Cometsystem s. r. o.

Comet Database
Database system for COMET devices

Instruction manual

Introduction

This database system is designed for collection and storage of data from COMET devices.

It offers:

- Filling the database with data downloaded from Monitoring systems, Dataloggers and Multiloggers

- Online data collection from Web Sensors and from Monitoring systems MS6, MS55 and Multiloggers

- Compression of online collected data

- Backing up the database

- Viewing data from the database in tabular and chart format

- Print and PDF output as tables and charts as well

- Output table data to CSV (MS Excel compatible format)

- Viewing data from different devices at a time and their comparing on one chart

- Viewing online values

- Acoustic and visual signalization of alarms

- Alarming via SMS texts and emails

Actually it supports these devices:

- Monitoring systems: MS3+, MS4+, MS5, MS6 and MS55

- Dataloggers of series: Rxxxx, Sxxxx, Lxxxx, Uxxxx and UxxxxM (Mobile Datalogger)

- Dataloggers with printer: T-PRINT, T-PRINT-2, G0221, G0841 and G0241

- Portable instruments COMMETER of series Dxxxx

- Web Sensors of series: Txxxx, Hxxxx, P85xx, P86xx, Txxxx-CO2, Hxxxx-CO2, P2520

- Wifi Sensors of serie: Wx7xx

- With use of service RS485/232Utility RS485/232 sensors and RS485/232 3rd party devices which supports Modbus protocol

Attention:

Primary data source of measured values from Monitoring systems, dataloggers and Multiloggers are downloaded files. **Never delete original *.msx , *.mss and *.msb files!**

Components of the systém:

- Database server Microsoft SQL Server

- Database on the database serverem

- Windows services for data acquisition from devices (SOAP Server, Datalink service), service for evaluation of alarm states (Alarm Notifier service) and services for sending warning messages (SMS Sender, Email Sender)

- Program Database Manager. Serves for creating database on SQL server and for administration of whole Comet Database system

- Program Database Viewer. Serves for viewing data. It is intended for users. It is possilbe to install it on more PCs.

- Other programs, which downloads data from devices and inserts data into database (Program for monitoring systems, Program for dataloggers, Comet Vision)
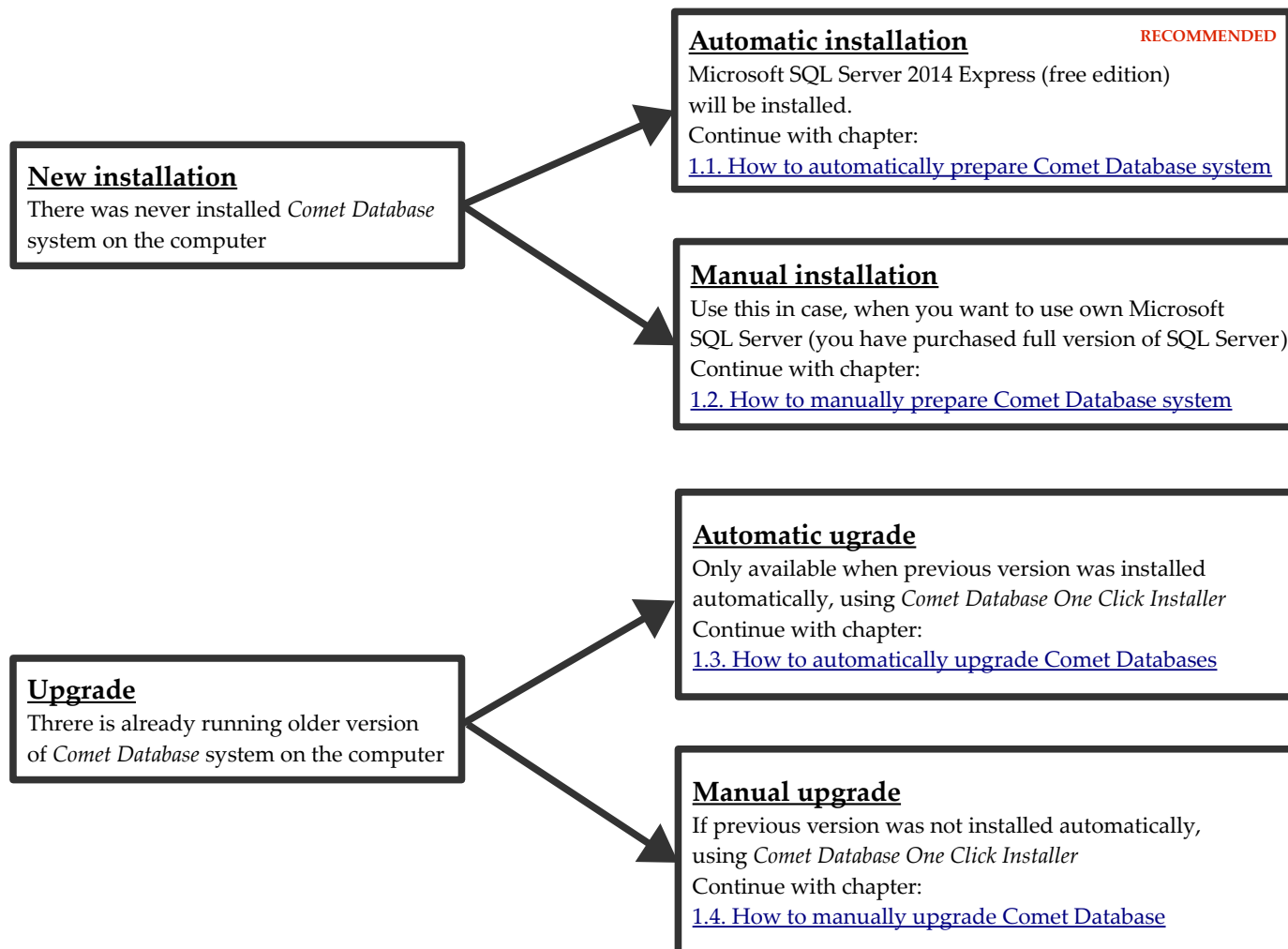
Obsah

1 Preparation Comet Database system

You have to decide on the way of installation before preparing the system:

New installation
There was never installed *Comet Database*
system on the computer

Automatic installation   RECOMMENDED
Microsoft SQL Server 2014 Express (free edition)
will be installed.
Continue with chapter:
1.1. How to automatically prepare Comet Database system

Manual installation
Use this in case, when you want to use own Microsoft
SQL Server (you have purchased full version of SQL Server)
Continue with chapter:
1.2. How to manually prepare Comet Database system

Upgrade
Threre is already running older version
of *Comet Database* system on the computer

Automatic ugrade
Only available when previous version was installed
automatically, using *Comet Database One Click Installer*
Continue with chapter:
1.3. How to automatically upgrade Comet Databases

Manual upgrade
If previous version was not installed automatically,
using *Comet Database One Click Installer*
Continue with chapter:
1.4. How to manually upgrade Comet Database

1.1 How to automatically prepare Comet Database system

Automatic preparation of *Comet Database* system can be done by *Comet Database One Click Installer*.

The installer will install and prepare *SQL Server Express 2014* (free edition with 10GB limit on database). If this is not sufficient for you, i.e. you have purchased full version of SQL Server (version 2008 and higher), then you have to prepare the system manualy: 1.2 How to manually prepare Comet Database system.

Automatic preparation of Comet Database system

1) Download *Comet Database One Click Installer* from:

   http://www.cometsystem.com/products/reg-CDB#downloadd

2) Run downloaded installer. Wait until the program will extract all requested files to temporary folder and then choose language.

3) Choose the choice *Automatic installation* after the installer is open. Because the preparation creates 4 SQL Server accounts, their passwords will be generated automatically. If you want to create these passwords on your own, then choose second choice *Automatic installation (you will be asked for entering passwords)*.
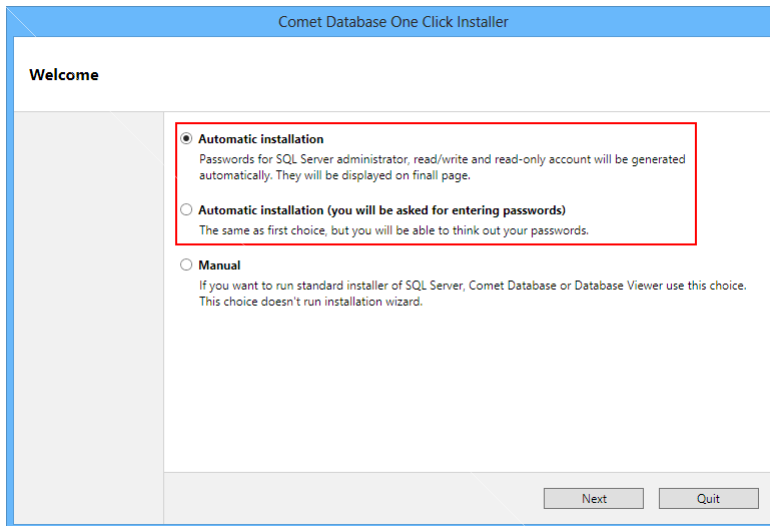
4) Click the button *next* to start installation. If you chose automatic installation with entering passwords, you will be asked for entering passwords on next page and then start installation with button *Start*. Installation may take several minutes. You can watch which part is currently in progress (highlighted in bold) on left panel.

5) Final page will be displayed after installation. Here, you can see, if *Comet Database* system was successfully prepared:
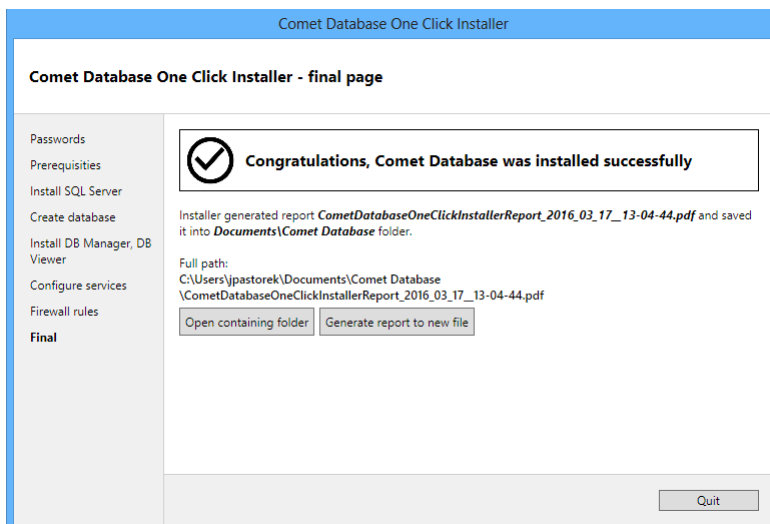
Also, you can see the location of PDF report about installation, which was generated by the installer. **Print this document, alternatively store it on save place!** It includes passwords for SQL Server accounts. If you lose them, it wouldn't be possible to work with database in the future (upgrade database, reconfigure services, connect another *Database Viewer*, etc.).

6) On the first page of PDF report, you can read about how SQL Server was set up, information about created accounts and their passwords and settings of listening ports of services.

Here are links to next pages, where are concrete examples how to configure Web Sensors and Multilogger for sending data into database.

Other links redirects to pages with concrete examples about database connection parameters configuration in programs Database Manager, Database Viewer, Program for monitoring systems and Program for dataloggers.

1.2 How to manually prepare Comet Database system

Following steps will guide you through the preparation of system Comet Database. Each steps shortly describes what to do and references on particular chapters, where the theme is explained in detail.

1) Install *Microsoft SQL server*.

Described in chapter 11.5 Installation of Microsoft SQL Server for use with Comet Databases

2) Install the program Database Manager (is part of product Comet Database) on the same computer where you have installed database server.

Described in chapter 2.1 Installation of program Database Manager

3) Create database on database server.

Described in chapter 2.2 Using Database Manager for creation of the database on the database server

4) Create two accounts in the database. One with read and one with read/write access. If you want to have ability to add notes to data or log signing in and alarm confirmation in program Database Viewer, then create account with restricted write as well.

Described in chapter 2.3.3.a MS SQL Server Accounts administration

5) Prepare *SOAP Server*. It serves for online data acquisition from sensors and monitoring systems MS55 and MS6. If you don't plan online acquisition from these devices, then you can skip this step.

Described in chapter 11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors)

6) Prepare *Datalink* service. This service serves for online data acquisition and autonomous periodical download of record from Multiloggers. If you don't plan to use Multiloggers, then you can skip this chapter.

Described in chapter 7.2.1 Preparation of Datalink service

7) Install the program *Database Viewer*. Run it and set database connection parameters.

Described in chapter 3.1 Installation of Database Viewer and 3.2 Database connection parameters settings

8) Prepare data acquisition into database from measuring devices. Choose from following steps according to device type:

   a) **Web Sensors**: Connect at least one Web sensor to the system.

   Described in chapter 6.2 Sensor settings

   b) **Multiloggers**: Connect at least one Multilogger to the system.

   Described in chapter 7.2.2 Preparation of Multilogger for use with Datalink service

   c) **Monitoring systems**: Learn how to insert data into database. Monitoring systems MS6 and MS55 can send measuring dat into database online (usng *SOAP Server*, same as in case of Web Sensors)

   Described in chapters 5.2 Storing data from monitoring systems into database

   d) **Dataloggers**: Learn how to insert data into database.

   Described in chapter 4.2 Storing data from dataloggers into database

   e) **Wifi Sensors:** Connect at least one Wifi Sensor to the system.

   Described in chapter 9.2 Wifi Sensor settings

1.3 How to automatically upgrade Comet Databases

Actual version of *Comet Database One Click Installer* 13.0 currently doesn't support upgrade. It will be implemented in next version 14.0.

1.4 How to manually upgrade Comet Database

Follow steps one by one:

1) If services *SOAP Server*, *Alarm Notifier* service and *Datalink* service are running, then stop them.

(*Database Manager - Home - Stop* button at every service.

In case, when the program *Database Manager* is already uninstalled, then it is possible to stop services in the list of Windows services. Go to *Control Panel*, *Administrative Tools* and choose *Services*. Stop these services:

- *Datalogger database SOAP server services*

- *Datalogger Database Alarm Notifier services*

- *Datalink Service*

2) Stop all programs on all computers which are connecting to the database

- Database Viewer

- Comet Vision

- Program for Dataloggers

- Program for Monitoring Systems MS

3) Install new version of program Database Manager

Described in chapter 2.1 Installation of program Database Manager

4) Run *Database Manager* and connect to the database. The program will detect, that the database is of older version and will offer tools for backing up and upgrading only. So do following:

a) **At first:** Database Back up (the button *Backup* on the tab *Backup*).

b) **After it**: Upgrade database to new version (button *Upgrade database to the latest version* on the tab *Upgrading*.

5) The database is upgraded now. Don't forget to start services again. Other programs (*Database Viewer, Comet Vision, Program for Dataloggers, Program for Monitoring Systems MS*) will not be able to connect to the database from this moment, because the database is of newer version. Therefore reinstall all programs on all computers with their actual versions.

2 Using program Database Manager

The program *Database Manager* is the utility for managing the system *Comet Database*. You can read about all functions of this program in chapter 2.3 Functions of program Database Manager.

2.1 Installation of program Database Manager

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then the program *Database Manager* is already installed. You will find its icon on the desktop.

If you prepare *Comet Database* manually, read further. Program *Database Manager* is one component of the system *Comet Database*, so it install *Comet Database* installer. Install the system *Comet Database* on the same computer where is installed *Microsoft SQL Server*.

1) Download installer *Comet Datbase One Click Installer* from:

   http://www.cometsystem.com/products/reg-cdb#downloadd

2) Run the installer, wait until requested files are extracted and welcome page is displayed. Here, choose manual installation and click the button *Next* to continue:

3) Click the button *Run Comet Database Installer* on the following page:
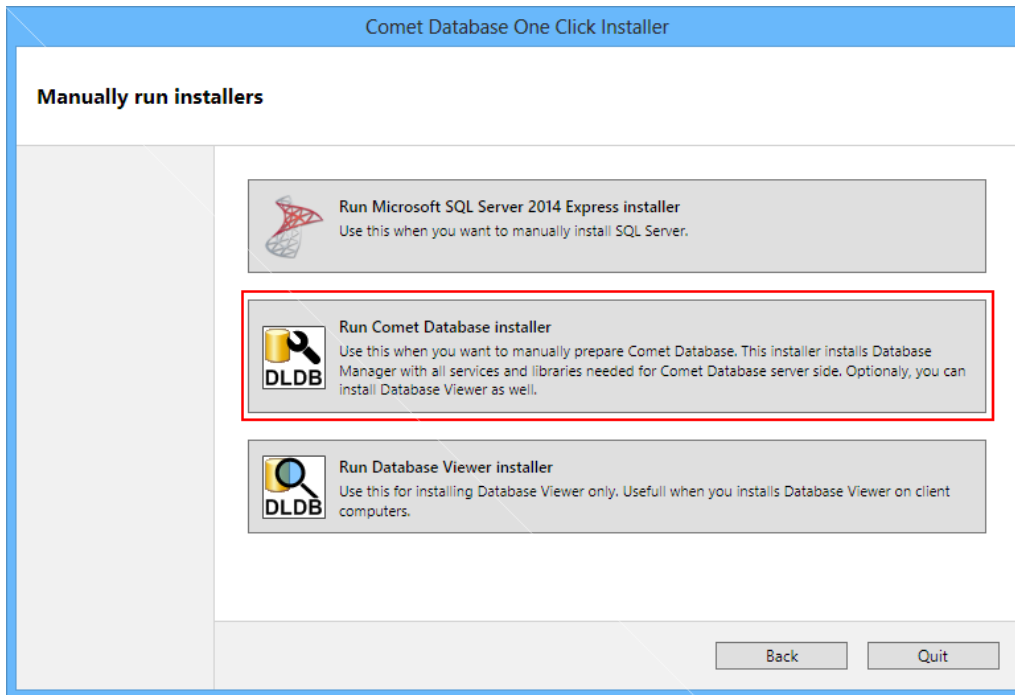
2.2 Using Database Manager for creation of the database on the database server
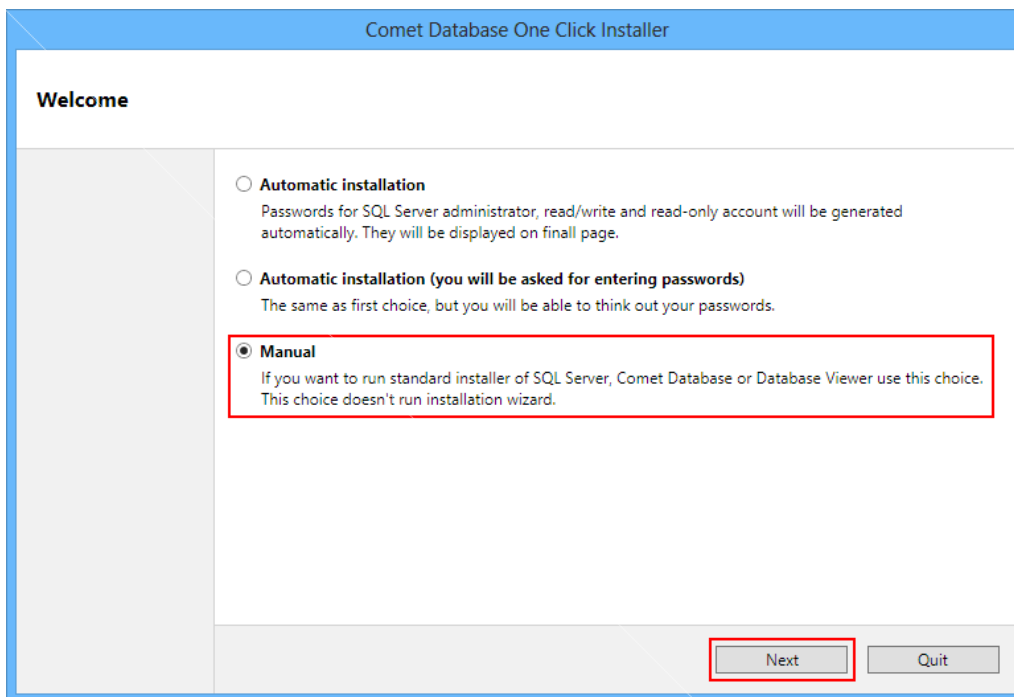
If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then the database is already created. Its name is *CometDatabase*. Don't create another database, because services are already configured for connection to the database *CometDatabase*.

If you prepare *Comet Database* manualy, continue reading this chapter.

Database Manager

Run the program *Database Manager*. Login dialog will be displayed at first. Enter database connection parameters (more info in chapter 11.2 Entering database connection parameters), but don't choose the *database* at this moment.

Select *SQL Server Authentication*, enter *sa* as the *User name* and as the *Password* enter the password that you have entered during *Microsoft SQL server* installation.

During installation you also added minimally one windows account into database system administrators list. If you have executed program under this user you can also use *Windows authentication mode*. If you choose this, then you will not enter User name and password.
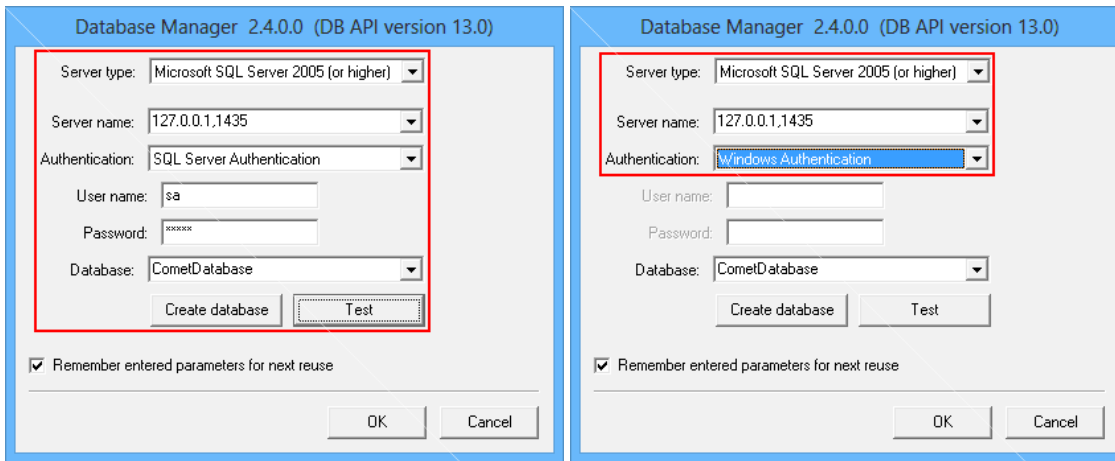
At this moment, you can use button *Test* to verify if you have entered correct database connection parameters. If parameters are OK, then message *Database name is not entered* will be displayed. Otherwise the program will inform you that it is unable to log in the server.

If parameters are OK, create some database name and enter it into the field *Database*. Use characters a..z, 0..9 only and instead of character space use character underline „_". Remember, number can not be the first character (valid examples: test_01, database_system,…)
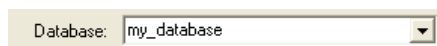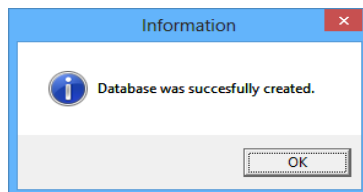

Click on the button *Create database* to execute creation process of the database. After successful creation of the database following message will be displayed:

2.3 Functions of program Database Manager

Enter database connection parameters after running *Database Manager*, choose the database and press the button *OK* to get to the database administration. How to enter database connection parameters is explained in chapter 11.2 Entering database connection parameters.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then always choose the database *CometDatabase*.

