

Commissioning WinPQ System



Software WinPQ

A. Eberle GmbH & Co. KG

Frankenstraße 160

D-90461 Nürnberg

Telefon: 0911 / 62 81 08 0

Telefax: 0911 / 62 81 08 99

E-Mail: info@a-eberle.de

Internet: www.a-eberle.de

Die Firma **A. Eberle GmbH & Co. KG** übernimmt keine Haftung für Schäden oder Verluste jeglicher Art, die aus Druckfehlern oder Änderungen in dieser Bedienungsanleitung entstehen.

Ebenso wird von der Firma **A. Eberle GmbH & Co. KG** keine Haftung für Schäden und Verluste jeglicher Art übernommen, die sich aus fehlerhaften Geräten oder durch Geräte, die vom Anwender geändert wurden, ergeben.

Copyright 2019 by A. Eberle GmbH & Co. KG

Änderungen vorbehalten.

Contents

Commissioning WinPQ System	6
Introduction PQ-Systems	7
Available Documentation for Commissioning	9
Important Installation Instructions	10
Required programs for commissioning	12
Installation WinPQ Software	13
General System Requirements	14
Directory of TCP/IP Ports	15
Installation of WinPQ	16
Installation procedure	17
Advanced database installation	25
Uninstall WinPQ Software	28
WinPQ Update	31
Continuous operation of WinPQ	34
Check WinPQ background process operation	35
Manual configuration of WinPQ background processes	37
Setup of the WinPQ processes	48
Setup automatic database backup	50
First start WinPQ and device setup	53
Setup PQI-DA smart	55
Finishing the setup in security mode	62
Compatibility Mode	70
Security Mode	74
Sicherheitsmodus RADIUS	82
Einrichten eines PQI-DE	84
Setup PQI-D(A)	85
Firmware Update PQI-devices	90
Firmware-Update PQI-DA smart	91
Automated Firmware-Update of many PQI-DA smart	95
Firmware-Update PQI-D(A)	98
IT-Security Upgrade PQI-DA smart or PQI-DE	102
Installation of WinPQ clients	103
Create a WinPQ client on WinPQ server	104
Install the WinPQ client	107
WinPQ Desktop PQStart	109
Presentation of the devices in WinPQ	111
Create devices, groups or tabs	113
Basic device settings	115
Alert settings	117
Modification of the program interface	118
Save the WinPQ Desktop	119
System Management (PQAdmin) - Setup of the WinPQ program	121
Setup PQI-D(A) device	122
Network connection TCP/IP setup of PQI-D(A)	123
Connection with integrated ethernet interface	124
Connection via external COM-server	128
Modem connection setup of PQI-D(A)	130

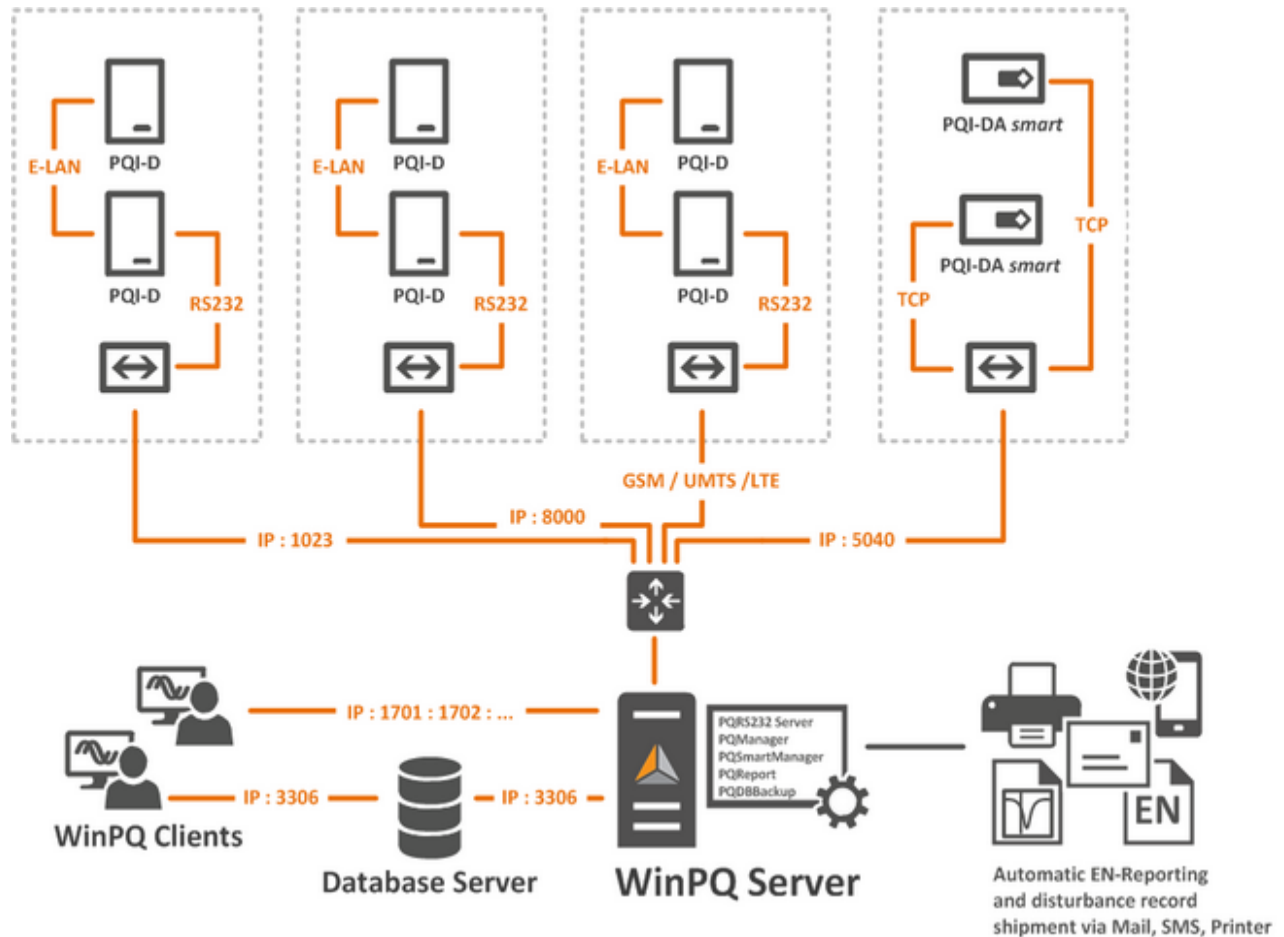
Configuration of PQI-D(A) for modem operation	131
Setting of the modem connected to PQI-D(A)	134
Setting of the modem connected at the receiver	135
Modem settings on WinPQ Server	136
Configuration of modem operation	137
Time synchronization bus	139
Time synchronization bus	140
Time Synchronization with WinPQ Server	142
Time Synchronization with external receiver	145
Connection DCF77 radio clock module	146
Connection of the GPS Radio Clock	147
Configuration	148
Time Synchronization with external receiver via time synchronization bus	152
Configuration and parameter setup PQI-D(A)	154
Configuration with ParaExpress	155
Configuration with WinPQ	156
Sample files for device settings	157
Device name, E-LAN, Time	158
Device identification	159
Configuration of communication parameters	160
Time synchronization	161
ECL command	163
E-LAN structure	164
Connection, Transducer, IO	165
Grid connection and transformer factors	166
Measurement setup	167
Option M94/M95 analogue output	168
Option M97/M98 analogue input	169
Binary Input	171
Configuring relay output and LED display	173
Thresholds and recording	174
Overview	175
Configuration of continuous recording	177
Trigger configuration	179
Triggerbus	181
Oscilloscope and TRMS Recorder	182
Harmonic Recorder	184
Ripple Control Recorder	185
EN50160 threshold values	187
Event Data Class	189
Transnestic function	190
Online measurement values	192
3 Second Online Values	193
Vector diagram	194
Direction of Harmonic	195



Commissioning WinPQ System

Introduction PQ-Systems

With the **WinPQ** client-server software, a large quantity of fixed installed grid analysers and sequence of events recorders **PQI-D**, **PQI-DA** and **PQI-DA smart** can be administered. The devices can communicate via various communication paths parallel with the WinPQ software. The great system flexibility requires a certain care and basic IT knowledge for software installation. The overview figure shows a configuration with different PQ devices and shows which software modules can be installed on which computers.



Explanation of the servers and programs used:

- **Database server:**
Computers on which the database "MySQL" runs and where the data can be stored. The most frequent and recommended standard installation variant is to install the database via the automatic installer directly on the same server (computer) as the WinPQ.
- **WinPQ Server:**
computer running continuously and on which the following programs ensure fully-automatic operation.
 - **PQ-RS232Server:** Program segment of the "WinPQ" software via which the communication of the individual WinPQ programs run for the PQI-D(A) devices.
 - **PQManager:** Program segment of the WinPQ software, via which complete data transfer of all connected PQI-D(A)s is performed automatically.
 - **PQSmartManager** Program segment of the WinPQ software, via which a complete data transfer of all connected PQI-D(A)s is performed automatically.
 - **PQReport:** Program section of the WinPQ software allowing for many EN-reports, sequence of events and long term data can be exported completely automatically on all hard drives and can be sent to select email addresses.

-
- **PQDBBackup:** Program creating automatic backups from the database and copies them, to the network drives.

- **WinPQ Clients:**

Computers which can be used depending on the assigned access rights to access the database for assessment and analysis as well as to operate the PQ analysers (localised). One WinPQ Client is licensed as part of the standard license.

Available Documentation for Commissioning

- Commissioning Introduction for WinPQ and the PQ-analysers PQI-D(A), PQI-DA smart
- Operating instructions for WinPQ analysis software
- Operating instructions for PQI-DA smart (hardware and free SW WinPQ smart)
- Operating instructions for PQI-D (hardware)
- Operating instructions for PQI-DA (hardware)
- Operating instructions for PQI-DE (hardware)
- Security documentation PQ-System
- Short introduction in WinPQ - "F1" button or click on

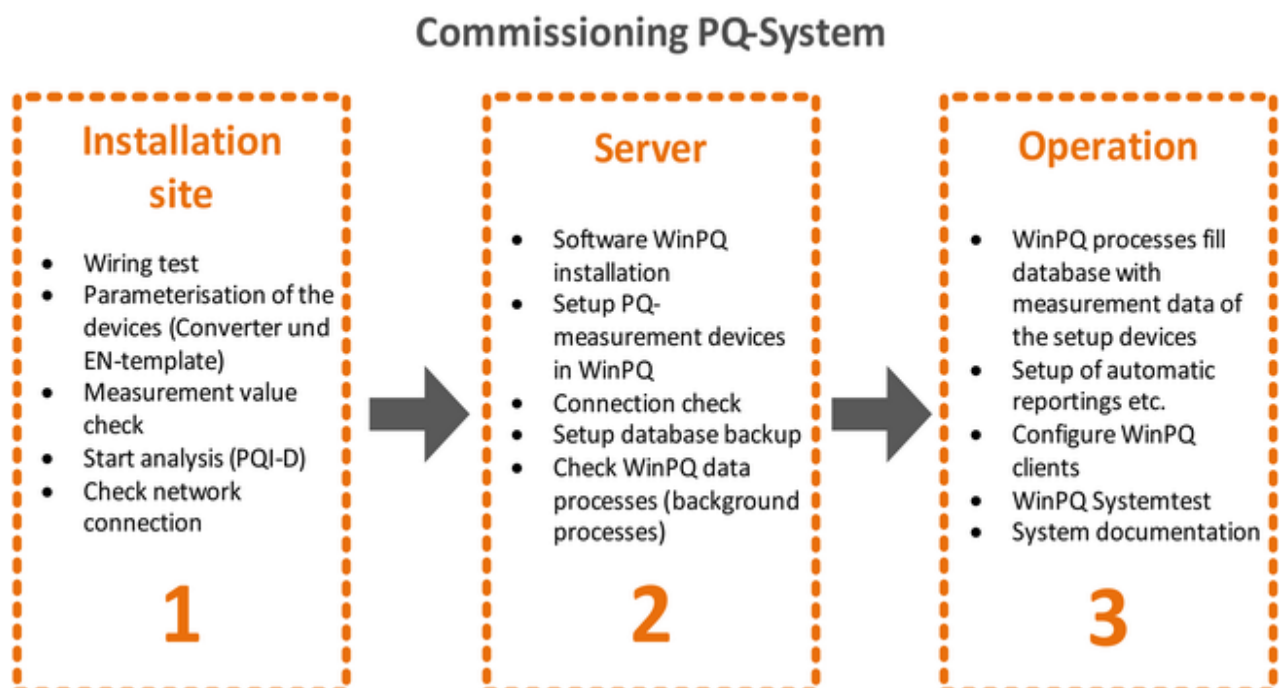


Important Installation Instructions

The WinPQ system solution is integrated into the client company current IT structure, because the communication paths and often present servers and PC's are used. Therefore, the installation of the PQ system should be done in a structured sequence. The advantages of this prescribed structured sequence include:

- Lower working expenses.
- Guaranteed accessibility to the PQ measurement devices.
- Possible use of the set-up wizards after WinPQ installation.
- Consistent data file on the PQ measurement devices and in the database.
- Guaranteed system function.

The following sequence of commissioning and installation of your PQ system is recommended!



1. At the installationsite

Check wiring: Check the wiring of the measurement device before switching on the PQ measurement device. Instructions related to the connection of measurement devices directly can be found in the relevant operating instructions for PQI-D, PQI-DA, or PQI-DA smart.

Configuration of the device: The PQ measurement device requires special parameters at the installation site in use, such as the converter data, the communication settings (IP address, gateway) and also the standard according to which the installed PQ measurement device should record.

One can find the settings of the PQI-D(A) in chapter [Setup PQI-D\(A\) device](#). Also use this chapter for setup of the communication settings of the PQI-D(A)s.

The PQI-DA smart has an automatic installation wizard. Upon its use all important parameters and communication settings will be called up during the first start up.

Check measurement values: To ensure that the wiring test and the configuration of the measurement device are performed correctly, it is recommended that the measurement values be checked directly at the installation site.

Start analysis - only PQI-D(A): If the test of the measurement values was successful, one must start up the analysis on the PQI-D(A) as described in chapter 10.5.1 under "Analyse".

Check TCP/IP connection: For the following installation of your WINPQ software on the WinPQ server one must ensure that the PQ measuring device is accessible from the server. Please test this by ping on the server and also via Telnet. Additional instructions on this step in the FAQ section of this manual.

2. WinPQ- Server

Installation of WinPQ: The installation of WinPQ including the database is performed directly on the WinPQ server via a step-by-step installation wizard. The procedure is described in chapter [Installation WinPQ Software](#).

Set up PQ measurement devices in WinPQ: Add all PQ measurement devices in WinPQ via the integrated set-up wizard of WinPQ as described in chapter [First start WinPQ and device setup](#).

Check connection: After all of the PQ measurement devices have been added to WinPQ, it is recommended that to check the connections to the individual measurements using the online data.

Set-up a database backup: To prevent data loss, it's recommended that the configuration of an automated database backup, see chapter [Setup automatic database backup](#).

Starting background processes / restart server: As described in chapter [Continuous operation of WinPQ](#), all automated processes will be performed via background programs on the WinPQ server. In order to start these programs, after configuration of the PQ measurement devices and the backup, it is recommended to make a restart of the server. After restart, the programs are started automatically and the data from the measurement devices are read into the database. The programs can be found always in the "Windows Task Manager", under "Processes". Note also the instructions in the FAQ of this manual.

3. WinPQ Server (active)

After commissioning at the measuring device location, and after the installation of the WinPQ server which was restarted, the background programs read the data from the connected measurement devices. First all configurations of the connected measuring devices are uploaded, then all of the measurement data are loaded into the database. This can take some time depending on the number of measurement devices connected and the process of commissioning. The following configurations on the WinPQ server are all device-dependent and are therefore dependent on the data file in the database.

Configuration of automatic reporting: In addition to the reports you can derive manually from the database, the system offers a large spectrum of automated reports. On the one hand one can call up, for example, sequence of events of PQ reports, device or group selective and receive them by email. On the other hand, the export of all measurements and sequences of events in various formats is possible automatically. One can find more explanations of this and the set up in chapter [System Management \(PQAdmin\)](#). After set-up it is required to restart the server to activate the settings.

Configuration of WinPQ clients: The configuration of the WinPQ client for the analysis and operation of the measurement devices of other workplace PCs is described in chapter [Installation of WinPQ Clients](#).

WinPQ system test: To ensure that the alarm notification via email or the automated system monitoring is working correctly, it is recommended that after complete installation and integration of the system into your IT infrastructure a test is performed. If once, for example, activate a software trigger on a connected PQI-D or enter a measurement value using a test tool which falls outside of your set boundary limits, an error message will be received by email.

Required programs for commissioning

It is recommended that you download the current versions of the required programs from the A. Eberle homepage before commissioning the PQ system. Usually, the software is delivered with the system.

Download the programs from:

<http://www.a-eberle.de/de/download-center-categories/f%C3%BCr-festinstallierte-ger%C3%A4te>

Power Quality:

- ParaExpress: Program for configuring PQI-D and PQI-DA on site.
- WinPQ smart: Program for configuring the PQI-DA smart on site.
- WinPQ: The full version is found on the CD delivered with the system, which includes the license key.

Communication:

- REG-P Loader: Program for configuring the IP address of the PQI-DA
- W&T – ComServer: Program for configuring the REG-COM or the W&T ComServer:
<http://www.wut.de/e-5www-17-inde-000.php>

Other:

- PDF-Reader: An installation should be present on the server for the documentation and viewing fault recorders in PDF
- Telnet Client: The Telnet client should be activated on the WinPQ server, or a comparable derivation of it (such as Putty)

Installation WinPQ Software

The software packet for WinPQ consists basically of two components, the database and the visualization software. A complete installation must only be performed on the WinPQ server. The installation of the WinPQ client is performed after configuring of the server via an export interface on the WinPQ server.

General System Requirements

Supported operation systems

- Windows 7 32 and 64 Bit
- Windows 8 32 and 64 Bit
- Windows 10 32 and 64 Bit
- Windows Server 2008 32 and 64 Bit
- Windows Server 2012
- Windows Server 2012 R2
- Windows Server 2016
- Windows Server 2019

Minimal system requirements

- CPU: 2 cores
- RAM: 4 GB
- Storage: 20 GB for WinPQ Installation and additional 1 GB storage per year per connected device (using the standard profiles)
- Network: Ethernet adapter for communication with TCP/IP devices
- Display: Remote desktop connection or display with minimum 1280 x 1024 pixel resolution

Recommended system configuration

- Hardware: (virtual) server for permanent operation
- CPU: Processor with 4 or more cores
- RAM: 8 GB or more RAM
- Storage: 20 GB for WinPQ Installation and additional 1 GB storage per year per connected device (using the standard profiles)
- Network: Ethernet Adapter with high transferrates for communication with the devices
- Display: Remote desktop connection or display with high resolution, e.g. 1920x1200 pixel

Directory of TCP/IP Ports

The table shows a listing of all port addresses for the system. The ports are used depending on the system configuration and the hardware utilized.

Required TCP Ports

TCP Port	Name	Application	Server/Client	Description
3306	MySQL	mysqld.exe	Server	Database server
1701, 1702, ...	PQRS232Server	PQRS232Server.exe	Server	RS232-Converter software
3306	PQReport PQVisu PQStart	PQReport.exe PQVisu.exe PQStart.exe	Client	Graphical User Interface with Desktop, visualization and reporting
1701, 1702, ...	PQPara	PQPara.exe	Client	Parameter settings and communication PQI-D(A)
1701, 1702, ...	PQManager	PQManager.exe	Client	Collecting and transferring of the measurement data of the PQI-D(A) devices to the database
5040 oder 22*	PQSmartManager WinPQlite	PQSmartManager.exe WinPQlite.exe	Client	Collecting and transferring of the measurement data of the PQI-DA smart and PQI-DE devices to the database
1111, 8000	WuT-Com	depends on version	Client	Optional, parameter settings of the COM server

* The used port for communication with the PQ-devices PQI-DA smart and PQI-DE depends on the operation mode of the device since firmware version 2.0. In compatibility mode the port 5040 (like in firmware versions 1.x) is used, in security mode port 22 (encrypted communication via SSH protocol).

Installation of WinPQ

To install WinPQ on the WinPQ server, please proceed as described in point 2.4 of these operating instructions. The installation wizard automatically installs the background programs in the standard installation described in chapter 1. These are started up after the server is restarted. Please follow the recommended installation sequence in chapter 1.2.

The **WinPQ clients** are extracted with all of the settings from the server in a special export format after complete commissioning of the WinPQ server. Thus the installation of the WinPQ clients is possible without system knowledge on the WinPQ client PCs.

The WinPQ software contains a database in different versions. The requirements of the BDEW white paper regarding the security of the system require a MySQL database version 5.7.18 or higher. The encryption of the database connection is done automatically during the installation of the database. Further information can be found at the following web link. Even if you want to use your own certificates, the following link describes how to set up them

<https://dev.mysql.com/doc/refman/5.7/en/using-encrypted-connections.htm>

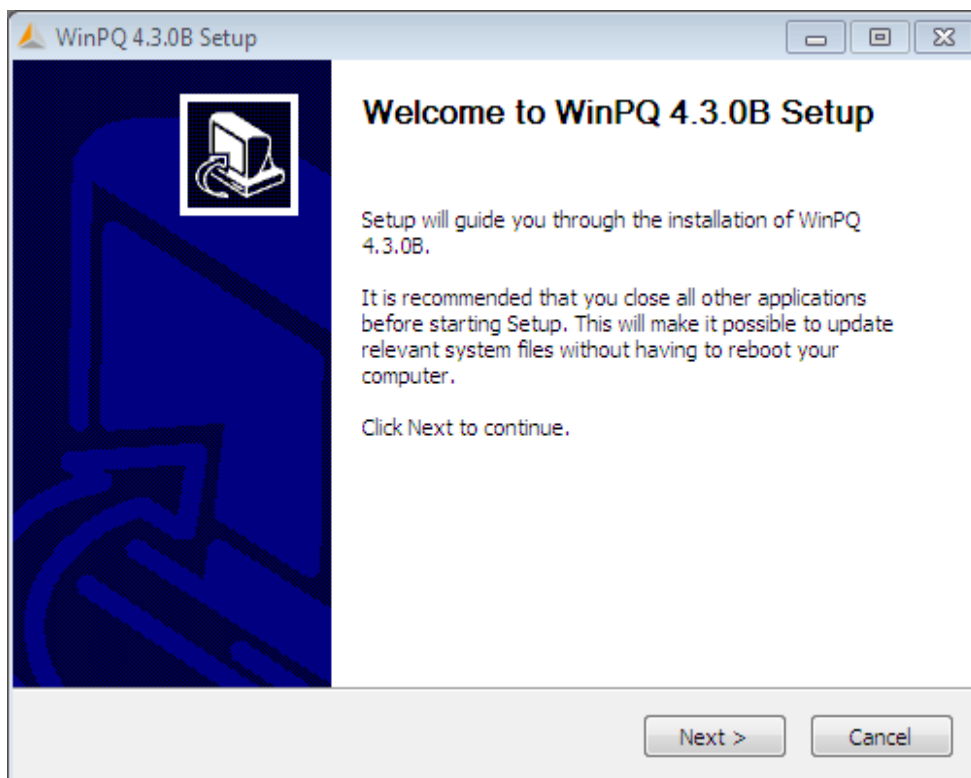
Installation procedure

You will find the file WinPQ_v.V_YYMMDD.exe on the installation CD. This is a self-extracting installation file which is unpacked and can be started by double clicking on it (such as select and ENTER). The importance of the individual installation steps is described in the following images. The installation of the WinPQ software requires local administrative rights. Confirm the equivalent dialog of the user account control (UAC).

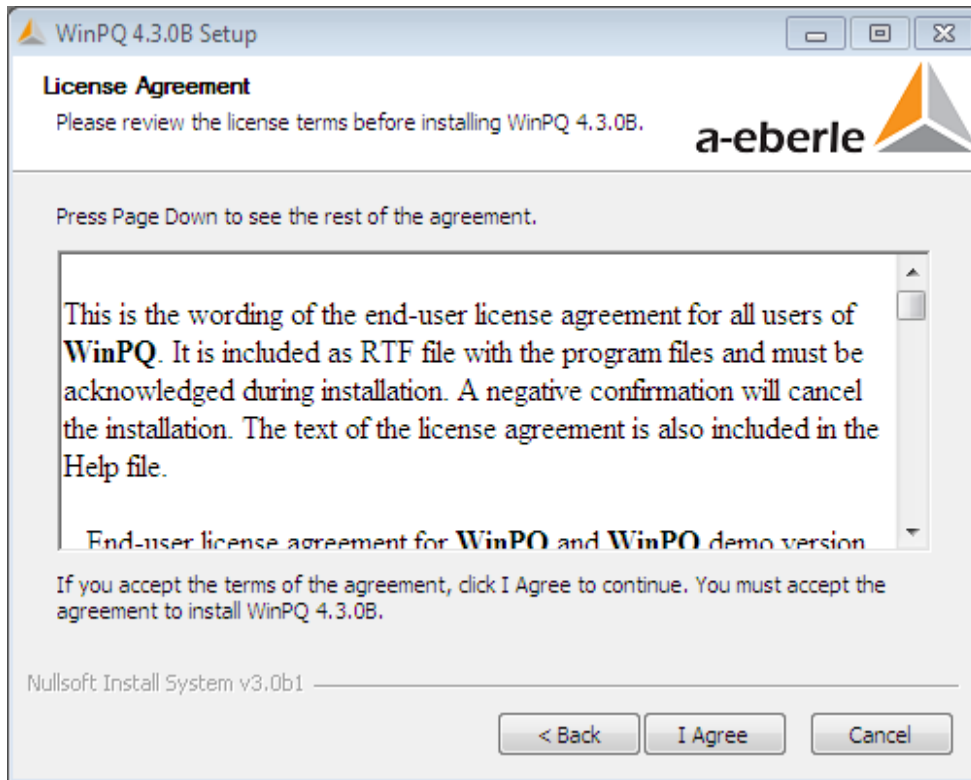
1. Select the installation language



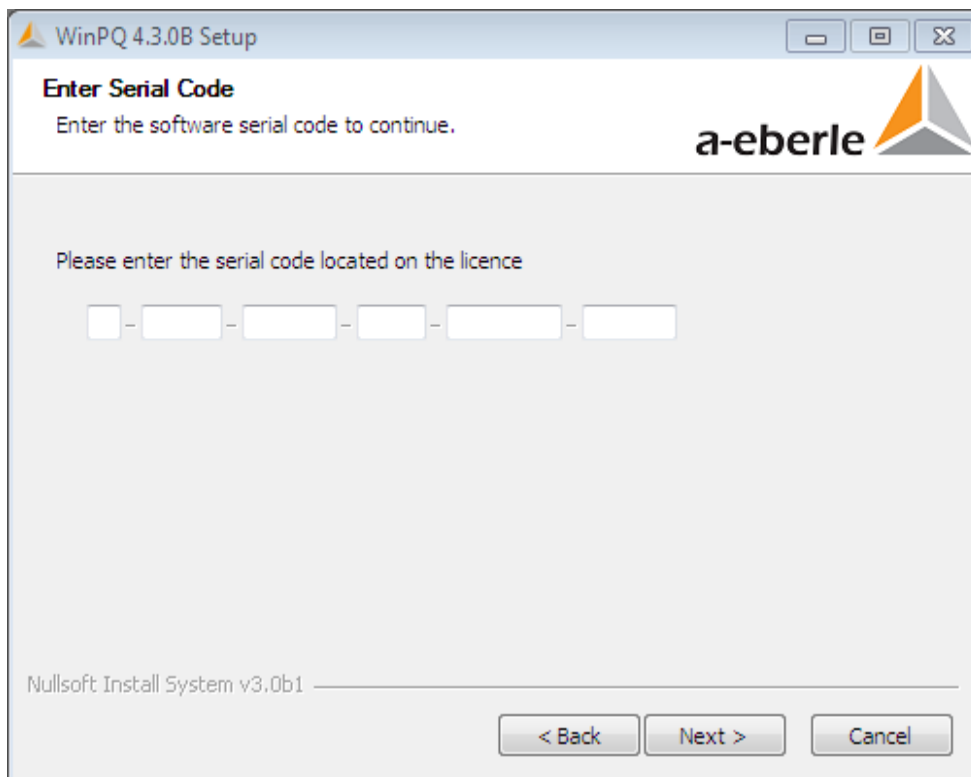
2. Installation wizard starts



3. Please read the license agreement thoroughly and confirm by checking "Accept"



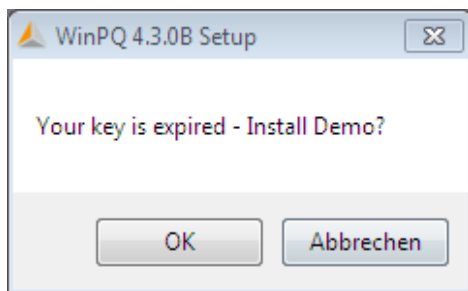
4. Entry of the license number (see PDF file on the installation CD)



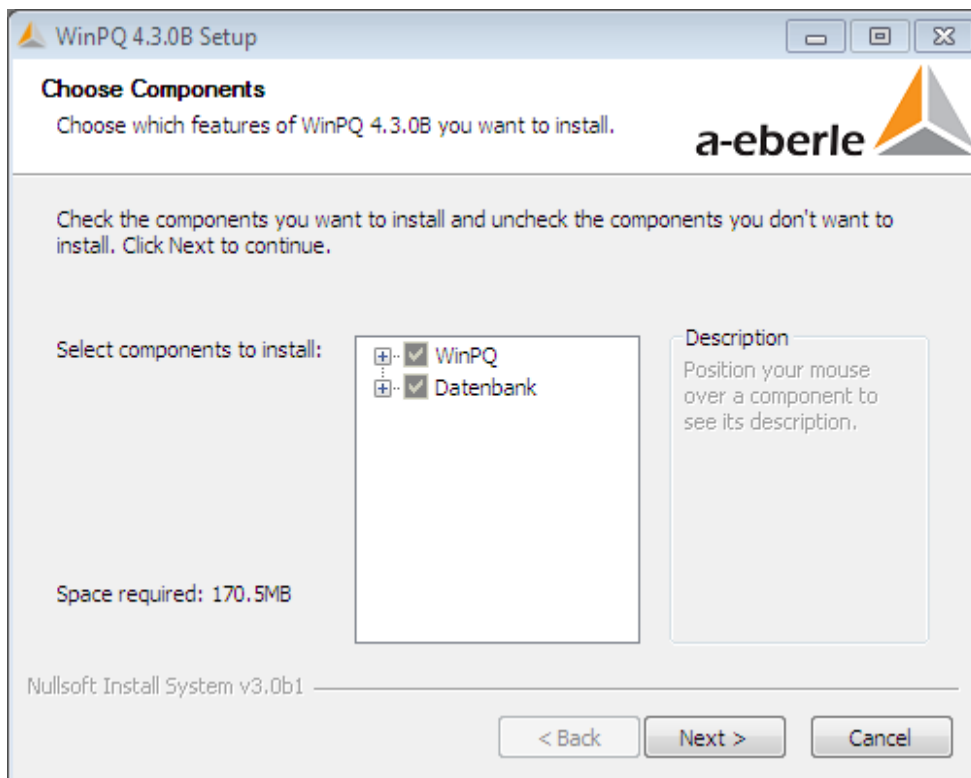
WinPQ differentiates the various system sizes and various databases (MySQL, MariaDB) based on the license entered. Mobile grid analysers are not included in this count. An upgrade of the maximum possible devices is possible at a later time via a changed license code.

- If you are using no license number and want to install the software as a demo version, confirm with "Next" without entering a license code. You will receive the following message:

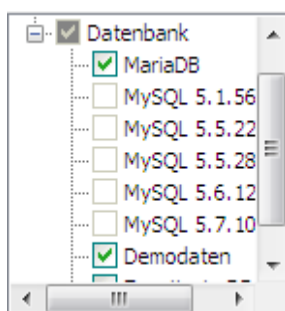
If you confirm it with OK, WinPQ will be installed as a demo version. In this variant it is not possible to communicate with devices. Demo measurement data are present to enable working with the software.



- You have entered a valid license number and confirm with "Next"

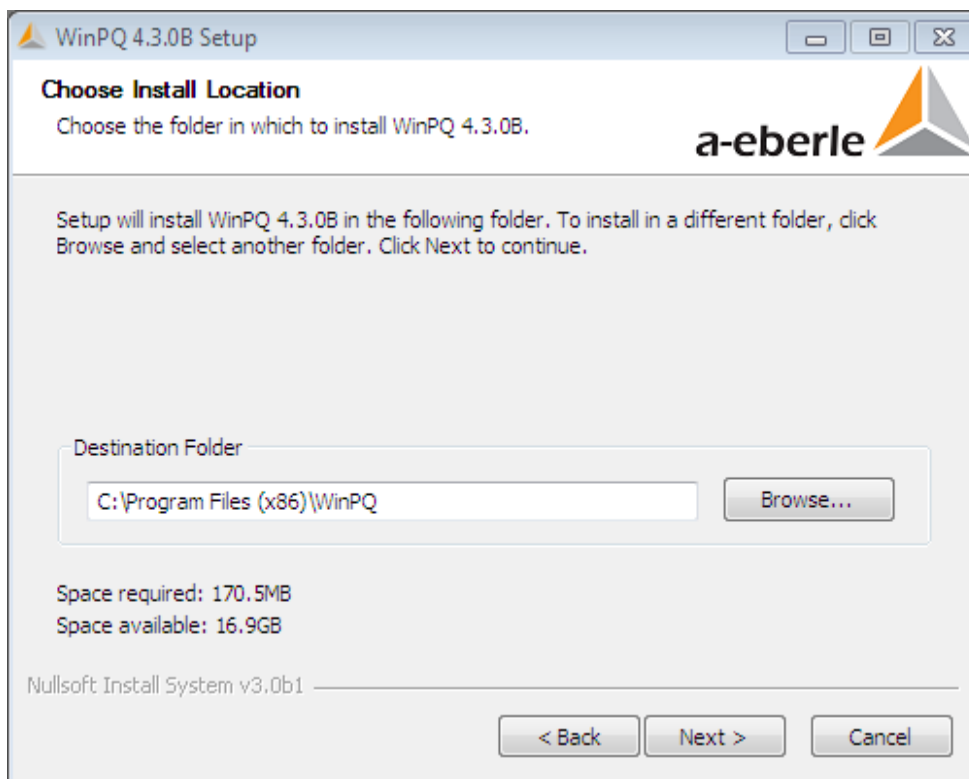


The relevant database will be installed dependent on your license code.

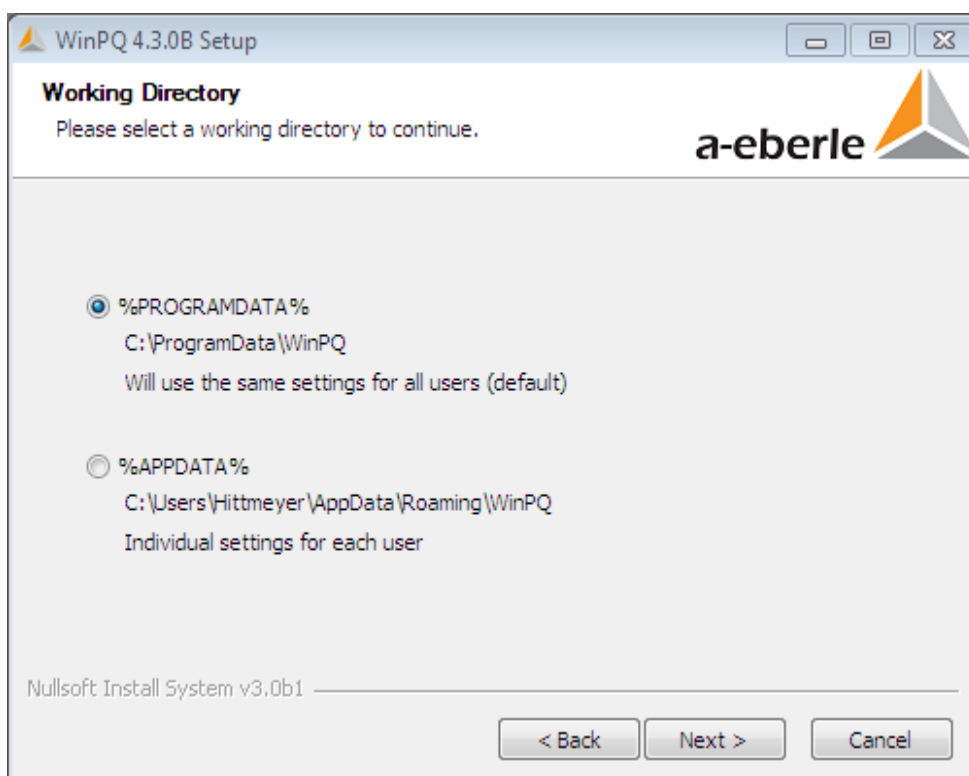


Using the selection in the drop down menu, you can also perform the installation in Expert Mode "Expanded DB Installation". This will enable you to explicitly select the storage location of the database as well as to adjust the standard rights and user data of the database to your needs. You will find details on this in chapter [advanced database installation](#).

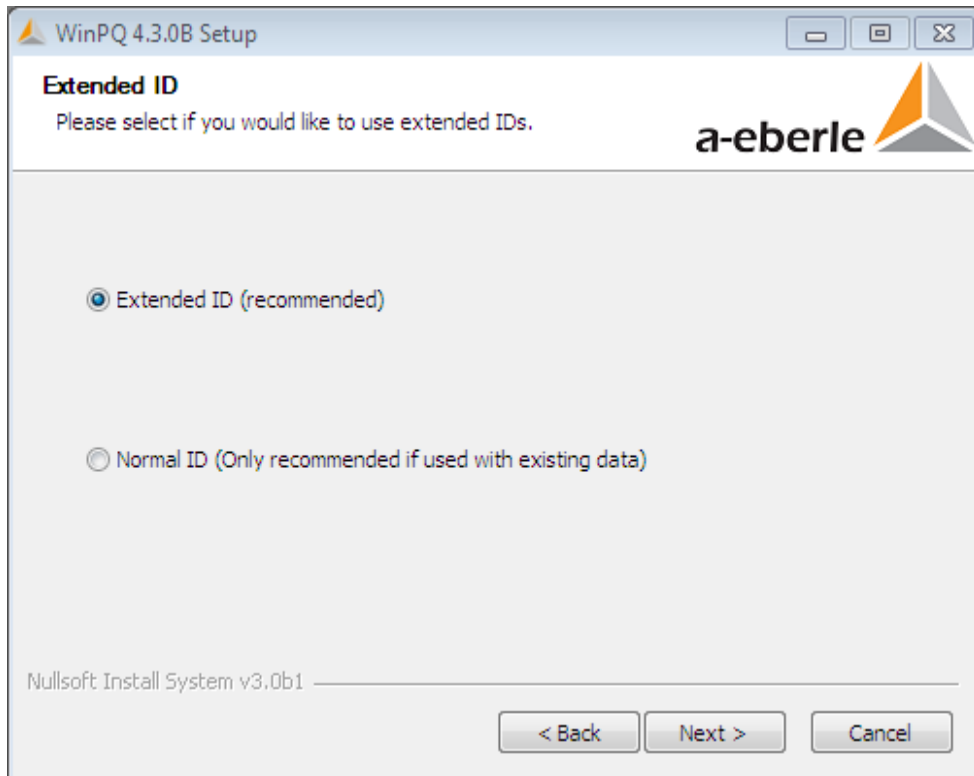
- Choose the installation location of WinPQ



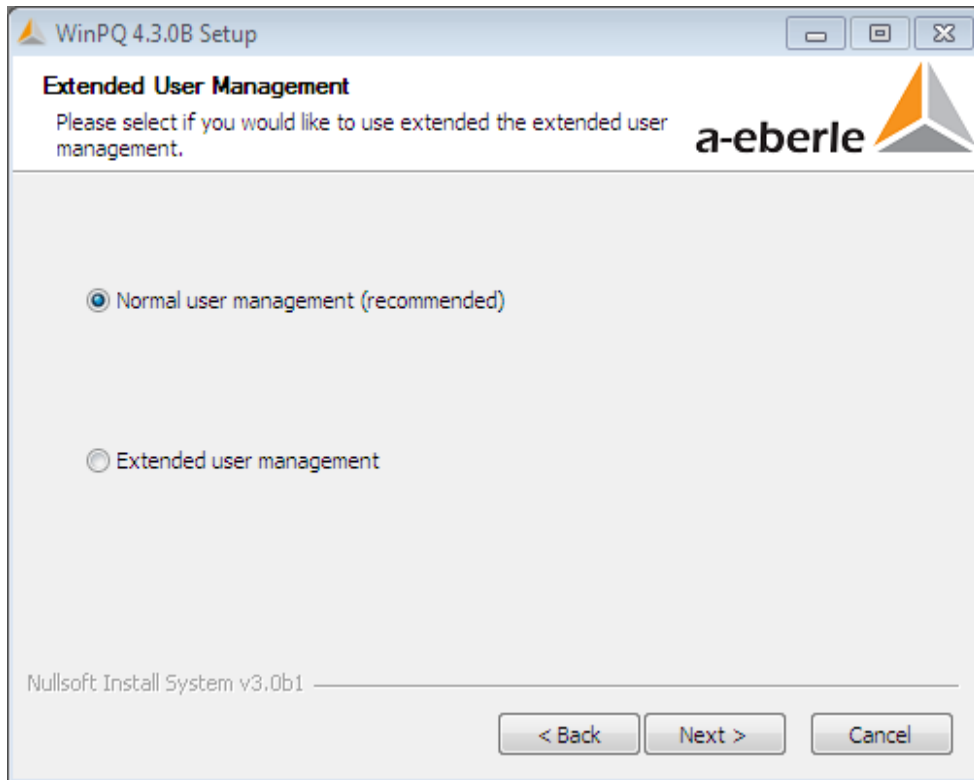
- Choose the operating directory for software settings of the user. We recommend using the windows system directory %Programdata% as the standard folder for all users. Thus all users who register on the system have the same start screen and settings. This simplifies management significantly.



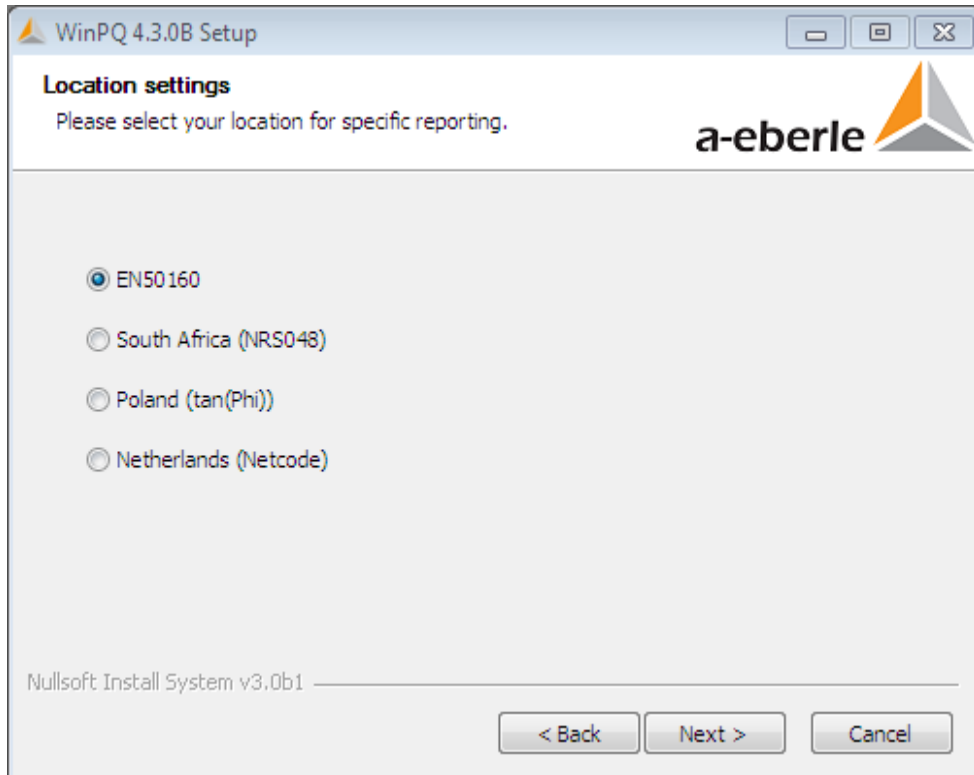
- Selection of the normal or extended database identification. Choosing the extended ID is strongly recommended, normal ID is only necessary for compatibility issues with old database systems. Learn more in chapter basic device settings.



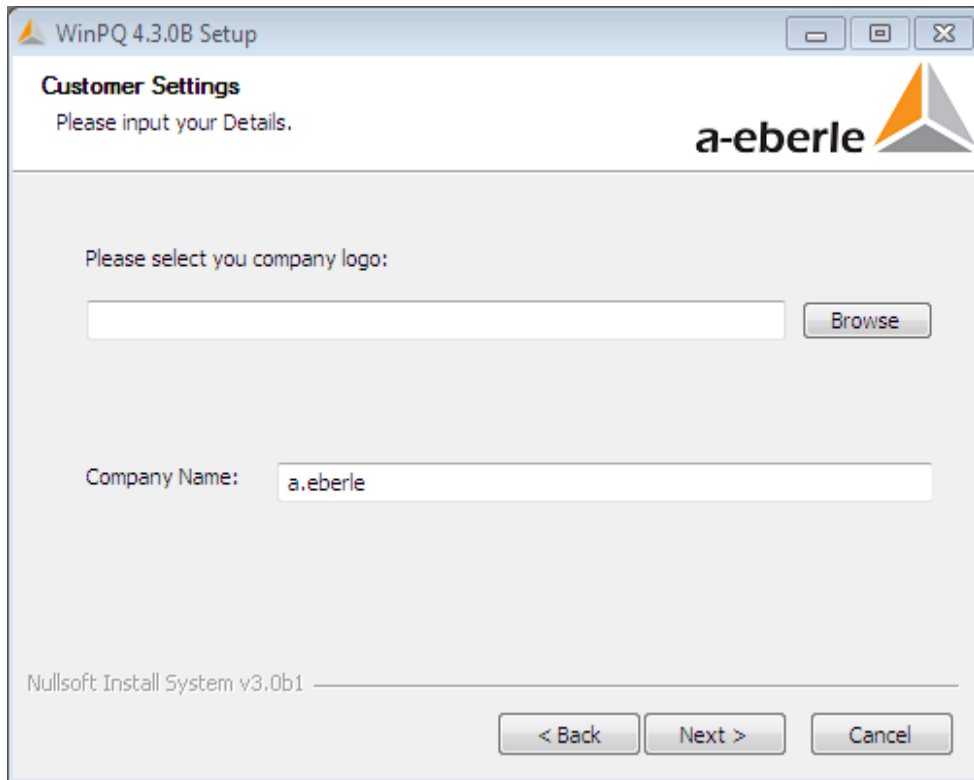
- Selection of the normal (simple) or advanced (extended) user management. The option normal user management is recommended for standard use. The advanced user management uses the user account information of the operating system. More details in chapter advanced user management.



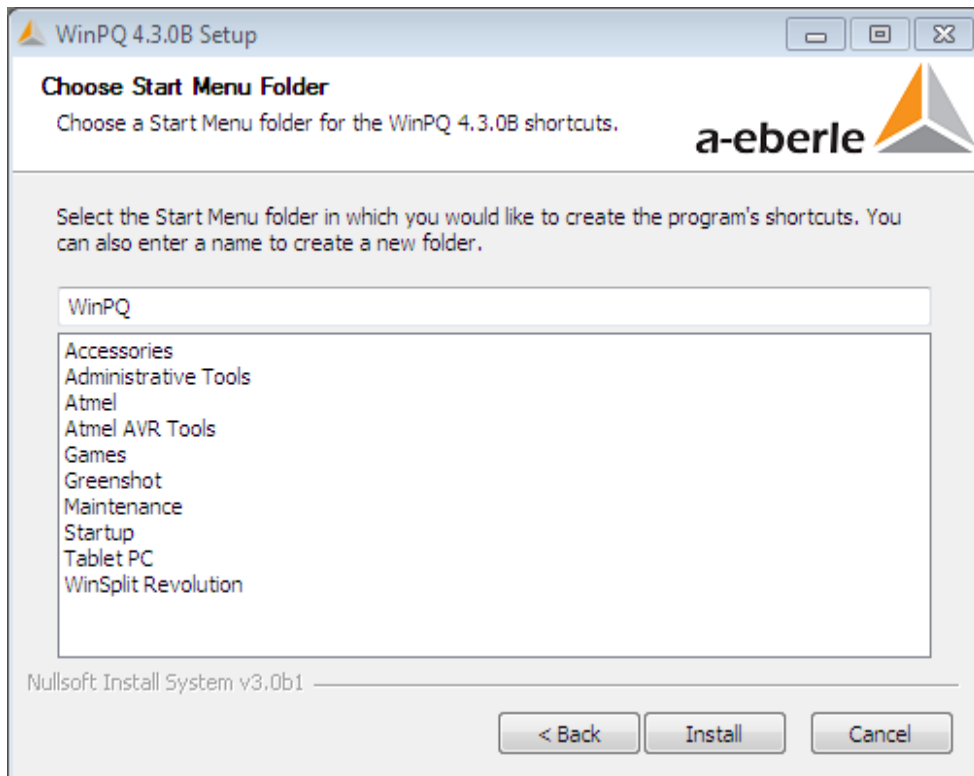
- Selection of the location for specific reporting.



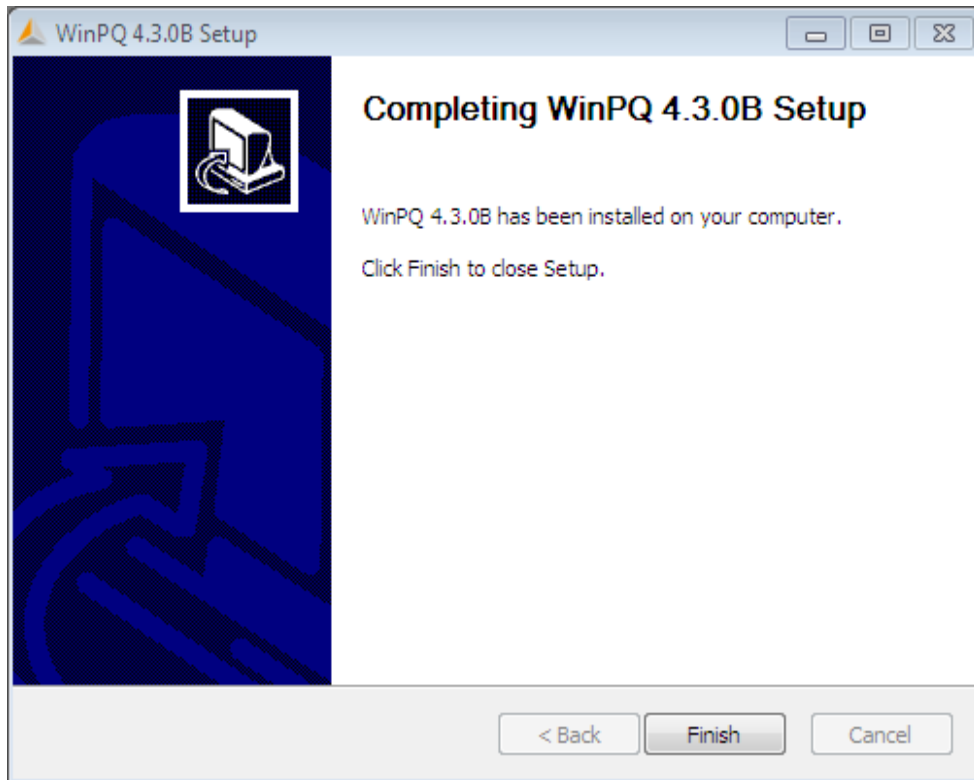
- Add company name and logo
At this point it is possible to determine for later reports and printing from the software on which company name and logo should appear. The formats "jpg", "bmp" and "png" are supported for the logo.



- Choose the start menu folder
Finally, choose the Windows start menu folder and click on "Install". The installation will start automatically. This process can take a few minutes.



- The following message will appear after a successful installation.

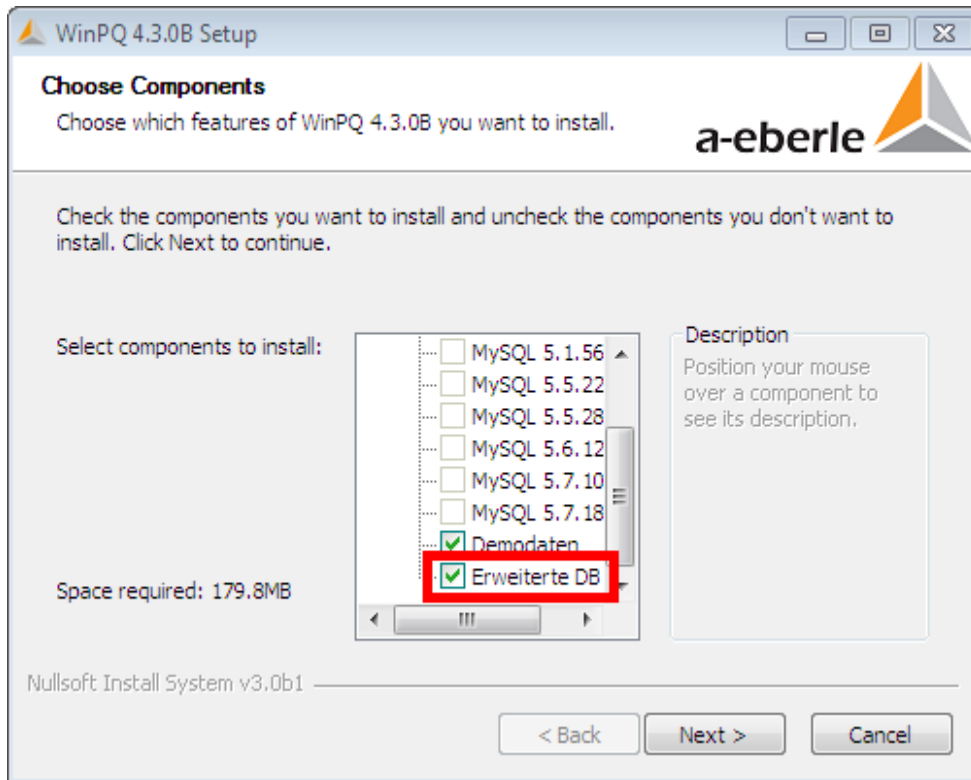


WinPQ has now been successfully been installed and will be started after clicking on "Finish".

Advanced database installation

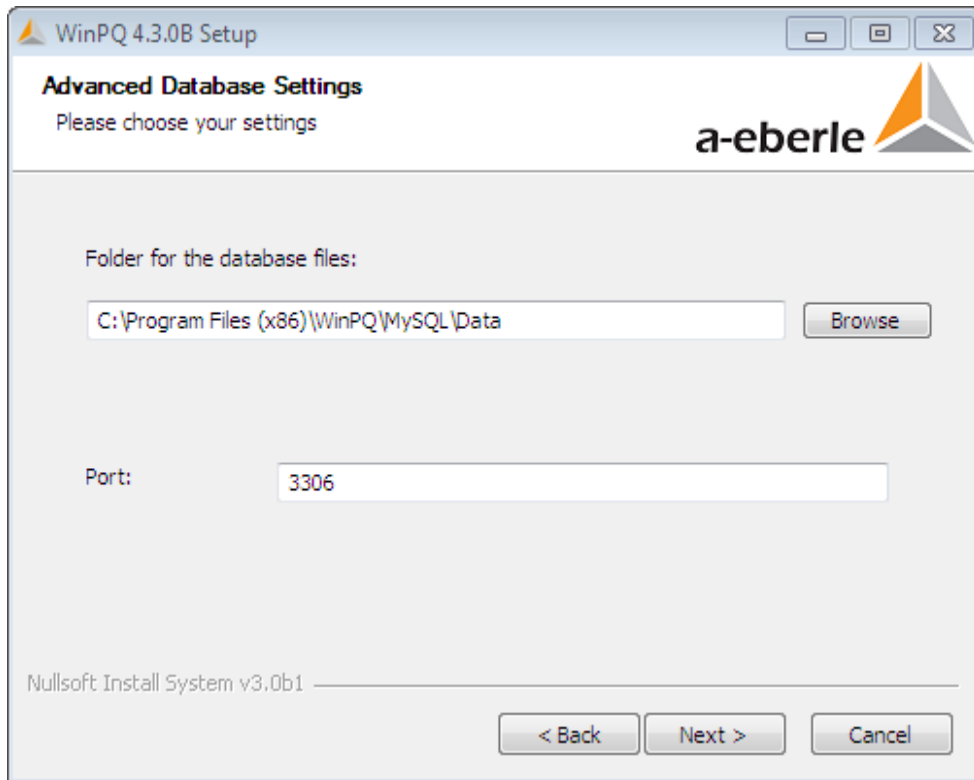
The option "advanced database installation" will enable the explicit selection of the database storage location as well as adjusting the standard database rights and user data to one's needs.

In order to implement the installation in the expanded mode to be able to set these special settings, in the installation step "Select components" one must select the box "Advanced database settings".

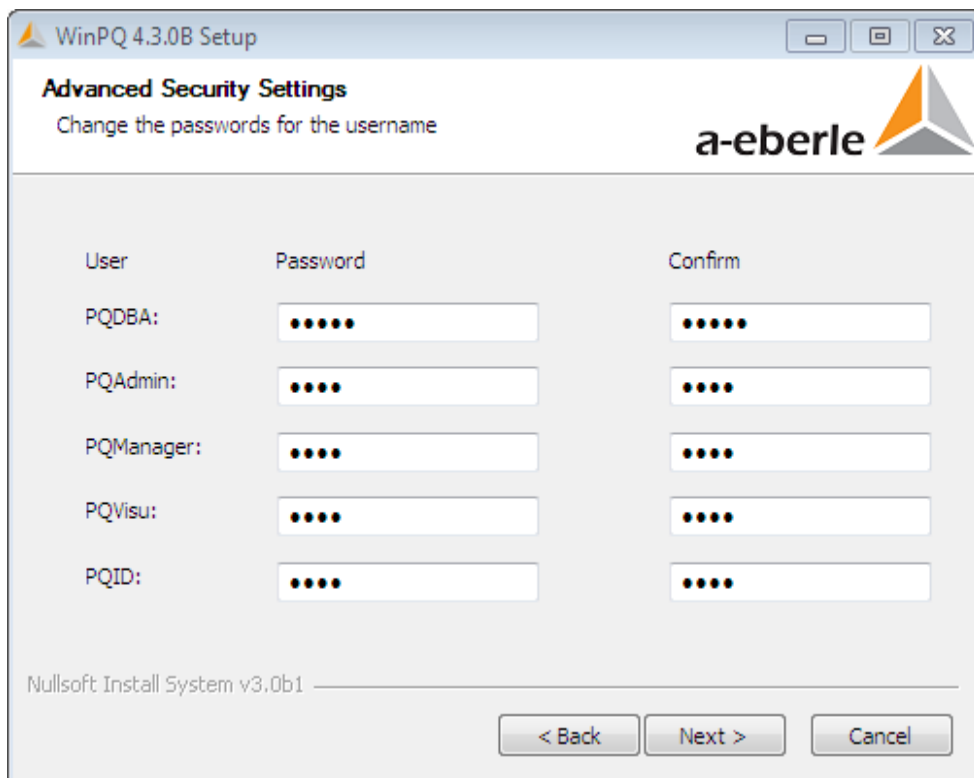


In addition, after the steps described in the [previous chapter](#) there are two additional installation settings:

- Selection of the storage location of the database and the database port (documentation is absolutely necessary!)



- **Advanced security settings**
In order to fulfil certain security guidelines once have the option in this dialogue to use different and freely selectable passwords for the different users, which WinPQ needs in the database. Please note that these passwords must be documented!



The installation assistant continues as described in [previous chapter](#).



Uninstall WinPQ Software

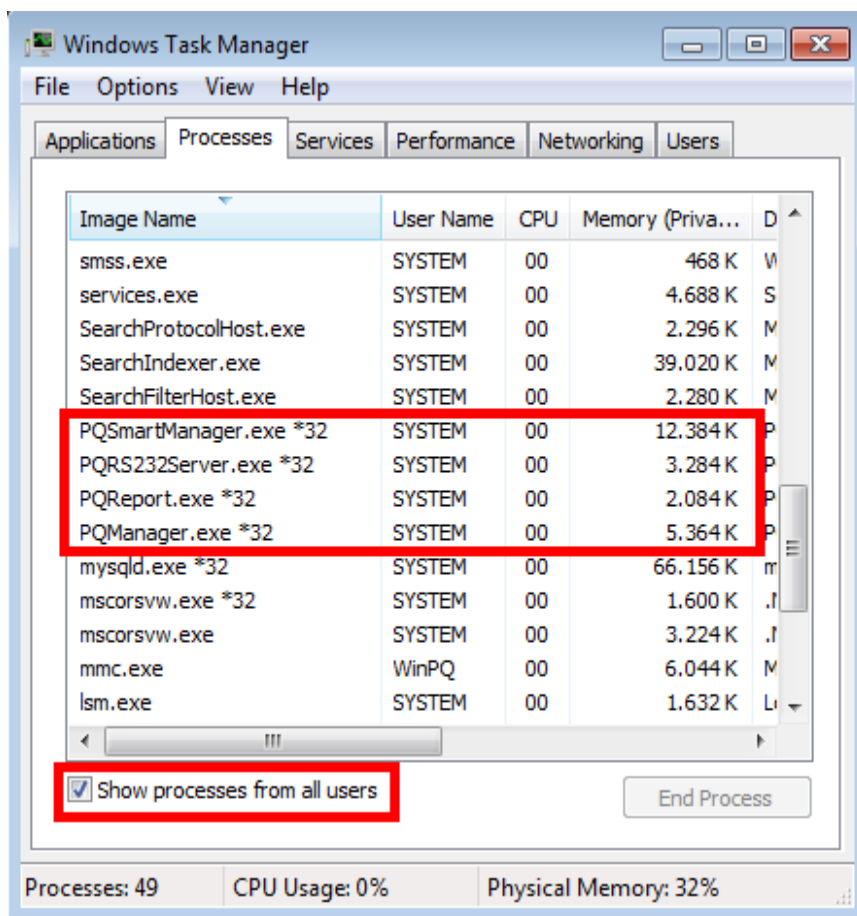
For complete uninstall of the WinPQ software, including the MySQL database and all of the data contained within it, one can use the "Uninstall" program installed with the software. This is found under "Start>>All Programs>>WinPQ". The program requires administrator authorization for windows to start and will request this automatically. Confirm the equivalent dialog of the user account control (UAC).

