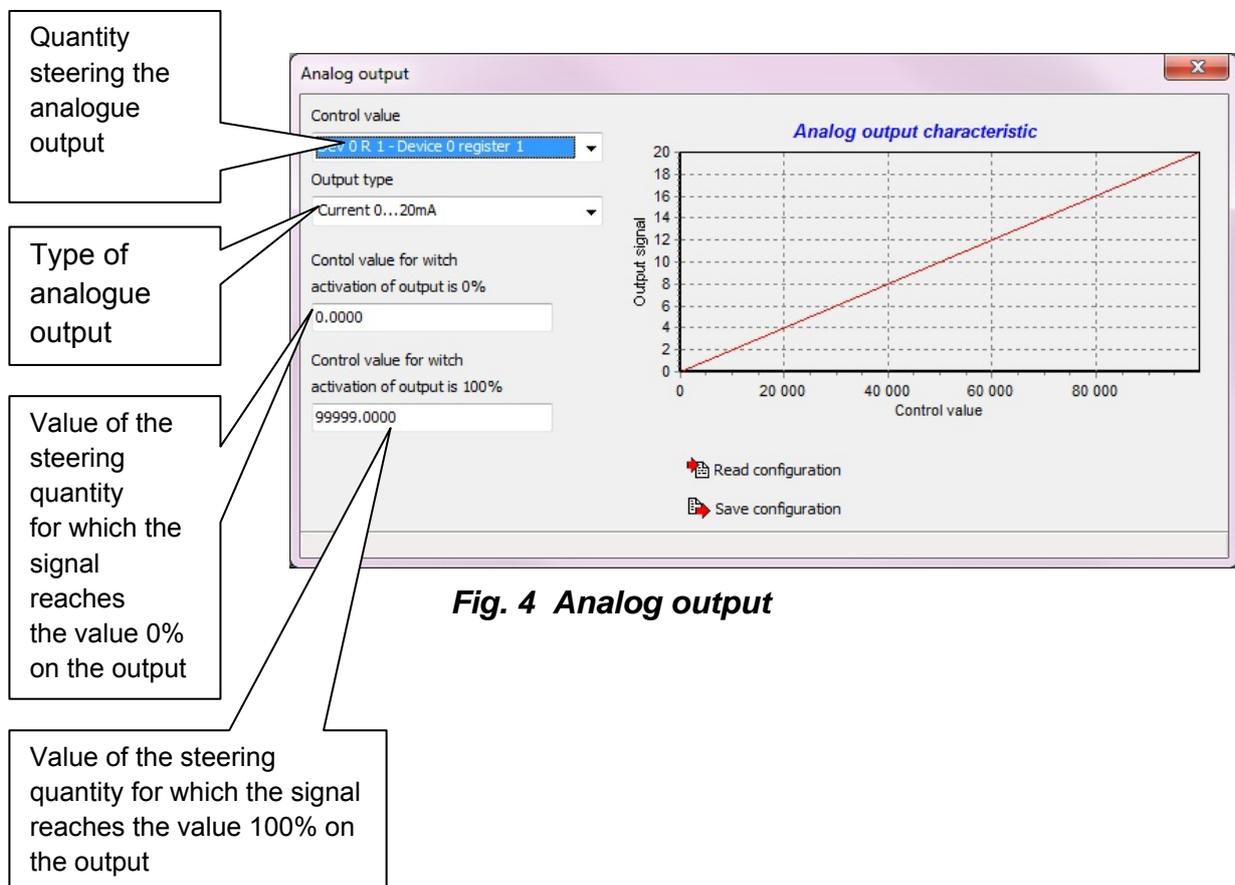


Fig. 4 Analog output

3.1.4 Alarms

The configuration of alarms is realized in the dialogue window started after choosing the *Alarm* option. The dialogue window is divided into 4 parts. Each of the part includes parameters destined for the configuration of the specific alarm. The view of the window is presented on the fig. 5.

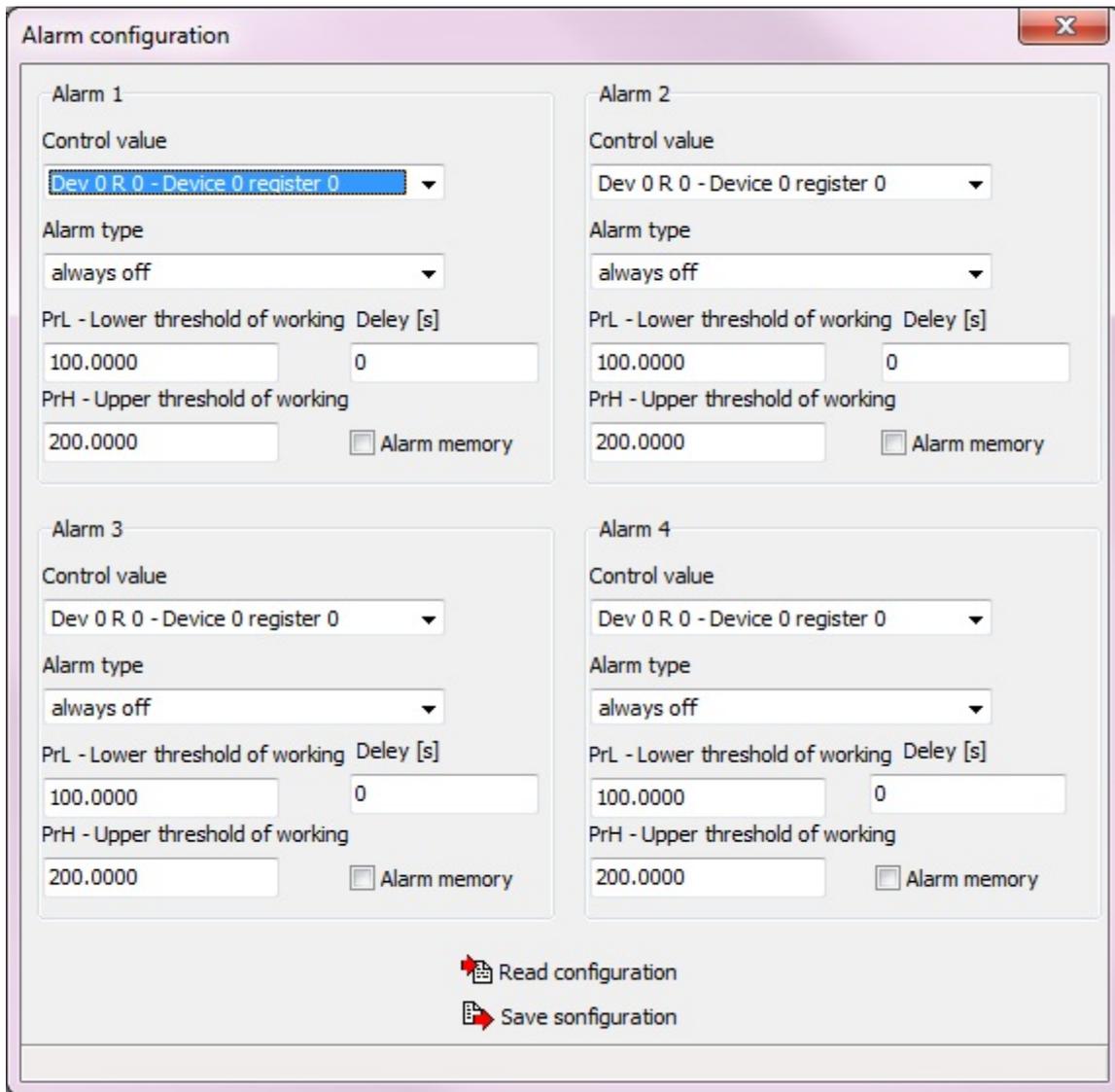
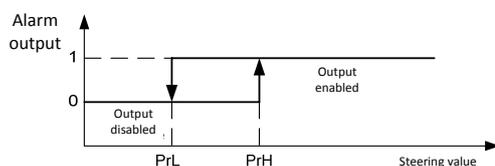


Fig. 5 Alarms

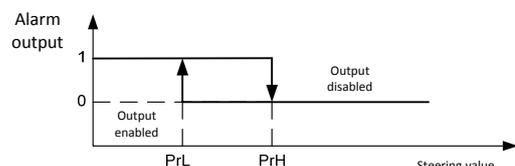
During the alarm configuration, one must determine:

- the quantity steering the alarm. As the steering quantity, one can choose one of the read out/recorded register by means of the recorder interface, the displayed value or the clock.
- Alarm type – defines the way of alarm operation. The operation of particular types of alarms is presented below:

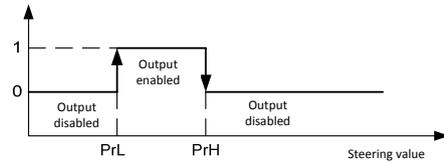
n-on



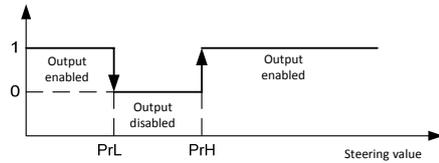
n-off



on



off



- Lower threshold of the alarm PrL state change.
- Upper threshold of the alarm PrH state change.
- Delay of the alarm operation expressed in seconds. This value defines the laps of the alarm state time after which the alarm will be switched over.
- Alarm memory – The option switching on causes, that after the alarm start, the diode on the display remains lighted, signalling in this way the alarm operation. The alarm memory can be erased by means of recorder push-buttons.

3.1.5 Systemic Parameters. Time and Date

The dialogue window *Systemic parameters* includes information about the current state of the N30B recorder. By means of this window, the user can erase status flags and perform the readout, record operations or the synchronizing of the real time clock. The view of the dialog window is presented on the fig. 6.