Program *Database Manager* serves for administrating the database, services and tools associated with the system *Comet Database*. There is menu (tree structured) on the left side. Using this menu you can enter all program functions.

The program will switch on page *Home* after start. At the top of this page you will find basic information about the database: Its name, version and possible there may be a message. For example, that the database should be updated to the new version. Furthermore, there is a quick overview of Windows services. You can quickly switch on or off them in this overview.

2.3.1 Section *Services*

It includes tools for administrating Windows services of *Comet Database.*

Administrations of services are similar. You'll find information about service status (running/stopped) here, buttons for controling and configuration of the service and the log about service actions and errors.

2.3.1.a Service *SOAP Server*
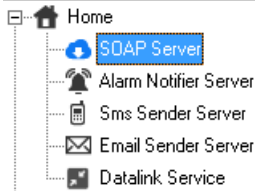
SOAP Server provides online data acquisition from devices supporting sending measured values through SOAP protocol:

- Web Sensors – sensors with ethernet interface

- Digital Sensors – RS485/RS232 sensors using RS485/232Utility

- analog devices connected through sensor P2520 (transducer from current loop 0-20mA)

- monitoring systems MS6, MS55

- RS485/232 devices supporting protocol Modbus using RS485/232Utility

- Mobile Dataloggerx UxxxxM

- Wifi Sensors Wx7xx

Configuration

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then the *SOAP server* is already configured.

Pres the button *Reconfigure*. Port 80 is recommended as listening TCP port, but you have to be sure, that there is no other application using this port on the computer. Especially HTTP server like Apache or IIS use this port (port 80 is standard for HTTP). Finally remember to allow entered TCP port on firewall (explained in chapter 11.1 Allowing TCP port on Windows firewall)!

As database account you have to use account with read/write privileges (explained in chapter 2.3.3.a MS SQL Server Accounts administration).

Controlling the service

To start/stop the service use buttons *start/stop*. When you start the service you should check the *SOAP server* diagnostic by clicking on the button *Diagnostic*.

2.3.1.b Service *Alarm Notifier Server*
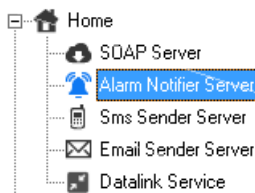
Alarm Notifier Server service watches the database and analysis requirements for sending notification for the system *Alarming via SMS texts/emails*.

Press the button *Reconfigure* to enter the configuration. Editor of configuration will be opened:
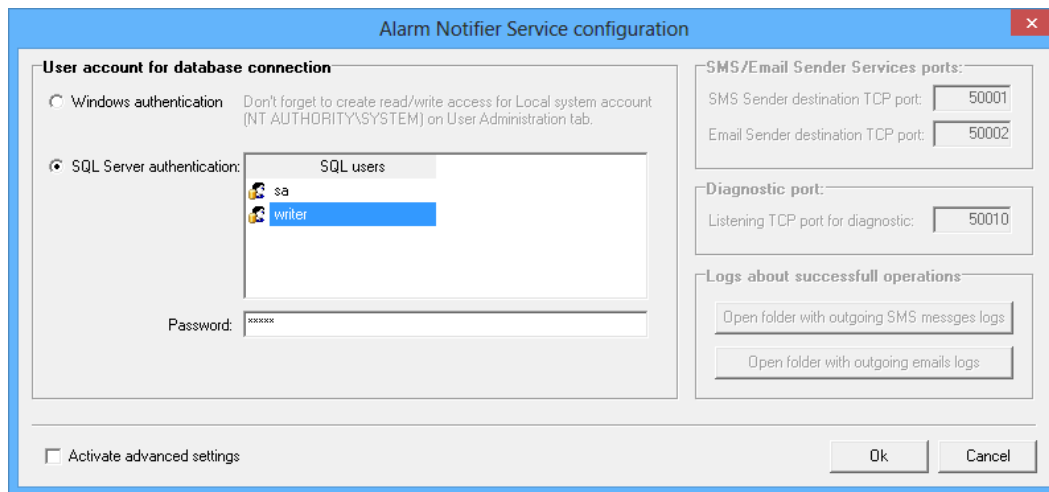
It is necessary to enter the database account that the service will use for database connection. This account must have read/write access to the database. More about database accounts you can read in chapter 2.3.3.a MS SQL Server Accounts administration.

You can enable advanced settings by choice *Activate advanced settings*. It will activate:

Settings of destination TCP ports for SMS Sender and Email Sender services. This setting is necessary to change only if default ports 50001 and 50002 are occupied by another application only. But this will force the change of listening ports at SMS Sender and Email Sender services so that they would be identical.

Settings of TCP port for diagnostic. Again, this is necessary to change only if default port 50010 is occupied by another application. Web diagnostic is accessible at this port.

Buttons for opening the folder with logs about sent SMS texts and emails. It is useful to view the logs in case when solving problems. You'll find out if the service really correctly analyzed the alarm and forwarded the message to the sending service.

2.3.1.c *Service SMS Sender*
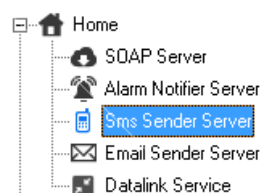
SMS Sender service is responsible for sending SMS texts to recipient's cellular phone using modem. It works in the way that it listening on TCP port (default settings of listening port is 50001) and it sends all received correct requests to the recipient specified in the request.

Press the button *Reconfigure* to enter the configuration. Editor of configuration will be opened:

It is necessary to correctly set parameters for modem connection in section *Modem connection*. You must select correct COM port to which the modem is connected (11.4 How to get information about COM ports in the computer).

Next you must select correct communication speed. Usually the default speed of modem is 9600 bauds (eventually 115200). Also, rest of parameters (*Data Bits, Parity, Stop Bits*) are preset as they usually are being set as default setting of the modem.

If the SIM card is secured by PIN code, then enable choice *Enter PIN* and enter the PIN code.

If there is not set Short Message Service Center in the modem, then enable the choice *Enter SMSC* and enter phone number of the Center. Phone number of SMSC you can find out at your telephone company.

You can enable advanced settings by choice *Activate advanced settings.* It will activate:

In section *Other Modem Settings*:

Send Delay – minimum time delay between sending two consecutive SMS texts

Send Retry – maximum number of retries of sending if sending fails

Timeout – time limit for serial link communication

In the section *Entry point configuration*, there is setting of TCP port for listening. It is necessary to change it only when default port 50001 is already occupied by another application. In this case you must set identical port in configuration of *Alarm Notifier* service as well.

In the section *Service overload notification*, there is configuration of system for alerting in case when the service is congested with large number of request. Because sending of one SMS text may take a few seconds, then it is possible that the service will be congested if too many requests come in a short time. Here you can set whom to send alerting SMS text (you can enter multiple phone number separated by a semicolon) in case that the service accepted but still did not manage to send more than specified number of SMS texts. Moreover, it is necessary to specify how often the warning message will be sent if the service remains congested.

The service divides requests into three priorities: *Normal, High* and the highest *Service*. You can choose from priority *Normal* and *High* at profile configuration. The highest priority *Service* is used for sending maintenance messages –

e.g. system *Service overload notification* or testing messages. This make sure that maintenance messages will be handled preferentially.

In the section *Debug log*, you can enable debug logging of the service. Then the service will write detailed dump of communication during its operating. But this function slows down the operation of the service. Therefore it is advisable to turn it on only when troubleshooting.

In section *Logs about successful operation*, you will find buttons for opening folders with logs about successfully received request for sending and successfully sent messages.

2.3.1.d Service *Email Sender*
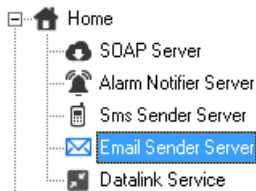
Email Sender service is responsible for sending emails to recipient's mailbox using SMTP server. It works the same way as the service *SMS Sender*. Default TCP port for listening is 50002.

Press the button *Reconfigure* to enter the configuration. Editor of configuration will be opened:

It is needed to set parameters for connection to SMTP server in section *Connection to SMTP*. You can use your company SMTP server (ask you network administrator for required values). Or you can use some of public email provider. Picture above shows settings with use of SMTP from Google (gmail.com):

In section *Email settings*, you can change texts, that will be shown in warning email as items *"From"* and *"Subject"*.

You can enable advanced settings by choice *Activate advanced settings*. It will activate:

In section *Entry point configuration*, there is setting of TCP port for listening. It is necessary to change it only when default port 50001 is already occupied by another application. In this case you must set identical port in configuration of *Alarm Notifier* service as well.

In the section *Debug log*, you can enable debug logging of the service. Then the service will write detailed dump of communication during its operating. But this function slows down the operation of the service. Therefore it is advisable to turn it on only when troubleshooting.

In section *Logs about successful operation*, you will find buttons for opening folders with logs about successfully received request for sending and successfully sent messages.

2.3.1.e *Datalink service*

Datalink service provides online data acquisition and downloading data record from the device:

• Multilogger

Datalink operates in the way that it listens until device connects to it. *Datalink* reads configuration from the device after the connection is established and then *Datalink* reads online values and eventually downloads record according to the configuration. So, how often the device should connect to the *Datalink* (= online values interval) and interval of record downloading is configurable in the device.

Press the button *Reconfigure* for service configuration:
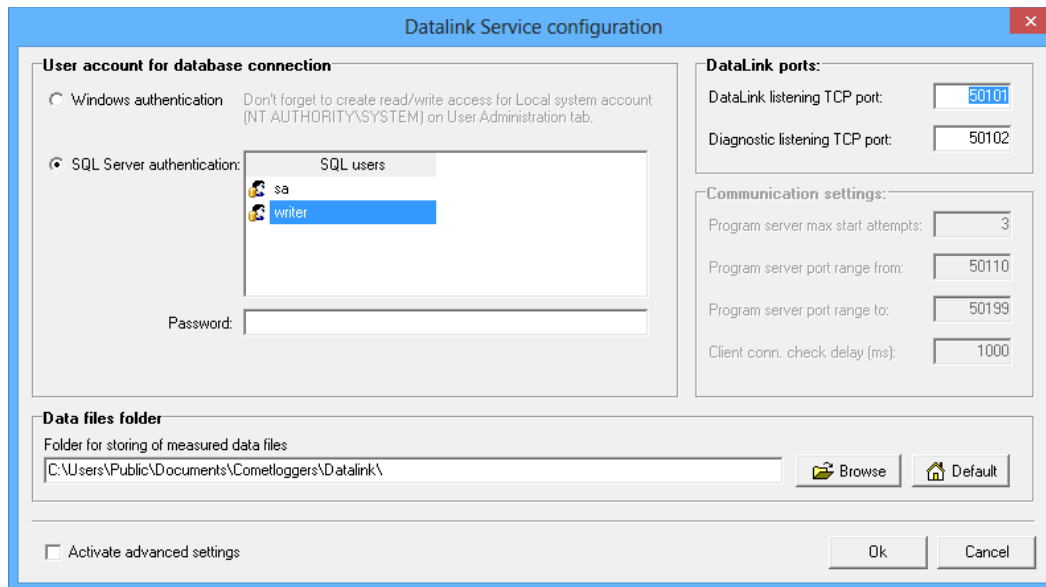
As database account you have to use account with read/write privileges (explained in chapter 2.3.3.a MS SQL Server Accounts administration).

Because *Datalink* not only inserts downloaded record into the database, but also saves download record as data file *.mss to disc, then you can change the folder where the files should be stored in *Data files folder* settings.

Change listening port and diagnostic port only if they are in a collision.

2.3.2 Section *Database configuration*

Here, you will find tools that relate to work with data in *Comet Database*. For example: device/channels properties, online acquisition compression, settings of device filtering according to views in viewer and settings of SMS/email alarming.

2.3.2.a *Device / channels properties*

This tool primarily allows you to rename devices and its channels. You can give user-friendly name to any device/channel in the database. This name will be displayed everywhere in *Database Viewer* where device serial number / channel technical label was displayed before.

In addition, there is *SMS name* in channel properties. If this name will be entered, then instead of technical label or instead of user-friendly name it will be shown this text in warning SMS text. And this text will not include device name. This is due to limitation of SMS text length. It is very useful to create the shortest SMS names as possible.

Another function is enabling / disabling devices and channels for viewing. For example, when you cancel monitoring from some device and you don't want to see this device and its values in *Database Viewer*, then switch off *Enabled for viewing* checkbox.

The setting *How to recognize online acquisition fault* applies only on online monitoring via *SOAP Server* and *Datalink* service. If the sample from the device doesn't income exactly at given interval, it is not possible to mark this as that online acquisition fault happened. For example, due to communication over ethernet network, it is not guaranteed, that every sample will income exactly at given interval. Therefore, this setting defines period, which must elapse from the time, when the sample had to income, so that the system declares that there was online acquisition fault from given device.

For example when some sensor has sending interval 10 seconds and this settings is set to 2 drop-outs by default then samples which came in times: *12:00:00; 12:00:10; 12:00:20* are considered to be correct logging. But when samples came in times: *12:00:00; 12:00:14; 12:00:50* then interrupted logging will be recognized between 2nd and 3rd sample. In most cases default settings is acceptable and don't need to be changed.

It is advisable to change this setting in case when long sending intervals are used. For example, when sending interval is 1 hour, it is advisable to set *How to recognize online acquisition fault* to *by dealy exceeding* and enter 60 seconds. It means that if another sample will not arrive till 1 hour and 1 minute, then the system will evaluate this as online acquisition fault.

You can get useful information about sensor location in the network from *Last sample obtained from IP*.

When the channel, whose data was are collected online, was selected, then you are able to adjust compression configuration for current channel – select *Adjust it for current channel*. When you left *Use default / quantity-unit predefined* selected then compression configuration will be inherited from global configuration. See 2.3.2.b Online acquisition compression settings to read more about this topic.
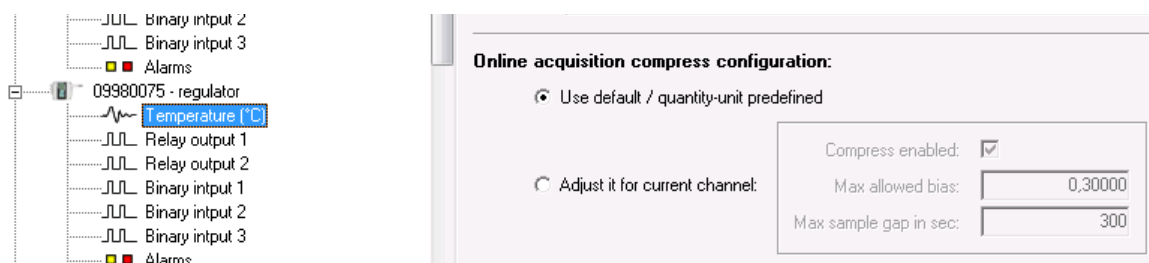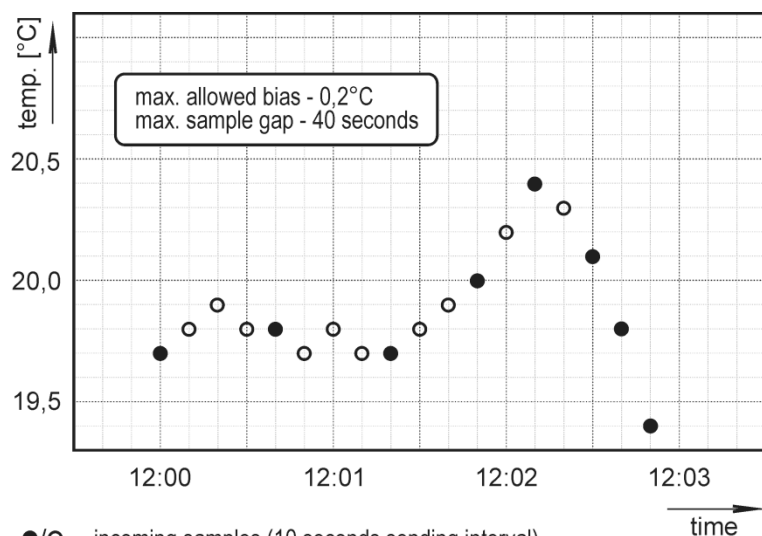

2.3.2.b *Online acquisition compression settings*
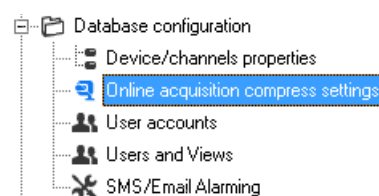
This compression applies to online acquisition only. Data-loss compression would be better title, because it works in such a way that insignificant data samples are not stored into history.

It is very useful to use this compression because it reduce amount of data stored into the database. If the compression is enabled, then it is able to set minimal sending interval of online data in the device, without worrying, that the database size will grow rapidly. Using of minimal sending interval (10 seconds) guarantees that there will be the most fresh values in online data monitor (3.4 Viewing online data)

There is compression setting, where maximum allowed deviation from analog value and maximum sample gap must be set. If newly incoming value is inside interval of deviation from the last stored sample and if the last stored sample is not older then maximum sample gap then this new sample will not be stored:

- ●/○   incoming samples (10 seconds sending interval)
- ●   value will be stored into history
- ○   value will be lost

Here, in configuration of online acquisition compression, you can enable / disable compression and adjust its configuration for each quantity-unit combination separately.

Another option there is *Store values of all channels when storage of one is needed*. If this option is selected, then the behavior is as this: When any channel of the device needs to be stored according to the compression settings then all channels of the device are stored. It involves better look of table format view but a little worse compression level.

This feature is not applicable on backward compression with Deleting/compressing data tool on previous tab.

Example: Store values of all channels when storage of one is needed disabled:

Date and time	23		
	Temperature (°C)	Relative humidity (%)	Absolute humidity (g/m^3)
08.12.2010 14:01:31		44,3	
08.12.2010 14:02:21	24,5		
08.12.2010 14:02:41			
08.12.2010 14:04:11			10,0
08.12.2010 14:06:31		44,4	
08.12.2010 14:07:21	24,6		
08.12.2010 14:07:41			
08.12.2010 14:09:11			10,1
08.12.2010 14:09:51		44,7	
08.12.2010 14:10:11		44,2	
08.12.2010 14:10:31		44,7	
08.12.2010 14:12:21	24,6		
08.12.2010 14:12:41			

Example: Store values of all channels when storage of one is needed enabled:

Date and time	08980017 - regulator		
	Temperature (°C)	Relative humidity (%)	Absolute humidity (g/m^3)
10.12.2010 15:45:14	22,7	38,2	7,7
10.12.2010 15:47:45	22,7	38,7	7,8
10.12.2010 15:47:55	22,7	38,4	7,8
10.12.2010 15:48:15	22,7	38,9	7,9
10.12.2010 15:51:05	22,7	39,3	7,9
10.12.2010 15:53:15	22,6	39,6	8,0
10.12.2010 15:53:25	22,6	39,3	7,9
10.12.2010 15:53:45	22,6	39,6	8,0
10.12.2010 15:56:55	22,6	40,0	8,1
10.12.2010 16:01:55	22,6	40,1	8,1
10.12.2010 16:03:25	22,7	40,7	8,2
10.12.2010 16:03:36	22,7	41,8	8,5
10.12.2010 16:03:46	22,8	40,8	8,3
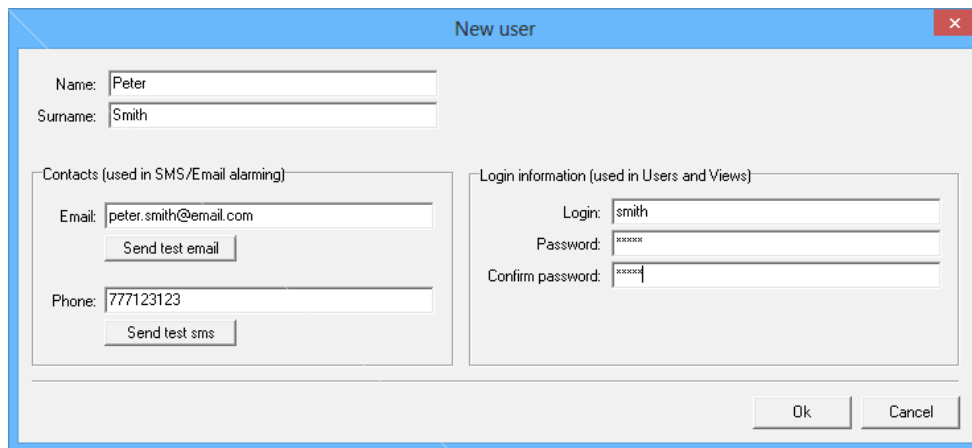
You can also set acquisition compression configuration for particular channel in the database. These settings you will find in channel settings, see: 2.3.2.a Device / channels properties.

2.3.2.c *User accounts* administration
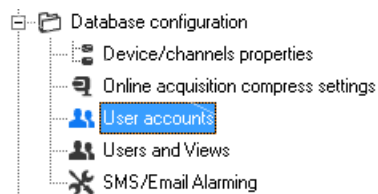
You can create user accounts here. There accounts serves for:

- Filtering of devices displayed when viewing data in program Database Viewer. How to create view you can read in chapter 2.3.2.c User accounts administration.

- Logging of log-in/log-out of the user and alarm confirmation in program Database Viewer.

- Using as recipients in SMS/Email alarming (2.3.2.e SMS/Email alarming)

- Click on the button *Add* to create user:

Email and telephone number will be used in SMS/Email alarming only. You can send test message by buttons *Send test email* and *Send test SMS*. Attention, services *SMS Sender / Email Sender* must by configured correctly and running.

Login servers for signin in program Database Viewer. The system guards the login is unique within the database.
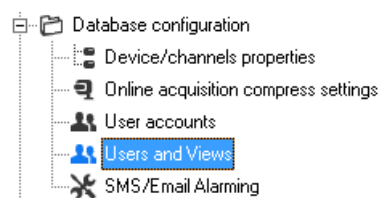
If you will have many users in the database you can sort them into groups.
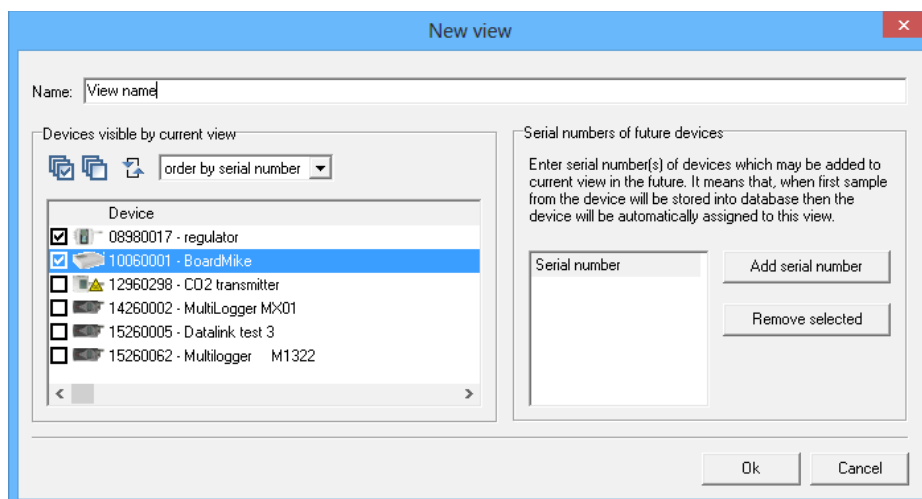
2.3.2.d *Users and Views* administration

You can create Views = filters on devices here. The View defines set of devices. If you assign the user into the view, then this user will see only devices from this view. If you assign the user into more views, then this user will see devices defined in all of these views.

