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DataWarehouse 2 Documentation

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Content

Table of figures

1   INTRODUCTION

The eibPort contains an internal ring buffer for 20.000 telegrams. In a ring buffer the oldest telegram will be deleted for the newest. Depending on how much telegrams a running in the facility and if there is set an EIB record filter in the eibPort, it is consumed within a few hours.

To create a telegram record over a longer period the data must be stored on an external media. For this purpose the eibPort software is offering the MySQL Database connection. By this the data is been stored on an external database server automatically. To organize this data best and to supply it for a possible graphical evaluation, serves the eibPort additional software "DataWarehouse 2".

2   REQUIREMENTS

In order to use the described functions of the DataWarehouse 2 and of the eibPort a MySQL Server in the network is necessary. To describe the installation of those is not the topic of this documentation due to the fact that there are different server systems and that there are already sufficient installation guides available. The DataWarehouse 2 has the following requirements to the MySQL server:

MySQL version: >= 5.1.12

Additionally the "root" – user resp. a user with "SUPER" privileges must be known, so that the DataWarehouse 2 is able to create the database and the corresponding user. A current installation package of a MySQL server including installation guide is available here:

http://www.mysql.de

There is the so-called "Community Server" is download able.

3 START DATAWAREHOUSE 2

As an Java programm the „*DataWarehouse 2*" can be executed directly. By the help of an assistant you establish a connection to an existing database or create a new database on an existing server.
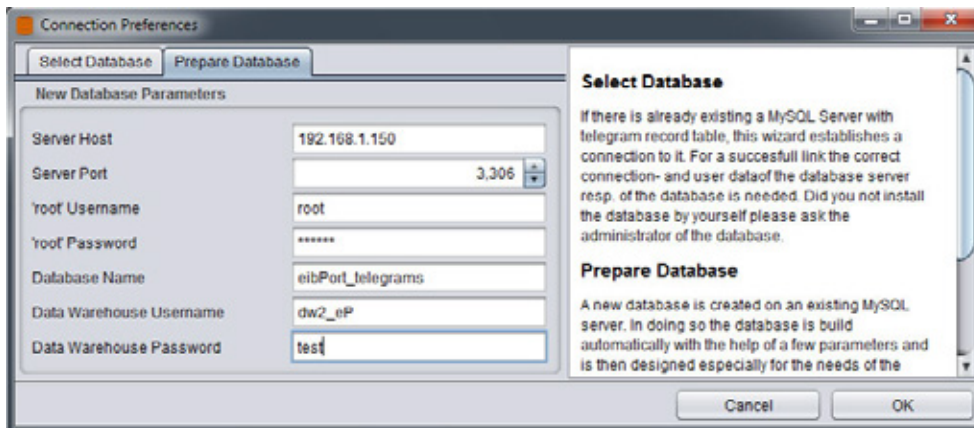

Figure 1: Database Wizard

3.1 DATABASE WIZARD

Switch into the window "*Create Database*" and fill in the necessary entries. This are:

Server Host / Server Port
Fill in the IP-address or the hostname of the database server. The port number is entered below. Standardport for MySQL is: 3306.

Admin User / Admin password
The admin user is the user "*root*" of the database server. Only he has the rights to create new users and databases. This user is created by building the database server.

Note: Please ensure before that the database administrator "root" has the necessary rights. It might be that the "root" - user is set without password and only has the rights to have local access rights. It should be assigned a password and the user should have the access rights from all hosts ('%').

Database Name
Determines which name the new database gets.

Database Username / Password
This is the user account the *DataWarehouse 2* is using. The user data is set here.

With a click on "*OK*" the defined database with user account is created on the server. Does the operation fails a corresponding error message is dropped. Nevertheless you should control if everything is set alright on the database server (especially the user rights).