Additionally, one can protect the recorder by a password from the dialog window level. Then, the entry into the menu from the keyboard level will require giving the access code. The user has also the option to restore manufacturer's settings, erase the archive contents and erase maximum and minimum values.

Notice! : If in the moment of erasing minimum and maximum values, the value to display is the value signalling an error (e.g. 1E+20), then the erasing operation of minimum and maximum will not be performed.

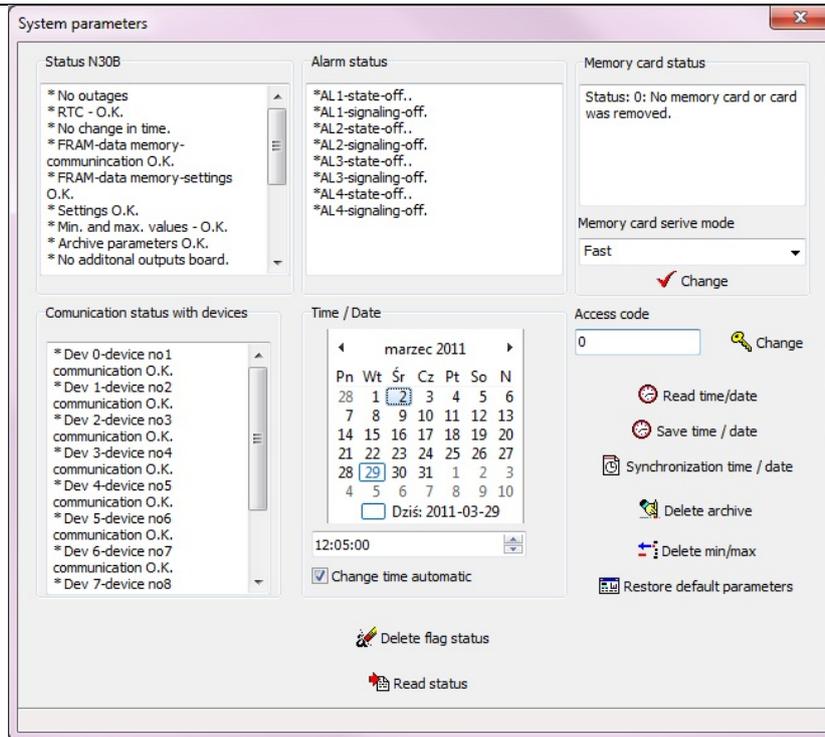


Fig. 6 Systemic parameters.

The *Synchronize time/date* option available on the panel causes the synchronization of the N30B recorder time with the computer time. During the synchronization of the time, the software waits for the change of minutes on the computer and in the moment, when the value of seconds in the systemic computer clock has the value 0, makes the record of time in the recorder. During the use of the *record time/date* option or *read out time/date* the value of seconds is always established on zero.

3.1.6 Connection parameters

The change of transmission parameters on ports of the serial RS-485 data transmission is realized by using the *Connection parameter* window. The window is divided into two groups. A physical recorder interface corresponds to each group

- Port 2 interface – it is the interface located on the additional output plate. This interface always works in the slave mode. Parameters related to this interface are: address (in the option without an extra interface in case of operation in slave mode it always defines the N30B recorder address in the MODBUS network), transmission mode (type of data frame), transmission rate.
- Port 1 interface – it is the interface located on the basic recorder plate. This interface can operate as master or as slave (in the version without the port 2). Parameters which characterizes this interface are: address (only for the operation in the slave mode), time Out (waiting time for the response from the slavedevice, parameter expressed in milliseconds), transmission mode (type of data frame), transmission rate.

The change of interface transmission parameters and their recording in the recorder causes, that after the change, the software automatically switches over again on newly recorded parameters.

3.1.7 Configuration of Readout and Archiving

The configuration of readout and archiving parameters is available after choosing the option *Readout configuration from devices/archiving*. The user can configure the data readout from added devices (operation in the slave mode) and perform archiving parameters in the dialogue window .

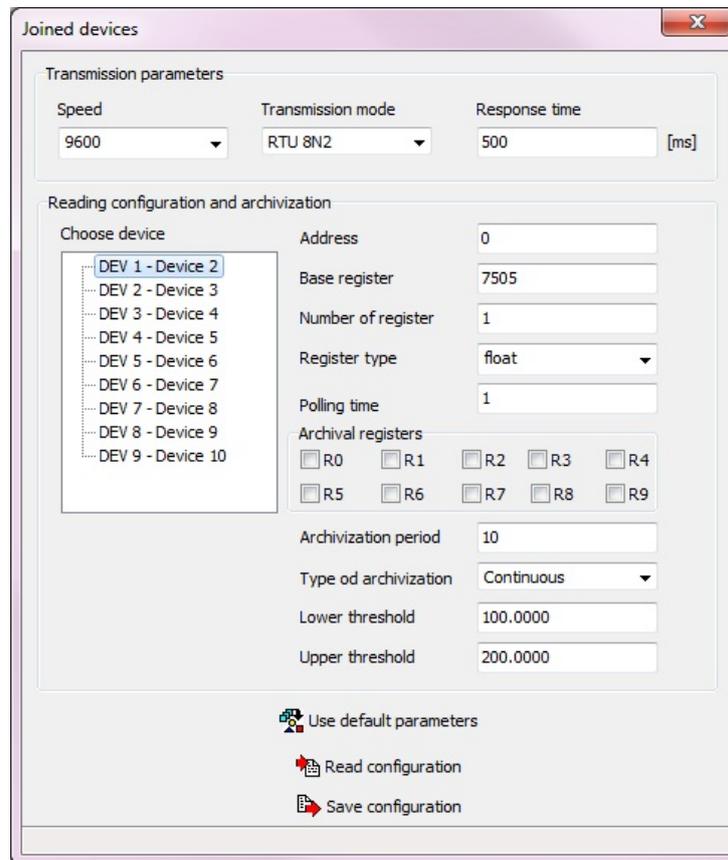


Fig. 7. Readout configuration from devices/archiving

The configuration of data readout from the device consists of selecting the device DEV0...DEV9 and next, defining readout and archiving parameters. During the operation in slave mode, the archiving of recorded registers is assigned to devices. The first 10 registers correspond to the device DEV0, successive 10 registers correspond to the device DEV1, etc. During the readout/archiving configuration, one must define following parameters:

- Address – defines the address of the co-operating device, the write of the value 0 causes the data readout switch off from the device. This parameter concerns the recorder operation in master mode.
- Basic register – defines the register in the added device which the data readout has to be followed from – it is the first read out register.
- Number of registers – number of read out registers from the device. In case of float type data composed of two 16-bit registers, one must give as the number of registers, the number of variables what we want read out from the device (e.g. we read out the temperature and humidity values from the device, and as the number of registers give the value 2, despite that these variables occupies four 16-bit registers in the device – two 32-bit values of float type).
- Register type – defines the register type in the device which data will be read out from.

- Pooling period – time expressed in seconds defining the frequency of transmitted queries to the device. In case of co-operation with devices with a long waiting time for the response, the time between successive queries can be longer than the time programmed by the user.
- Archived registers – group in which the user sets, which registers among read out registers have to be archived.
- Archiving period – defines the time interval in which read out data will be located in the archive. Data are located in the archive if there are no communication errors with the device which data have to be archived from. The archiving period is expressed in seconds and must be a multiple of the number 10 (minimal archiving period). In case when giving a number which is not a multiple of 10, the software automatically matches the archiving period through the execution of the dividing operation on integers by 10 and rejection the remainder of the division.
- Kind of archiving – defines the kind of archiving, Where the user can choose the continuous archiving with the set archiving period or conditional archiving with the definition of the register read out from the device. During the conditional archiving, the value in the indicated register starts or stops the archiving. For the conditional archiving the condition to archive is the variable “output” in the register steering the archiving beyond the interval definite by the lower and upper threshold. The overflow of threshold values causes the archiving start, where registers definite in the group of archived registers will be archived. The archiving will be carried out then, with an archiving period given by the user during the configuration.
- Lower threshold, upper threshold – define threshold values for the conditional archiving. If the value steering the conditional archiving is not situated in the interval defined by these thresholds , the archiving start follows.

3.1.8 Monitor

The window monitoring the operation of the N30B recorder state is available after selecting the *Monitor-readout data* option. Thanks to this window, the user can monitor read out values from devices added to the N30B recorder, the state of the communication with co-operating devices (including the error statistics) , state of alarms, level of the archive memory filling, analog output steering, displayed value, minimum and maximum values. Additionally, there are courses presenting changes in time of the displayed value on the window, and changes in time of alarm levels. The view of the monitor panel is presented on the fig. 8.



Fig. 8 Monitor

Presented runs can be expanded. The expansion is realized through the marking of the fragment to be expanded from the left top corner of the given diagram fragment towards the right top corner, which has to be viewed on the diagram. The withdraw of the marking is carried out by the marking in reversal direction (from the right top corner towards the left top corner), although the marked area is of no importance here.

Additionally, a *Show read out values* push-button is located on the window. After its pressure, the window presented on the fig. 9 is displayed, including a table with a set of read out values.

Read out values										
	DEV 0	DEV 1	DEV 2	DEV 3	DEV 4	DEV 5	DEV 6	DEV 7	DEV 8	DEV 9
R0	23,2208	*****	18,9052	0,0000	*****	*****	*****	*****	*****	*****
R1	18,8186	*****	24,1625	68,1355	*****	*****	*****	*****	*****	*****
R2	*****	*****	21,0574	68,1355	*****	*****	*****	*****	*****	*****
R3	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R4	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R5	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R6	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R7	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R8	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
R9	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

Fig. 9. Read out values

Descriptions situated in the table have following meanings:

- ✚ DEV0...DEV9 – devices which data are read out from.
- ✚ R0...R9 – data read out (registers). R0 means the first read out register from the device, R1 means the second read out register, etc.