Please note that all background programs should be closed before uninstallation. All of processes can be found in the Windows Task Manager. Caution, uninstallation deletes all databases!

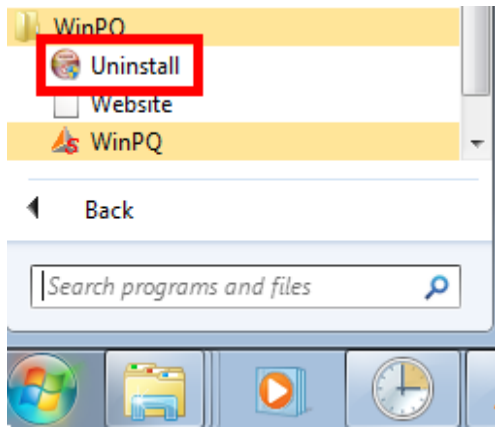
Deinstallation

The steps for the deinstallation of WinPQ are described below.

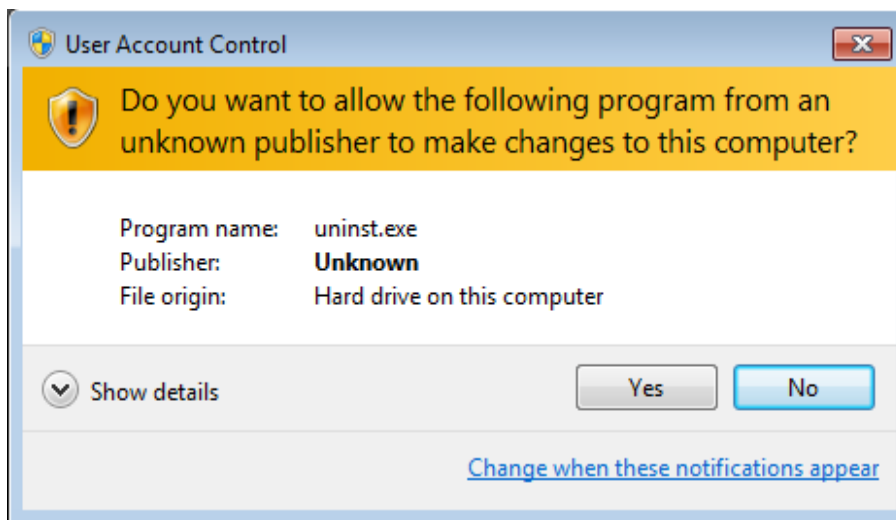
1. Quit the following WinPQ processes with Windows Task Manager.



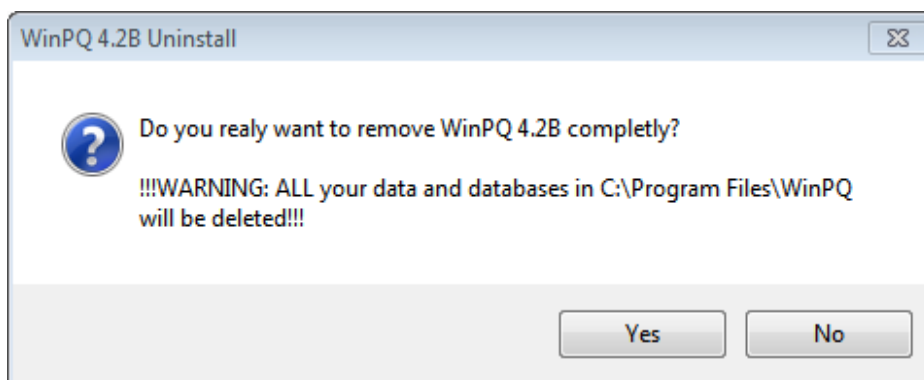
2. Start the WinPQ uninstaller via Windows Start Menu.



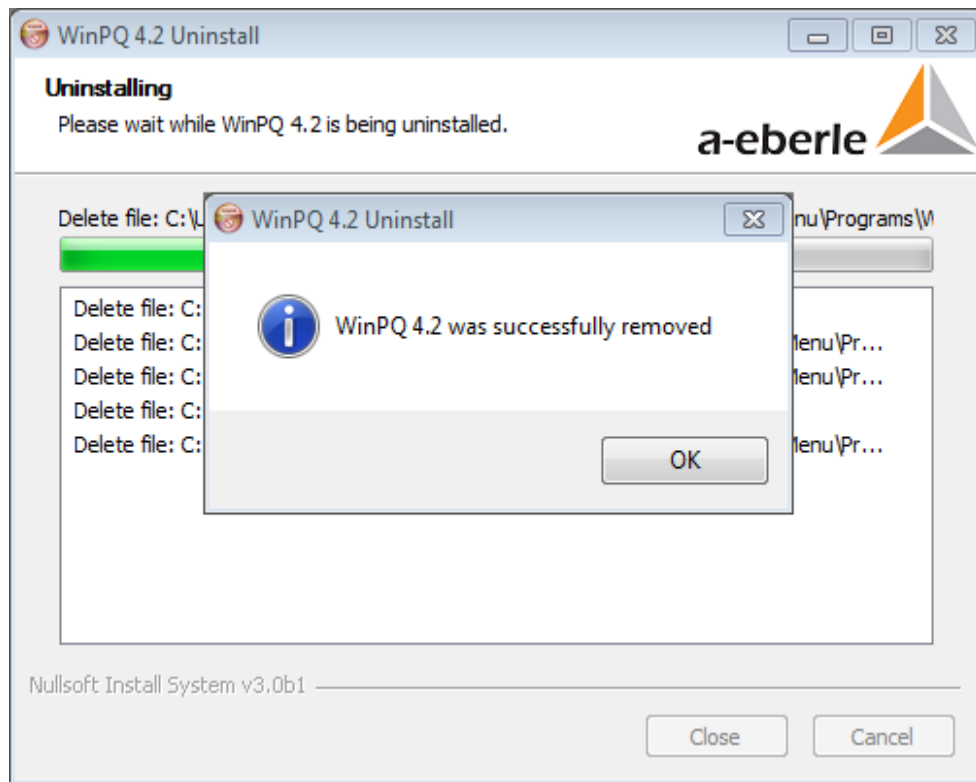
3. The program requires administrator authorization for windows to start and will request this automatically. Confirm the equivalent dialog of the user account control (UAC).



4. The Uninstallation will be performed completely by clicking on "Yes". Please note the information below.



5. All data will be removed sequentially!



User data directory

All user data will be completely removed from the system as long as all standard parameters are used for installation. Thus, for example, the user data directory %Programdata% will be completely removed. If client specific settings are used, the data must be deleted manually.

Database

The database will also be removed from the system if it was installed in the installation directory of WinPQ. Please note that once should create a database security before uninstallation to prevent data losses.

WinPQ Update

Follow this [link](#) for the current WinPQ version updates. In order to perform a WinPQ software update, start the update file WinPQ_Update_vXXX.exe.

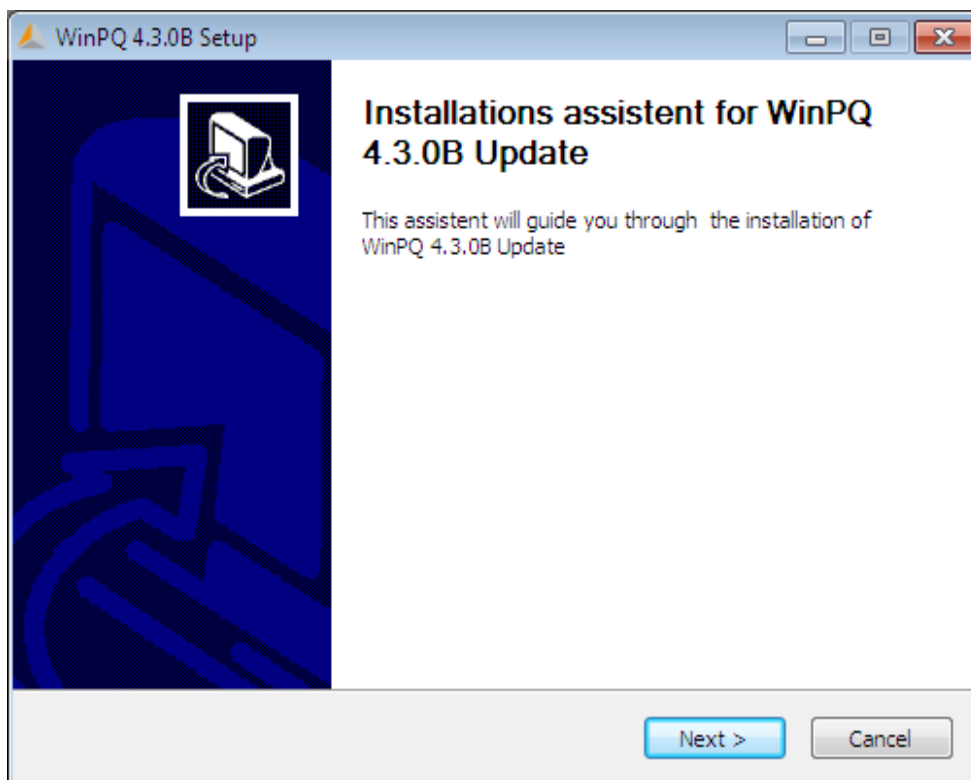
Exit all running WinPQ programs before updating the software to avoid data loss!

The update routine quits the following processes automatically to perform the software installation:

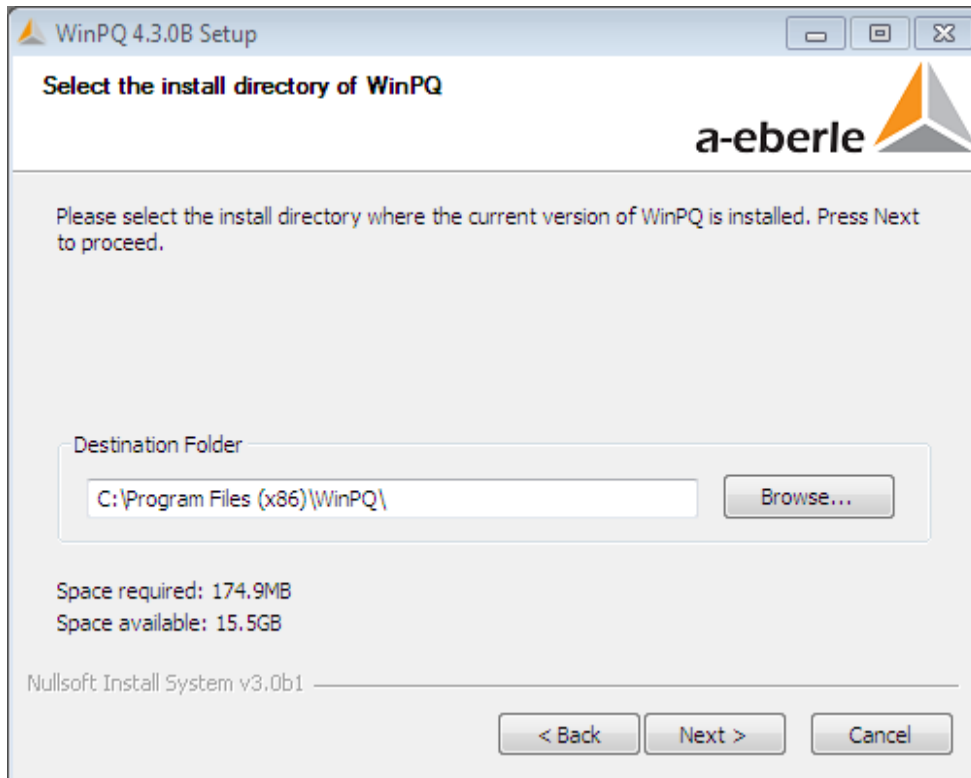
- PQManager.exe
- PQSmartManager.exe
- PQReport.exe
- PQRS232Server.exe
- PQStart.exe
- PQAdmin.exe
- PQVisu.exe
- PQDBBackup.exe

To start the WinPQ update start the update file, e.g. *WinPQ_Update_V.X_YYMMDD.exe*. The installation assistant starts automatically.

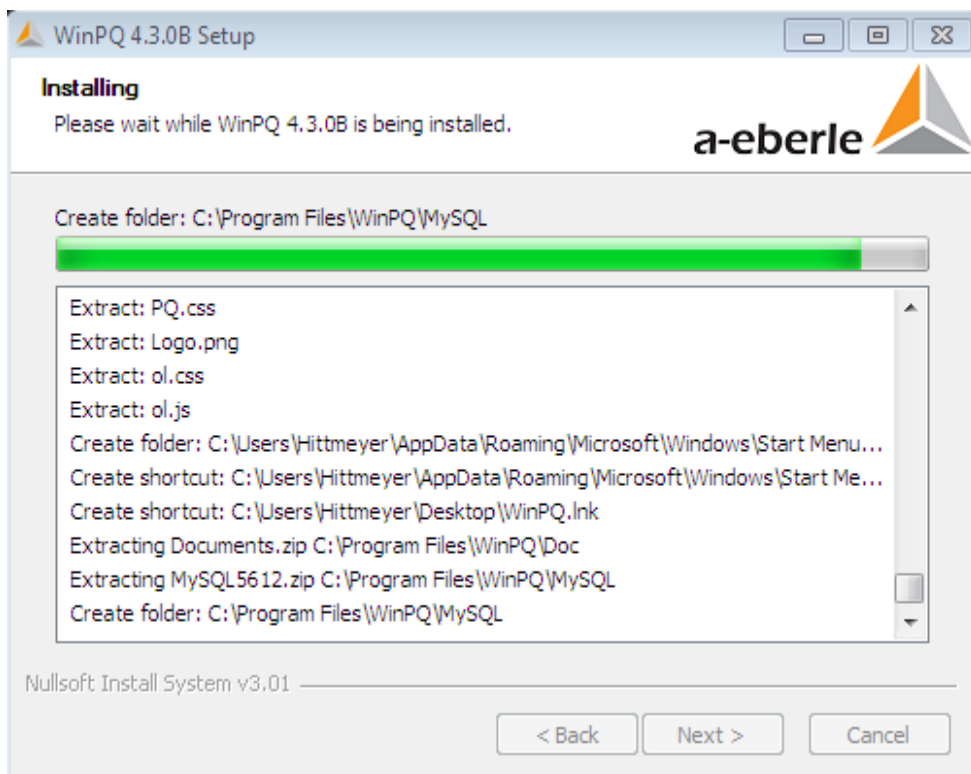
1. Start the update process by clicking the *Next* button.



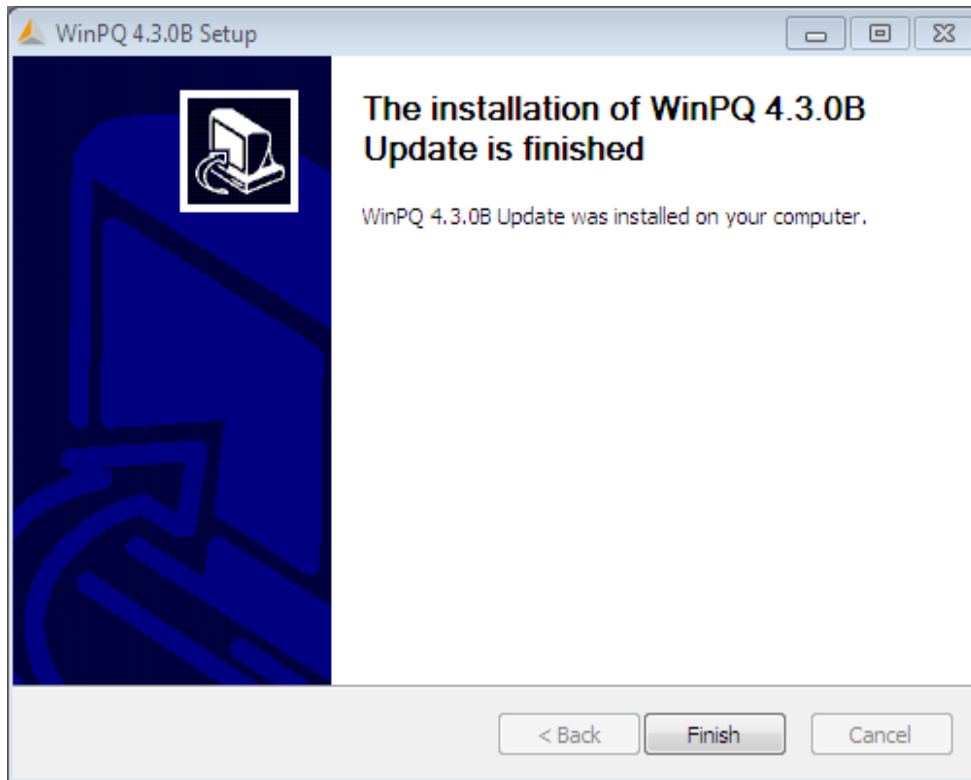
2. Choose the current WinPQ install directory for the destination folder of the update (default is *C:\Program Files (x86)\WinPQ*)



3. The update process is executed automatically.



4. Press the Finish button to quit the installation.



Finally the WinPQ tasks PQManager, PQSmartManager and PQReport will be startet automatically, if applicable.

Continuous operation of WinPQ

As previously described, the main tasks of your PQ system, such as data reading and report generation are done by so-called background processes which are constantly running on your WinPQ server. To ensure this, during the installation of the WinPQ software, the most important background processes are installed with default parameters on your Windows system in the Task Scheduler.

The following section [Check WinPQ background process operation](#) describes how to check the correct setup of the WinPQ background processes. In case of any errors the background process could also be setup manually, as described [here](#).

The following processes are installed by default:

- **PQManager:** Transfer of the measurement data from PQI-D(A)
- **PQSmartManager:** Transfer of the measurement data from PQI-DA *smart*
- **PQReport:** Creates the automatic fault record and power quality reports

If you wish to create an automatic backup, you can also have this done via a background program. The background process can then be installed directly from the program!

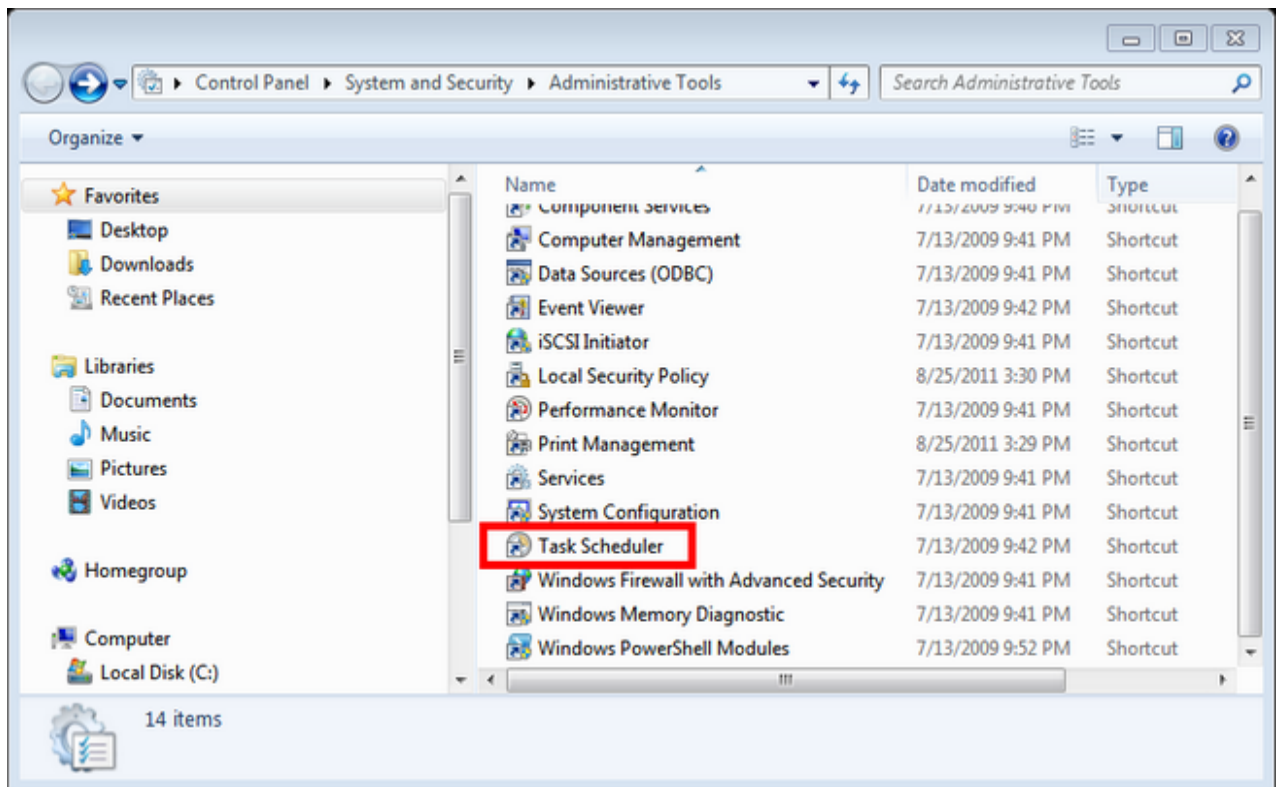
- **PQDBBackup:** Creates a weekly automated database backup in a target folder.

The background processes installed during installation are executed in the Windows User Account "System". If your backup process requires other Windows user rights to access the network drive, for example, which are not accessible in the system account, you can take care of this directly in Windows Task Manager.

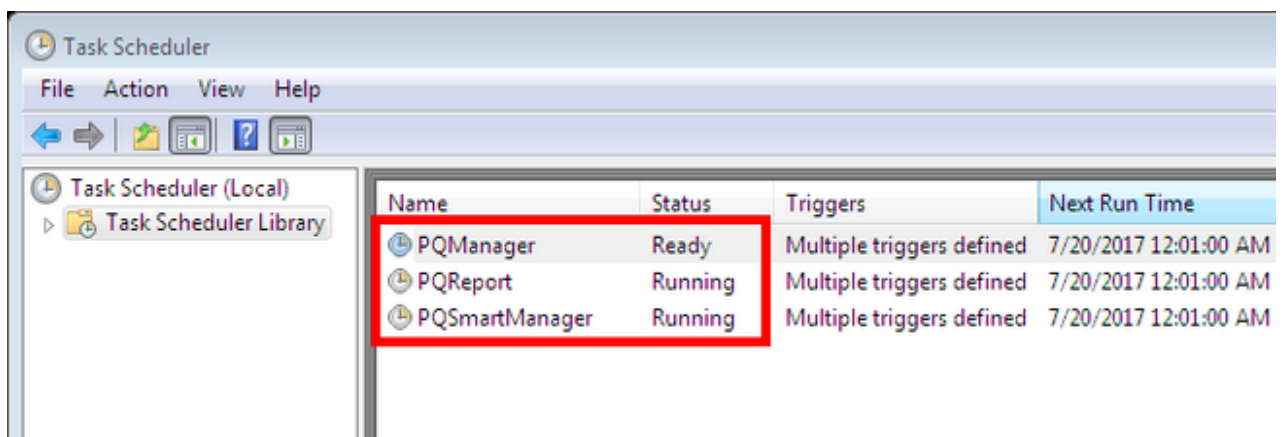
Check WinPQ background process operation

Background processes in Windows Task Scheduler

To check the correct installation of the WinPQ background processes open the Windows Task Scheduler in *System >> Task Scheduler*. Or start the task scheduler from the main menu bar in the WinPQ PQAdmin program.

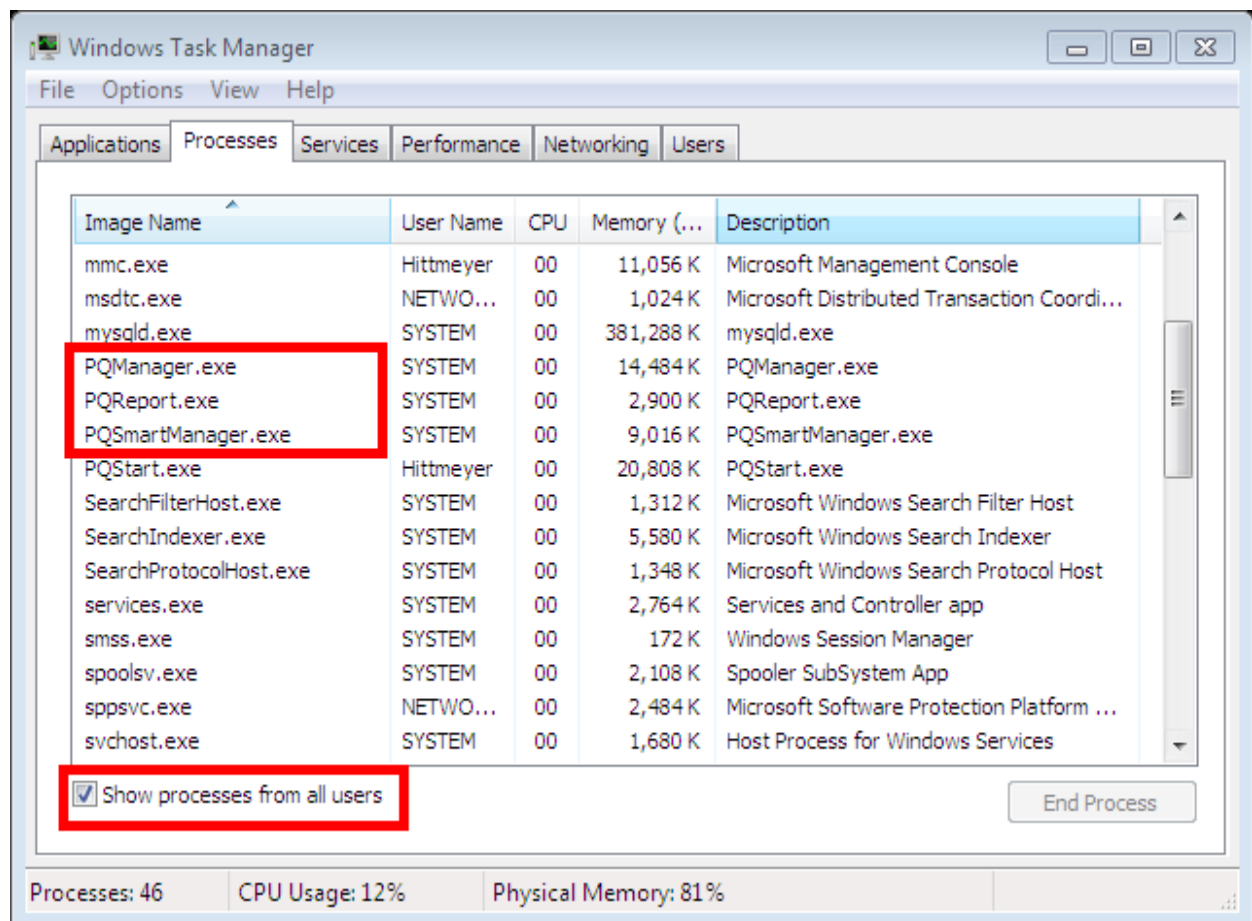


The Windows Task Manager should contain the following highlighted entries.



Check the WinPQ processes in Windows Task Manager

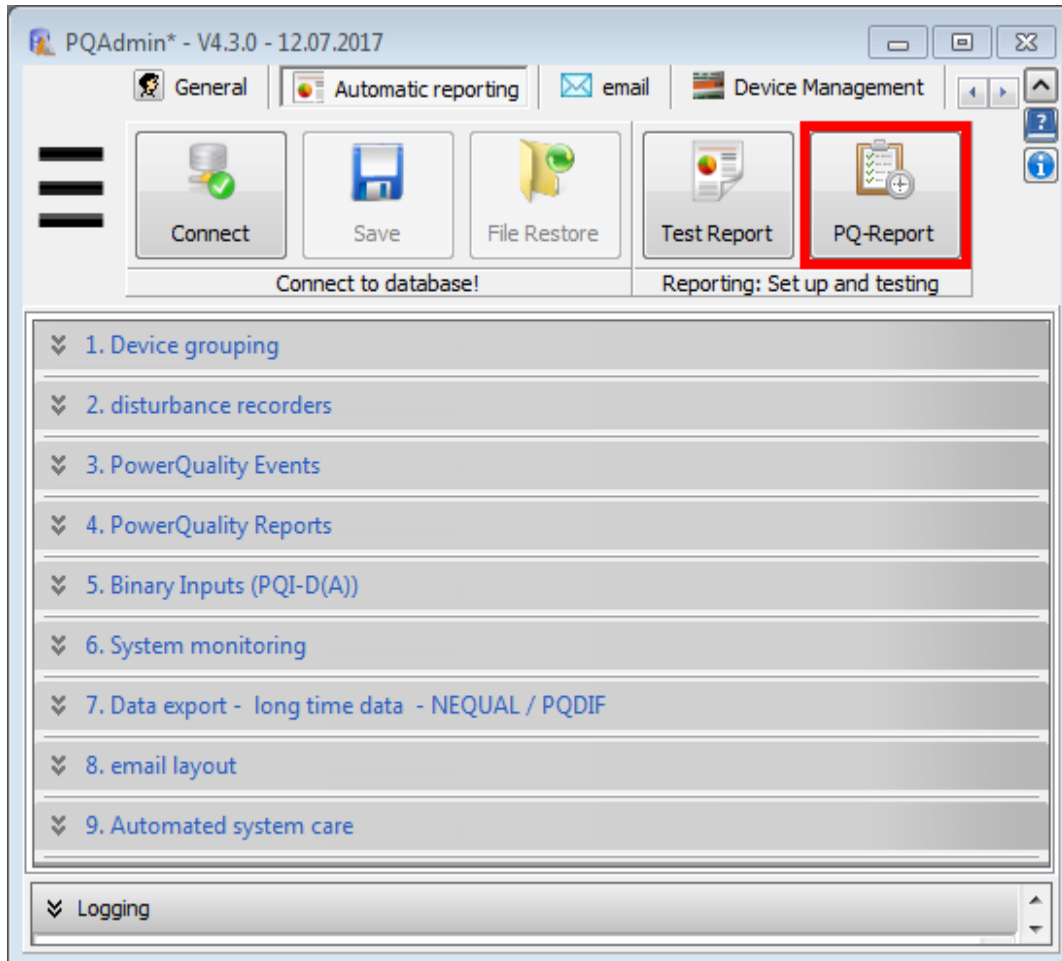
To check the execution of the WinPQ background processes either start the Windows Task Manager by pressing the keyboard shortcut *CTRL + ALT + DEL* or rightclick on the taskbar and click *Start Task Manager*. Activate the option *Show processes from all users* (WinPQ processes are executed by SYSTEM user). The following highlighted processes must be running for correct function of WinPQ.



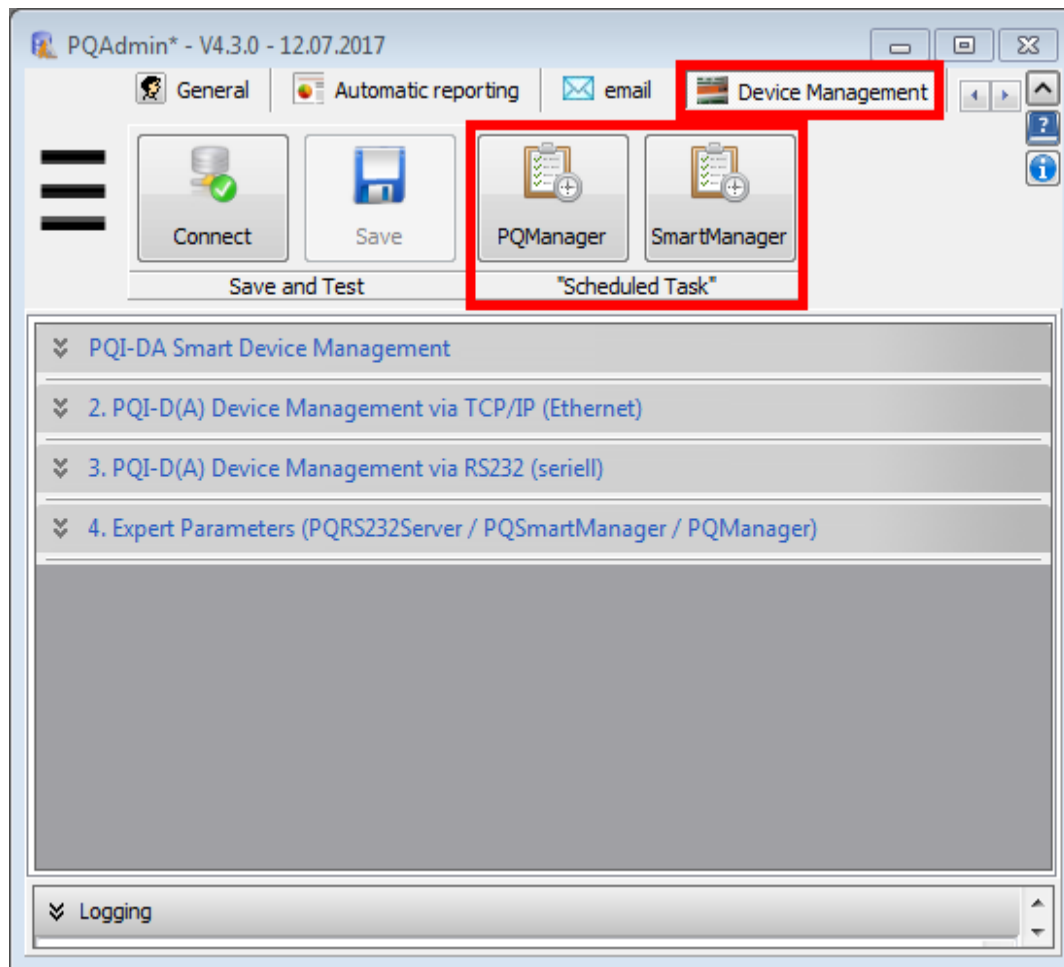
Manual configuration of WinPQ background processes

Manual configuration of the WinPQ background processes in WinPQ

To configure the WinPQ background processes directly in WinPQ start the program PQAdmin, open the tab *Automatic reporting* and press the PQ-Report button.

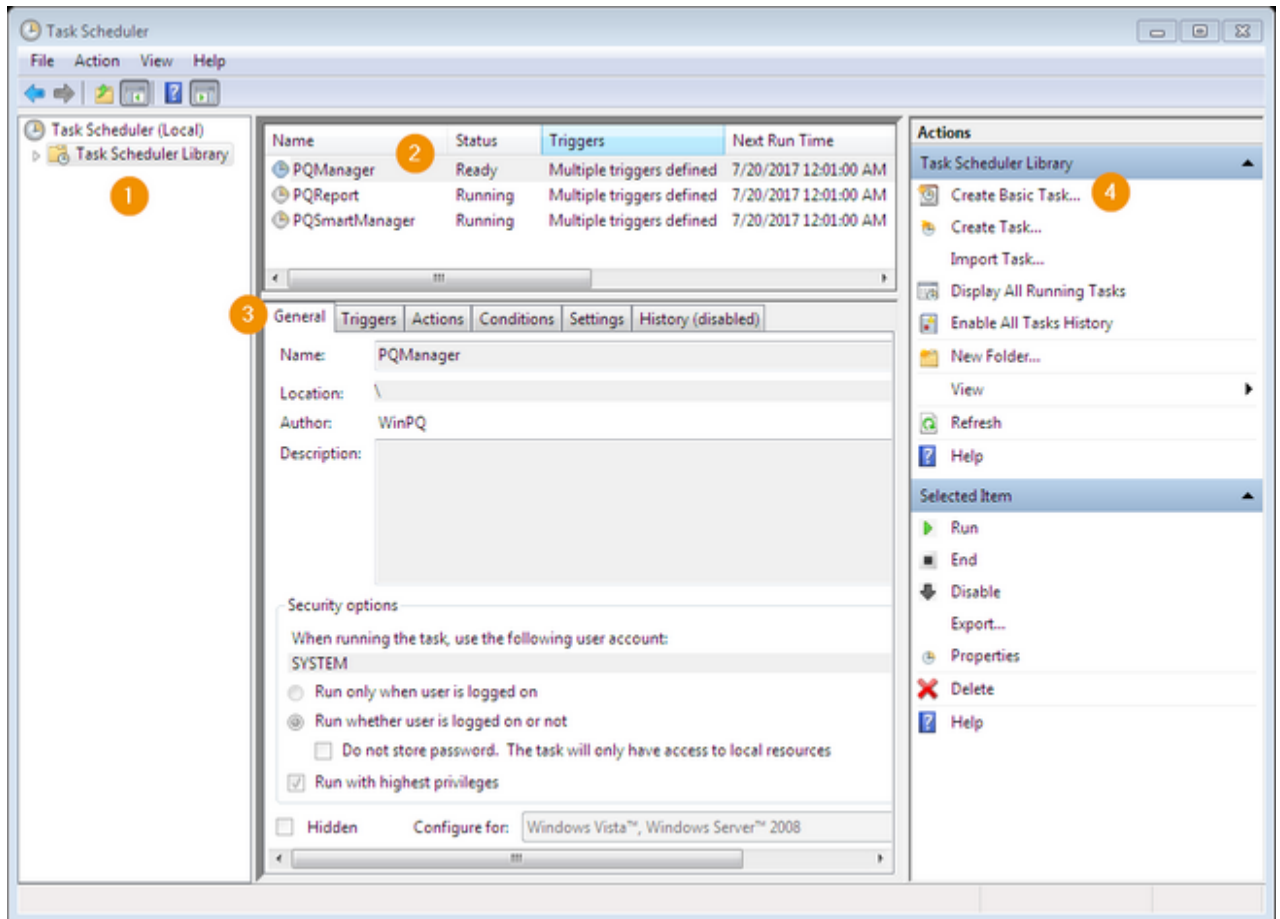


The WinPQ background processes PQmanager and PQSmartManager are configured by pressing the corresponding buttons in section Device Management as shown below.



Manual configuration of the WinPQ background processes with Windows Task Scheduler

This section describes the manual configuration of the WinPQ background processes in the Windows Task Scheduler. The following screenshot shows the final settings.



Select the Task Scheduler Library in the left Task Scheduler (1) window. The section (2) should contain the entries *PQManager*, *PQReport* and *PQSmartManager* as shown above (details of the respective entry are shown in section (3)). If not, they have to be created by starting the command Create Basic Task in section (4). Please run the subsequent task creation assistant inputs as described below. The procedure has to be performed for the *PQSmartManager* and the *PQReport* in the same way.

1. Enter the name of the task *PQManager* (*PQSmartManager* and *PQReport* respectively) and continue with Next.

Create Basic Task Wizard

Create a Basic Task

Use this wizard to quickly schedule a common task. For more advanced options or settings such as multiple task actions or triggers, use the Create Task command in the Actions pane.

Name: PQManager

Description:

< Back Next > Cancel

2. Select the daily Task Trigger.

Create Basic Task Wizard

Task Trigger

When do you want the task to start?

☒ Daily

☐ Weekly

☐ Monthly

☐ One time

☐ When the computer starts

☐ When I log on


☐ When a specific event is logged

< Back Next > Cancel

-
3. Enter 00:01 as the starting time.



Create Basic Task Wizard

 Daily

Create a Basic Task

Trigger

Daily

Action

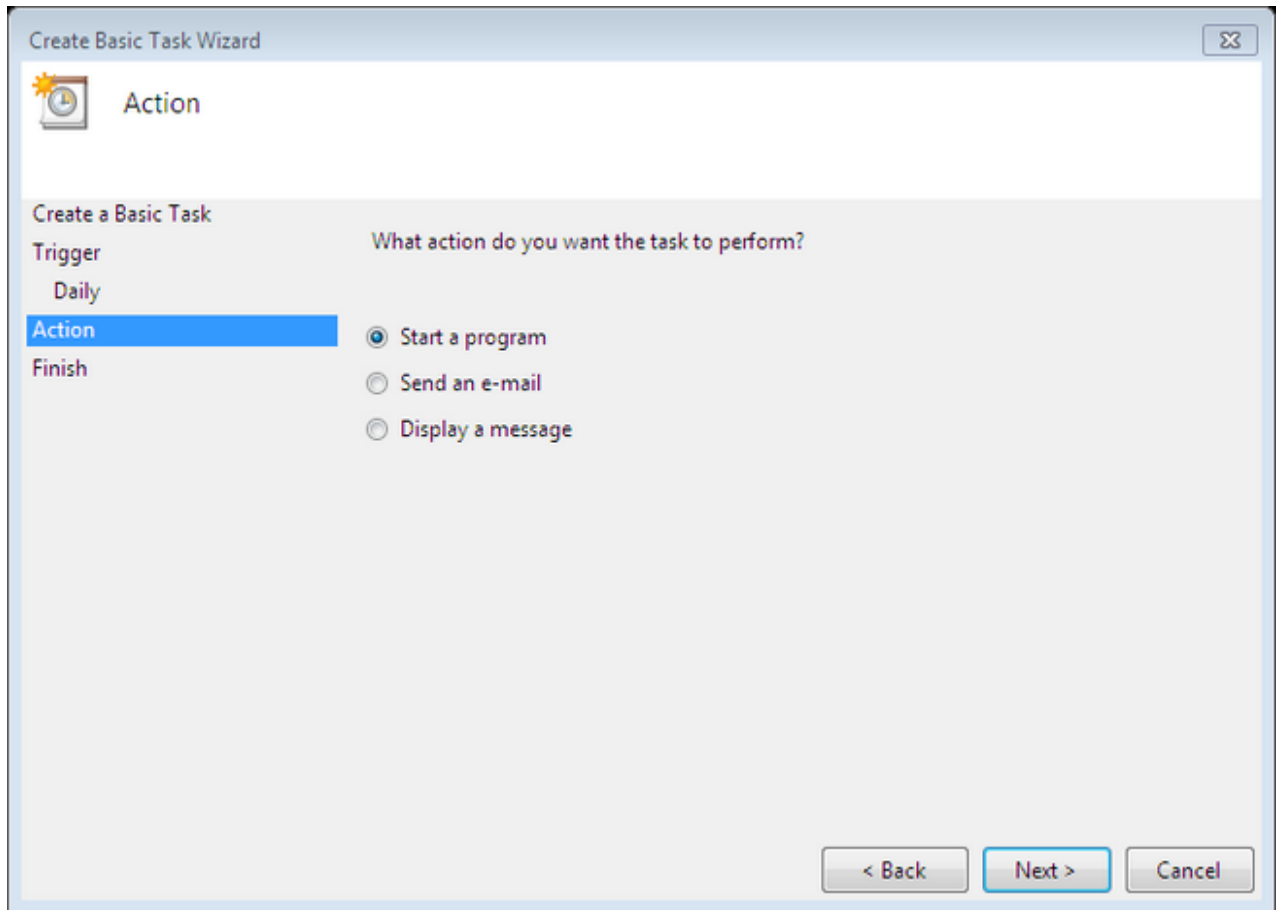
Finish

Start: 7/19/2017 12:00:01 AM Synchronize across time zones

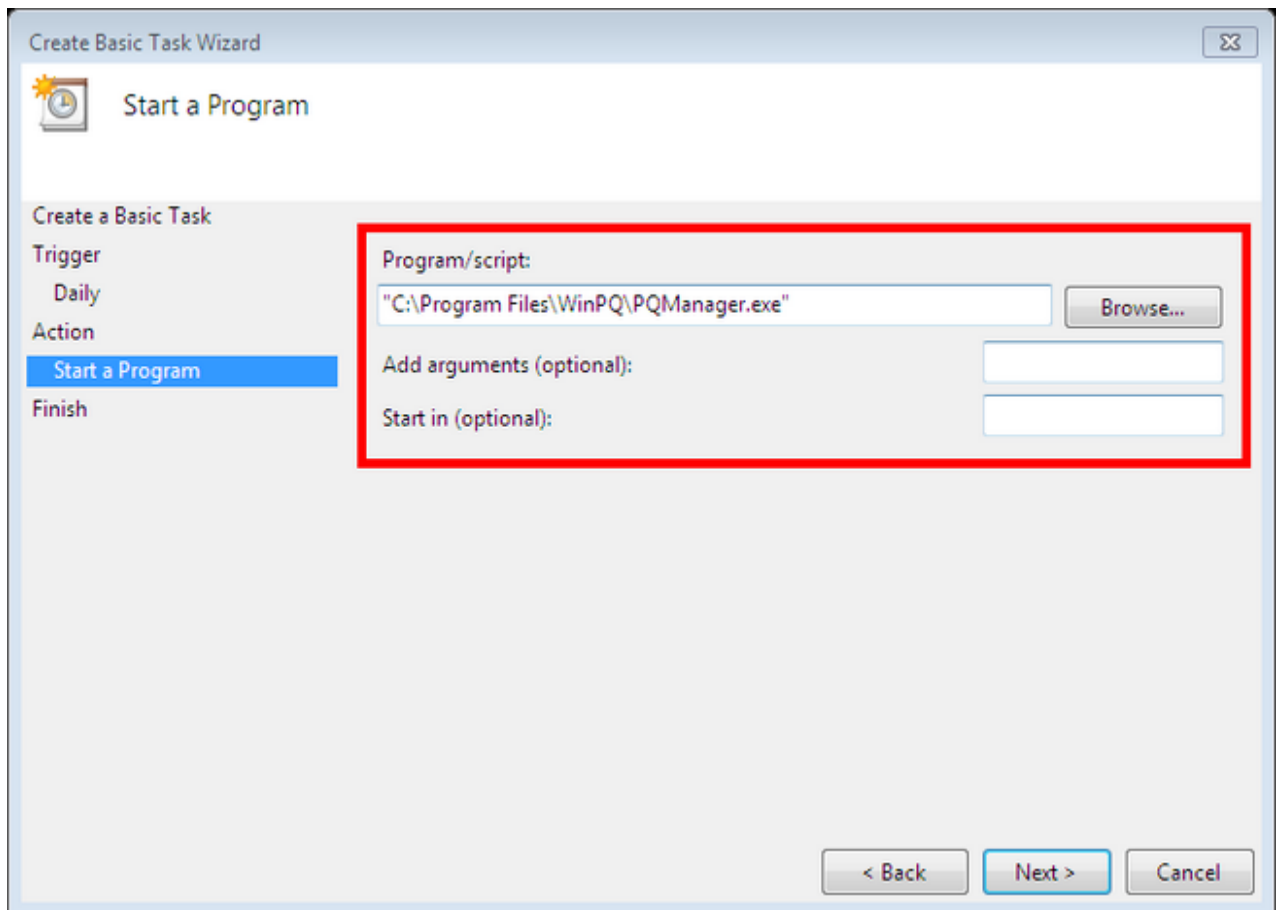
Recur every: 1 days

< Back Next > Cancel

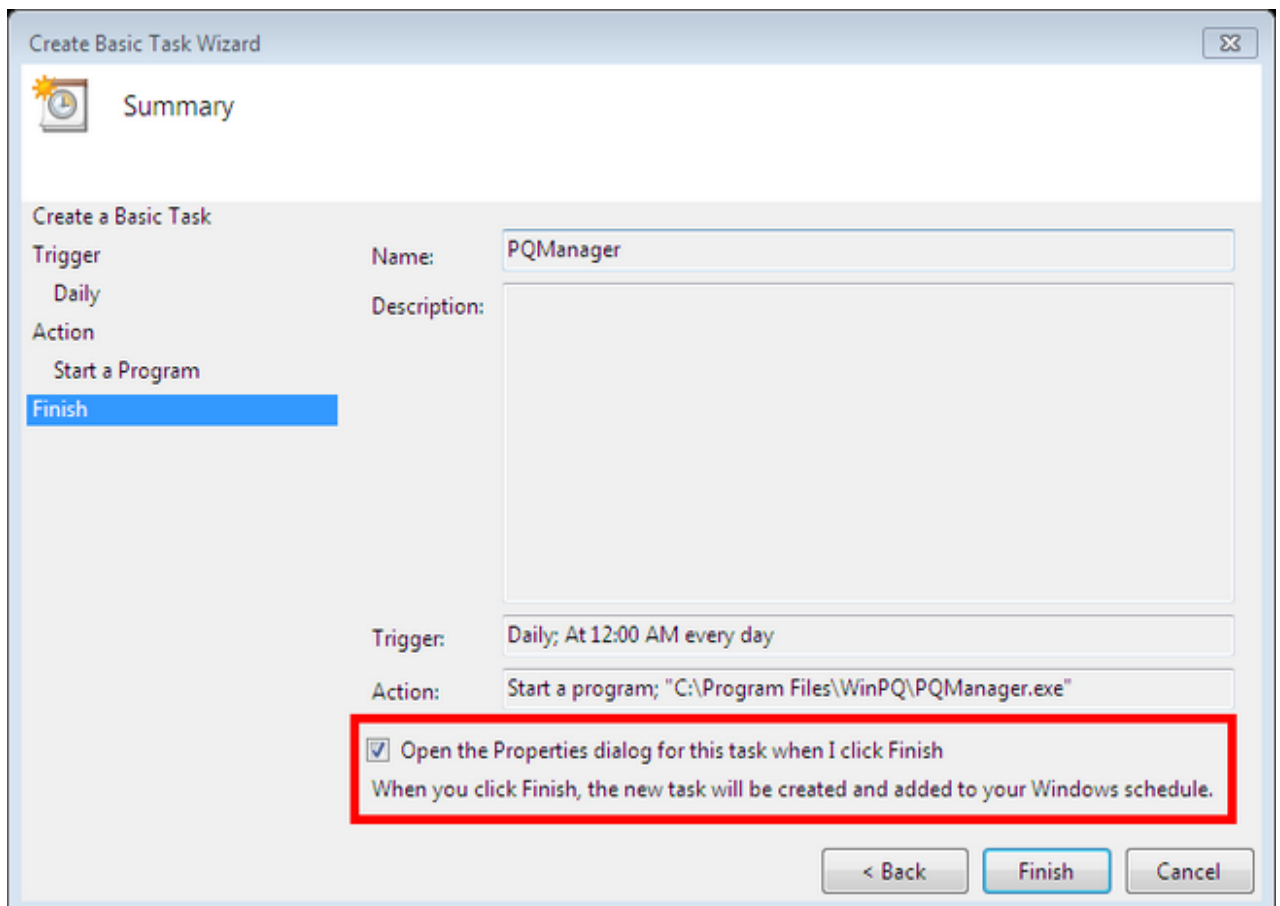
4. Select the Action Start a program.



5. Enter the path of the program which should be started, "C:\Program Files (x86)\WinPQ\PQManager.exe" for PQManager ("...\PQSmartManager.exe" and "...PQReport.exe" respectively). Other (optional) arguments (e.g. allocations with ini-files) are not necessary.

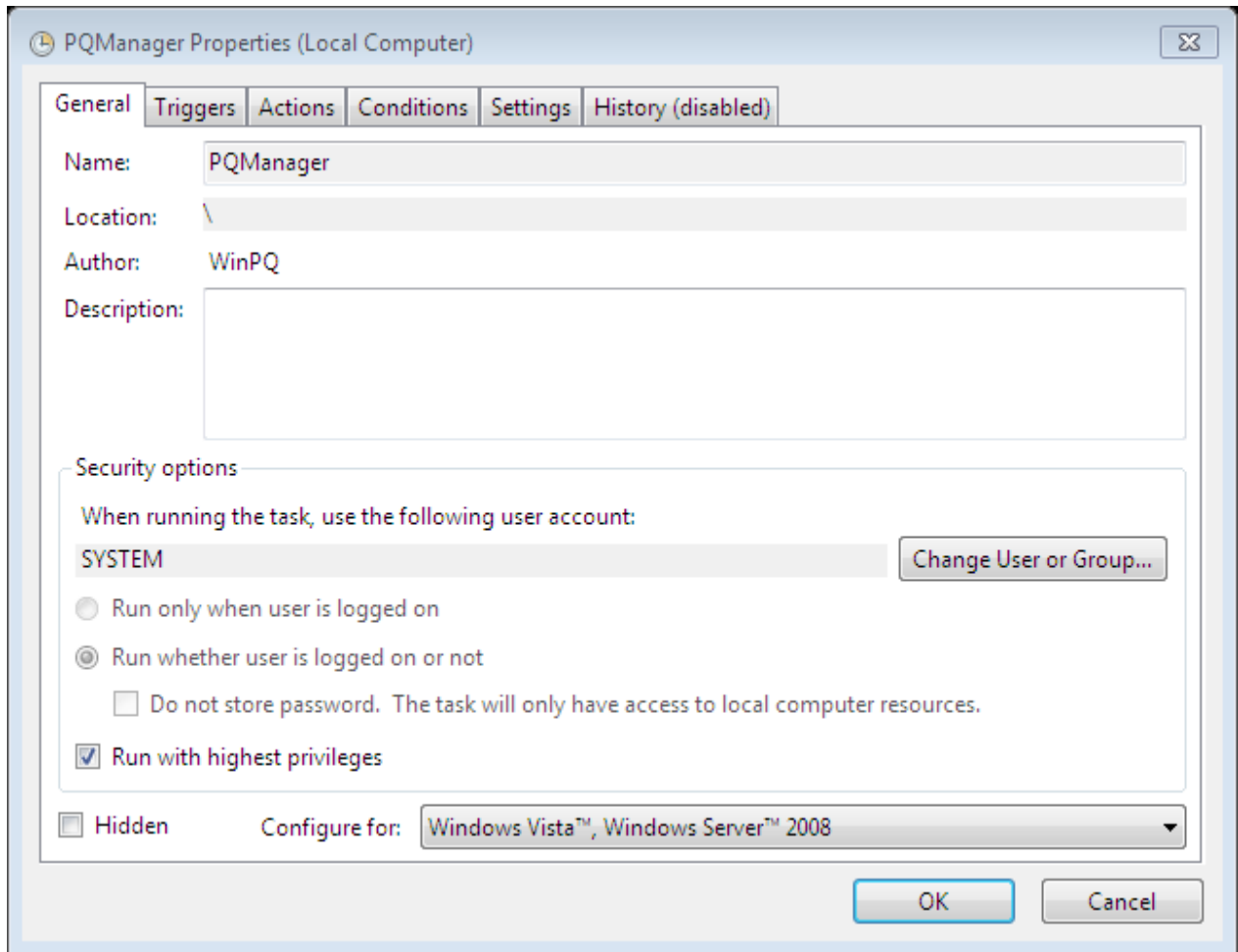


6. Finally activate the checkbox as shown below and quit the assistant by clicking Finish.

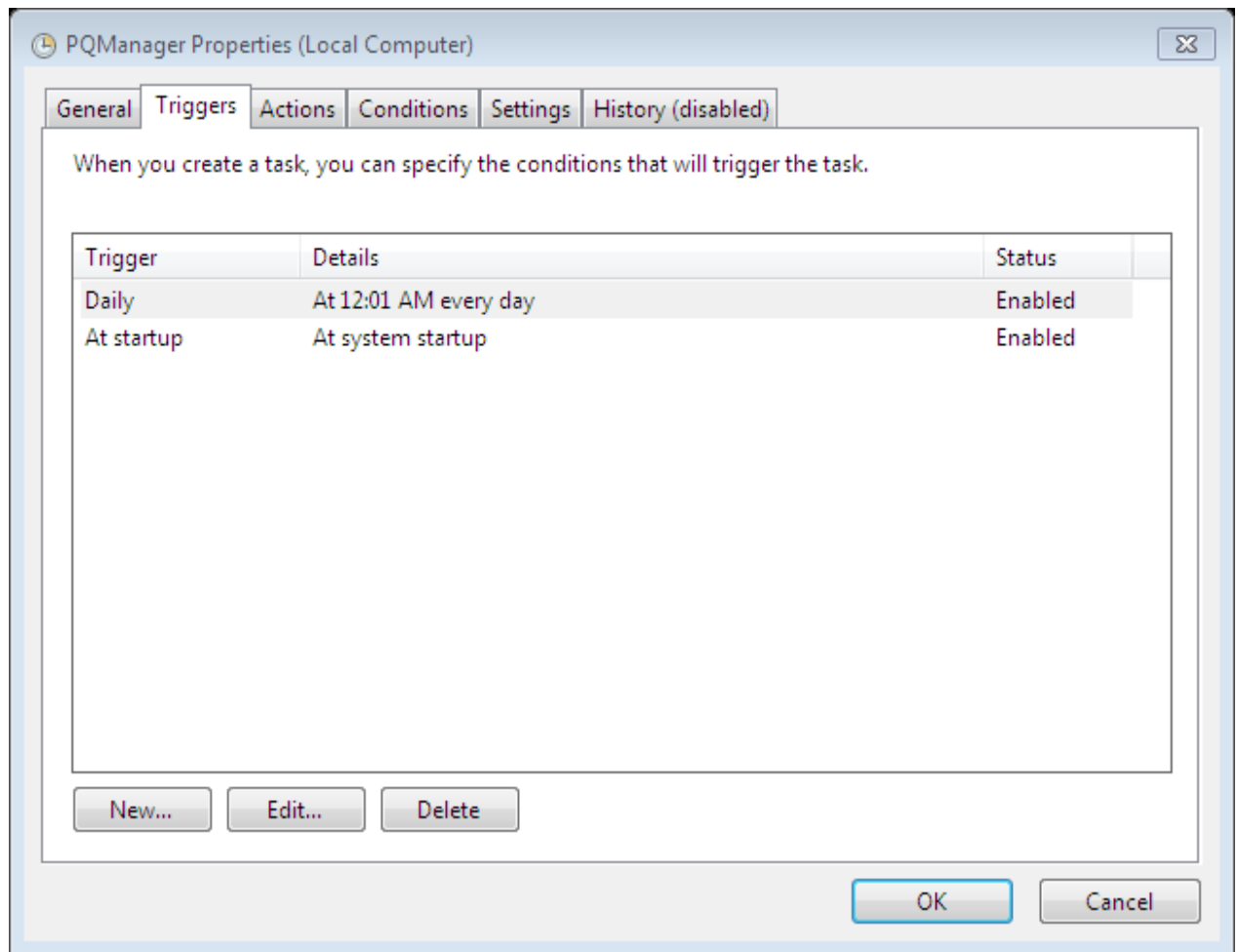


After finishing the assistant edit the properties of the respective task PQManager, PQSmartManager and PQManager as described below. Double click on the task name in the task scheduler to open the respective property window if it does not open automatically.

1. The Security section settings are located in the General tab. It is recommended to use a user account with local administrative privileges, e.g. the SYSTEM account. If the task was created by a user with administrative rights, this should be already archived.
Additionally the task should run whether user is logged on or not and executed with highest privileges (activate the corresponding checkbox).
Note for older version of WinPQ: The immediate screen display of the generated PDF files only makes sense if the option "Only execute when a user is logged in" is selected. Otherwise the PDF reader will be opened, but is not visible!



2. In the Triggers tab it is recommended to add an system startup trigger besides the daily trigger. Create a new trigger with the New... button.



3. The new system startup trigger should be configured with one minute delay as shown below.

New Trigger ✕

Begin the task: At startup ▼

Settings

No additional settings required.

Advanced settings

☒ Delay task for: 1 minute ▼

☐ Repeat task every: 1 hour ▼ for a duration of: 1 day ▼

☐ Stop all running tasks at end of repetition duration

☐ Stop task if it runs longer than: 3 days ▼

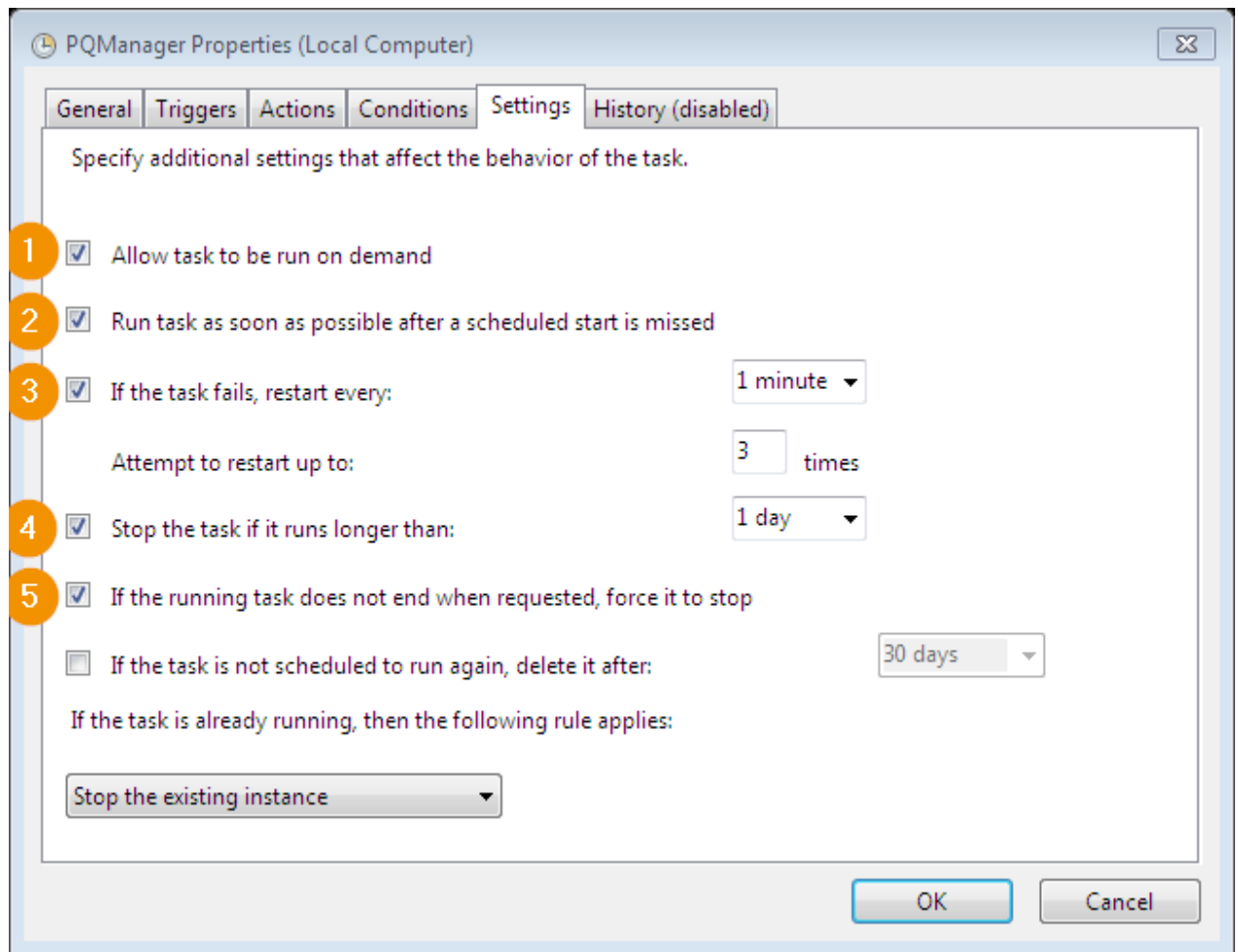
☐ Activate: 7/19/2017 ▼ 4:32:15 AM ▼ ☐ Synchronize across time zones

☐ Expire: 7/19/2018 ▼ 4:32:15 AM ▼ ☐ Synchronize across time zones

☒ Enabled

OK Cancel

4. Finally configure the settings tab with the following description.



Allow task to be run on demand **1** means it is possible to start the task directly from the task scheduler (with right mouse click). Activate this option **2** to allow the system retry a failed start of the task. If the first restart also fails this option **3** starts new attempts as shown above. The option **4** forcing a shut-down if the program has not shut-down on its own after 24 hours enables on to have the system synchronize itself even after a program crash. The option **5** that no new instance will be created, is already provided for the program properties of the previously discussed WinPQ programs.