3.2   SELECT DATABASE

Establishes a connection to an already existing database. Furthermore a database connection can be changed. For the connection assistant you will need the following details:
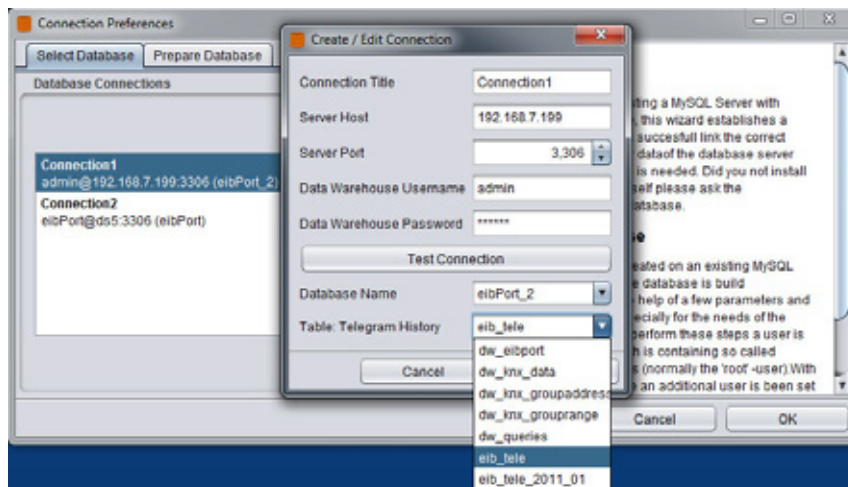

Figure 2: Create Database connection

Database Connection
Please assign a database name.

Server Host
Please enter the IP-address or the hostname of the computer where the database server is installed.

Server Port
This is the port number over which the MySQL server communicates. Standard value is 3306.

Database User / Password
The user account which is used by the DataWarehouse 2 to communicate with the database server.

Test Connection
Please test your connection settings. If the connection cannot be established an error messages with the corresponding information occurs.

Database Name
To have a choice here the connection test above has to be finished successfully. Then you will be able to choose all associated databases.

Table: Telegram History
For the analysis later on it is important to choose the right table at this point. Always the table with the telegram history must be selected here. In the predefined table structure this is the table with the name "eib_tele"!

The table structure of the DataWarehouse 2 database is looking like this:

dw_eibPort
dw_knx_data
dw_knx_groupaddress
dw_knx_grouprange
dw_queries
eib_tele
eib_tele_YYYY_MM (Y = Year / M = Month)

Note: At the end of the day the database sorts the daily telegrams into the table of the current month. These tables are created automatically and serve for the better performance. Further information about that you will find in the last chapter.

Is the database connection set successfully it is shown in the overview and is stored there for the future. To reach to the analysis surface the connection has to be just double clicked.

4 CREATING THE DATABASE CONNECTION IN THE EIBPORT

After the database is created successfully with the assistant, the *eibPort* must be arranged to write data into it. Please open the configuration interface "*System*" (ConfigTool) > "*Database*" of the *eibPort*.
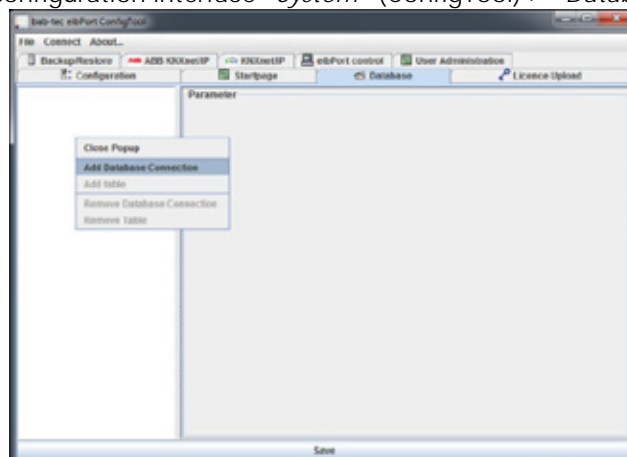

Figure 3: eibPort - Add Database connection

4.1 DATABASE

Configure the database connection by right clicking the choice "Add Database Connection" in the left handed window. The database connection needs the following parameters:

Description
A unique label for the connection.