You have to switch on the choice *Global switch for filtering devices in DBViewer according to "Views – Users" settings* to enable filtering in program *Database Viewer*. If the choice is not enabled, then signing into viewer will not be requested and anybody can see all devices in the database.

Click the button *Add* to create new view:

Choose the device from the list, that you would like to belong to this view. If you plan to connect another device into *Comet Database*, that is not in the database yet and you want the device to be added automatically to this view after its connection, then enter its serial number to the list *Serial number of future devices*.

Finally, you have to assign users to views. You can see actually assigned users to selected view in the list *Binded users*. Following picture shows that user Smith is assigned to view View1:
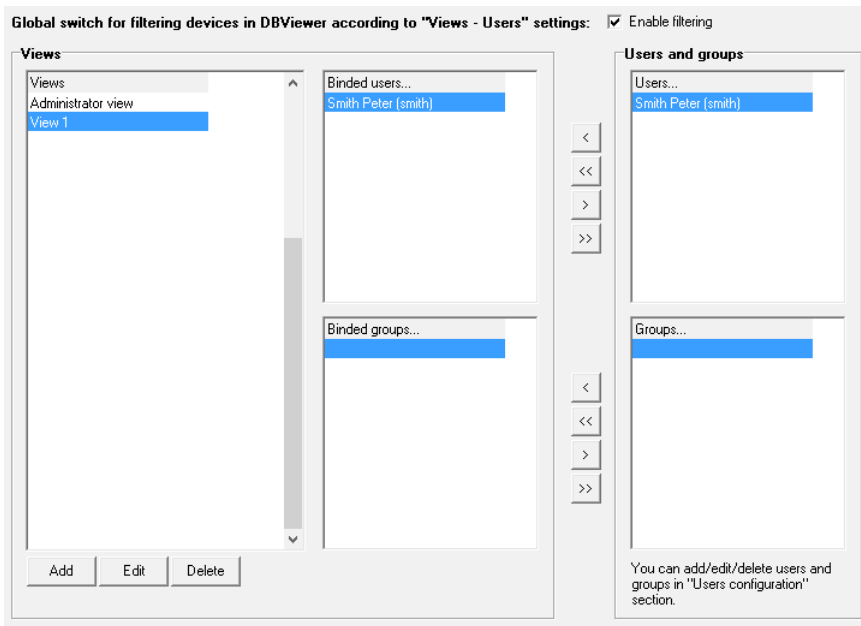
In the same way as users you can assign groups of users to views.

Moreover, there exists special view *Administrator view*. You can not delete this view. If you assign user to it, then this user will see all devices in the database.

2.3.2.e SMS/Email alarming

You can create monitoring profiles here. Monitoring profile defines which devices-channels are to be monitored and at what moment warning SMS or email messages are to be sent.

Every monitoring profile can watch different channels, send warning in different cases and to different recipients. For example, you can create profile that will watch raising of alarm on all channels in the database and sends warning via email to the recipient X. Concurrently, you can have another profile created that will watch raising and also quitting of alarm on selected channels and sends warning via SMS text to recipients in the group Y. And so on.

Creating, editing and deleting profile allows buttons *New*, *Edit* and *Delete*. Profile editor allows to:

• Enter the name of the profile – *Name*

• Select the situations in which to send notifications:

   • *when alarm starts* – notification is sent when the alarm becomes active

   • *when alarms ends* – notification is sent when the alarm is no longer active

   • *every X minutes* – notification will be sent periodically every X-th minute, regardless of whether any alarm is active or not. This option is suitable for periodical informative sending of measured data. Possibly, it is also suitable for periodical sending of a maintaining message that informs that the system is still in operation.

   • *Every X minutes if alarm remains active* – notification will be sent every X-th minute in case when the alarm remains active.

• Select the method of notification – by sending email, by sending SMS text – *Actions*

- Increase its priority of SMS text. This is useful if you have created multiple profiles and you want to be sure, for one particular profile, that its notifications will be served in preference by the service *SMS Sender* in case of service overload.

- Choose channels to be monitored

You will add/remove recipients (or whole group of recipients) to the selected profile by buttons "<","<<" / ">", ">>".
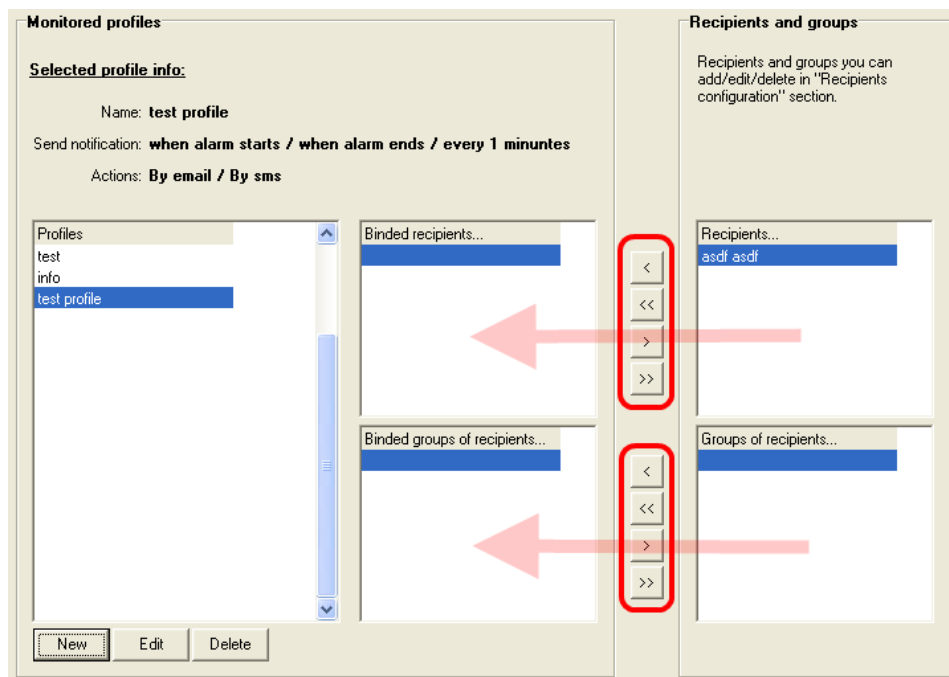
To verify that the system is functioning properly, we recommend to create the testing profile. In this testing profile will be selected "Send notification every 1 minute" and at least one channel will be selected for monitoring. Example:
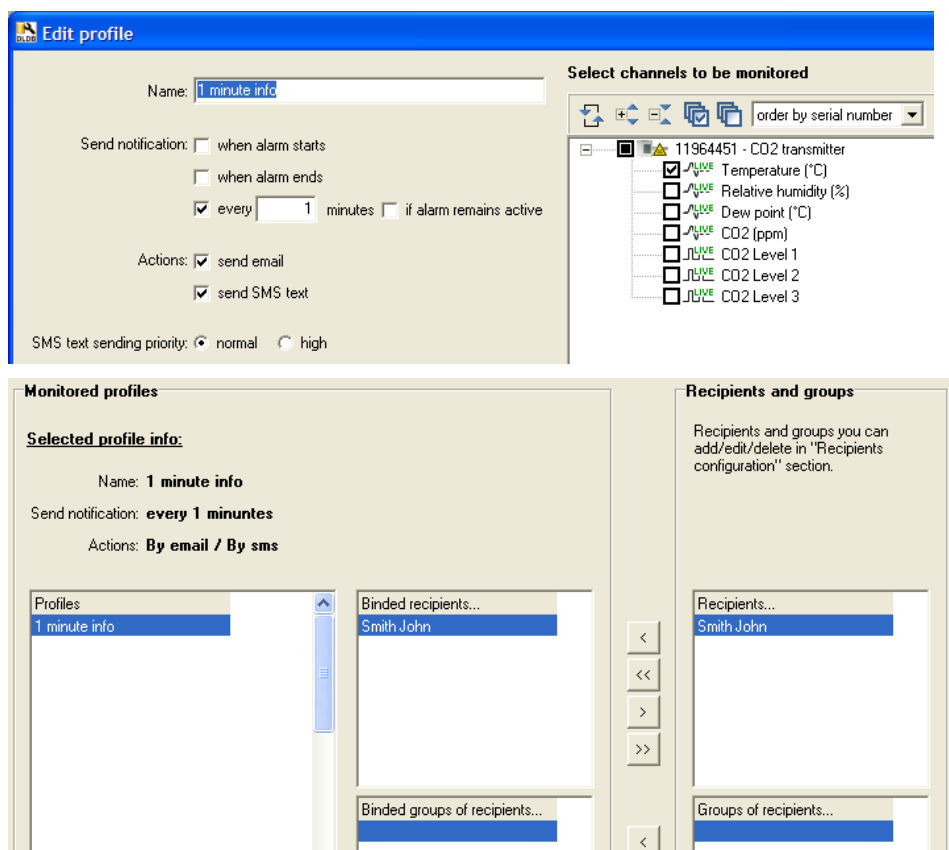
As you can see from the pictures, email and SMS text will be sent every 1 minute with information about channel Temperature from the sensor with serial number 11964451 to the recipient John Smith.

This profile you can use for sending so-called maintenance message. Fix sending interval for example to 180 minutes and every 3 hour you will obtain message that will inform you that the system is still operating and functional.

2.3.3 Section *Database administration*

Here, you will find tools for administration SQL Server accounts, backing up, restoring and deleting data in database and database log.

2.3.3.a *MS SQL Server Accounts* administration
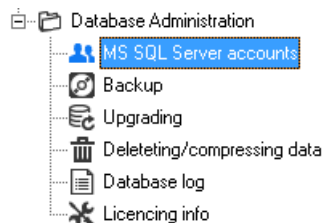
It is advisable to create at least two accounts for database system: *writer* and *reader* and then to add them access rights this way: *writer* has rights for read and write, *reader* has rights only for reading.

Furthermore, 3rd type of account *restricted writer* exists. This type of account has read only access to the database + it has allowed to insert notes, log sign in/out and confirm alarms in program *Database Viewer*. For example: If you want to have possibility to insert notes into database, then *Database Viewer* must be connected to the database using this account.

The administration has two lists: *SQL Server accounts* on server (marked with number 1 on the picture below) and *Accounts with access to actual database* (marked with number 2 on the picture below).

SQL Server accounts on server list displays all accounts on the database server. Below are buttons for creating new account, deleting existing account and changing the password for existing account. Be careful that you have selected known account (especially when deleting account or changing password) – program allows deleting and changing password for all accounts on server (except *sa* account).

The list *Accounts with access to actual database* displays accounts which can view or insert data into actual database. If the account have in *reader* columns tick and don't have tick in *writer* column then this account has rights for

viewing the database only. If the account have tick in both *reader* and *writer* column then he has rights for viewing and also for inserting data to the database.

As it was mentioned at the beginning of this chapter, newly exists account type *restricted writer*. This type of account have to have tick in column *rest.writer*.

You can add *read-only*, *read/write* or *restricted writer* access rights to any existing account in *SQL Server accounts on server* list by buttons between this list: first select account in *SQL Server accounts on server* list and then click the button. You can also deny access rights for account who already have some rights to the database: first select the account in *SQL Server accounts on server* list and then click on the *Deny access from account* button.

If some account in *Accounts with access to actual database* list has gray tick in global column then this account has access rights globally. It means that the account has global rights for all databases on the server (e.g. account sa will be the one for sure, because *sa* account has all rights to all databases, because it is database server administrator). If another account than *sa* is in the list with global tick, then the only way to deny the access to the database for this account, is to completely delete it from the database server by the button *Delete selected account*. Remember, you must be sure that this account is not used in another project on SQL server!

If using *Microsoft SQL Server* installed with *Windows authentication* support only, be very careful! You must not delete that windows account which you have added into database system administrators list during installation, because then there will be no *sysadmin* account and you will not be able to administrate the database and whole server.

2.3.3.b Backing up and restoring
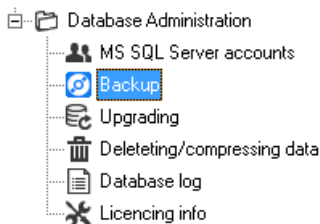
Here you will find tools for backing up and restoring the database. We recommend to backup the database every time before special actions like: Deleting data in the database, Upgrading to newer version of *Comet Database*.

Function backup makes single-shot full backup of the database to **.bkp* file. This type of backing up is compatible with backing up in *Microsoft SQL Server Management Studio (SSMS)*. That means that it is possible to restore database from **.bkp* in *SSMS*. It is only needed to rename file from **.bkp* to **.bak*.

Function *Restore* database from file restores the database from **.bkp* file to actual database. Before running this action be absolutely sure, that the database, to which you are actually connected with *Database Manager*, you want to delete and replace with the database from the backup.

Further, here you will find functions *Rebuild indexes* and *Shrink database*. These functions are intended for experienced database specialist. Normally, there is no reason to use them. The only reason, when it should be useful to use these functions, is after huge data deleting in the database.

2.3.3.c *Upgrading*

When you get newer version of *Database Manager* then it is possible that this version of manager supports newer version of the database. In this case the manager will inform you in the *Notice* label that the database is of an older version and that the database should be upgraded. Furthermore, there will only be Upgrading and Backup items in the menu. Instructions on how to proceed with the upgrade you can read here 1.4 How to manually upgrade Comet Database.

It is strictly recommended to backup the database before executing upgrade process! More info about backing up is in chapter 2.3.3.b Backing up and restoring.

Another think you have to figure out before upgrading is that after the upgrade the database will be of a newer version than the version which is supported by programs which are in use now (*Database Viewer*, *Comet Vision*, *Program for monitoring systems*, *Program for dataloggers*). These programs will not be able to connect to the database until you upgrade them.

2.3.3.d *Deleting / compressing data*
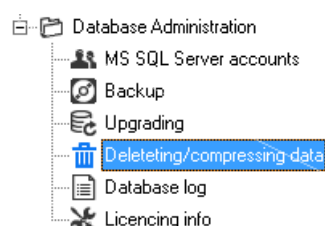
This tool allows you to delete or compress data in the database. Be careful when using this tool, because changes done by it are irreversible!

You can switch between two kinds of resolution:

- *resolution on devices* allows you to delete / compress data from selected devices (i.e. when you select process all data, then whole device will be deleted from the database)

- *resolution on channels* allows you to delete / compress data only from selected channels.

To select the row click on the check box on row beginning. Under the grid there you can choose if you want to *process all data* or *process only data older then* entered date-time. Finally use button *delete* to proceed deletion or button *compress* to proceed compression.

If compression task was chosen, then compression will be done according to online acquisition compression settings (See chapter: 2.3.2.b Online acquisition compression settings). But there is one exception: Option *Store values of all channels when storage of one is needed* will be ignored and data will be compressed as if this option would be disabled.

The compression only applies to channels whose data is acquired online. After compression of channels acquired by downloading data record, their data will remain unchanged.

2.3.3.e *Database log*
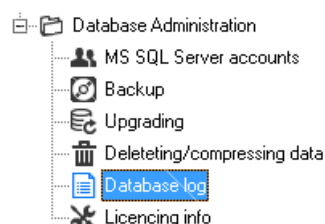
It is viewer of the database log. Errors during inserting data into the database are logged here especially. If any problem occurs then information from this table should help us to solve it.

Also, information about signing in/out in program *Database Viewer* is stored here. You can read about signing in/out in chapters: 2.3.2.d Users and Views administration and 3.11 Signing in to program Database Viewer using user accounts. Further, information about alarm confirmation from program *Database Viewer* is stored here.

Additionally, there is the button *Export all logs*. If you solved some problem with our support, you would probably be asked for generating the log by this button and send it to us.

2.3.3.f *Licencing info*

You will find information about licence here. If *Database Manager* is not activated yet, you will find function for doing license activation.

3 Using program Database Viewer

The program *Database Viewer* serves for viewing data from the database. You can view records from the database as tables and charts. You can print and export to PDF as tables and charts. Also, you can export table data to CSV (useful for processing in MS Excel).

Great deal of this database system is that you can view records of any channel and any device, which are stored in the database, all at once and compare it on one chart.

When using online data acquisition via SOAP Server (this applies to sensors and monitoring systems MS6 and MS55) or via *Datalink* service (Multilogger device) then *Database Viewer* offers online visualization of actual values and alarms.

3.1 Installation of Database Viewer

You can install *Database Viewer* on whatever computer in local network where is the computer with database server or directly on this computer. Standalone *Database Viewer* installer can be downloaded here:

http://www.cometsystem.com/products/reg-DBV#downloadd

3.2 Database connection parameters settings

You have to set database connection parameters before using *Database Viewer*. This settings are located in program *Menu → Program → Connection Settings*. How to enter connection parameters is described in chapter 11.2 Entering database connection parameters. You can use the user with *read-only* access to the database.

If you want to have possibility to insert notes to data in database and log signing in/out and alarm confirmation, then you have to use account with restricted write access. More about this is in chapter 2.3.3.a MS SQL Server Accounts administration.

3.3 Viewing history data from database

This chapter describes how to view history data from database. You have to do four simple steps to obtain requested history data view from the database:

• Switch to the tab *History data from database*

• Choose channels whose records you want to view

• Choose interval – time boundaries, data will be displayed within them

• Click on the button View history data from database – data will be displayed as table
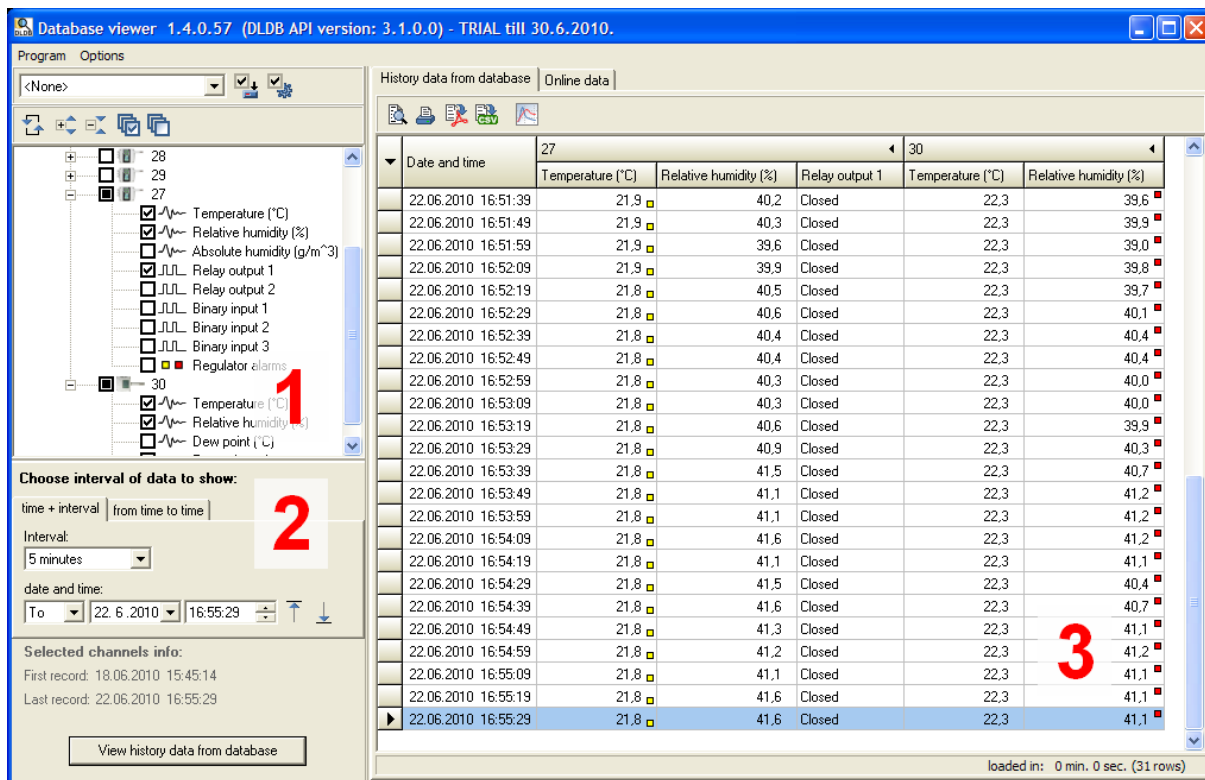
3.3.1 How to choose channels whose data are to be viewed

Tree view, which is marked by number 1 on previous picture, provides it. The tree of devices and their channels, which are in the database, is displayed here after launching the viewer or clicking on the button *Refresh* ⬚. Any channel can be added into channels which are to be viewed by enabling the field next to the channel:

- ☑ ∿ analog channel

- ☑ ⊓⊔ binary channel

- ☑ ▢▪ alarm channel

- ☑ ∿LIVE, ☑ ⊔LIVE online analog and binary channel. Channels, whose data are collected online via SOAP server or Datalink service, are marked with sign *"LIVE"*. All channels of sensors, channels of monitoring systems MS6 and MS55 and channels of Multiloggers whose data collection is online via SOAP server will be marked this way.

- ☑ ∿JOIN the channel joined from online channel and record channel

  - this channel is generated automatically in case of MS6, MS55 and Multilogger when there is simultaneously running online acquisition and filling from record (downloading from device memory and export downloaded data to the database)

  - actually, this channel is online channel and displays data obtained via online acquisition. But in case, when online acquisition was interrupted (e.g. due to ethernet network crash), missing data are appended with data downloaded from record.

  - If it is needed to analyze channels from which joined channel originate from, then these channels are accessible at lower level:

    ☑ ∿JOIN #1 : Cooler[A] (°C)
    ———— ☑ ∿LIVE #1 : Cooler[A] (°C) [online]
    ———— ☑ ∿ #1 : Cooler[A] (°C) [record]
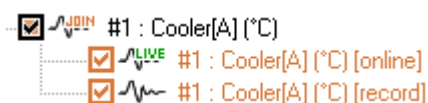
Clicking on field at device level selects / unselects all channels of the device:

- ▢ ▮ datalogger device (eventually datalogger with printer or portable instrument COMMETER)

- ☐ 📦 monitoring system device
- ☐ 📟 sensor device – P85xx ethernet thermometers
- ☐ 📟 sensor device – Txxxx series (Temperature, Relative Humidity, Pressure)
- ☐ 📟 sensor device – Hxxxx series (Temperature, Relative Humidity, Pressure + Relay output and Binary input)
- ☐ 📟⚠ sensor CO2 device – Txxxx series(Temperature, Relative Humidity, CO2)
- ☐ 📟⚠ sensor CO2 device –Hxxxx series (Temperature, Relative Humidity, CO2 + Relay output)
- ☐ 📟 Multilogger

3.3.2 Choosing of interval

This provides area for interval selection, which is marked by number 2 on the picture above. Use this to set time boundaries of data to be viewed. You have two options how to choose the interval:

- by entering one date-time and selecting length of the interval. In addition, it is possible to choose whether requested interval shall start from or end to the selected date.

- By entering two date-times as from – to boundaries
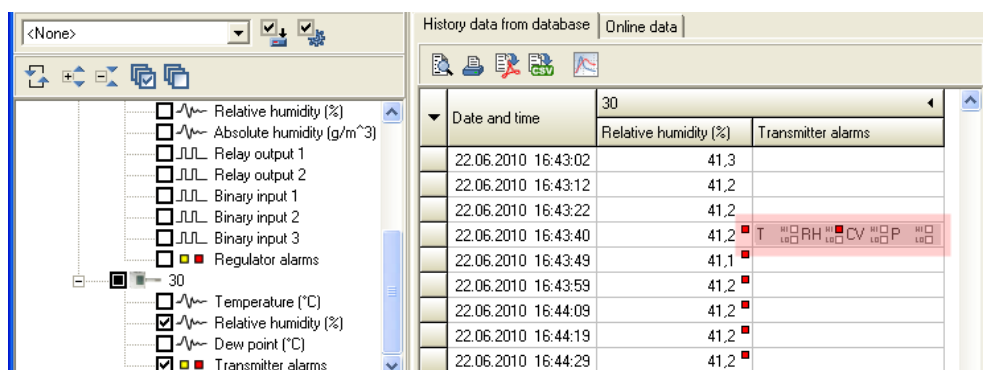
You can use additional buttons to set a date-time to the first ⬆ or the last ⬇ sample date-time of data from selected channels in Tree view.