Setup of the WinPQ processes

Boot behavior and run time of WinPQ background processes

It is necessary to adjust the boot behavior of background processes in certain application cases. To achieve that, the parameter *MaxRuntime* can be added to the file *WinPQ.ini* (in the folder *C:\Program Files (x86)\WinPQ\INI*) starting with WinPQ version 4.5.1. This parameter determines after how many minutes the running WinPQ processes are terminated. In case, this parameter is not specified, the default will be 1397 minutes (24 hours minus 3 minutes). The time frame can be chosen, without limitations, between 30 minutes and 31 days (min = 30 and max = 43400). After the expiration of the chosen time, the programs will terminate automatically. These settings are set during an update and the two parameters *Maxruntime* and *CLoseEndOfDay* of previous versions are no longer in use.

The behavior of the WinPQ processes is as follows:

- The WinPQ processes remember if they were started by a user or are running as background processes.
- If a user tries to start a process, this will be interdicted if said process is already running in the background.
- The process recognizes during the run time (if that process is already running) if it is supposed to be restarted in the background. In this case the process delays it's execution by 30 seconds, wherein it terminates the already running process after 15 seconds, if that one has not already done so itself, in order to restart after a further 15 seconds.

Following are three application cases to exemplify the different requirements:

Case 1: Standard setup

13:54:00:

The WinPQ update is loaded, the restart of the processes is at 00:01:00 as usual. The processes run 1357 minutes. After the update e.g. the PQSmartManager is restarted in the background automatically. This process would now run until the next day at 13:51:00.

00:01:00:

The planned restart of the process is executed but the PQSmartManager is still running. The newly started process recognizes that it is being started automatically but that an instance is still running and terminates itself.

00:01:15:

The current process instance is being terminated.

00:01:30:

The new process instance is being started. The next planned shutdown is now 23:58:30.

23:58:30:

The instance terminates automatically.

00:01:00:

The new process instance starts and is being executed nominally.

Case 2: Customization in order to prevent a restart of the processes at midnight, because the systems will be unsupervised during that time

The restart of the processes is supposed to happen at 12:00 (noon). In this scenario the WinPQ.ini does not have to be modified, because the 1357 minutes run time (24 hours minus 3 minutes) are appropriate in this case. In the task planner however the start up time of the processes has to be changed to 12:00 hours. From here on out the process run times will behave as in Example one, just with a 12 hour time shift.

Case 3: New Opportunities for the WinPQ

A user does not want to run the connection to the devices permanently, but e.g. just once during the morning and once in the evening and transfer the data of the connected devices once a day. For this the run time is set to 60 minutes in the WinPQ.ini in order to run the Processes for one hour each time. In the task planner the start time is adjusted to 6:00 in the morning and 18:00 in the afternoon. The processes will run under these conditions from 6:00 to 7:00 and from 18:00 to 19:00 o'clock.

Settings of the device connections

The hereinafter mentioned parameters should solely be edited through the system settings of the WinPQ under the tab "Expert settings" and not directly within the corresponding INI files

Restoration of device connections

An interruption of communication connections to a linked device, in a way they can occur e.g. during the use of wireless connections (UMTS etc.), will be reported with a special warning in the WinPQ. The parameter Freecon, which is adjustable through the tab "Device settings" under article 4 "Expert settings", determines how many times the software tries to reconnect after a loss of connection. The parameter Freecon is set to 0 under default settings, meaning it will try to reconnect continuously. A value of 10 would for example restrict the amount of retries to 10. Only after a restart of the process (after 24 hours, if not otherwise specified as shown above) another 10 tries to establish a connection to the device will be executed. In WinPQ versions before 4.5.1 the parameter had been set to 10, from 4.5.1 (in the case of a fresh installation) onward the standard setting is 0, since this is the usual behavior in cases of communication problems.

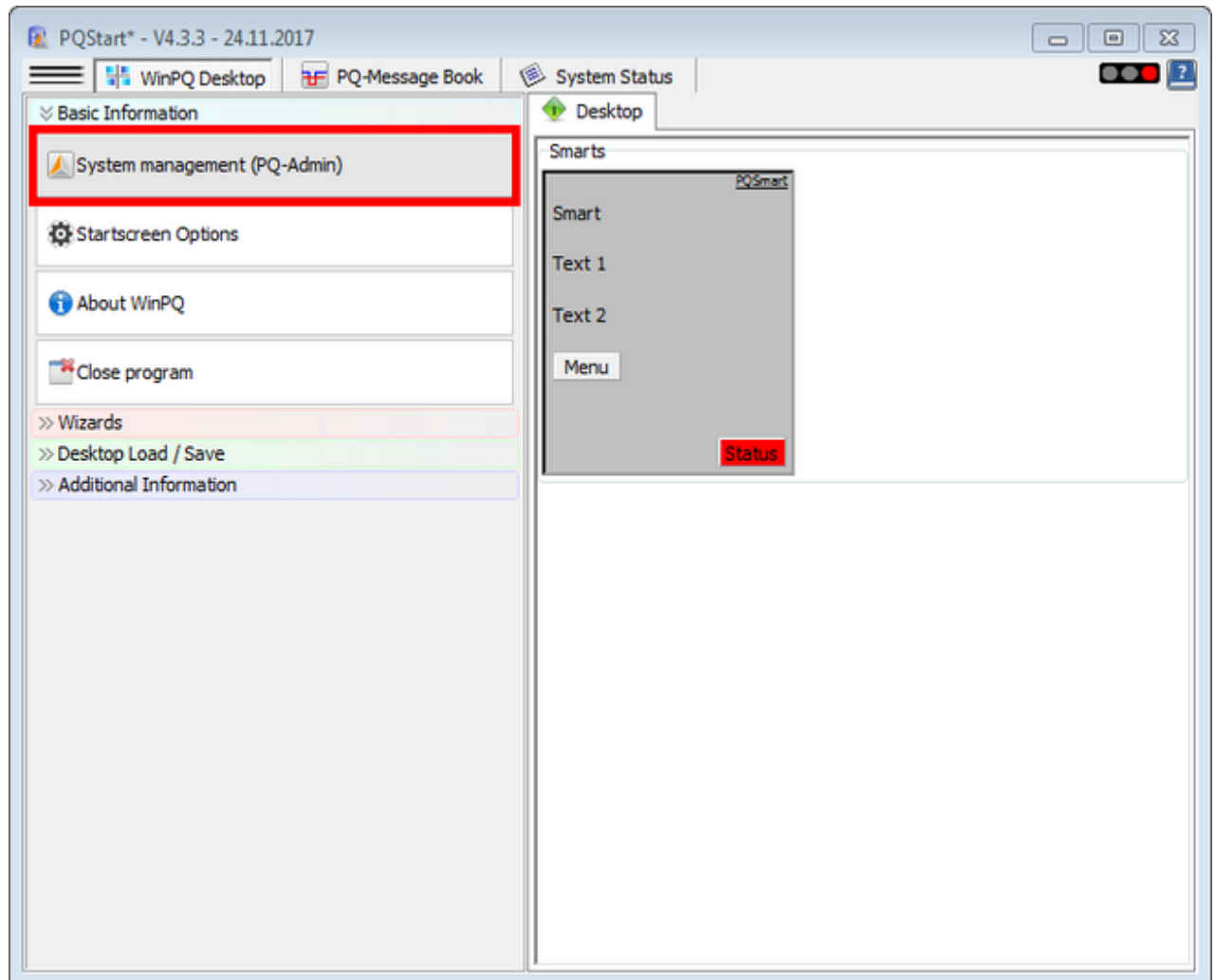
Time behavior of device connections

The two parameters ReReadDir and ReConnect control the time behavior of connections as follows:

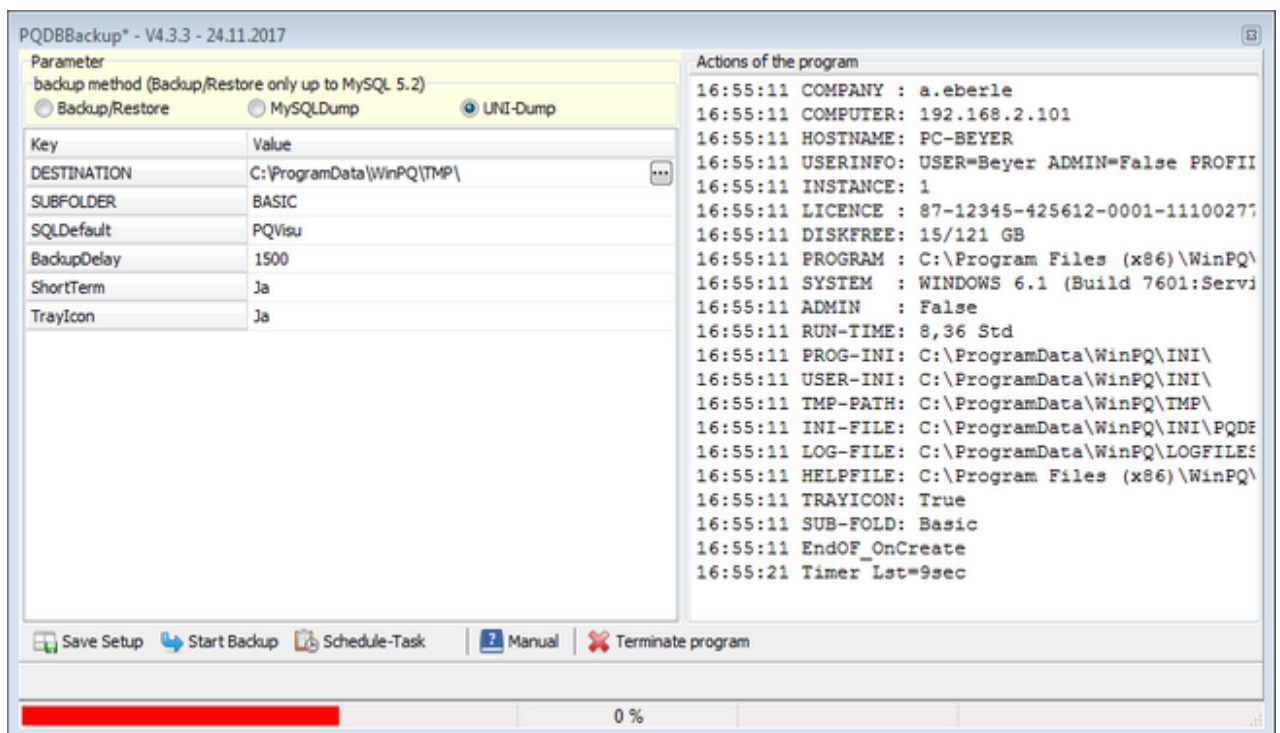
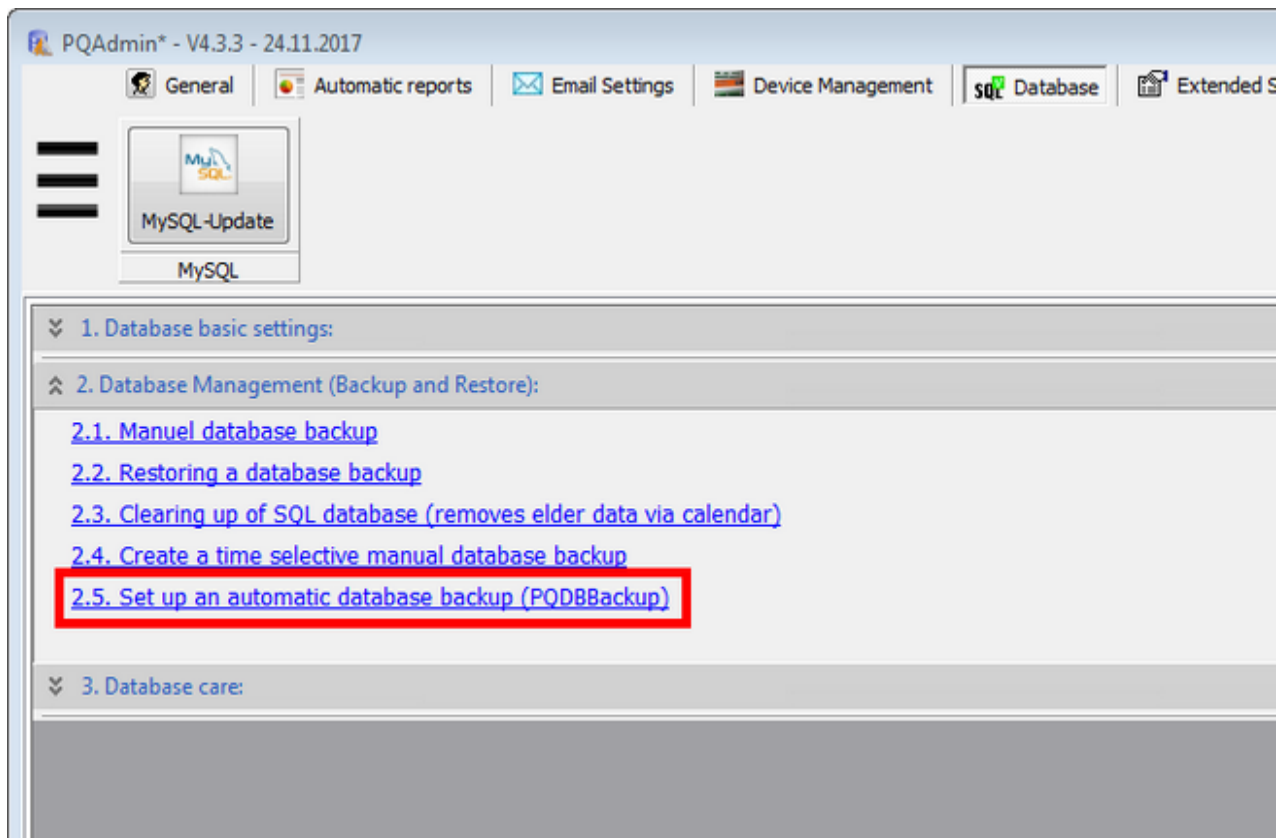
- ReReadDir
The time of the intervals in seconds in which the software will check the devices for new Data. The parameter is set to 600 by default; the minimum is 60 seconds
- ReConnect:
The time of the intervals in seconds in which the software tries to reestablish (repeatedly) the communication connection to the devices, in case it had been severed before.

Setup automatic database backup

Automatic backups of the WinPQ database files can be performed automatically with the software tool PQDBBackup. Start the System management from the WinPQ Desktop main menu.



Switch to the automatic database settings on the Database tab and select the PQDBBackup link.



The PQDBBackup software tool replaces the previous program "PQBackup". The first benefit of the new tool is that it is able to backup a table at any reachable location. In the first step the table files are saved to the local tmp-directory. In the second step those files are copied to the selected destination, e.g. a network folder. Another benefit is the possibility to plan the backup execution time, e.g. every day, week and so on, because the service is part of the windows task scheduler.

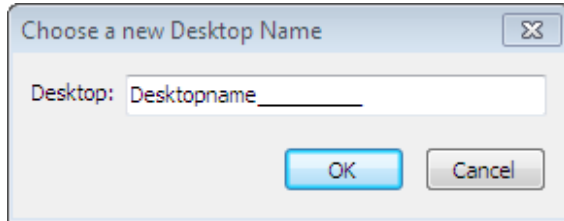
Description of the rows in the PQDBBackup window as shown above. The values for options MySQLCump and UNI-Dump are identical:

DESTINATION: database backup files are stored here
SUBFOLDER: force creating subfolders
SQLDefault: select the database connection to backup
BACKUPDELAY: time to wait between backup actions (default 1500 ms) to reduce the system load (higher means less load)
ShortTerm: if enabled all measurement values in second range (1-sec, 3-sec) Messwerte Sekundenbereich sichern oder nicht (größte Datenmenge)
TRAYICON: if enabled a status icon if the backup tool is displayed in the windows info area (next to the date and clock in the right bottom corner)

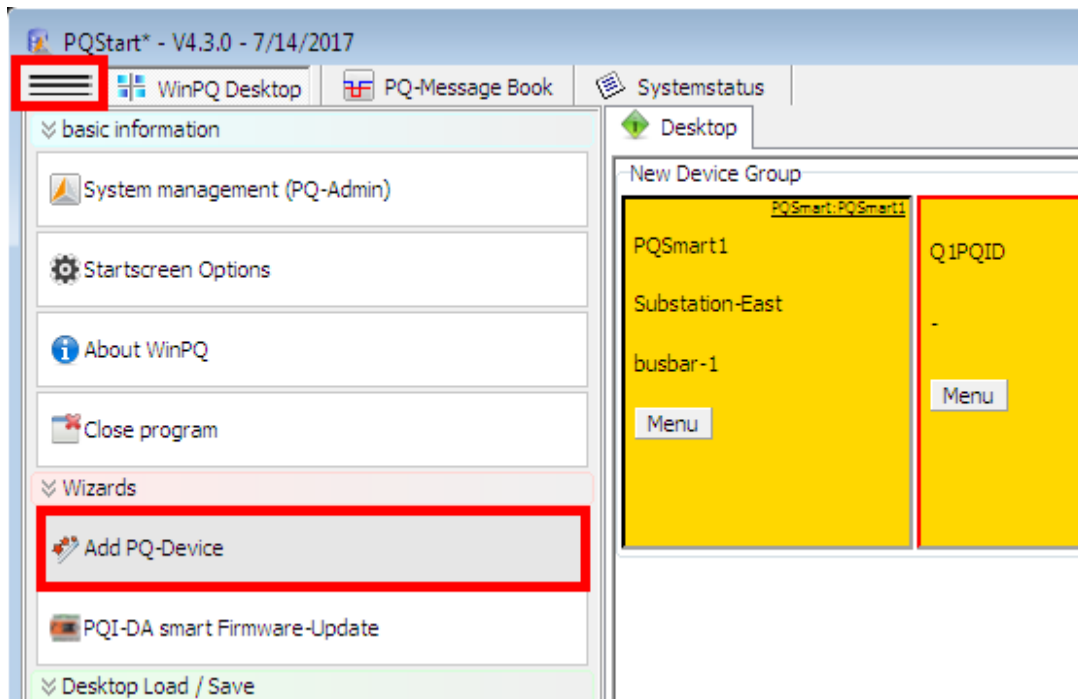
First start WinPQ and device setup

Setup WinPQ desktop

At the first start of the WinPQ software please set a name for the WinPQ Desktop (user interface), e.g. PQdevices.



The setup wizard for adding and setting up pq devices starts subsequently. We recommend using this wizard for PQ-device setups. The setup wizard for setting up PQ-devices can be found in the main menu of the WinPQ Desktop window.



Device setup

The following devices are supported by WinPQ and can be set up by the wizard (link to the WinPQ system database, respectively).

Power Quality:

- PQI-DA smart
- PQI-DE
- PQI-D(A)
- PQ-Box (PQ-Box 100 / 150 / 200)

Grid Dynamics Analysis:

- DMR-D
- DA-Box 2000

Low Voltage Regulation:

- LVRs devices

The following device selection lists all supported devices. Choose the device to set up and link to the WinPQ database.

Add PQ-Device

Device selection

Please choose the device, which you want to include into the WinPQ System.

PowerQuality:

- ☒ PQI-DA smart
- ☐ PQI-D(A)
- ☐ PQ-Box (PQ-Box 100 / 150 / 200)

Grid Dynamic Analysis:

- ☐ DMR-D
- ☐ DA-Box 2000

Low Voltage Regulation

- ☐ LVRsys

Back Next Ok Cancel

Setup of PQ devices

The setup of a [PQI-DA smart](#) device and PQI-D or PQI-DA (abbreviated as [PQI-D\(A\)](#)) is described in the following sections.

IT-Security upgrade / Moving a PQ-device

If a PQI-DA smart or PQI-DE device already created in WinPQ with firmware version 2.0 or higher is set up in safety mode, the connection in WinPQ must be adapted, see the following chapter Moving devices.

Setup PQI-DA smart

Device selection

The setup of a PQI-DA smart is hereinafter described.

Add PQ-Device

Device selection

Please choose the device, which you want to include into the WinPQ System.

PowerQuality:

- ☒ PQI-DA smart
- ☐ PQI-DE
- ☐ PQI-D(A)
- ☐ PQ-Box (PQ-Box 100 / 150 / 200)

Grid Dynamic Analysis:

- ☐ DMR-D
- ☐ DA-Box 2000

Low Voltage Regulation

- ☐ LVRsys

Back Next Ok Cancel

Database ID (ID)

Setting of a unique database identification (ID) for identification purposes of the device in the database – in this example “TRAFO 104”. This designation can not be altered thereafter. Please remark, that there are no special characters available.

Add PQ-Device

Devicename

Please enter a unique device name.
This device name is used as a unique database identifier. Please note that the device name can not be changed anymore.

Database ID:
PQSmart1

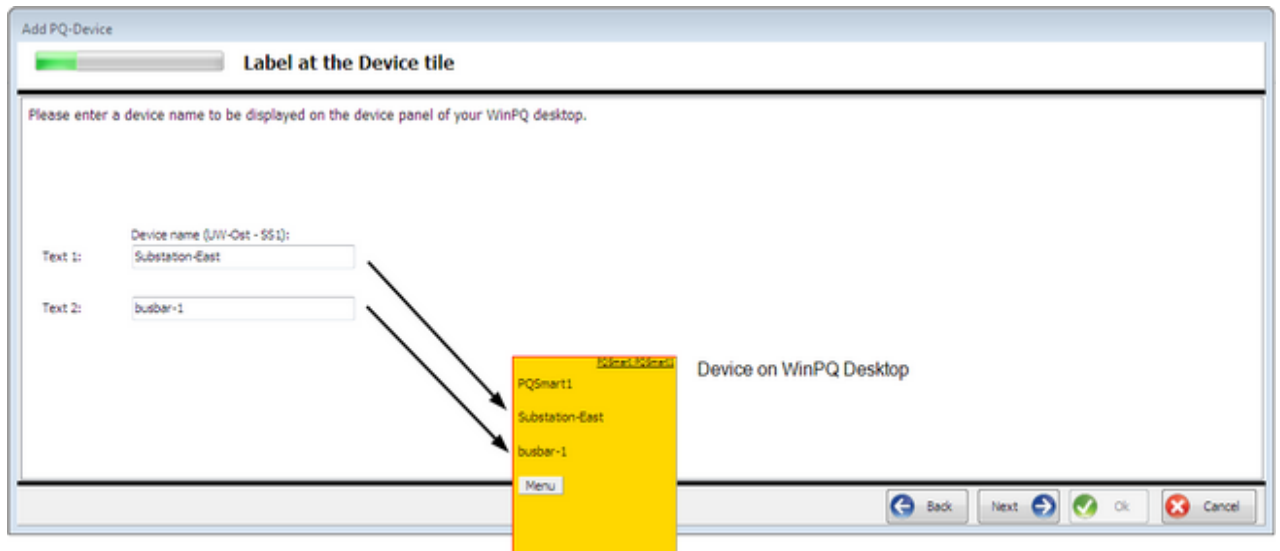
Device on WinPQ Desktop

- PQSmart1
- Substation-East
- busbar-1
- Menu

Back Next Ok Cancel

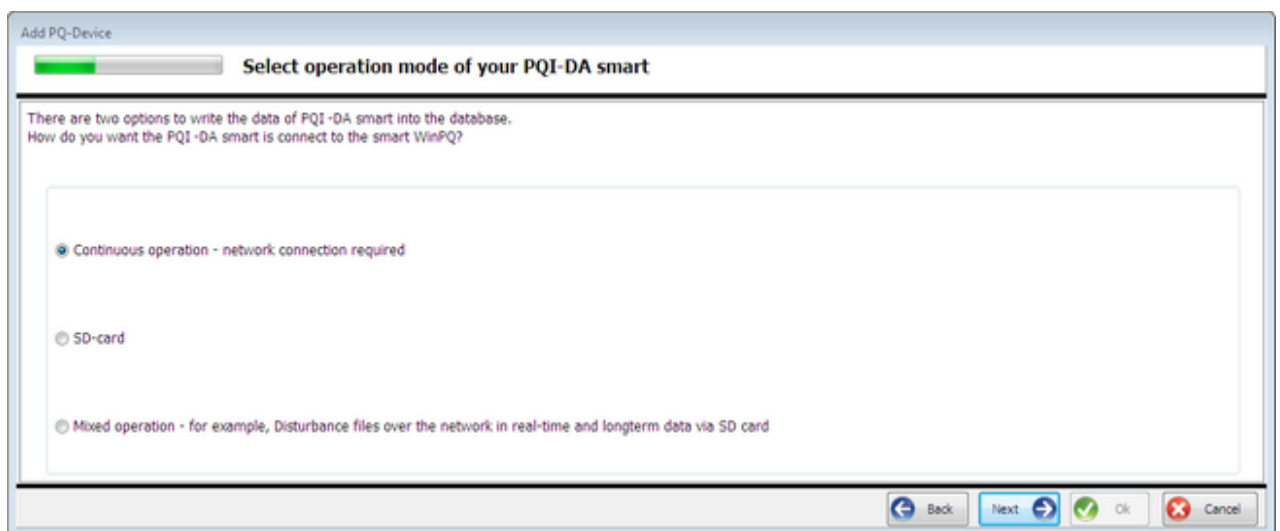
Device label

Setting of the device name in the WinPQ software interface – in this example UW Ost – SS1 – Trafo 104”. This designation can be altered at any time.



PQI-DA smart operating modes

- **Continuous operation**
The PQI-DA smart is permanently connected to the WinPQ system (database) with a TCP-IP connection.
- **SD-Card (manual)**
The measurement data are retrieved from the device using an SD-card and manually read into the database.
- **Mixed operation**
The PQI-DA smart is connected to the database via a TCP-IP connection, but only a part of the measurement data is permanently transferred.
Example: Only error messages and PQ events are transferred. The long term measurement data are picked up from time to time from the device using the SD card.



Installation of the device

The installation of devices in compatibility mode is unsafe, since neither the communication between the WinPQ software and PQ-device is encrypted, nor the device access protected. This mode is included for compatibility reasons with older systems. Systems with WinPQ versions of 5.0 and higher should be operated in the security mode.

During the further installation of the devices two cases are differentiated:

- Connection of a device that has been set up completely. In this case a device is integrated into the WinPQ

software that has already been set up completely, meaning the setup assistant has been run completely and the network communication to the WinPQ System has been set up. The PQ-devices can be operated either in compatibility mode or in security mode. The installation of both variants is described in the following sub chapters Compatibility mode and Security mode.

- Finishing the setup with IT- security: Finishing the setup of a new device with active IT-security functions. The setup of a device that is supposed to be operated with active security functions requires the setup of user accounts for access to the device. This is achieved through the software and explained in the following chapter Completion setup in security mode.

----- OLD -----

The screenshot shows a dialog box titled "Add PQ-Device". At the top, there is a progress bar with a green segment on the left. Below the title bar, a text box contains the following information: "In compatibility mode, data transmission can be performed without encryption. In security mode, certificates and other parameters must be assigned." Below this text, there is a section labeled "Mode:" containing two radio button options: "Compatibility mode: without IT security" (which is selected) and "Security mode: IT security option enabled". At the bottom of the dialog, there are four buttons: "Back" (with a left arrow), "Next" (with a right arrow), "Ok" (with a green checkmark), and "Cancel" (with a red X).

- Fertigstellung Inbetriebnahme mit IT-Sicherheit: Inbetriebnahme eines neuen Geräts mit aktiven IT-Sicherheitsfunktionen abschließen.
Die Einrichtung eines Geräts welches mit aktiven Sicherheitsfunktionen betrieben werden soll erfordert die Einrichtung von Benutzerkonten für den Gerätezugriff. Dies wird mit Hilfe der Software durchgeführt und im folgenden Kapitel Fertigstellung Inbetriebnahme im Sicherheitsmodus beschrieben.

Add PQ-Device

The data transfer between host and devices can be encrypted via SSH using firmware V2.x or higher.

Device connection:

☒ Connect a device that has already been set up.

☐ Finish commissioning with IT security:
Complete commissioning of a new device with activated IT security option.

Back Next Ok Cancel

PQI-DA smart communication setup

Enter the IP address and port number of the PQI-DA smart measurement device. The IP address and network port can be changed on the measurement device via display and keys. The standard network port of the PQI-QA smart is 5040 and should only be changed in exceptional cases. The connection can be tested with the button Test Connection (WinPQ searches the network for an existing device with the given IP address). If the connection is established, the circle next to the button switches to green otherwise red.

Add PQ-Device

Communication setup of the PQI-DA smart

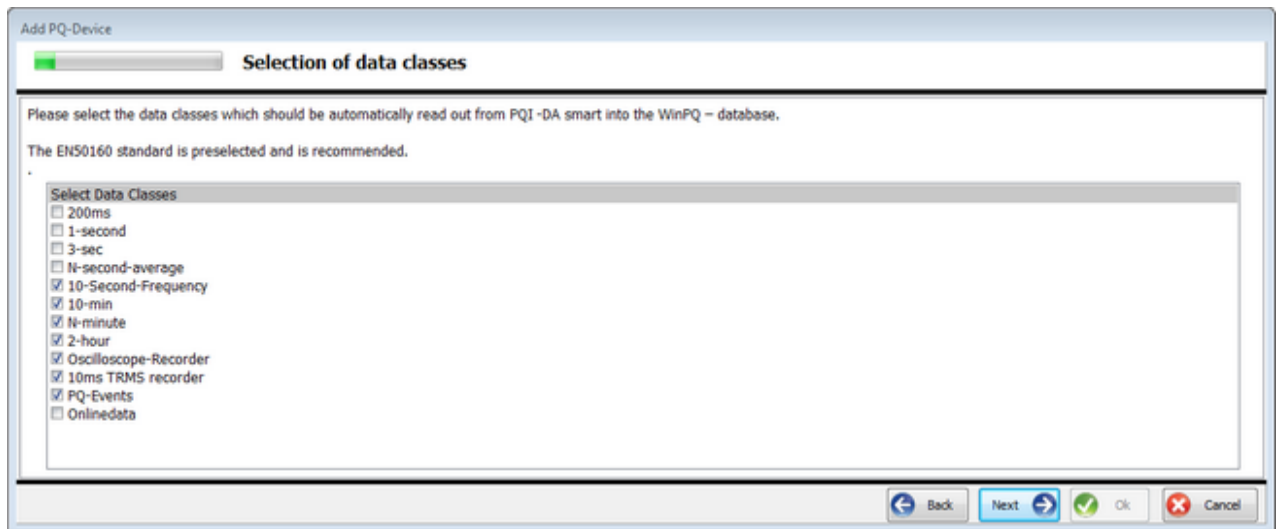
Please enter the network address of your PQI-DA smart.
Please note that the network port is required for communication must be accessible on your network.

IP-Adresse: 192.168.056.190 Network port: 5040 Test Connection

Back Next Ok Cancel

Selection of the data classes to be transferred to the WinPQ database

Next setup step is to select the data classes which should be automatically transferred from the device to the WinPQ database.



The PQI-DA smart records 8 different measurement intervals of permanent data, a fault recorder, power quality events and the online data. The standard configuration (parameter setting for EN 50160) includes the following active data classes:

- 10-Second-Frequency
- 10-min
- N-minute
- 2-hour
- 10ms TRMS recorder (1/2 period recorder)
- PQ-Events

Every data class which should be transferred to WinPQ has to be activated on the PQI-DA smart first (parameter setting of the PQ-device). If the PQI-DA smart device is completely parameterized, e.g. with the commissioning wizard on the device, the above listed default data classes are active (will be recorded by the device), thus can be transferred to the WinPQ database.

It is important to note that a parameter setting with additional active data classes (based on the default parameter settings) will increase the data volume in the device storage as well as the data traffic transferring to WinPQ. Especially the data classes with short measurement intervals (e.g. 200ms) produce an extremely high amount of data.

Device groups

In this step create a new WinPQ desktop for the device or choose an existing desktop, e.g. Desktopname. Then type in a desktop or group name to add a new group with the device on the WinPQ desktop or select an existing group to assign the device to this group.

Add PQ-Device

Grouping of Device Tiles

Please select the group where your new device should be added. You can also create a new group. Please enter a free name. The new group will be created at the selected "Page":

Geräte auf Karte anlegen:

☐ Neue Karte

☒ Desktopname

Group selection:

☐ New Group

☒ Neue Gerätegruppe

Group Name:

Back Next Ok Cancel

Summary of device setup

The summary of the device setup details can be printed or saved as a text file for documentation.

Add PQ-Device

Summary

Following device will be created in the database:

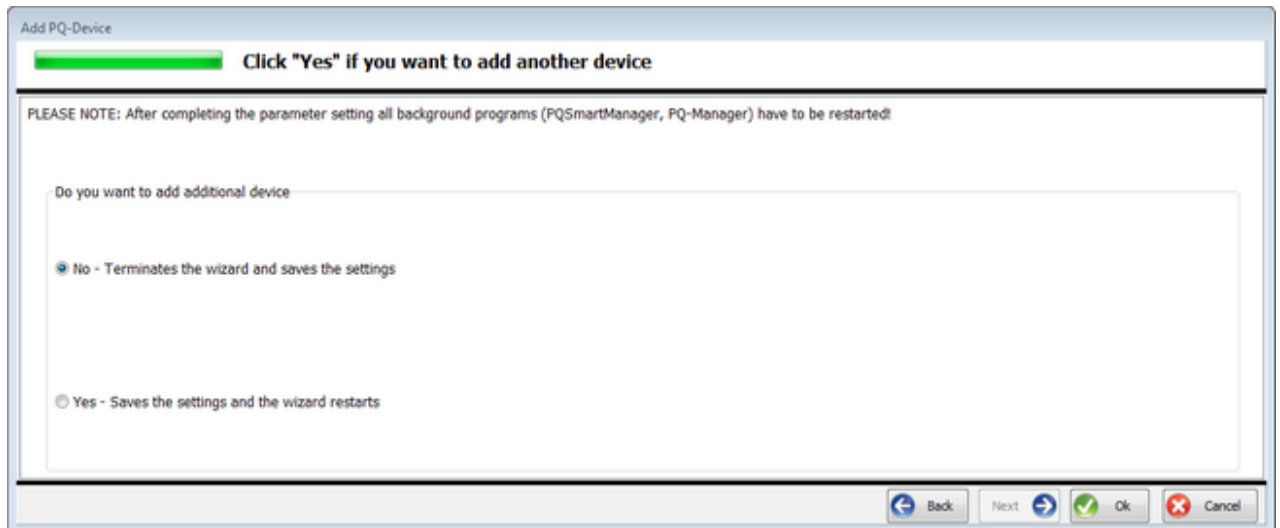
```

PQSmart:Device IDPQIDASmart
Online=Yes
IP/Port=192.168.056.190:5040
Data-Classes:
- 10-Second-Frequency
- 10-min
- N-minute
- 2-hour
- Oscilloscope-Recorder
- 10ms IRMS recorder
- PQ-Events
  
```

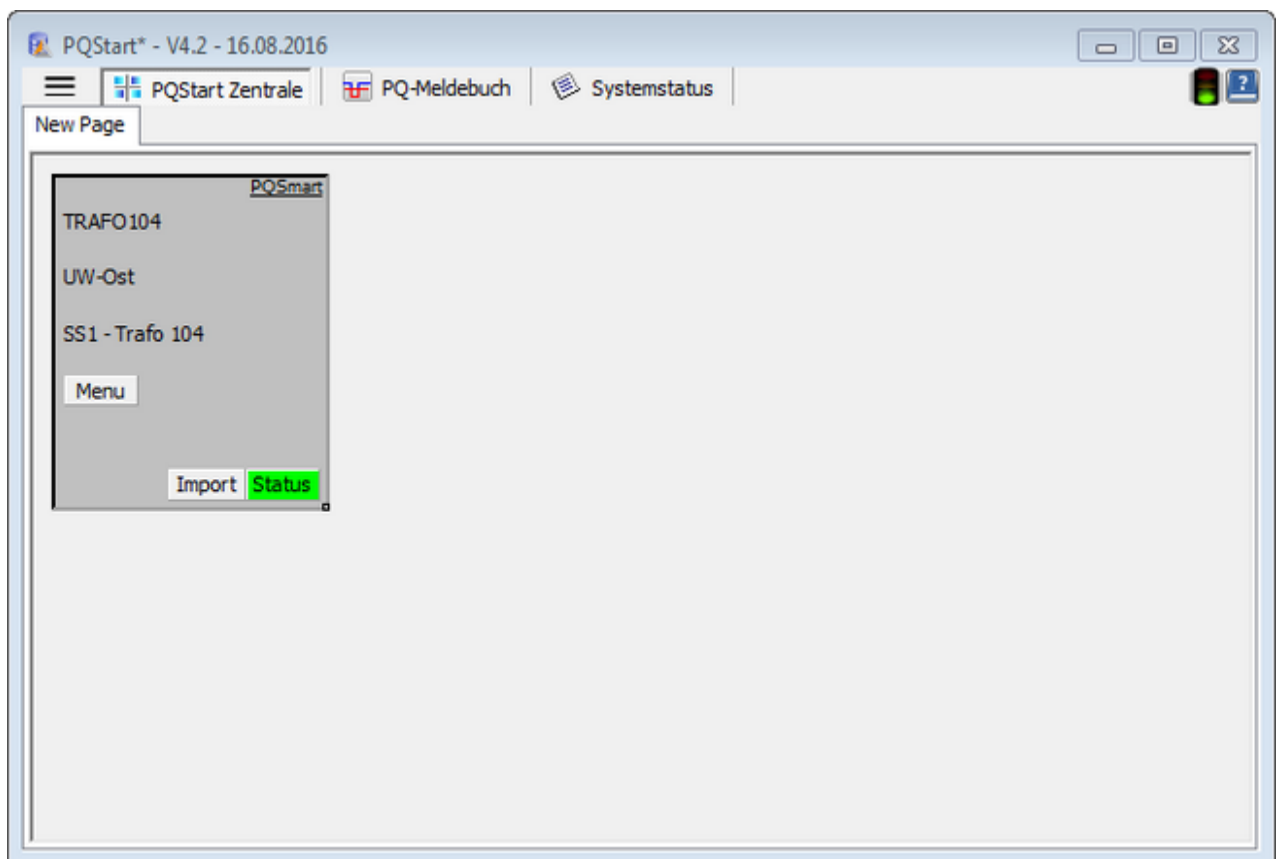
Print Back Next Ok Cancel

Setup another device

The last step saves all settings made and restarts the wizard to setup another device if desired.



After finishing the wizard the new device appears on the WinPQ desktop.



Finishing the setup in security mode

The following describes the finalization of the setup of a device in security mode. The setup can be done either using a so called ident file (Option 1) or manually (Option 2).

With the help of the serial number, the required accounts, administrator, operator and user, will be set up initially for safe operation

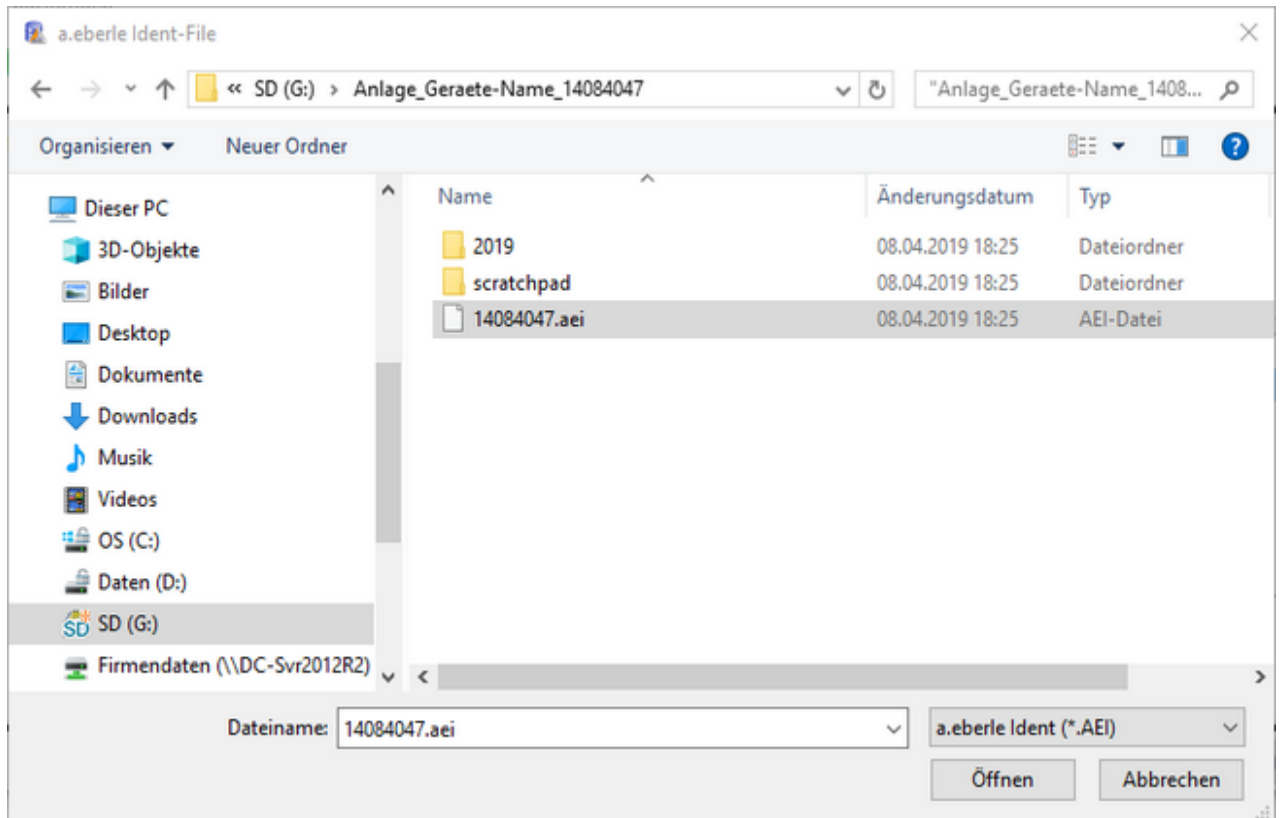
Option 1: Setup with an ident file

The ident file is generated directly at the device during initial reboot after completing the commissioning wizard at the device. This way, the required information for the finalization of the device in the software, don't have to be entered manually. To achieve this, insert a SD-Card into the slot at the front of the device before finishing the commissioning wizard. On the SD-Card there will be a newly created folder, in the likes of `anlage_geraete-name_seriennummer` with the device data. Herein you will find the ident file (file type .AEI) which contains the type of the device, the IP-address and communication port as well as the ECDSA fingerprint. Example:

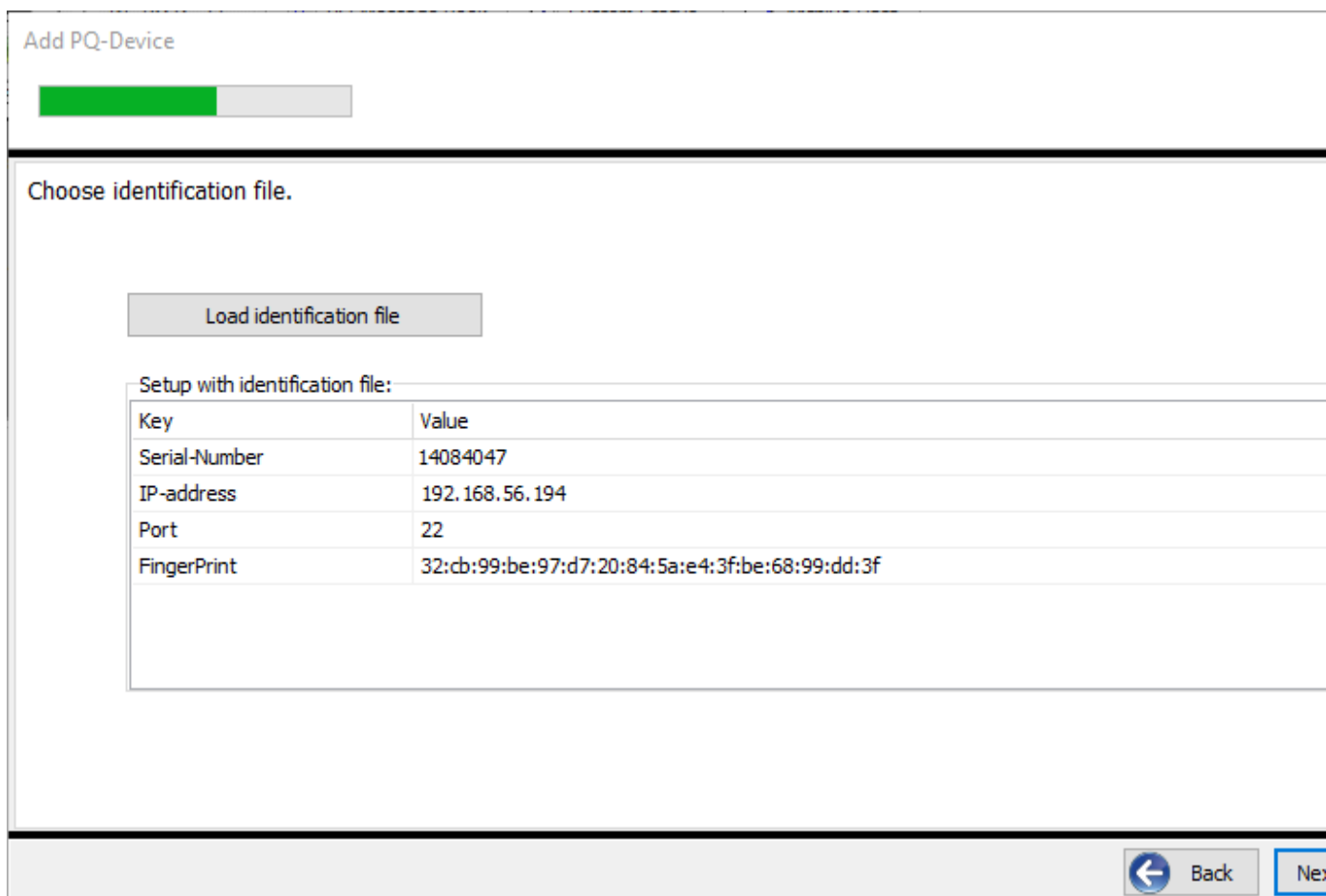
Device type: PQI-DA smart

IP address: 192.168.56.192:22

ECDSA fingerprint: md5 69:5d:48:86:bc:94:f0:9a:e2:29:5c:ce:fd:dd:fc:3a



The contents of the ident file are displayed again to verify the identity of the device.



When confirming with next, the connection to the device will be established. Please continue in the subsection

“Finalizing the setup” (Skip the next subsection).

Option 2: Manual setup without ident file

If manual setup is chosen, the next step is to enter the connection data of the device. Enter the IP-address of the device here (currently only IPv4 is supported). If not manually changed, the communication port is 22. The connection can be tested immediately. If a green light is shown, the connection has been successfully established. Finally the serial number of the device has to be entered, in order to finalize the initial setup in security mode. This is required in order to set up the required user accounts. The serial number can be found either on the installation screen, directly on the device (sticker on the side or the back of the device) or be found on the certificate of the device.

Add PQ-Device

Communication setup of the PQ device

Enter the network address of your PQ device.
Note that the required network port must be accessible in your network.

Choose Internet-Protocol:
☒ IPv4 ☐ IPv6

IP-address: 192.168.56.95 Network port: 22 Test Connection ●

Serial number:
[]

Back Next Ok Cancel

Operating modes of security mode

The following settings for operation in safety mode are possible:

Mode	Description
1	RADIUS inactive
2	RADIUS only
3	RADIUS with fallback
4	RADIUS and default

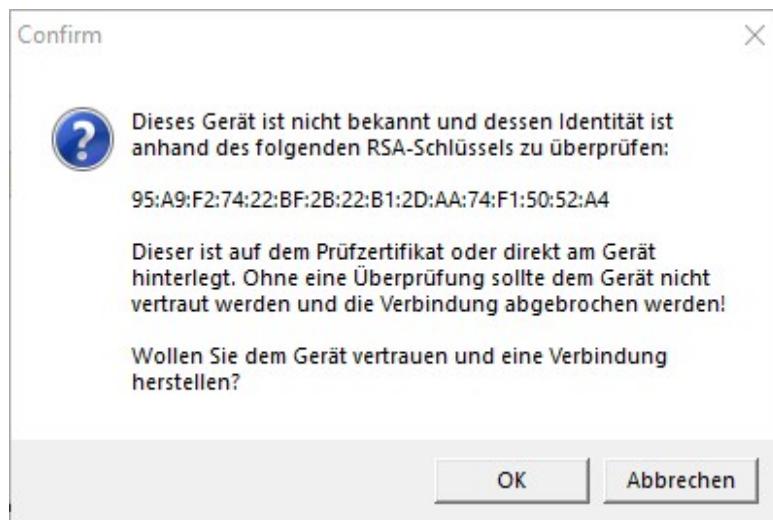
Mode 1 is the factory setting and means that no RADIUS server is used for logging on to the device. The commissioning can be continued as follows. In mode 2 and 3 the RADIUS protocol is used, please continue the setup as described in chapter "Security mode RADIUS". In mode 2, the device can only log on to the RADIUS server. If this is not available (communication interruption or similar), logon is also not possible. In mode 3, an emergency user is set up with which a local logon to the device is possible if the RADIUS servers are not available. Mode 4 supports a local login (as described below) as well as a RADIUS login. The device always tries to log on to the RADIUS server first. If the RADIUS server is not available, it is also possible to log on locally. The setup of a RADIUS server as described in chapter "RADIUS security mode" is necessary for modes 2, 3 and 4 (see also IT security documentation).

Finalizing the setup

The identity of the device has to be confirmed once either manually or through the ident file. The fingerprint of the ECDSA device key will be displayed directly on the device screen, is printed onto the certificate as well as saved in the ident file. If all the fingerprints of the keys match, the initial setup can be continued with OK.

The ECDSA fingerprint displayed in the software has to match the device's. Only then, the identity of the device is confirmed! After confirmation of the identity, the ECDAS key's fingerprints are saved in the file

C:\ProgramData\WinPQ\INI\Hash following the format IP-address:Port=ECSA-Fingerprint. After the first established connection the devices saved there will be trusted.



Initiale Einrichtung der Benutzerkonten

In order for the system to meet the IT security requirements (including those of the BDEW White Paper), four user accounts must initially be set up as follows.
werden.

- **Administrator**
User who installs, maintains, and attends to the system. The administrator therefore has, among other things, the authorization to change the security and system configuration.
- **Operator**
User who operates the system within the scope of its intended use. This also includes the right to change operation-relevant settings.
- **User**
User who is allowed to retrieve the status of the system and read defined operating data, but is not authorized to make changes.
- **WinPQ M2M User**
For autonomous communication between the WinPQ software and the devices (e.g. continuous readout of measurement data), a so-called machine-to-machine (M2M) must be created.

In the user administration of the devices it is also possible to set up further user accounts with individual role assignment. For normal operation, the above user set is necessary and sufficient.

In the user administration of the devices it is also possible to set up further user accounts with individual role assignment. An exception is the WinPQ M2M user, because he must be able to log in autonomously to the device in order to be able to carry out continuous data transmission. When this M2M user is created, a key pair consisting of a public and a private key is generated with which the software can log on to the device. The key pairs are created in the directory C:\ProgramData\WinPQ\Ini\Keys named after IP address and port where the private key is encrypted using the Windows Data Protection API. So only users who have access to the Windows system on which WinPQ is installed can use the keys. Further information regarding user administration is described in the manual of the respective device and details regarding encryption etc. can be found in the security documentation.

Wizard

Administrator name Administrator password Confirm password

Operator name Operator password Confirm password

User name User password Confirm password

☒ Generate M2M user for WinPQ

WinPQ M2M User password Confirm password

Password requirements:
 Min. password length: 10
 Min. capital letters: 1
 Min. lower case letters: 1
 Min. Numbers: 1
 Min. other characters: 1

Next OK Cancel

The assigned usernames and passwords must not be lost! It is not possible to restore them without completely resetting the device to the factory settings. All data on the device will be removed and the device has to be completely reset afterwards! After 5 incorrect entries or attempts to change the password of a user, this user account will be locked and can only be unlocked by an administrator via the user administration. Caution, this also applies to administrators! The password requirements (see figure above) and access rules, such as the maximum number of logon attempts, can be individually adapted in the parameterization of the devices in expert mode under user administration. These parameters must be clarified with the system administrator, e.g. to meet the password policy of your company.

Information

User created successfully.:
 192.168.56.194 22 - Anlage Messfeld-Name Geraete-Name

OK

At the end a successful setup of the user accounts is confirmed with the above message and the setup of the security mode of the device in the WinPQ is completed.

Selection of the data classes to be transferred to the WinPQ database

Next setup step is to select the data classes which should be automatically transferred from the device to the WinPQ database.

Add PQ-Device

Selection of data classes

Please select the data classes to be automatically read by the PQ device into the 'WinPQ' database.
The EN50160 standard is pre-selected and recommended.

Select Data Classes

- ☐ 200ms
- ☐ 1s TRMS
- ☐ 3s TRMS
- ☐ n-second mean value
- ☒ 10-Second-Frequency
- ☒ 10-min
- ☒ n-minute mean value
- ☒ 2-hour
- ☒ Oscilloscope-Recorder
- ☒ 10ms TRMS recorder
- ☐ 10min Harmonic recorder
- ☒ EN 50160-Events
- ☐ Online Data

Back Next Ok Cancel



The PQI-DA smart records 8 different measurement intervals of permanent data, a fault recorder, power quality events and the online data. The standard configuration (parameter setting for EN 50160) includes the following active data classes:

- 10-Second-Frequency
- 10-min
- N-minute
- 2-hour
- 10ms TRMS recorder (1/2 period recorder)
- PQ-Events

Every data class which should be transferred to WinPQ has to be activated on the PQI-DA smart first (parameter setting of the PQ-device). If the PQI-DA smart device is completely parameterized, e.g. with the commissioning wizard on the device, the above listed default data classes are active (will be recorded by the device), thus can be transferred to the WinPQ database.

It is important to note that a parameter setting with additional active data classes (based on the default parameter settings) will increase the data volume in the device storage as well as the data traffic transferring to WinPQ. Especially the data classes with short measurement intervals (e.g. 200ms) produce an extremely high amount of data.

Device groups on the WinPQ Desktop

In this step create a new WinPQ desktop for the device or choose an existing desktop, e.g. Desktopname. Then type in a desktop or group name to add a new group with the device on the WinPQ desktop or select an existing group to assign the device to this group.

Add PQ-Device

Grouping of Device Tiles

Please select the group or tab in which the new device is to be added. You can also create a new group or tab. A new group is created under the selected tab.

Choose Tab

☐ New tab

☒ Desktop

Group selection:

☒ New Group

☐ Smarts

Group Name:

Back Next Ok Cancel

Summary of device setup

The summary of the device setup details can be printed or saved as a text file for documentation.

Add PQ-Device

Summary

Following device will be created in the database:

```

Serial number=
ONLINE=Yes
IP/Port=192.168.56.194;5040
Mode=ipv4

Data-Classes:
- 10-Second-Frequency
- 10-min
- n-minute mean value
- 2-hour
- Oscilloscope-Recorder
- 10ms TRMS recorder
- EN 50160-Events
  
```

Print Back Next Ok Cancel

Setup another device

The last step saves all settings made and restarts the wizard to setup another device if desired.

Add PQ-Device

Click "Yes" if you want to add another device

The newly added devices will be read out automatically with the background process.

Do you want to add additional device

☒ No - Exit wizard and save settings.

☐ Yes - Save settings and restarts the wizard.

Back

Next

Ok

Cancel

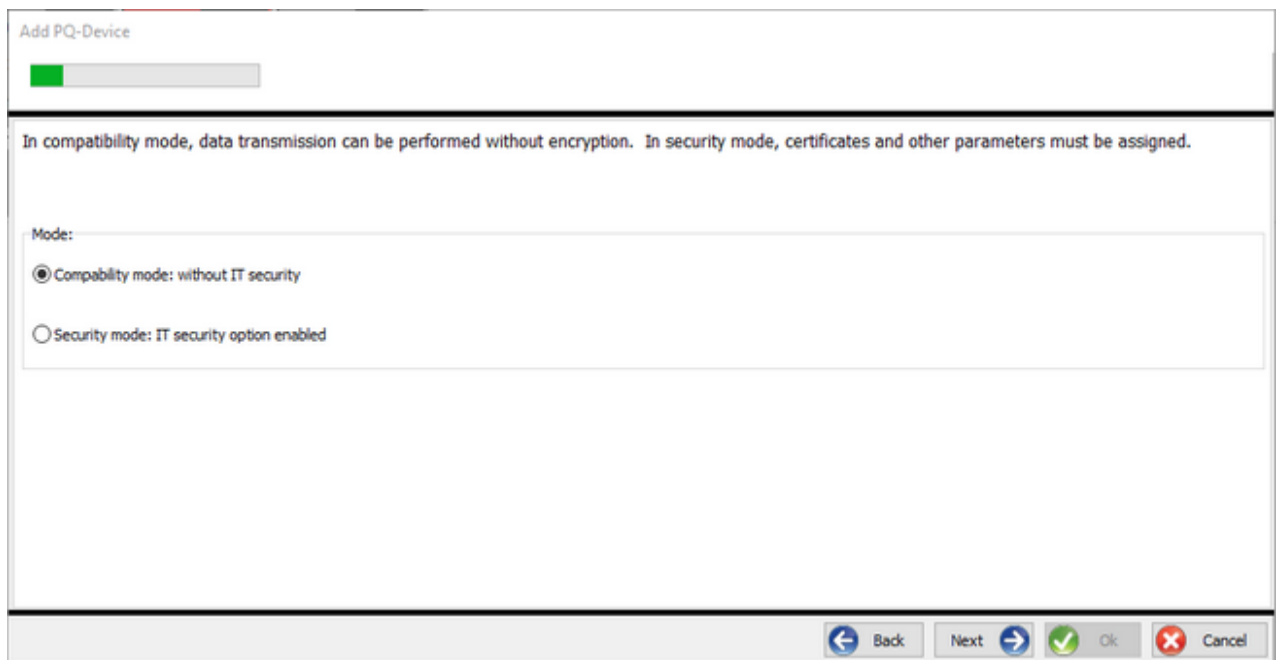
After finishing the wizard the new device appears on the WinPQ desktop and the setup of the device is finished.

Compatibility Mode

Setup of devices in compatibility mode

The connection of PQ-devices which either use firmware version 1.X (no security mode available) or devices with firmware version 2.X or higher which were set up using compatibility mode (via the setup wizard on the device) is described in the following chapter.

The setup of devices in compatibility mode is unsafe, since neither the communication between WinPQ Software and the PQ-device is encrypted, nor the access to the device restricted. This mode is available for compatibility reasons with older systems and systems with WinPQ Version 5 or later should be run in security mode.




PQI-DA smart communication setup



Enter the IP address and port number of the PQI-DA smart measurement device. The IP address and network port can be changed on the measurement device via display and keys. The standard network port of the PQI-QA smart is 5040 and should only be changed in exceptional cases. The connection can be tested with the button Test Connection (WinPQ searches the network for an existing device with the given IP address). If the connection is established, the circle next to the button switches to green otherwise red.

Add PQ-Device

Communication setup of the PQ device

Enter the network address of your PQ device.
Note that the required network port must be accessible in your network.

IP-address: 192.168.56.194 Network port: 5040 **Test Connection** 

Back Next  Ok  Cancel

Selection of the data classes to be transferred to the WinPQ database

Next setup step is to select the data classes which should be automatically transferred from the device to the WinPQ database.



Add PQ-Device

Selection of data classes

Please select the data classes to be automatically read by the PQ device into the 'WinPQ' database.
The EN50160 standard is pre-selected and recommended.

Select Data Classes

- ☐ 200ms
- ☐ 1s TRMS
- ☐ 3s TRMS
- ☐ n-second mean value
- ☒ 10-Second-Frequency
- ☒ 10-min
- ☒ n-minute mean value
- ☒ 2-hour
- ☒ Oscilloscope-Recorder
- ☒ 10ms TRMS recorder
- ☐ 10min Harmonic recorder
- ☒ EN 50160-Events
- ☐ Online Data

Back Next  Ok  Cancel



The PQI-DA smart records 8 different measurement intervals of permanent data, a fault recorder, power quality events and the online data. The standard configuration (parameter setting for EN 50160) includes the following active data classes:

- 10-Second-Frequency
- 10-min
- N-minute
- 2-hour
- 10ms TRMS recorder (1/2 period recorder)

Every data class which should be transferred to WinPQ has to be activated on the PQI-DA smart first (parameter setting of the PQ-device). If the PQI-DA smart device is completely parameterized, e.g. with the commissioning wizard on the device, the above listed default data classes are active (will be recorded by the device), thus can be transferred to the WinPQ database.

It is important to note that a parameter setting with additional active data classes (based on the default parameter settings) will increase the data volume in the device storage as well as the data traffic transferring to WinPQ. Especially the data classes with short measurement intervals (e.g. 200ms) produce an extremely high amount of data.

Device groups on the WinPQ Desktop

In this step create a new WinPQ desktop for the device or choose an existing desktop, e.g. Desktopname. Then type in a desktop or group name to add a new group with the device on the WinPQ desktop or select an existing group to assign the device to this group.

Summary of device setup

The summary of the device setup details can be printed or saved as a text file for documentation.