Enabled
Disables or enables the connection.

DB-type
Only the type „MySQL" can be selected.

Host
The IP-address or the hostname of the database server.

Port
The port on which the database connection is communicating. Standard setting is 3306.

Database
Means the database name. This one is defined when you created the database with the wizard.

Username / password
Please enter the account data of the Database user you set in the DataWarehouse 2. After that please push the "Save" Button below.

4.2 ADD TABLE

To have the correct data later on in your database, the eibPort has to be told in which table it has to write. To do this please right-click on the new created database connection and choose "Add Table" in the context menu. For configuration you have the following parameters:

Description
A unique description of the table (for example "telegram history").

Enabled
By default every new created table is enabled. If desired it can be disabled.

Type / Name
The eibPort offers three different database types:

Telegrams: Writes the telegram history into the database. Default name: "eib_tele".
State Table: Writes the address state table into the database. Default name: "s_table".
Log Messages: Writes the eibPort system log into the database. Default name: "ep_log".

For the analysis of the telegram data only the table "eib_tele" is interesting.

Generate SQL Statement
To create the necessary structure on a database server a SQL statement can be generated. This can be copied and then executed on the database server. In case of the DataWarehouse 2 this is not necessary because the creating of the data structure is already made by the "database wizard".

Save
The settings must be saved by using the "Save" button below. After that the eibPort is writing into the database.

4.3 CHECK DATABASE CONNECTION

To check the connection from the eibPort to the database there is a little cgi script which can be requested by browsing a webpage of the eibPort. Please enter the following address into your browsers address bar:

```
http://<eibPort_IP>/cgi-bin/db_statecgi
```

After hitting "Enter" a page with the title "eibPort database status" will be shown. There you will find information about the connection status. Is the connection with the table "eib_tele" successfully established the output should look like this:

Figure 4: eibPort - database status

There is displayed the connection status to the database as well as the connection status to the corresponding table. If the connection is enabled it is shown "Status: enabled" and if the connection is working it is shown "Active?: yes".

If the connection is not working a "no" shown in the line "Active?" and below that an error messages is printed out. E.g.: "Access denied..." because of wrong user data. In this case please check the settings in the eibPort, change them if necessary, and re-save the connection again. To verify the database status once more, you have to re-enter the above mentioned URL.

5 LICENSING DATAWAREHOUSE 2

To upload a valid licence into the DataWarehouse 2 please use the menu "Help" > "Licensing" in the main window of the DataWarehouse 2. The main window opens as soon as a database connection is been chosen.
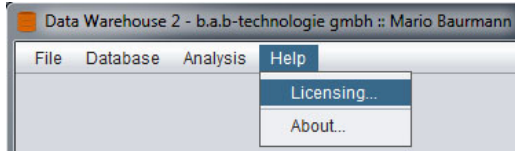

Figure 5: DataWarehouse 2 - Licensing

A licence for the DataWarehouse 2 can be ordered at info@bab-tec.de. Without a licence the DataWarehouse 2 could not export the data.