Finally, clicking on the button View history data from database will launch the process of mining data from the database. This can take a short time or several minutes. It depends on the amount of data which was selected (too many channels, too wide interval). This also depends on hardware equipment. The program executes counting of selected data before execution of mining data from the database. There are preset amount boundaries, when the program warns and stops data mining process.

3.3.3 Displayed data

This is labeled by number 3 on the picture above. You can view data in table format here. Data are sorted chronologically from the oldest to the newest samples within selected interval. First column of every view displays date-time of samples. The other columns displays data of selected channels. There can be displayed red/yellow square next to the analog or binary value, which informs that high/low alarm was on.

If alarm channel of any device is displayed then you can see that there aren't its values in every sample. It is because there are displayed only changes of alarms. For example, you can see alarm channel of Hxxxx sensor on the picture below. There is only one sample in alarm channel when alarm of Temperature channel arose. Alarm channel shows states of all alarms in device at the sample date and time.

If monitoring is interrupted (i.e. sensor is disconnected from the network and then connected back again) then whole row of starting sample (first sent sample after sensor reconnection) is marked by red color. See example on the picture below.
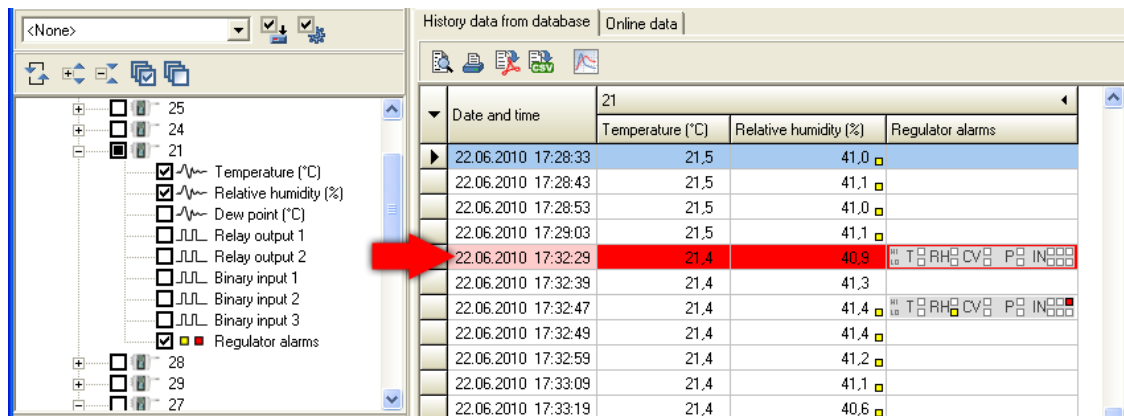
To print with preview, print or export viewed data to the PDF, CSV use these buttons:

To switch from table view to chart view use button . You will be able to view, and also print, viewed data as graphical visualization in curves:
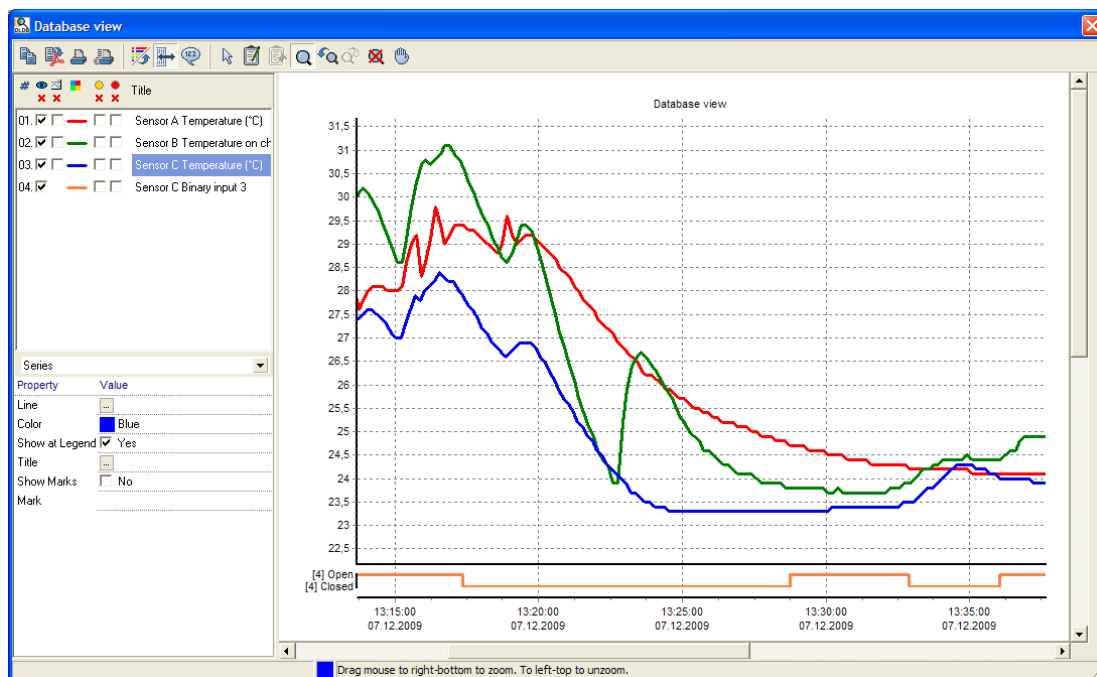
Click the button: to show statistic of currently viewed data. Information about record count, minimal, maximal and average value on each channel will be showed. The statistic is only elementary at this moment (in case of analog channels error values are not excluded from calculation and in case of binary channels only count of samples is calculated). Extending of this feature is planed for the future.

3.4 Viewing online data

Database Viewer has very useful tool Online data monitor. It allows you to watch actually measured values and alarms' states from devices witch sends its data online to *SOAP server or Datalink*. These devices are P85xx, Txxxx and Hxxxx ethernet sensors, monitoring systems MS6 and MS55 a Multilogger.
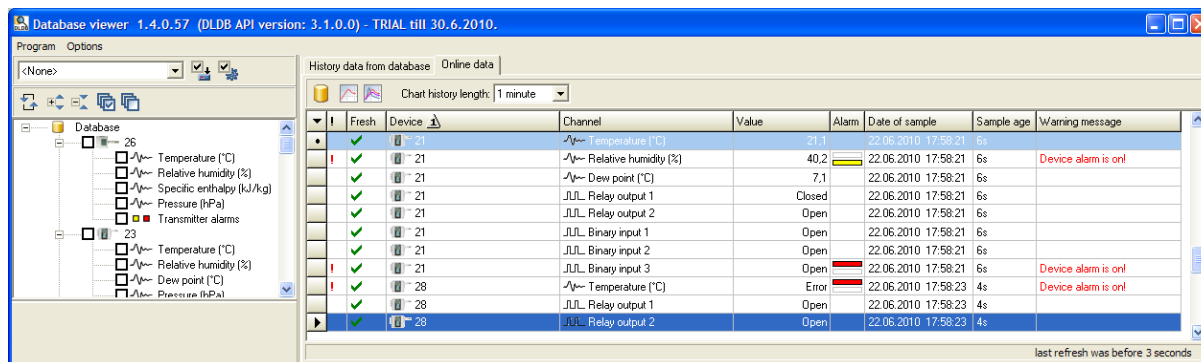
Click on the tab Online data to switch to this tool. If any Online device ever sent measured data to the database system, then there will be its last values visible. Every row in the table represents last value from one channel of the device. For example you can see values from channels of sensors named "21" and "28" on the picture above.

Note: When program is switched to Online data, then area for interval selection is hidden, because it has no use in this mode.

Columns of the Online data table have following meanings:

- Columns " ! " informs about any warning. Type of the warning is written in column Warning message. For example it can be that the data aren't fresh (it means that it's too long from the time when the device lastly send values), or that the channel is in alarm state.

- Column Fresh displays green tick if the value is fresh. Otherwise whole row is grayed.

- Columns Device and Channels display device serial number or renamed name (devices can be renamed, see 2.3.2.a Device / channels properties) and channel type.

- Column Value displays lastly measured analog value or state of binary channel.

- Column Alarms informs about alarm on the channel. If red rectangle higher in the cell is displayed then channel is in high alarm state. If yellow rectangle lower in the cell is displayed then channel is in low alarm state.

- Column Date of sample informs about time and date when the sample was measured. Additionally next column Sample age shows elapsed time since date of sample to last online table refresh. Note: Online table refreshes every 5 seconds.

If too many rows are in the table then you can use filtering. Select channels which you want to watch from Tree view and switch filter button from ![icon] to ![icon]. For example, there is online table filtered on temperature channels of both devices on the picture bellow.
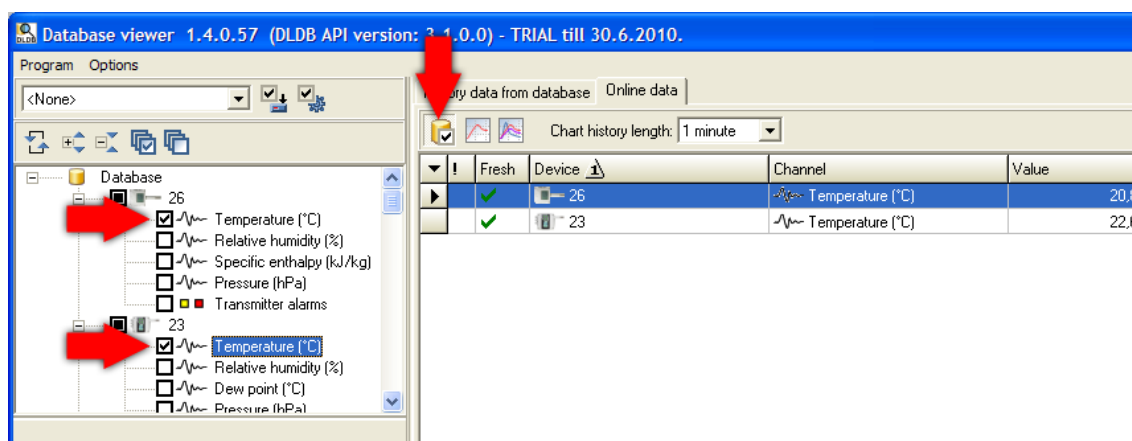
You can also see online chart of selected channels. This chart will be changing online as new values will income to the system. First choose chart history length, then click Online chart button:

- Use ![icon] to see online chart of selected channel / channels (to select more channels use CTRL + Click on the row in grid)

- Use to see online chart for all channels in the grid.

3.5 Presets of selected channels

This tool allows you to save current selection of channels and reuse it later. Click on the button to save current selection. You will be asked for entering selection name. You're also able to export/import presets to/from file. This can be useful when you want to move presets to another *Database Viewer* on another computer. Use button to open export/import manager.
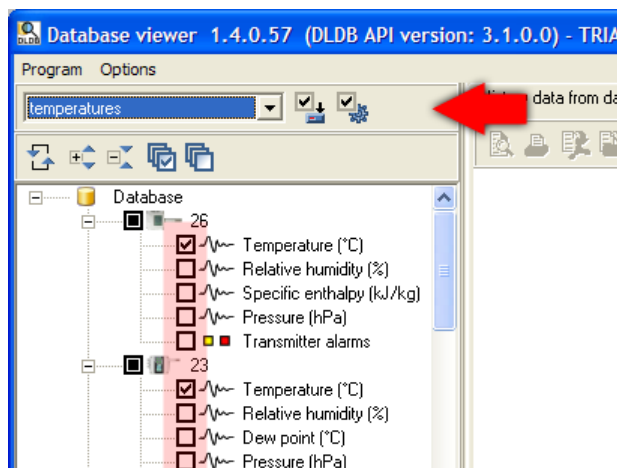
3.6 Sorting of device in device-channels tree

You can choose between two options:

Sort by serial number

Devices will always be sorted by serial number in this case and also in the case when device name was renamed via program *Database Manager* and serial number is not showing.This is default and only one sorting in DB API versions older then 6.0.

Sort by name

The sorting is always by name in this case.

Sorting by name can be suitably used for organizing devices into groups. When devices are renamed with added prefixes identifying the group (e.g. sensor location) then devices which belongs to the same group will be sorted side by side. Ilustration:
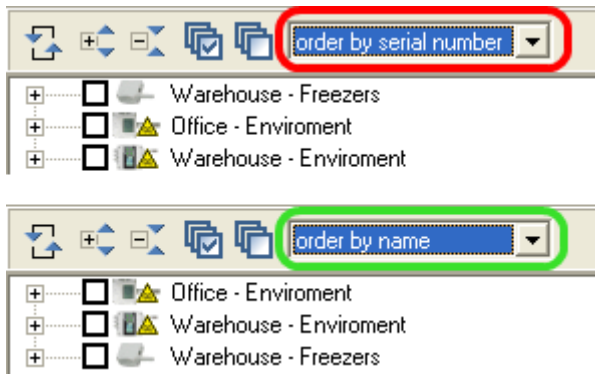
Note: To rename device use program *Database Manager*, see chapter 2.3.2.a Device / channels properties.

3.7 Showing information about online device

Information about online device will be showed by clicking with right button on the device in devices-channels tree. These information will be showed:

- Actual IP address of the device (from what IP adress the device for the last time).

  - Attention, this is valid when devices and *SOAP Server/Datalink* server are located in the same network only. Otherwise mentioned IP address will point on gateway to outer network only.

- Click the button *Go to WEB* to show device web pages in the browser.

  - In this case it must also be valid that viewer is executed on the computer located in the same network as *SOAP Server/Datalink* service and devices.

- Sample rate – interval of sending measured data (configured in the device)

- Max. freshness – measured value is considered to be fresh (actual) if the time from last received sample will not exceed specified count of seconds. Max. freshness is 2.5 multiple of sample rate. You can change this value for every device in program *Database Manager* (see chapter 2.3.2.a Device / channels properties).

3.8 Acoustic and visual alerting of alarm states

Database Viewer can inform about occurred alarm state by playing sound and "blinking". This alerting applies for online acquisition only. Alerting will be on if at least one channel in the table of online values is in alarm state, if instead of measured value is ERROR showd (this can happened for example when the probe is pulled out from sensor) or in the case when measured values of any device are not current (online acquisition was interrupted, e.g.: device was disconnected from the network.

You can choose between two alerting behavior:

Alerting is on until the user confirms current state with button "Confirm"

After the user press the button "Confirm" the alerting is off and stay off until any new alarm will occur for example on some another channel or until some of confirmed alarms is of and on again.

If signing in of users into program *Database Viewer* is enabled (2.3.2.d Users and Views administration) and Database Viewer is connected to the database using account with restricted write access (2.3.3.a MS SQL Server Accounts administration), then information about who and when confirmed alarm will be stored into log in database (2.3.3.e Database log).

Alerting is on throughout till any alarm occurs

The button "Confirm" is not visible in this case. This behavior can be undesirable when alarm occurs on any channel all the time, user knows about this alarm and is not cardinal.

To know more about how to enable and configure acoustic and visual alerting see chapter 3.9.2 Acoustic and visual alerting settings.

3.8.1 Problem with long-term disconnected online devices

In case when some device was sending its data into database but the device is disconnected now, then last measured data are visible in the table of online values and are marked as not fresh (inactive – gray colored). This situation leads to permanent activation of alarming and it can be bothering, because measured values from this device are not interesting for the user no longer.

You can solve this by disabling the device for viewer: Run *Database Manager*, on the tab *Device/channels properties* select demanded device and disable the choice *Enalbed for viewer*.

If you are sure you will not need data from this device anytime in the future, then you can delete whole device and its data from the database: *Database Manager*, the tab *Deleting and compressing data*.

3.9 Viewer settings

You'll find it in Menu - Options - Viewer settings.

3.9.1 Time shift settings

Tab Online Acquisition, group Time shift settings.

This setting applies only to data from devices which haven't got time generator (acquisition from these devices is online and the SOAP service assigns the time to each incoming sample). These devices are Txxxx, Hxxxx, P85xx sensors and online acquisition from monitoring systems MS6 and MS55.

The program automatically shifts the time to current locale but you can adjust it to manual shift towards UTC time.

3.9.2 Acoustic and visual alerting settings

Tab Online acquisition, group Alerting settings.

Alerting is activated by enabling at least one of choices Acoustic alerting and Visual alerting.

After enabling choice Acoustic alerting you must select either system sound (sounds from operating system) or choose sound file *.wav, which is about to be played during alerting.

After enabling choice Visual alerting red rectangle with text „>>>Alarm <<<" will be showed in upper part of viewer during alerting. Visual alerting can be high lighten by choice Red panel is blinking. To prevent that user will not notice that alarm occurred due to minimized viewer, enable the choice Application icon in tray is blinking.

Last choice is switching alerting behavior. Explanation of alerting behavior you can find in chapter 3.8 Acoustic and visual alerting of alarm states.

3.9.3 Print settings

Tab Others, group Print settings.

After enabling choice Ink saving print of data in table it will be used less highlights on the background.

3.9.4 Visibility of extra columns at online data

Tab Others, group Visibility of extra columns at online data.

You can enable / disable visibility of some columns in table of online values.

3.10 Editing notes assigned to data in database

To be able to insert notes into database, program *Database viewer* must be connected to the database using account with restricted write access. If the *Database Viewer* will be connected using account with read only access, then it will not be able to insert notes. About types of accounts you can read in chapter 2.3.3.a MS SQL Server Accounts administration.

It is possible to insert notes assigned to data from displayed historical data or from chart. Attention, notes can not be inserted from online data view.

Insert note from table

Right-click on the value to which you want to assign note and from pop-up menu choose *Insert/Edit note*. The cell in table will be highlighted by blue triangle after inserting note.
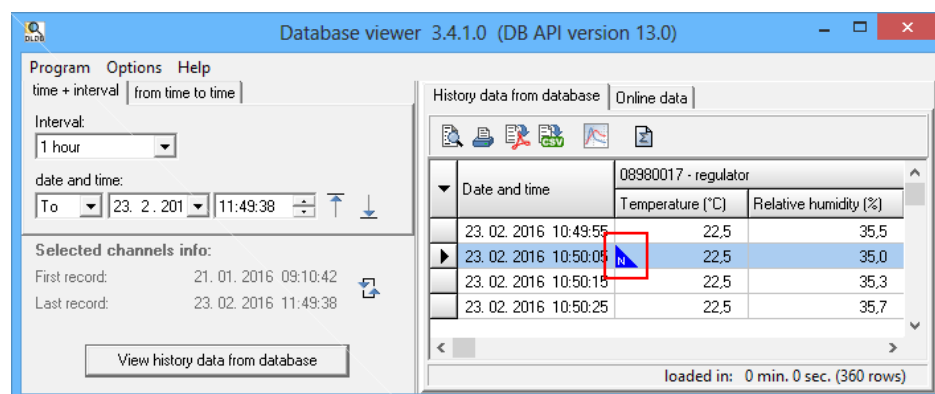
Click on the blue triangle to view the note:
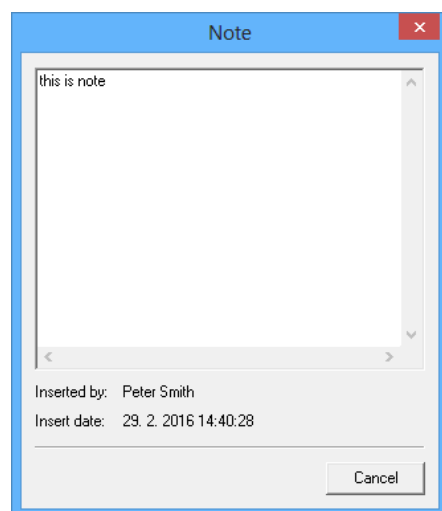
In the window, which shows the note you can also see when the note was inserted. If signing in program *Database Viewer* using user accounts is enabled, then here is also displayed user name which inserted the note. About singing in program *Database Viewer* you can read in chapter 3.11 Signing in to program Database Viewer using user accounts.

Inserting note from chart

1) Create note into chart – the button annotation
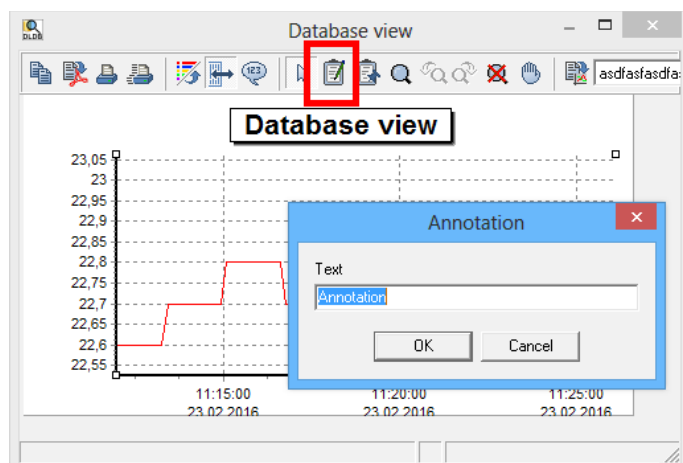
2) Assign the note to data: 1. click on the button annotation pointer; 2) click on the note; 3) click on the chart line at the place where you want to assign the note:
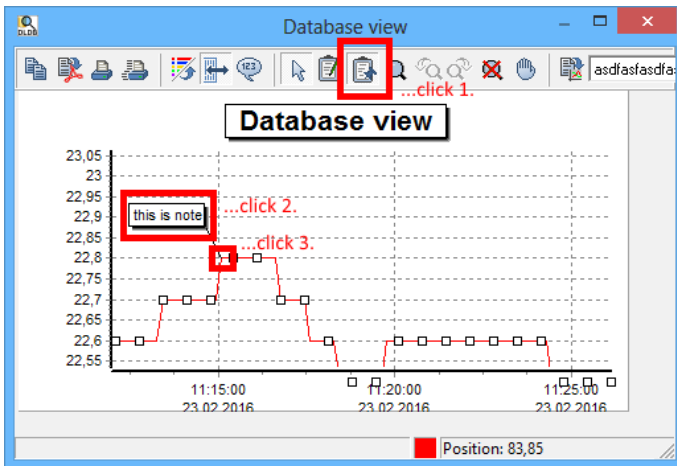
3.11 Signing in to program Database Viewer using user accounts

To make the program *Database Viewer* enforce signing in of user, the function *Global switch for filtering devices* must be enabled and users, which should sign in, must be assigned to one view at least. Read more in chapters: 2.3.2.d Users and Views administration and 2.3.2.c User accounts administration.

If mentioned function is enabled, then Database Viewer always shows sign-in dialog after its start.

Database Viewer in enabled signing in mode allows to:

- store information about who create note (3.10 Editing notes assigned to data in database)
- log into database log who and when signed in/out (2.3.3.e Database log)
- log into database log alarm confirmation (3.8 Acoustic and visual alerting of alarm states)
- filtering devices according to signed in user (3.12 Filtering devices according to user account)

3.12 Filtering devices according to user account

Filtering devices according to users is active only if *Database Viewer* enforces signing in of users (3.11 Signing in to program Database Viewer using user accounts).

After signing in to program *Database Viewer*, the user will see only that devices which belong to the view where is the user placed. How to create views and users you can read here: 2.3.2.d Users and Views administration and 2.3.2.c User accounts administration.