3.1.9 Readout and Record of the Whole Configuration from/to the Recorder

The readout or record of the whole N30B recorder configuration is possible directly from the main application panel. One must remember, that during the configuration recording to the recorder, all configuration data together with the archive configuration and configuration of transmission parameters are recorded.

Notice!: The configuration recording causes the erasing of the archive located in the internal recorder memory and the change of recorder transmission parameters.

3.1.10 Readout and Configuration Recording from/to the File

The configuration of the N30B recorder can be stored in the file and thanks to that, it is possible to create a copy of the current configuration or duplicate it on other recorders. Configuration files created earlier can be read in the software, thanks to that, one can modify them, transmit the read in configuration to the recorder, etc.

During its closing, the N30Bsoftware records automatically the last configuration. However during the start it reads in the last configuration. The automatic configuration recording/readout concerns all recorder parameters, and also parameters related to periodical tasks and the configuration of diagrams.

The configuration of connection parameters with the recorder as: transmission port, address, and rate will be automatically stored in during the software closing. These settings will be automatically read in during the software start. Thanks to that, thanks to that, there is no need to change connection parameters after each software start.

3.1.11 Create the Monthly Archive

If the memory card is used data from pooled devices are stored in daily files. For an Easier further analysis, one must create monthly archives for individual devices in separate files. After choosing the option Create the monthly archive, one must indicate the catalogue with daily files (on the card or another support with data), the incoming place and press the *Create a new archive* push-button.

Files named N30B rrrmm_Dx.DAT where rrrr – archive year, mm – archive month, x device number. Exemplary file name: NA30Bo9110002_201101_DO.DAT.

3.2 Service of Internal Archive

Archive, data memory of the N30B recorder can be stored in the internal memory enabling to accumulate 350064 records or in the external memory in the shape of a memory card located in the recorder socket. The access through the interface is only possible to the internal memory. The memory card is not available through the interface.

During the archive memory card use as the memory, data can be monitored or exported to the data base with the use of available import functions of data files in the software. Methods and available ways to import and data storage are presented in further parts of this manual.

3.2.1 Archive Readout through the Interface

The archive readout through the interface is available from the dialogue window level started from the main panel – *Archive-Readout/Conversion* option. The view of the archive dialogue window is presented on the fig. 10.

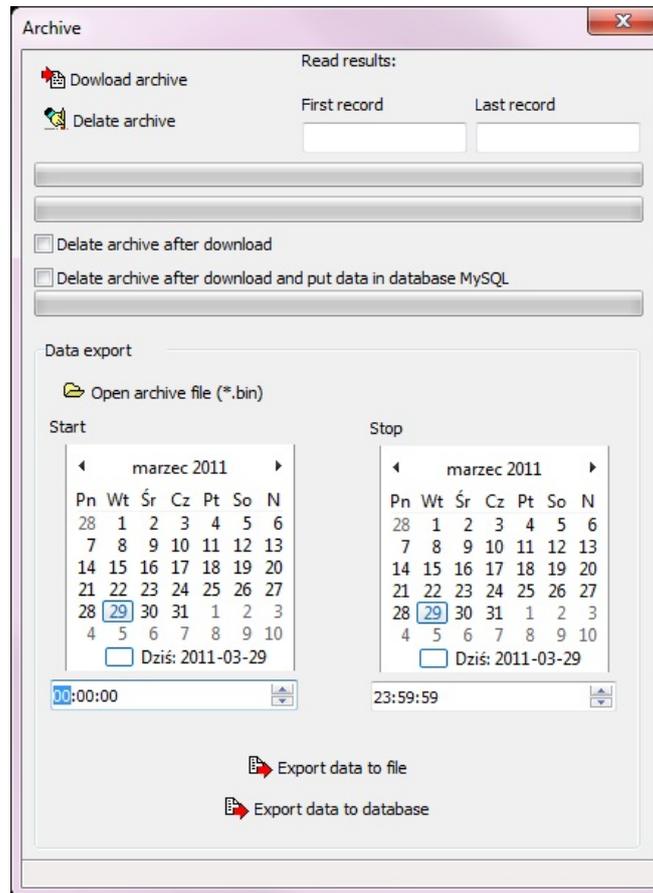


Fig. 10. Archive

One can divide into two parts the presented window on the fig. 10.

- Service of functions related to the readout, erasing, and automatic location of data in the data base.
- Service of data import and export.

In frames of the first group, the user has the access to following functions:

- *Archive download* – The push-button pressure causes the readout of archived data from the N30B recorder. Depending on the number of data and connection rate, this can take a dozen or more minutes. After finishing the data readout, data are located in the computer memory and can be exported (see the state bar: data in memory). Additionally in an automatic way, the Archives catalogue is created on the computer disk, in which the file with lately read out data is located (binary file with the name corresponding to the date and readout time and including information about the N30B address which these data arise) from. One can convert this catalog in the future: open, review on a diagram or in the table form. After finishing the readout operation it will be displayed.

Following parameters are related with the readout operation:

- *Erase the archive after downloading* – the marking of the option causes, that after the archive downloading, data of the N30B recorder will be erased. This option allows to

maintain data in order – during the successive readout, only new records will be downloaded.

Duplicating data will not occur.

- *Erase the archive after downloading and locate data in the MySQL data base* – the selection of this option causes, that after downloading data from the N30B archive, archive data will be erased from the N30B recorder memory, and readout data will be located in the data base. The use of this option requires a correct connection configuration with the MySQL data base. If during the data readout this option has not been marked, data can be at once transmitted to the data base by pressing the *Export to data base* push-button.
- *Erase the archive* – the selection of the option occasions the erasing of the archive contents located in the internal recorder memory.

In the second group of functions located on the panel, the user has at his disposal functions related to data import and export. One can number to these functions:

- Export of data readout from the selected time interval to the text file or to the data base.
- Export of data from the definite binary file to the text file or to the data base.

A detailed explanation of functions has been presented below:

3.2.2 Archive Export to the File

The export of the archive to the file is carried out after selecting the option *Archive-Readout/conversion* available from the level of the main application window – group of data export.

Archive data currently read out from the recorder (data in the software memory) can be directly exported to the text file after choosing the *Export data to the file* option. One can additionally define export parameters such as the date of the beginning and end. In case when the export beginning date is the same as the export end data, the user can define the beginning hour and the end hour. Exported data will include the indicated period. After carrying out the archive readout through the interface, start and stop parameters will be automatically set on the archive beginning and end.

In order to convert binary files (e.g. coming from the data readout from the recorder operating on the object or coming from earlier archive readout), one must press the *Open archive file (*.bin)* push-button and next indicate the file which has to be read in.

After reading in data on the window status bar, the path and the file name will be displayed, fields of the first record and last record will indicate the time interval of data located in the file. Start and stop export parameters defining the time interval for export will be set in the automatic way. In order to carry out the export to the text file, one must select the *Export data to the file* option.

After indicating the file name, the file with text data located in the form of columns separated by the tabulator index will be created. The format of the text file created by the software is in compliance with the text stored in the memory card located in the N30B recorder.

3.2.3 Archive Export to the Data base

The archive export to the data base can be carried out directly after the data readout from the N30B recorder or can be carried out on the base of data coming from earlier archive data readouts located in binary files. Data export functions to the data base are available in the dialogue window which appears after pressing the *Archive-Readout/Conversion* push-button. The way of the binary file reading in and the selection of the data time interval is presented in the section *Export Archive to the File*. In case of data export to the data base, one must proceed in the similar way, and after defining export parameters, one must press the *Export data to the data base* push-button.

The direct data export to the data base after the archive readout by the interface is possible if before the archive download, the *Erase the archive after download and locate data in the MySQL data base* option will be marked or after downloading through the pressure of the *Export data to the data base* push-button.

Notice: One must remember, that the data export to the MySQL data base can follows only in case, when the connection with the data base has been correctly configured - *MySQL-connection configuration* dialogue window.

3.2.4 Conversion of Text Files to the Data base, Connection Configuration

Text files being the result of data export or coming from the memory card on which the N30B recorder archived data, can be located in the data base. In order to locate data from text files (*.dat), one must transit to the MySQL dialogue window. To this aim, one must press the *MySQL-connection configuration* push-button. Then, the dialogue window presented on the fig. 11 will be displayed.

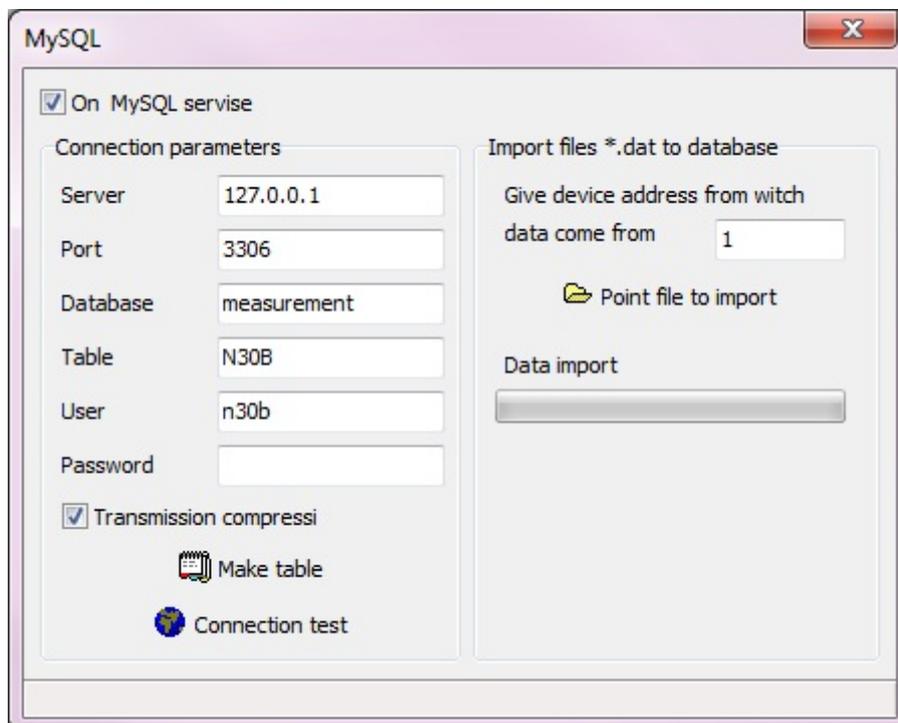


Fig. 11. MySQL.