6 DATABASE EVALUATION

Is a database connection to an existing database established, and the database is containing data an evaluation can be created. For this purpose double click the connection and you will reach the DataWarehouse 2 main window.
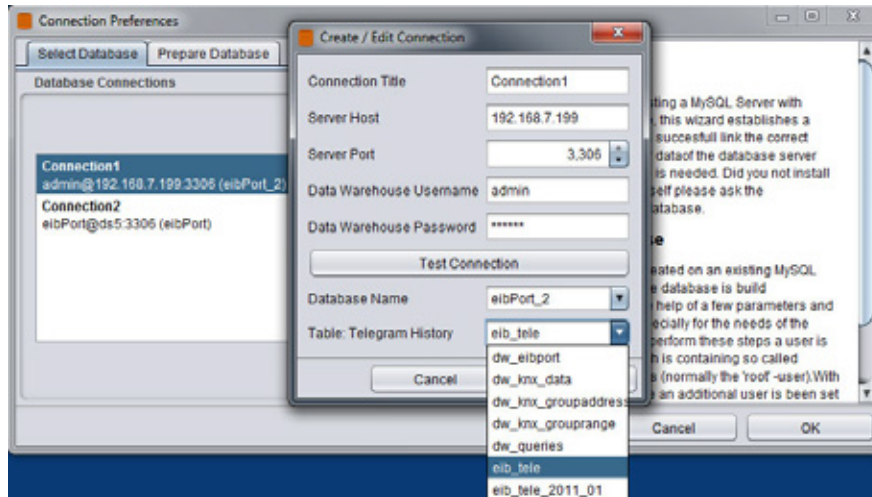

Figure 6: Select database connection

6.1 CONFIGURE EIBPORTS

In order to interpret the telegram data correctly the DataWarehouse 2 needs the information about the KNX data types. Therefore the ESF data (ETS address file), which is also used by the eibPort, is needed. It is loaded into the database and linked to the telegram data. Once it is loaded it is always available for the future.

In order to do that please switch to the menu "Database" > "Configure eibPorts" in the DataWarehouse 2. Automatically all eibPorts which are using this database are shown. The eibPort Name and the corresponding serial number are shown. To upload the ESF Data into the database you will have two possibilities:
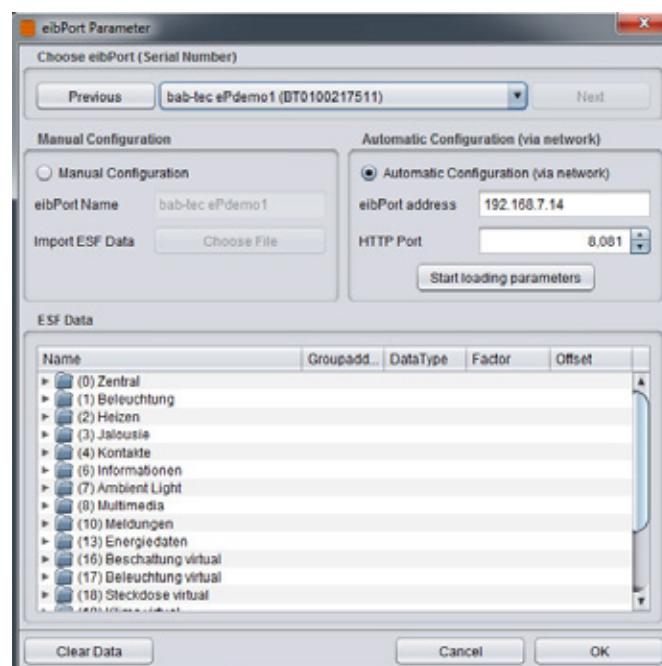

Figure 7: Configure eibPort

6.1.1   MANUAL CONFIGURATION

The address data is been uploaded manually into the DataWarehouse 2, for example from the hard disk of the client pc. The linking is happening automatically.

eibPort Name
Best is using the same name as for the eibPort itself.

Import ESF data
The ESF data comes out of the ETS and is containing the information about identifier and data type of the addresses. Please choose the corresponding file here (with the ending *.esf). The imported data will be shown in the window "ESF Data". By hitting the "OK" button you will confirm the process, the file is stored into the database.

6.1.2   AUTOMATIC CONFIGURATION (VIA NETWORK)

This function allows you to download the address file directly from the eibPort (if existing there) into the DataWarehouse 2. For this purpose the hostname or the IP-address and the http Port of the eibPort has to be entered.

Start loading parameters
The ESF data will automatically transferred out of the chosen eibPort. The data is then shown in the window "ESF Data". By hitting the "OK" button you will confirm the choice and it is written into the database.