4 Using database system with dataloggers

Datalogger

Database system supports dataloggers of series: Rxxxx, Sxxxx, Lxxxx, dataloggers with printer: T-PRINT, T-PRINT-2, G0221, G0841 and G0241 and portable instruments COMMETER of series Dxxxx.

The program for dataloggers provides both: data insertion to the database and viewing the data. The first what is needed is to set database connection parameters.

4.1 Database connection parameters settings in program for dataloggers

This settings is located in program options Menu – File – Options on page Database system. How to enter parameters is explained in chapter 11.2 Entering database connection parameters.
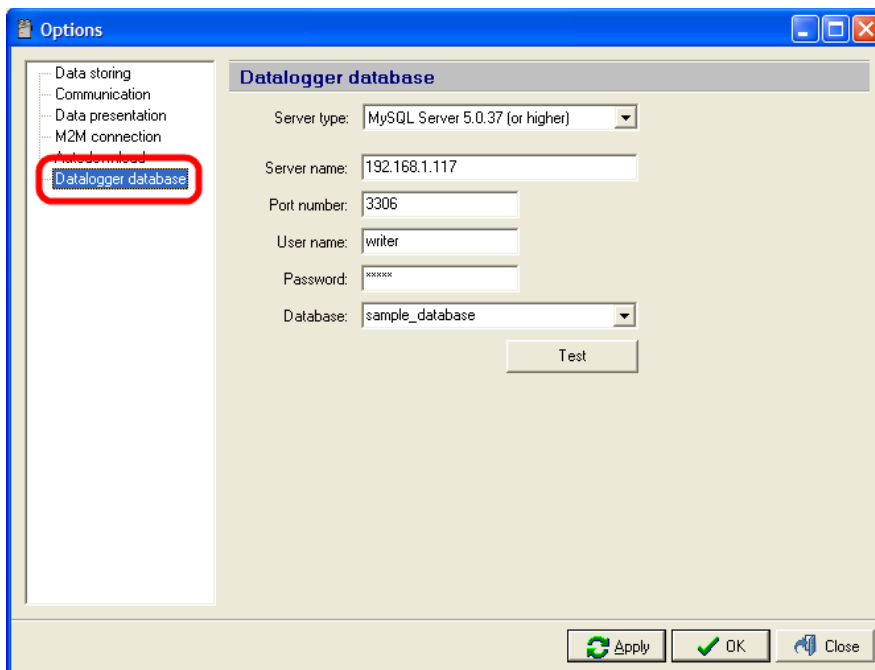
4.2 Storing data from dataloggers into database

You can store currently opened data in the program for dataloggers into the database by clicking on the command in menu: Menu – File – Add current file to database. There are "opened data" in the program when they are downloaded from the device or after opening them from *.mss file.

Second option is batch storing of data into the database from *.mss files in directory. This tool is located in: Menu – File – Fill database from directory.
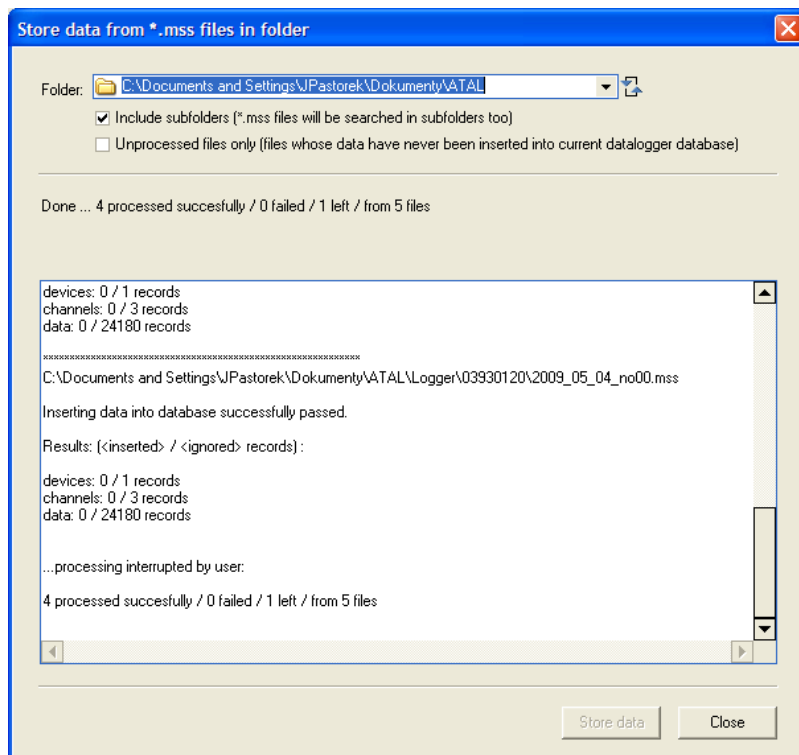
Drop down choosing dialog *Folder* and choose the directory where *.mss files, from which you want to store data into the database, are placed. There is info window under choosing parameters where you can see how many files has program found.

You can also enable the choice *Include subfolders* - then *.mss files will be searched in subdirectories of selected directory too.

If you enable the choice *Unprocessed files only* then only files, which weren't processed yet, will be included into the storing process. When any file is stored into the database then its filename with full path is stored into the database as the source. Therefore the system is able to detect if data from the file were stored into the database or not. It is not needed to enable this choice – system is able to detect duplicate records and forbids insertion of duplicate records into the database. It means that if any record exists in the database (record is identified by device, channel and time) then no new record with the same identification will be inserted.

By clicking on the button *Store data* storing process is executed. Above the info window you can see information about how many files are already processed, how many files processing failed and how many files left. There are detailed information about processing of one file in the info window.

Storing process can be interrupted by clicking on the button *Interrupt*. After clicking on this button processing of current file will be finished and then storing process will stop.

5 Using database system with monitoring systems

MS+

Working with database system in the program for monitoring system is similar as in the program for dataloggers. Program also provides both functions: data insertion and data viewing. Also, the first thing to do is to set database connection parameters.

Database system supports online data collection via *SOAP Server* for monitoring systems MS6 and MS55. It is advisable for these devices to have running simultaneously online data acquisition and downloading from device record via autodownload function in the program for monitoring systems. Hence it is guaranteed that it is possible to watch currently measured values via database viewer and in addition to it data will be backwardly loaded to the database from record in device in case of online acquisition drop out (online acquisition can fail for example due to ethernet network failure).

## 5.1 Database connection parameters settings in program for monitoring systems

These settings are located in program options Menu – File – Options on page Database system. How to enter parameters is explained in chapter 11.2 Entering database connection parameters.

There is additional settings Automatic export located under the Connection parameters settings. If the Automatic export is enabled then downloaded data will be stored into the database after downloading them from the device

.
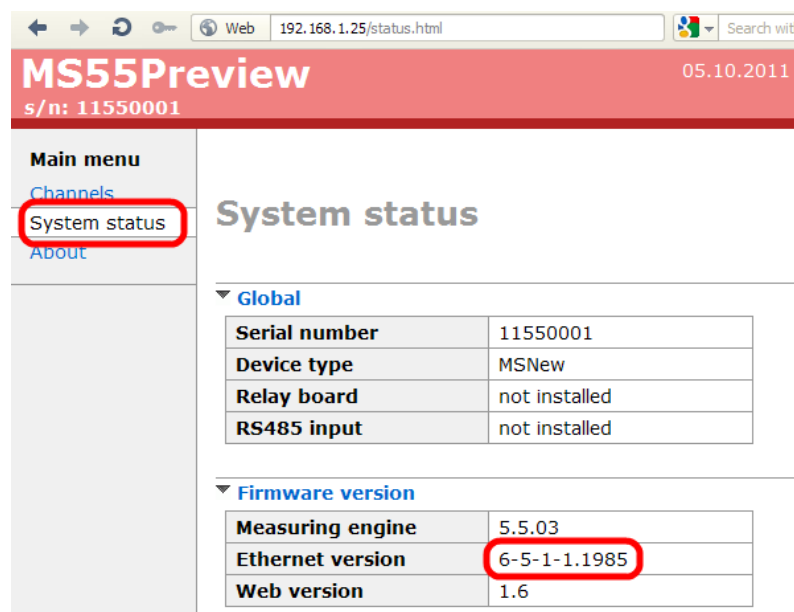
5.2 Storing data from monitoring systems into database

Storing data into the database is absolutely the same as in the program for dataloggers with only one exception: data files of monitoring systems has this format: *.msx. To understand this topic please read chapter 4.2 Storing data from dataloggers into database.

When monitoring systems MS6 and MS55 are used then it is possible to launch online data acqusition via *SOAP Server*. To launch online acquisition is needed:

1) Prepare *SOAP Server*. SOAP Server servers for collecting measured data which monitoring system sends online (as frequently as big time interval was choosed) via SOAP protocol. Because the preparation of *SOAP Server* is topic which is common for online acquisition from monitoring systems and also for sensors, then you can read about it in appendixes, chapter: 11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors) (data entry for online data acquisition from sensors and monitoring systems MS6 and MS55)

2) Configure SOAP settings in monitoring system device (the device needs to have information about *SOAP server* location where the device shall send SOAP messages. More about it you can read in following chapter 5.2.1 Configuration of SOAP settings in monitoring system.

Database system supports online data acqustion from MS6 and MS55 devices with minimal firmware version of ethernet interface 6-5-1-1.1985. It is possible to find firmware version on device web pages:

5.2.1 Configuration of SOAP settings in monitoring system

Enter the configuration of demanded device in program from monitoring systems: Menu – Configuration – Datalogger settings and switch to the tab Communication.
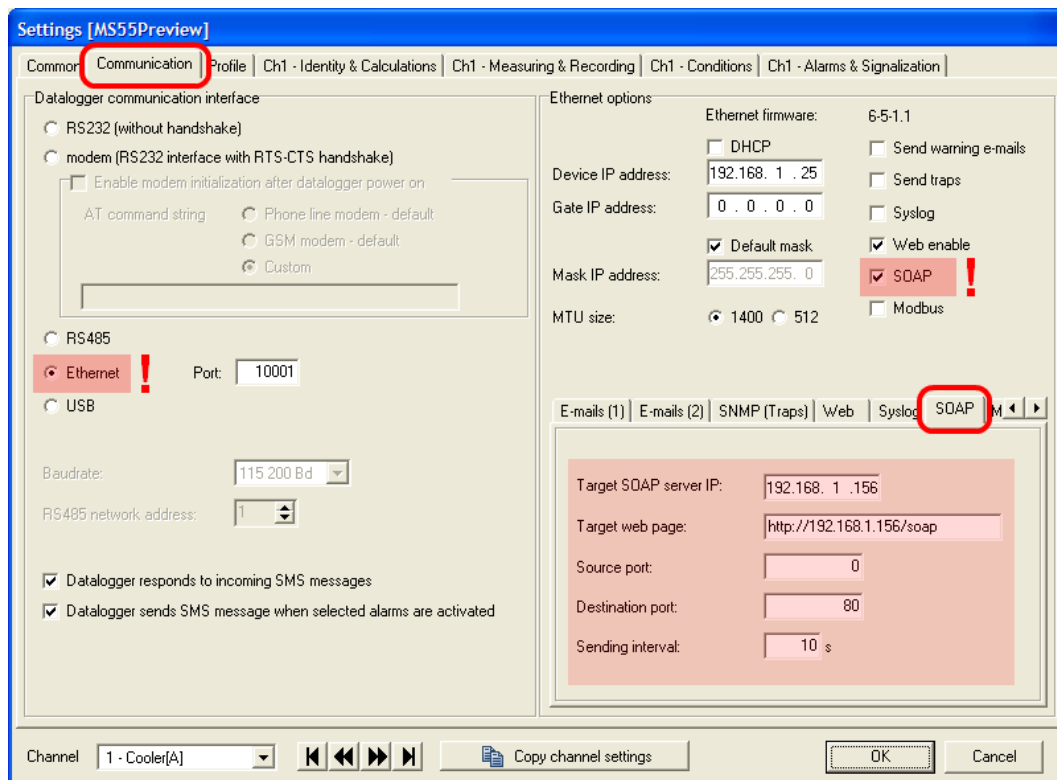
Note in advance: online data acquisition is based on SOAP protocol, which is running on ethernet network. Hence communication interface of the device must be switch to Ethernet mode and device must be connected to ethernet network where *SOAP Server* is accessible.

Enable the choice SOAP on the right side of the window. Edit fields for SOAP configuration will be enabled and you can find them lower under the tab SOAP.

To the field Target SOAP server IP enter its IP address. This address you can find out with help of SOAP Server diagnostic (*Database Manager* - tab SOAP Server - button *Diagnostic*).

As Target web page enter the text composed of SOAP server IP address and string "/soap":

```
http://<IP_address>/soap
```

As the source port enter 0 and as the destination port enter listening TCP port of the SOAP server (if you went in accordance with this manual then it is 80).

Finally, choose sending interval. You can enter minimally 10 seconds, but we alert you, that entering short interval will lead to rapid growing of the database if compression of online acquisition is not enabled (see chapter 2.3.2.b Online acquisition compression settings).

When compression is not enabled we recommend to use short intervals (10 s) only when tuning data acquisition. But when you are sure that acquisition works well, reconfigure all devices settings and set sending interval minimally on 60 seconds. But recommended are values longer than 300 seconds (5 minutes).

This is everything you have to set up so click the button OK to save changes to the device. From this moment the device will start sending SOAP messages to *SOAP server*. If you entered short interval, e.g. 10 seconds, then it can take up to half of minute until the first value will be sent.

6 Using database system with sensors

Database system also supports sensors with ethernet output. The advantage is that data acquisition from sensors is online and automatic. This means that you don't need to download data from the device manually like in case of dataloggers. Ethernet sensors periodically sends measured values to the database via SOAP protocol. Hence, there have to be *SOAP Server* running, which captures messages sent from sensors and stores them to the database.
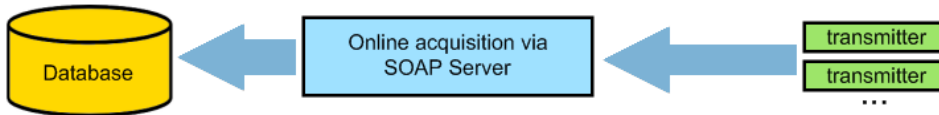
Database system supports ethernet sensors of series Tx5xx, Hx5xx a P85xx with this minimal firmware version of ethernet interface:

- Tx5xx, Hx5xx: from firmware version 1-5-2.02

- Tx5xx-CO2, Hx5xx-CO2

- P85xx, P86xx: from firmware version 4-5-1.20

- P2520

It is possible to find firmware version on sensor web pages, on page *About*:
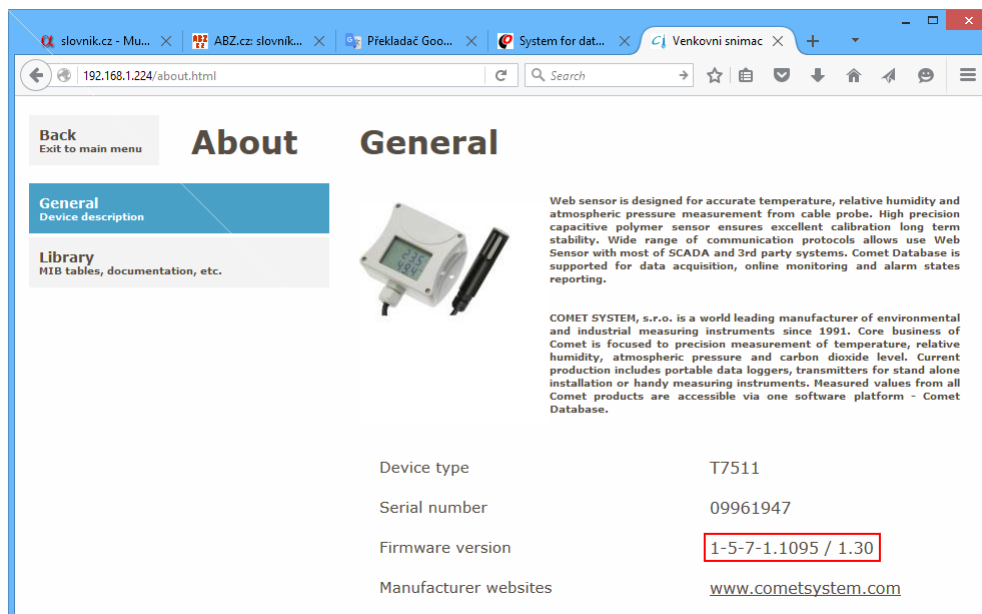
6.1 Preparing SOAP Server (data entry for online data acquisition)

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *SOAP Server* is already configured and then do not read this chapter.

Because the preparation of SOAP Server is topic which is common for online acquisition from monitoring systems and also for sensors, then you can read about it in appendixes, chapter: 11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors).

6.2 Sensor settings

Now, when the *SOAP server* is ready, the last step to do is to set sensors to send measured values to the *SOAP Server*.

1) Go to sensor's web and choose *Settings*. Further, choose *SOAP protocol*.
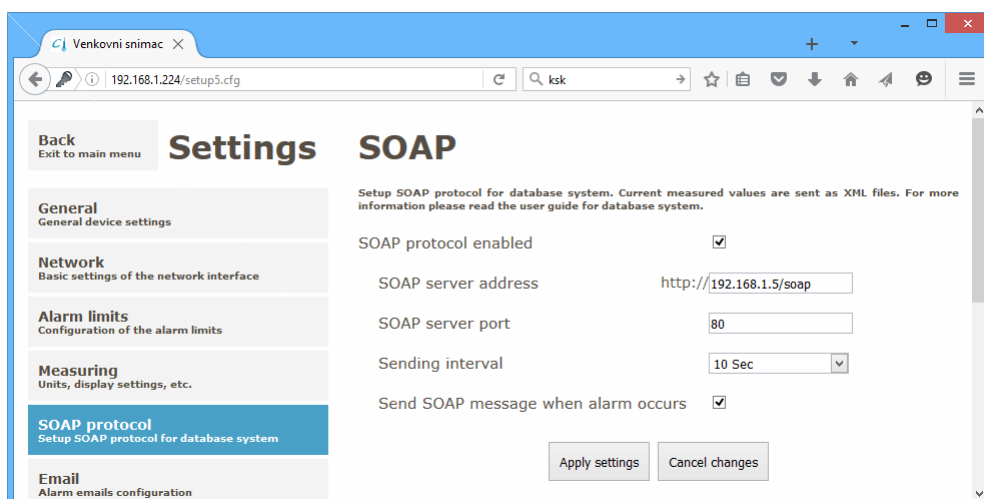
2) Switch on the choice *SOAP protocol enabled*. Settings will be showed.

3) Enter *SOAP Server address* in format `<IP_address>/soap`. Don't forget to append `/soap` behind the IP address – this is often forgotten.

4) Enter the port number at which *SOAP Server* listens (*SOAP Server port*).

5) Enter *Sending interval*. For testing purposes enter 10 seconds. After, you verify, that data acquisition is working, we recommend to use minimally 60 seconds or more. Size of the database will grow quickly in case when too short sending interval is used.

6) Confirm change of settings by button *Apply settings*.

7) Verify data acquisition: When all was set correctly, then data from the sensor will appear in program *Database Viewer*, *Online data* view in about 1 minute.

Note: It is also possible to configure sensor using program *TSensor*.

TSensor

You can find the example, about how to set SOAP protocol in the sensor, in diagnostic page of *SOAP Server* (program *Database Manager – Services – SOAP Server –* button *Diagnostic*). This example shows configuration using program *Tsensor*.

You should enter all parameters as in this example. Only setting of Sending interval is up to you.

7 Using database system with Multiloggers

You can export data to the database using these two ways:

- Manually, via program *Comet Vision*

- Automatically, via *Datalink* service

7.1 Manual export of data to the database

7.1.1 Database connection settings in Comet Vision

At first, you must set database connection parameters in program *Comet Vision*. This setting you can find in *Home – Program home – Program options – Database*:

> If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then you can find concrete example *How to connect to the database with the Comet Vision software* in PDF report generated by installer.
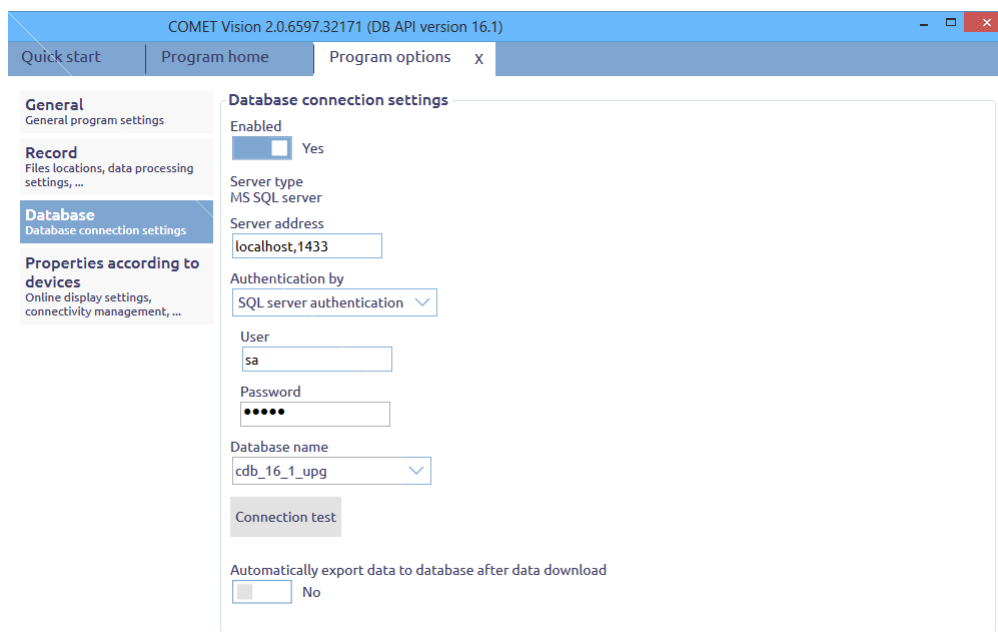
If you set the choice *Automatically export data to database after download,* then export of record to the database will be executed after every record download.

7.1.2 Export of data to the database in Comet Vision

You can find the button for executing export of data to the database on every file in window *Exports and Reports*:

43
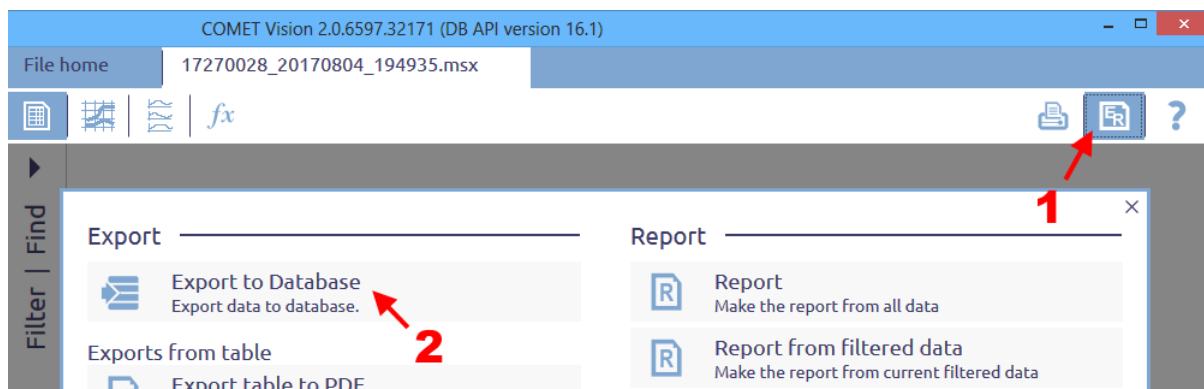
7.2 Automatic export of data to the database via Datalink service

Datalink service is TCP/IP server. It listens, until Multilogger connects. After the connection is established, it reads settings from Multilogger and stores online values and eventually record into database.