Add PQ-Device

Summary

Following device will be created in the database:

```
Serial number=
ONLINE=Yes
IP/Port=192.168.56.194;5040
Mode=ipv4

Data-Classes:
- 10-Second-Frequency
- 10-min
- n-minute mean value
- 2-hour
- Oscilloscope-Recorder
- 10ms TRMS recorder
- EN 50160-Events
```

Print Back Next Ok Cancel

Setup another device

The last step saves all settings made and restarts the wizard to setup another device if desired.

Add PQ-Device

Click "Yes" if you want to add another device

The newly added devices will be read out automatically with the background process.

Do you want to add additional device

☒ No - Exit wizard and save settings.

☐ Yes - Save settings and restarts the wizard.

Back Next Ok Cancel

After finishing the wizard the new device appears on the WinPQ desktop and the setup of the device is finished.

Security Mode

Setup of devices in security mode

A device in security mode that has already been setup completely, for example via the WinPQ lite software (Setup of user accounts completed, see chapter “Finalizing the setup in security mode), will be set up for the connection to WinPQ with the following steps.

Communication settings

First, the setup requires the connection data. Enter the IP-address chosen on the device (currently only IPv4 is supported). If not changed, the communication port is 22. The connection can be tested immediately. If a green light is shown, the connection has been established successfully.

PQ-Gerät hinzufügen

Kommunikationseinstellung des PQ Geräts

Geben Sie die Netzwerkadresse Ihres PQ Geräts ein.
Beachten Sie, dass der Netzwerkport der zur Kommunikation benötigt wird, in Ihrem Netzwerk erreichbar sein muss.

Auswahl Internet-Protokoll:
☒ IPv4 ☐ IPv6

IP-Adresse: 192.168.56.95
Netzwerkport: 22

Verbindung testen

Zurück Weiter OK Abbruch

Setup of the autonomous communication (WinPQ M2M user)

After establishing the connection to the device, a special user account for the communication with the software has to be set up on the device. This so called WinPQ M2M is required for the autonomous (without the login of a user) communication between the WinPQ software and the devices for continuous readout of measuring data. This M2M (Machine-to-Machine) user authenticates on the device with the help of a key that is being created in the following steps.

Authentication on the device happens via user name and password for all user accounts. The M2M account constitutes the exception, because he must be able to log into the device autonomously in order to execute the continuous data transmission. During the setup process, a pair of keys, consisting of a private and a public key, is generated, with which the software is enabled to log into the device. The key pairs are saved in the folder `C:\ProgramData\WinPQ\Ini\Keys`, named according to IP-address and port number and the private key is encrypted using the Windows Data Protection API. This way, access to the use of these keys is restricted to users that have access to the Windows system on which the WinPQ software has been installed. Further information concerning the user account management are described in the manuals of the specific device and details concerning the encryption can be obtained from the security documentation

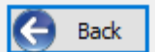
During the first integration of a device into the WinPQ system, no keys are yet generated. If the device has been previously connected, the software will automatically recognize the existing keys and will display this in the following window. If this is not the case, the M2M user has to be set up. Please use the button Setup WinPQ M2M Use to do so.

Add PQ-Device



Key files already exist for this device.
You can continue without further action!

Setup WinPQ M2M user



First, a user with administrator privileges has to sign into the device.

Login

Username

Password

☐ Save password

Cancel OK

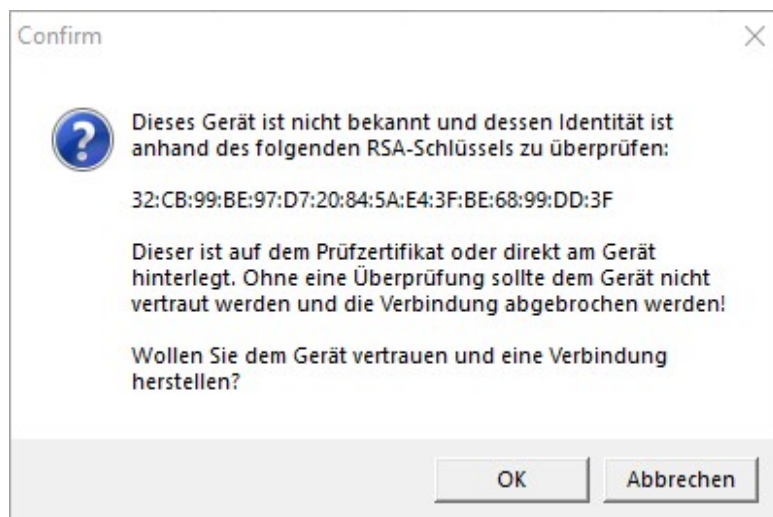
If the check box *Save password* is checked, the software will save the login information of this device connection in the Windows Credential Manager. They will be saved in the Credential Manager in the form of *WPQ-IP-adress-port* together with the user name and password combination. They can be removed from the Credential Manager at any later time.

WPQ-192.168.56.192-22

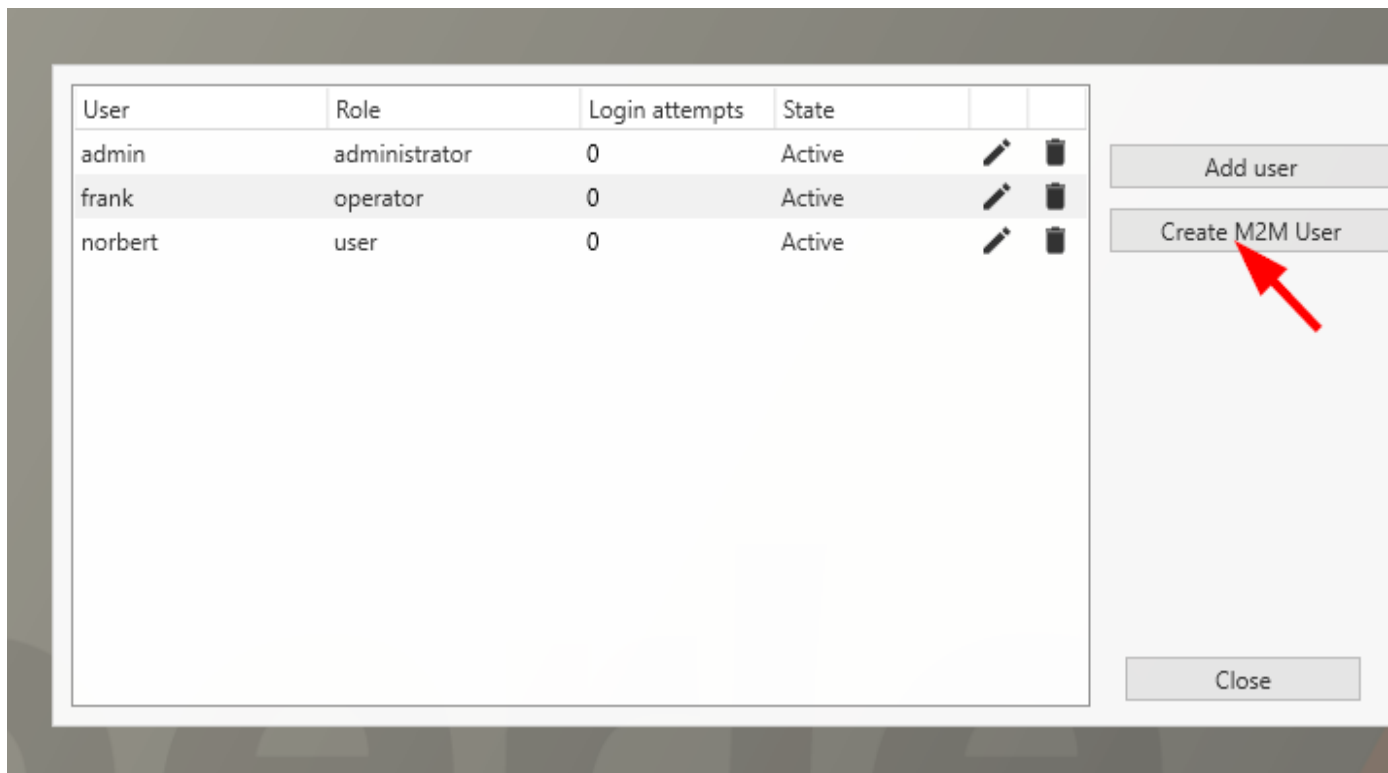
Geändert: Heute

Internet- oder Netzwerkadresse: WPQ-192.168.56.192-22
Benutzername: admin
Kennwort:
Dauerhaftigkeit: Lokaler Computer
[Bearbeiten](#) [Entfernen](#)

After successful login of an administrator, the identity of the device that is to be integrated, has to be confirmed once. The fingerprint of the device's ECDSA key is displayed directly on the device's screen, printed onto the test certificate and saved in the ident file for confirmation. If the displayed fingerprints of the keys are identical, OK will continue the setup of the user accounts.



The ECDSA fingerprint displayed by the software has to be identical to the one of the device. Only then, the identity of the device can be confirmed. After the confirmation of the identity, the fingerprints of the ECDSA keys are saved to the folder C:\Programdata\WinPQ\Ini\hash and named after the format IP-address:Port=ECDSA-Fingerprint. After the first connection has been established, the devices saved there are trusted



Checking user accounts

In order for the device to conform to IT-Security requirements (et al the ones specified in the BDEW whitepaper), the following four user accounts have to be set up.

- **Administrator**
User that sets up, maintains and is responsible for the system. For this reason, the administrator has, among others, the rights to change the security and system configuration.
- **Operator**
User that operates the system within the intended purpose. This also includes the rights to change settings that are relevant to the operation of the system.
- **User**
User that can read out the status of the system and has access to predefined data, but is does not have the rights to apply changes.
- **WinPQ M2M user**
For the autonomous (without direct login of a user) communication between the WinPQ software and the devices, for example in order to continuously read out measuring data, a so called Machine-to-Machine (M2M) user has to be set up.

In this step of the process it should be checked if those users have been set up. For normal operation the set of default users is necessary and sufficient (see figure above). It is also possible to set up additional user accounts, with individual sets of rights, in the user manager. As shown in the figure above, continue with the option "Add M2M user". In order to continue, a password for the M2M user has to be set (the user name cannot be changed), which enables the creation of the individual keys for the WinPQ software's autonomous access.

Username:

Comment:

Role:

Suspended: ☐

Login attempts:

Password:

M2M Key:

Cancel

Password requirements:

- Min. password length: 10
- Min. lower case letters: 1
- Min. capital letters: 1
- Min. Numbers: 1
- Min. other characters: 1

This concludes the setup of the WinPQ M2M user account and the window can be closed. The keys that have been created in the background can be found in the folder `C:\Programdata\WinPQ\InI\keys`, and are named according to the IP-address and the port number.

User	Role	Login attempts	State		
admin	administrator	0	Active		
frank	operator	0	Active		
norbert	user	0	Active		
WinPQ	winpq-m2m	0	Active		

Add user

Selection of the data classes to be transferred to the WinPQ database

Next setup step is to select the data classes which should be automatically transferred from the device to the WinPQ database.

Add PQ-Device

Selection of data classes

Please select the data classes to be automatically read by the PQ device into the 'WinPQ' database.
The EN50160 standard is pre-selected and recommended.

Select Data Classes

- ☐ 200ms
- ☐ 1s TRMS
- ☐ 3s TRMS
- ☐ n-second mean value
- ☒ 10-Second-Frequency
- ☒ 10-min
- ☒ n-minute mean value
- ☒ 2-hour
- ☒ Oscilloscope-Recorder
- ☒ 10ms TRMS recorder
- ☐ 10min Harmonic recorder
- ☒ EN 50160-Events
- ☐ Online Data

Back Next Ok Cancel



The PQI-DA smart records 8 different measurement intervals of permanent data, a fault recorder, power quality events and the online data. The standard configuration (parameter setting for EN 50160) includes the following active data classes:

- 10-Second-Frequency
- 10-min
- N-minute
- 2-hour
- 10ms TRMS recorder (1/2 period recorder)
- PQ-Events

Every data class which should be transferred to WinPQ has to be activated on the PQI-DA smart first (parameter setting of the PQ-device). If the PQI-DA smart device is completely parameterized, e.g. with the commissioning wizard on the device, the above listed default data classes are active (will be recorded by the device), thus can be transferred to the WinPQ database.

It is important to note that a parameter setting with additional active data classes (based on the default parameter settings) will increase the data volume in the device storage as well as the data traffic transferring to WinPQ. Especially the data classes with short measurement intervals (e.g. 200ms) produce an extremely high amount of data.

Device groups on the WinPQ Desktop

In this step create a new WinPQ desktop for the device or choose an existing desktop, e.g. Desktopname. Then type in a desktop or group name to add a new group with the device on the WinPQ desktop or select an existing group to assign the device to this group.

Add PQ-Device

Grouping of Device Tiles

Please select the group or tab in which the new device is to be added. You can also create a new group or tab. A new group is created under the selected tab.

Choose Tab

☐ New tab

☒ Desktop

Group selection:

☒ New Group

☐ Smarts

Group Name:

Back Next Ok Cancel

Summary of device setup

The summary of the device setup details can be printed or saved as a text file for documentation.

Add PQ-Device

Summary

Following device will be created in the database:

```

Serial number=
ONLINE=Yes
IP/Port=192.168.56.194;5040
Mode=ipv4

Data-Classes:
- 10-Second-Frequency
- 10-min
- n-minute mean value
- 2-hour
- Oscilloscope-Recorder
- 10ms TRMS recorder
- EN 50160-Events
  
```

Print Back Next Ok Cancel

Setup another device

The last step saves all settings made and restarts the wizard to setup another device if desired.

Add PQ-Device

Click "Yes" if you want to add another device

The newly added devices will be read out automatically with the background process.

Do you want to add additional device

☒ No - Exit wizard and save settings.

☐ Yes - Save settings and restarts the wizard.

Back

Next

Ok

Cancel

After finishing the wizard the new device appears on the WinPQ desktop and the setup of the device is finished.

Sicherheitsmodus RADIUS

Commissioning of devices in security mode with the RADIUS protocol

The PQ devices also support the RADIUS protocol. For this purpose, a RADIUS server must be set up which supports the following roles with the corresponding IDs (further information is contained in the IT security documentation).

ID	Role
1	Administrator
2	ControlOperator
3	Observer

The devices must be set up again to use the RADIUS functionality. The setup is done analog to chapter "Finishing the setup in security mode":

1. Select PQI-DA smart and continue.
2. Select "Completion of commissioning ..." item 2 and continue.
3. Select "Manual setup: ..." and continue.
4. Select IPv4 and continue (IPv6 is not currently supported by the device).
5. Enter the assigned IP address of the device and continue.
6. Enter serial number and continue.
7. Check connection establishment and accept with OK.
8. Now the RADIUS and RBAC settings can be made. We recommend the RADIUS and Standard mode, then it is also possible to log in with the user names/passwords assigned in the mask (local login on the device and on the RADIUS server). The other modes are described in chapter "Completing commissioning in security mode".
9. Enter the RADIUS server settings in the fields. Up to 4 RADIUS servers can be set up.
10. The same role set (see above) must be set on the RADIUS server.
11. Administrator with role_id = 1
12. ControlOperator with role_id = 2
13. Observer with role_id = 3
14. Enter the server secret.
15. With the button Test you can test the connections last (see figure below) as well as log in with the users then.

The setup must be performed for each device, but can also be performed in the parameterization settings under RADIUS (i.e. without the wizard). To do this, open the parameterization of a device and then switch to the expert view (dropdown at the top right). There you will find the settings for the RADIUS server, secrets, etc.

Wizard

RADIUS und Standard

Radius 1 Radius 2 Radius 3 Radius 4

IP-Adresse: 172.16.0.9

Port: 1812

Server Secret:

Information

Der Test war erfolgreich!

OK

Passwortanforderung:

Min. Passwortlänge: 6

Min. große Buchstaben: 1

Min. kleine Buchstaben: 1

Min. Zahlen: 1

Min. sonstige Zeichen: 1

☒ M2M Benutzer für WinPQ generieren

WinPQ:

Weiter Weiter OK Abbruch

The setup of a PQI-DE device is identical to the PQI-DA smart, see previous chapter.

POI-DE

LEIST

0.00W

0.00W

0.00W

0.00W

0.00W

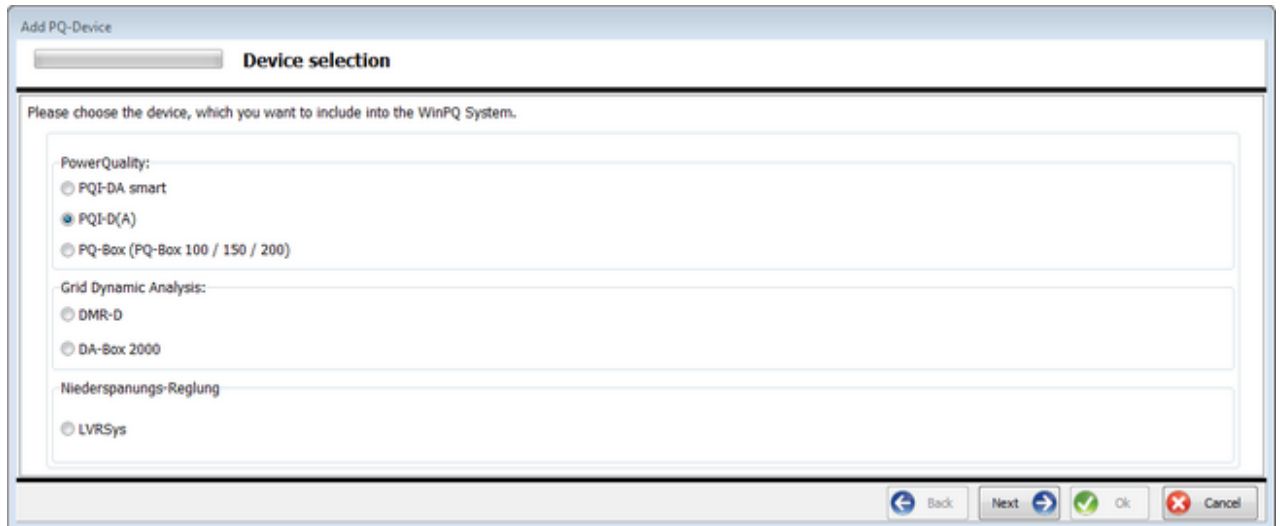
0.00W

Power Quality Analy

Setup PQI-D(A)

Device selection

The setup of a PQI-D and PQI-DA (abbreviated as PQI-D(A)) device is described as follows.



Type of communication

There are generally three options for connecting your PQI-D(A) in WinPQ:

- Serial interface (RS232)
The PQI-D(A) is directly connected to the COM interface on the server.
- Network connection (TCP/IP)
 - PQI-DA
The ethernet network interface is integrated with the device (Feature T1). The description for the network interface setup of the PQI-DA is described in chapter [Network connection TCP/IP setup PQI-D\(A\)](#).
 - PQI-D
The PQI-D uses a serial to TCP/IP converter. This converter is usually a A. Eberle REG-COM device if the PQI-D is installed in a 19 inch rack. The settings and configuration of the REG-COM or W&T ComServer is described in chapter [Network connection TCP/IP setup of PQI-D\(A\)](#).
- Dial-up modem
The instructions for setup the PQI-D(A) with a dial-up modem is described in chapter [Modem connection setup of PQI-D\(A\)](#).

Add PQ-Device

Type of communication

Please select the type of connection through which you want to attach to the WinPQ Software PQI-D.

Interface selection:

☐ Serial interface (RS232)

☒ Network connection (TCP / IP)

Back Next Ok Cancel

Network parameter

The IP address and the port of the measurement device for the connection is configured in WinPQ. The following ports are used as default:

REG-Com or W&T ComServer: port 8000

PQI-DA: port 1023

Add PQ-Device

Network parameters

Please enter the IP address and the communication port of the TCP/IP ComServer.
By default, the following ports are used:
TCP port 8000: REG-COM W & T ComServer
TCP port 1023 PQI-DA.

IP of the COM-Servers:
192.168.056.095

TCP/IP Client-Port (Interface to the device)
1023

Back Next Ok Cancel

Device search and network connection check

Multiple PQI-D(A) measurement devices are found behind a network connection which communicate with each other via an E-LAN bus (2-wire / 4-wire connection). The WinPQ software recognizes the connected devices after clicking on "Device search" with successful network access and lists this in a table. If no successful communication can occur, check the network settings of the server as well as the communications settings directly on the measurement device.

- **E-LAN ID:** Every device must have a unique E-LAN ID in the E-LAN segment
jedem E-LAN Segment muss eine eindeutige E-LAN Kennung vorliegen. Hier im Beispiel Q1-Q6. Das Eingabefeld ist beschränkt von A1 bis Z4.
- **Name:** Jedes PQ-Gerät hat zusätzlich zur zweistelligen E-LAN Kennung ein weiteres Bezeichnungsfeld. Dieses Feld ist beschränkt auf acht Zeichen.



The database identifies the connected devices using the set E-LAN identification and the name, e.g. device "Q1 Sued_T1" gets the database identification "Q1Sued_T1".

NOTE: If there are subsequent changes to the E-LAN identification or name in running operation, a new device will be created in the database and special settings must be configured.

- **Tile Text:** This text appears in the WinPQ start interface directly on the device tile and can be adapted for each customer.

By clicking on the save button next to the device search, the E-LAN identification and the device name are sent directly to the connected devices. Once can check this again by clicking on "Device Search".

[Device]	E-LAN ID	Name	Tile Text	Device-type
Device1	Q1	PQID	-	UI

PQI-D(A) setup without network connection

If here the commissioning is not possible with a network connection, it is possible to use the function to set the number of PQI-D(A) devices already in the software as device tiles. Three devices were added in the following example. All three devices are setup with the same IP address and will be connected with each other by an E-LAN bus later.

[Device]	E-LAN ID	Name	Tile Text	Device-type
Device1	Q1	PQID1	Substation_North_1	UI
Device2	Q2	PQID2	Substation_North_2	UI
Device3	Q3	PQID3	Substation_North_3	UI

Number of offline devices: 3

PQStart

A connection to '192.168.056.095:1023' could not be established!
Please check the connection details and try to reach the device with ping or Telnet!

OK

Time synchronization

The time synchronization of the PQI-D(A) devices is set via the database server. The following options are available:

- None (local synchronization is available)
The measurement device is synchronized by a radio clock on site.
- From the server to all E-LAN A. Eberle devices
WinPQ synchronizes all devices from A. Eberle in this E-LAN connection
- From the server to the device
WinPQ synchronizes only the connected measurement device.

- The Server receives time from the end device
The measurement device is synchronized on site by a radio clock and WinPQ receives this time from the measurement device
- From the server to all E-LAN A. Eberle PQ devices
WinPQ synchronizes all of the PQ measurement devices connected to the E-LAN.

Add PQ-Device

Time synchronization - method

Your power quality devices requires time synchronization to fulfill the norm standards. There are many ways to realize this, for example, DCF 77 synchronization using a DCF or GPS clock directly on the PQI-D. If you do not use on-site synchronization, we recommend that you should do synchronization from WinPQ server to the connected devices.

You can choose between the following options:

- ☒ None (local synchronization is available)
- ☐ From the server to all in the E-LAN connected Eberle devices
- ☐ From server to a directly connected device
- ☐ The server gets the time from the direct connected device
- ☐ From the server to all in the E-LAN connected PQ devices

Back Next Ok Cancel

Device groups

In this step create a new WinPQ desktop for the device or choose an existing desktop, e.g. Desktopname. Then type in a desktop or group name to add a new group with the device on the WinPQ desktop or select an existing group to assign the device to this group.

Add PQ-Device

Grouping of Device Tiles

Please select the group where your new device should be added. You can also create a new group. Please enter a free name. The new group will be created at the selected "Page":

Geräte auf Karte anlegen:

☐ Neue Karte

☒ Desktopname

Group selection:

☐ New Group

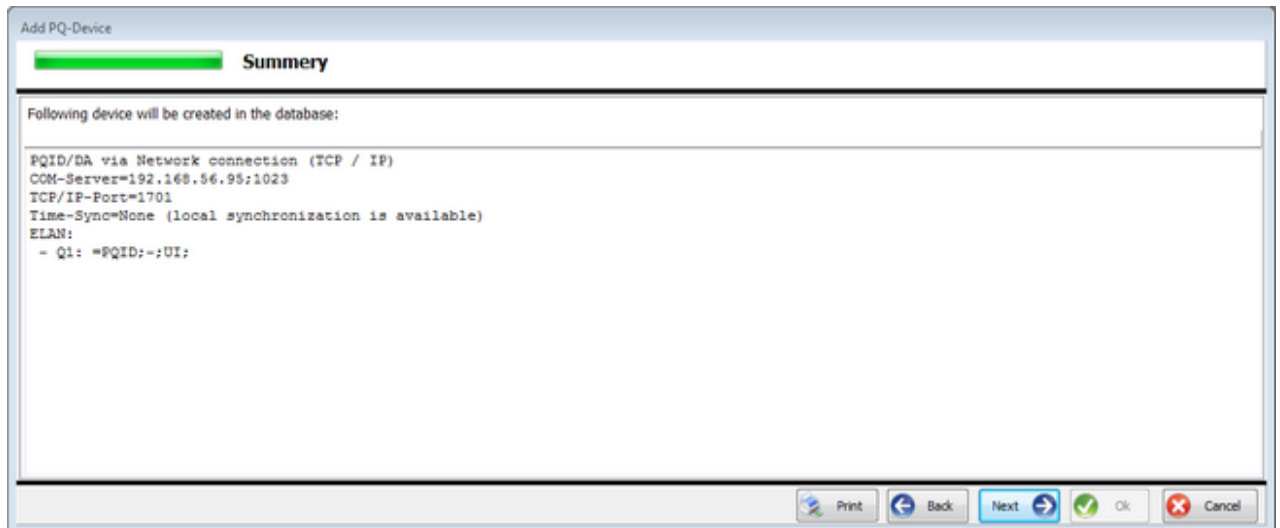
☒ Neue Gerätegruppe

Group Name:

Back Next Ok Cancel

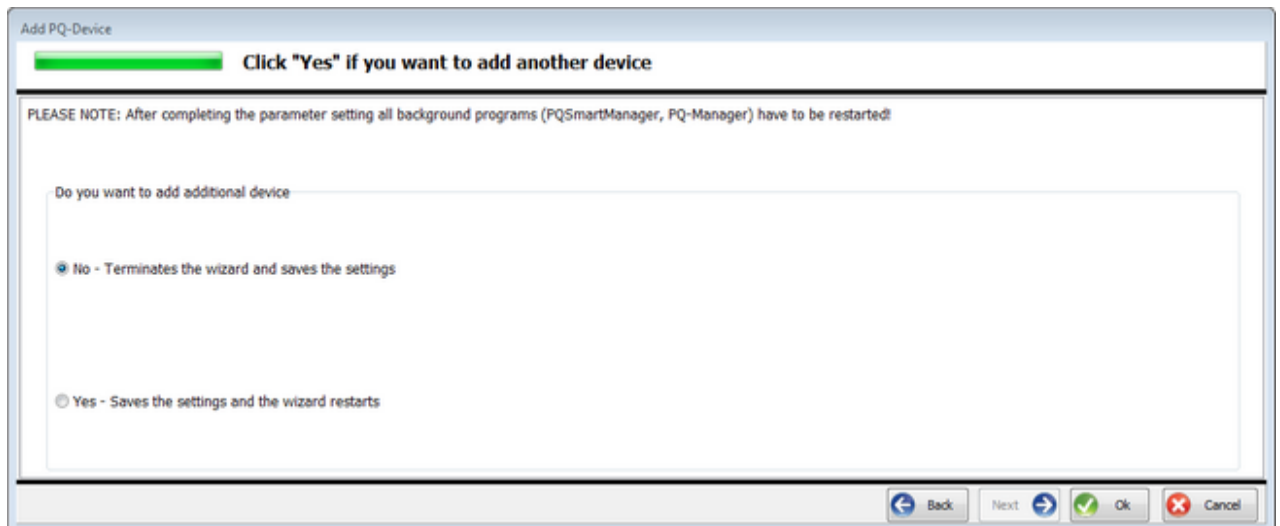
Summary of device setup

The summary of the device setup details can be printed or saved as a text file for documentation.



Setup another device

The last step saves all settings made and, if desired, restarts the wizard to setup another device.



Firmware Update PQI-devices

Latest firmware version of the PQI-devices

In the first step please check the [A. Eberle Website](#) for the latest firmware version of the PQI-D, PQI-DA and PQI-DA smart devices as shown below. The next step is to compare the current firmware version of your PQI-device with the version number of the latest version. If there is a newer version (higher firmware number) which is compatible to your device you can run a firmware update. How to determine the firmware version of your PQI-device, check the compatibility and perform a firmware update is described in the next subchapters.

The screenshot shows the A. Eberle website's navigation bar with links: HOME, ABOUT US, PRODUCT GROUPS, DOWNLOADS, ACTIVITIES, and CONTACT. Below the navigation bar, the text "for fix installed devices." is visible. The main content area displays a list of firmware updates. The first update is "NEU: Firmware PQI-DA smart" with a version number "V1.8.0 Build 7594" highlighted in a red box. A red-bordered box contains a warning in German, English, and Spanish: "Für das Update auf Version 1.8.0. muss auf dem PQI-DA smart mindestens die Version 2385 vorhanden sein! For the update to version 1.8.0. at the PQI-DA smart at least has to be version 2385 available! Para la actualización a version 1.8.0. el PQI-DA smart por lo menos tiene que tener la versión 2385!". Below this, there are two more updates: "Änderungsliste zur Software WinPQ smart" (V07/2017, 3.43 MB) and "Improvements for Software WinPQ smart" (V07/2017, 1.41 MB). The next update is "Firmware PQI-D / PQI-DA: 4xU & 4xl" with a version number "V7.0.04" highlighted in a red box. The final update is "Firmware PQI-D / PQI-DA: 8xU" with a version number "V4.0.0.7." highlighted in a red box.

Update Title	Language	Version	Size
NEU: Firmware PQI-DA smart		V1.8.0 Build 7594	3.02 MB
Für das Update auf Version 1.8.0. muss auf dem PQI-DA smart mindestens die Version 2385 vorhanden sein! For the update to version 1.8.0. at the PQI-DA smart at least has to be version 2385 available! Para la actualización a version 1.8.0. el PQI-DA smart por lo menos tiene que tener la versión 2385!			
Änderungsliste zur Software WinPQ smart	DE	V07/2017	3.43 MB
Improvements for Software WinPQ smart	EN	V07/2017	1.41 MB
Firmware PQI-D / PQI-DA: 4xU & 4xl		V7.0.04	702.39 KB
Firmware PQI-D / PQI-DA: 8xU		V4.0.0.7.	644.29 KB

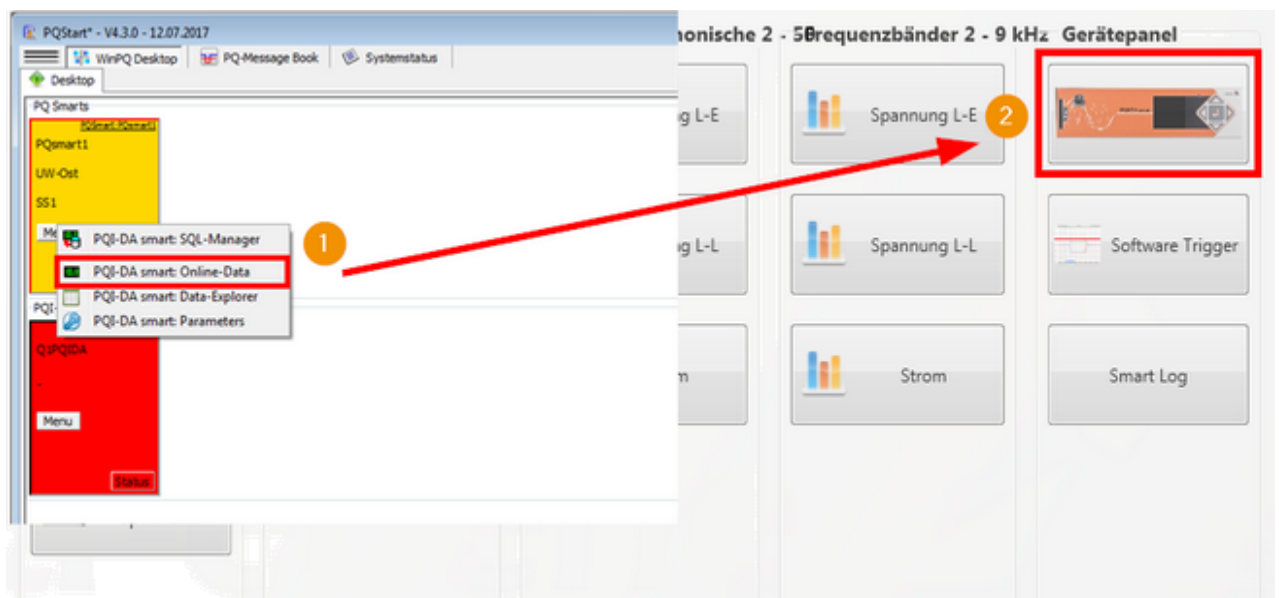
Please always check the compatibility of the firmware and your device as shown exemplary above for the PQI-DA smart firmware. Especially older firmware versions and devices are not compatible to every (newer) version. In case of doubt please contact the [A. Eberle Support](#)!

Firmware-Update PQI-DA smart

Read the PQI-DA smart firmware version

The firmware update function requires administrative rights. Only users with a membership of the administrator role are allowed to perform a firmware update.

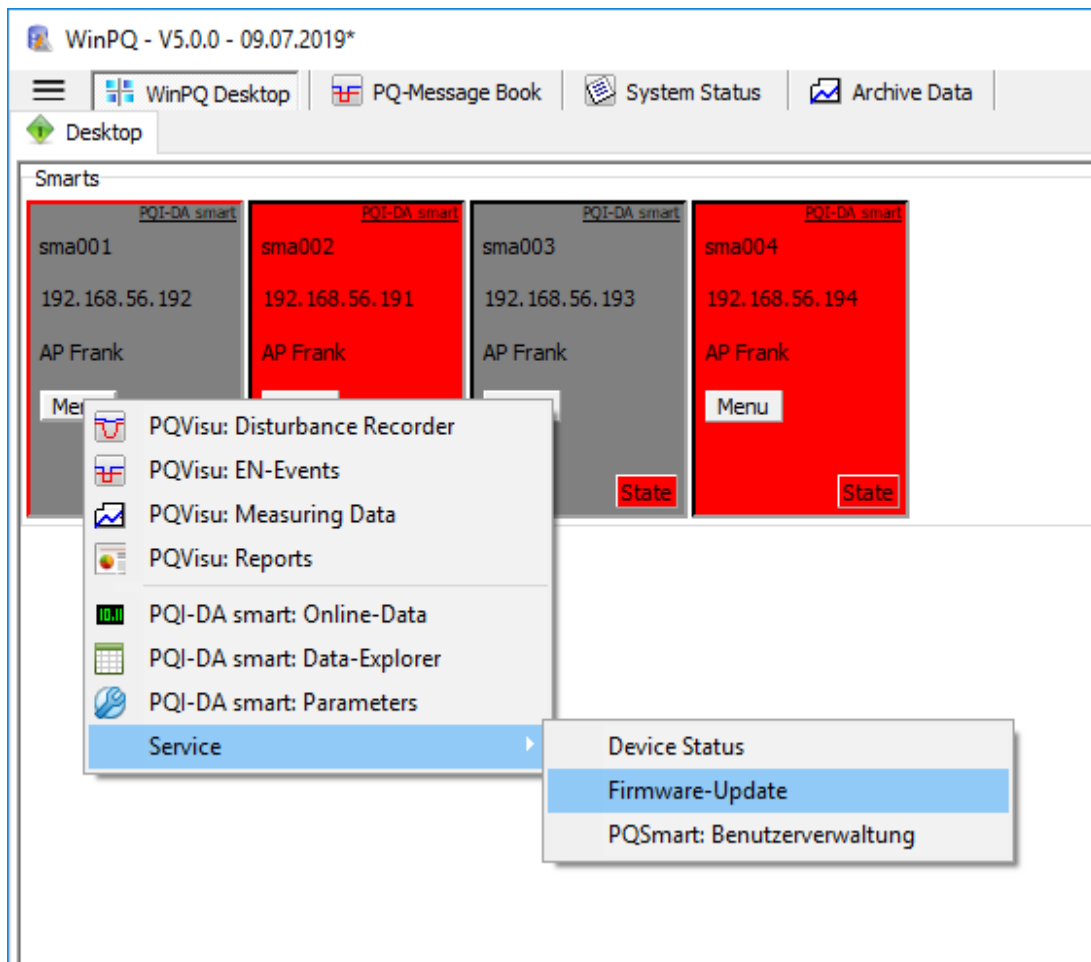
The firmware version of a PQI-DA smart can be read either directly on the device display menu **PQ Smart >> Firmware** or in the WinPQ Smart or WinPQ software. In WinPQ smart open the online data on the device tile and the display view as shown below (like directly on the device). In WinPQ open the device menu, which starts the software WinPQ smart and there open again the display view as shown below. Navigate with the right and left cursors to the page named PQ Smart which displays the current installed firmware version.



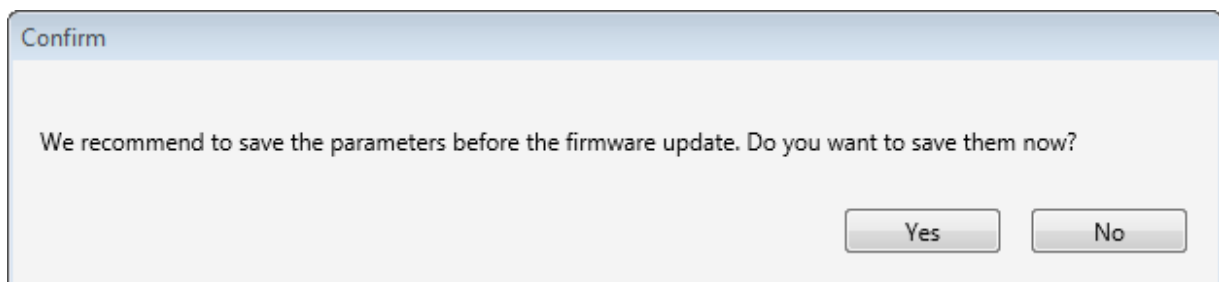
The firmware update can be performed with the software WinPQ, WinPQ smart or directly on the device by SD-card. The firmware update process with WinPQ and WinPQ smart is described as follows. Only the downloaded firmware file, e.g. *PQI-DA_Smart_v1.4.0_4077* from the A. Eberle website is needed. Do not unzip the firmware file!

Firmware update with WinPQ

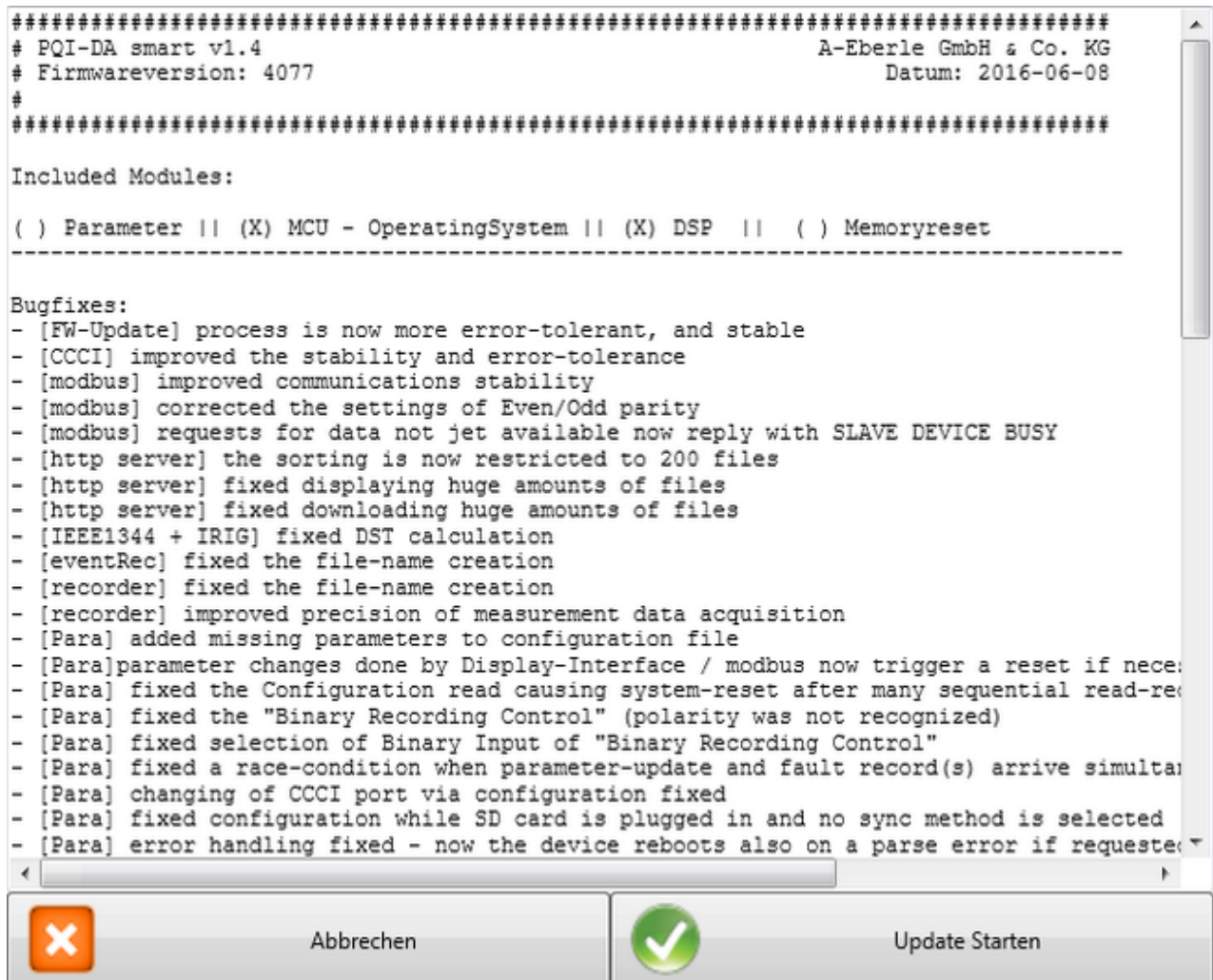
1. Open the device Menu and choose then Service and Firmware-Update. The function requires a user with administrative rights.



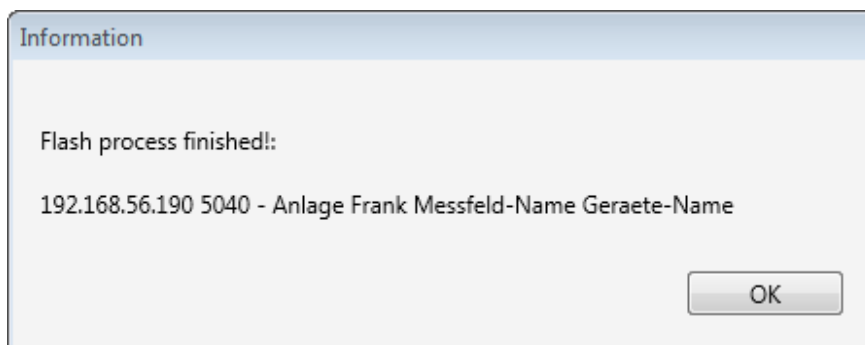
2. A backup of the parameter settings of the device is strongly recommended before updating the firmware. The backup file is stored in the selected folder.



3. Finally a changelog overview of the modules to be updated and a selection of the implemented bugfixes of the selected firmware version is shown. Click the Start Update button to start the firmware-update.

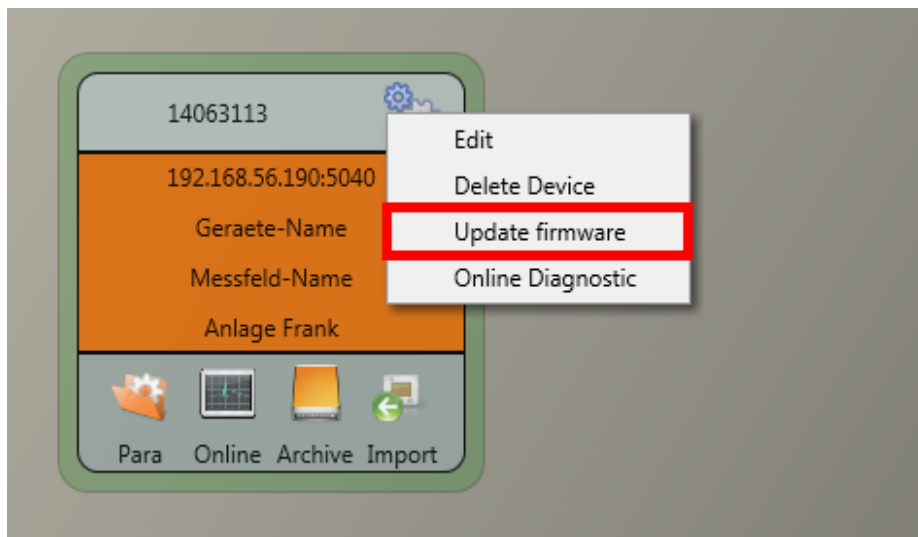


4. After the transfer of the new firmware file the device restarts and installs the new version automatically.



Firmware-Update via WinPQ smart

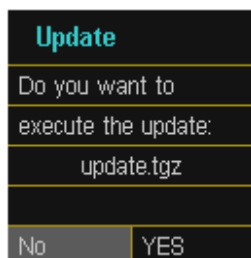
In the WinPQ smart software the firmware update process can be started via the setup icon on the device tile as shown below. The further installation process is identical to the update with WinPQ as described above.



Firmware update with SD-card

The firmware update functionality is only available for devices without active security operation mode.

The last possibility updating the PQI-DA smart firmware is with a SD-card directly on the device. Copy the unzipped firmware files readme.txt, update.md5 and update.tgz to the SD-card root folder. Insert the card into the SD-card slot on the front of the device. The firmware update file will be detected automatically and the following message will be displayed.

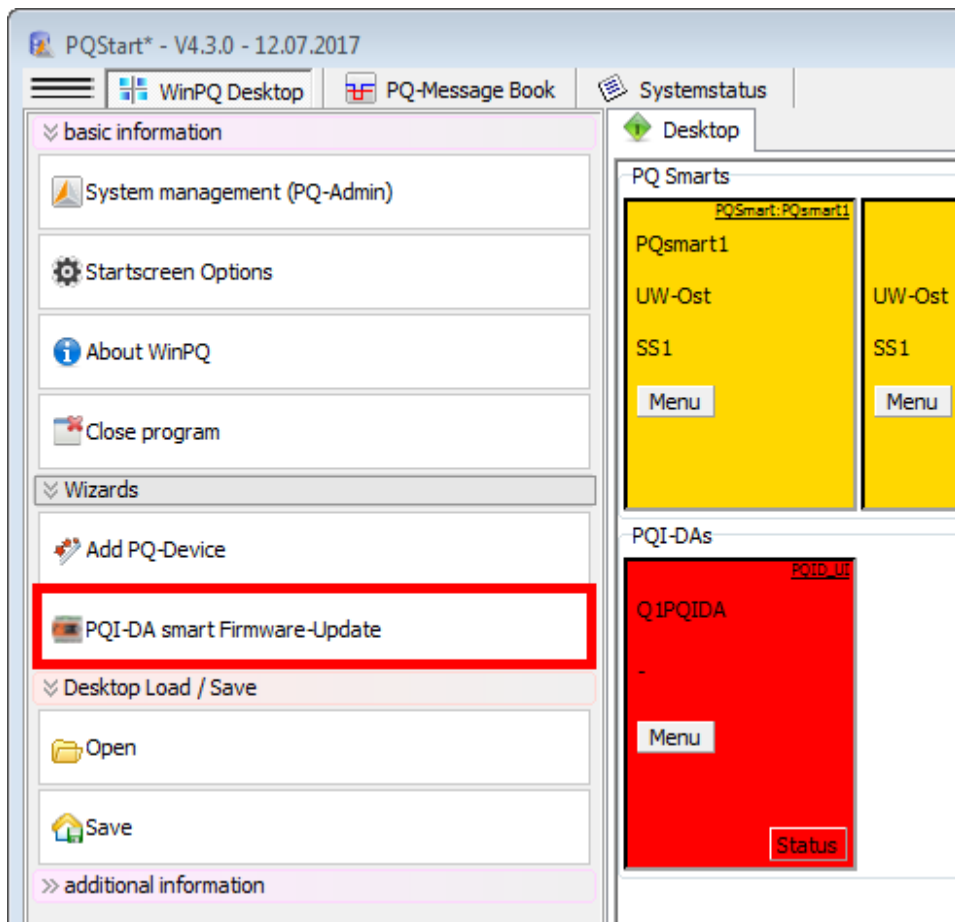


The firmware update will be installed with entering YES and the device restarts automatically after completing the update process.

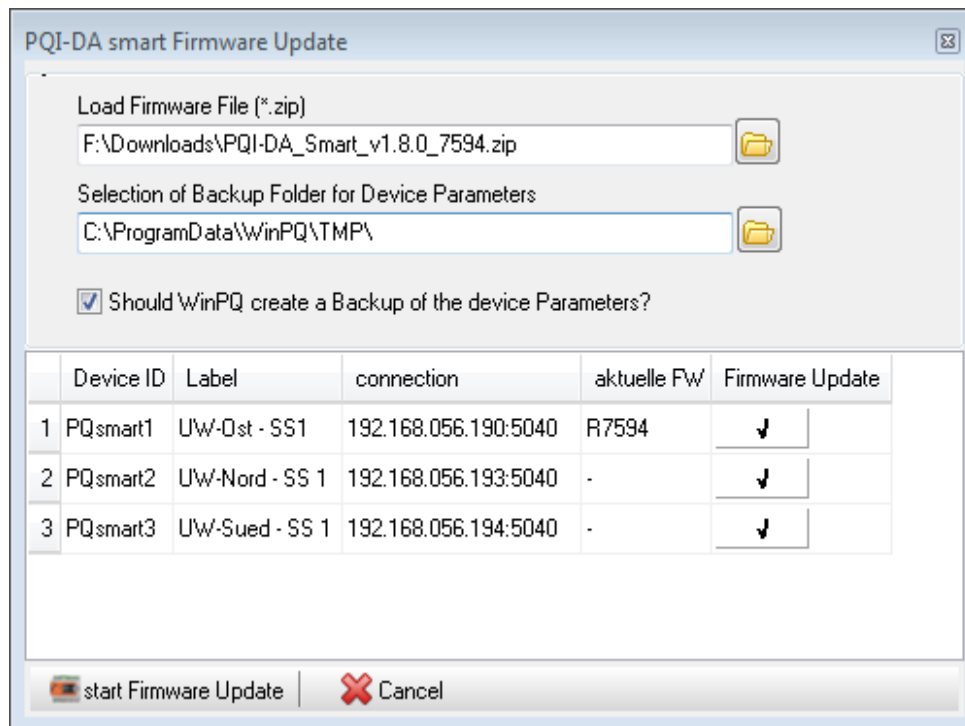
Automated Firmware-Update of many PQI-DA smarts

The firmware update in a WinPQ System with many connected PQI-DA smart devices will be very time-consuming. For this reason the WinPQ software is able to update the firmware of any number of PQI-DA smart devices automatically. The corresponding assistant can be found in the WinPQ main menu.

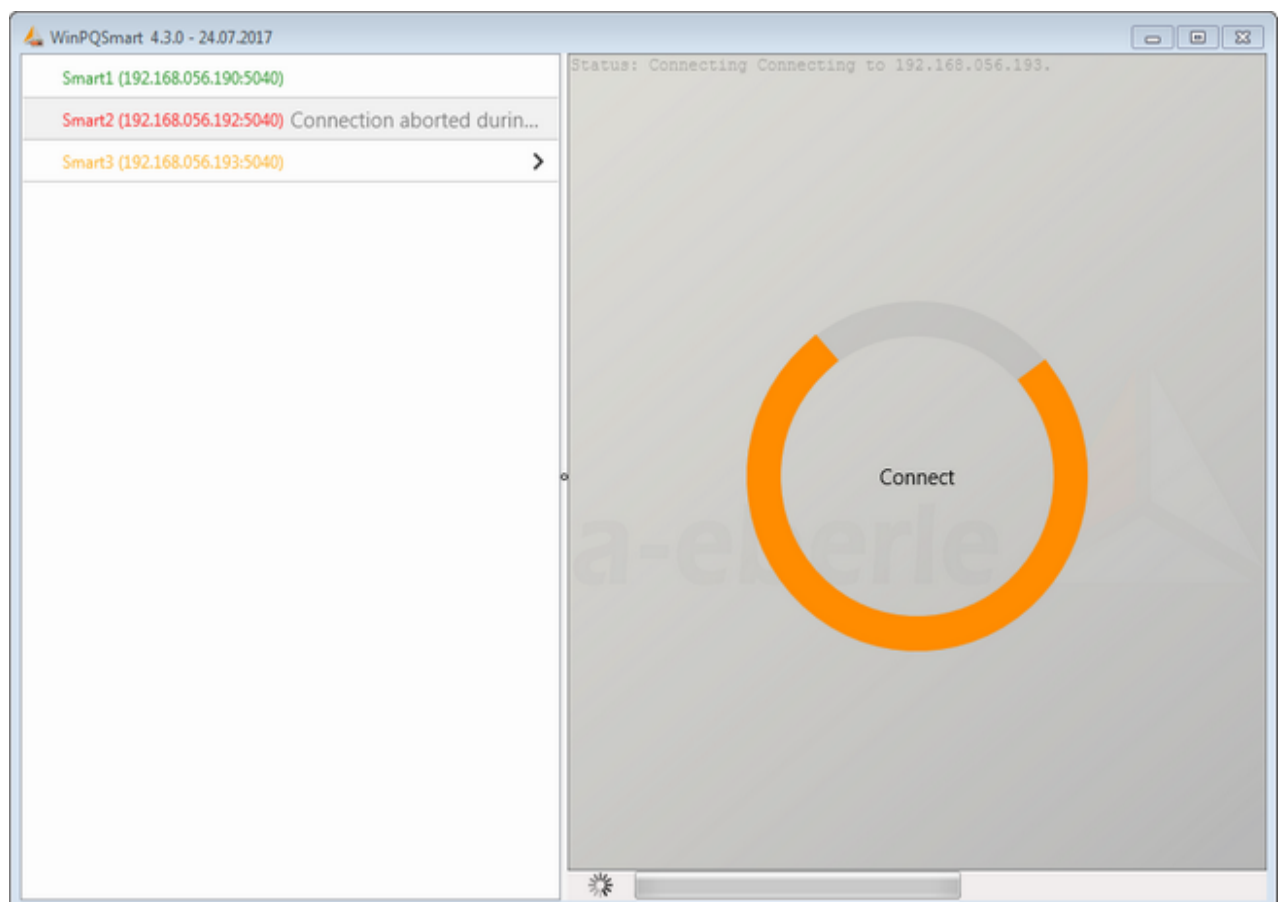
Updating the firmware requires administrative rights on the respective device. So only users with the role Administrator can perform such a firmware update. Devices in security mode cannot be updated with this function!



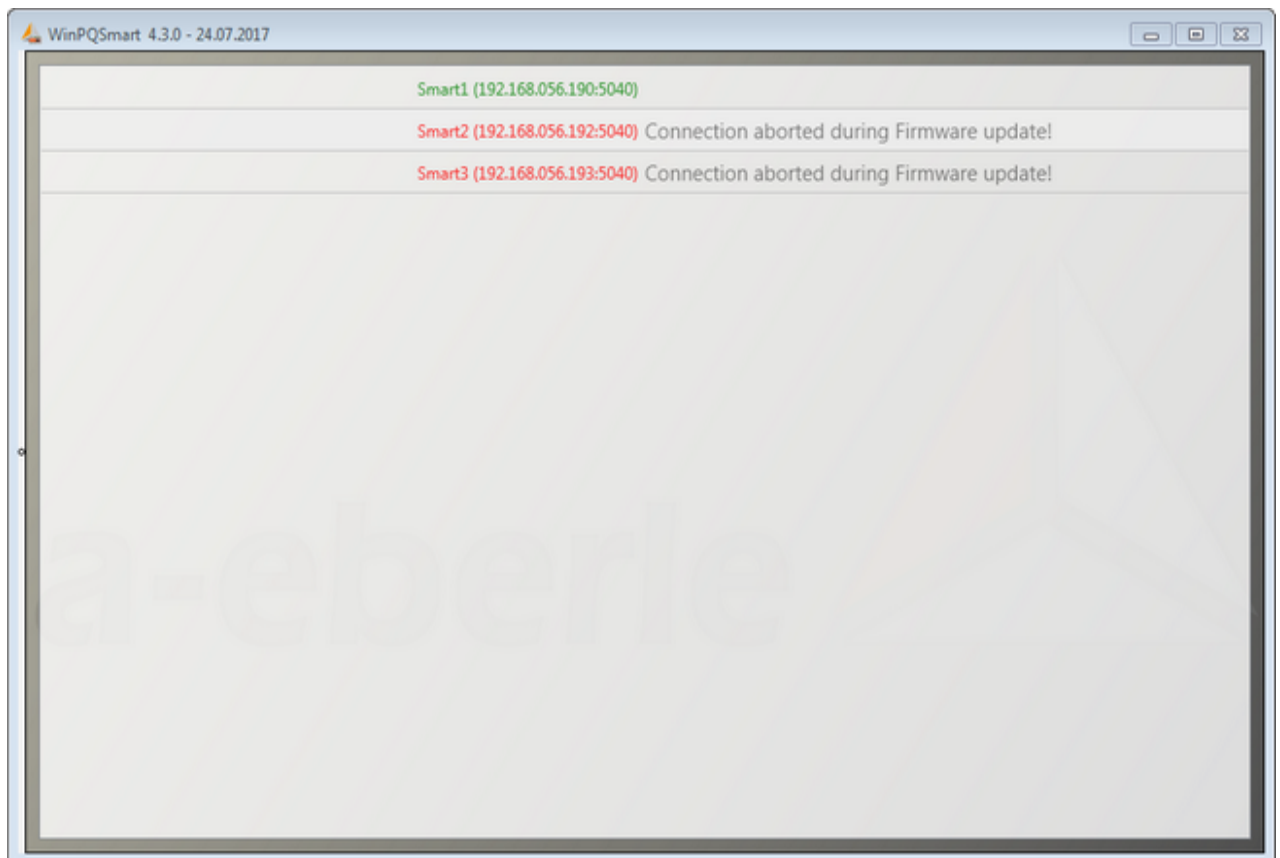
In the next step select the firmware file, the folder for the device parameter backups and all devices to be updated. The devices have to be set up previously in WinPQ. Please save the device parameters before updating the firmware!



Finally start the update process with *start Firmware Update* WinPQ smart displays the status during the update process.



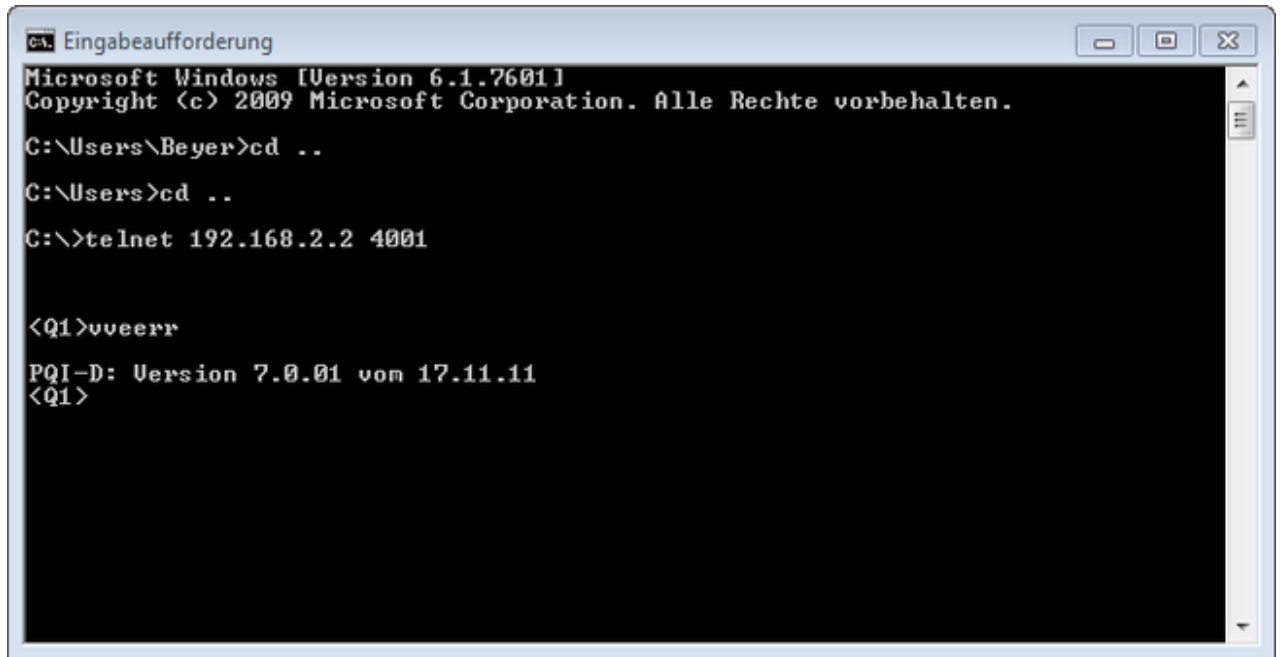
The results are shown at the end of the update process. In the following example just the first device was updated successfully.



Firmware-Update PQI-D(A)

Determine the firmware-version of the PQI-D(A)

The firmware version of the device is read out either with a console program, e.g. Telnet as shown below, or with the PQPara software. After establishing the connection with the device (e.g. via Ethernet as shown below) the current firmware version is read out with the command `<Q1>`, e.g. version 7.0.01 as shown below.