Before beginning to the text file conversion and locating data In the data base, one must configure the connection with the data base. For this aim, one must give:

- Server – IP address or the server name on which there is the MySQL data base. In case, when it is the base located in the same computer on which the software has been started, it is enough to give local host as the name or give the address:
IP 127.0.0.1
- Port – port on which the MySQL server listens out. The standard configuration operates on the port 3306.
- Data base – data base name. The data base must exist in the server.
- Table – table name which exists or will has to be created.
- User – user's name possessing entitlements to add data to the table definite in data configuration (INSERT) and to review data from the base (SELECT).
Notice: in case, when the table will be generated from the level of the N30B software, the user must have entitlements to the data base allowing to create the table.
- Password – password for the user authorizing to access to the data base.
- Transmission compression – makes possible the compression switching on during the connection with the data base.

After giving connection parameters, one can create a table in which data will be stored or make a connection test with the data base.

In case, when in the data base there is no table given in the table field, the data import from the text file does not succeed.

The import of the text file consist of giving the recorder address which data are coming from (the address is a parameter which serves to differentiate recorders located in one table and it is not recorded in the file), and next, one must click the *Indicate the file to be imported* push-button. After indicating the file the data import process and location them in the data base will begin. After finishing the process, the number of added records to the data base will be displayed on the panel.

3.2.5 Automatic Archive Downloading

The automatic archive downloading allows to defining 32 tasks, what allows to download data in various hours, in various days. Thanks to automatic tasks, one can download data from 32 N30B recorders once a day. The operation of automatic data download has a sense only for N30B recorders accumulating data in the internal memory

Automatic tasks are started 60 sec. after the software starting. If there are overdue tasks from the given day, they will be carried out.

The configuration of automatic tasks is carried out in the *Automatic archive download* dialogue window presented on the fig. 12

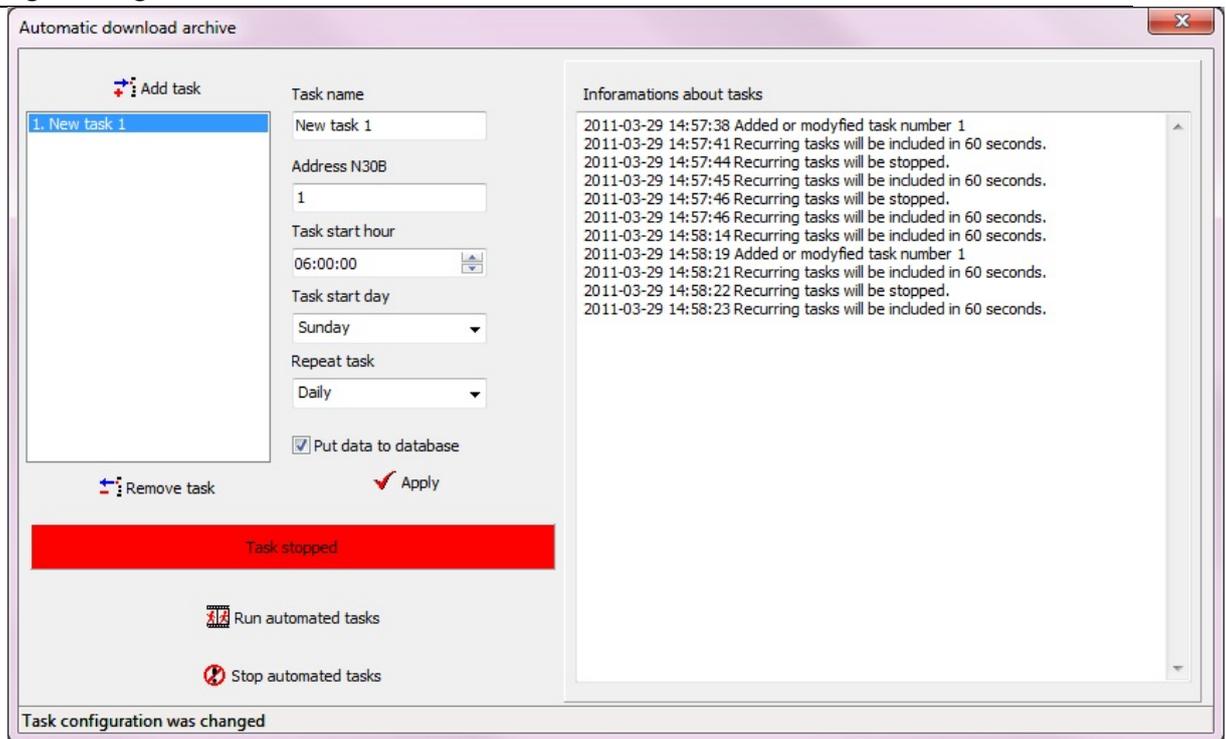


Fig. 12 Automatic archive downloading

The addition of new tasks consists of pressing the *Add task* push-button. Next, in the new added task, one must give following parameters:

- Task name – any text.
- N30B address – recorder address from which data will be read out.
- Time of the task beginning - defines the time since which the task should begin. If more tasks will be defined in the same time, they will be set in a queue and next cyclically performed.
- Day of the task beginning – defines the weekday in which the task will be carried out.
- Repeat the task – defines when the task has to be repeated. Selecting the lack of repetition option causes, that the after carrying out the task will be erased from the list.
- Locate data in the data base – the marking of this option causes, that after carrying out the task, data will be automatically located in the data base. In case when this option is switched off only binary files are created in the Archives catalogue.

After defining the task, one must press the *Apply* push-button in order to actualize the task.

Note: during carrying out periodic tasks the software can no answer. The fact to realize periodic tasks is signaled by the software through the software icon display in the systemic bar (by the clock in the task bar).

Additionally, the user can stop the execution of systemic tasks, and next start them manually.

All messages of the automatic task module are displayed in the dialogue window allowing the operation checking, communication correctness and the state of periodic task realization.

3.2.6 Analysis of Archive Data - Graph

Accumulated archive data can be reviewed on the graph dialogue window. The user can review any data in the shape of graphs. Created graphs can be printed. Moreover, there is the possibility to review data in the shape of a table. The view of the dialogue window Graph is presented on the fig. 13. The meaning of edition fields and push-buttons located in the dialogue window is presented on the fig. 14. One must remember to press the Apply push-button after each parameter change of the given series, what causes the data download about the series.

The series configuration is automatically recorded during the software closing and is read in after starting the software. Thanks to that, the generation of such same graphs from different periods does not require a continuous configuration of series parameters.

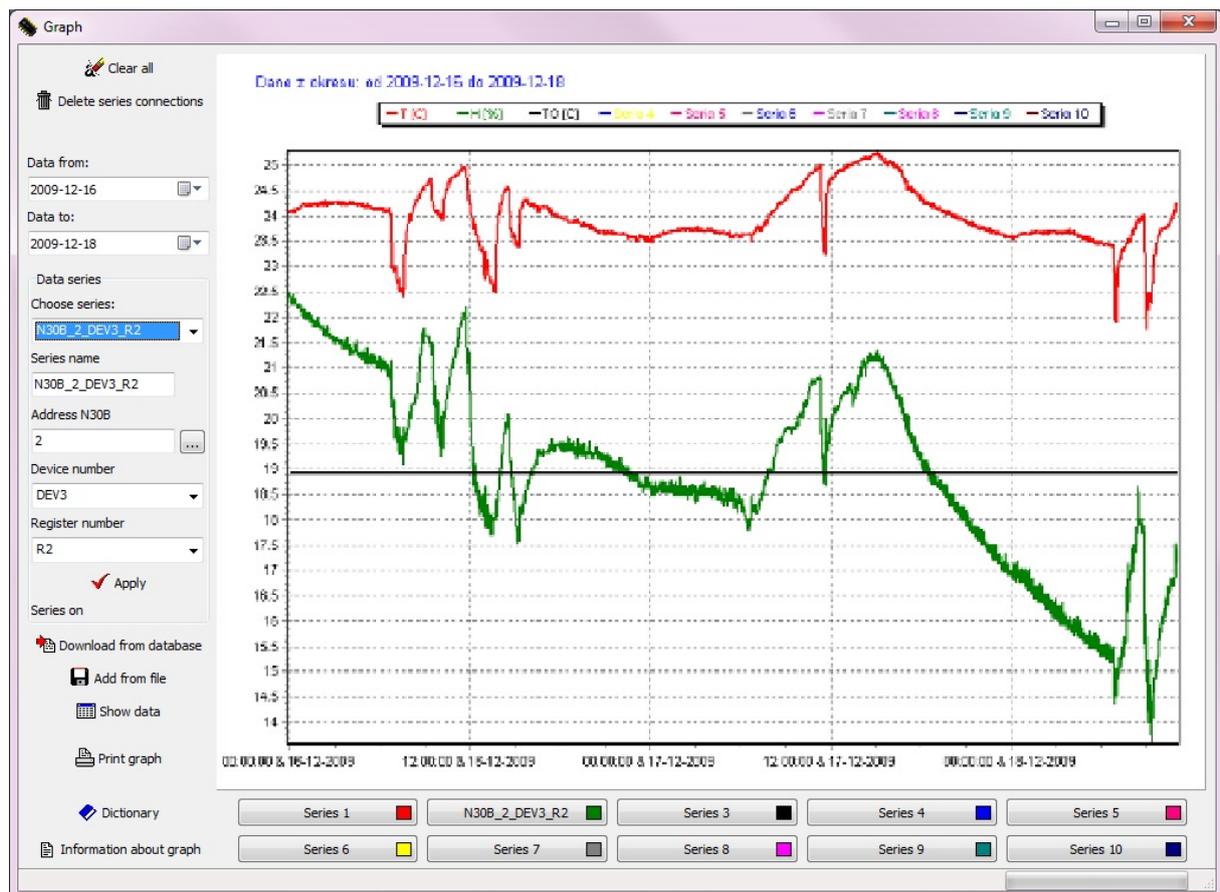


Fig. 13 Diagram

The lateral panel of dialogue window (fig. 14.) includes push-buttons, text fields and selection fields. Functions fulfilled by these fields are as follow:

- *Clear the graph* – The push-button pressure causes the clearing of all graphs and the data erasing from tables. Series connections will be preserved.
- *Erase series connections* – The push-button pressure causes the erasing of all series and clearing of the graph. The series configuration will be erased.
- *Data from* – date defining the period beginning. Selection fields of the date are destined to define the time interval from which the graph interests us.
- *Data to* – data określająca koniec wykresu.
- *Series selection* – the field serves to select the series, the configuration of which we want to change. After introducing the change, one must press the Apply push-button.

If the given series has been displayed on the graph, it will be cleared till the time of a renewed data download from the data base of file.

- *Series name* – any name allowing an easy identification of the given series.
- *N30B Address* – physical address of the N30B recorder from which data are generated.

The series is switched off for the value 0.

- *Device number* – defines the device number in N30B (DEV0...DEV9) recorder configuration from which data will be presented In the series frames.
- *Register number* – defines the register number of the selected device (DEV0...DEV9), archive data of which will be presented on the graph within the selected data series frames. Fields of the N30B address, device number and register number allow to an unambiguous definition of the register which will be presented in the series frames.
- *Apply* – Causes the download of introduced series settings. If the series has been active, it will be cleared on the graph till the moment of data download from the data base or the file.
- *Download from data base* – causes the download of data necessary to erase series from the data base.
- *Add from the file* – causes the readout of the file with data. If there are data in the file which match to one of the series, they will be located on the graph. After selecting the Add option from the file, the user will be asked to give the recorder address which data are generated from.
- *Show data* – causes the opening of the window including data being on the graph. Data are set In the form of tables. For each series, an individual table is created with data presenting downloaded records from the data base.
- *Print the graph* – causes the graph printing.
- *Dictionary*– start the dictionary allowing the series configuration. Tanks to the dictionary, one can assign to each device register a name and use it in the future for the series configuration on the base of this name. The dictionary admit the addition up to 32 N30B recorders.
- *Information about the graph* – Causes the display of the dialogue window presenting detailed data about graph series.

The Graph dialogue window allows also reviewing data In the form of tables including data from the given device. The view of the dialogue window presenting data in the table form, starting after selecting the *Show data* option is presented on the fig. 15.

Tablica

T [C] H [%] TO [C] Seria 4 Seria 5 Seria 6 Seria 7 Seria 8 Seria 9 Seria 10

Seria1: T [C] N30B Adres: 1 Urządzenie: DEV0

Data	Czas	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9
2009-12-14	00:00:00	24.413800	19.998700	2E20							
2009-12-14	00:01:00	24.433800	20.073900	2E20							
2009-12-14	00:02:00	24.413800	20.146600	2E20							
2009-12-14	00:03:00	24.403700	19.998100	2E20							
2009-12-14	00:04:00	24.413800	19.998700	2E20							
2009-12-14	00:05:00	24.423800	19.999300	2E20							
2009-12-14	00:06:00	24.433800	19.999900	2E20							
2009-12-14	00:07:00	24.433800	20.073900	2E20							
2009-12-14	00:08:00	24.413800	20.072700	2E20							
2009-12-14	00:09:00	24.413800	19.998700	2E20							
2009-12-14	00:10:00	24.433800	20.036900	2E20							
2009-12-14	00:11:00	24.423800	19.999300	2E20							
2009-12-14	00:12:00	24.433800	19.999900	2E20							
2009-12-14	00:13:00	24.433800	20.147800	2E20							
2009-12-14	00:14:00	24.413800	20.109700	2E20							
2009-12-14	00:15:00	24.403700	20.072100	2E20							
2009-12-14	00:16:00	24.413800	20.072700	2E20							
2009-12-14	00:17:00	24.393700	20.071500	2E20							
2009-12-14	00:18:00	24.393700	20.071500	2E20							
2009-12-14	00:19:00	24.413800	19.998700	2E20							
2009-12-14	00:20:00	24.423800	19.999300	2E20							

Zamknij

Fig 14. Data in the table form.

Besides data in the table form, one can also take advantage from information about the graph, where besides the series name following parameters are available:

- N30B recorder address which data are coming from.
- Device number which data have been read out from (DEV0...DEV9).
- Register number of the DEVx device, data of which have been presented on the graph.
- Minimum: lowest value registered in the set period of time with the given time and date of occurrence.
- Maximum: highest value registered in the set period of time with the given time and date of occurrence.
- Mean – mean value calculated on the base of downloaded data.

The window view with information is presented on the fig. 15.

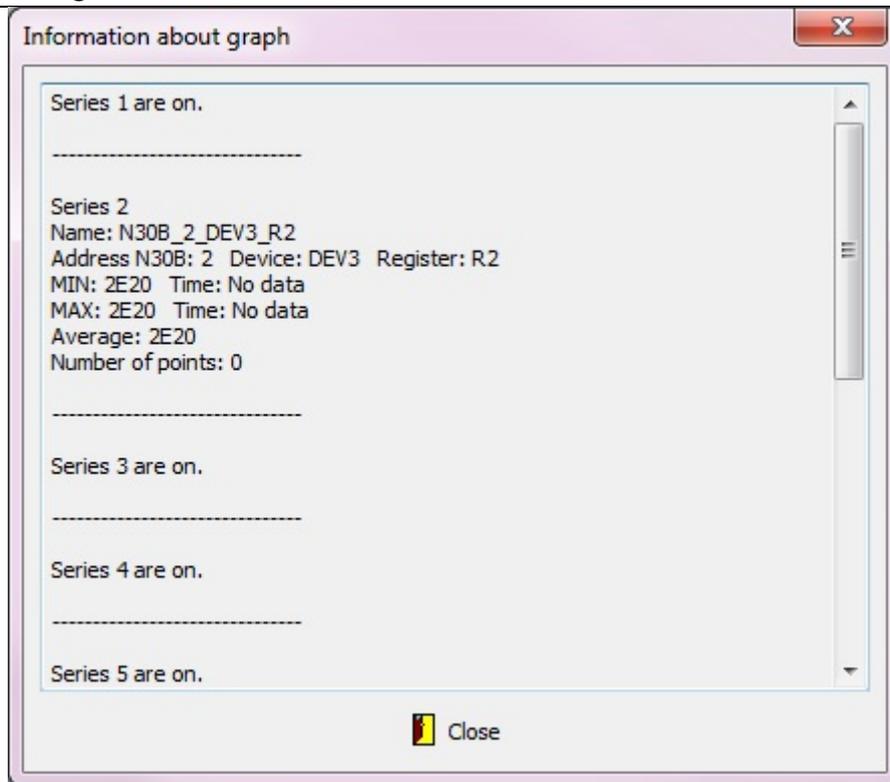


Fig.15 Information about the graph

According to information presented above, the series configuration can be carried out on the base of the dictionary. The view of the main dictionary window is presented on the fig. 16. The user can configure up to 32 registrations, which will be used during the configuration of graph series.