In Multilogger configuration, it is needed to set "where is *Datalink* service", interval of connection to *Datalink* service (that is interval of online values) and how often record should be downloaded.

Note: Acquisition via *Datalink* Service can operate with Multiloggers connected thru Ethernet interface only. So, it is not possible to collect data from Multiloggers connected thru USB.

7.2.1 Preparation of Datalink service

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *Datalink* service is already configured and then do not read this chapter.

You can set the *Datalink* service in program *Database Manager*. Run it, connect to the database, choose *Services - Datalink Service* in the tree menu and click the button *Reconfigure*:
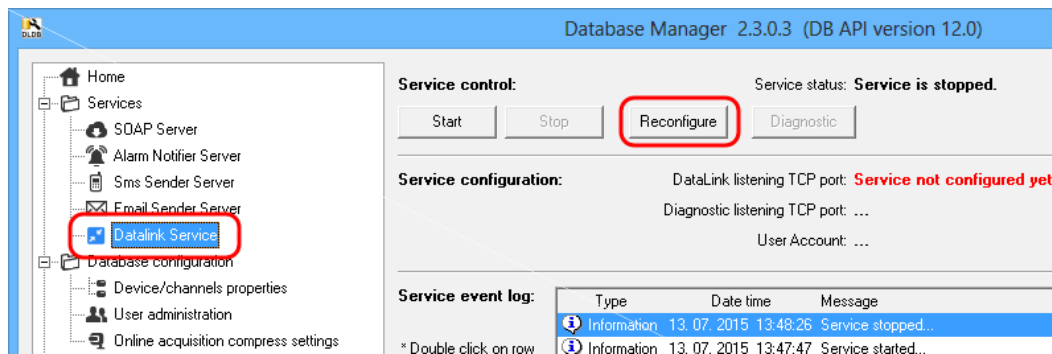
You have to enter database account with read and write rights in *Datalink* service configuration. You can read more about database accounts in the chapter: 2.3.3.a MS SQL Server Accounts administration.
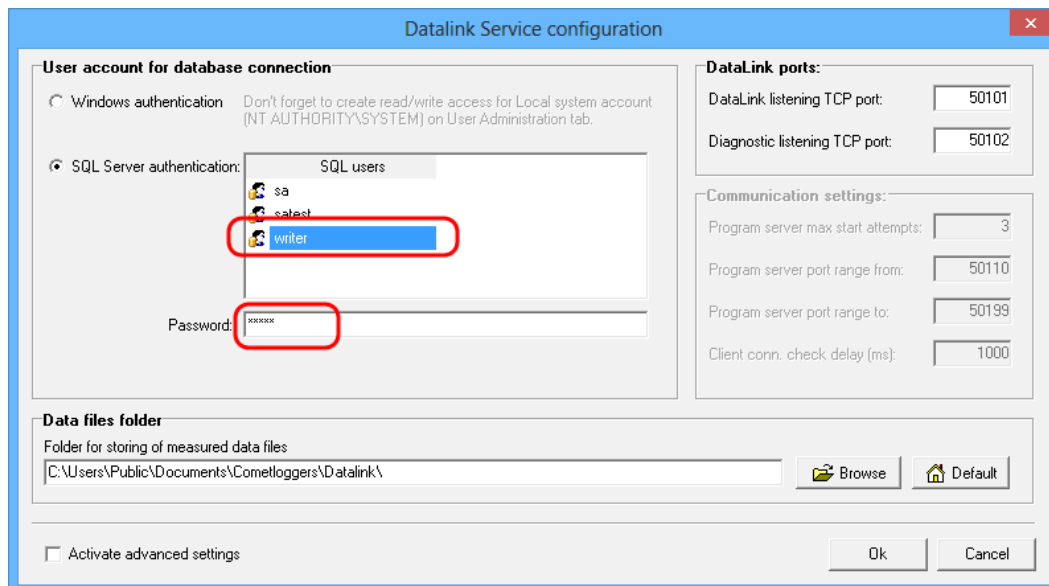
You can change the folder, where the *Datalink* will save data files. But pay attention on network folders. *Datalink* service is running under Windows account *NT AUTHORITY\SYSTEM*, hence the access will be verified for this user.

Others parameters would only be necessary to change in case when port collision would occur. For example when on port 50101 already listens another service.

Finally, save the configuration by clicking on the button *OK*. Start *Datalink* service and launch the diagnostic for checking the service functioning by clicking on the button *Diagnostic*:
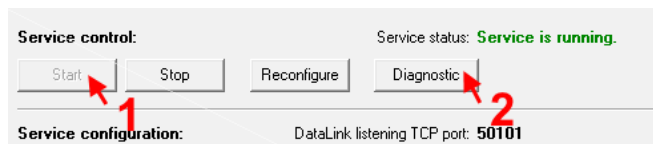
The diagnostic will be opened in the web browser. You have to see 3 successful result of tests which verifies database connection (3x green sentence, marked as "1" on the picture below). If you see e.g. warning *Failed to connect to the database*, check up, that you chose right user account and that you entered right password.
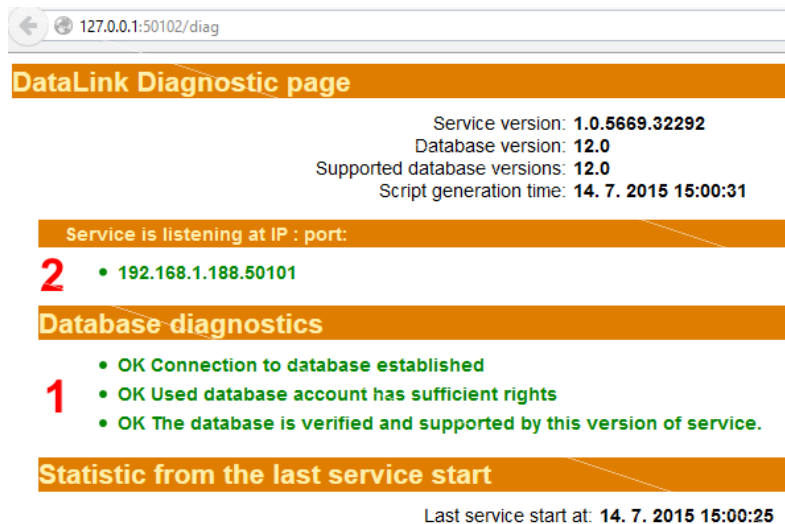
Also, you can see actual IP address and port (marked as "2" on the picture) in the diagnostic. These parameters you will need for configuration of *Datalink* in Multilogger.

Finally, it is needed set rule on the firewall for allowing the port on what Datalink listens (standardly 50101). How to do it you can read in chapter: 11.1 Allowing TCP port on Windows firewall.

It is advisable to verify, that the path to the Datalink service is really open from the network. Please sit to another computer in the network and enter `http://<ip>:<port>` into the web browser. IP address and port you can read from the diagnostic (marked as "2" on the picture above).

If the browser shows a few similar characters as on the following picture, then the *Datalink* is accessible from the network.
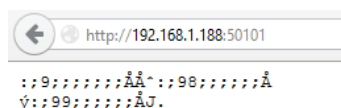
If the browser shows the message, that it is not possible to connect to the server, then the *Datalink* service is not running or is blocked by firewall.

7.2.2 Preparation of Multilogger for use with Datalink service

As soon as you have prepared *Datalink* service, it only remains to set information "where is *Datalink* service" into Multilogger, interval of online values and if you want to download record, then how often you want it.

Connect the Multilogger in the program *Comet Vision*. Click on the *Devices* in the menu on right side, then click on the *Add device* in opened tab *Devices home*:

Now, choose Ethernet connection. Choose required Multilogger in the list and click the button *Finish*. Note: searching list will only find device connected in local network. If you cannot see required Multilogger in the list (for example you connected Multilogger to the network after opening this tab), click the button *Refresh*.
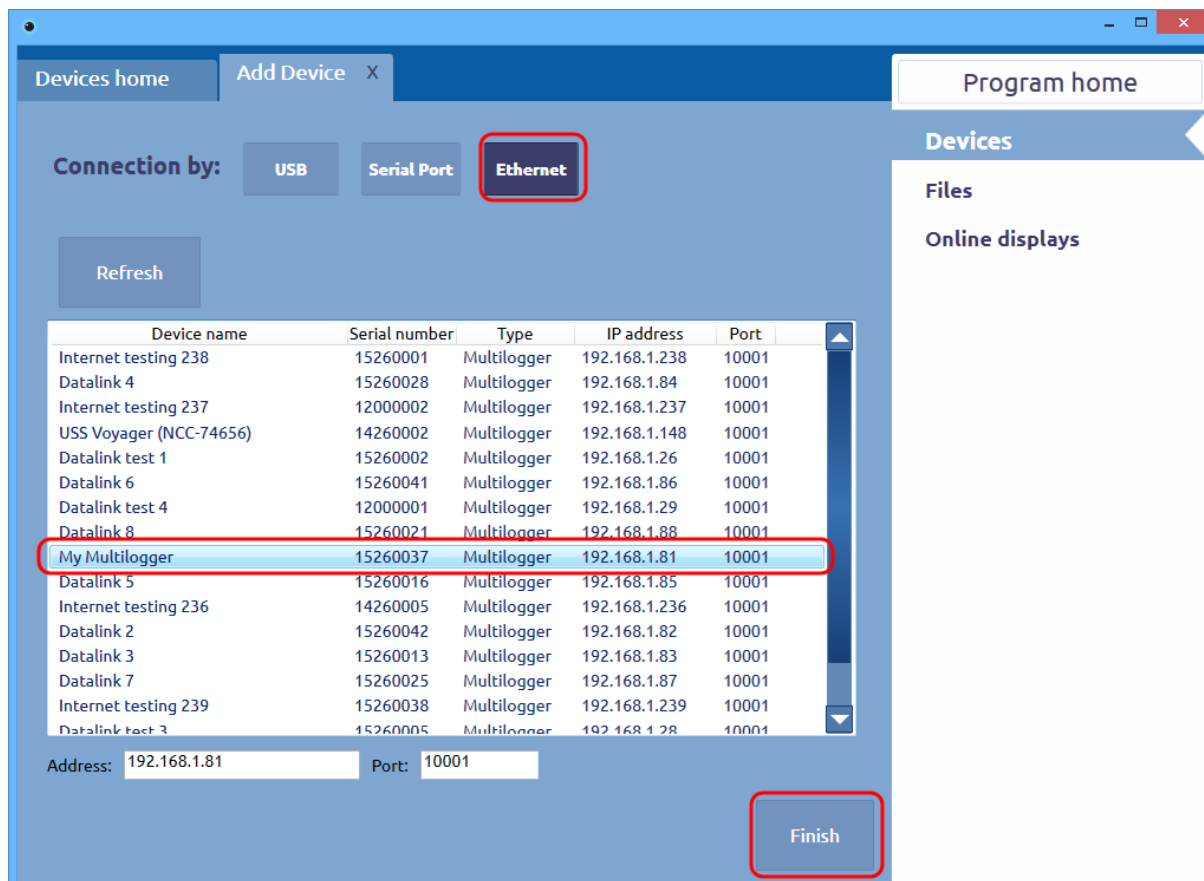
Now, you will see the tab *Device home* of connected device (later, you can go here by choosing the device in list *Devices* on right side). Click the button *Configuration*:
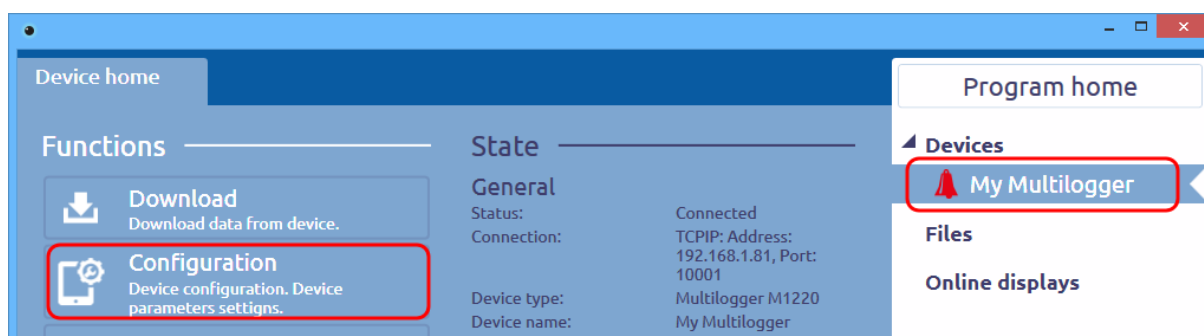
Get into *Datalink* configuration by choosing section *Ethernet - Datalink*:
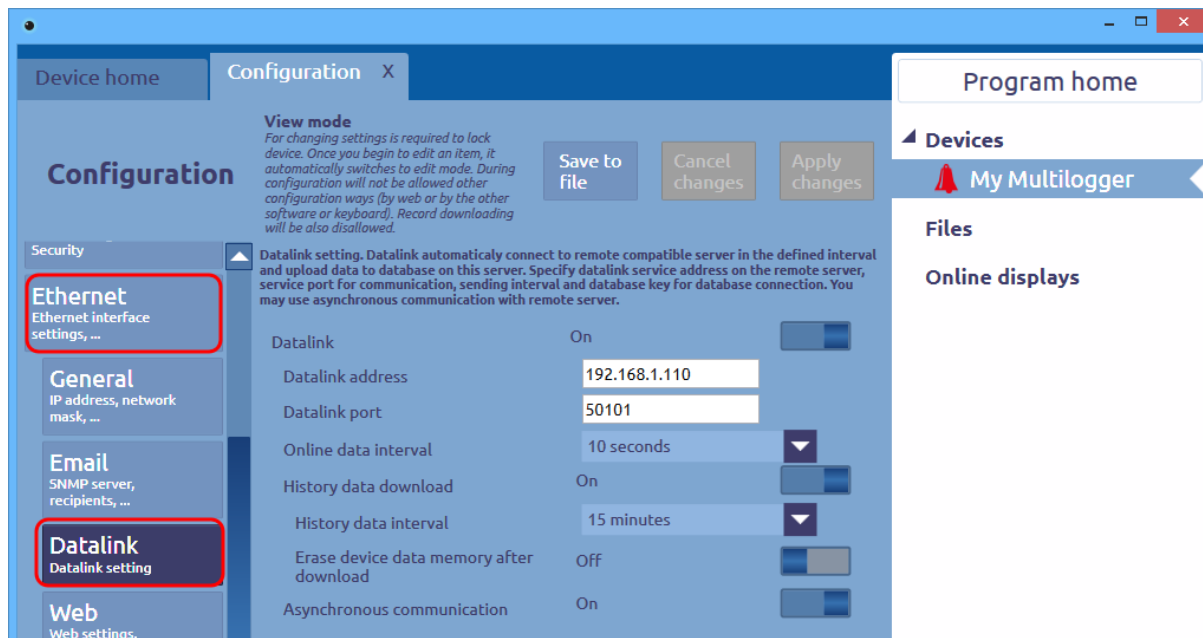
Enable the function *Datalink - On*. Enter IP address of the computer where *Datalink* service is running and the port on which it listens (default is 50101). IP and port you can read from diagnostic of *Datalink* service (explained in chapter 7.2.1 Preparation of Datalink service).

Choose interval of online data acquisition (this also means interval in which the Multilogger connects to the *Datalink* server). Choose 10 seconds for primary testing. To avoid useless disk space consumption due to too frequent inserting of online values, choose reasonable interval for live operation.

If you require automatic download of record as well, enable the choice *History data download* and choose how often you want to download the record – *History data interval*. If you require to erase data memory in the device after download choose *Erase device data memory after download*. But if you have chosen cyclic record in the device, then it is useless to erase data memory. When the cyclic record is set and the data memory is full then oldest records are overwritten. Insertion of data to the database ignores duplicities (samples, which was inserted by previous download, will not be inserted again).

When you enable the choice *Asynchronous communication*, then the Multilogger will connect to the *Datalink* service out of the interval as well. This will happen in case when Multilogger detects any change in alarm states (so that online values would be stored at this moment).

Finally, save changed configuration to the device by clicking the button *Apply changes*.

Now, it only lefts to check up, if data are really getting to the database. Launch *Database viewer*, set database connection parameters and look at the tab *Online data*. If you can see values from requested Multilogger, then everything is OK. More about program *Database Viewer* you can read in chapter: 3 Using program Database Viewer.

8 Using database system with Mobile Dataloggers

You can export data to the database using these two ways:

- Manually, via program *Comet Vision*

- Automatically, via the *SOAP service*

8.1 Manual export of data to the database

8.1.1 Database connection settings in Comet Vision

Explained in the chapter 7.1.1 Database connection settings in Comet Vision

8.1.2 Export of data to the database in Comet Vision

Export of the data into the database is the same as in case of Multiloggers. Explained in the chapter 7.1.2 Export of data to the database in Comet Vision

8.2 Automatic data sending to the database

Automatic data sending to the database is the same for Mobile Dataloggers as for Web Sensors. The device sends current measured values in the specified interval to the *Comet Database* (more accurate: to the *SOAP Server*, which takes care of storing the data into the database).

Fundamental difference between Web Sensors and Mobile Dataloggers is in the connection type to the ethernet network. In case of Web Sensor, which is located in the same network as the computer with *Comet Database* (*CDB*), it is possible to easily enter the target web page this way:

```
http://<IP of computer with CDB>:<port of SOAP Server>/soap
```
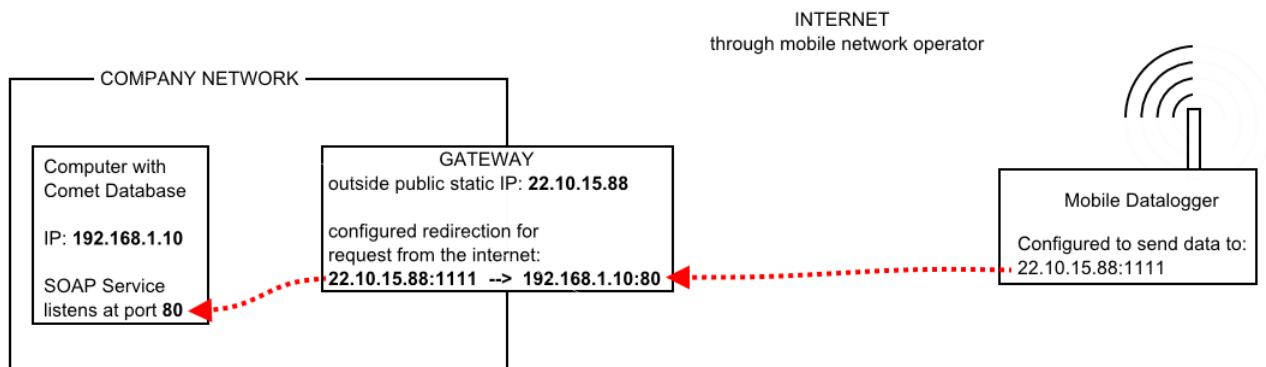

Configuration of redirection is not explained in this manual. Please contact you network administrator.

8.2.1 Preparing SOAP Server (data entry for online data acquisition)

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *SOAP Server* is already configured and then do not read this chapter.

The preparation of the *SOAP Server* is common topic for online acquisition from monitoring systems, Web Sensors and Mobile Dataloggers. You can read about it in appendixes, chapter: 11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors).

8.2.2 Configuration of data sending in the Mobile Datalogger

1) Connect to the device with the *Comet Vision* software

Run the *Comet Vision* software at first and just then connect the Mobile Datalogger to the computer using USB cable. *Comet Vision* software will automatically recognize that the Mobile Datalogger device was connected and it will add it to the list of devices.

2) Choose the device and click on the *Configure* button on the device home page. Choose the *Modem* section in the configuration.

3) You can set the PIN of the SIM card in the *General* section (in case when using of the PIN is enabled in the SIM card)

4) Choose the *Data* section. Enter the access point settings (APN) in the *General* subsection. For information, refer to your mobile SIM card operator.

5) Enable the choice *Data sending* in the *Data sending* section. Now, the complete settings will be displayed.

6) Enter the *URL*: `http://<gateway IP>:<reserved port>/soap`. It was explained in more detail in chapter 8.2 Automatic data sending to the database.

7) Finally, enable the data sending and choose the sending interval. The settings is twofold: one for case of external power supply and one for battery mode.

8) Save the configuration into the device with the Save button.

Testing on the first use

When using the Mobile Datalogger for the first time, we recommend to set the shortest sending interval. Afterward, run the *Database Viewer* software, switch to the *Online Data* tab and check if the data successfully reached the database. More about viewing data from the database you can read in chapter: 3 Using program Database Viewer.

Verification if the SOAP Server is accessible from the internet

Run the internet browser in the smart phone with mobile data connection and open the page `http://<gateway IP>:<reserved port>/diag`. If the diagnostic page of the *SOAP Server* is opened, then the *SOAP server* is accessible from the internet. If the browser reports troubles with connection to the site, then something is wrong. It may be a problem with the redirection on the gateway, or, for example, with incorrectly configured rules on the firewall.

9 Using database system with Wifi Sensors

Wifi Sensors are very similar devices such as Web Sensors. Wifi Sensors have ethenet output as well and sends measured data online in defined interval to the SOAP Server. Hence this chapter will be very similar to 6 Using database system with sensors

The only noticeable difference is that target endpoint url address on SOAP server is not …/soap but …/wifisensor. Another difference is that the Wifi Sensor supports ability to send measured values recorded during network outage or SOAP Server outage.

9.1 Preparing SOAP Server (data entry for online data acquisition)

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *SOAP Server* is already configured and then do not read this chapter.

The preparation of the *SOAP Server* is common topic for online acquisition from monitoring systems, Web Sensors, Mobile Dataloggers and Wifi Sensors. You can read about it in appendixes, chapter: 11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors).

9.2 Wifi Sensor settings

Now, when the *SOAP server* is ready, the last step to do is to set sensors to send measured values to the *SOAP Server*.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then you can find concrete example *How to configure Wifi Sensor* in PDF report generated by installer.

1) Go to the Wifi Sensor's web, choose *Settings* and choose *Cloud*.

2) Choose *Cloud mode* and select *COMET Database / User server*

3) Choose *URL for the server*. Enter *URL* in format `<IP_address>:<port>/wifisensor`. Don't forget to append `/wifisensor` behind the IP address:port – this is often forgotten. If SOAP Server listens at port 80, colon and port number can be omitted.

Insert URL for the server

`http://192.168.1.100:80/wifisensor`

OK   Cancel

4) Enter *User server send interval*. For testing purposes enter 10 seconds. After, you verify, that data acquisition is working, we recommend to use minimally 60 seconds or more. Size of the database will grow quickly in case when too short sending interval is used.

5) There are other options:

Asynchronous messages

    In case of alarm change, the message will be sent outside interval.

    Checked is recommended value.

Memory disabled

    Memory is used to backup messages, which was unable to reach SOAP Server due to network issues for example. Then, after the Wifi Sensor establishes connection with SOAP server, these backed up messages are sent.

    Unchecked is recommended value.

6) Finally choose *Back*, choose *Save or Cancel* and confirm with the *Save* button

7) Verify data acquisition: When all was set correctly, then data from the Wifi Sensor will appear in program *Database Viewer*, *Online data view* in about 1 minute.

10 Alarming via SMS Texts and emails

The main task of this function is to quickly inform the user about raised alarm. Thanks to sending emails and especially SMS texts the user will be reached anywhere and anytime.