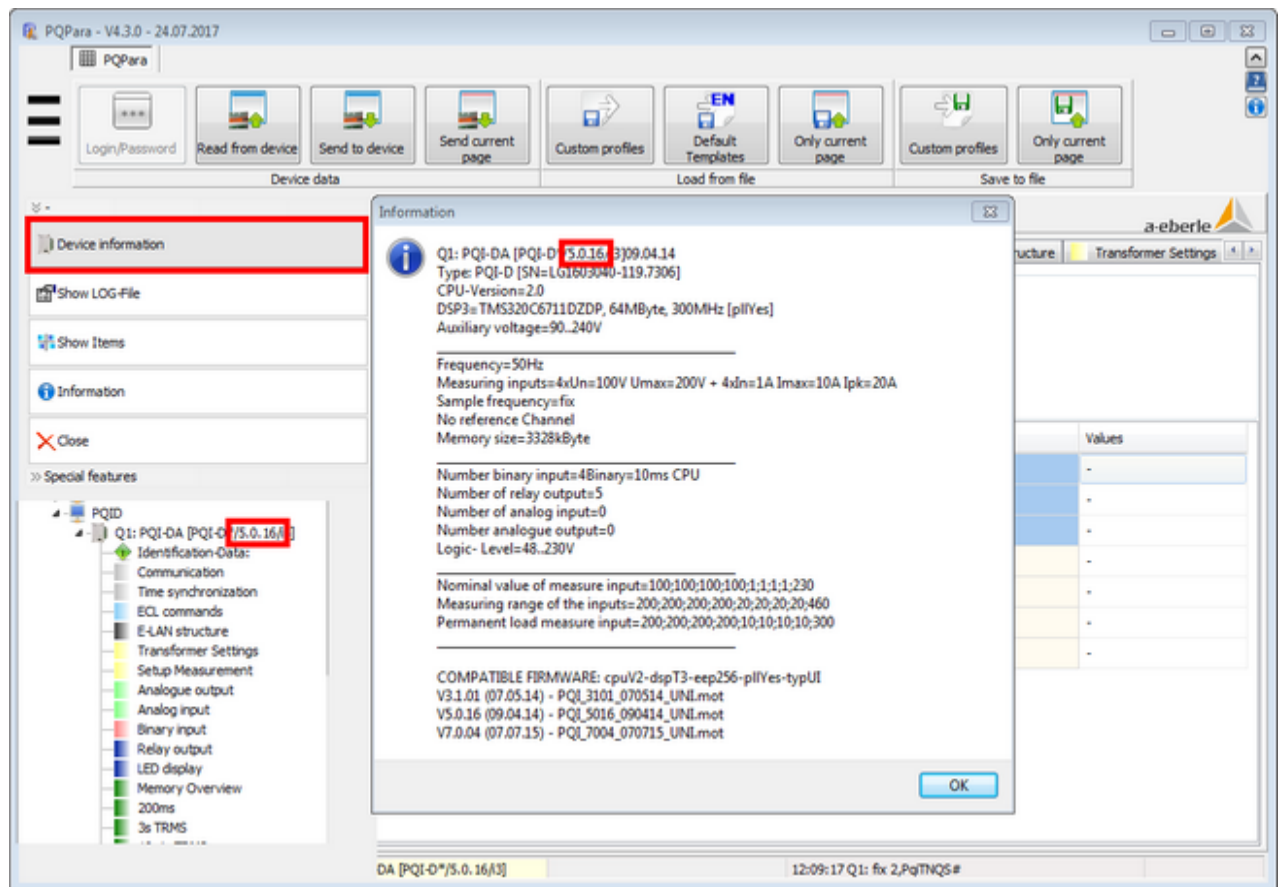


```
C:\Eingabeaufforderung
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. Alle Rechte vorbehalten.

C:\Users\Beyer>cd ..
C:\Users>cd ..
C:\>telnet 192.168.2.2 4001

<Q1>vveerr
PQI-D: Version 7.0.01 vom 17.11.11
<Q1>
```

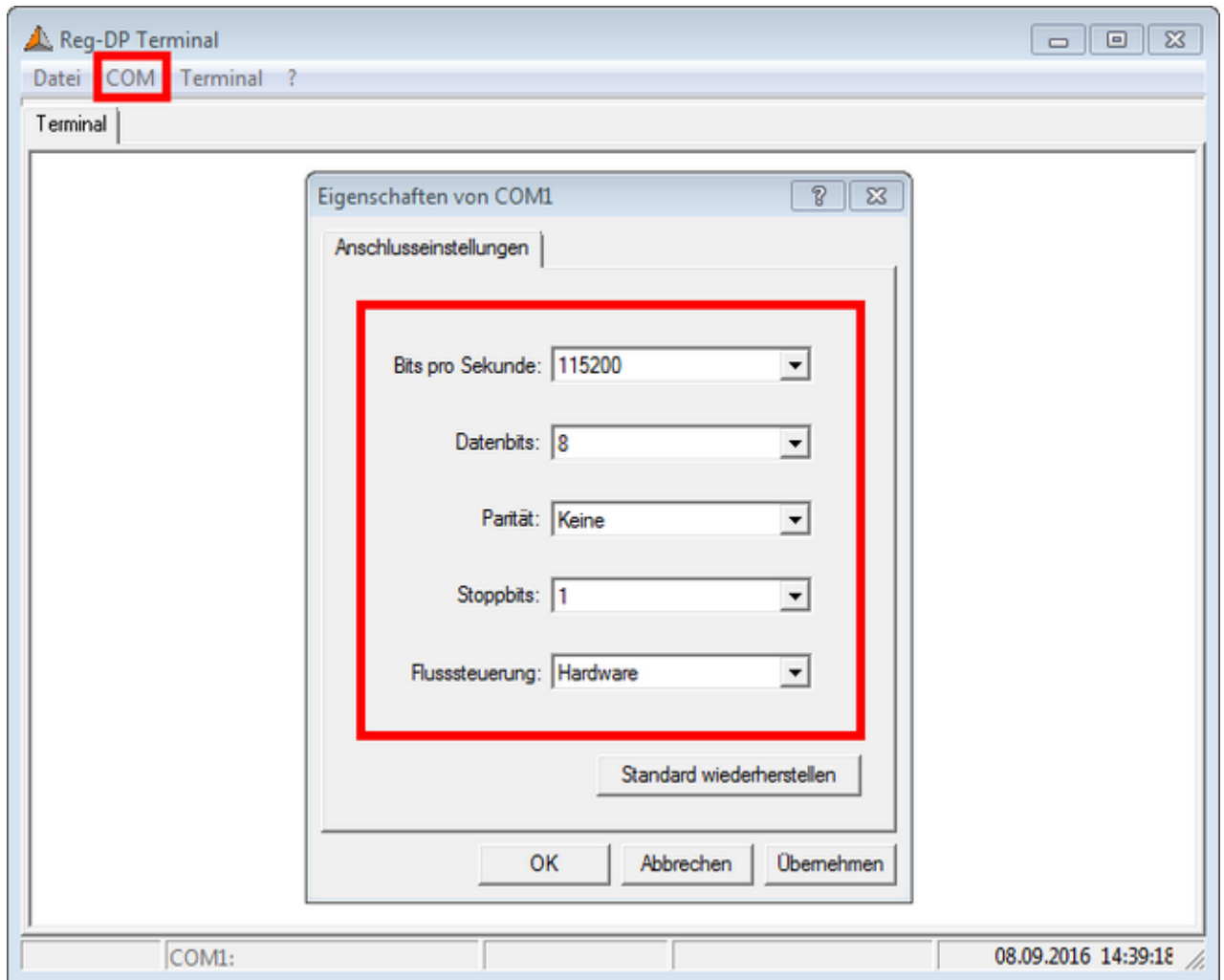
The firmware version of the device can be determined with the WinPQ Software, too. On the WinPQ desktop left-click the Menu button on the device tile and select PQPara: All device parameters. The firmware version is shown directly in the device list in the left section, e.g. version 5.0.16 as shown below. The firmware version is also shown in the device info window, *PQPara main menu >> Device information* as shown below.



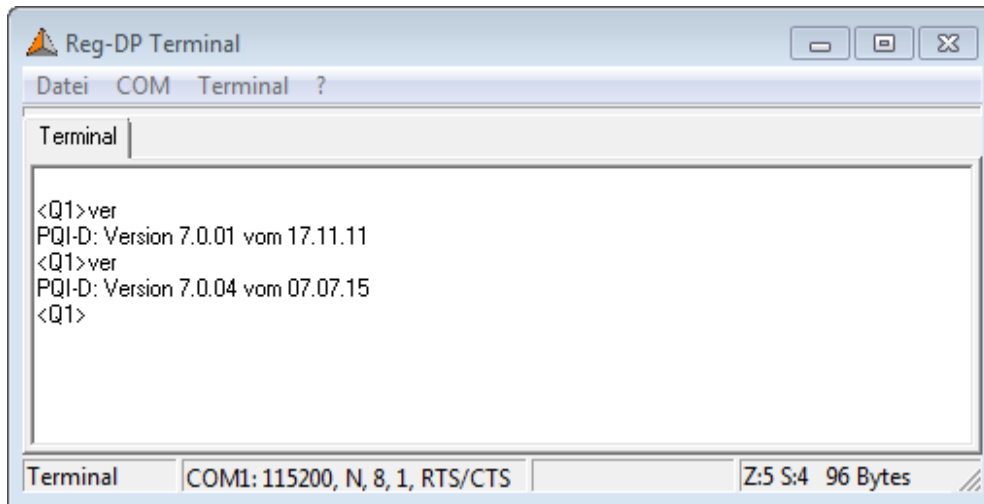
Firmware-Update PQI-D(A)

The device must be connected with the standard serial cable supplied with the device. The software Reg-DP Terminal is only available in german language.

1. Connect the device and the computer with the serial cable.
2. Start the program "Com.exe" in the sub directory "..\programs\WinPQ\Firmware" or open the corresponding link in the ParaExpress software.
3. Select the COM port with the connected device and set up the serial interface in the COM menu with the settings as shown below.



4. First perform a hardware-reset of the device. Press the small reset button on the front with a thin item (e.g. screwdriver or bent up paperclip) for at least 5 seconds until the colors of the front LEDs change. The color of the LEDs after the restart may differ.
5. Updating the bootloader is often necessary for a new firmware. Select in the Terminal menu *Firmware senden mit Reset* the new bootloader file, e.g. *boot_211.bot* or newer and open it. Confirm the pop up message "Trotzdem fortfahren" with *OK*.
6. Repeat the procedure with the firmware file after the upload of the *boot_211.mot* file as described above. First reset the device as described (point 4 above) and repeat point 5 with the firmware update file, e.g. *PQI_7004_070715_UNI.mot*, instead of the bootloader file.
7. The update was successful if only the green status LED should light after the procedure. Check the firmware version with the ECL-command "ver" in the terminal command line as shown above.



In the program PQParaExpress it is also possible to update the firmware with the program REGUpdate. Start the program *FrmUpd32.exe* which is located in the WinPQ installation directory `...\WinPQ\Firmware`.



IT-Security Upgrade PQI-DA smart or PQI-DE

If an already set up PQI-DA smart or PQI-DE device with a firmware version of 2.0 or higher is set up in security mode, the connection in WinPQ has to be adjusted. The communication connection is being encrypted in security mode and the autonomous user has to be set up.

Following prerequisites have to be met:

- WinPQ version of 5.0 or higher installed
- PQI-DA smart or PQI-DE device with a firmware version of 2.0 or higher and activated security mode
- Known serial number and IP-address of the device
- IP-Adresse und Seriennummer des Geräts bekannt
- Outbound connection on the side of the WinPQ system on port 22 have to be enabled

The following steps have to be performed directly on the WinPQ system (server)! (It is not possible to do this on the WinPQ client!).

1. Remove device and connection

First the metadata device ID and the tab name has to be written down and subsequently deleted, using the context menu (right click on the specific device tab). After being asked if the connection should also be deleted, confirm this. Only the connection will be deleted and no data.

2. Re set up the device

In the main menu of the WinPQ desktop, start the “Add PQ-device” assistant. After choosing a device, enter the database identification (ID) of the device in the second setup step. This is crucial, because only this way, the data can be allocated to the old device again!

3. Check connection

A short check if the device has been successfully reconnected should be executed. To achieve this, for example open the online data of the device via pressing the button on the device.

Repeat these steps for all devices that have been reordered. Finally save the desktop. Simply close the WinPQ desktop and confirm the question if the changes in the device structure should be saved.

Installation of WinPQ clients

The creation of WinPQ facilitates working with the WinPQ system in a team. This client installation of the WinPQ facilitates the common work on the WinPQ system in order to e.g. not necessarily have to carry out an evaluation of measurement data directly on the WinPQ server, but comfortably on the workstation PC. Only parts of the WinPQ system are executed on these workstation installations, e.g. no WinPQ processes.

The WinPQ system should be set up completely before creating clients. If the WinPQ system is updated, the clients should also be updated afterwards. The WinPQ clients will notice this on startup when the host system has been updated and will display a corresponding message. In the corresponding dialog window the update of the client can be started. Adding or connecting new devices can only be done directly on the WinPQ Server. This functional restriction of the WinPQ clients is necessary due to security requirements (M2M key bound to the server!).

Create a WinPQ client on WinPQ server

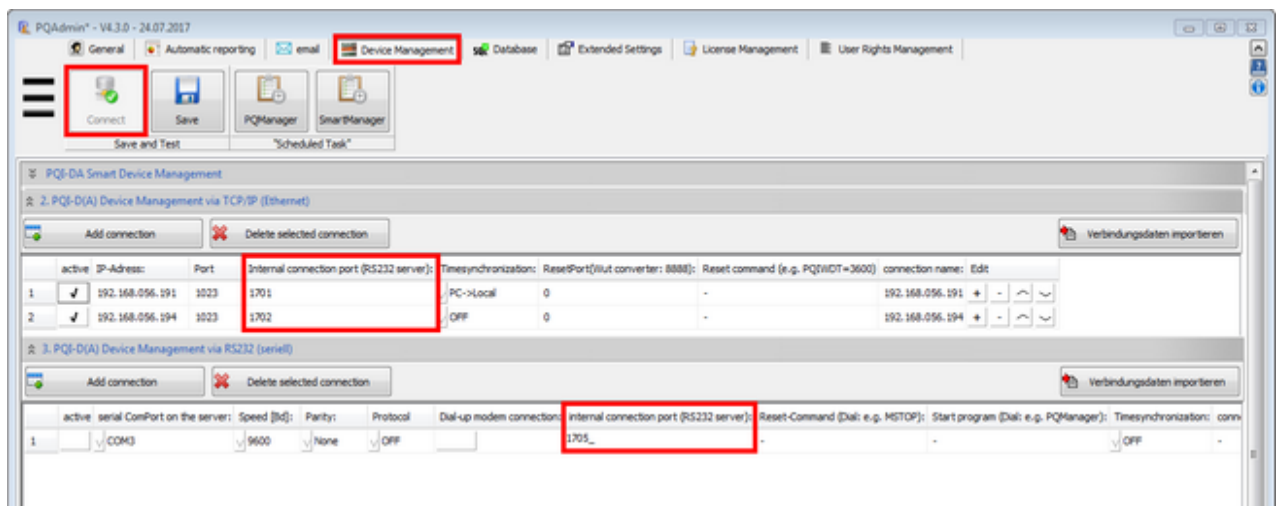
The installation of a WinPQ client, e.g. on a analysis desktop computer, is recommended with the completely automated procedure of the WinPQ system management (PQAdmin). The reason is that all communication settings like IP addresses and database configurations are set up automatically. Consequently all settings should be set up and checked at the WinPQ server first and only then creating and installing the clients.

Setup of the server-client communication



The WinPQ clients installations require the following open ports.

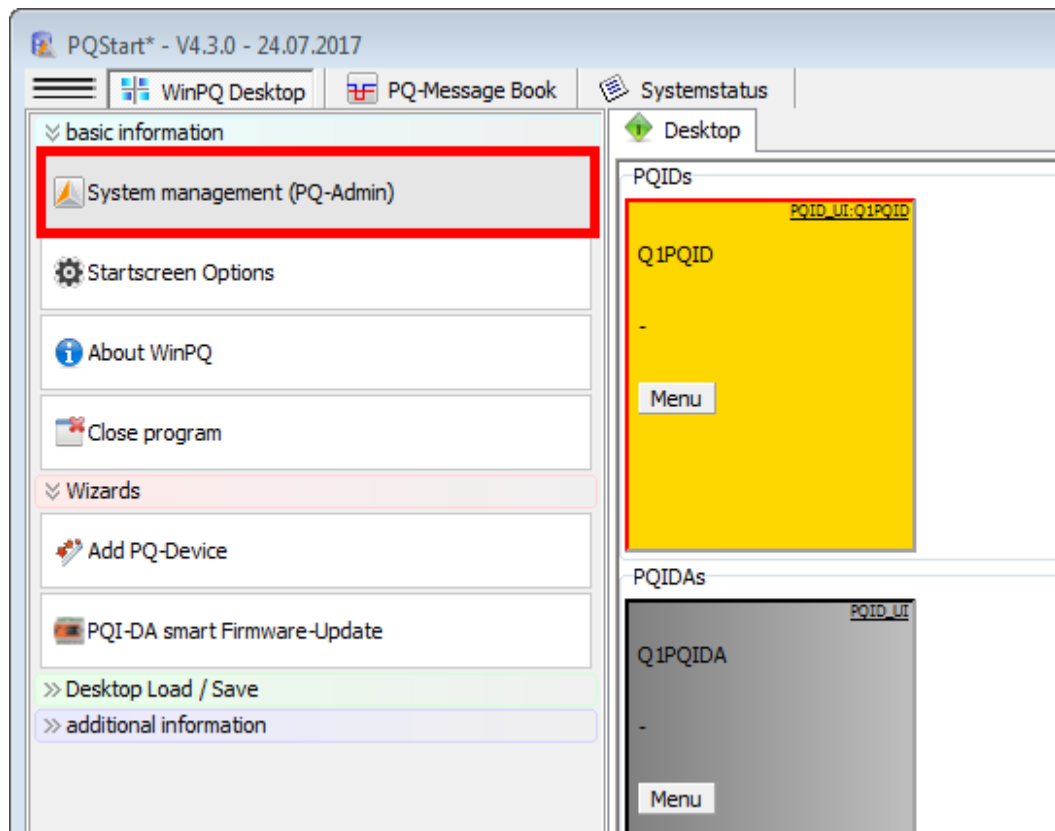
- **Port of the database:**
The default port is **3306**. Open this port if the client should access the measurement data on the WinPQ server (all firewalls and network components between client and server).
- **Parameter settings (only PQI-D(A)):** If the client should be able to parameterize PQI-D(A) devices additional ports must be opened. Every connection which is used by the WinPQ server can also be used by the client. This additional port numbers (also called intern ports) are listed in *Menu >> system management (PQAdmin) >> Device Management*. Click Connect to
Example: In the shown configuration below are two IP connections with internal ports 1701 and 1702 and a serial connection via COM port 3 and internal connection port 1705. Consequently the ports 1701, 1702 and 1705 have to be open at the client.



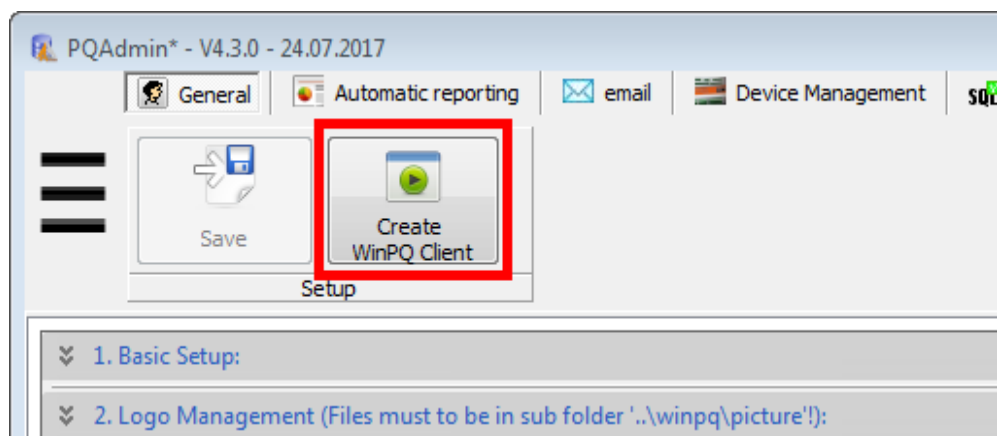
Create a client on WinPQ server

Perform the following steps to create a WinPQ client on the WinPQ server:

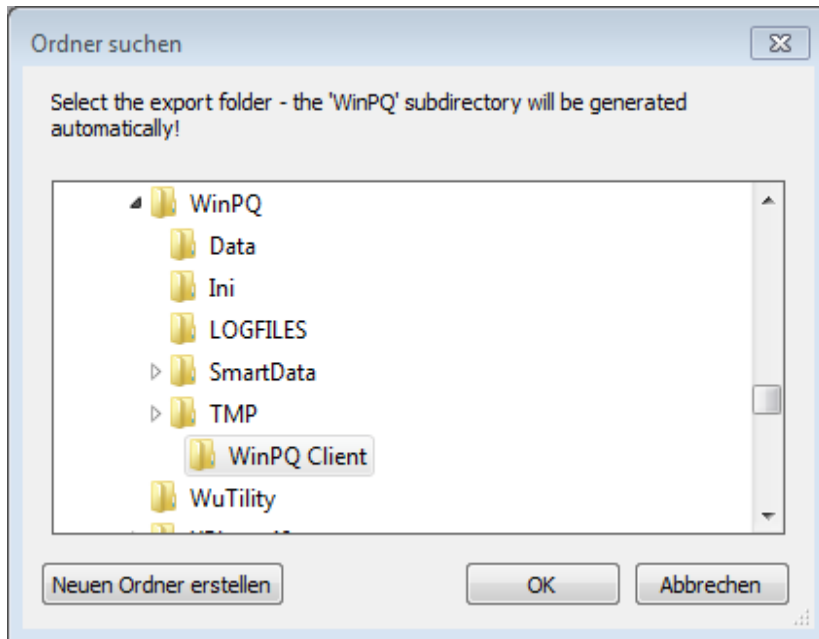
1. Open *Menu >> System management (PQAdmin)*



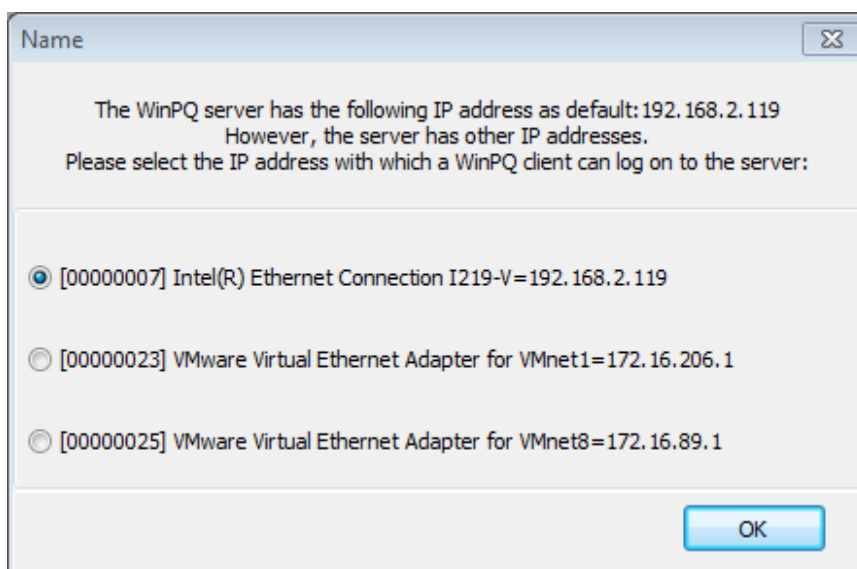
2. Execute *Create WinPQ Client* in the General tab.



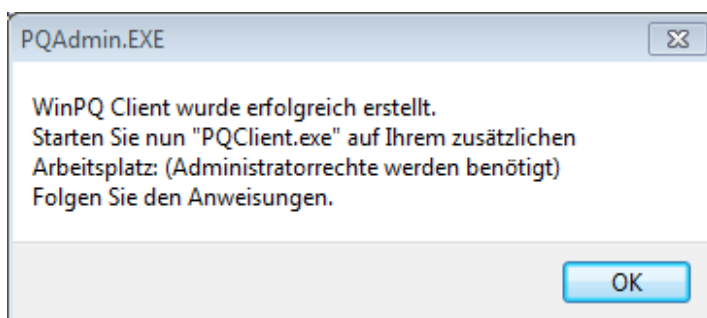
3. Choose or create a folder to save the new WinPQ client and proceed with OK. **Hint:** Save the WinPQ client in a network drive for easy access for the subsequent installation on the client computer.



4. If the WinPQ server has more than one network connection choose the dedicated network connection of the WinPQ server and client communication.



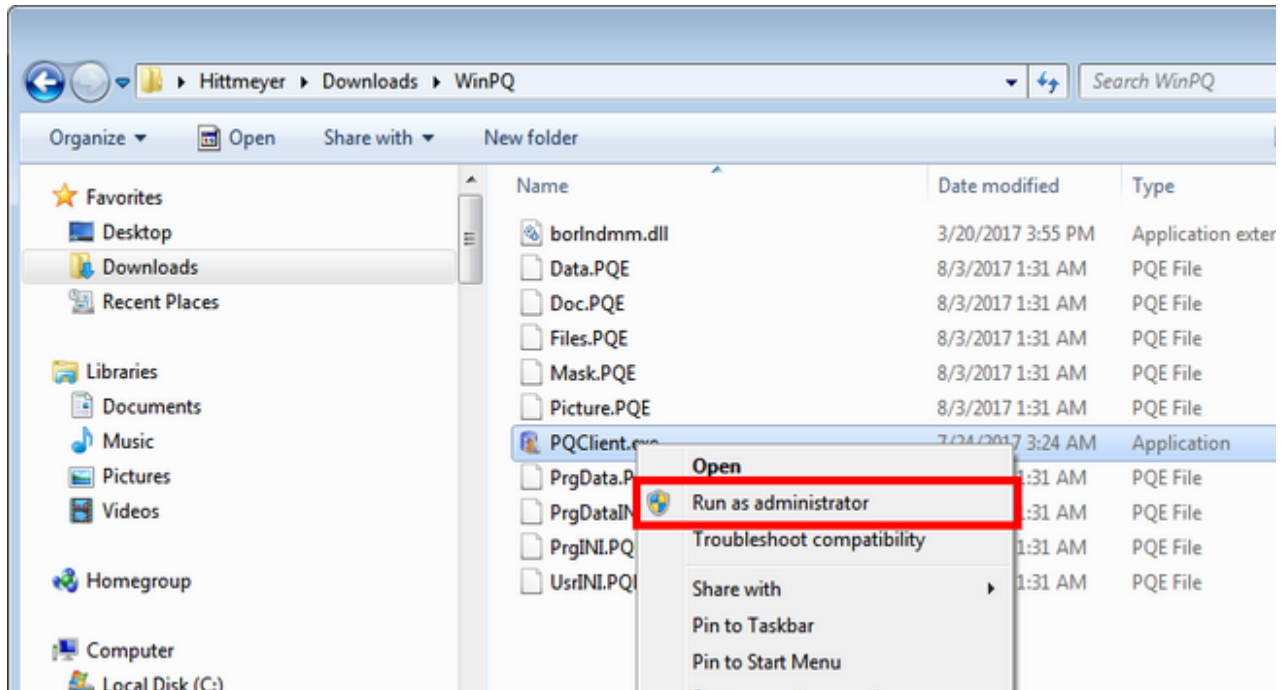
5. At the end the WinPQ client installation files are stored in the given folder. The installation of the WinPQ client is described in the next section.



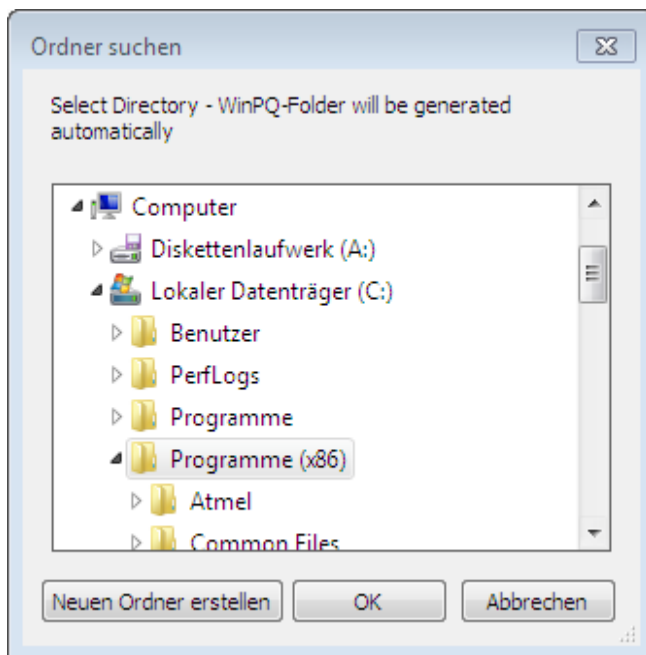
Install the WinPQ client

This section describes the WinPQ client installation on a client computer with the created WinPQ client files from the [previous section](#).

1. First start the file *PQClient.exe* in the WinPQ client folder with administrative rights.



2. Select the directory for the installation of the WinPQ client, e.g. C:\programs\). Please note that if that directory has limited rights the program PQExport.exe must be started with administrative rights. The WinPQ files are created in the selected folder. All user settings will be stored in the user directory %ProgramData%.





WinPQ Desktop PQStart

Elements of the WinPQ desktop

The program PQStart (via desktop shortcut WinPQ) is the communication and control center of WinPQ. The configured devices are represented by a device tile each which allows direct device access.

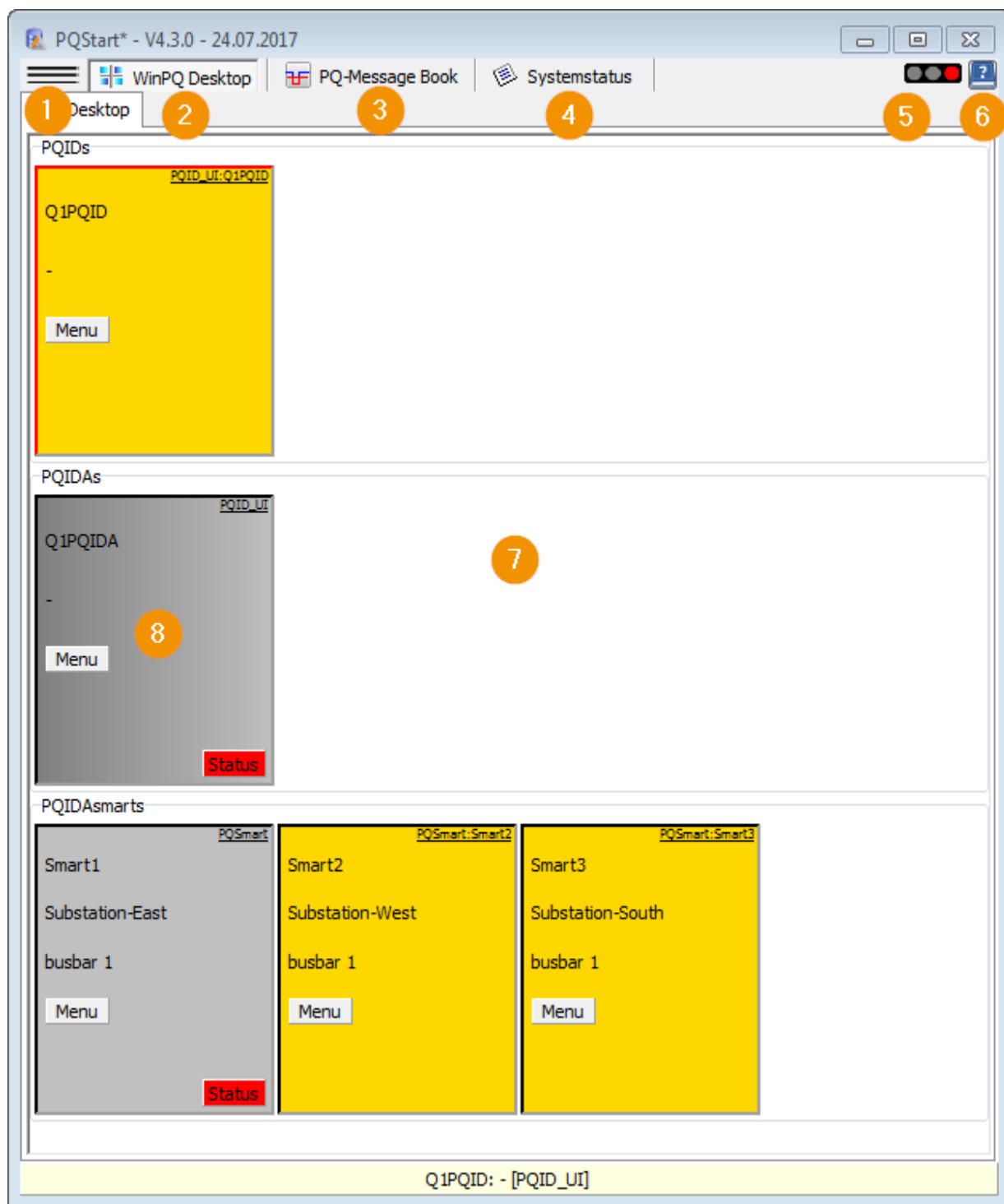
The most important functions of the software are:

- Desktop interface with a device overview, settings and measurement data access (including device labeling)
- Direct access to the measurement data on the devices (settings, configuration, parameter settings and other device data) or to the measurement data in the WinPQ database
- Access to the settings and configuration of the devices
- Alarm messages of PQ-events fault records or binary input state changes
- Alphanumeric or graphical presentation of online data, e.g. mean values of the 3-second data class

Interface of the WinPQ Desktop with device overview

The WinPQ Desktop (program PQStart) enables a complete overview of all devices and direct access to all program features of the WinPQ software.

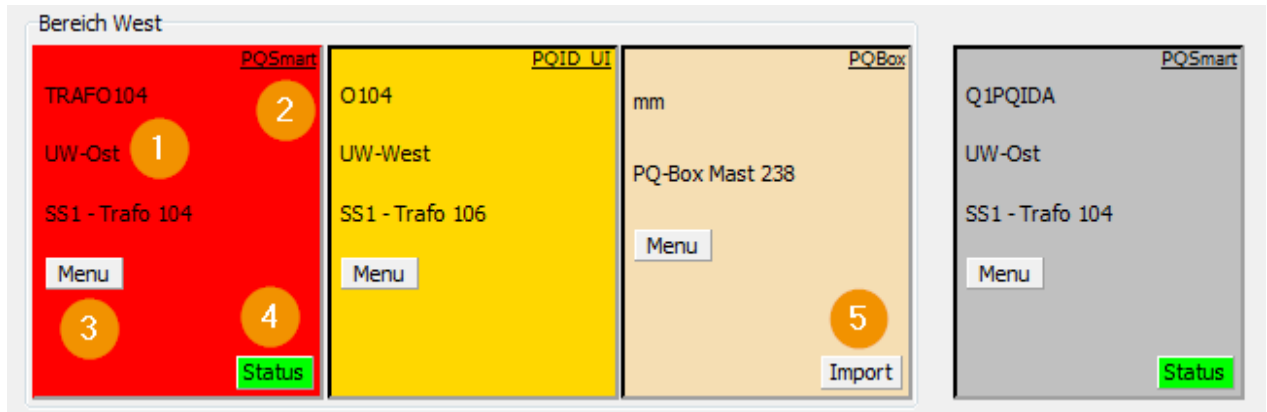
- 1 **Mainmenu** of WinPQ (add PQ-devices, system management with the program PQAdmin etc.)
- 2 **WinPQ Desktop** displays the device overview desktop in device tile view by default
- 3 **PQ-Message Book** lists all the PQ-events and the fault records
- 4 **Systemstatus** is the central system monitoring program section and lists the messages of the WinPQ programs
- 5 simplified view of the current **Systemstatus** (as described above) with a traffic light
- 6 **WinPQ Help** provides manuals, data sheets and more documentation
- 7 WinPQ Desktop displays the configured devices grouped in the tile view



Presentation of the devices in WinPQ

Presentation of the device tile

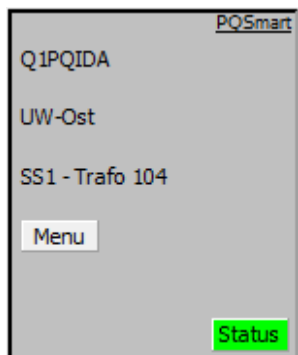
All properties like specifications, connection information, GPS-coordinates etc. of the device can be found here. The device tiles can be grouped (Bereich West) or spaced over various tabs for a better clarity.



- 1 freely selectable label of the description of the device
- 2 Type of the device
- 3 Selection of the available functions of the device with the tile **Menu**
- 4 **Status** provides information about occurred fault records or PQ-events (see also section [Alert settings](#))
- 5 **Import** provides the manual import of measurement data (e.g. from a PQ-Box)

Colors of the device tiles

The coloring of the device tiles have the following meanings.



The device **Q1PQIDA** is in operation and monitored by the WinPQ software.



The device **O 104** is created but there is no measurement data in the database yet.



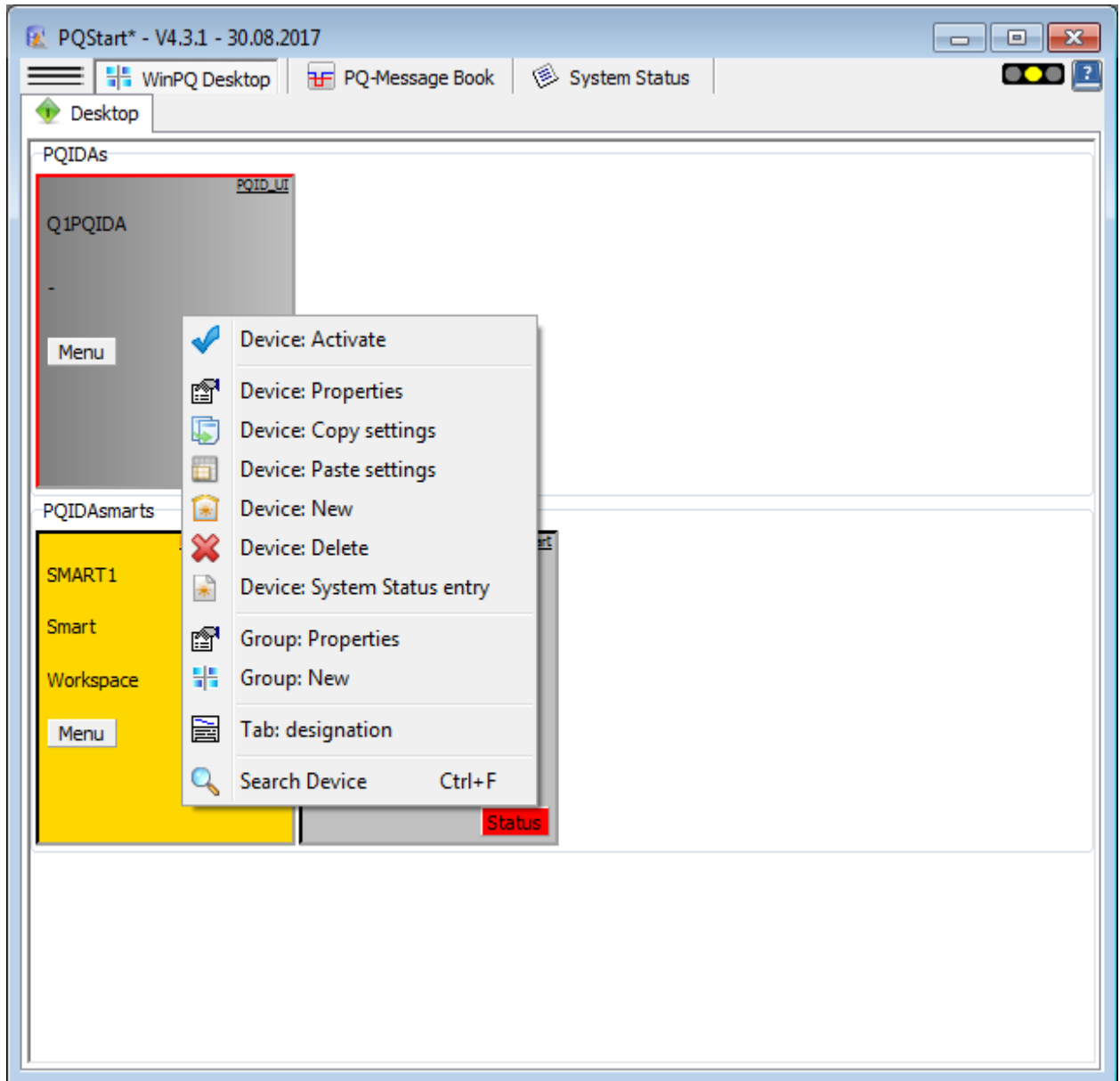
A communication problem with the device **Trafo 104** occurred, the device was disconnected and is not available.



Create devices, groups or tabs

Create devices

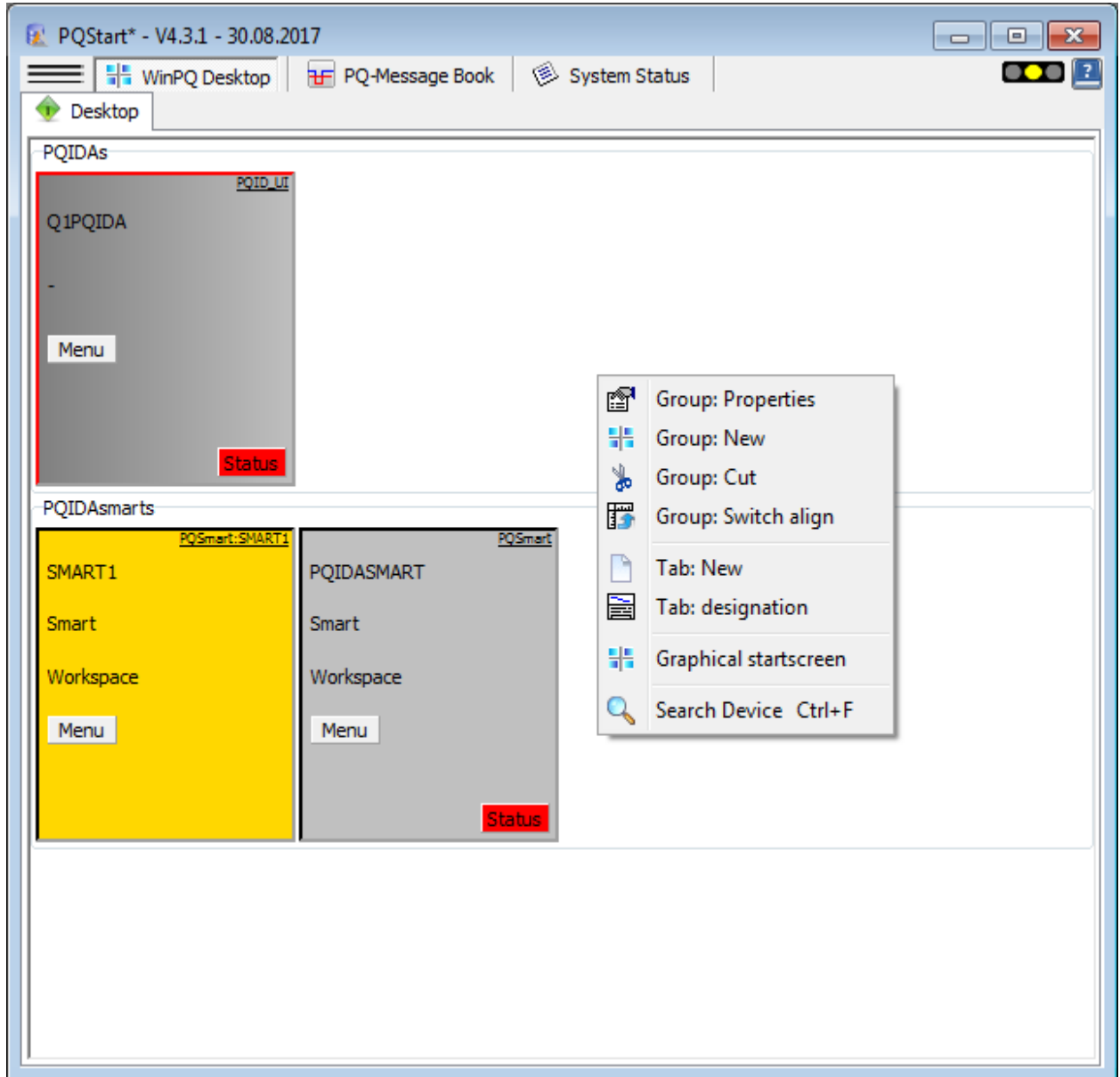
Open the device menu by right mouse click on the device tile. The device menu provides the following options.



Device: Activate	Device can be activated and deactivated here (change of database connection)
Device: Properties	Set the properties for this device, see Basic device settings
Device: Copy settings	All settings under "Device: Properties" are copied
Device: Paste settings	Paste the copied settings
Device: New	Creates a new device
Device: Delete	Devices will be deleted from WinPQ Desktop
Device: System status entry	Set a new system status for the selected device
Group: Properties	Name and size of the group can be changed
Group: New	Creates a new group
Tab: designation	Changes the name of the tab

Create groups of tabs

Open the desktop menu by right mouse click on the WinPQ desktop. The desktop menu provides the following options. The name of the current active Tab "Desktop" can be changed here for example.



Basic device settings

A right mouse click on a device tile opens the context menu of the device. The "Device: properties" option opens the basic device settings. A device tile can be created for every device with is connected to the WinPQ system. The tile provides direct access to the corresponding device. Please choose a significant device tile designation to prevent allocation problems later. The basic device settings window is described below.

SMART1: Smart;Workspace [PQSmart]

Device Alert

Device tile basis parameters

Device type: PQI-DA smart Database ID: SMART1 unallocated Meters: Operation mode: ☒ Operation Mode ☐ Offline (SD-Karte) ☐ Mixed operation Firmware update Online diagnosis

Device tile designation

Designation: Smart;Workspace Design, busbar 1: Menu

Device DataBase connection

DB-Connection: PQVisu

Communication: Device tile to the measuring device

IP address / DNS name: 192.168.056.190 Port: 5040

Device tile size and data monitoring

Left: 3 Top: 18 Width: 150 Height: 177 Data monitoring time [min]: 180 Inherit this Properties

Comment:

Font Colour

OK Cancel



If the device was created by the setup wizard, the corresponding designations are set automatically. The settings can be customized in the device properties window as shown above (for a PQI-DA smart).

The most important settings are:

1

Device tile basic parameter: Device type and database ID:

The database ID (SMART1 in the example above) is the linkage of the device tile to the data of the measurement device in the database. For this reason the database ID has to be unique. If the device was created by the setup wizard the database ID is already set correctly. Please note that there is a difference between the PQI-D(A) and the PQI-DA smart device regarding the database ID as described below.

PQI-D(A): The database ID is automatically created by the software from the E-LAN identification and the name of the device (8 digit) (Extended ID). Therefore it is recommended that you enter the E-LAN identification as well as the device name on the PQI-D(A) one time on commissioning. This is not to be changed to prevent assignment problems!

PQI-DA smart: The database identification is a name independent on the device. The assignment of data base to PQI-DA smart is done via the connection (IP address). The database identification is a parameter, which is taken directly from the installation assistant. The database identification can be viewed under "Menu>>System management>>devices and communication" and also changed accordingly.

2

Device tile designation

A modification of the device tile designation do not affect or change any settings on the device. For this reason the designation of the device itself and the device tile designation may differ. The text can be freely selected, e.g. "Smart;Workspace" and a semicolon sets a line break.

3 Device database connection

The database connection can be changed in this section. The default connection is PQVisu.

4 Communication: Device tile to the measurement device

The connection settings in this section link the device tile with the physical measurement device corresponding with the communication parameter IP address or DNS name and communication port. The communication parameter differ depending on the device type PQI-D(A) or PQI-DA smart.

Device	IP-address / DNS name	Port
PQI-D(A)	IP-address of the servers which runs the PQRS232-Server, <i>localhost</i> by default	intern communication port of the connection to the device, e.g. 1701
PQI-DA smart	IP-address of the PQI-DA <i>smart</i>	default is 5040

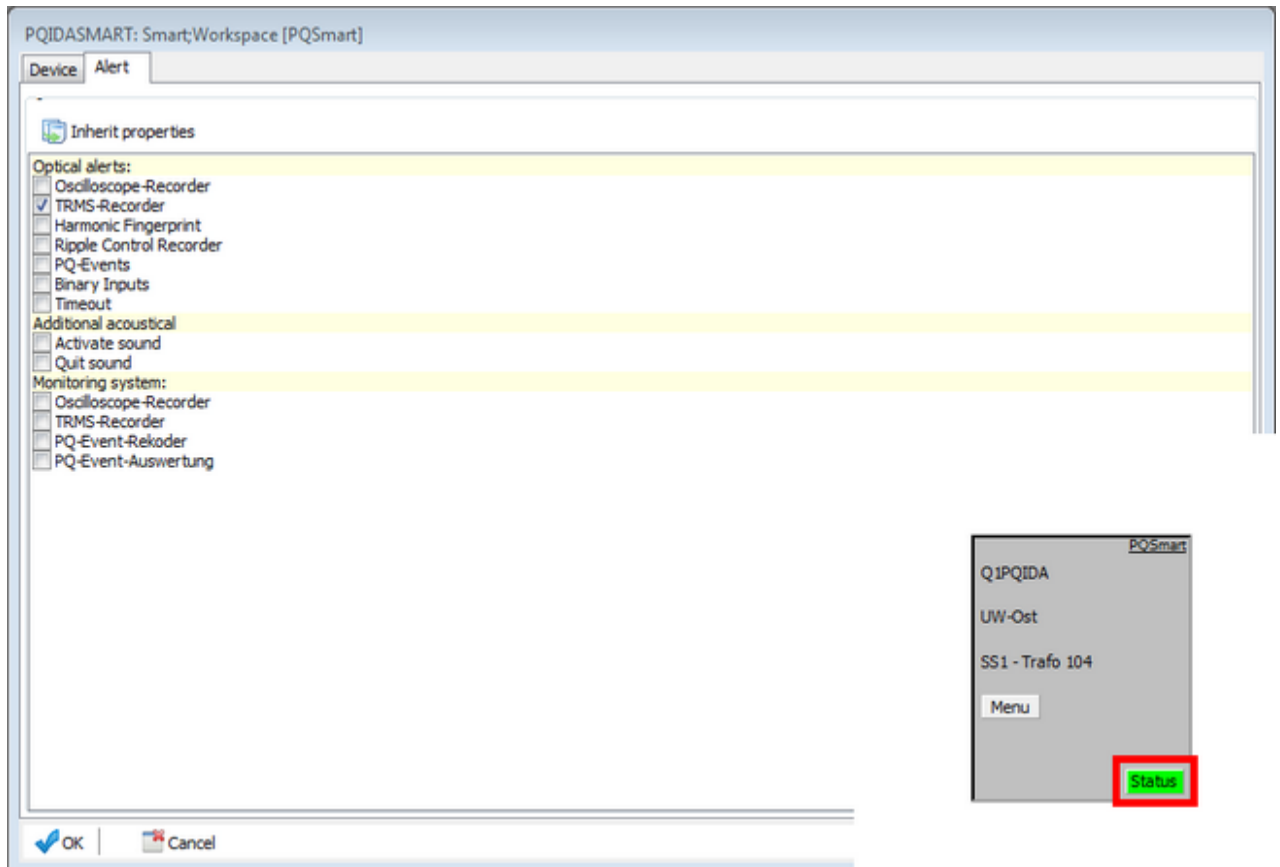
5 Data monitoring time

The maximum data transfer time difference in minutes is set in this field. In the example above the max. time difference is set to 180 minutes. That means after max. 180 minutes WinPQ connects to the device and transfers the latest measurement data to the database. Your recommendation for the max. data transfer time difference is 30 minutes for permanently connected devices. Device connections with high communication costs like modem links should be read much rarer, e.g. once per day (every 1440 minutes).

Alert settings

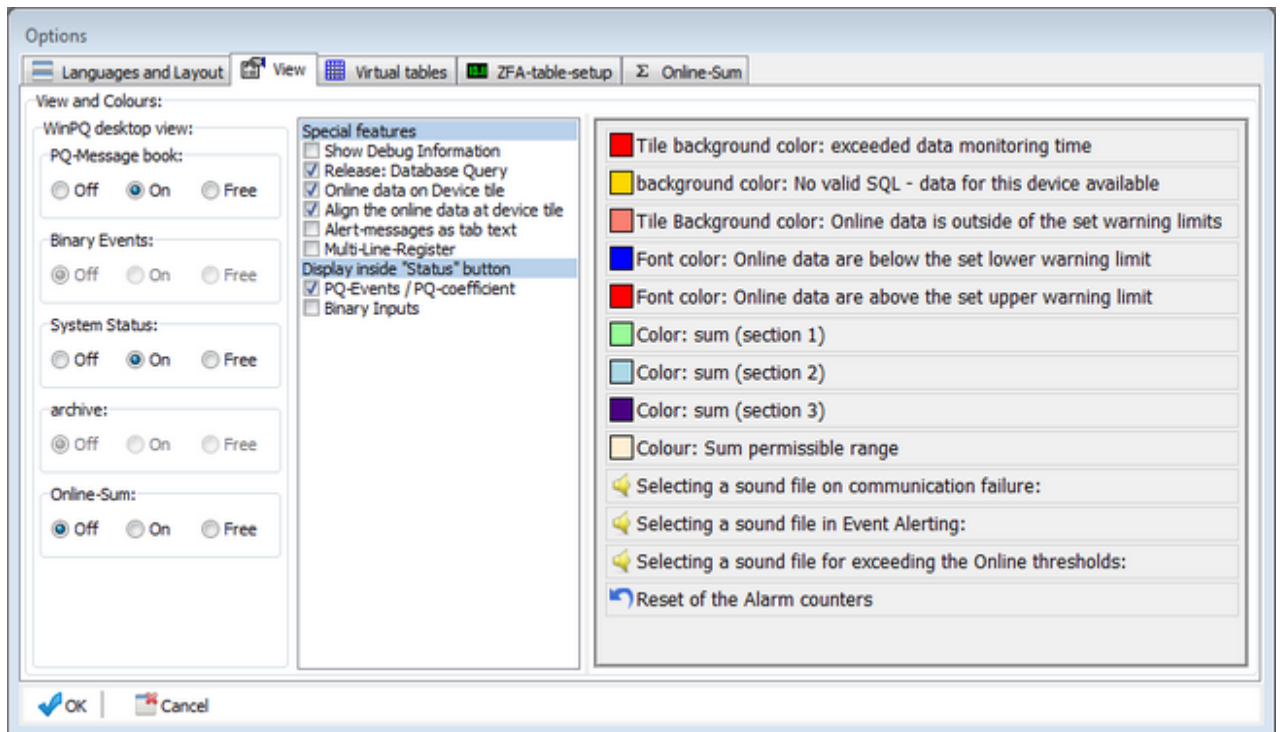
The alert settings of a device are located at the device properties menu. Right click on a device on the WinPQ desktop and select Device: Properties and switch to the tab Alert in the opened device properties window, see figure below. There are different alert settings for incoming events available, e.g. "quit sound" plays an acoustical alarm sound signal as long as the event was not receipted. The TRMS-Recorder alert option is activated by default and recommended.

In case of an active alert, e.g. the TRMS-Recorder, the color of the status display on the device tile (located on the WinPQ Desktop) changes, see cutout in figure below, from green to red.



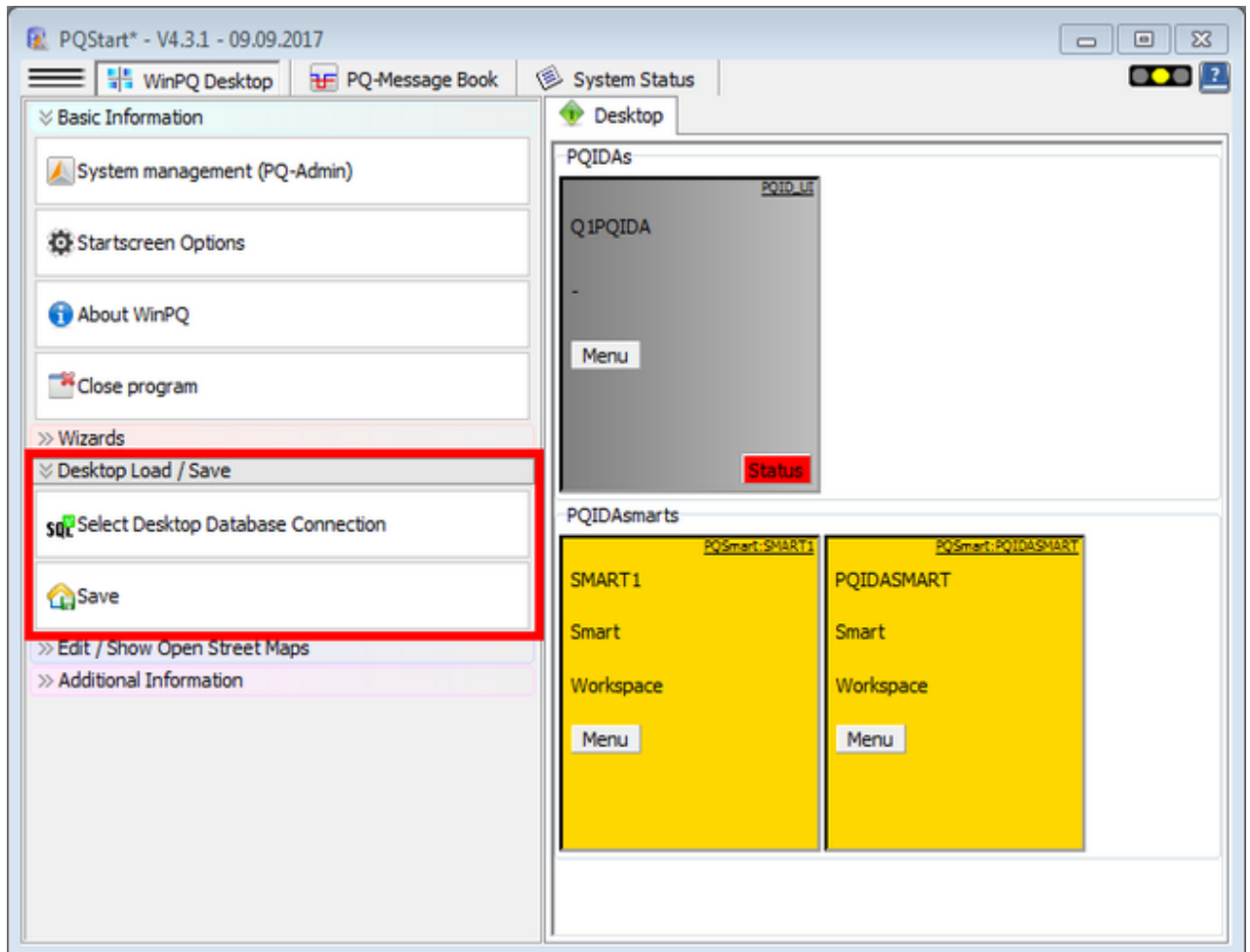
Modification of the program interface

The appearance of the WinPQ program interface can be modified. The corresponding options are located in the main menu of the PQStart (WinPQ Desktop) in the section *Startscreen Options*.



Save the WinPQ Desktop

Since version 4.3 of WinPQ the desktop is no longer stored locally as XML-file, *wpdesktop.xml*, but also saved centrally in the WinPQ database. For compatibility reasons the desktop XML file is also stored locally. The desktop is saved manually with the main menu as shown below. WinPQ compares the local XML file with the desktop file in the database automatically and synchronizes them if necessary.



The database in which the WinPQ desktop should be stored is selected by *Select Desktop Database Connection* in the main menu. The default setting is shown below and should not be changed usually.

Selection of Desktop DataBase

Selection of Desktop DataBase

Eventually it is necessary to choose another Database connection!

PQVisu

Password

connection parameter

Key	Value
ConnName	PQVisu
DriverName	MySQL
HostName	LocalHost
Port	3306
UserName	PQVisu
DataBase	PQID

Next | Save | Test DB connection | Cancel

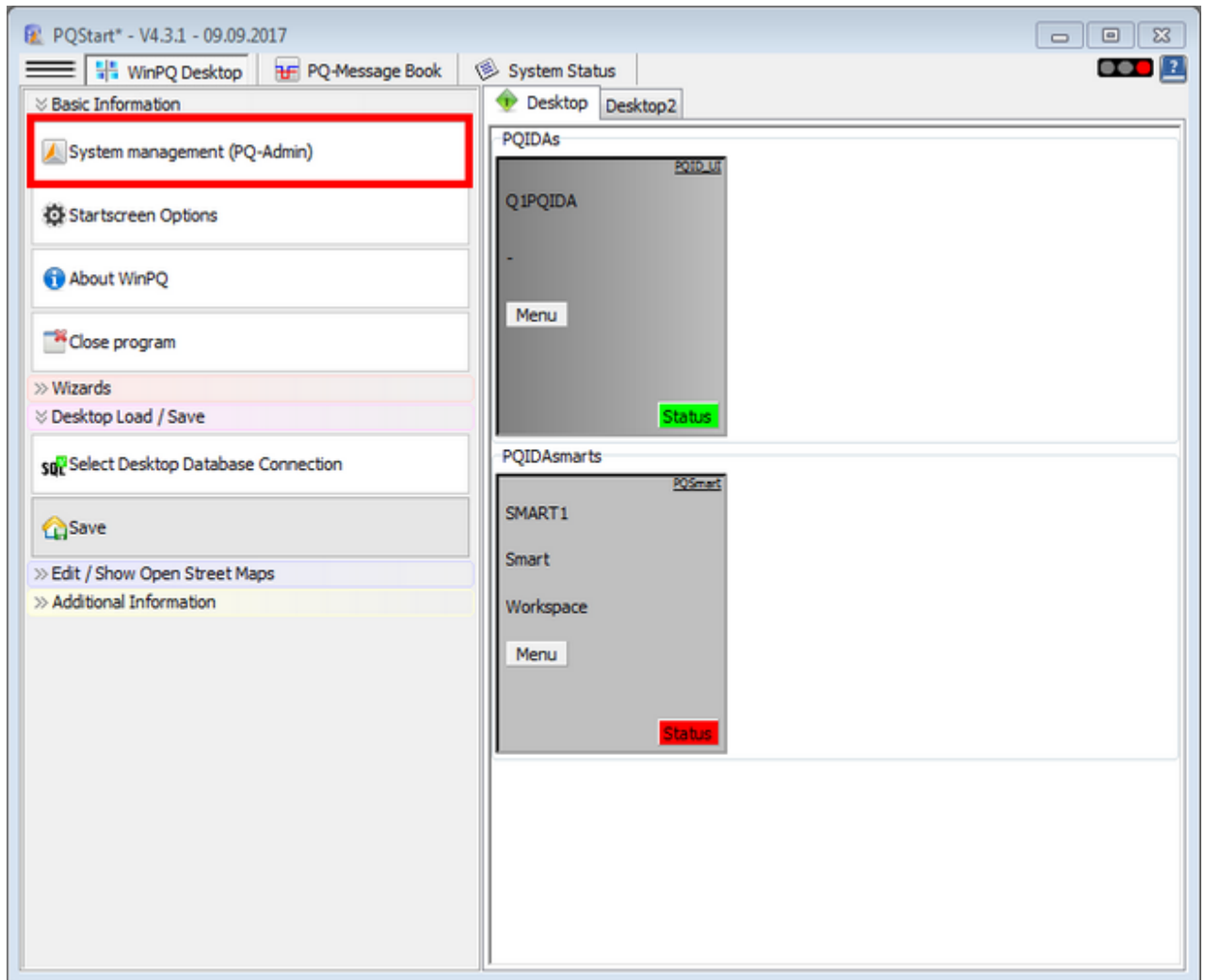
The WinPQ Desktop is stored automatically, e.g. after the setup of a new device. Also before closing the WinPQ Desktop window (PQStart application) a corresponding dialog is shown if the settings should be saved (in the database). Furthermore new added device tiles are also stored in the database automatically and manual savings are no longer needed.