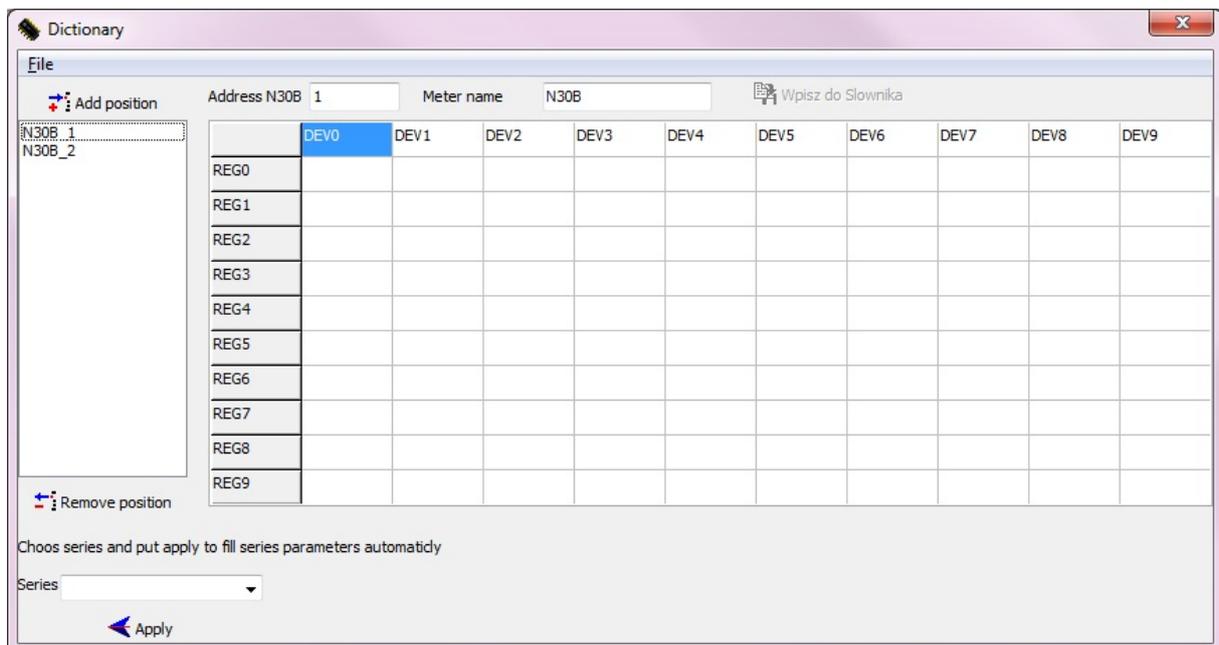


Fig. 16 Dictionary

The addition of registrations to the dictionary consists of the *Add position* selection option, and next of giving the N30B recorder address concerned by the given dictionary field and the recorder name. As the recorder name, one can give any name. Next, one must give device and register names of the given device. After finishing the configuration process, one must press the *Write In the dictionary* push-button, what causes the record of introduced changes of the given configuration to the selected dictionary position.

One can also erase dictionary positions. For this aim, it is sufficient to mark the position to erase and press the *Erase position* push-button.

One can write in the file the created dictionary configuration. It is also possible to readout the previously created configuration. These options are available from the menu File level.

4 DATA BASE

The N30B software has implemented co-operation functions with the MySQL data base. Data coming from the N30B recorder can be located in the data base. Moreover, the software enables the readout and the representation of read out data in the shape of a table and graph.

Data base in which data are stored, can be located in the computer which the N30B software is installed in, or in any computer which exists a connection by means of the TCP/IP with.

The application of the data base gives the possibility to review data from various computers having access to the data base. Additionally, the user can create an internet page in which will be placed data coming from the data base.

In accordance with what has been presented above, the MySQL data base has been selected as the data base. It is one of the most popular data bases which can be free used and for it there are many examples in the Internet concerning both the configuration of the same base and its administration and concerning connections between the server of internet pages (e.g. Apache) and the MySQL data base.

4.1 Installation

Before the data base installation, one must download the installation software, which will carry out the installation process together with the user. The newest version of the software and the full documentation are in the <http://www.mysql.com> page.

A curtailed installation description and a basic server configuration of the data base in the 5.1.41 version has been presented below (installation process and configuration of successive version can be different, since the project is continuously developed and new versions of data base appear). The presented installation concern description MySQL data base installation in the Windows system. In case of other operating systems. one must proceed according to requirements and documentation of the given operating system.

After downloading the installation software, we start the *mysql-5.1.41-win32.msi* file (it is the file of the Windows installing system). This generates the dialogue start, which conduct the user through the installation process. The view of the dialogue windows is presented on the fig. 17.

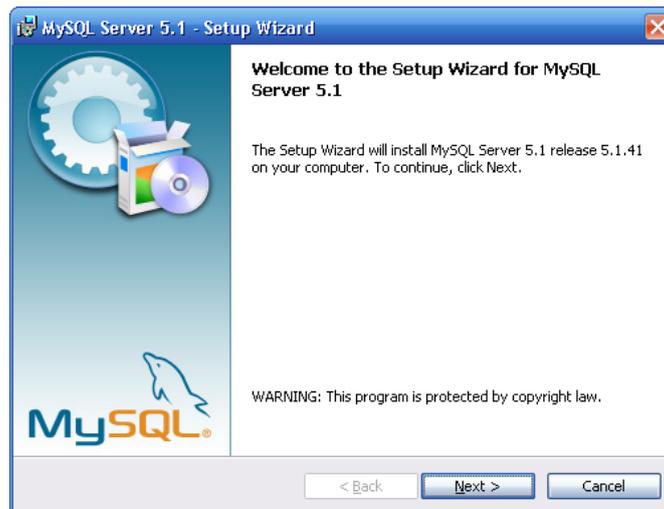


Fig. 17 Start of the data base installation

After turning up the window presented on the figure, we press the *NEXT* push-button, then the dialogue window presented on the fig. 18 will be displayed.



Fig. 18 Installation

Select a typical installation and click *NEXT*. Next, the window informing where will be installed components and where will be stored data, will be displayed.

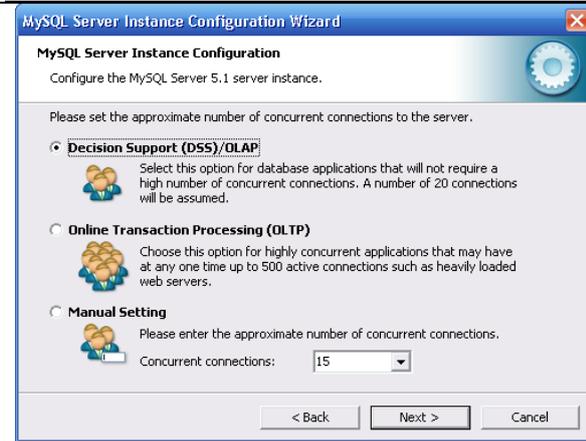
After clicking *NEXT*, the installation process will start. After finishing file copying, the dialogue window presented on the fig. 19 will be displayed. Mark the server configuration option and click *NEXT*. One can additionally select the MySQL server registration.



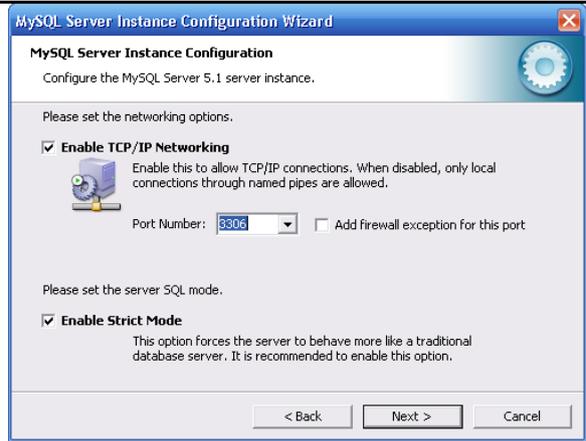
Fig. 19 End of file copying

After starting the installation mode, select the server configuration and transit through successive Windows showed on figures below:

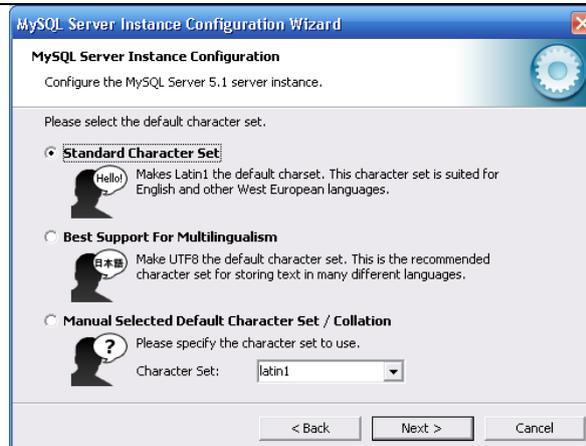
<p>Press the finish push-button to transit to the MySQL. server configuration.</p>	<p>Select the server type</p>
<p>Select the base type used by the server</p>	<p>Select the place, where will be stored data</p>



Select the number of users serviced by the server.



Set the TCP/IP port and turn the network service on. In case of firewall use, we have the possibility to create rules unlocking this port.



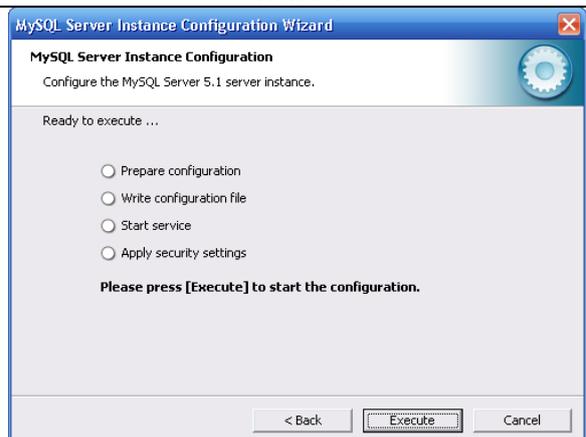
Set marks (table of marks), which will be used.