This feature is only applicable to devices that can send measured data online. These devices are all ethernet transmitters (Web Sensors), monitoring systems MS6, MS55 with ethernet communication interface, Multiloggers, Mobile Dataloggers (UxxxxM) and Wifi Sensors. The system operates in such a way that it periodically checks table of online values ??in the database, and if necessary it sends a notification. The system can send the notification by SMS text and/or email. The way of sending and particular users (recipients of messages) are to be set during configuration of monitoring profiles.

From a user point of view configuration includes:

- "**User accounts (recipients) administration**" – allows you to create address book of users with their phone numbers and email addresses. Users created this way then can be assigned to particular monitoring profiles.

- "**Monitoring profiles administration**" - allows you to create any number of profiles that tell the system what to monitor and what actions to perform. So it is possible to have for example a profile that will watch the beginning of alarm on channel X and that will have assigned users P and Q. According to this profile, the system sends notification to users P and Q in case that the alarm begins on channel X. Concurrently, other profiles can be set that monitor other channels, watch for example ending of alarm state and send notification to different users.

From technical point of view the system is composed of four Windows services that is necessary to configure correctly at first:

- *SOAP Server service* – the service providing online acquisition of data from devices to the database.

- *Database Alarm Notifier service* – the service that watch the database and analyses requirements for sending notification.

- *SMS Sender service* – the service providing sending of notification via SMS texts using modem to recipient's cellular phone.

- *Email Sender service* – the service providing sending of notification via email into recipient's mailbox.
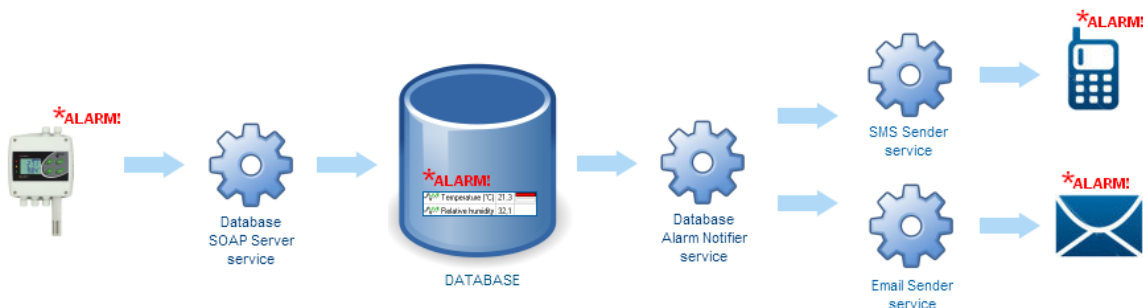
10.1 Preparation of alarming via SMS and email

The following steps assume that you already have functional online collection of data from devices. Than means, you have properly created the database, correctly configured *SOAP server* and correctly configured SOAP protocol in devices. If so, then you already can see online data from devices in the viewer *Database Viewer*.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *SOAP Server* is already configured.

Preparation of the system SMS text/email alarming requires performing following steps subsequently:
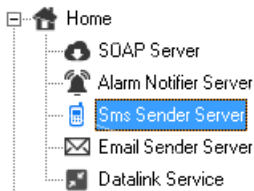
- 10.1.1 Preparation of service SMS Sender
- 10.1.2 Preparation of service Email Sender

10.1.1 Preparation of service SMS Sender

If you don't want to use notification via SMS text then skip this chapter.

1) Find administration of service *SMS Sender* in the program *Database Manager*, section *Services*:

and go to service configuration by button *Reconfigure*.

2) Set parameters for modem connection in section *Modem connection*.

Choose correct COM port where the modem is connected. How to find out available COM ports in the computer you can read in chapter 11.4 How to get information about COM ports in the computer.

Select correct communication speed. Usually the default speed of modem is 9600 bauds.

If the SIM card is secured by PIN code, then enable choice *Enter PIN* and enter the PIN code.

If there is not set Short Message Service Center in the modem, then enable the choice *Enter SMSC* and enter phone number of the Center. Phone number of SMSC you can find out at your telephone company.

3) Save the configuration by the button *OK* and run the service by the button Start. Wait at least 20 seconds if there will or will not be shown error message in the log. If there is no error message in the log than you can continue. Otherwise, correct the configuration.

Bellow is the example of error message that will be shown in case when incorrect COM port was entered:

4) The service *SMS Sender* is running now. You can verify its functionality by sending test SMS text – use the button *Send test SMS Text*.

10.1.2 Preparation of service Email Sender

If you don't want to use notification via SMS text then skip this chapter

1) Find administration of service *Email Sender* in the program *Database Manager*, section *Services*:
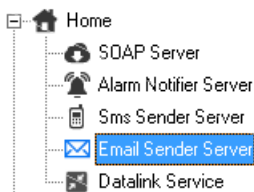
and go to service configuration by button *Reconfigure*.

2) Set parameters for connection to SMTP server in section *Connection to SMTP*. You can use your company SMTP server (ask you network administrator for required values). Or you can use some of public email provider. Following example shows settings with use of SMTP from Google (gmail.com):

3) Save the configuration by button *OK* and runt the service by button *Start*.

4) The service *Email Sender* is running now. You can verify its functionality by sending test email – use the button *Send test email*.
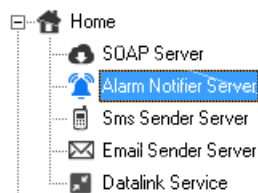
10.1.3 Creation of user accounts with contacts

1) Find *User accounts* administration in the program *Database Manager*, section *Database configration*:
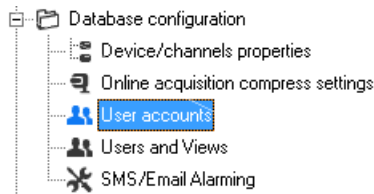
2) Create at least one user – the button *New*. Note: The form will enforce you to enter the Login (account name). This login you will have to enter, although it is not necessary for SMS/Email alarming. Login is for signing in program *Database Viewer* in case when the function filtering of devices according to user is enabled (3.12 Filtering devices according to user account).

3) 3) Test if you correctly entered email / phone number by sending test email / SMS text (Buttons *Send test email* and *Send test sms* in edit user window. **WARNING:** Don't forget, that for sending of test message Email Sender / SMS Sender services must be running.

4) 4) If you have a large number of users, it is useful to create groups – Groups…, the button New. Than you can add users to the selected group with buttons "`>`" "`>>`" or delete with buttons "`<`" "`<<`". In the profile administration, you will be able to quickly assign the group to the profile instead of adding individual users.

10.1.4 Preparation of service Database Alarm Notifier

1) Find administration of service Alarm notifier in the program Database Manager, section Services:

and go to service configuration by button *Reconfigure*.

2) Enter the database account that the service will use for database connection. This account must have read/write access to the database. More about database accounts you can read in chapter 2.3.3.a MS SQL Server Accounts administration.

3) Save the configuration by button *OK* and run the service by button *Start*.

10.1.5 Creation of monitoring profiles

1) Find *SMS/Email Alarming* administration in the program *Database Manager*, section *Database configuration*:

2) Create new profile by button *New*. Profile editor will be opened:
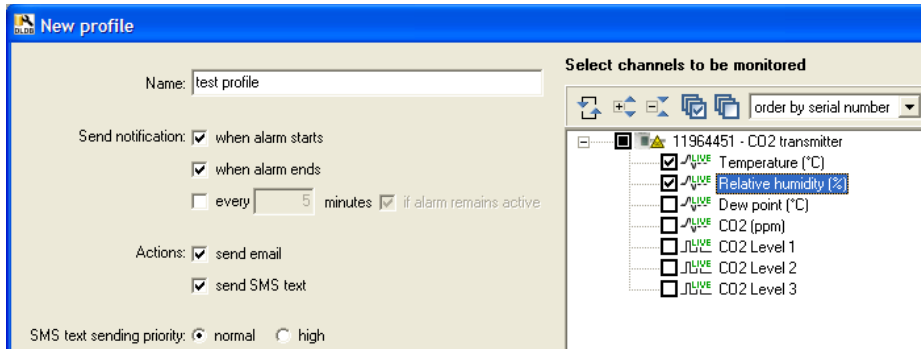
a) Enter the name of the profile – *Name*

b) Select the situations in which to send notifications:

   i) *when alarm starts* – notification is sent when the alarm becomes active

   ii) *when alarms ends* – notification is sent when the alarm is no longer active

   iii) *every X minutes* – notification will be sent periodically every X-th minute, regardless of whether any alarm is active or not. This option is suitable for periodical informative sending of measured data. Possibly, it is also suitable for periodical sending of a maintaining message that informs that the system is still in operation.

   iv) *Every X minutes if alarm remains active* – notification will be sent every X-th minute in case when the alarm remains active.

c) Select the method of notification – by sending email, by sending SMS text – *Actions*

d) When using SMS text it is possible to increase its priority. This is useful if you have created multiple profiles and you want to be sure, for one particular profile, that its notifications will be served in preference by the service *SMS Sender* in case of service congestion.

e) Choose channels to be monitored

3) Click the button *OK* to finish editing of the profile

4) Finally, assign desired users to the profile from users or groups lists:
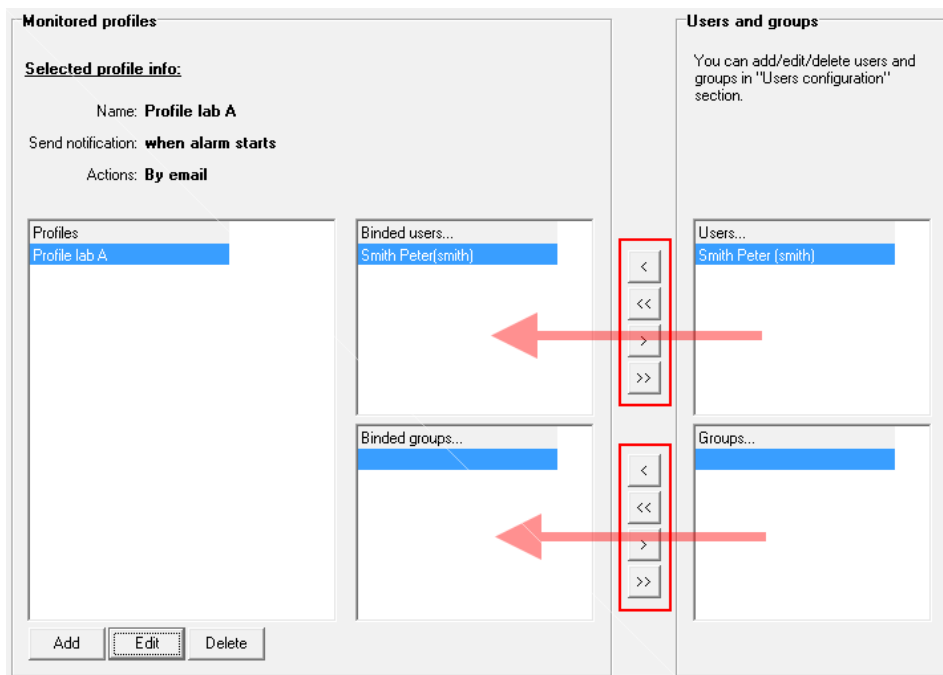
5) The system is ready at this moment. It is not necessary to restart services in case of adding/editing profiles.

6) To verify that the system is functioning properly, we recommend to create the testing profile. In this testing profile will be selected "Send notification every 1 minute" and at least one channel will be selected for monitoring. Example:
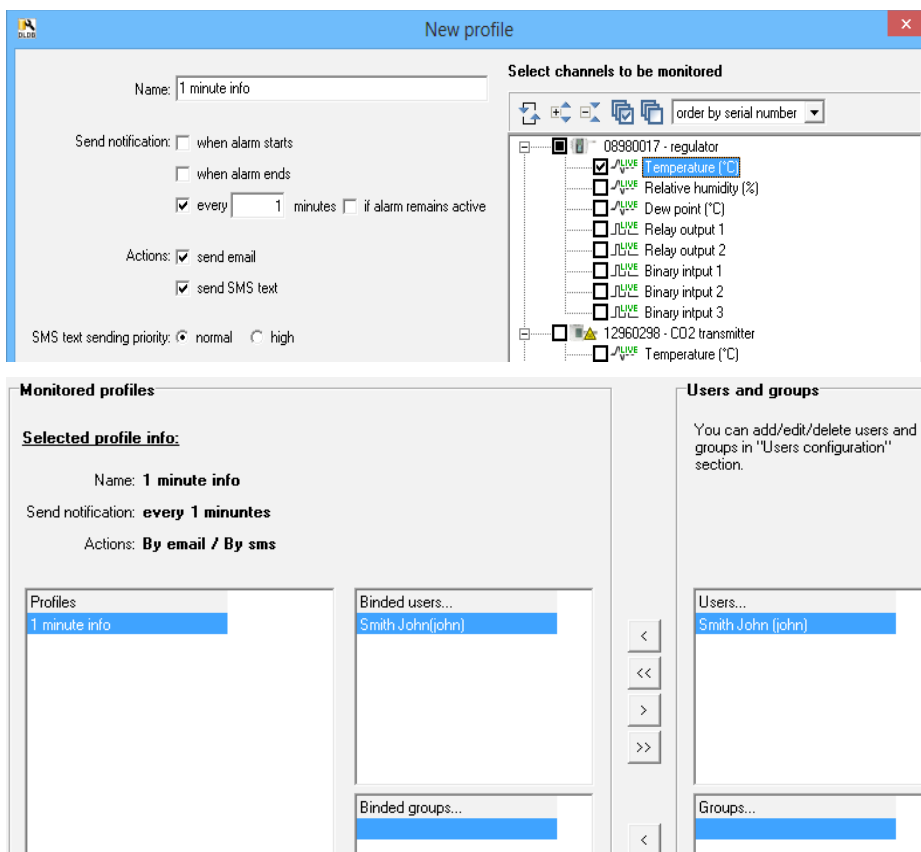
As you can see from the pictures, email and SMS text will be sent every 1 minute with information about channel Temperature from the sensor with serial number 08980017 to the user John Smith.

11 Appendixes

11.1 Allowing TCP port on Windows firewall

Following guide shows how to how to allow TCP port on Windows firewall in Windows 7.

Attention: Not only Windows firewall can be running on the computer. Also, for example some antivirus programs includes own firewalls. If this is the case then allowing port on this firewall or disabling whole firewall is needed too.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then all requested ports were already allowed on the firewall.

1) Run settings of Windows Firewall in Control Panel:
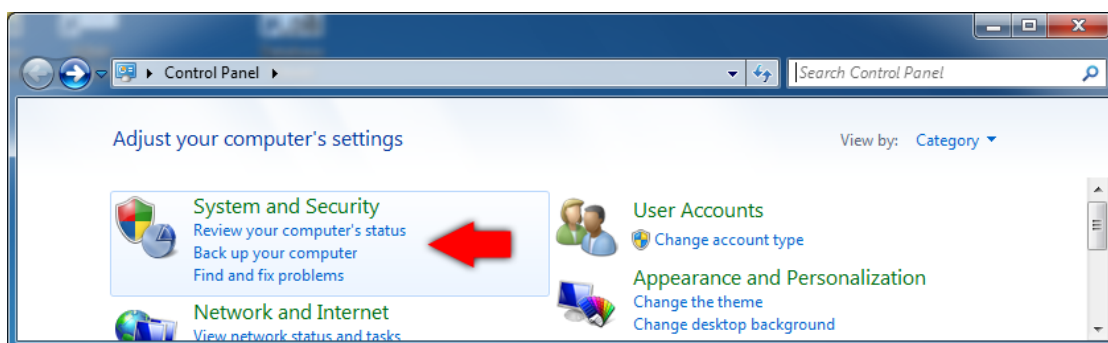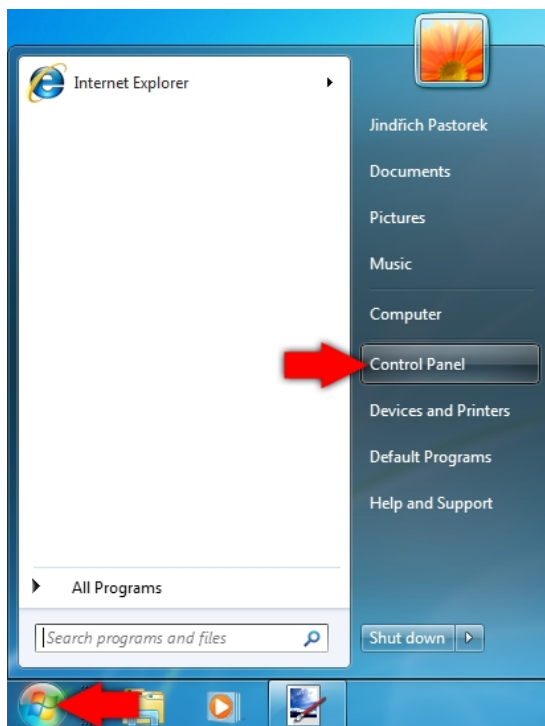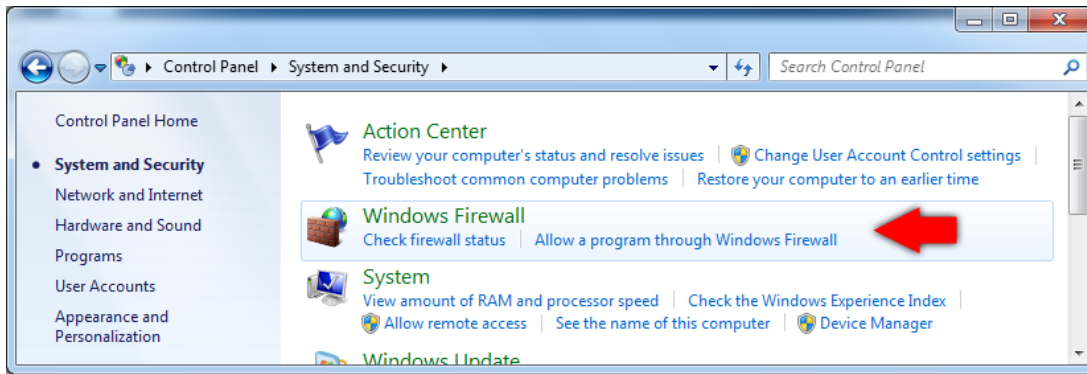
2) Choose advanced settings in Windows Firewall:
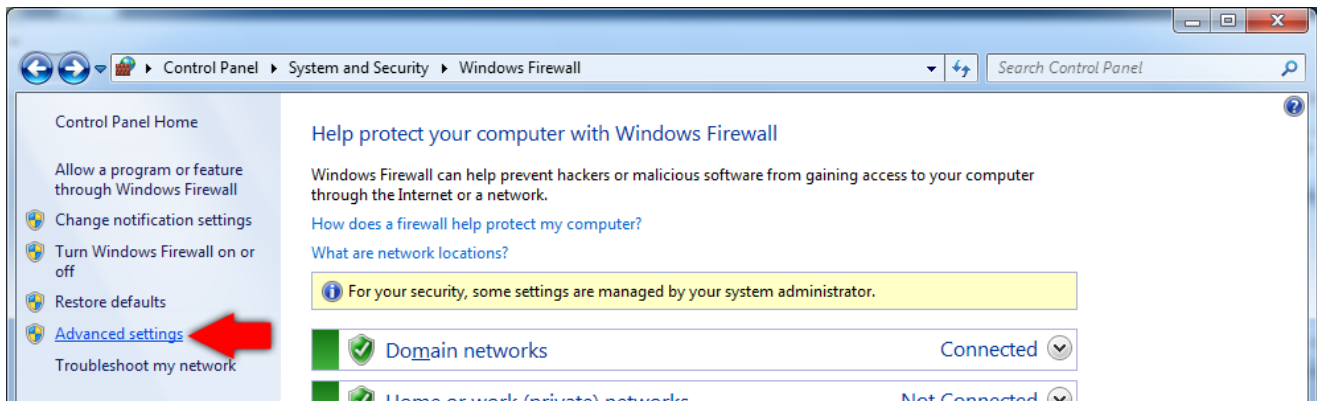
3) Left-click on Inboud Rules and choose New Rule…
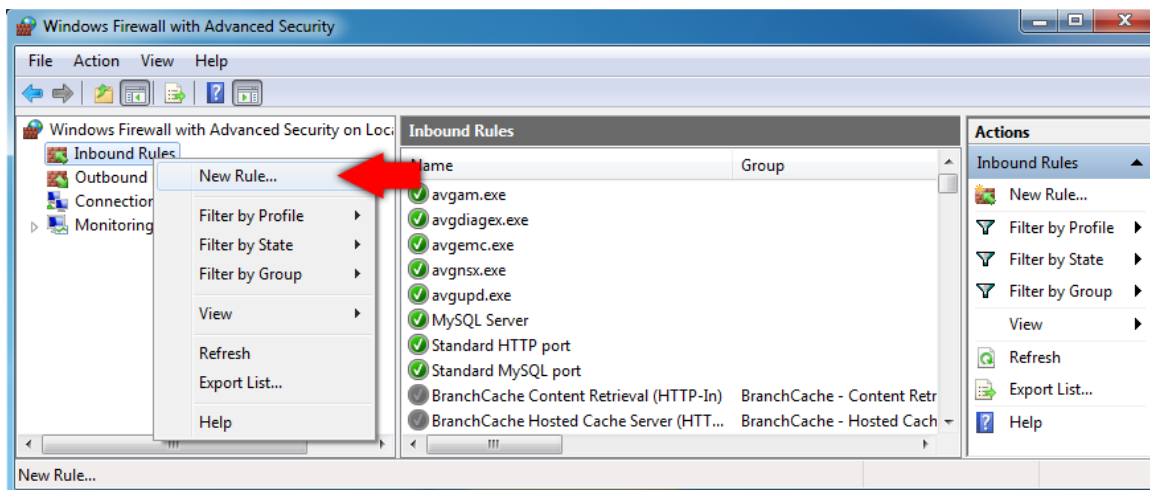
4) Choose Port as the type of rule on the first page of New Inbound Rule Wizard. Then click the button Next.
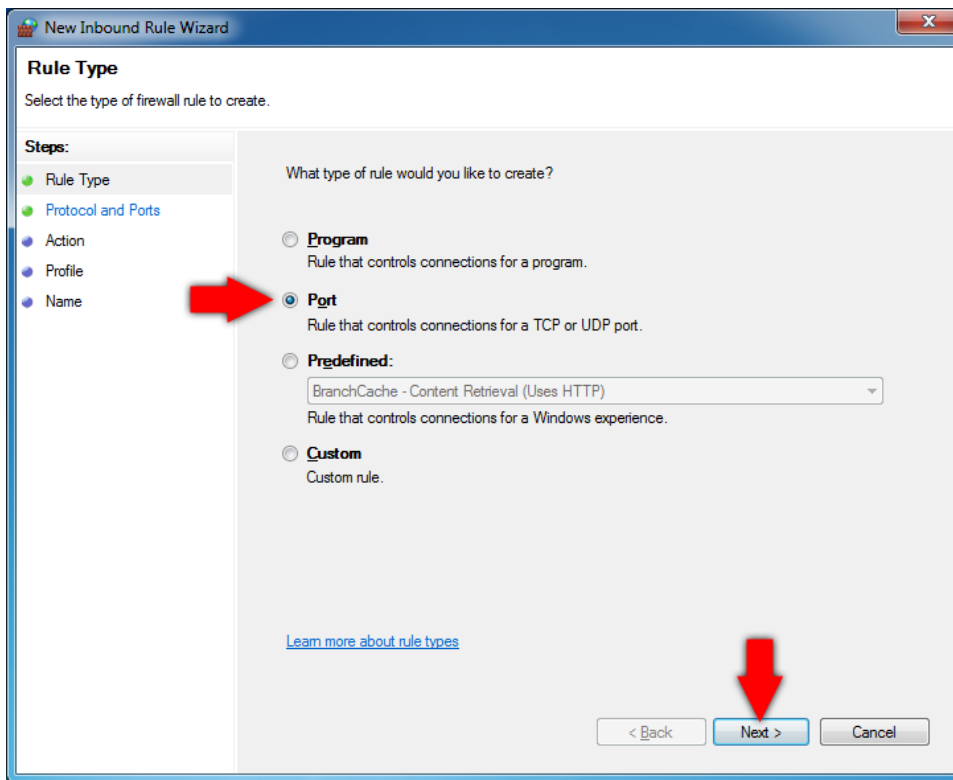
5) Left the choice TCP selected. Enter the port number which is to be allowed into the field Specific local ports. Examples of standard port which you may need to allow:

Name: MSSQL   Port number: 1433

Name: HTTP   Port number: 80
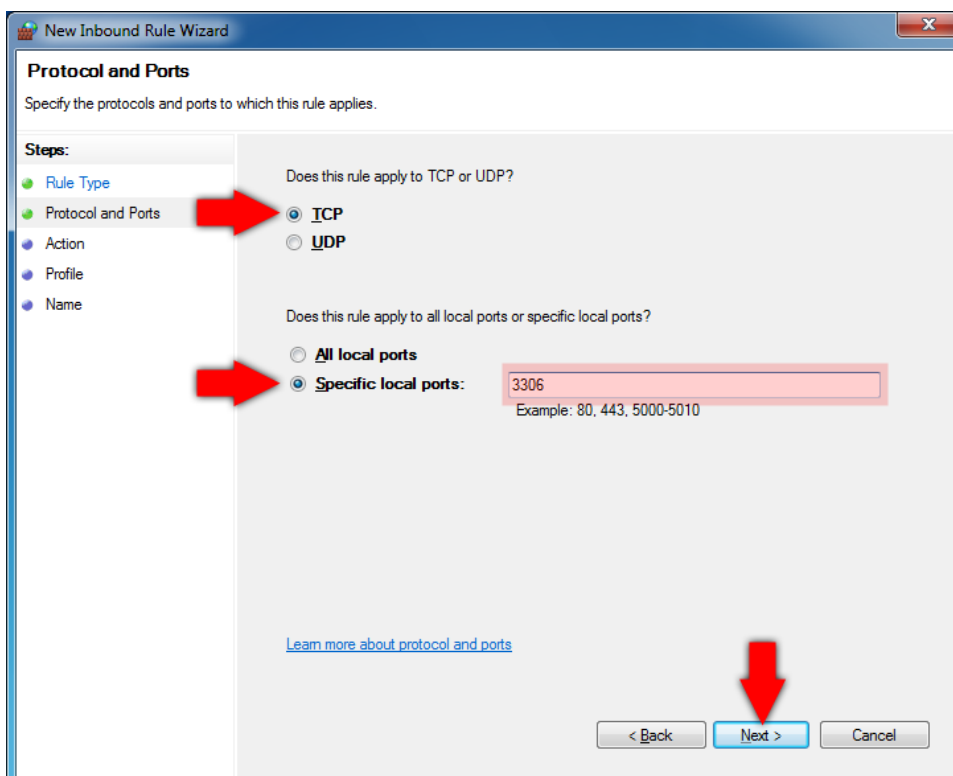
6) Skip following two pages without changes with the button Next until you get to the page Name. Enter exception name (it's up to you what name you think up) into the field Name. Finally click the button Finish.
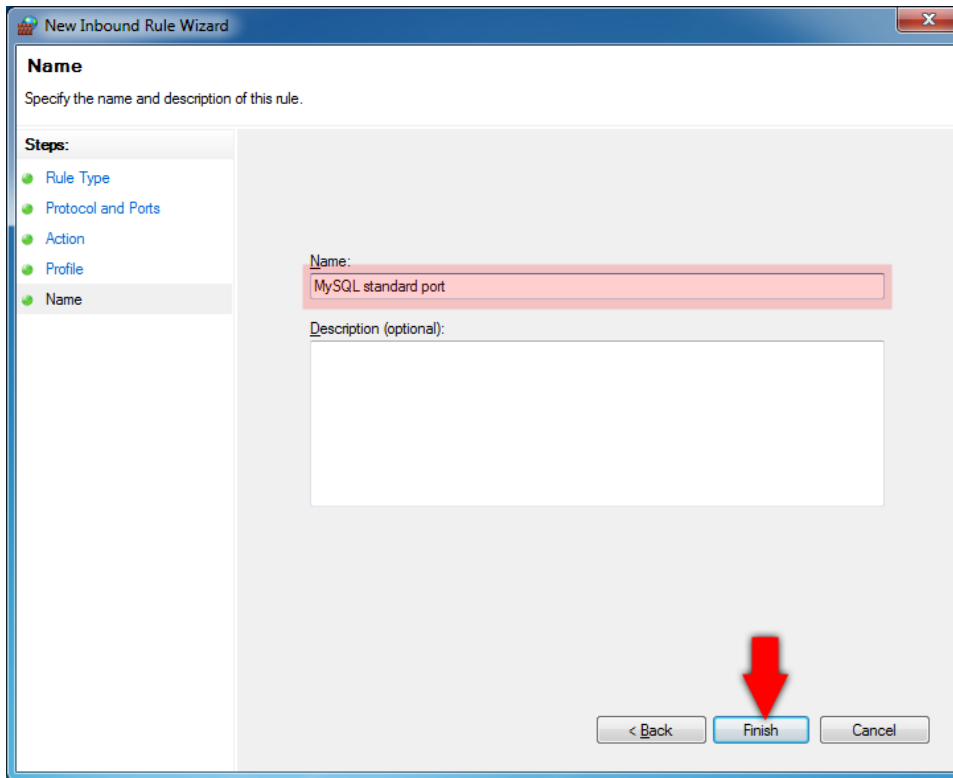
11.2 Entering database connection parameters

Every program which works with database system needs to have entered database connection parameters to establish connection with the database server. Programs have the same interface for entering these parameters. How to use it is explained once at this chapter for all programs.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then database connection parameters are already set in program *Database Manager* and *Database Viewer*. Look at examples in pdf report, which was generated by *Comet Database One Click Installer*, to know how to set this in other programs (*program for dataloggers, program for measuring devices and Comet Vision software*) or how to set this in *Database Viewer* on another computer.

Server type:

The only choice *Microsoft SQL Server* is here. It is advisable to left the choice None only in programs for dataloggers and monitoring systems, if these doesn't use *Comet Database*. Due to this, the program will not test database connection on its start.

Server name:

Drop down the list to search available SQL Servers on the network. SQL servers are identified by computer names where they are installed. In case of the demanded server is not found, you can type in name of the computer where is SQL Server located manually.

Note: If more then one instance of SQL Server is installed on the computer, then second and following instances are named this way: *computer_name\instance_name*

To find computer name, right click on the Computer icon and see Computer Name.

If word (local) is in the list then it means SQL server on current computer.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then you can see in generated pdf report, that server name is entered in format `<computer IP address>,<port number>`. This is another way to enter. It is possible in case when SQL Server has its listening port set statically (of course, *Comet Database One Click Installer* set it this way).

Authentication:

If you choose SQL Server Authentication, then you must enter SQL user name and password.

If you choose Windows Authentication, then currently logged windows user will be authenticated.

User name:

Enter SQL user name.

Password:

Enter the password for the SQL user.

Database:

Drop down the list and choose the database. Also, you can type in database name. Typing in database name will be useful when creating new database.

11.2.1 Security levels of database accounts

Database server administrator

You have to use this account when you work with *Database Manager*. If you chose SQL Server Authentication, then it is account sa. Its password you created during SQL Server installation.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then you will find the password for *sa* account in pdf report, which was generated by *Comet Database One Click Installer*.

If you chose Windows Authentication then it is requested that your Windows account is added to the list of administrators in SQL server during its installation. Easier is to use SQL server authentication and the account sa.

Account with read/write rights to the database

This type of account can read and write to the database. It is requested to use it in services and programs, which inserts data into database.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then this account was already created. Its name is *writer* and its password you will find in pdf report.

Account with readonly rights to the database

This type of account you can use in *Database Viewer*, because this program only read from the database.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then this account was already created. Its name is reader and its password you will find in pdf report.

Account with read and restricted write rights

This type of account has readonly access to the database but it allows to insert notes and write to log.

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then this account was already created. Its name is *reader*_extra and its password you will find in pdf report.

Whenever you want, you can use button test to verify entered parameters. Program will try to connect, verify rights and check the database. Then it will show test result, for example that:

• parameters are ok and entered database is accessible for reading and writing

- the server is unreachable (probably there is not any Microsoft SQL server running on computer identified by Server name)

- the program cannot log in with entered user name and password

- the database doesn't exits

11.3 Preparation of SOAP Server (data entry for online data acquisition from Web Sensors, monitoring systems MS6 and MS55, Mobile Dataloggers and Wifi Sensors)

If the system *Comet Database* was prepared using automatic installation in *Comet Database One Click Installer*, then *SOAP Server* is already prepared and do not read the guide further.

The *SOAP server* was placed on the computer during installation of the product *Comet Database*. It is only needed to configure and start it.

Step by step instructions how to configure and start SOAP server:

1) Connect to your database with program *Database Manager* and choose *Home – SOAP Server*. Then press the button *Reconfigure*.
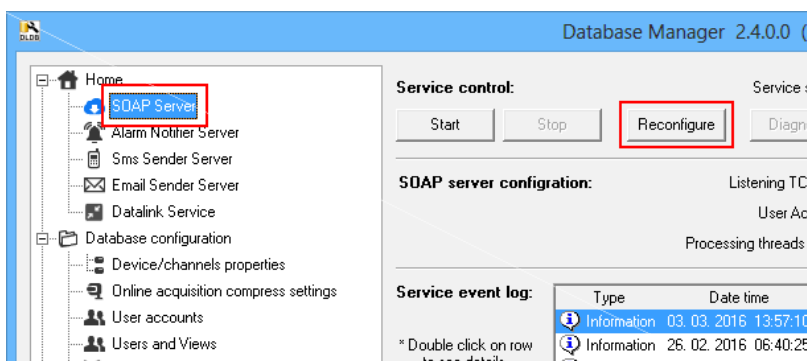

2) Enter listening TCP port. 80 is recommended value, but you have to be sure, that there is no other application using this port on the computer. Especially HTTP server like Apache or IIS uses port 80 because 80 is standard for HTTP. Other possible port numbers are for example: 88, 8080, 8888.Program will check if the port is occupied on configuration window closing. If the port is occupied you will be warn.
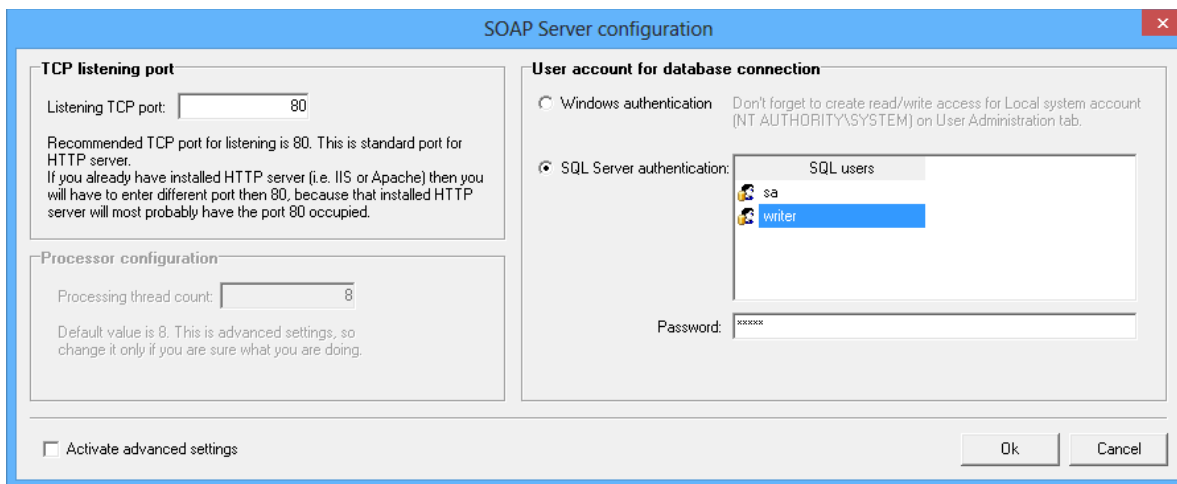
3) Further you have to enter database account. This account must have read/write access to the database. About database user accounts you can read in chapter 2.3.3.a MS SQL Server Accounts administration. Finally click the OK button to save configuration.

4) SOAP server is configured at this moment. Now, you have to allow listening TCP port on the firewall. Allow port 80 – HTTP standard port on the firewall (or 8080 if you used this one). How to do it you can read in chapter

11.1 Allowing TCP port on Windows firewall. Also remember, that there can be other firewalls running on your computer and also some anti-virus programs contains firewalls.

5) Since you have the port allowed, go back to the Database Manager and press the button Start to start the SOAP server.

6) Wait until the Service status is Service is running. You can see new message in Service event log: Service: Serice started…
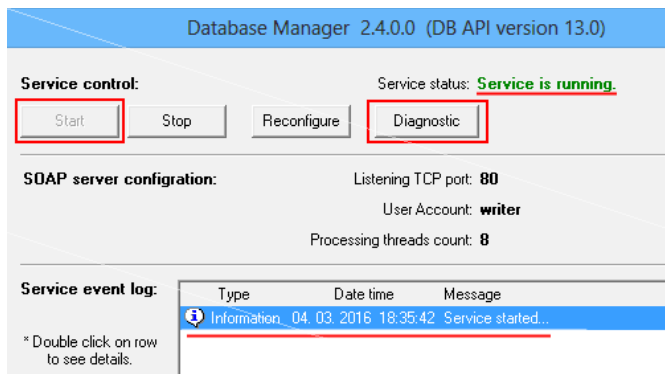

7) Click the button Diagnostic to verify if the SOAP server is well running and well configured. Diagnostic page will be opened in the default web browser. Before it, you will see the dialog with HTTP addresses, which tells you how to get to the diagnostic page if the browser doesn't open automatically.
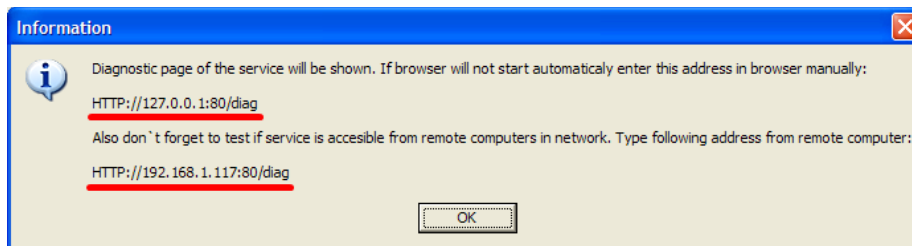
Second The second HTTP address guides you to open diagnostic page on remote computer. Go to some another computer in the network and open second HTTP address in browser on that computer. This will verify, that SOAP server is accessible and not blocked by firewall.

If the SOAP server is well configured, then there are no warnings highlighted with red color on the diagnostic page and the diagnostic page should look like this one:
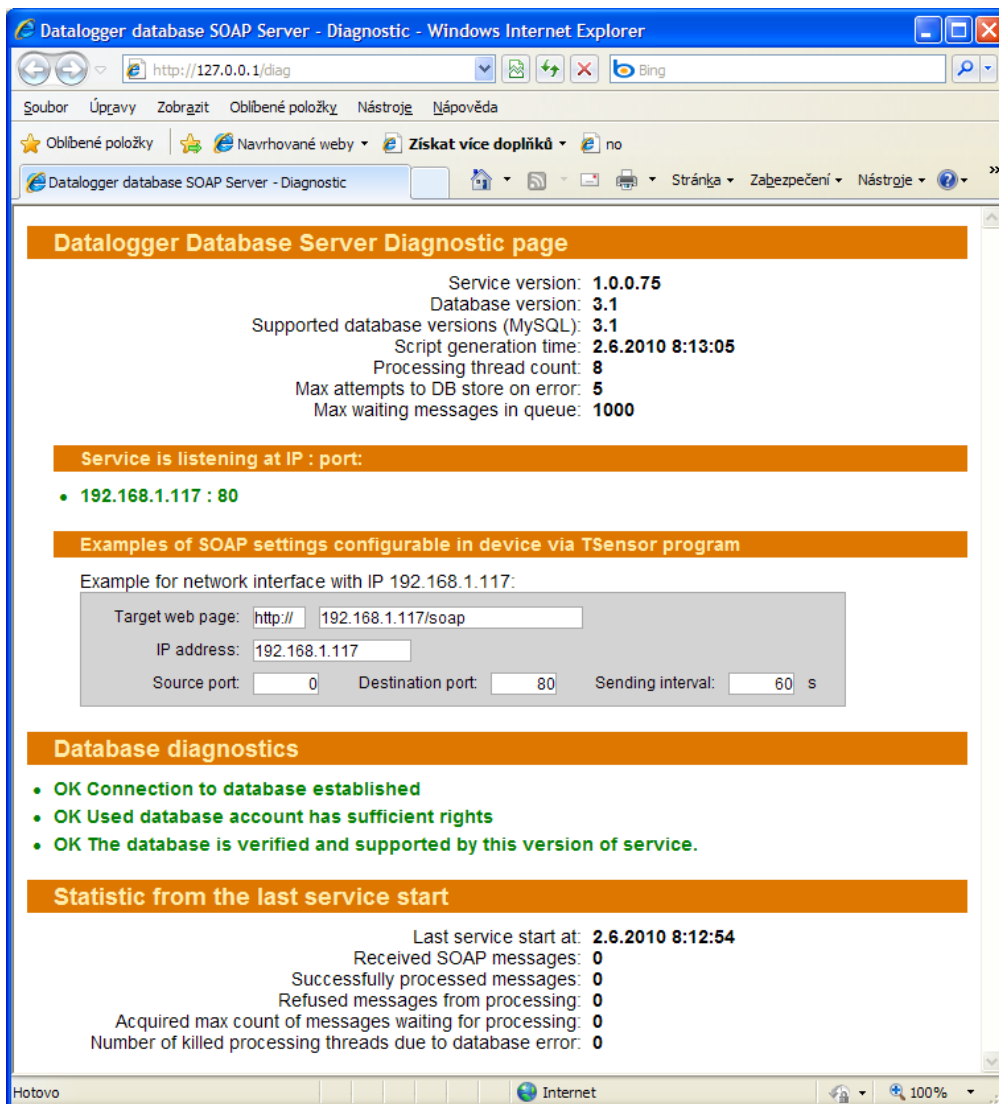
If i.e. you have configured the SOAP server with incorrect database user account, then the diagnostic page will inform you about this:

If diagnostic page opened on local and also on remote computer doesn't show any warnings, than you have successfully prepared the SOAP server. At this moment, you only have to configure devices to send its measured values to this SOAP server.

Configure sensors directly on its web pages (eventually via program Tsensor – configuration program for sensors and transducers). Monitoring systems you must configure via program for monitoring systems.

There is Example of SOAP settings in program Tsensor on the diagnostic page (this settings looks similar in the program for monitoring systems):

Important note for use with Wifi Sensors:

Until the support of Wifi Sensors (Wx7xx) devices, the Target URL path was always …`/soap` for whatever device. But for Wifi Sensors it is …`/wifisensor`.

You should enter all parameters as in this example. Only setting of Sending interval is up to you. You can enter minimally 10 seconds, but we alert you, that entering short interval will lead to rapid growing of the database if compression of online acquisition is not enabled (see chapter 1.3.2.2 Online acquisition compression settings).

If compression of online acquisition is not enabled then we recommend to use short intervals (10 s) only when tuning data acquisition. But when you are sure that acquisition works well, reconfigure all devices settings and set sending interval minimally on 60 seconds. But recommended are values longer than 300 seconds (5 minutes).

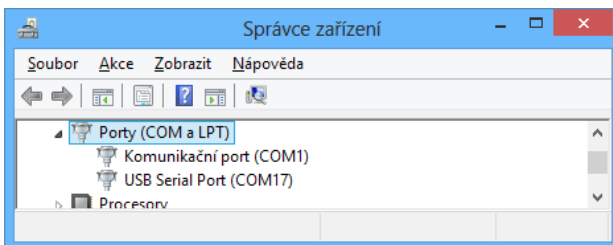## 11.4 How to get information about COM ports in the computer

1) **Windows 8 and higher**

   Right-click on the button Windows Start (alternatively WINKEY+X) and choose Device manager

   Windows 7

   Open Control Panel, choose Hardware and sound, choose Device manager

2) Choose Ports (COM & LPT) in the list

11.5 Installation of Microsoft SQL Server for use with Comet Databases

If it is sufficient for you to use free edition *Microsoft SQL Server Express*, then it is recommended to use automatic installation of *Comet Database* by the help of *Comet Database One Click Installer*. Installer will automatically install *SQL Server 2014 Express* and will do the configuration requested for use with *Comet Database*.

If purchased full version of *Microsoft SQL Server*, then you have to do the installation manually. Here are requirements:

- Version of *Microsoft SQL Server* must be 2008 or higher
- *SQL Server* collation must be in case insensitive mode. Choose `<language>_CI_AS`
- *SQL Server* Service must be running as user *Local System (NT AUTHORITY\SYSTEM)*
- Authentication must be in mode *SQL Server and Windows Authentication mode*. It must be possible to connect to *SQL Server* using *sa* account (system administrator), which is account of *SQL Server*.
- Protocol *TCP/IP* must be enabled. *SQL Server* must listen at static port.
- Listening port of *SQL Server* must be allowed on *Windows Firewall*.

11.6 Estimating disc space usage

Following table shows approximate sizes of samples:

Sample type	Size in bytes
• Monitoring system analog data	73
• Monitoring system binary data	56

- Datalogger analog data   55
- Datalogger binary data   47
- Sensor analog data   55
- Sensor binary data   47
- Multilogger analog data   80
- Multilogger binary data   56

Important: Final result can be between the calculated value and its double. It is because SQL Server file space allocation. So, better is to count with that maximum estimated space will be the calculated value multiplied by 2.

1. Example:

How much disc space will be occupied when sensor H7530 will be set to send values to the database every 10 seconds during 1 year?

H7530 has 4 analog channels (Temp, RelHum, Press, ComputedValue) and 5 binary channels (3x BinInput, 2xRelayOutput)

Sample size = 4ch * 55B + 5ch * 47B = 455 B

Samples per year = (356d * 24h *60m * 60s) / 10s(sending interval) = 3 075 840 samples

Disc consumption per year = 3 075 840samples * 455B = 1 399 507 200 B ≅ **1,3 GB**

Imagine, how much space will be saved when longer sending interval will be used. For example 5 minutes sending interval:

Disc consumption per year = (356d * 24h *60m) / 5m * 455B = 58 235 904 B ≅ **46 MB**

2. Example:

How much disc space will be occupied during 1 year when 100 monitoring systems with

all 16 channels occupied with temperature probe will send measured values to the database

every 10 seconds?

Sample size = 16ch * 73 = 1 168 B

Samples per year = (356d * 24h *60m * 60s) / 10s(sending interval) = 3 075 840 samples

Disc consumption per year from 100 devices = 3 075 840samples * 1 168B * 100devices = 359 258 112 000 B ≅ **335 GB**

Imagine, when sending interval will be exteded to 5 minutes, then disc consumption per year will be **11 GB**.