System Management (PQAdmin) - Setup of the WinPQ program

The System Management of WinPQ (PQAdmin program) provides the complete setup of the WinPQ software. The setup of all functional settings and tools like automatic reports, E-Mail settings, device management, database, extended and license management settings and the group policy is made here.



The System Management is described in the WinPQ Manual.



Setup PQI-D(A) device

The setup of the PQI-D and PQI-DA (abbreviated as PQI-D(A) via [network](#) or [modem](#) and the configuration of the [time sync](#) and parameter settings are described in this chapter.

Network connection TCP/IP setup of PQI-D(A)

Preparation of the PQI-D(A) TCP/IP connection

Agree upon a free IP address with your network administrator, which can be permanently assigned to the device. Also note the subnet mask of your network. Also note the MAC address of the device. You will find this on the type plate. If the connection to your office network runs via a router (gateway, bridge), also note the IP address of the router. If you connect the device directly to your laptop, please use a crossover cable, not a patch cable.

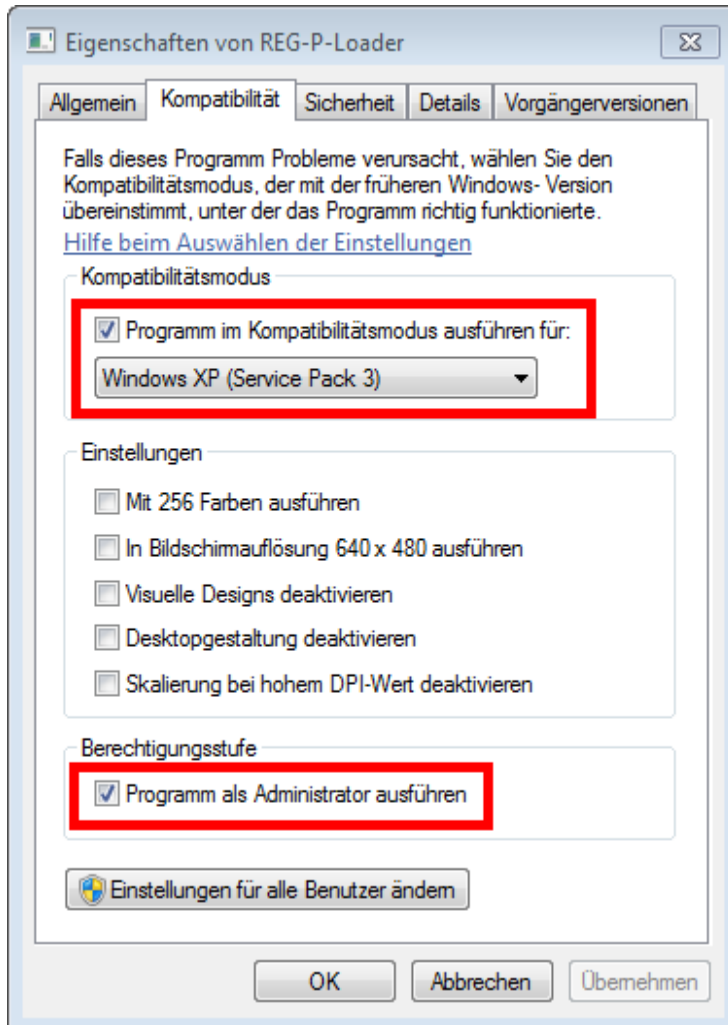


Variants of the PQI-D(A) TCP/IP connection

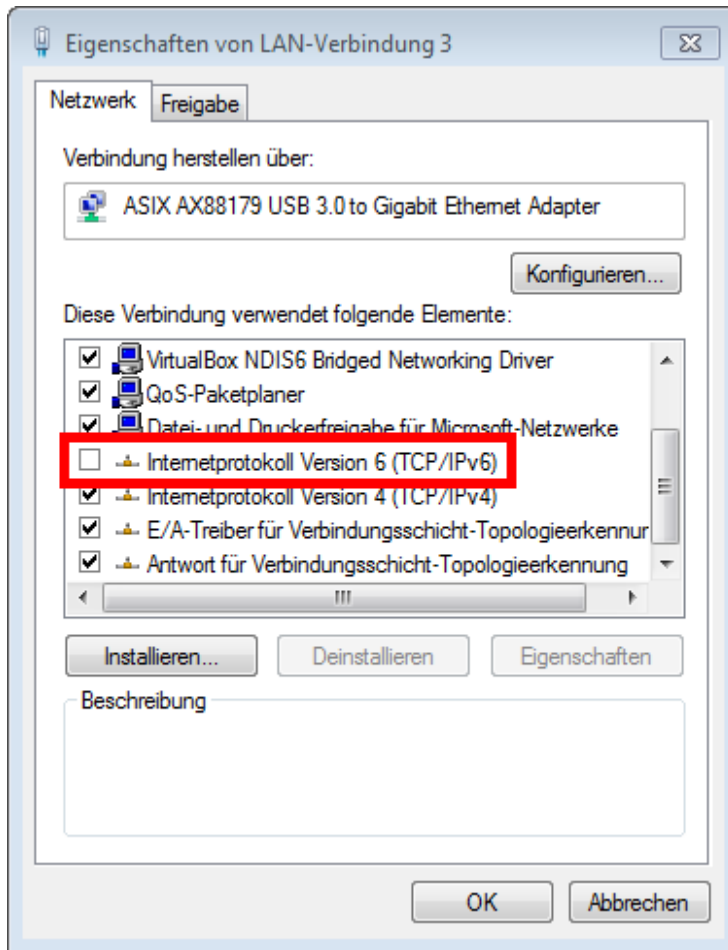
The PQI-D(A) connection depends on the device type (with or without integrated Ethernet interface). The PQI-D(A) with [integrated ethernet-interface](#) or with an [external COM-Server](#), e.g. from the company Wiesemann & Theis.

Connection with integrated ethernet interface

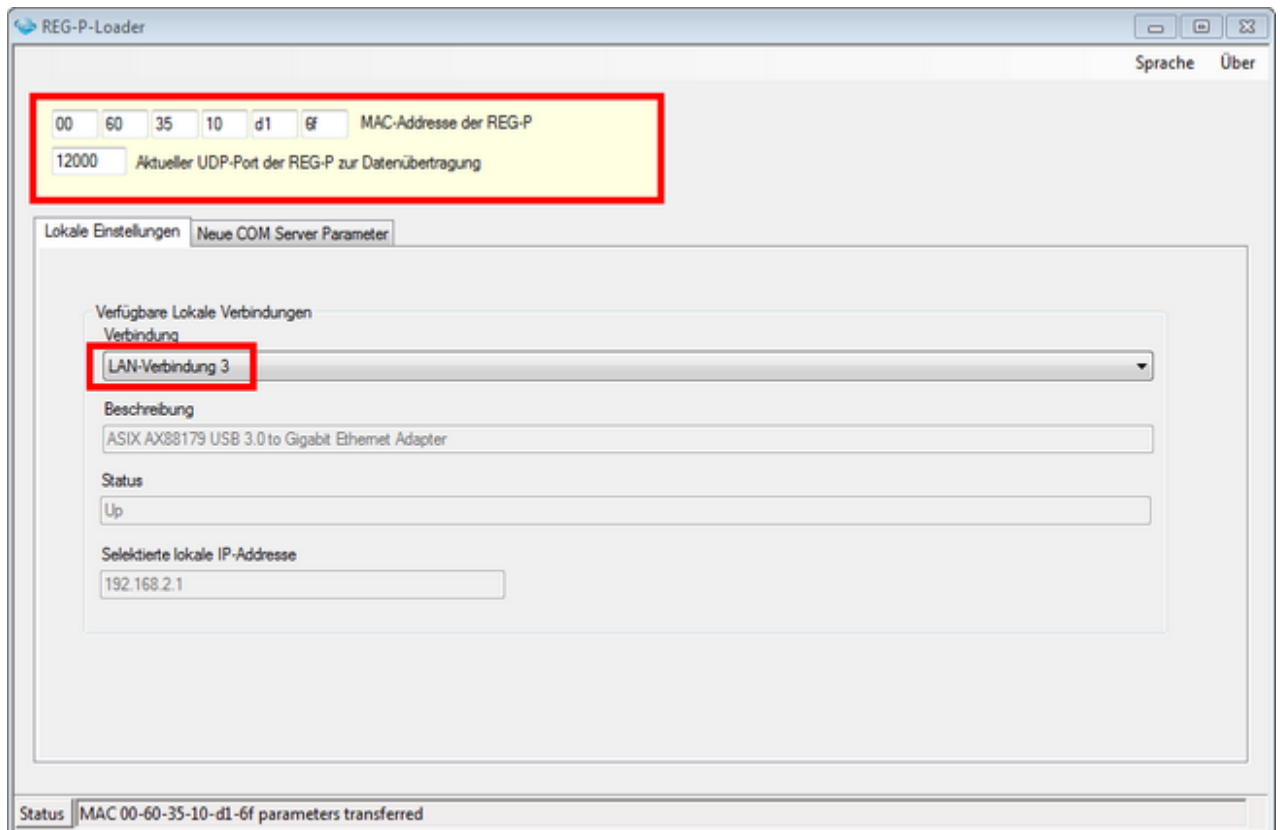
1. The program REG-P-Loader is required for the configuration of the ethernet interface of the PQI-DA. The installation files are located on the WinPQ installation CD or the installation folder. Install the REG-P Loader and execute the software with use of the following options.



2. Das Link the PQI-D(A) and the computer with a network cable (crossover cable). The TCP/IP protocol version 6 must be disabled in the network adapter settings as shown below.



3. Run the REG-P Loader now, enter the MAC-address of the device which should be configured and choose the correct connection which is linked with the PQI-D(A).



4. On the tab *Neue COM Server Parameter* ① execute the button *COM Server Parameter einlesen* ② to read the current device settings. Subsequently enter the parameters IP address, subnet mask and so on ③ (the parameters are described below).
Finally transfer the new parameter with the button *Neue Parameter übertragen* ④. The program confirms the correct transmission of the settings with a corresponding response.

Description of the parameter:

- IP-address:** The IP address of the measurement device PQI-D(A) which is assigned by the system administrator.
- Subnetmask:** Enter the subnetmask, default is 255.255.255.0.
- IP address of the default gateway:** If the device is connected with a gateway (router or bridge) please enter the IP address of this device here. If there is no gateway present enter 0.0.0.0
- TCP-port (data transfer):** The used communication port, default is 1023.
- T-O:** For the first sign = 240
- T-O:** Between the signs = 36

5. The settings of the COM2 interface (via ParaExpress) of the PQI-D(A) interfaces (in the PQI-DA the PQI-D is connected with COM1 to the front plate and the COM2 internal connected with the REG-P and this to the ethernet port):

Mode ECL

Baud Rate 115200

Parity PE

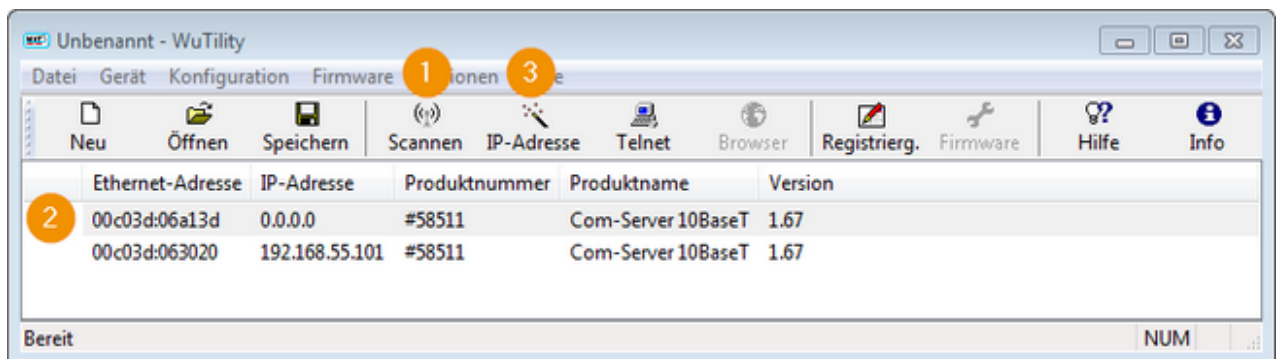
Connection via external COM-server

If the PQI-D(A) has no integrated Ethernet interface it can be connected with an external COM-server via TCP/IP to the network.

1. Connect the ethernet port of the COM-server ① and your computer with a network cable. The PQI-D(A) and the COM-server ② are connected with a null modem cable (serial) as shown below.



2. The installation of a COM-server from the company Wiesemann & Theis is performed with the program WuTility (install the program with the supplied CD or download it [here](#)). In the program interface (see figure below) first search all available COM-server with *Scannen* ①. Subsequently select the corresponding device ② from the list and third open the device settings with the *IP-Adresse* button.



3. The network settings of the COM-server are configured in the settings menu as shown in the following figure. After registering the parameter configuration click the next button to complete the setup.

Geräteeinstellungen: Netzwerkparameter

☐ dynamisch (DHCP)
 ☐ dynamisch (BOOTP)
 ☒ statisch

IP-Adresse (muss eindeutig sein): 172 . 16 . 9 . 35
 Adressbereich: beliebiges Netzwerk

Derzeitige IP-Adresse des Gerätes:

Subnetzmaske: 255 . 255 . 0 . 0
 Vorgabe: Windows-Netzwerk

Standardgateway: 192 . 168 . 1 . 102

DNS-Server A: 192 . 168 . 1 . 10

DNS-Server B: 192 . 168 . 1 . 102

< Zurück Weiter > Abbrechen

Description of the network parameter:

- IP-address:** Per default the three first fields of the IP address are deactivated. To change these parameter select "beliebiges Netzwerk" in the drop down menu "Adressbereich".
- Subnetmask:** Insert the value given by your system administrator, default is 255.255.255.0.
- Default-Gateway:** Insert the value given by your system administrator. If no gateway is used insert 0.0.0.0.

4. The settings of the COM-interface of the PQI-D(A) devices for the W&T COM-server are:

- Mode** ECL
- Baud rate** W&T COM-Server with **100 MBit** Ethernet: 115200 baud
W&T COM-Server with **10 MBit** Ethernet: 57600 bau
- Parity** P-
- Protocol** RTS (CTS)

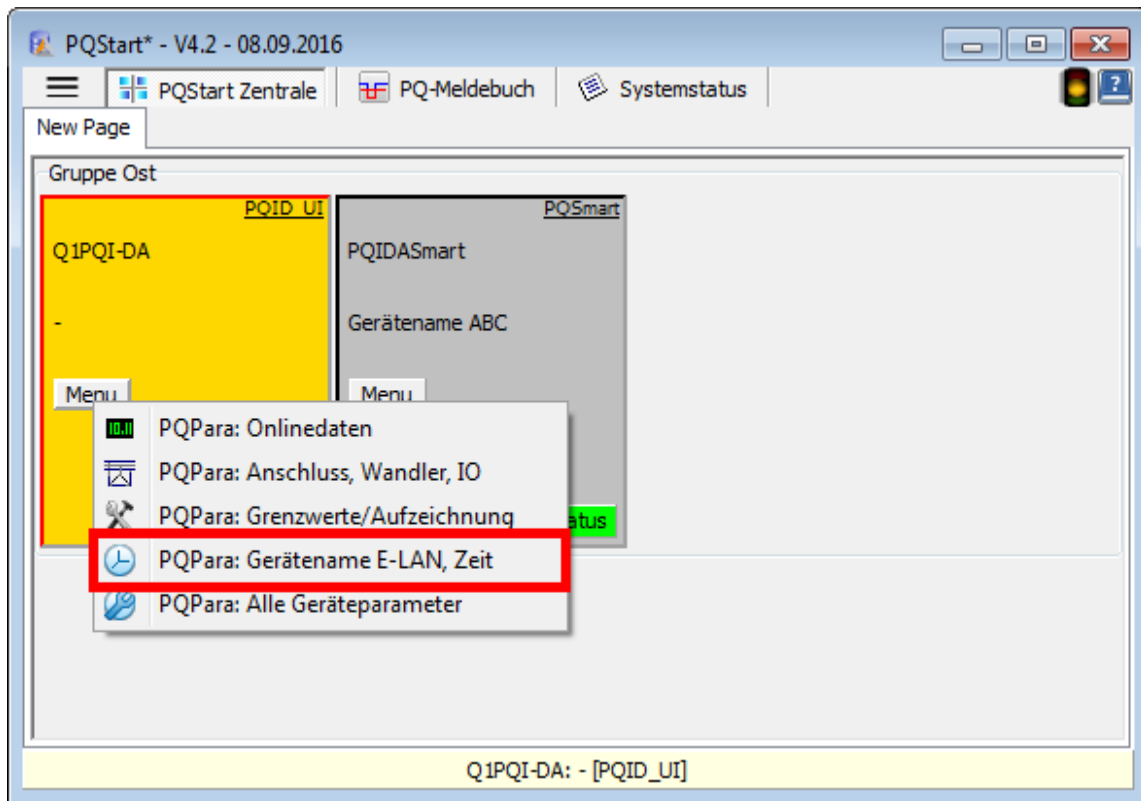
Modem connection setup of PQI-D(A)

There are two different possibilities connecting a PQI-DA with a dial-up modem:

1. The modem is used "unilaterally" to retrieve data. This means that a connection is always made from the control panel, not from the PQI-D side modem.
2. When a fault record occurs, the PQI-D side modem will make contact itself and transfer the fault record.

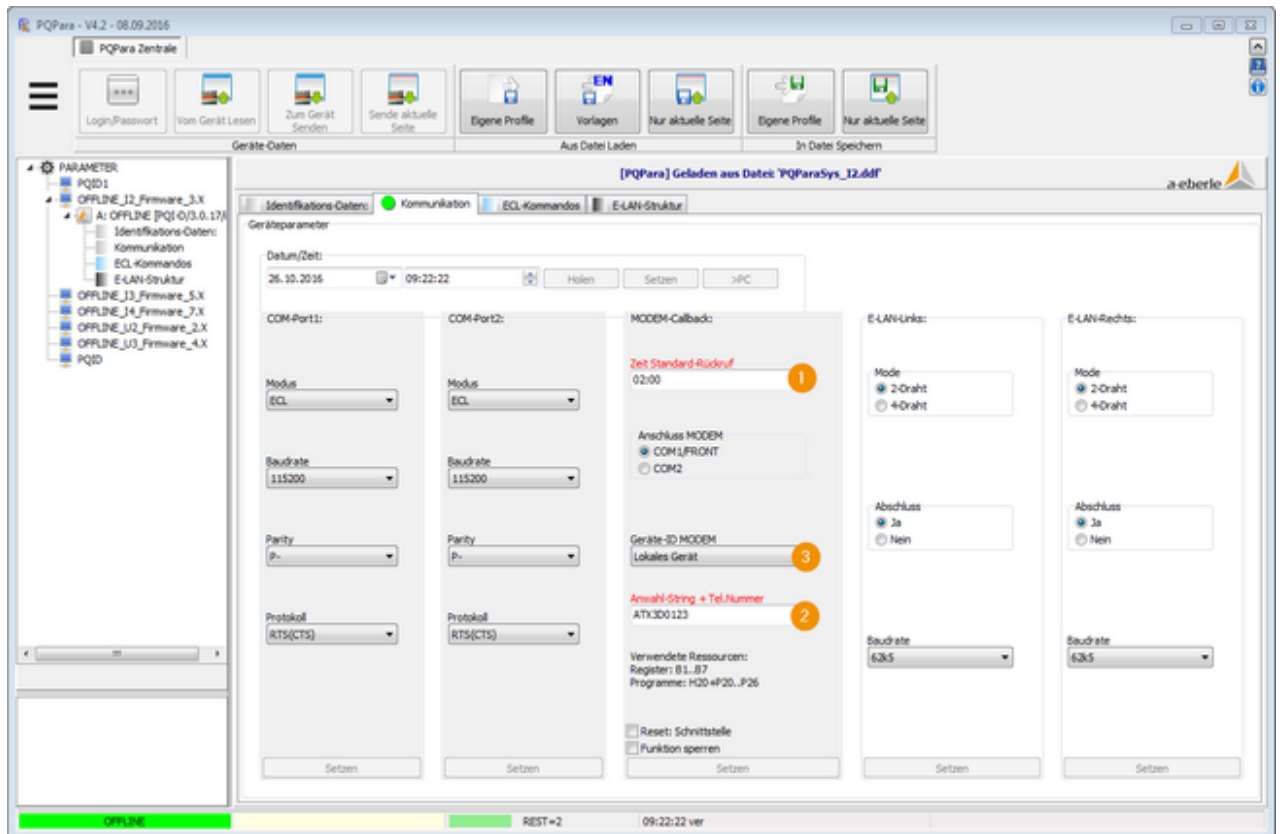
Configuration of PQI-D(A) for modem operation

In WinPQ start the program "PQPara: Name, E-LAN, Time" on the device tile.



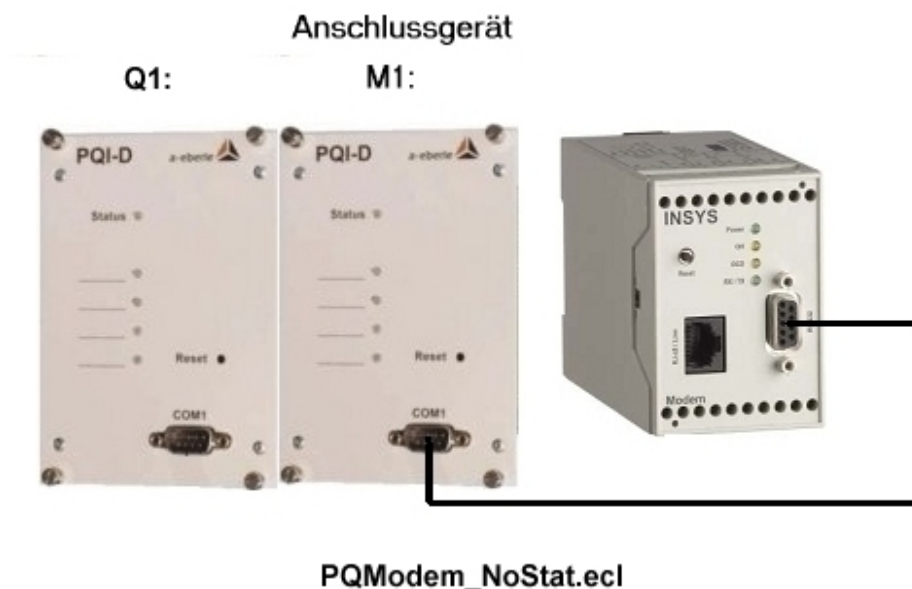
On the second tab, "Communication" you will see the necessary settings for the measurement device interface. Set the interface to which the modem is connected to the correct values. Within the area "MODEM Callback" you can set all parameters for the callback. With "Place" the settings are transferred to the PQI-D.

- ① Time for the daily automatic data transfer from the measurement device to the PC
- ② Dial in string and telephone number of the PC to be called in the event of a fault.



If you want to use your MODEM without automatic callback, you can skip this section and go directly to the section "Set PC side MODEM" in chapter 8.2. The automatic callback of the MODEM in the event of a network event is implemented as a background program. There are two conceivable cases:

Case 1: The modem is connected to a PQI-D.



Case 2: The modem is not directly connected to a PQI-D device in E-LAN, but for example, is connected to a voltage regulator or another REGSys device.

Anschlussgerät

Q1:

M1:



PQModem_Stat.ecf

Communication via E-LAN: Set the identifier of the measurement device to which the modem is connected at position ③ as shown in figure above.

Setting of the modem connected to PQI-D(A)

The PQI-D side modem must be set so that it will accept calls. The required settings for this are (as an example of the AT command for the modem Devolo Microlink 56 k i):

start with standard settings	&F
deactivate result codes	Q1
Ignore DTR	&D0
Echo off	E0
Accept call after 3 rings	S0=3
Close command line = esc	S3=27
Silent operation	L0
Load of Profile 0	&W0
Save settings as profile 0	&Y0

The complete command:

AT&F Q1 &D0 E0 S0=3 S3=27 L0 &W0 &Y0



It is advisable to always use capital letters or always lower-case letters when configuring the modem. A mixture of capital and lower-case letters lead to undesired events in some cases. If you possess another modem, you should have the settings done by a specialist, because a single wrong character will call into question the smooth operation of the modem.

Setting of the modem connected at the receiver

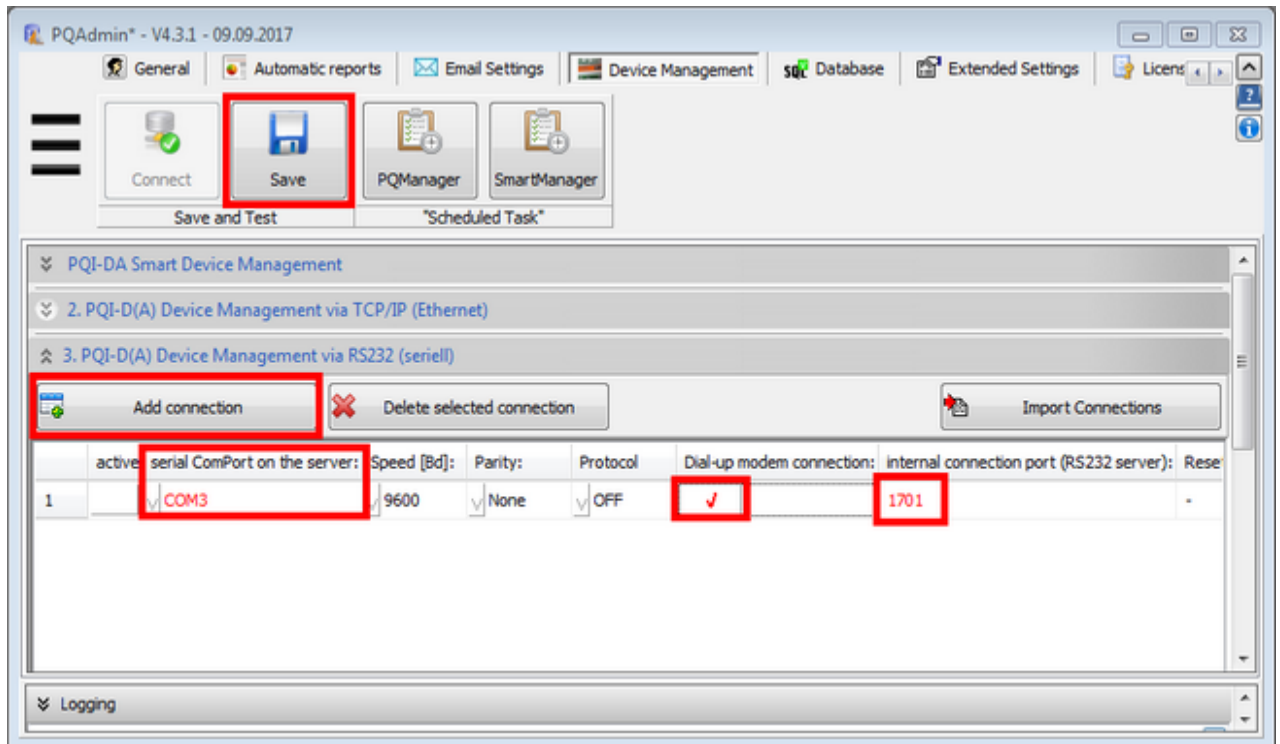
Without modem callback: The modem can remain in standard mode without modem callback.

With modem callback: If the PQI-D side modem calls back, this modem must also be transferred into a status where it can receive calls.

Modem settings on WinPQ Server

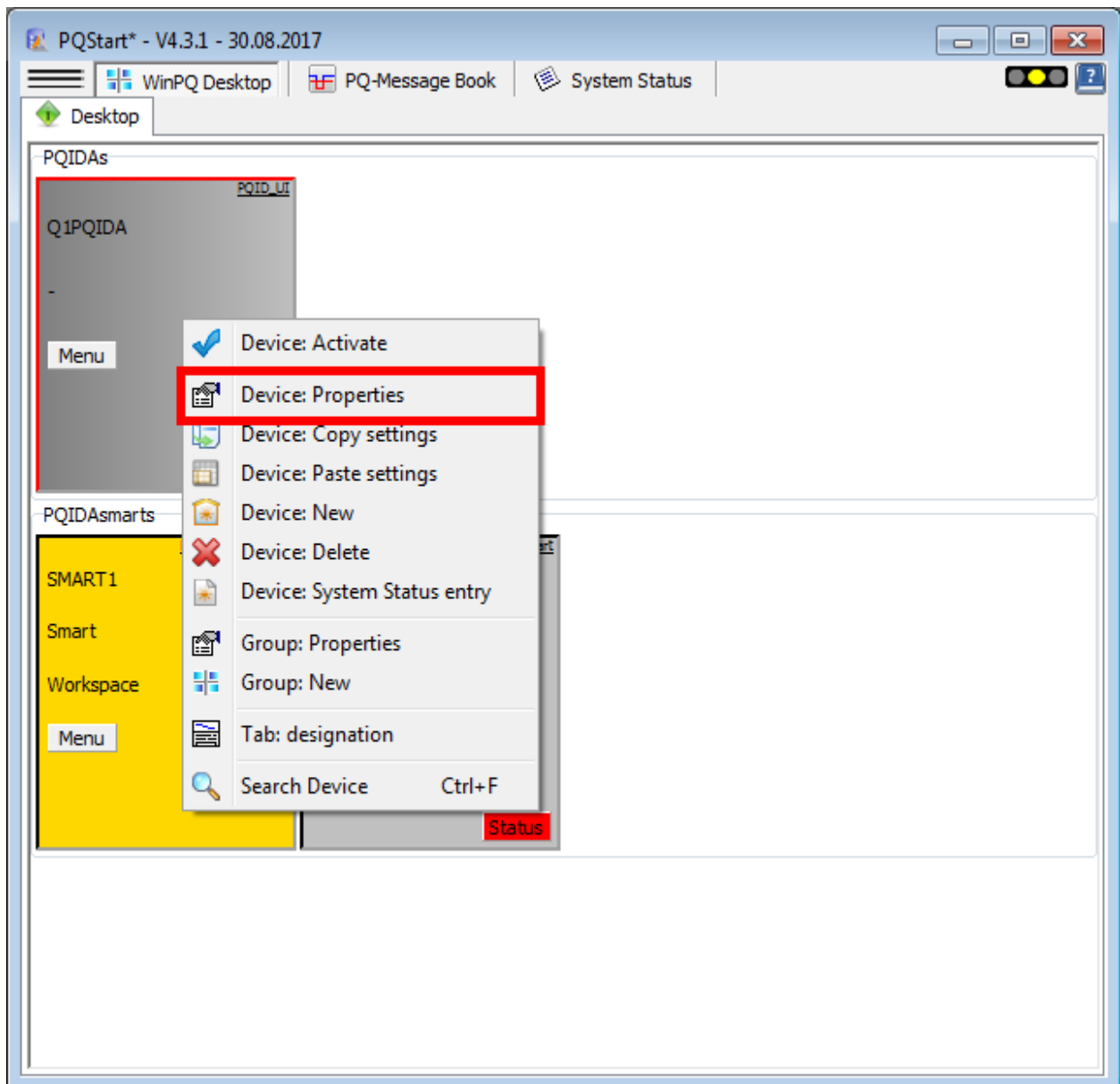
Special settings must be made on the WinPQ server to upload the PQI-D by modem.

In the "Control Panel" under "Devices and Communication>>PQI-D(A) device management" you must add an entry using the "Number". Here you enter the COM interface to which the PC side modem is connected. It is important to check the entry "Dial Up Connection". The "internet connection port" is 1705. This is needed in the next chapter.



Configuration of modem operation

Select *Device: Properties* on your **WinPQ Desktop** (PQStart).



You must set the internal port in the "Basic Settings" which you have been given in the previous chapter (here 1701).

Q1PQIDA: - [PQID_UI]

Device: **dial-up modem** | Alert

Device tile basis parameters

Device type: PQI-D(A) UI (voltage + cu) Database ID: Q1:PQIDA_ unallocated Meters:

Device tile designation

Designation: Designation

Design. busbar 1: Menu

Device DataBase connection

DB-Connection: PQVisu

Communication: Device tile to the measuring device

IP address / DNS name: LocalHost Port: 1701

Device access:

- ☒ Offline Device
- ☐ View Options:
- ☐ Mini-view
- ☐ Mini-Display with 'Status'

Device tile size and data monitoring

Left: 3 Top: 18 Width: 150 Height: 177 Data monitoring time [min]: 180

Comment:

OK | Cancel

Activate the check box "dial-up Modem" and enter the number under which the MODEM device can be reached. If you have a telephone system and must redial 0 enter the "0," before the telephone number. The comma represents a half a second break. This is required for some telephone systems. In addition, you should enter the Pre Dial command X3. X3 order the modem to wait for a dial tone after picking up. For a test, start one of the WinPQ programs to check the functionality of the settings. The program "Name, E-LAN, time" is recommended because it transfers the least amount of data.

Q1PQIDA: - [PQID_UI]

Device: **dial-up modem** | Alert

☒ Device is connected v

phone number: 01234567890

Pre-dial command: X3

OK | Cancel

In the modem section you can enter the telephone number and a Pre-dial command.

Time synchronization bus

Each measurement device in the REGSys family has a highly accurate battery buffered real time clock which updates the system time, even if the backup power is out. The PQSys time synchronization includes the time synchronization with a time deviation of < 20ms (IEC61000-4-30 Class A).

To ensure that the accuracy to world time UTC required by standard IEC61000-4-30 is achieved, and to prevent deviations in the system between the fault records, we recommend using one of the following time synchronizations for your PQSys system:

1. Directly via the time synchronization bus on the PQI-D(A) of a GPS or DCF clock (IRIG A/B...)
2. Via the WinPQ server to the connected PQI-D(A) and via E-LAN
3. Via the COM interface of the time master of a GPS or DCF clock (IRIG A/B...)
4. Via the available control technology for the communication module (NTP / IEC103)

The four different procedures of time synchronization result in different configurations and settings on the PQI-D(A), which will be explained in the following chapters.

Time synchronization bus

Each PQI-D(A) has a so-called time synchronization bus, which offers the option of using a time standard for multiple PQI-D(A)s. The time synchronization bus is configured as a 2-wire bus (A, B with earth) - RS485 / RS422.

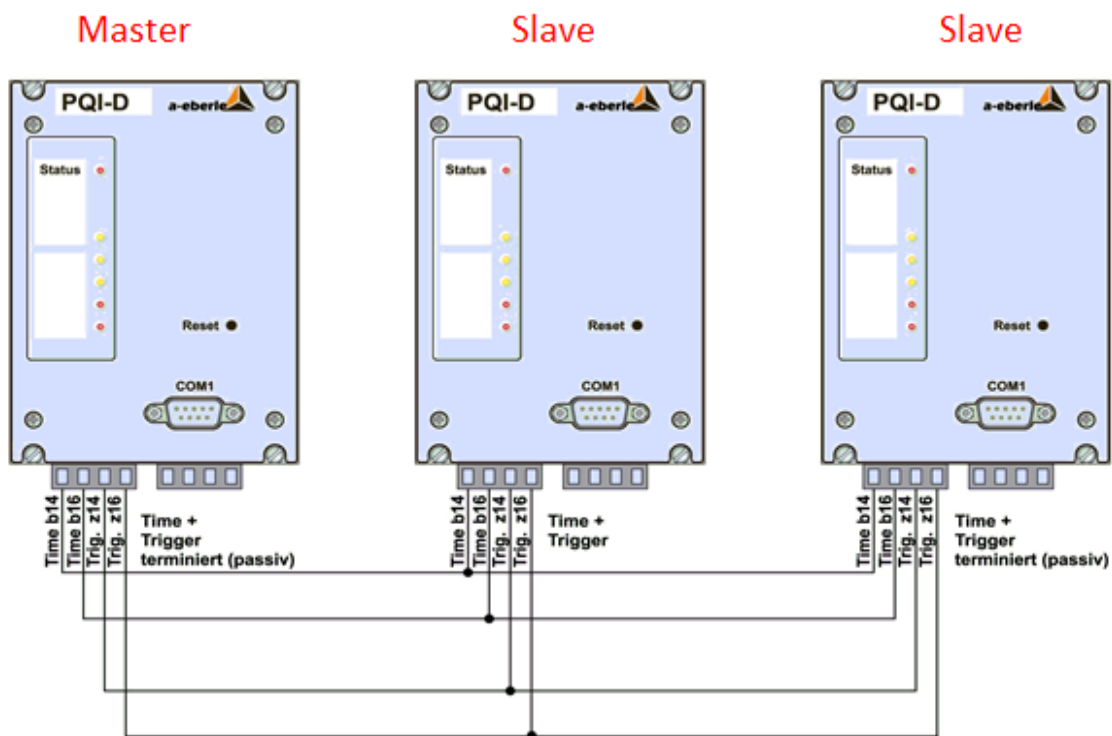
One device is configured as the time master and cyclically transmits its system time to the other PQI-D(A)s (time slaves). The real time clocks of the synchronized PQI-D(A)s are updated exactly to the master PQI-D(A)s.

- **Master / Slave**

One PQI-D(A) which is not connected via the time synchronization bus (stand-alone) must be configured as the time master. The PQI-DAs connected via the bus must be configured as Master/Slave, even if there is no external time synchronization source. In addition, there may be no configuration with multiple connected masters on the bus!

- **Termination**

PQI-D and PQI-DAs connected to each other on the time synchronization bus must be correctly terminated. The first and last participants on the bus must be terminated.



Termination of PQI-D

The termination of the PQI-Ds must be done by dip switch insertion on the side of the PQI-D.

	2 wire – S301						4 wire – S201					
Jumper	1	2	3	4	5	6	1	2	3	4	5	6
Termination time (S 301)	off	off	on	on	on	on	on	on	on	on	off	off
Termination trigger (S 201)	off	off	on	on	on	on	on	on	on	on	off	off
Without termination	off	off	off	off	on	on	off	off	off	off	off	off

Termination PQI-DA

The active termination must be enjoined at one bus end (also with only one PQI-DA!), in that the relevant device A is connected with Term A and with Term B.

Connection-	Function	Terminal	First/last	Other
-------------	----------	----------	------------	-------

bus No.		No.	PQI-DA	PQI-DA
x6	Term A	46	Line „A“	
	A	47	Line „A“	Line „A“
	B	48	Line „B“	Line „B“
	Term B	49	Line „B“	
	GND	50	Line „GND“	Line „GND“



In 19 inch component systems, all settings and terminations for the systems are pre-configured at the factory. Please note the rules above in case you have an exchanged PQI-D.

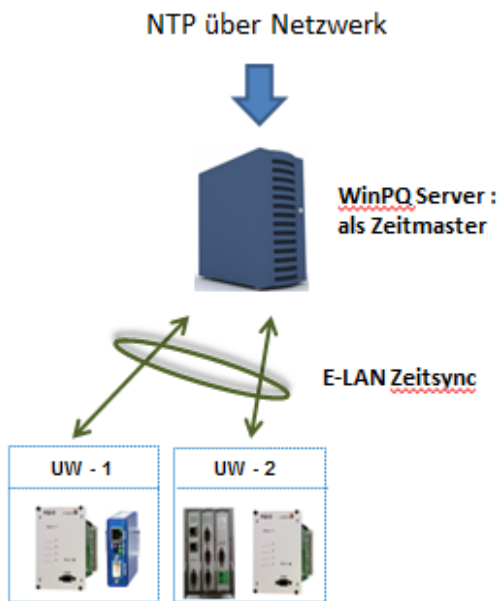
Time Synchronization with WinPQ Server

Due to the frequently used NTP time synchronization method in the domain or within the network of your WinPQ server, your WinPQ server is time synchronized. This provides a quick and simple option to synchronize the time of the PQI-D(A)s via the WinPQ server.

The functionality of this method is that the server sends the server time to the connected PQI-DAs every five minutes.

The advantages of this time synchronization are:

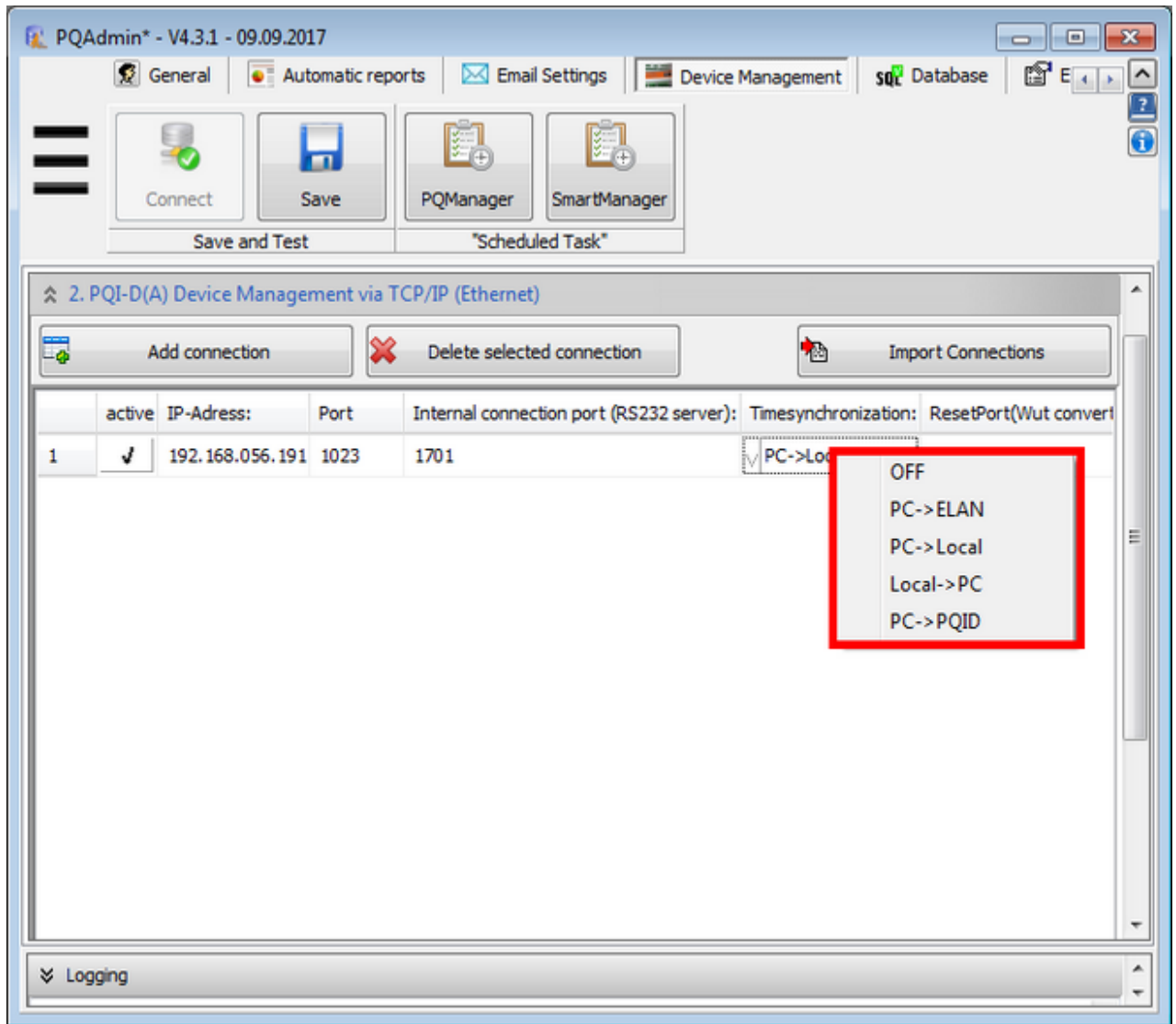
- Very inexpensive, because it is included in the program.
- Quick and easy configuration



Configuration on WinPQ Server

In the introduction there is a description of how you add a PQI-D(A) into the database. The selection of the time synchronization method is also a part of this installation assistant.

For changes or to check which method was selected, you can check the settings in the "Control Panel" under "Devices and communication" for each individual communication path and make changes if necessary.



Configuration on PQI-D(A)

In chapter [Configuration and parameter setup PQI-D\(A\)](#), all complete parameters for time synchronization are explained. If the time synchronization method "Time synchronization via WinPQ server" is selected, the following settings must be configured.

Parameter name	Value
Summer/Winter Conversion:	Release
Operating mode:	Master (if stand-alone and first device on bus)
Device time zone:	Your time zone (Germany: 1)
Release of time setting via ECL:	Protected or on

Behaviour and Configuration on the Time Synchronization Bus

If multiple PQI-D(A)s are connected via the time synchronization bus and are synchronized using the method "Time synchronization via WinPQ server", we recommend the method PC > local (the WinPQ server transmits the server time to the time master on the bus) and then distributing the time via the RS485 time synchronization bus.

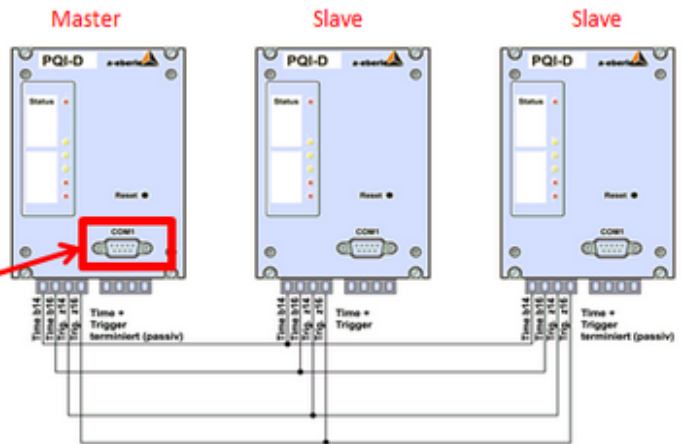
This results in the following settings:

PQI-D	Parameter name	Parameter value
Master	Summer/Winter Conversion:	<i>Release</i>
	Operating mode:	<i>Master</i>
	Device time zone	<i>Your time zone (Germany: 1)</i>
	Release of time setting via ECL:	<i>Protected or On</i>
Additional PQI-D(A)s:	Summer/Winter Conversion:	<i>Release</i>
	Operating mode:	<i>Slave</i>
	Device time zone	<i>Your time zone (Germany: 1)</i>
	Release of time setting via ECL:	<i>Protected or On</i>

Time Synchronization with external receiver

If a radio clock with a DCF77 output signal (DCF77 radio clock or GPS radio clock with DCF77 output signal) is connected to the RS232 interface and it is set to receive this signal, the time master will send the signal received over the time synchronization bus to the slaves, via which all further PQI-DAs can be synchronized.

GPS-UHR: Merkmal D1
z.B. 111.9024.47



An example of a configuration of a GPS clock, which is connected to the COM interface of the master. All PQI-D(A)s connected to the time bus receive the time from the master.

Connection DCF77 radio clock module

The radio clock module and the COM2 connection cable for the serial interface COM2 of the REGSys™ device are included in the scope of delivery of the DCF77 radio clock module for REGSys™.

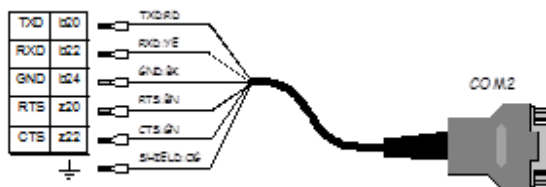
Please note that low frequency disruptions may permanently affect the receipt, iron girders and control boxes of metal disrupt the function less, however. To align the DCF receiver, please follow the instructions in chapter [Configuration](#).

- **Connection to COM1 (front side):**

The COM1 interface on the front side of the device is available for measurement devices. The radio clock module can be directly connected to this COM1.

- **Connection to COM2 (back side) or PQI-DA via terminal on the front:**

The COM2 signals TXD[b20], RXD[b22], RTS[z20], CTS[z22] and GND[b24] are provided on the multiple contact strip. The connection of the radio clock module is done using the COM2 cable included, which ensures the connection with a stop screw.



Connection of the GPS Radio Clock

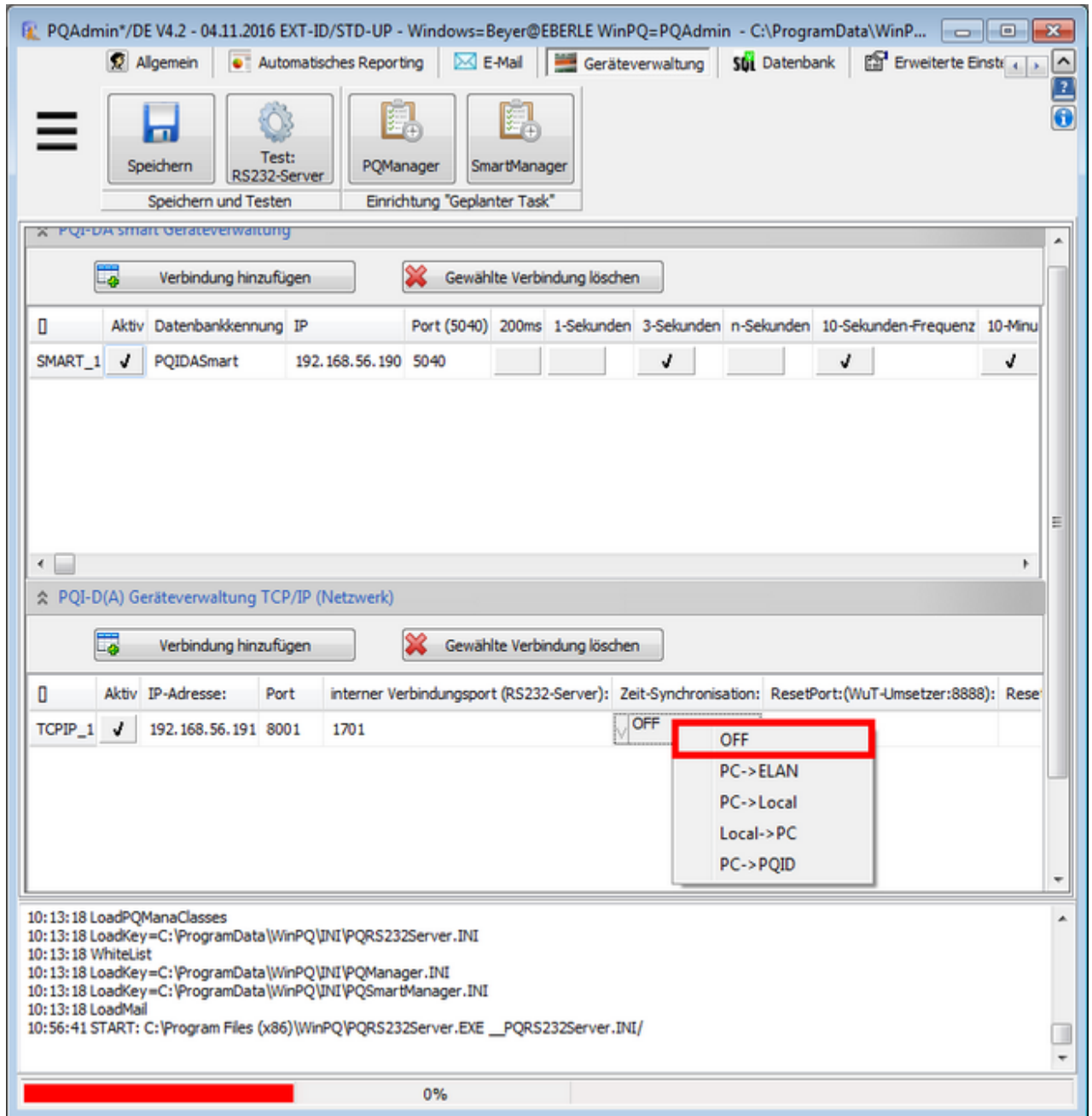
The GPS radio clock in model D2 can be connected via the RS232 interface.

On model 1, this can be connected directly to the time bus. The connection to the time bus (characteristic D2) is preferred because it transmits a significantly more accurate signal.

Configuration

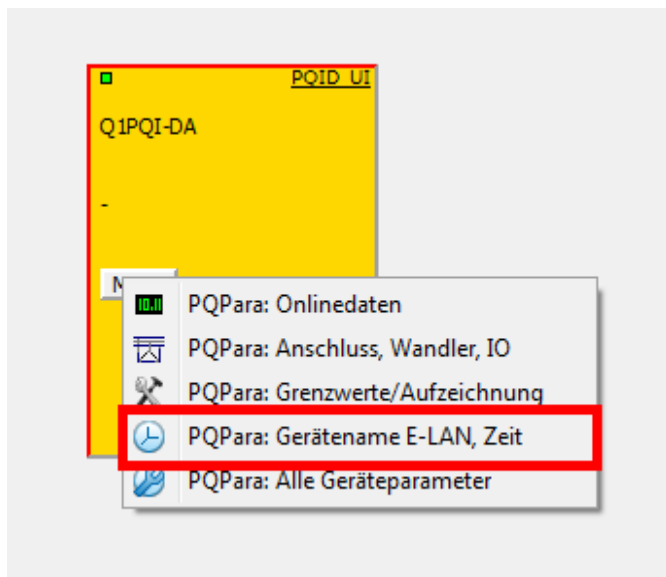
Configuration on WinPQ Server

The settings on WinPQ must be set to "OFF" in the case of external time synchronization.



Configuration on PQI-D(A)

1. Start the parameter interface "Designation, E-LAN, Time".



2. Communication - Configuring the Interface

Make sure that you have loaded the right device (to which the clock will be connected). Set the selected interface (in the image COM2, because the DCF/GPS clock should be connected via Com 2) to "DCF77" mode. All additional fields on this COM interface will not be used. Save the setting with the "Set" button. Now the interface is set up to receive a DCF-77 signal.

The screenshot shows the 'Kommunikation' tab with the following settings:

- Identifikations-Daten:** ☒ Kommunikation
- Zeitsynchronisation:** ☐ Zeitsynchronisation
- ECL-Kommandos:** ☐ ECL-Kommandos
- E-LAN-Struktur:** ☐ E-LAN-Struktur

Geräteparameter

COM-Port1:	COM-Port2:	MODEM-Callback:
Modus ECL	Modus DCF77	Zeit Standard-Rückruf _:_
Baudrate 115200	Baudrate 115200	Anschluss MODEM <input checked="" type="radio"/> COM1/FRONT <input type="radio"/> COM2
Parity P-	Parity P-	Geräte-ID MODEM Lokales Gerät
Protokoll RTS(CTS)	Protokoll RTS(CTS)	Anwahl-String + Tel.Nummer ATX3D0123..
Setzen	Setzen	Verwendete Ressourcen: Register: B1..B7 Programme: H20+P20..P26 <input type="checkbox"/> Reset: Schnittstelle <input type="checkbox"/> Funktion sperren Setzen

3. Time synchronization

If multiple PQI-D(A) are connected via the time synchronization bus, and are to be synchronized via the method "Time synchronization via external recipient on the COM interface", the following settings must be made on the "Time synchronization" tab.

PQI-D	Parameter name	Parameter value
Master	DCF: quality of receiving signal:	<i>Reading - see explanation below</i>
	Summer/Winter Conversion:	<i>Release</i>
	Operating mode:	<i>Master</i>
	Device time zone	<i>Your time zone (Germany: 1)</i>
	DCF time code time zone	<i>Your time zone (Germany: 1) note clock settings!</i>
	Release of DCF pulse to LED status	<i>ON</i>
	Release of time setting via ECL:	<i>Protected</i>
Slaves	DCF: quality of receiving signal:	<i>Reading - see explanation below</i>
	Summer/Winter Conversion:	<i>Release</i>
	Operating mode:	<i>Slave</i>
	Device time zone	<i>Your time zone (Germany: 1)</i>
	DCF time code time zone	<i>Your time zone (Germany: 1) note clock settings!</i>
	Release of DCF pulse to LED status	<i>OUT</i>
	Release of time setting via ECL:	<i>Protected</i>

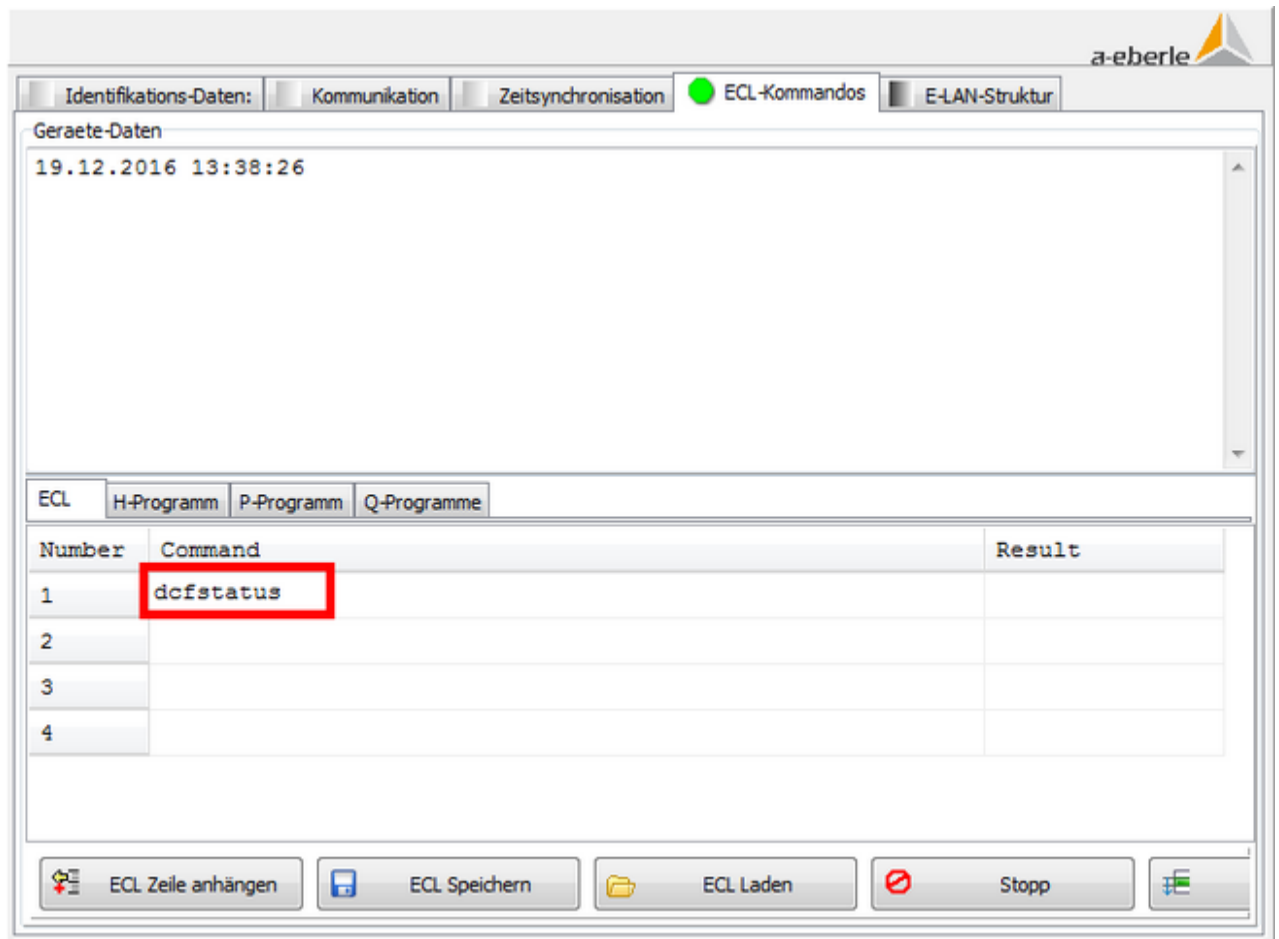
Instructions for aligning a connected DCF clock:

To align the DCF antenna there is the read parameter "DCF: quality of the receiving signal:" which shows the receiving quality of the DCF antenna on a scale from 0 to 100. The receiving quality should be at least 80% to guarantee sufficient accuracy and frequency of the synchronization.

In addition the parameter "Release DCF pulse to LED status" allows for the option of checking whether the DCF code is transmitted properly. There should be an even 1 second pulse which should be checked at least 1-2 minutes. If the pulse is not even, the antenna must be realigned.

The following is an additional possibility of checking the signal quality:

In the interface, change to the tab "ECL commands" and in the first program line enter the command "dcfstatus" and press "Enter".



If you get the following response in the response window:

DCF-Time: ??:??:00 [5579m]

Adjustment: --:--:--

The clock is emitting an incorrect signal. Try it again after realignment until you are getting a proper DCF signal. It can take up to 5 minutes until a first synchronization takes place.

In addition, the following additional ECL commands can be helpful during a check:

Display of times of all REGSys devices in the E-LAN. The command **all,time//&** can be skipped here. It shows a list of all devices with the current time. This is helpful later when you want to check that all devices are displaying the same time.