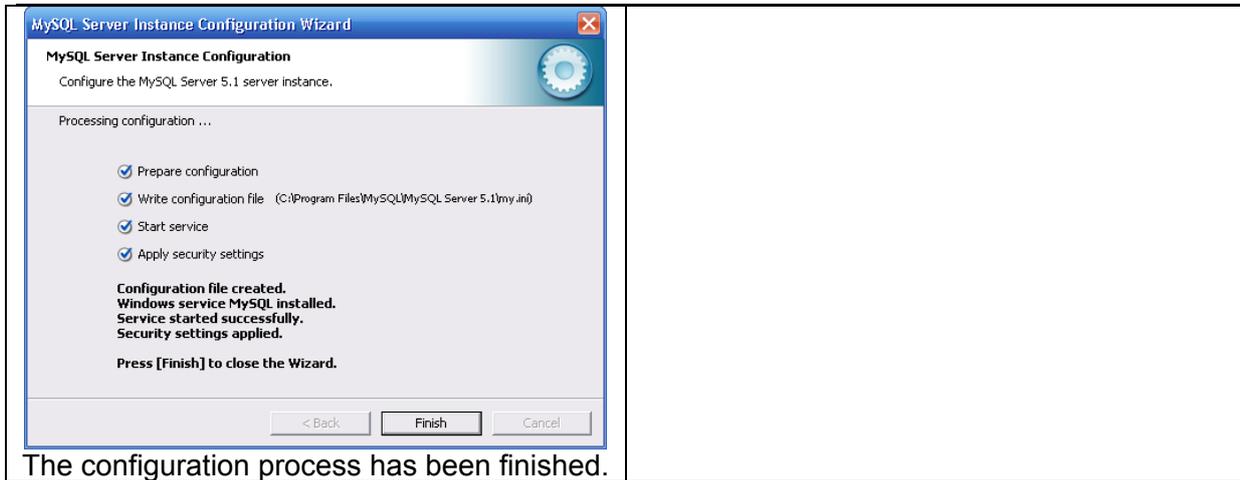
Select if the server has to automatically start itself after the system start and the service name (of the process) under which it will be visible.



Introduce the password of the administrator which will have entitlements for the data base administration.



Configuration end. Select Execute in order to introduce selected settings.



After transiting through successive dialogue and configuration windows the MySQL data base server has been installed and started. In order to change the server configuration and configuration of advanced options, one can use the `mysql-gui-tools` software available on the <http://www.mysql.com> page. This software enables the graphical configuration of server parameters and to install a console allowing to transmit queries to the data base server.

On the fig. 20, the exemplary view of the software window enabling the monitoring of server parameters and the configuration change, is presented. MySQL Administrator software.

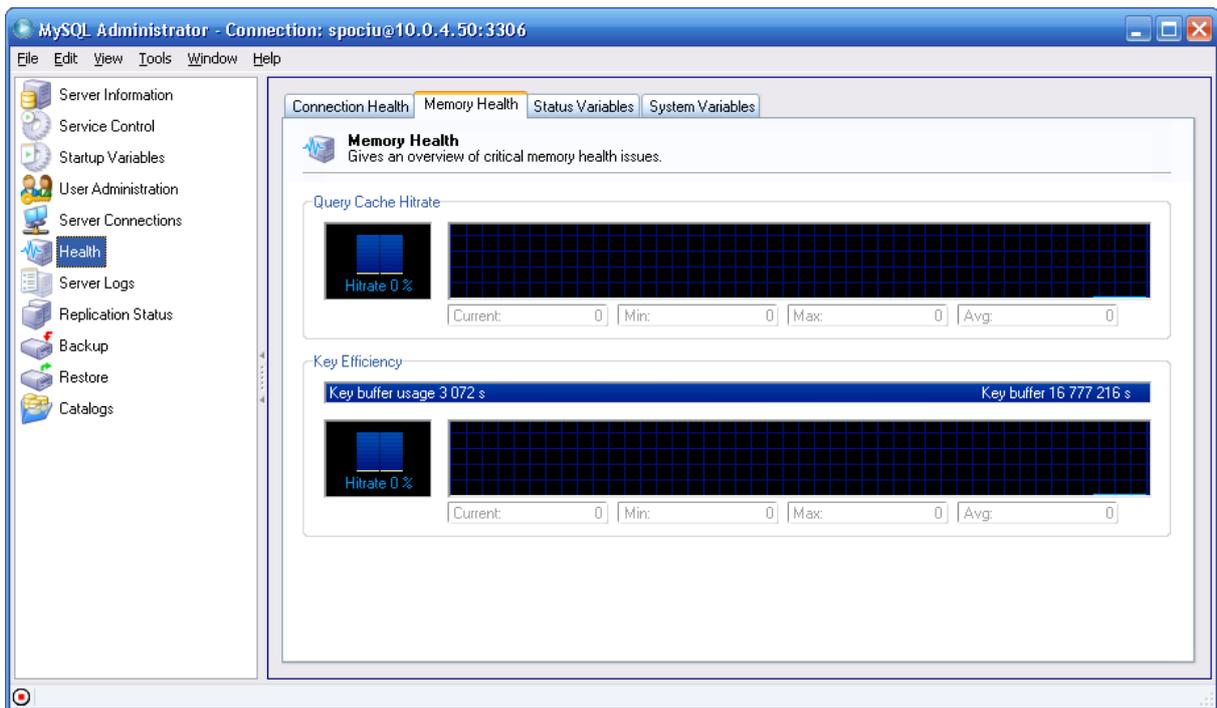


Fig. 20 Window of the MySQL administrator software

The view of the software window enabling to ask queries to the data base is presented in the fig. 21. – MySQL Query Browser.

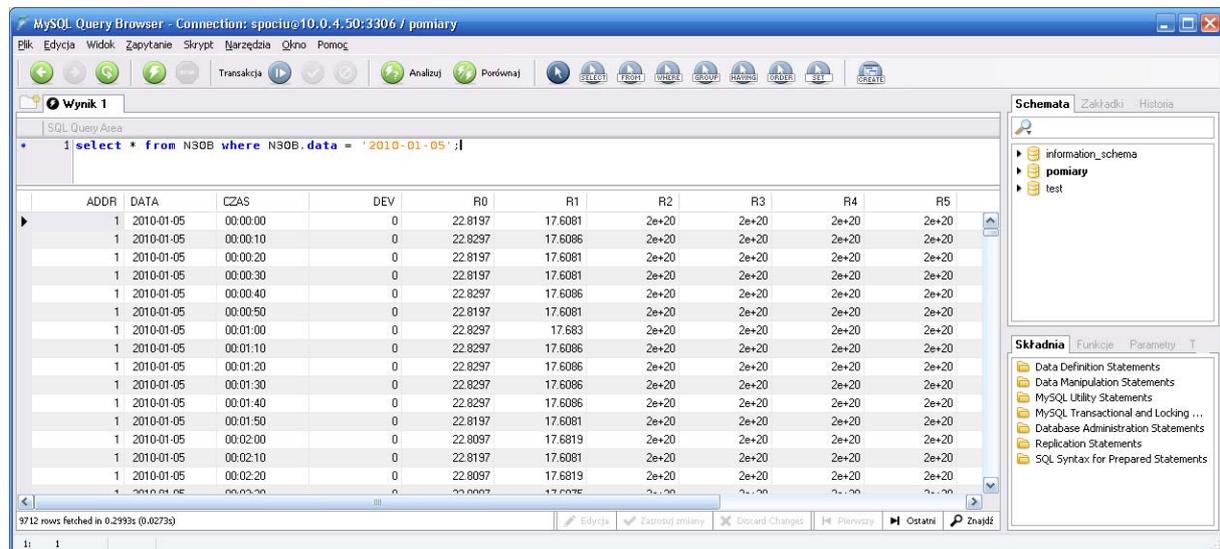


Fig. 21. Window of the MySQL software

4.2 Foundation of a Base

The N30B software needs one data base for a correct co-operation and established in it, a table with a definite structure (see the section: Structure of Used Table). The MySQL data base server allows creating many data bases. In each of these data bases, many tables can be located. Data are always stored in tables. Users having suitable entitlements (addition of records, record modification, record erasing, etc.) are assigned to each data base, table.

The foundation of a data base must be carried out from the level of the „MySQL Query Browser” software or by means of „MySQL Command Line Client” software installed with the MySQL server. Less set up that we want to create a measurement data base and give entitlements to a N30B user, to establish tables to add records, record modifications. For this aim, after starting the software of the data base client and logging as the administrator (user: Root, password: given during the server installation) one must write in following commands:

- *create measurement data base*, (press the Enter push-button). Giving the command, causes the creation of the measurement data base.
- *GRANT ALL ON measurements.* to 'n30b'@'localhost' identified by 'password';* (password – any password). Giving the command, grants entitlements for the N30B user identified by the 'password' , logged locally for all modifications of the measurement data base. However in case when entitlements have to be another than full, then, in the place of ALL, one must give entitlements (e.g. select, insert etc.). The N30B software requires that the user must possess entitlements of INSERT and SELECT type. However, in the case when the table has to be establish by the N30B software, the N30B user must possess entitlements to create tables.
- *GRANT ALL ON measurements.* to 'n30b'@'%' identified by 'password';* This command is similar to the previous command, but in this case, given entitlements are related to users logging in a remote-controlled way (from other computers).

In case, when we want create a user which can only review data In the data base of measurements located in the N30BTAB table, then one must give the command (notice: the N30BTAB table must exist):

```
GRANT SELECT ON measurements.N30BTAB to 'n30b_user'@'%' identified by the 'password_user'
```

4.3 Creation of Tables

In order to create tables in the given data base it is more comfortable to use the N30B software. From the level of the N30B software pass to the window MySQL (MySQL push-button – connection configuration), then the window presented on the fig. 22 will be displayed. In fields of the form, give data during transmitting entitlements to users (GRANT commands). After filling windows, press the *Create table* push-button). The creation of a table will be confirmed by a message appearing in the window status bar. From this moment. there is an operational connection with the data base and data can be located in the data base.