7   START A QUERY

To create an evaluation from certain telegram data, a query about group addresses and period has to be made. A query is been started over the tab " *New Query*" . There the period and the group addresses are determined.

7.1   PERIOD

For the choice of the period either the month archive or an arbitrary time span is available.

Month Archive
The month archives are automatically created by the database. Directly after the first day of a month ends, a new month archive is been written. This is done automatically by a so called "Event Scheduler" at 0:05 a.m. every day.

Beneath the month archives there is the choice "Live Records" which is containing all telegrams of the current day.

Note: Please consider absolutely the advices about the Event Scheduler at the end of this document, to guarantee his faultless function.

Timespan
With that menu you choose any desired time spans out of a calendar view which then can be filtered by the desired group addresses.
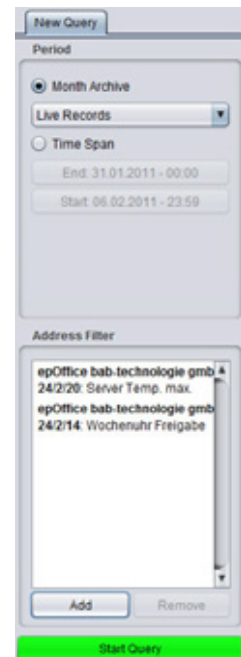
Figure 8: New Query

7.2   ADDRESS FILTER

The address filter is containing all group addresses which are chosen for the evaluation. By using "Add" a menu is opened in which devices (remember there can be multiple eibPorts write into one database) and addresses can be selected.

Select eibPort
Every database can be used by several eibPorts. The database can separate the information by the eibPort serial numbers which is part of every data set. To make it easier for the user additionally the eibPort name is been shown, in case it is available.

Manual Address Input
Please fill in the group address, the correct data type and a description of the group address.
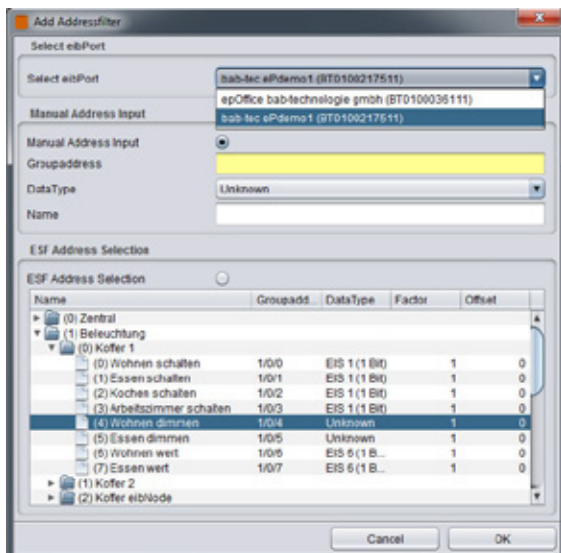
Figure 9: Add Address filter

ESF Address Selection
The database gets the address information by the help of the menu "Database" > "Configure eibPorts".
To select an address mark it with the mouse pointer and click "OK". Only one address can be selected
at the same time

7.3   START QUERY

Have you defined a time span and one or more group addresses, you are able to filter the necessary
data out of the database with the button "*Start Query*". Depending on how extensive your query is,
and how much computing power your database server has, the query could take some time.

The output will be a new window with the name "*New Query 1*". All data will be listed among each
other and will be sorted by time. With the Button "*Select Columns*" is determined which Columns
will be shown.

8 DATA EXPORT / PLOT

The DataWarehouse 2 is first meant as an additional software to organize the ascertain data and to interpret it correctly according to the ETS information. Beyond that it is used to query and export the values which should be supplied for a graphical analysis. A direct plot in the DataWarehouse 2 itself is although considered but not yet implemented.

Export as...
The data which is first collected by the defined query will be exported as a "Comma Seperated Value" – File (*.CSV). As a universal data format this file can be used by further software to generate a graphical analysis out of it (e.g. Microsoft™ Excel).