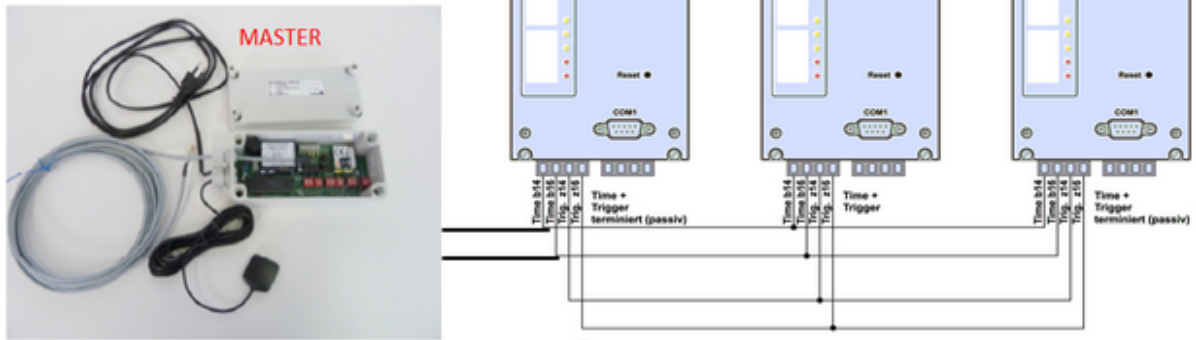
Summer/Winter Conversion:

The summer/winter conversion can be done locally or via the external DCF77 normal time clock. If the time conversion is configured in the local mode, the conversion will occur pursuant to the locally saved conversion parameters. The conversion times can be set for a particular year, or calculated from the conversion parameters of one year to the next. The configuration is formally the same for the periods of summer to winter conversion and winter to summer conversion. In the external mode the conversion times are taken for the time zone of the DCF77 code.

Time Synchronization with external receiver via time synchronization bus

The GPS clock 111.9024.45 should be preferentially connected to the time bus (RS485), because this transmits a higher accuracy signal. An example of a configuration with the GPS clock directly connected to the time synchronisation bus:

GPS-UHR: Merkmal D2
111.9024.45



Connection of the GPS radio clock

For this, the GPS clock has a DCF pulse output on RS485 level (timebus):

A DCF signal is emitted with RS485 level on terminal DCF-EA+ and DCF-EA. In order, for example, to synchronize a PQI-D or DA via GPS, the devices are to be connected as follows:

GPS radio clock	PQI-D(A)
DCF-EA+	"A" on plug X6, no. 47
DCF-EA-	"B" on plug X6, no. 48
GND	"GND" on plug X6, no. 50

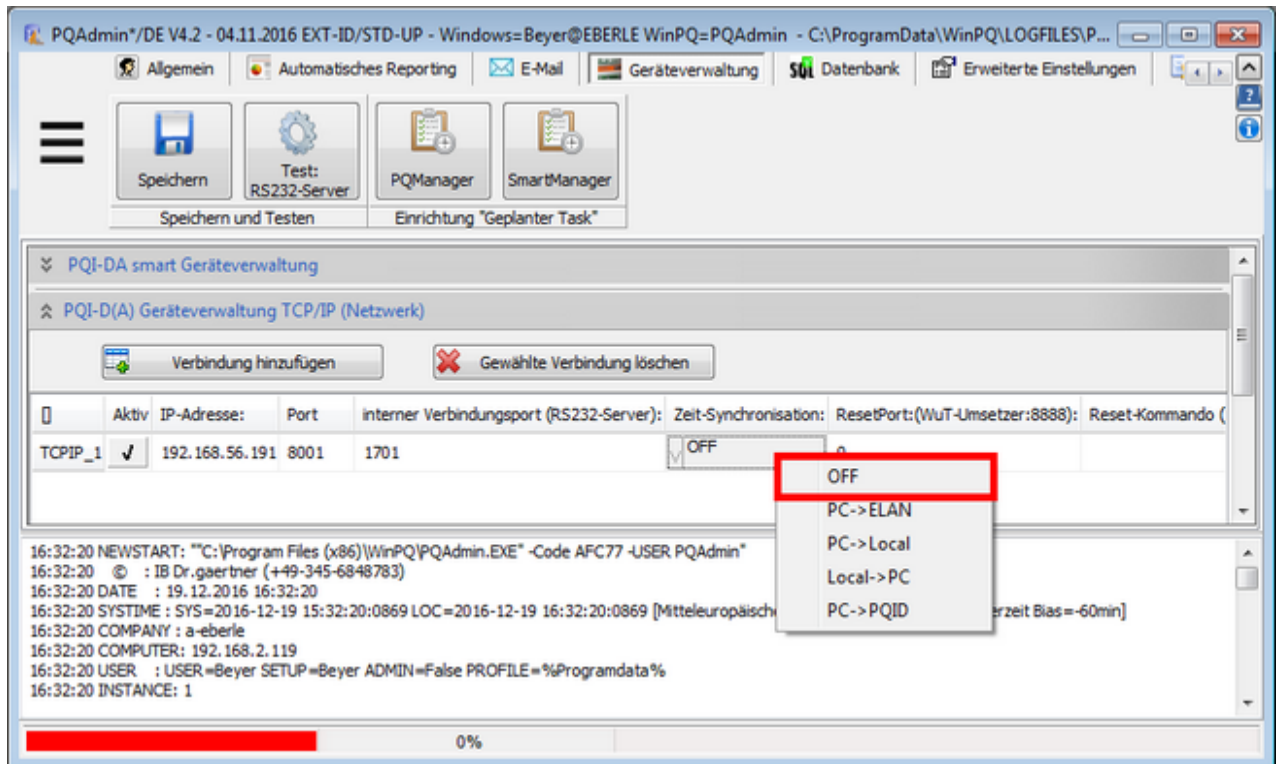
The termination of the bus is to be done as in the operating instructions of the relevant device, regardless of the connection to a GPS radio clock to the bus.

There are separating operating instructions for the radio clock which were delivered with it.

Configuration on the WinPQ Server and PQI-D(A)

If the NIS Time GPS radio clock is directly connected to the time bus (RS485), it will run as the master clock and all of the devices within the time bus network run as time slaves.

- On WinPQ Server:
The settings on WinPQ must be set to "OFF" in the case of external time synchronization.



- On PQI-D(A)
Start the parameter interface "Designation, E-LAN, Time".
The following setting must be made under "Designation, E-LAN, Time" in the device set-up:

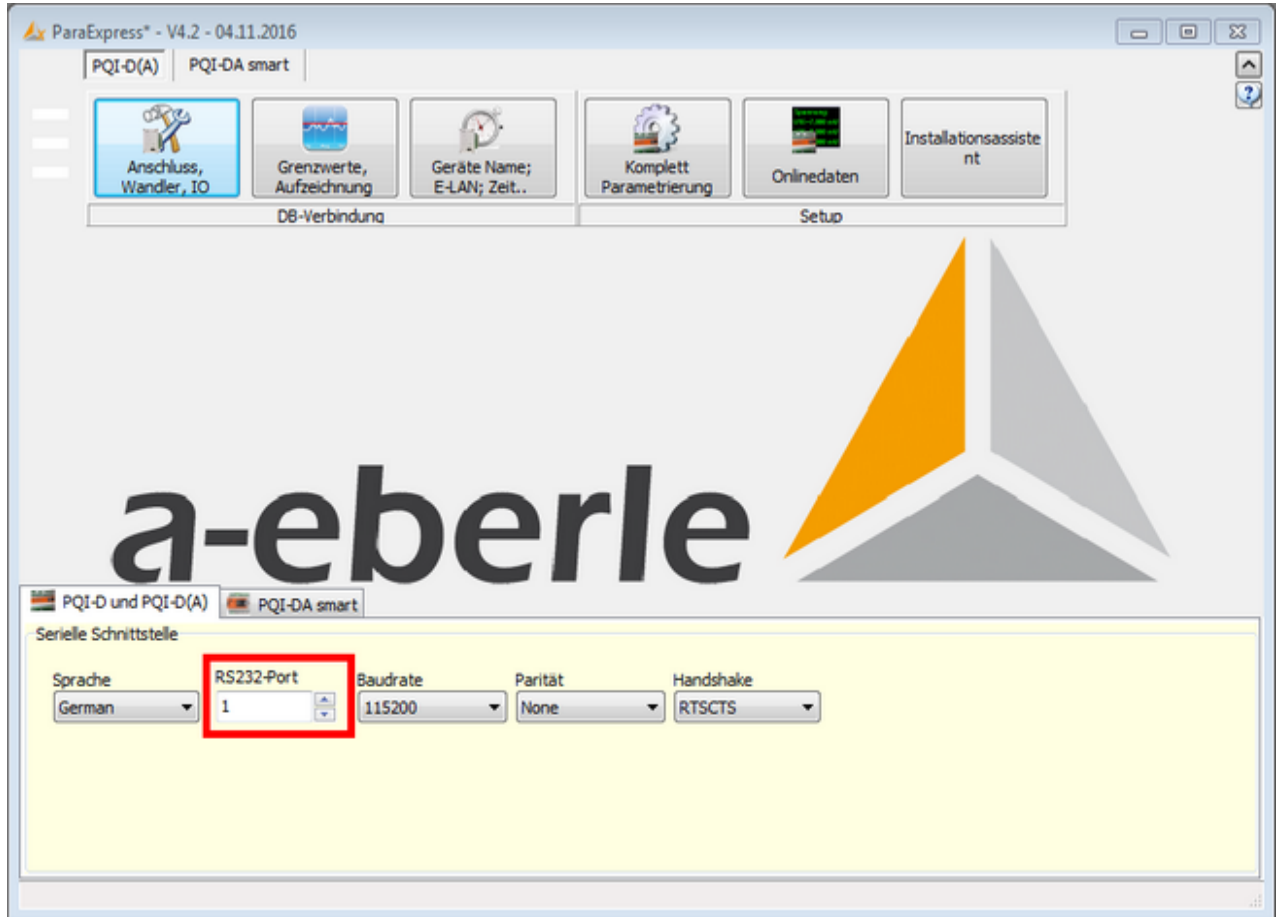
Parameter name	Parameter value
Summer/Winter Conversion:	<i>Release</i>
Operating mode:	<i>Slave</i>
Device time zone	<i>Your time zone (Germany: 1)</i>
DCF time code time zone	<i>Your time zone (Germany: 1) note clock settings!</i>
Release of time setting via ECL:	<i>Protected</i>

Configuration and parameter setup PQI-D(A)

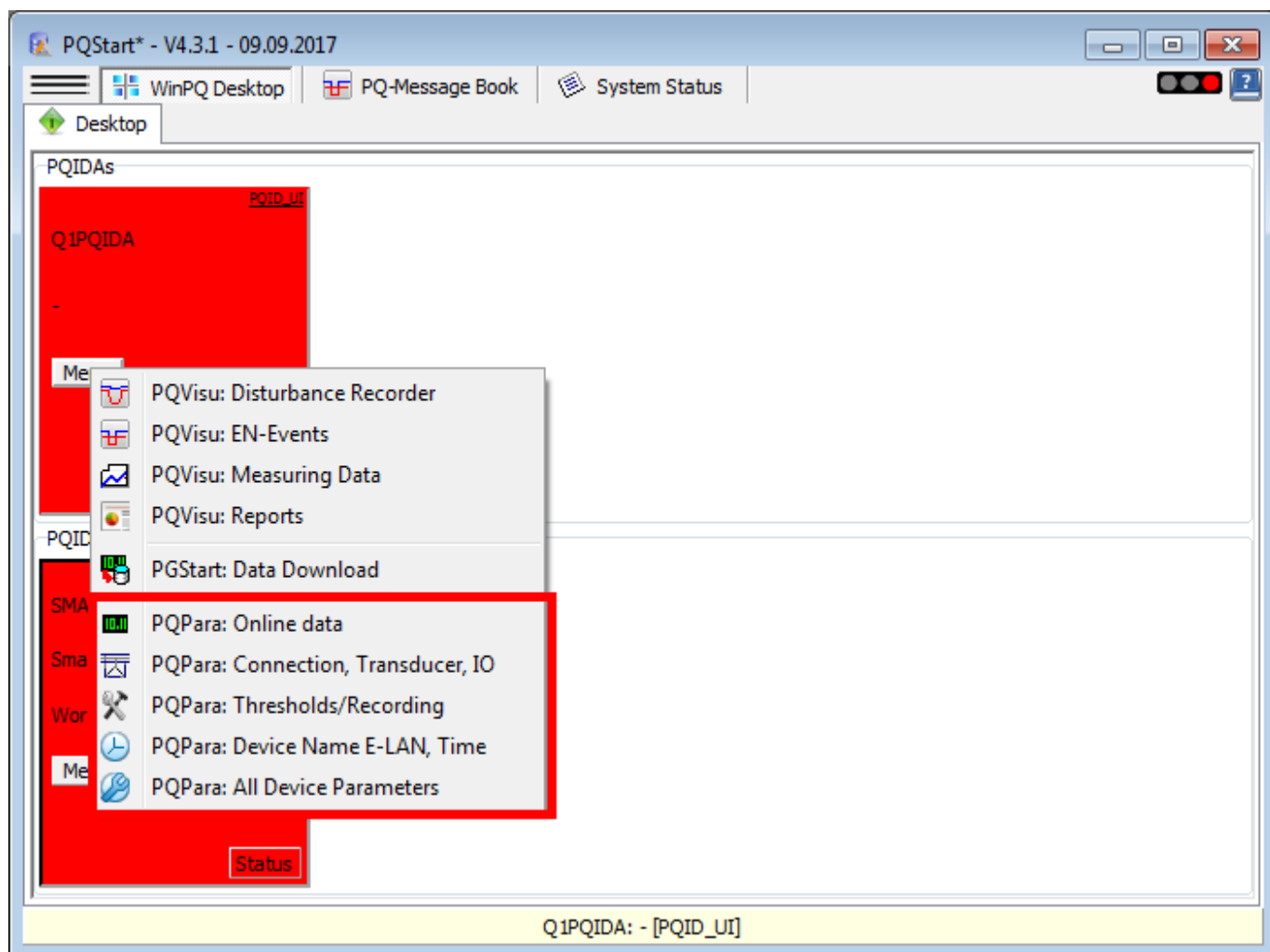
In the next chapter, we will discuss the options for device configuration, the measurement configuration and the trigger settings for the PQI-D and PQI-DA hardware. All settings options can be performed both via the WinPQ software, as well as via the ParaExpress software which is purely for configuration. The interfaces are identical in both programs. Download ParaExpress on the A. Eberle Website [here](#).

Configuration with ParaExpress

All configuration options on PQI-D and PQI-DA described for the WinPQ server software can also be done using the ParaExpress software. This software is available at no costs and is intended for device configurations on site, such as via a laptop. This software can also be started directly from a USB stick. Installation on the computer is not required.



Configuration with WinPQ

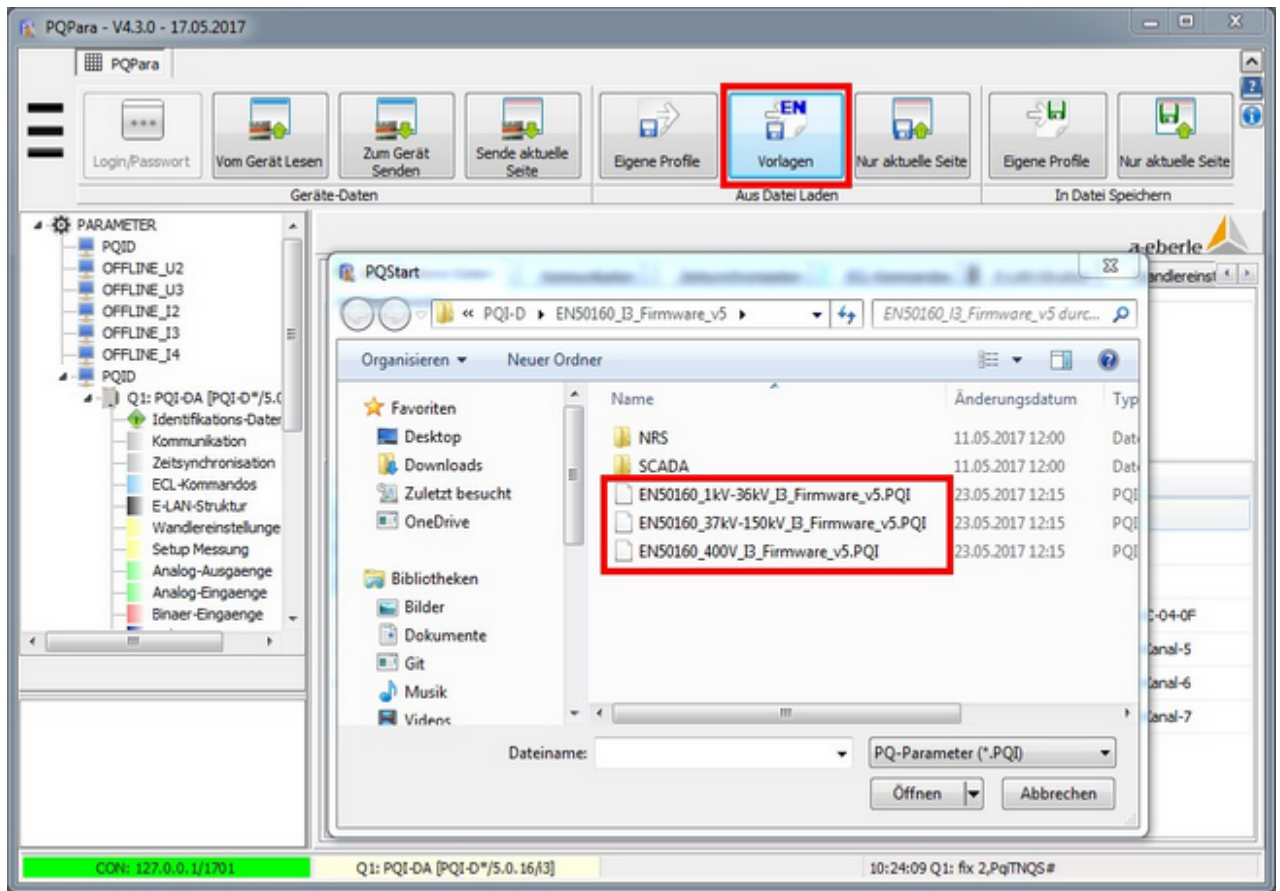


Configuration menu

Designation, E-LAN, Time	Here you can manage the device names and interface parameters. Each device must be clearly identified. Usually all PQI-D devices have the identifier Q1 on delivery.
Connection, Transducer, IO	The transmission ratios of the current and voltage transformers and the connection type can be changed here.
Thresholds/Recording	Trigger levels for fault records as well as all parameters for permanent recording are managed here.
All device parameters	Here all settings are displayed together or transferred. 1. Name, E-LAN, Time, 2. Connection, transformer, IO 3. Limit value / recording

Sample files for device settings

The WinPQ software contains sample files for various voltage levels.



We created a set-up file for all types of hardware and the various voltage levels. All templates meet the current standard EN50160 (Version 2010).

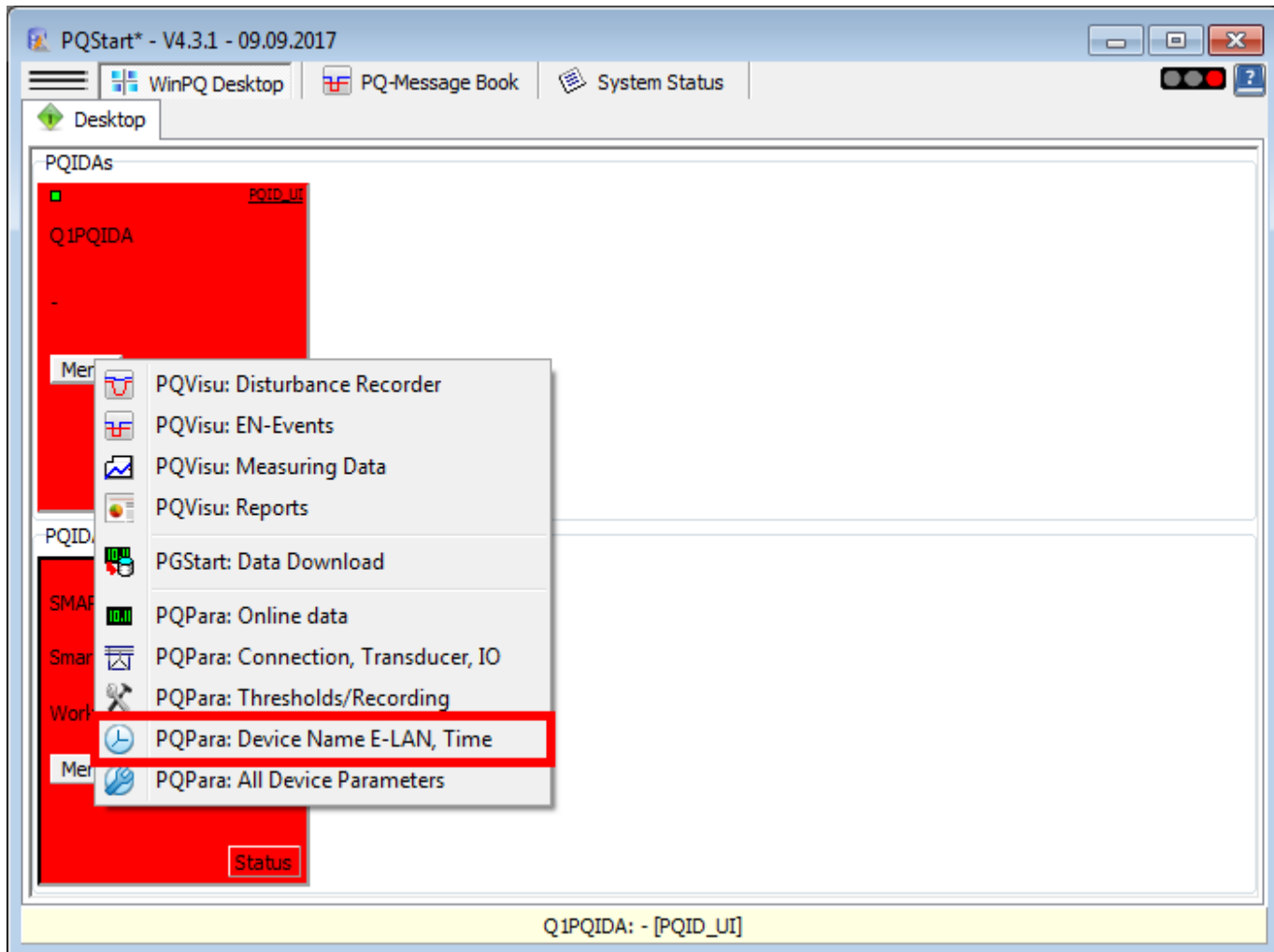
- U2 and U3 = Device with 8 voltage inputs.
- I2, I3 and I4 = Device with 4 voltage and 4 current inputs.
- The default settings in each device upon delivery are as follows: "EN50160_1kV-35kV", for a medium voltage grid for a device with 100V voltage inputs.
- A device with 400V voltage inputs has the factory setting sample "EN50160_400V" loaded for a low voltage grid.

After the reset command: "Sysreset=59" the device will default to these factory settings.

None of the templates can be changed. With "Save in file" you can create your own template. This template can then be used for all other devices in the grid.

Device name, E-LAN, Time

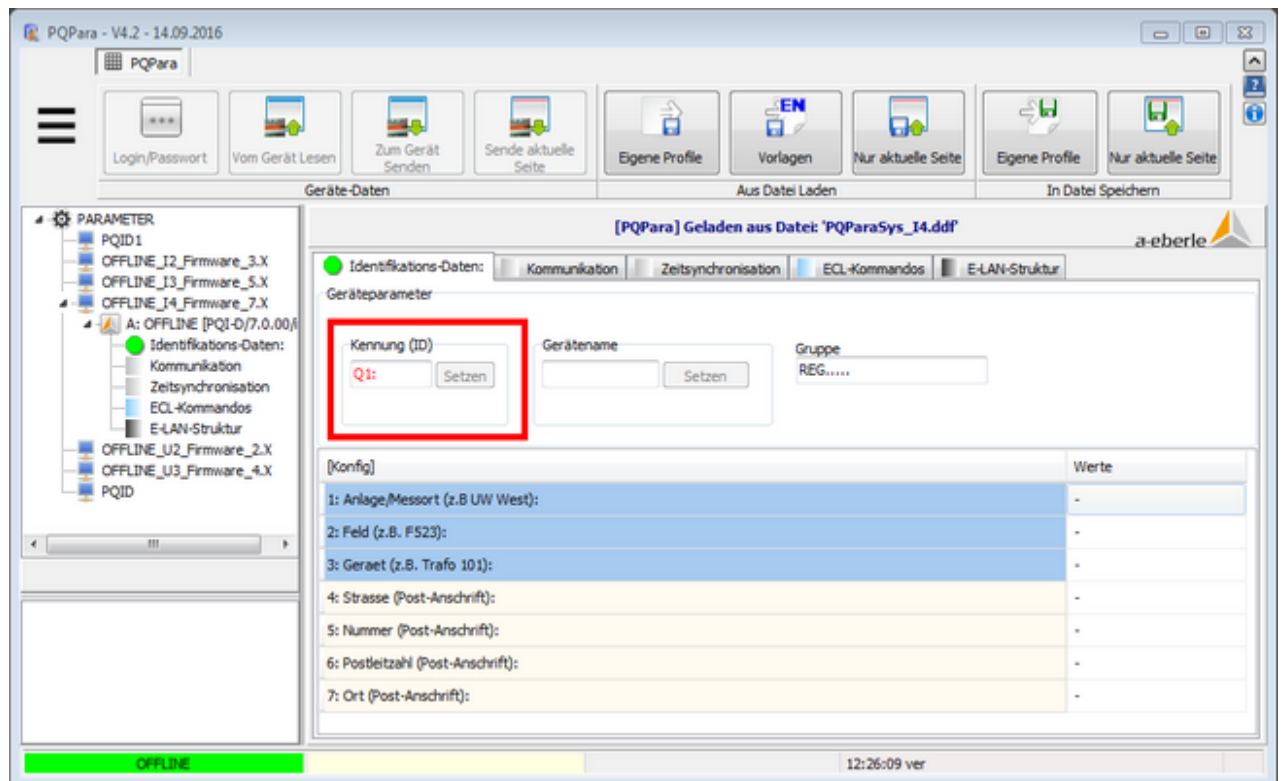
The basic parameters such as device name, communication parameters and the desired time synchronization method can be set in the menu point "Device name, E-LAN, Time".



Device identification

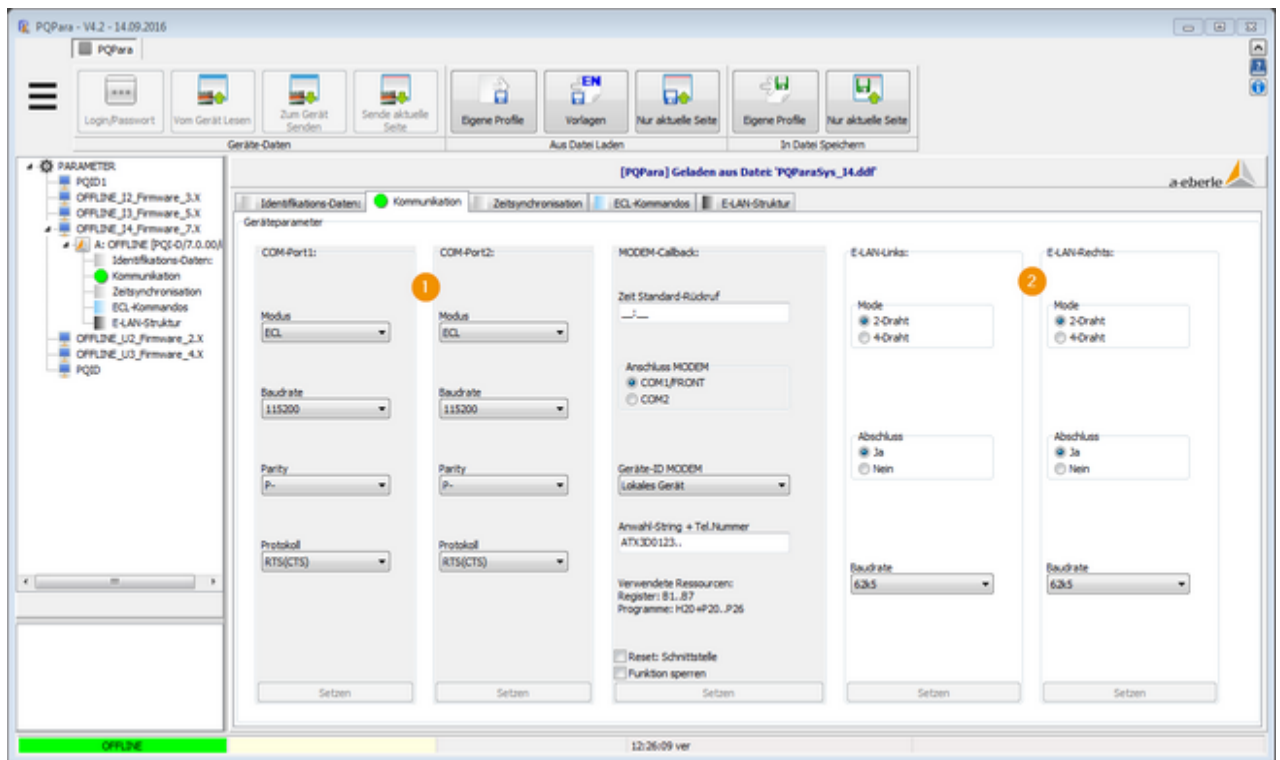
Each device receives its own name under ID.

Important: Each device must have a clear identification in the E-LAN network!



Configuration of communication parameters

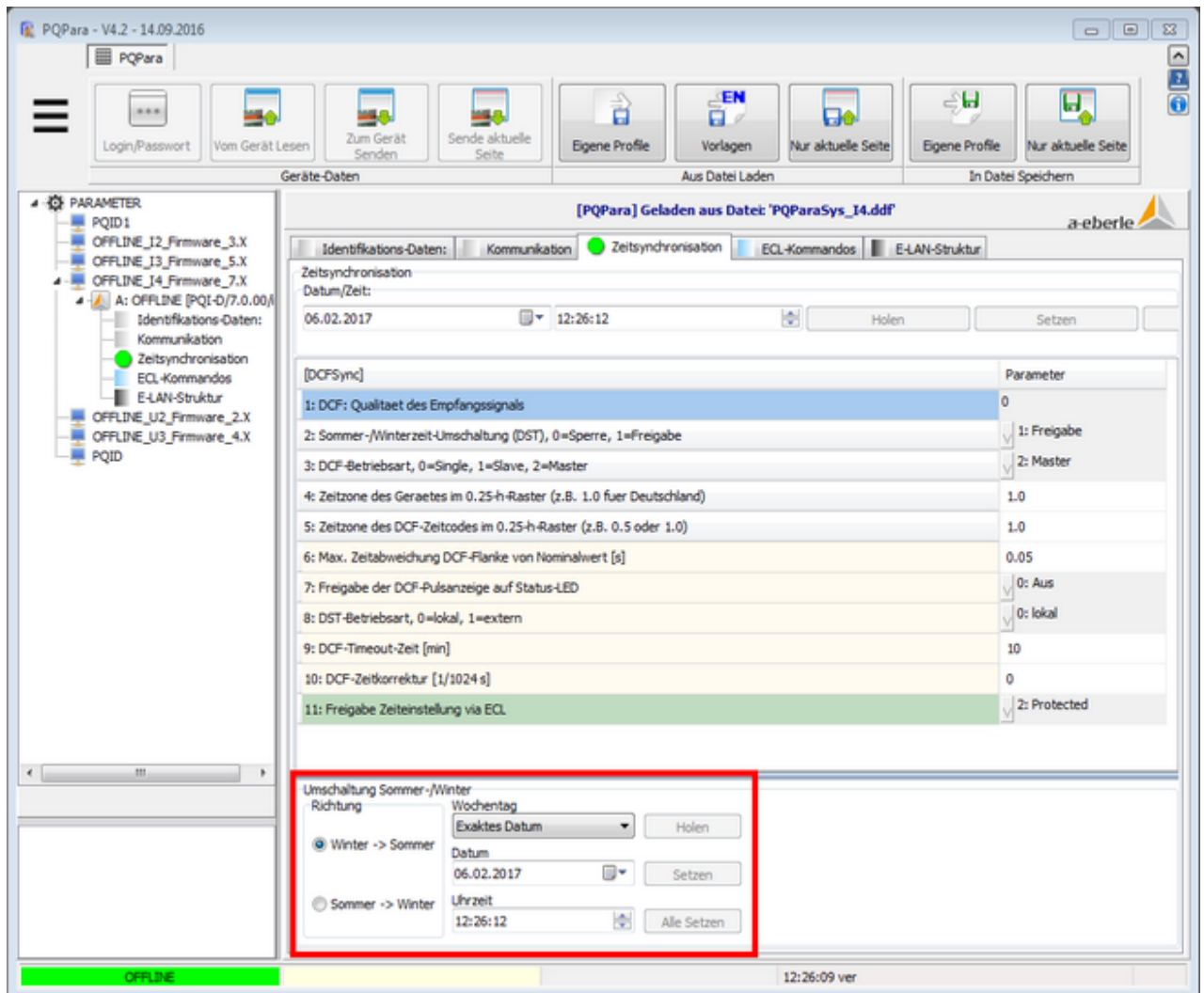
The communication parameter can be set here.



- 1 The current interfaces used for communication are highlighted in colour (here COM1)
- 2 A. Eberle devices can communicate with a 2- or 4-wire-connection with each other.

Time synchronization

On the "Time synchronization" tab you can enter settings for the time zone and summer and winter time settings.



Free entry to determine the summer to winter time changes and the reverse.

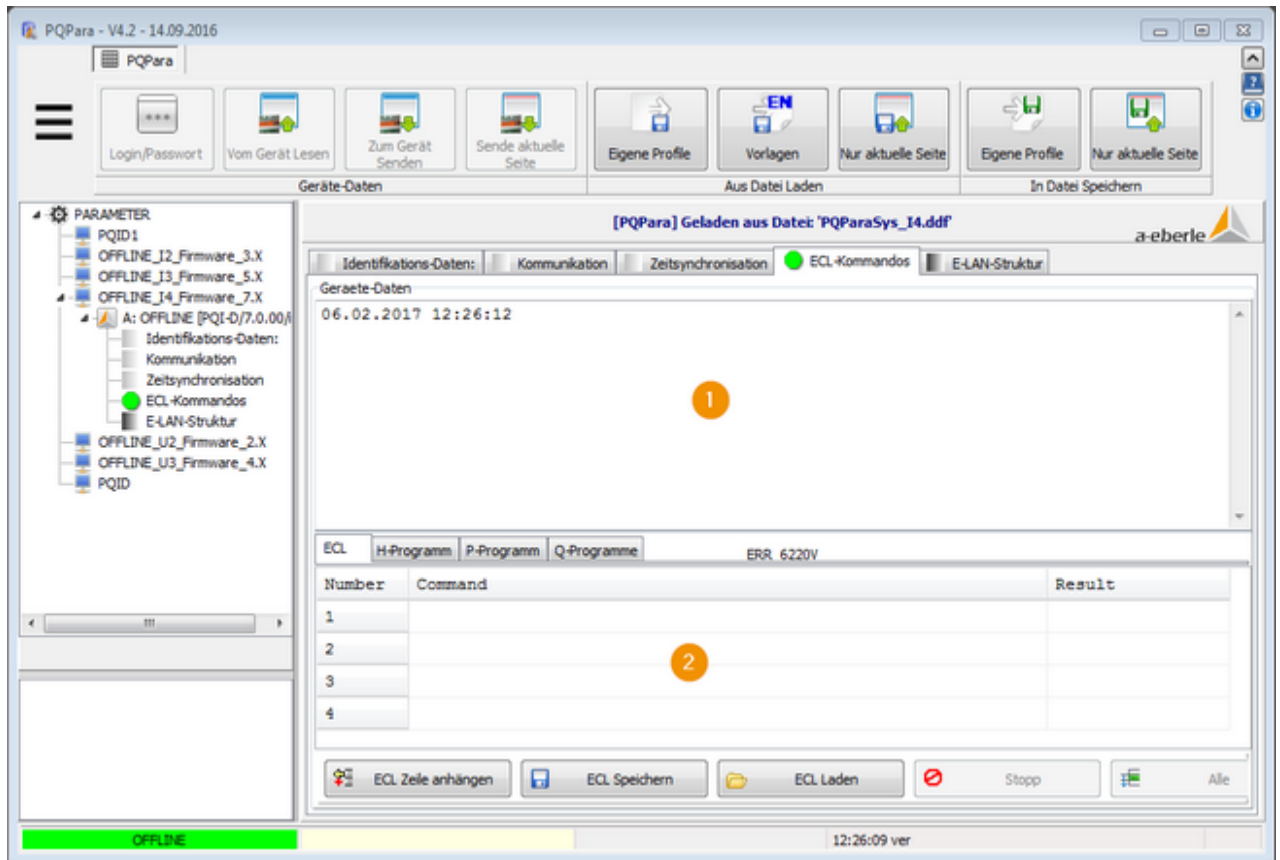
Time synchronization window:

1. DCF: Quality of receive signal - (read-only - here no entry option)
2. Summer-/Winter time change (1=set by the device; 0=no change)
3. If the synchronization bus will be used, we use the Master or Slave configuration. Only one device will be set to "Master" if the time bus is connected to a 19" system. All other devices on the time bus then act as "Slaves". Please note that the time synchronization bus (RS485 bus) must be terminated via the jumper on the PQI-D or via the correct wiring on the PQI-DA. You will find the description of this in the PQI-D or PQI-DA operating instructions.
4. Time zone of the device.
5. Time zone of the DCF signal.
6. Permitted deviation from the time interval in seconds
7. Display DCF impulse on an LED (1=display/0=none). This is very helpful in aligning the DCF antenna or the GPS antenna.
8. Local or external time changes (local=own internal time change)
9. If a time correction occurs that is greater than the set time, this is recorded as an event.
10. In the set time "Timeout" there is no assumption of an external time correction.

-
- 11.** Release of time setting via ECL: The default value here is "Protected". This mode prevents undesired time jumps. Setting the time on the PQI-D by a certain time range (such as 1 second deviation) is not permitted manually or via process control. In the "On" mode, the time can be sent directly to the PQI-D using the "Set" button. In the "Off" mode, no time synchronization is assumed via the process control connection or manually.

ECL command

Under "ECL commands", commands or small programs running parallel to the device firmware can be transferred to the PQI-D.



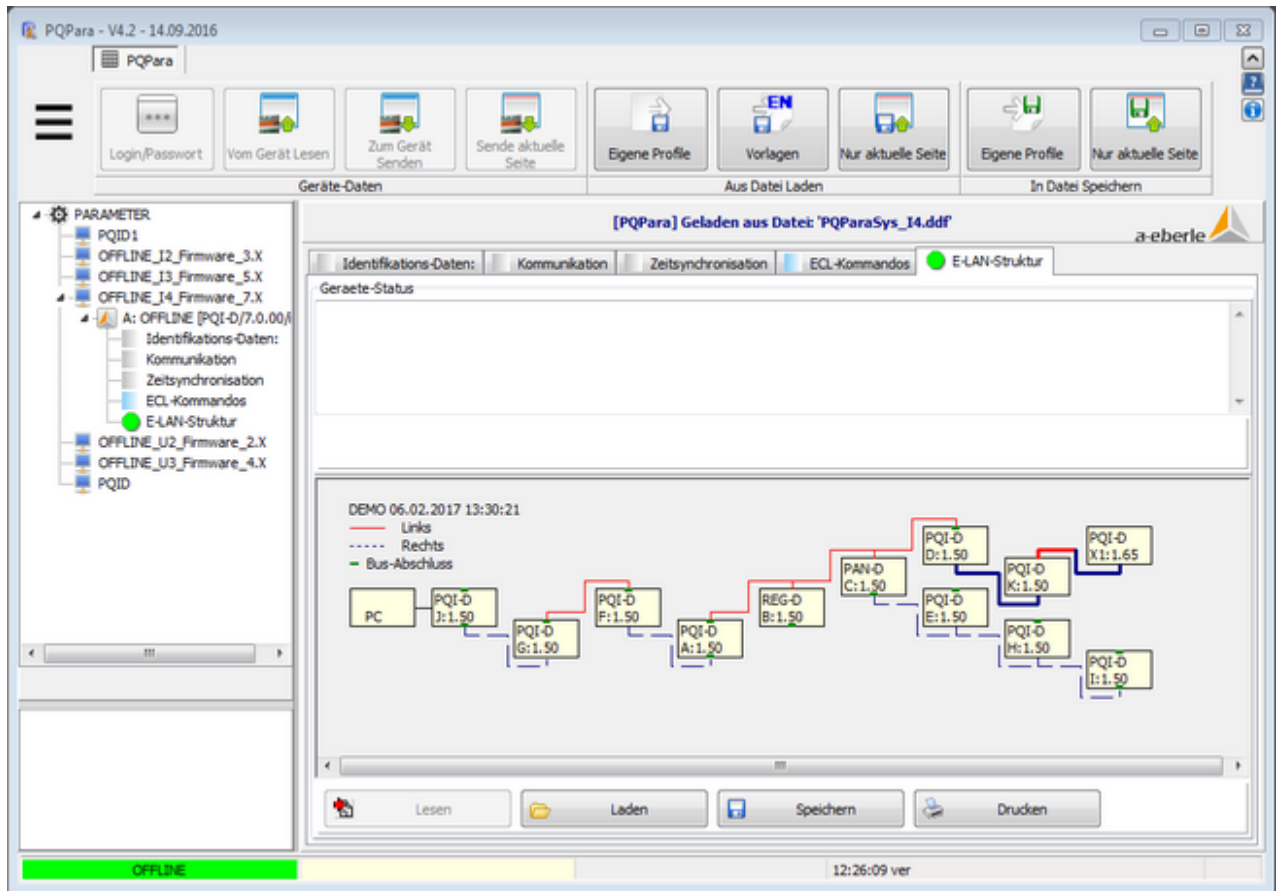
Running background program:

When you have performed the adjustments to the templates, save them under a clear name, such as "ModemDialin-Q1.ecf".

1. In WinPQ, start the menu point " Device name, E-LAN, Time"
2. Change to the ECL command tab.
3. Click "ECL Load" and select the file you have just created from the file list.

E-LAN structure

Under "E-LAN structure" it is possible to have a graphic representation of all grid analysers or regulators from A. Eberle which are connected via E-LAN. By clicking on a device, you will see the device status information.



Grid connection and transformer factors

The transformer factors (primary voltage/secondary voltage), the switching plan (V-circuit; Aron circuit) and the nominal voltage are set for the installed PQI-D on the first tab "Transformer Settings". The reference value for all trigger thresholds (percentages) is the nominal voltage and nominal current of the system.

Important:

In a transformer device the reference value is frequently just above the value of the nominal voltage (such as 20,000V grid - reference value = 20,600V). All trigger thresholds and limit values are calculated and analysed by the so-called "Agreed Line/Line Voltage".

"IR" is the rated value of the line current - all trigger thresholds on the current as well as the transnastic function are based on this value.

The screenshot displays the PQPara V4.3.1 software interface. The left sidebar shows a tree view of parameters, including 'Transformer Settings'. The main window is titled '[PQPara] Load from file: "PQParaConf_14.ddf"'. It features several tabs: 'Transformer Settings', 'Setup Measurement', 'Analogue output', 'Analogue input', 'Binary input', 'Relay output', and 'LED display'. The 'Transformer Settings' tab is active, showing a table for voltage transformer settings and a table for current transformer settings. Below these tables are two wiring diagrams: 'VT configuration 2, 3 wire system' and 'CT configuration 2, 3 wire system'.

Transformer Settings Table:

[WandlerU]	Primary rated volt	Voltage (input)	measure (read only)
Channel: [1]	100	100	U1E
Channel: [2]	100	100	U2E
Channel: [3]	100	100	U3E
Channel: [4]	100	100	NONE

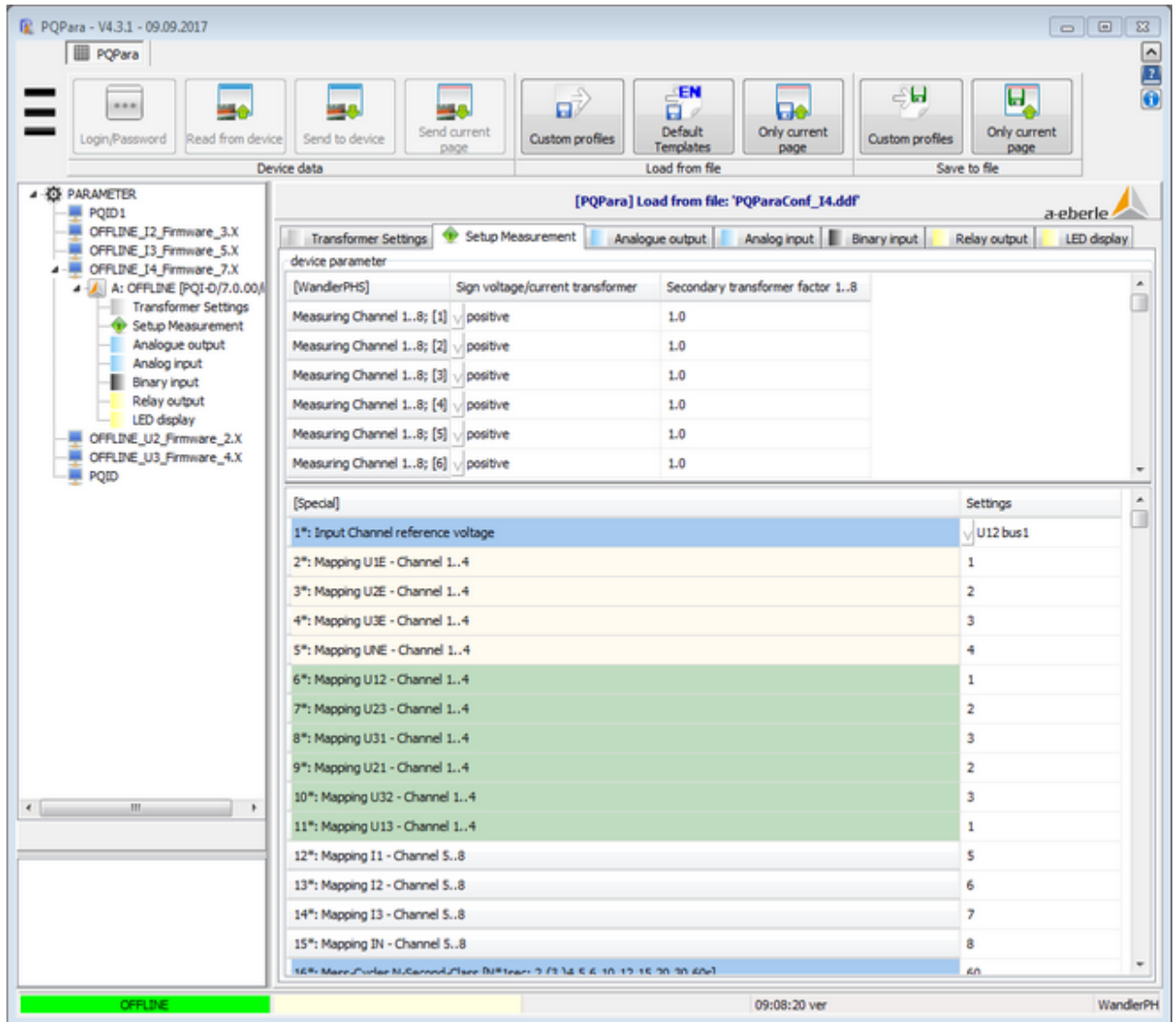
Current Transformer Settings Table:

[WandlerI]	Primary rated cur	Current (input)	measure (read on)
Channel: [5]	1.0	1.0	I1
Channel: [6]	1.0	1.0	I2
Channel: [7]	1.0	1.0	I3
Channel: [8]	1.0	1.0	NONE

The wiring diagrams show the connection of the transformer to the 3-wire system. The VT configuration shows the primary windings connected to the three phases (L1, L2, L3) and the secondary windings connected to the three phases (L1, L2, L3) and the neutral (N). The CT configuration shows the primary windings connected to the three phases (L1, L2, L3) and the secondary windings connected to the three phases (L1, L2, L3) and the neutral (N).

Measurement setup

An incorrect transformer connection (prefix current and voltage transformers, assignment of measurement channels, etc.) can be corrected in the menu point "Setup Measurement". The measurement interval (10 minute data class) and the grid frequency can also be set.

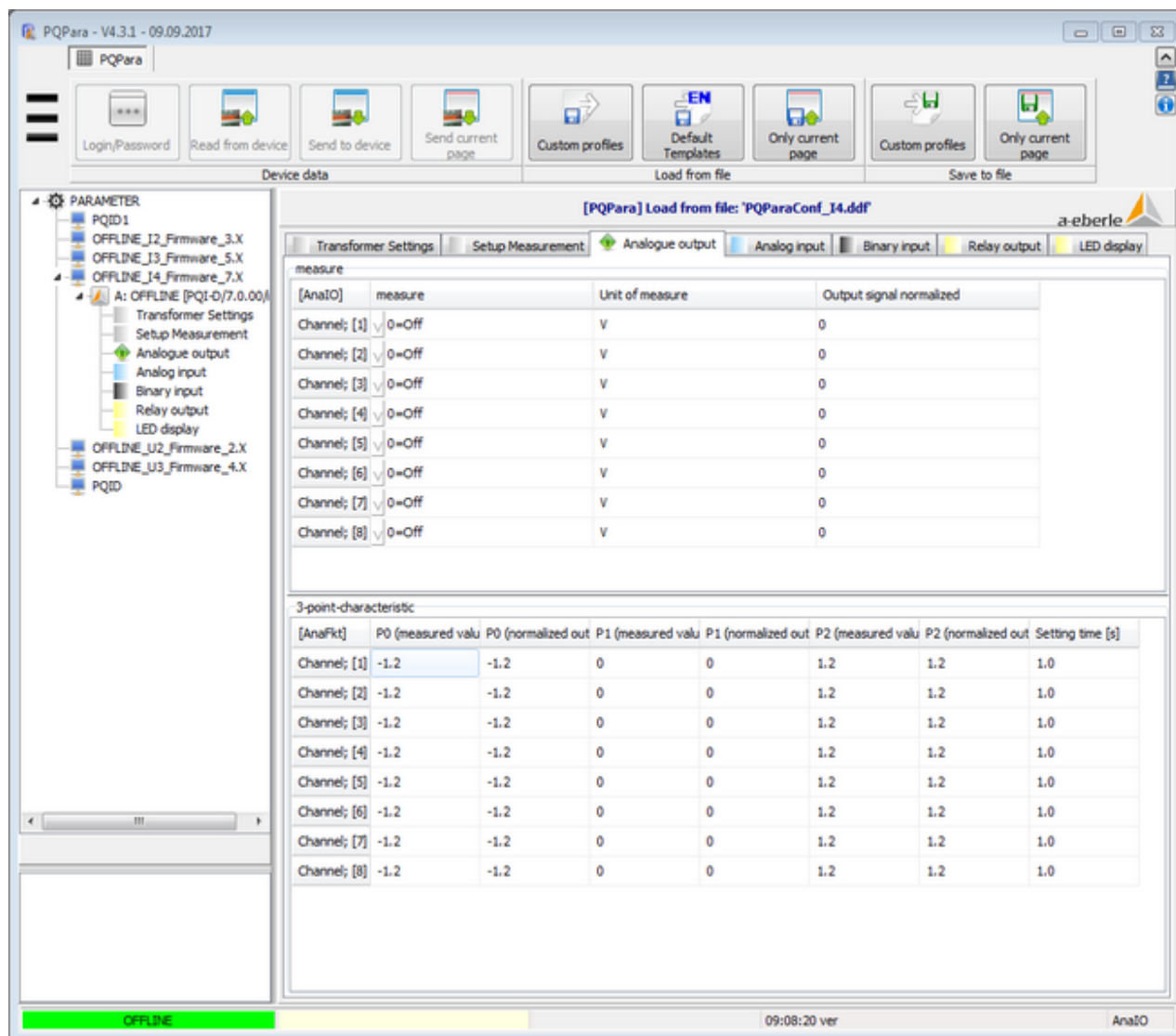


Interval duration of the 10 minute data class:

The 10 minute intervals are proscribed for a standard analysis. At this location it is possible to change this data class to 5; 7; 10; 12; 15; 20 and 30 minutes. All standard analyses are then created using these intervals.

Option M94/M95 analogue output

With the integrated hardware option M94 or M95 it is possible to use the device as a measurement value converter and to emit the selected measurement values as analogue output signals.



The characteristic curve of an analogue signal is defined in the following example.
The effective power of -200kW up to +200kW will be output as a -20mA to +20mA signal.

X0 =	lower measurement value (e.g. -200 000 = -200kW)
Y0 =	lower output value PQI-D (e.g. -1 = -20mA)
X1; Y1 =	average measurement and output value (entry required)
X2 =	upper measurement value (e.g. 200 000 = +200kW)
Y2 =	upper output value PQI-D (e.g. 1 = 20mA)

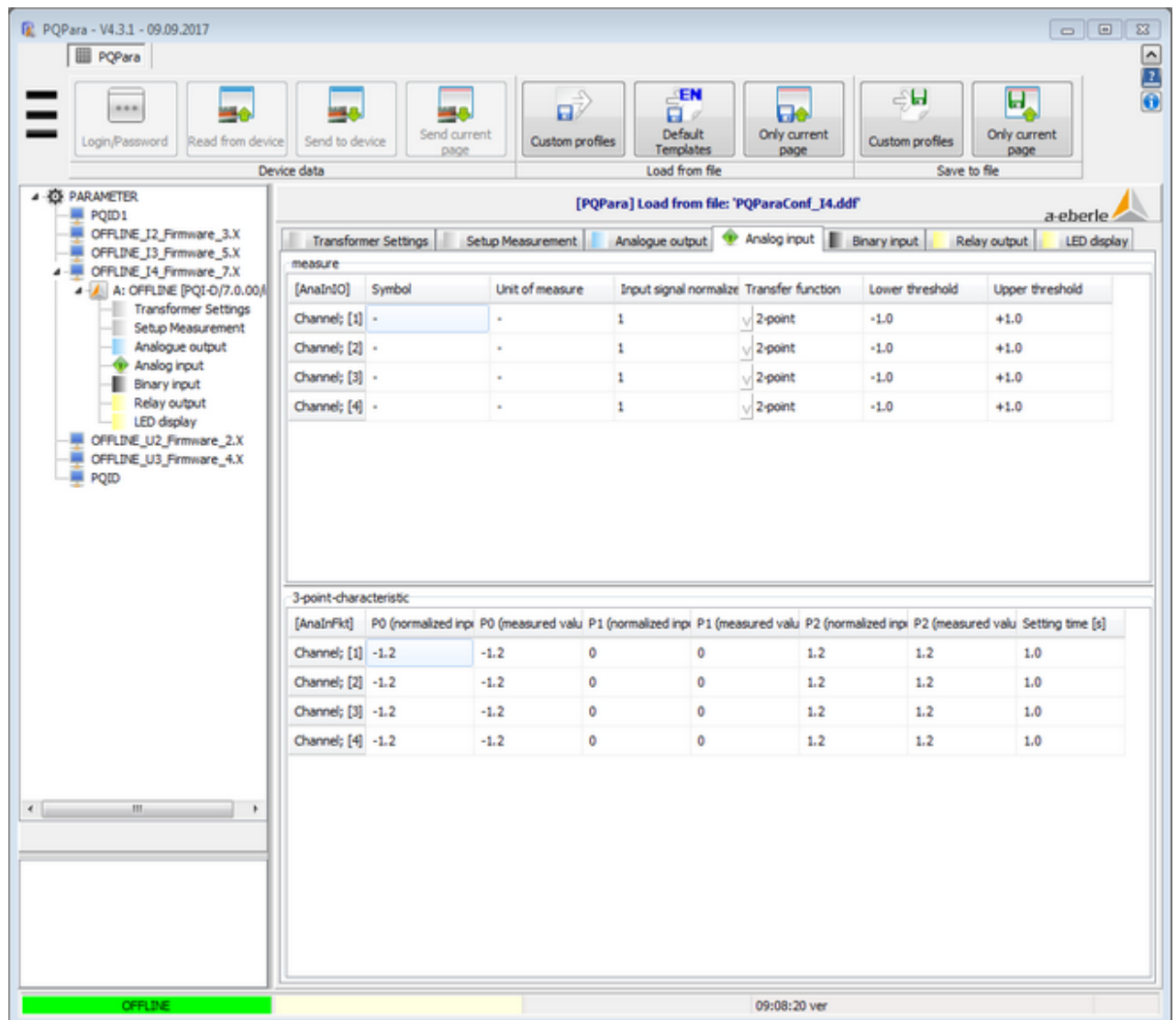
Option M97/M98 analogue input

The measurement card M97/M98 enables the recording of four additional analogue input signals. Voltage signals from 0V to 10V and current signals of -20mA to +20mA can be recorded. The limit value columns can be used for the entry of the limit values for internal alerts.

Example:

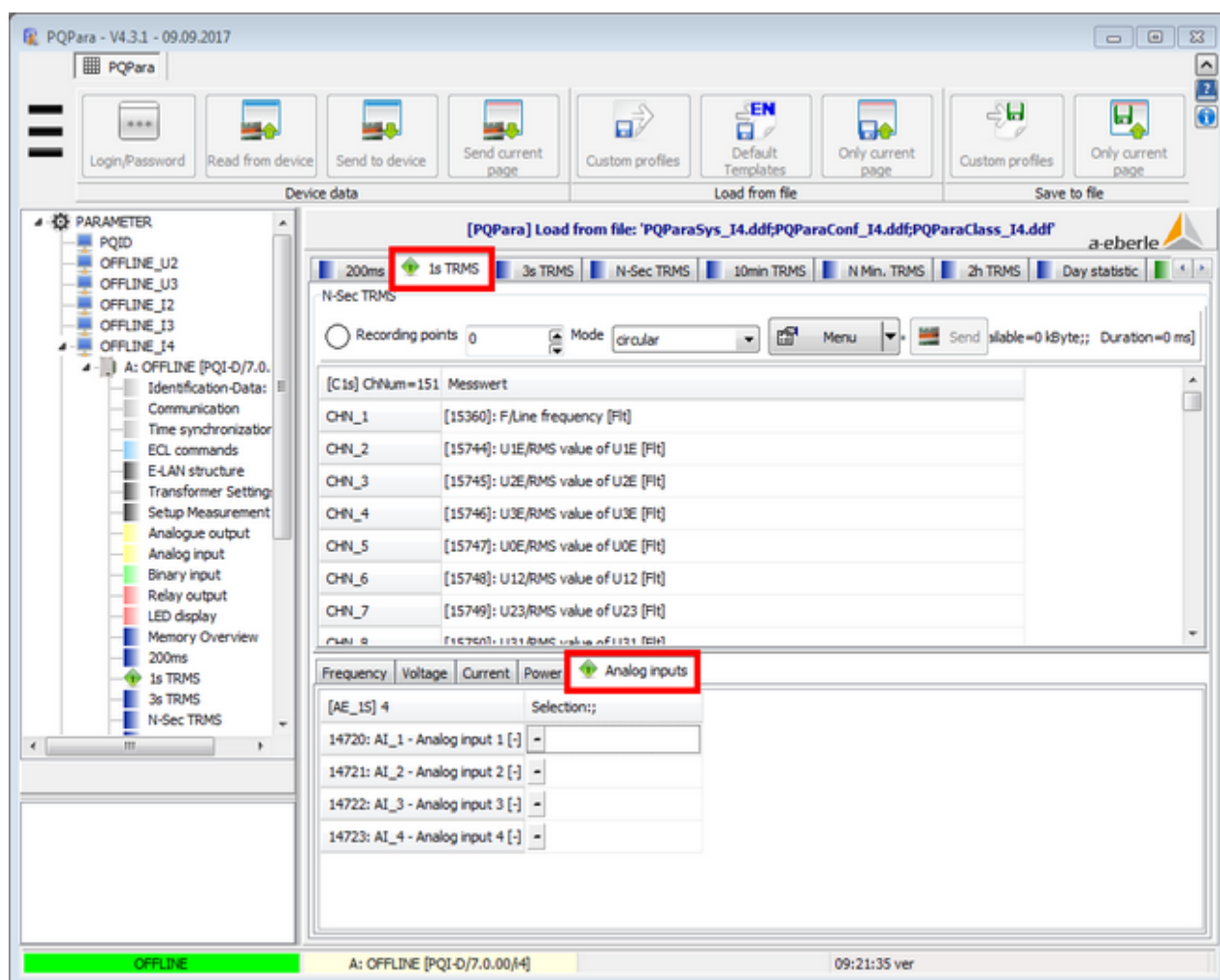
Channel 2: Radiation (W/square metre) – Input 4 –20mA = Output 0 –1600 W/square metre

Input value = 1 represents 20mA (or 10V)



These analogue channels can be recorded in the following data classes:

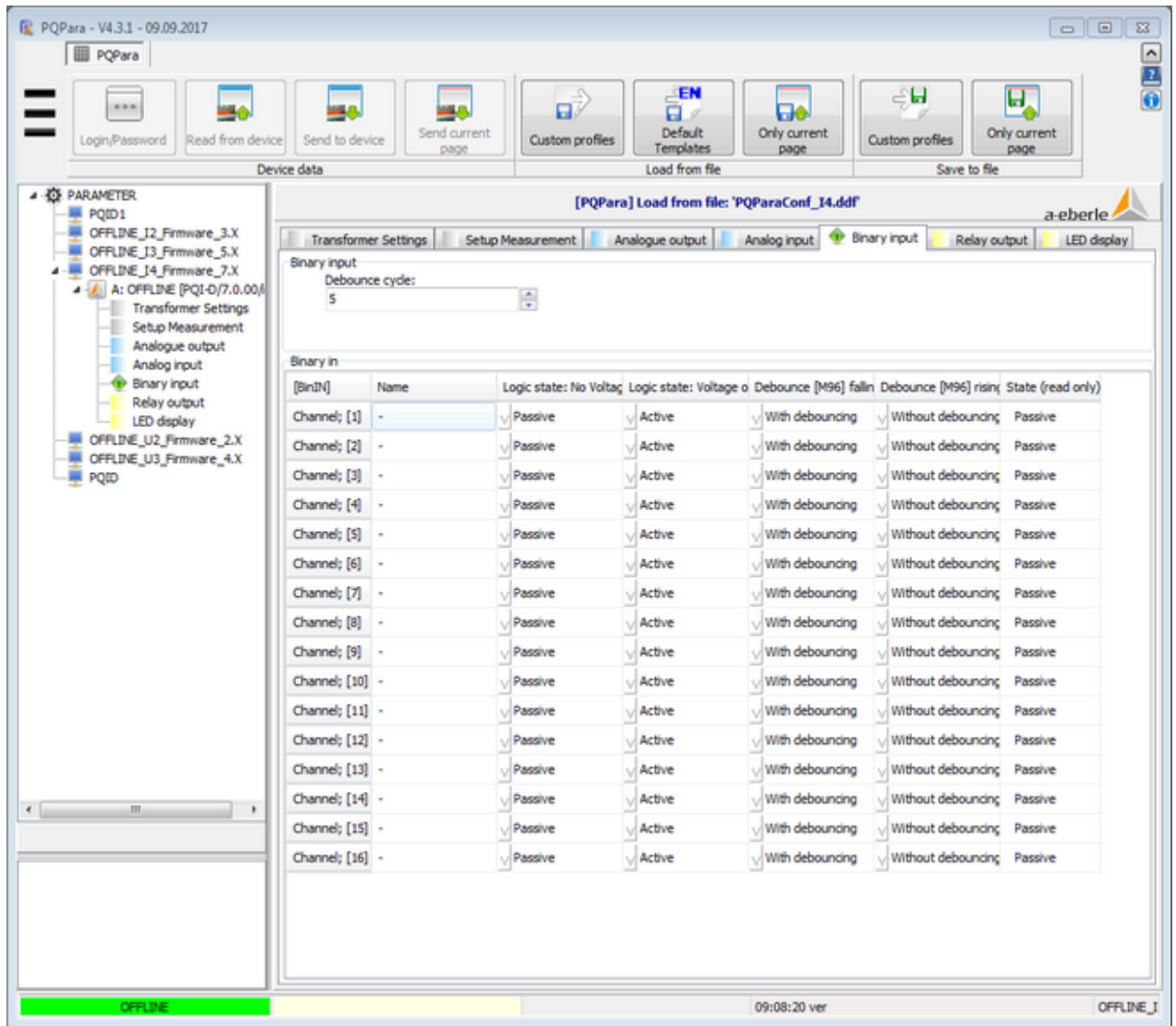
- 200 ms; 3 sec.; 10 min.; 2 hour values.
- In addition, there are still the 200ms extreme values available.