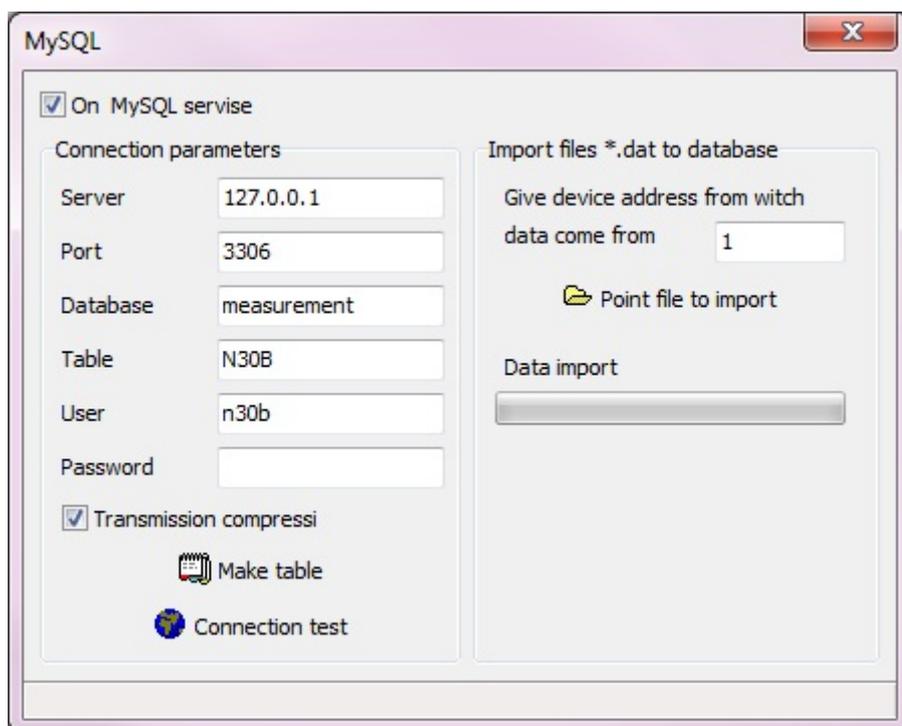


Fig. 22 Creation of the table

One can also create a table “manually” giving a command from the software window level of the data base client (in the same way like during the data base creation), next select the data base which the table will be create in.

After selecting the data base create the table:

```
CREATE TABLE n30b( ADDR TINYINT not null default '1',
```

```

DATA date not null default '2010-01-05',
CZAS time not null default '00:00:00',
DEV TINYINT not null default '0',
R0 float not null default '1E+20',
R1 float not null default '1E+20',
R2 float not null default '1E+20',
R3 float not null default '1E+20',
R4 float not null default '1E+20',
R5 float not null default '1E+20',
R6 float not null default '1E+20',
R7 float not null default '1E+20',
R8 float not null default '1E+20',
R9 float not null default '1E+20');

```

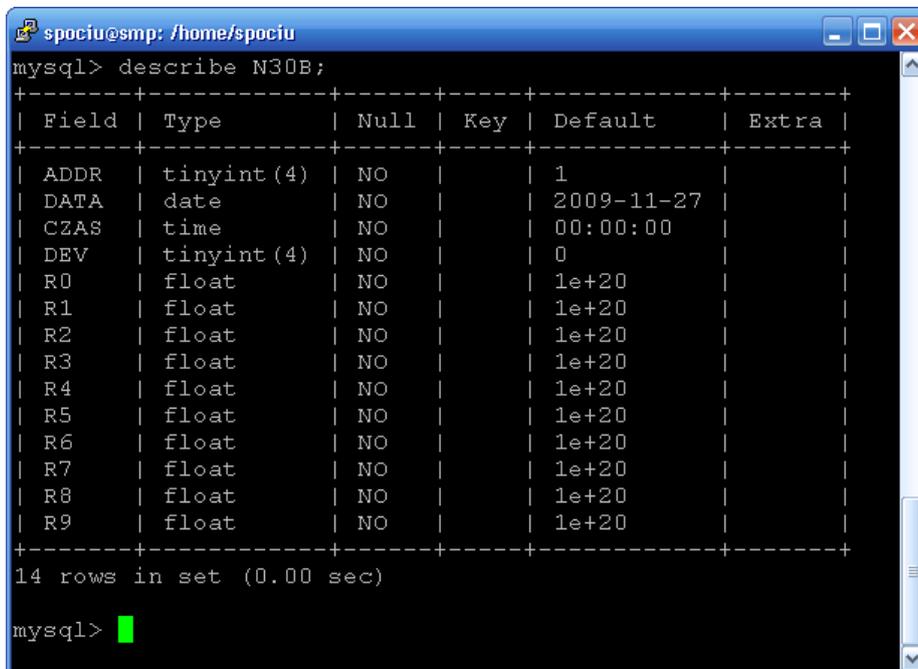
After giving the command, the table is already created. If we use more than one N30B recorder there is no need to create more than one table, since N30B recorders are identified by ADDR fields defining the address of the N30B recorder. In this case, one must only take care, that recorders have installed a unique (non-repeatable) address.

4.4 Structure of Used Table

The used table in the N30B software has the form of the table presented below. One can always check the table structure giving a command from the client's software level.

describe n30b; (where n30b the table name. One must select the command after choosing the data base.– *use measurements*).

The view of the window after giving the command is presented on the fig. 23.



```

spociu@smp: /home/spociu
mysql> describe N30B;
+-----+-----+-----+-----+-----+-----+
| Field | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| ADDR  | tinyint(4)| NO   |     | 1        |       |
| DATA | date      | NO   |     | 2009-11-27 |     |
| CZAS  | time      | NO   |     | 00:00:00 |     |
| DEV   | tinyint(4)| NO   |     | 0        |       |
| R0    | float     | NO   |     | 1e+20    |       |
| R1    | float     | NO   |     | 1e+20    |       |
| R2    | float     | NO   |     | 1e+20    |       |
| R3    | float     | NO   |     | 1e+20    |       |
| R4    | float     | NO   |     | 1e+20    |       |
| R5    | float     | NO   |     | 1e+20    |       |
| R6    | float     | NO   |     | 1e+20    |       |
| R7    | float     | NO   |     | 1e+20    |       |
| R8    | float     | NO   |     | 1e+20    |       |
| R9    | float     | NO   |     | 1e+20    |       |
+-----+-----+-----+-----+-----+-----+
14 rows in set (0.00 sec)

mysql>

```

Fig. 23 Table structure.

Field name	Type	By default	Description
ADDR	tinyint	1	Address – defines the N30B recorder address which data come from.
DATE	date	2009-11-27	Date – defines the date which data come from..
TIME	time	00:00:00	Time – defines the hour which data come from.
DEV	tinyint		DEV – device number connected to N30B (0..9) which data come from. The device number is definite in the N30B recorder configuration stage and depends on the device number DEV0...DEV9.
R0	float		First value read out from the device DEV.
...
R9	float		Last value read out from the device DEV. In case when there are less of read out values, excessive fields are filled by values 2E+20.

An example of values located in the data base is presented below.

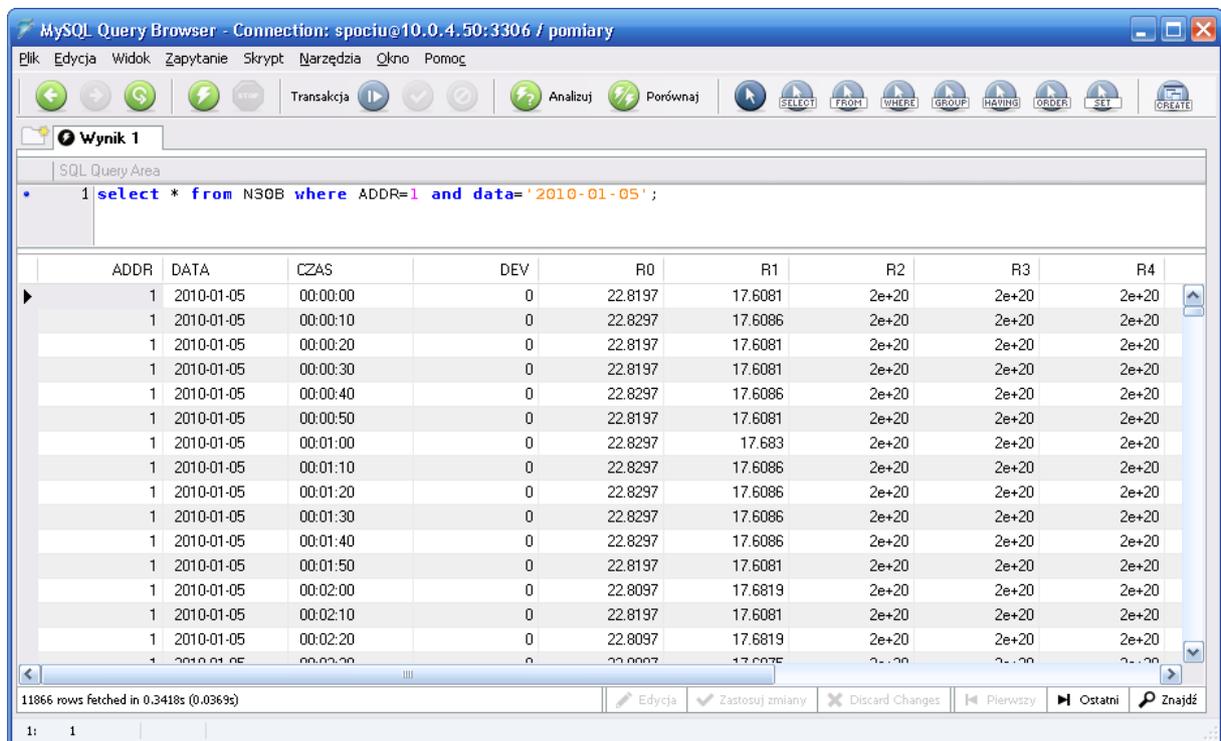


Fig. 24 Data view In the data base.

Presented data come from the N30B recorder with the address 1 from the device DEV0. Since only 2 values are read out from the device (R0 and R1), for this reason a part of record fields (R2..R9) has been filled by values 2E+20.



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