Plot with...
In future it should be possible to generate graphical analysis with so called 'Plugins' directly in the DataWarehouse 2. Customers and interested people should have the possibility to develop their own Plugins for the DataWarehouse 2.

9 ANALYSIS

The menu "Analysis" is offering some predefined queries in terms of an analysis. Thereby it is possible to request some general statistics about the database respectively about the telegram traffic in the facility.
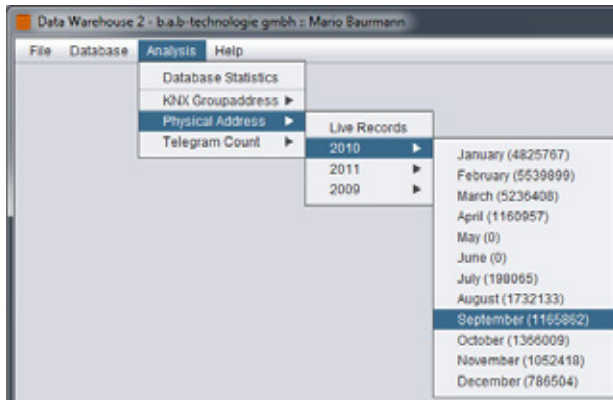

Figure 10: Analysis

Database Statistics
Is showing an overview of the different tables (month archives), how many telegrams they are containing and how much memory space is used by them.

KNX Groupaddress
Is requesting a telegram statistic sort by group addresses. The query can be either done for the Live Record (current day) or for the individual month archives.

Physical Address
Here the telegram statistic is sort by physical addresses. The query is either be done for the Live Record (current day) or for the individual month archives. The declaration "Virtual GA" is describing the physical address of all virtual group addresses of the eibPort.

Telegram Count
Is collecting a telegram statistic sort by month or individual days. If a single day is chosen, the total amount of telegrams will be divided in 1 h blocks. Is a month chosen it is divided by days.

10 IMPORTANT NOTES ABOUT THE DATABASE HANDLING

The database must match different requirements that the DataWarehouse 2 can work with it in optimal performances. For this purpose every day at 0:05am is started an optimisation of the recorded data and additional tables will be created. If the record is already containing telegrams, the first sorting can quite take some hours, depending on the amount of data and the power of the database server. During that time the database server should not be shut down. Before you shut down the server you should backup the database server for safety.

The criteria for the optimal operating can be split as follows:

Telegram History Table
This part contains two requirements. First the creation procedure to dynamically create the telegram history recording table is built; second the recording table itself is created.

DataWarehouse Userspace
In these tables, user settings (like ESF data) will be stored.

Sort Procedures
These sort procedures will fragment logged telegrams in month archive tables.

Sort Event
Each day this event starts the sort procedures. It starts at 0:05 and is necessary for quick data analysis and export. Please be sure that the event scheduler is enabled on this MySQL sever!

To fulfil these requirements the DataWarehouse 2 database user account must own the user rights described below.

10.1 USER RIGHTS FOR THE DATABASE USER

The *DataWarehouse 2* database user needs the following user rights:

- SELECT
- INSERT
- UPDATE
- DELETE
- DROP
- CREATE
- INDEX
- ALTER
- CREATE_ROUTINE
- ALTER_ROUTINE
- EXECUTE
- EVENT

Those can be assigned by using "*phpMyAdmin*" , "*MySQL Administrator*" or by using the command prompt.

The commands for the command line are:

```
CREATE USER '_username_'@'%' IDENTIFIED BY '_password_';

GRANT
SELECT, INSERT, UPDATE, DELETE,
```

```
DROP, CREATE, INDEX, ALTER, CREATE ROUTINE, ALTER ROUTINE, EXECUTE, EVENT
ON '_datenbank_'.* TO '_username_'@'%';
```

We recommend doing these settings with a web interface like "*phpMyAdmin*".

10.2 SORT PROCEDURE FOR PERFORMANCE OPTIMISATION

If the DataWarehouse 2 prepared the database, there is one table in which the eibPorts writes its data "eib_tele". So that not too much data is existing in the table, which would slow down server with little RAM (e.g. NAS drives), the data sets will be resorted daily. For this purpose at 0:05am a sort procedure is starting (see "Activate Event Scheduler") which sorts the data sets in a month archive.

The tables then are named "eib_tele_2010_01", "eib_tele_2010_02", "eib_tele_2010_03" and so on. At an average telegram amount (4 telegrams per second) in such a table will come up ca. 10 millions data sets per month.

Note: On a not so powerful server there should only write one eibPort in a database, whereby definitely more than one database can run on one server. On a more powerful server also more eibPorts can write into one database.

10.3 ACTIVATE EVENT SCHEDULER

The event scheduler is necessary to run the sort procedure event every night. It can only be activated when the DataWarehouse 2 user has SUPER privilege. This parameter will be lost when the MySQL server restarts. To activate the event scheduler on server startup the configuration has to be changed.
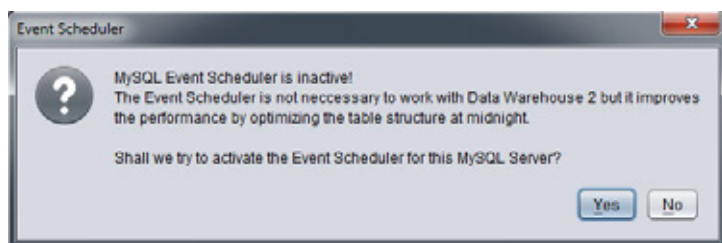

Figure 11: Event Scheduler inactive

On the Diskstation:

Access the DiskStation over ssh (Windows = Putty). The ssh service of the DiskStation possibly must be started first.
Open the file „/usr/syno/etc/rc.d/S21mysql.sh" with the texteditor „vi". Therefore enter:

```
vi /usr/syno/etc/rc.d/S21mysql.sh <Enter>
```

Please went to the line „MYSQL_ARGS=" with the cursor. This are the 'arguments' with that the MySQL server starts. To change something in the text with the „vi" at first the "insert" mode has to be enabled with typing "i".
Now please fill in the line „--event-scheduler=1" so that this row looks like this:

```
MYSQL_ARGS="--max_allowed_packet=8M --event-scheduler=ON"
```

Did you change the entry finish the "insert" mode by hitting the "Esc" Button and enter„:wq" (colon, W, Q).
With this you will save your changings and leave the "vi".
After changing the arguments the MySQL server has to be restarted with the following command:

```
„/usr/syno/etc/rc.d/S21mysql.sh restart"
```

Hint: Please consider that this settings will be reset by a firmware update.

After that you can close the putty console by clicking on the "X" or typing "exit" in the command prompt. The tool "Putty" can be downloaded here http://www.putty.org/. Beyond that you will find numerous documentations about the text editor "vi".

On Ubuntu:
Open the configuration file "/etc/mysql/my.cnf". Insert the line 'event-scheduler = 1 into the section "Fine Tuning".
The MySQL Server can be restarted with the command 'service mysql restart'

In xampp Version 1.7.3

Open the configuration file:

```
„\xampp-win32-1.7.3\xampp\mysql\bin\my.ini"
```

with a text editor. Insert the line "event-scheduler=1" into the section "[mysqld]" save the file and restart the MySQL server.

11 ADVICES ABOUT THE FUNCTIONAL SAFETY

This software serves to protocol the data of the KNX-bus system. So it is used for the data collection of values which are generated from applications of risk category III and IV (acc. to IEC 65A (SEC) 123). May there be recordings of data from higher risk categories the operator of the software must take measures to reduce the risk. A liability is, as well as claims of damage and indirect consequences through malfunction of the software excluded hereby.

Also see the building management system basics guideline of ZVEI/ZVEH.