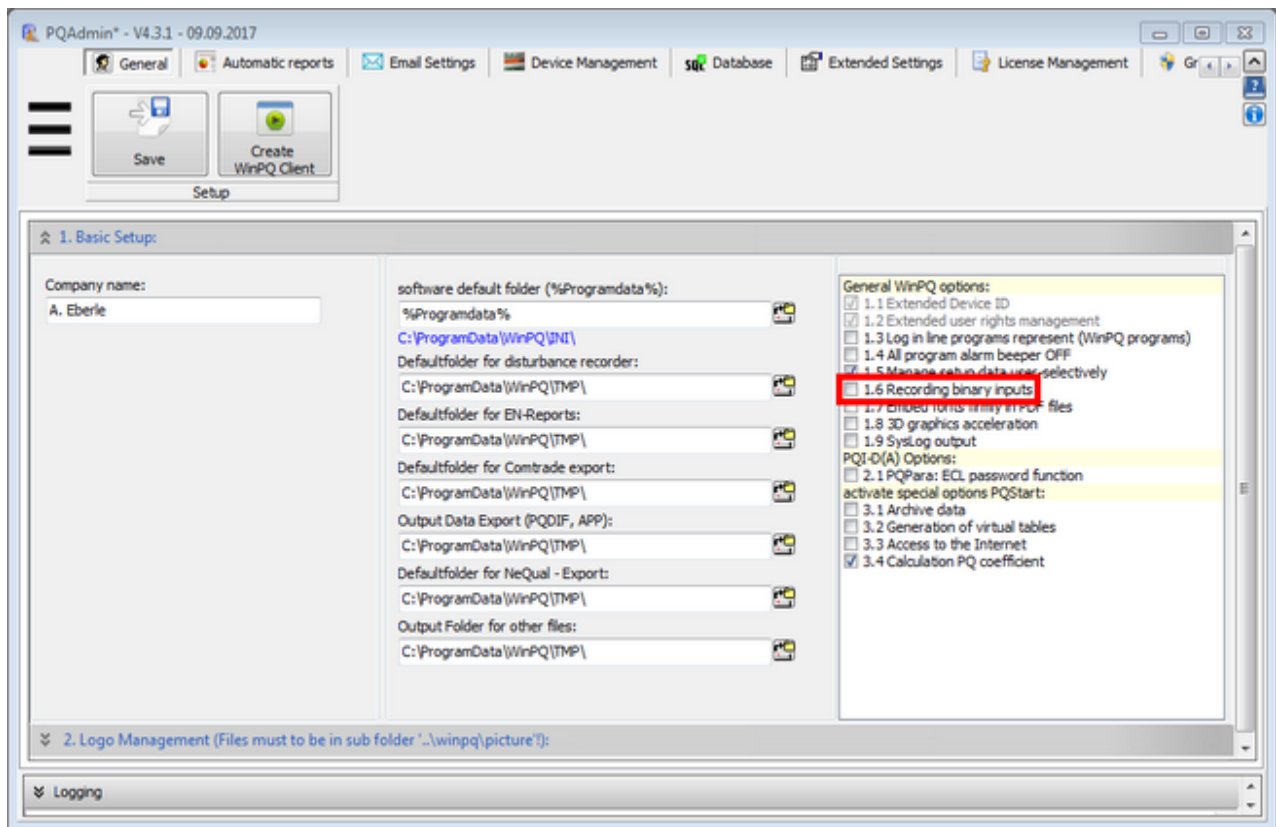
Binary Input

The name of the binary inputs can be assigned here and this will later be displayed in the database and the fault records.

If option M96 is available in PQI-D, the sampling rate of the binary inputs is 10,240Hz. For other measurement cards (such as M00 or M94), the measurement cycle is 4 ms.

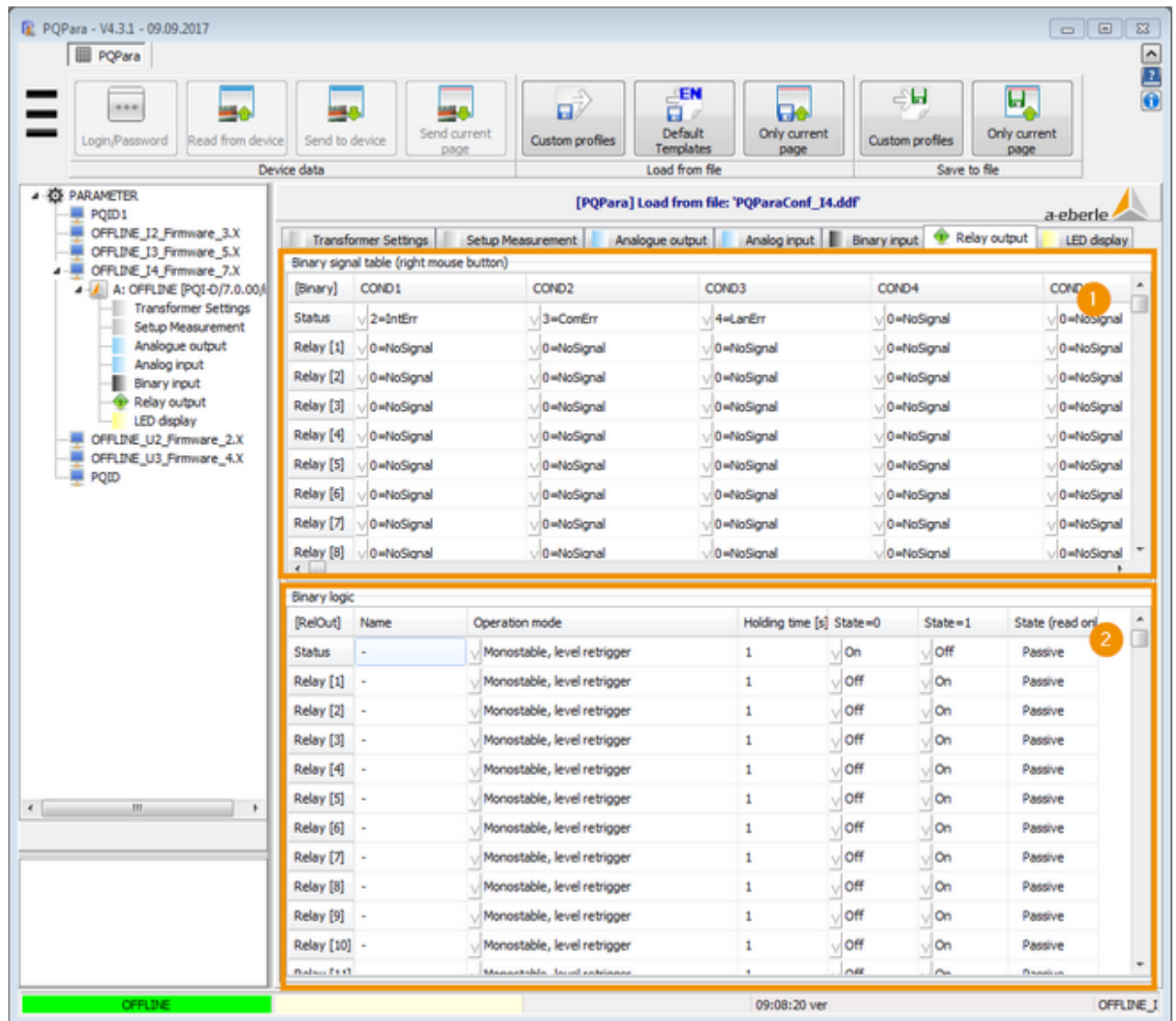


If binary signals are displayed together with the fault records in WinPQ, the following option must be activated in the software via the WinPQ system management.



If certain signals or messages are to be emitted on relay pins, or displayed via LED on the front side of the PQI-D, this can be set on the "Relay output" or "LED display" tab.

Configuring relay output and LED display



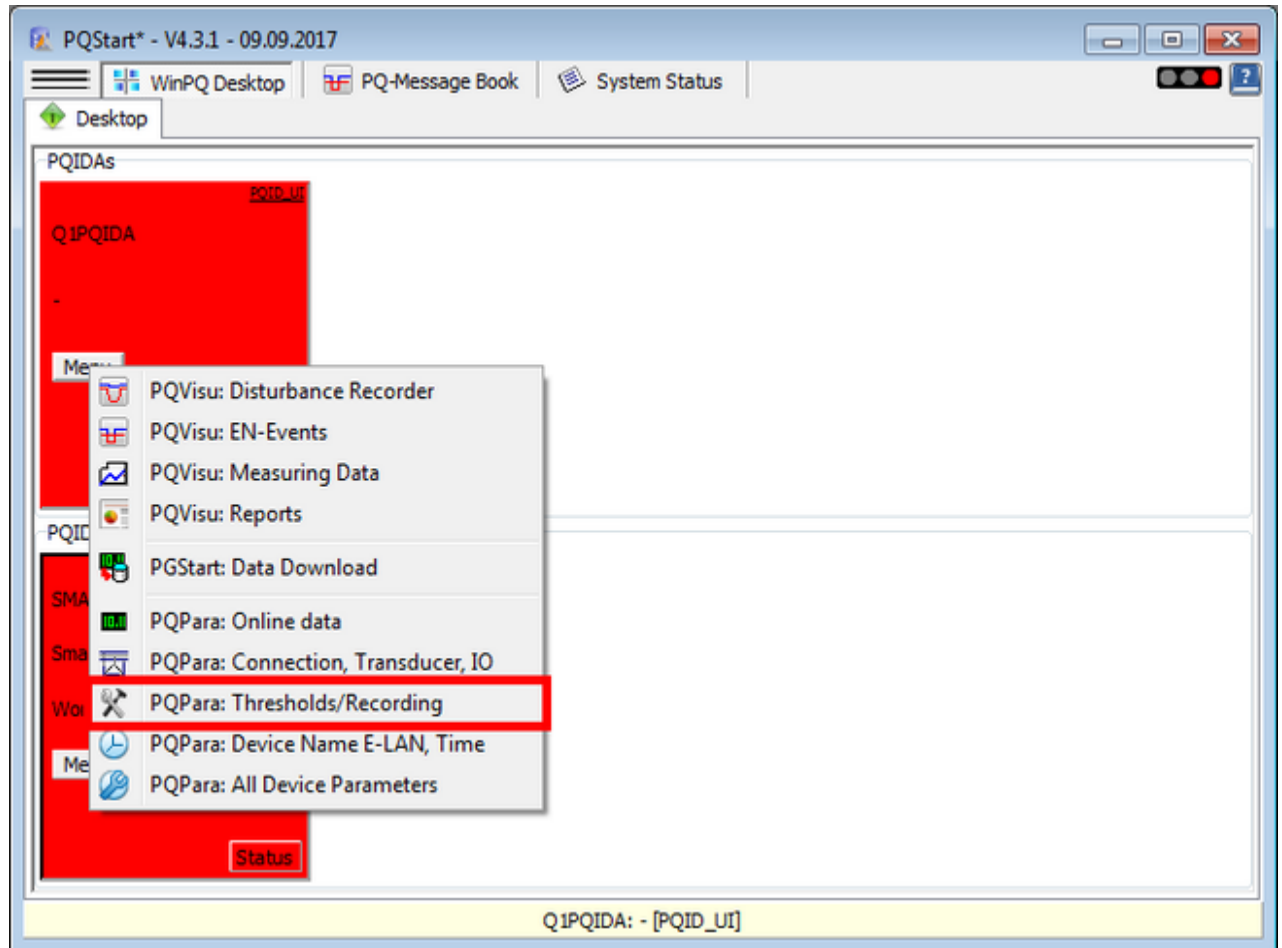
1 Conditions for activating the relay/LED. There is a local menu with the messaging IDs.

2 Configuring the performance: Operating Mode, Hold Time, Logic State

Using the right mouse button in the field "Operating mode" a menu will open with many options to set a relay or LED message. All conditions can be linked with OR.

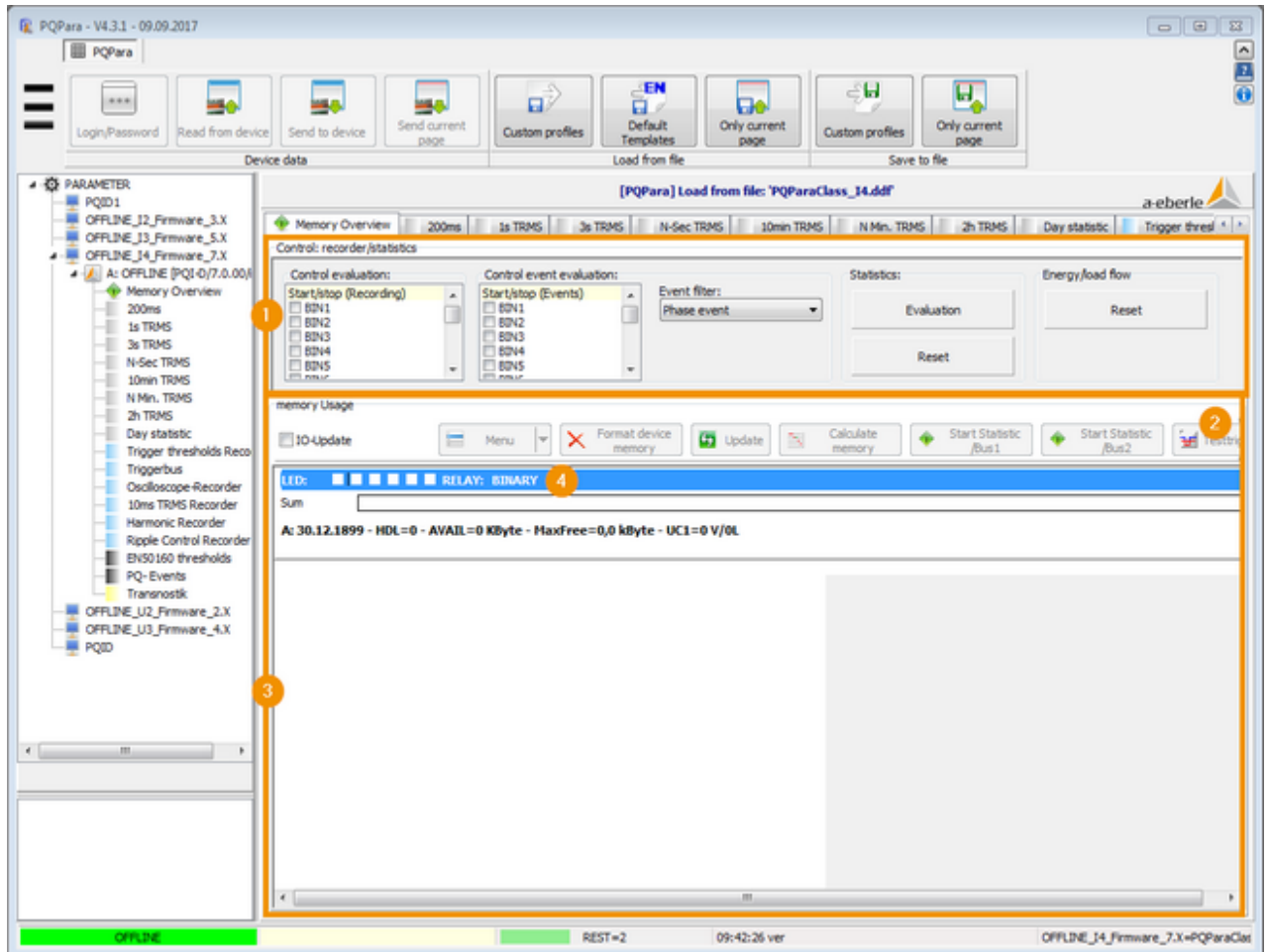
Thresholds and recording

The point "Thresholds/Recording" is the most extensive menu of all settings. Here all settings for the measurement data recording, the trigger limit value and the storage distribution are set. We recommend using our standard set-up template.



Overview

The point "Thresholds/Recording" is the most extensive menu of all settings. Here all settings for the measurement data recording, the trigger limit value and the storage distribution are set. We recommend using our standard set-up template.



The analysis is stopped in the PQI-Ds after delivery and must be started again after first configuration and checking the online data!

1 Control functions

- Recording Control: It is best to control the recording of the measurement data via a binary signal.
- Analysis Control (Binary In): The analysis of the PQ events starts here and stops when there is a signal on the binary input.
- Event Recording Mode: Phase event - counts events for each individual phase with the relevant length and depth. Grid Event - counts only one event for a three-phase event. The event length is the time from the start of the first phase to the end of the last phase. The deepest point determines the depth. (polyphase)
- Flagging: Measurement devices pursuant to IEC61000-4-30 Class A flag (mark) measurement intervals. Here you set the criterion from which flagging should take place.
- With the "Evaluation: Start" button, the event recording and thus the standard analysis is started or stopped. Red = analysis stopped
- Reset - deletes all event counters in the device.

2 Testtrigger

Release a test trigger signal with the software to test the trigger signal.



3 Storage allocation

- Grey: Deactivated
- Green: Reserved
- Red: Occupied
- Pink: Analysis
- Cross Hatch: Linear

4 Status display of the LEDs, relays and binary channels

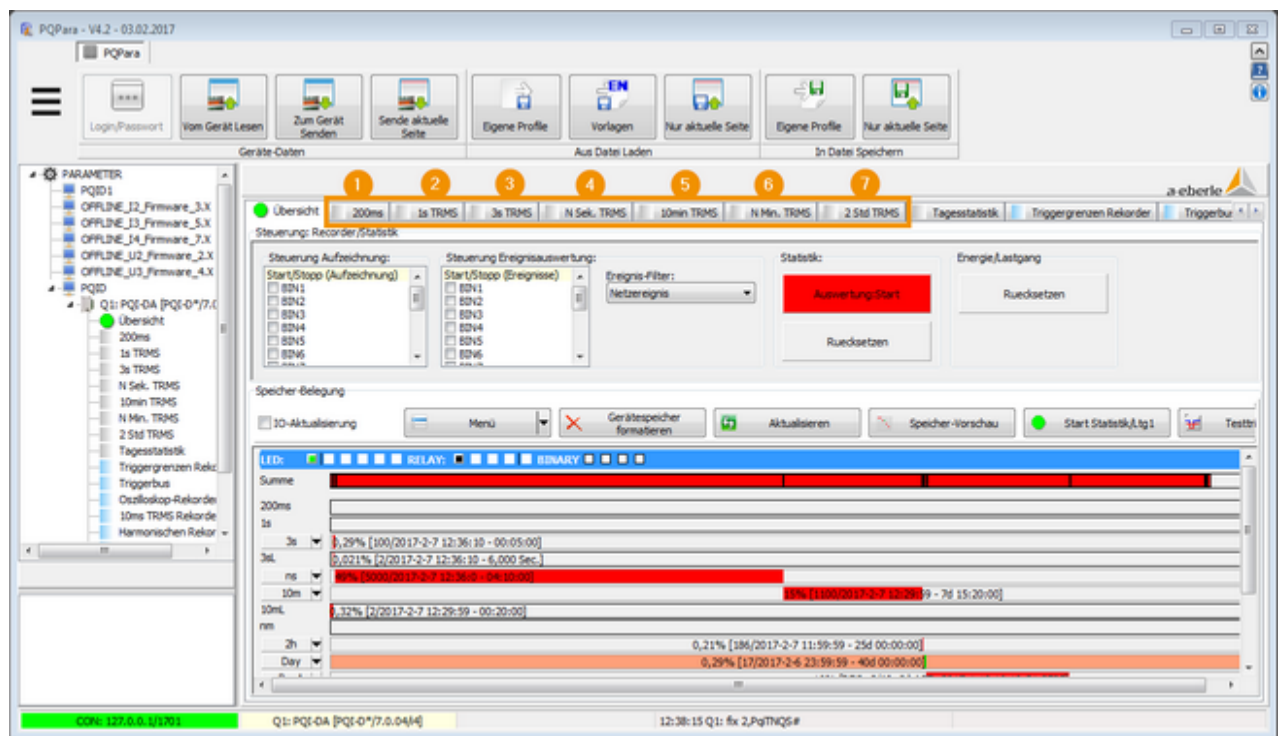


The display shows the current status of the LEDs, relays and binary channels.
The following variants are available:

 Channel is not active	 Channel is active
 Channel is fixed setting not active	 Channel is fixed setting to active

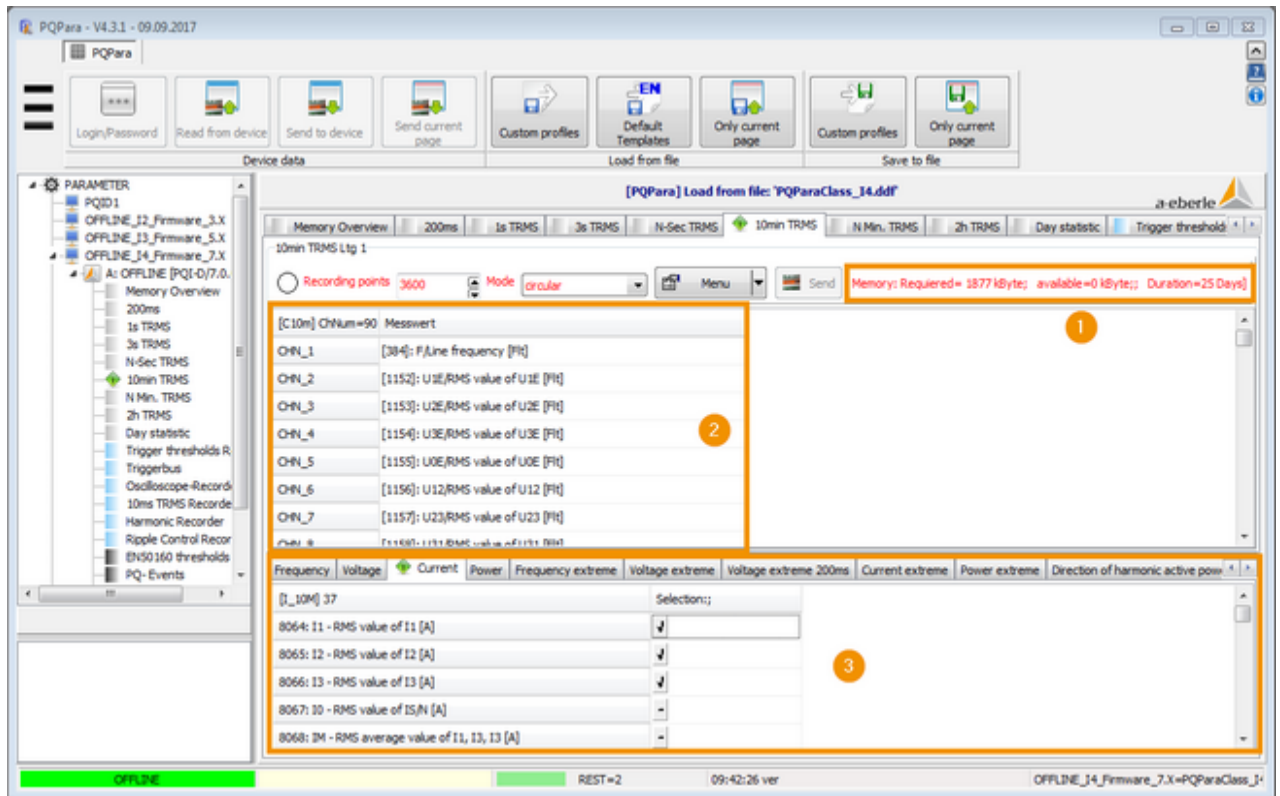
Configuration of continuous recording

The following cards list the measurements for permanent recording:



- 1 **200 ms** (200 Milliseconds):
this data class is primarily used in connection with analogue outputs
- 2 **1s TRMS** (1-Second-mean-values):
1 second data class.
- 3 **3s TRMS** (3-Second-mean-values):
all of the measurement values activated here are available as online measurements and can also be permanently saved in the database if needed.
- 4 **N Sek. TRMS** (N-Second-mean-values):
adjustable N-second data class.
- 5 **10min TRMS** (10-Minutes-mean-values):
all measurement data of the 10 minute average, minimum and maximum value recording are set on this card. There are over 2000 measurements available. Up to 1024 parallel parameters can be selected. The recording length is changed with the number of selected measurement values and displayed in the software.
- 6 **N Min. TRMS** (N-Minutes-mean-values):
adjustable N-minutes data class.
- 7 **2 Std TRMS** (2-Hours-mean-values):
all measurements are available here as well. Usually the long-term flicker value PLT is recorded here.

Example for the 10 minutes data class:



- 1 Storage, recording duration etc.
- 2 Active measurements
- 3 Pre-selection of Measurements: The registries frequency, voltage, current etc. are used for pre-selection of the measurements. Through the structuring of the measurements by physical factors, locating this is made easier.

Trigger configuration

All trigger thresholds for oscilloscope images, 10 ms effective value recorders and ripple telegram recorders are configured in this menu. All trigger limits with [%] are based on the set nominal values for voltage and current. See also chapter [Grid connection and transformer factors](#).

Recording length

Example: 3600 x 10 Minute Value

Display of recording length

Example: 25 days 0 hours

Control: recorder/statistics (bus 1)	
[TriggerTresh]	Values:
1: Trigger signal hold time	1
2: Frequency hysteresis [Hz]	0.05
3: Frequency upper threshold [Hz]	50.5
4: Frequency lower threshold [Hz]	49.5
5: Frequency jump [Hz/s]	0.5
6: Hysteresis for 1/2-period-voltage [%]	2.0
7: Upper threshold [%], line-to-earth-voltage	120.0
8: Lower threshold, line-to-earth-voltage	80
9: RMS jump threshold [%], line-to-earth-voltage	15.0
10: Phase jump threshold [°], line-to-earth-voltage	6.0
11: Upper threshold [%], NE voltage	30.0
12: RMS jump threshold [%], NE voltage	10.0
13: Upper threshold [%], line-to-line-voltage	110.0
14: Lower threshold [%], line-to-line-voltage	90.0
15: RMS jump threshold [%], line-to-line-voltage	10.0
16: Threshold wave shape trigger [%], line-to-earth-voltage	20.0
17: Threshold wave shape trigger [%], line-to-line-voltage	20.0

Threshold values:

- 0 Frequency
- 0 Phase to Earth Voltage (lower + upper)
- 0 Phase to Phase Voltage (lower + upper)
- 0 RMS voltage
- 0 NE voltage
- 0 Phase jump
- 0 Envelope trigger
- 0 Symmetric Components
- 0 Trigger through current limits
- 0 Rapid effective value changes
- 0 Signal voltage changes

These conditions can be used or not in the relevant recorder menu (e.g. 10 ms TRM recorder). In the example below: the oscilloscope recorder starts when the lower threshold U1E is violated, but not if the current threshold is exceeded.

Trigger mask			
[ExtTrgMask]	Trigger 1..32	Trigger 33..64	Trigger 65..96
Condition; [1]	- Deviation lower threshold U1E	- Deviation lower threshold I1	- Falling edge binary 1
Condition; [2]	- Deviation lower threshold U2E	- Deviation lower threshold I2	- Falling edge binary 2
Condition; [3]	- Deviation lower threshold U3E	- Deviation lower threshold I3	- Falling edge binary 3
Condition; [4]	- Deviation lower threshold U12		- Falling edge binary 4
Condition; [5]	- Deviation lower threshold U23	- Deviation upper threshold I1	- Falling edge binary 5
Condition; [6]	- Deviation lower threshold U31	- Deviation upper threshold I2	- Falling edge binary 6
Condition; [7]		- Deviation upper threshold I3	- Falling edge binary 7
Condition; [8]		- Deviation upper threshold IN	- Falling edge binary 8
Condition; [9]	- Deviation upper threshold U1F	- Current channel I1	- Falling edge binary 9

Triggerbus

Using the triggerbus it is possible for a grid analyser to start the fault recorder (oscilloscope images and 10 ms TRMS recorder) of other devices, even if they do not see a threshold violation.

In the "Triggerbus" menu, the criteria for which an external signal from this device is sent to another device is set. The length of the transmission pulse as well as a lock time (between two impulses) can be set.

Trigger thresholds Recorder **Triggerbus** Oscilloscope-Recorder 10ms TRMS Recorder Harmonic Recorder Ripple Control Recorder

Settings Triggerimpuls

[ExtTrgSetup]	Values:
1: Send impulse length [s]	1.0
2: Blocking time after rising edge of receive impulse [s]	15.0

Trigger mask

[ExtTrgMask]	Trigger 1..32	Trigger 33..64	Trigger 65..96
Condition; [1]	- Deviation lower threshold U1E	- Deviation lower threshold I1	- Falling edge binary 1
Condition; [2]	- Deviation lower threshold U2E	- Deviation lower threshold I2	- Falling edge binary 2
Condition; [3]	- Deviation lower threshold U3E	- Deviation lower threshold I3	- Falling edge binary 3
Condition; [4]	- Deviation lower threshold U12		- Falling edge binary 4
Condition; [5]	- Deviation lower threshold U23	- Deviation upper threshold I1	- Falling edge binary 5
Condition; [6]	- Deviation lower threshold U31	- Deviation upper threshold I2	- Falling edge binary 6
Condition; [7]		- Deviation upper threshold I3	- Falling edge binary 7
Condition; [8]		- Deviation upper threshold IN	- Falling edge binary 8
Condition; [9]	- Deviation upper threshold U11F	- Current channel I1	- Falling edge binary 9



All triggers can be forwarded to the trigger bus. You can find additional information on the triggerbus (activation/termination, etc.) in the PQI-D(A) hardware operating instructions.

Oscilloscope and TRMS Recorder

The recording lengths, history, re-triggers (repeat triggers) and the measurement channels to be recorded can be set in the "Oscilloscope Recorder" and "10ms TRMS Recorder" tabs.

- ① Direct channel selection for recorder B (RecB) Grid effective power, Grid idle power, Grid apparent power, Frequency, Frequency change
- ② Additional Parameters: Recorder Length, Pre-trigger, Re-trigger, Write per sequence
- ③ Trigger-Mask (Examples) Jumps for voltage effective values, Phase jumps, Power-Trigger and Power Jumps

Overview Trigger-criteria:

Basic parameters:

- Recorder Length
- Pre-trigger
- Re-trigger
- Write per sequence

Trigger Mask:

- Every criterion can be used for every conductor
- Send/receive external trigger
- Trigger from software

Phase-Earth Voltage:

- Upper threshold
- Lower threshold
- Effective value jump
- Phase jump

Phase-Phase Voltage:

- Upper threshold
- Lower threshold
- Effective value jump
- Phase jump

Residual voltage:

- Upper threshold
- Effective value jump

Conductor currents:

- Upper trigger threshold
- Lower trigger threshold
- Threshold of effective value jump
- Upper trigger threshold total current
- Threshold of phase jump of the total current

Special triggers:

- Envelope trigger
- Harmonic components

Threshold Hysteresis (Current + Voltage):

- Half period voltage
- Half period current

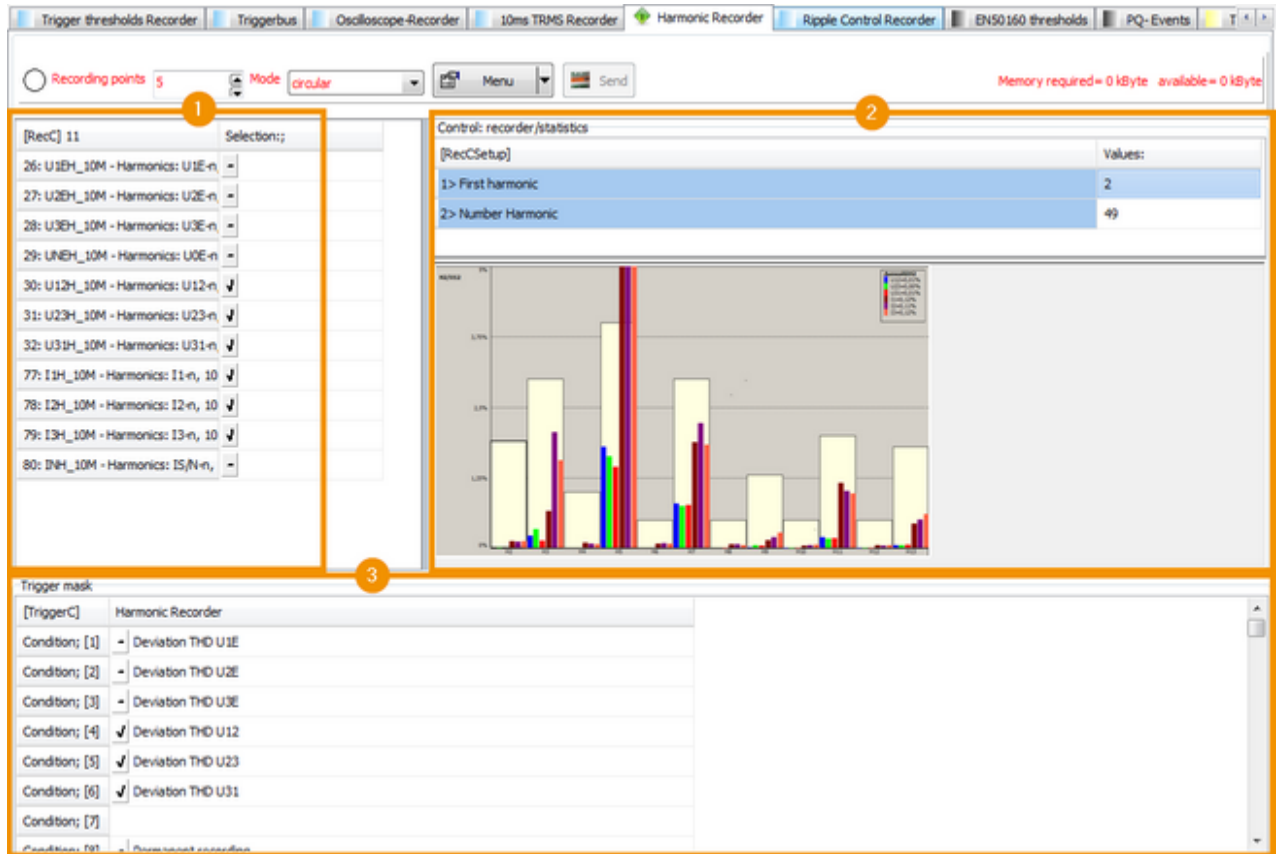
Trigger via Binary:

- 16 x falling edge
- 16 x rising edge

Harmonic Recorder

The harmonic recorder shows a fingerprint of all 10 minute values of the voltage and current harmonics in the event the limit value is exceeded.

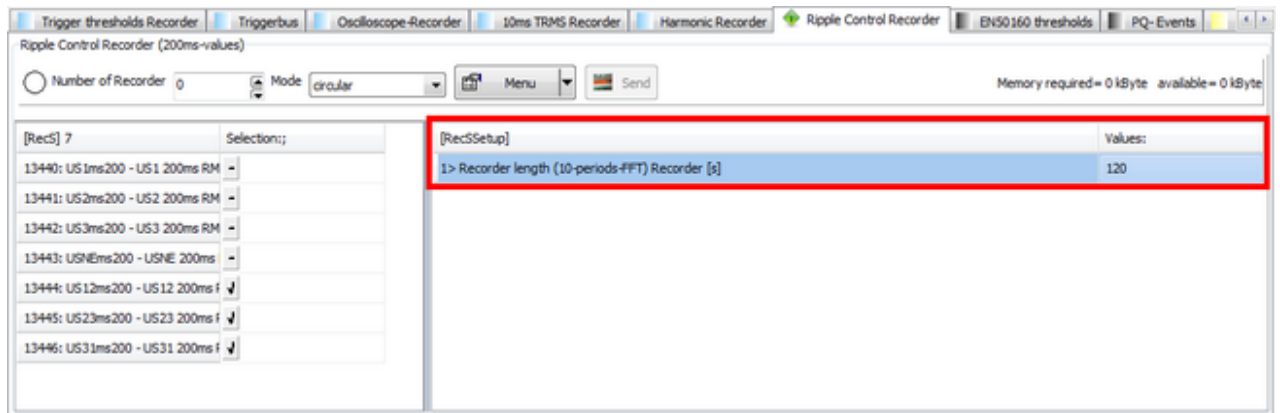
In the example below, when the limit value of the THD or one of the individual voltage harmonics of all voltage and current harmonics of the 2nd to 50th ordinal numbers are recorded. Because this is a medium voltage grid, here the linked voltage harmonics are selected.



- 1 Section for the measurement selection
- 2 Selection of harmonics (from and number)
- 3 Trigger conditions from the 10 minute range

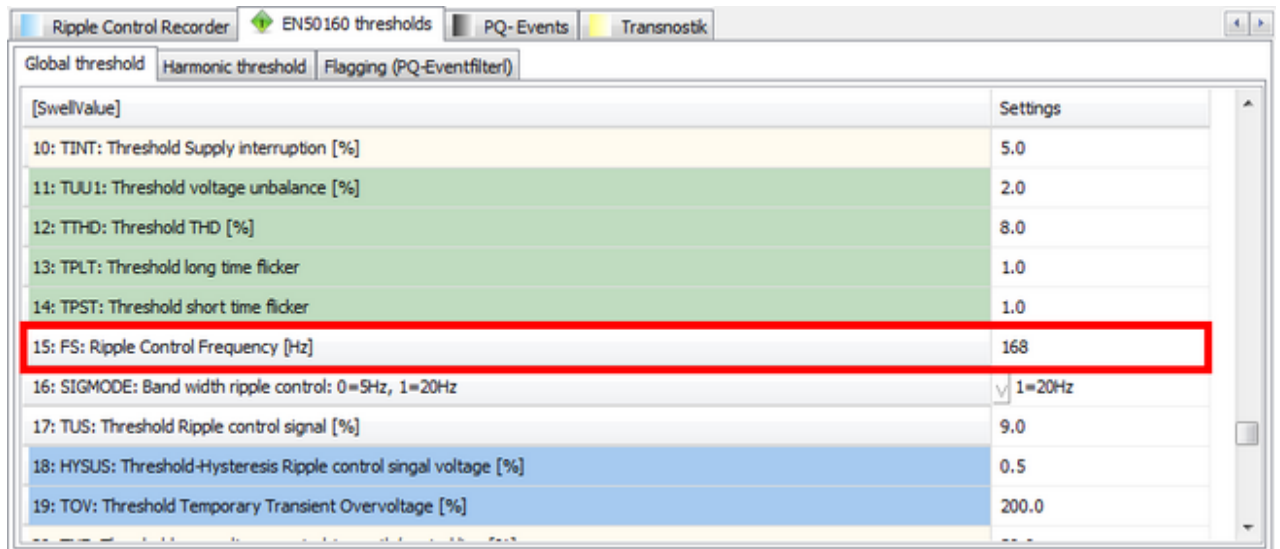
Ripple Control Recorder

The ripple control recorder is provided for the recording of ripple control signals, in the following example 120 seconds.



The frequency of the signal voltage can be adjusted on the tab "EN50160 Limit Values". The trigger threshold is to be set on the tab "Trigger threshold Recorder"

In the example below, the signal voltage is set to 168 Hz. This frequency can be changed within the range from 100Hz to 2500 Hz.



The trigger threshold is to be set on the tab "Trigger threshold Recorder":

Day statistic		Trigger thresholds Recorder	Triggerbus	Oscilloscope-Recorder	10ms TRMS Recorder	Harmonic Recorder
Control: recorder/statistics (bus 1)						
[TriggerTresh]		Values:				
14: Lower threshold [%], line-to-line -Voltage		90.0				
15: RMS jump threshold [%], line-to-line -Voltage		10.0				
16: Threshold wave shape trigger [%], line-to-earth-voltage		20.0				
17: Threshold wave shape trigger [%], line-to-line-voltage		20.0				
18: Threshold wave shape trigger [%], NE voltage		20.0				
19: Upper threshold positive sequence system [%]		110.0				
20: Lower threshold positive sequence system [%]		90.0				
21: Upper threshold negative sequence system [%]		10.0				
22: Upper threshold zero sequence system [%]		30.0				
23: Hysteresis for current RMS values [%]		2.0				
24: Upper threshold [%], phase current		200.0				
25: Lower threshold [%], phase current		0				
26: RMS jump threshold [%], phase current		20.0				
27: Upper threshold [%], sum current		50.0				
28: RMS jump threshold [%], sum current		20.0				
29: Trigger threshold Recorder [%]		1.0				

EN50160 threshold values

On tab "EN50160 threshold values" it is possible to freely change the tolerance level of the standard analysis (default is EN 50160 for medium voltage grids). Similar parameters are summarized in colour.

	Settings
6: TVS: Threshold voltage swell [%]	110.0
7: TVD: Threshold voltage dip [%]	90.0
8: TRVC: Threshold fast voltage change (RVC) [%]	4.0
9: BRVC: Tolerance band fast voltage change (RVC) [%]	0.2
10: TINT: Threshold Supply interruption [%]	5.0
11: TUU1: Threshold voltage unbalance [%]	2.0
12: TTHD: Threshold THD [%]	8.0
13: TPLT: Threshold long time flicker	1.0
14: TPST: Threshold short time flicker	1.0
15: FS: Ripple Control Frequency [Hz]	168
16: SIGMODE: Band width ripple control: 0=5Hz, 1=20Hz	1=20Hz
17: TUS: Threshold Ripple control signal [%]	9.0
18: HYSUS: Threshold-Hysteresis Ripple control singal voltage [%]	0.5
19: TOV: Threshold Temporary Transient Overvoltage [%]	200.0
20: TNE: Threshold overvoltage neutral-to-earth/neutral line [%]	30.0
21: HYSVPV: Threshold hysteresis of half period voltage [%]	1.0

- 1 General threshold values: Here the limit values of the set standard for the following measurements are set: frequency, voltage fluctuations, disruptions; voltage asymmetry and flicker.
- 2 Tolerance level/limit values of the harmonics: At this location all limit values of the voltage harmonics can be changed to the 50th harmonic.

10ms TRMS Recorder

Harmonic Recorder

Ripple Control Recorder

EN50160 thresholds

PQ- Events

Transnostik

Global threshold

Harmonic threshold

Flagging (PQ-Eventfilter)

[Compatibility]	Level
H35 (0.557%)	100.000
H36 (0.2%)	100.000
H37 (0.537%)	100.000
H38 (0.2%)	100.000
H39 (0.2%)	100.000
H40 (0.2%)	100.000
H41 (0.504%)	100.000
H42 (0.2%)	100.000
H43 (0.490%)	100.000
H44 (0.2%)	100.000
H45 (0.2%)	100.000
H46 (0.2%)	100.000
H47 (0.465%)	100.000
H48 (0.2%)	100.000
H49 (0.455%)	100.000
H50 (0.2%)	100.000

Event Data Class

The tab "Events" serves for the selection of the standard violation criteria as well as for the recording of the system data of the PQIDs (time setting, day change, etc.).

The screenshot shows the 'PQ-Events' tab in a software interface. At the top, there are tabs for '10ms TRMS Recorder', 'Harmonic Recorder', 'Ripple Control Recorder', 'EN50160 thresholds', 'PQ-Events' (selected), and 'Transnoscik'. Below the tabs, there are controls for 'Recording points' (set to 1000), 'Mode' (set to circular), a 'Menu' button, and a 'Send' button. A status bar at the top right shows 'd= 15 kByte; available=0 kByte;; Duration=].

Below the controls is a 'Selection:' section with a table of event selection criteria. The table has four columns: 'Events 1..32', 'Events 33..64', 'Events 65..96', and 'Events 97..128'. Each column contains a list of events with checkboxes for selection.

[EventMask]	Events 1..32	Events 33..64	Events 65..96	Events 97..128
Event; [1]		<input checked="" type="checkbox"/> Duration of transient event [s]	<input checked="" type="checkbox"/> Swell U31 (Stop)	<input checked="" type="checkbox"/> Power
Event; [2]	<input checked="" type="checkbox"/> System reset, start event	<input type="checkbox"/> Status change: recording data classes	<input type="checkbox"/> Dip U1E	<input checked="" type="checkbox"/> Power
Event; [3]	<input checked="" type="checkbox"/> System reset, stop event	<input type="checkbox"/> Status change: binary output	<input type="checkbox"/> Dip U1E (Stop)	<input checked="" type="checkbox"/> Power
Event; [4]		<input checked="" type="checkbox"/> Status change: external time sync	<input type="checkbox"/> Dip U2E	<input checked="" type="checkbox"/> Power
Event; [5]	<input checked="" type="checkbox"/> Station error flags	<input checked="" type="checkbox"/> DSP-Event buffer overflow	<input type="checkbox"/> Dip U2E (Stop)	<input checked="" type="checkbox"/> Power
Event; [6]	<input type="checkbox"/> Measure channel oversteer, start event	<input checked="" type="checkbox"/> Reset Event evaluation	<input type="checkbox"/> Dip U3E	<input type="checkbox"/> Voltage
Event; [7]	<input type="checkbox"/> Measure channel oversteer, stop event	<input checked="" type="checkbox"/> Event evaluation	<input type="checkbox"/> Dip U3E (Stop)	<input type="checkbox"/> Voltage
Event; [8]	<input type="checkbox"/> DSP time set	<input checked="" type="checkbox"/> Event evaluation (Stop)	<input checked="" type="checkbox"/> Dip U12	<input type="checkbox"/> Voltage
Event; [9]	<input checked="" type="checkbox"/> CPU time set	<input checked="" type="checkbox"/> New record Recorder A	<input checked="" type="checkbox"/> Dip U12 (Stop)	<input checked="" type="checkbox"/> Voltage
Event; [10]		<input type="checkbox"/> New record Recorder S	<input checked="" type="checkbox"/> Dip U23	<input checked="" type="checkbox"/> Voltage
Event; [11]		<input checked="" type="checkbox"/> New record Recorder B	<input checked="" type="checkbox"/> Dip U23 (Stop)	<input checked="" type="checkbox"/> Voltage
Event; [12]		<input type="checkbox"/> State change: Transnoscik	<input checked="" type="checkbox"/> Dip U31	<input type="checkbox"/> Exceed
Event; [13]		<input checked="" type="checkbox"/> New recording of Recorder C	<input checked="" type="checkbox"/> Dip U31 (Stop)	<input type="checkbox"/> Exceed



Pursuant to standard EN50160, the phase-phase events in the medium and high voltage grids and phase-earth events in low voltage grids are registered. This was already taken into account in our sample files.

Transnastic function

Determination of type and location of the fault.



An exact description of this functionality is found in the WinPQ operating instructions.

[Transnastic]		Settings
1: Threshold voltage dip ULE and ULL [%]		90.0
2: Threshold over voltage ULE and ULL [%]		110.0
3: Threshold neutral-to-earth [%]		30
4: Minimum voltage for direction decision / ULE [%]		5
5: Voltage hysteresis ULE and ULL [%]		2
6: Current threshold / INOM [%]		120
7: Maximum current for direction decision / INOM [%]		2000.0
8: Reactive power threshold for dip direction decision/ nominal apparent power [%]		20.0
9: Reactive power threshold for threshold direction decision / nominal apparent power [%]		5.0

Meaning of the setting values:

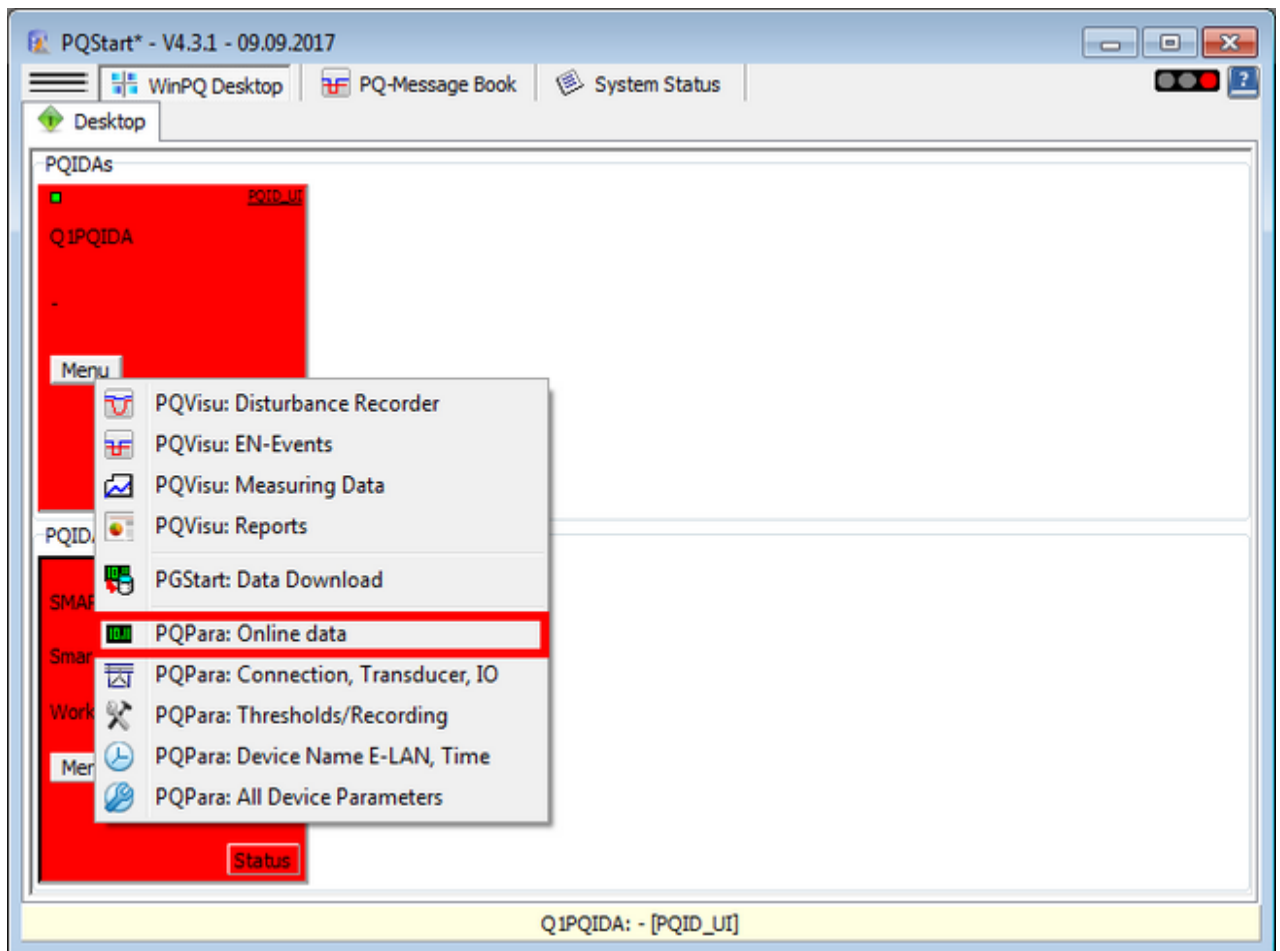
1. Trigger- threshold from which analysis occurs in a voltage disruption.
2. Trigger threshold for the analysis of over-voltage.
3. Threshold for the recognition of an earth fault.
4. Minimum voltage from which a calculation is done (if the residual voltage is too low, no correct measurement of the idle power is possible because the measurement fault is too great).
5. The hysteresis indicates the percentage that the measurement value must fall related to the trigger value before a new calculation is done. (this function avoids too many events in too short a time, if the voltage varies around the limit value).
6. The power threshold indicates the time from which over-voltage is detected.
7. The upper limit value for the maximum power limits the analysis range of the measurement device. The value must fit with the power channel of the PQI-Ds as well as to the connected measurement converter. (Example: if the device is connected to a measurement converter with a maximum power of 10A and the PQI-D is model 2xIn , the maximum value threshold must be set to 200%.
8. The idle power threshold indicates the minimum value from which the power is calculated and used for the direction decision for a voltage dip.
9. The idle power threshold is set for the analysis of the over-voltage in percent.

Note: The nominal power of the system to which the power thresholds are related is to be entered in the converter settings of the PQI-D.



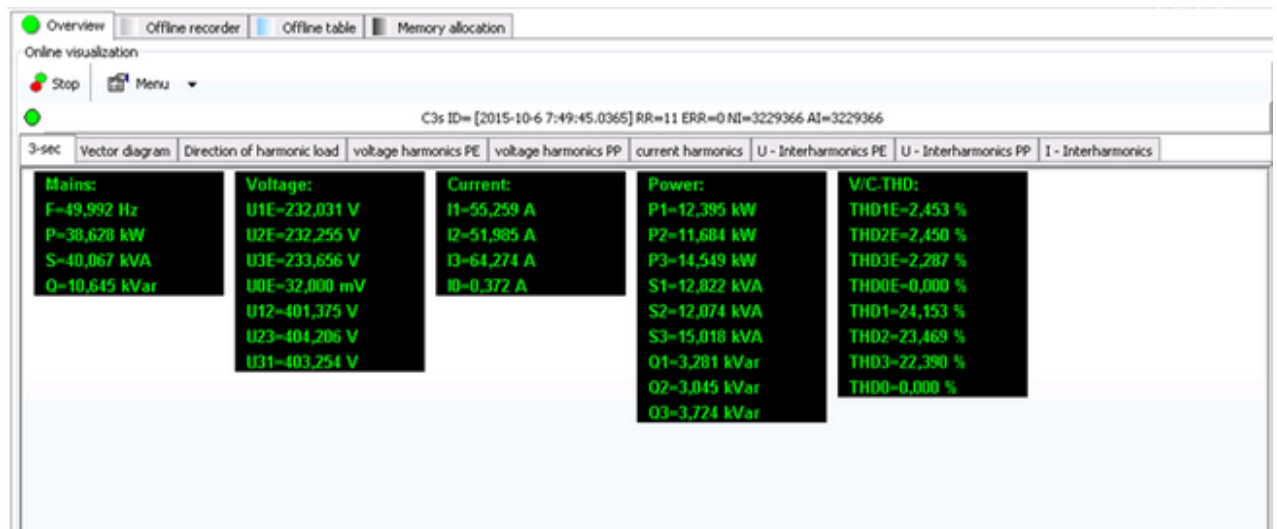
Online measurement values

In the configuration screen there are some online options integrated to be able to check the correct device connection



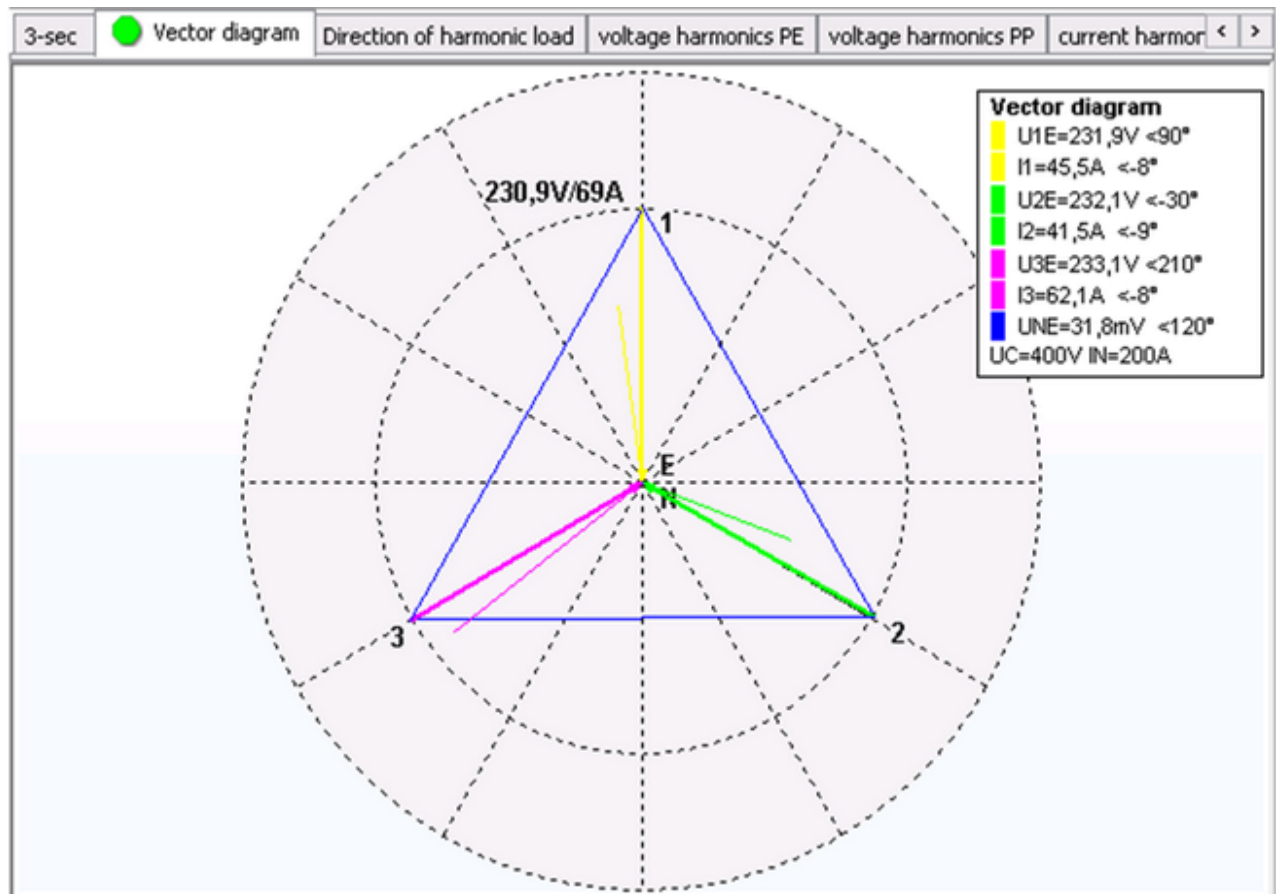
3 Second Online Values

All of the active measurement values in this data class are displayed in the "3 Sec Average" tab.



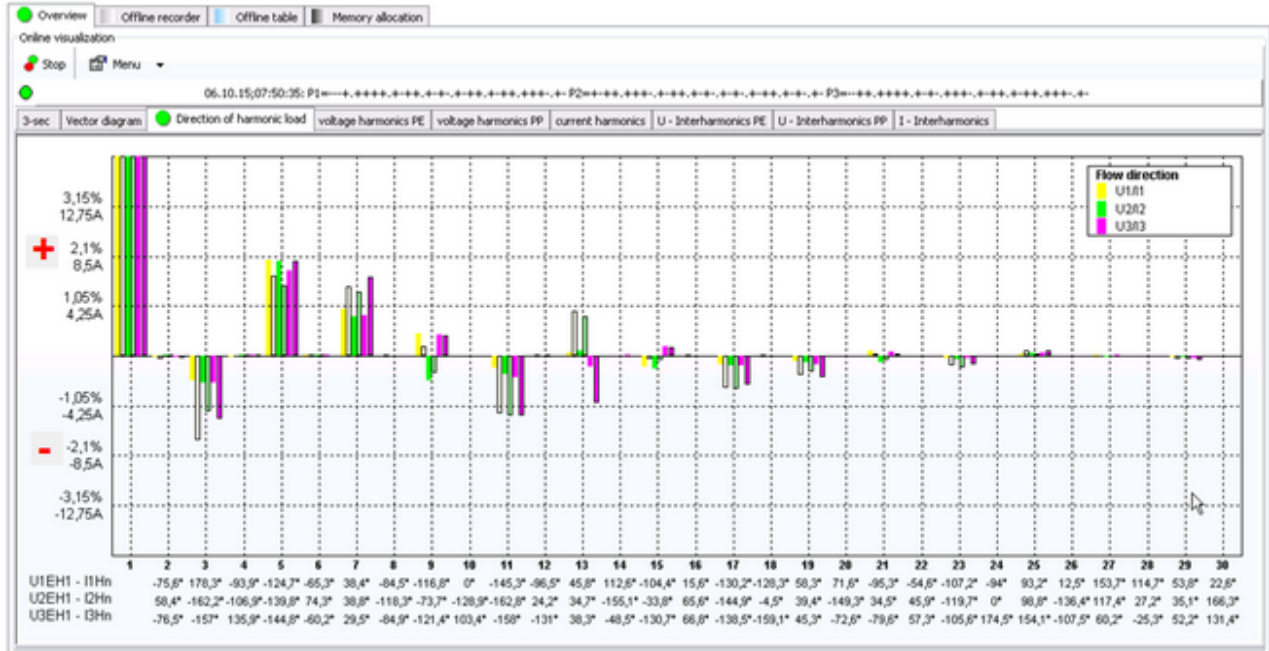
Vector diagram

In the vector diagram you can easily see the connection faults of the hardware (such as a transformer connection turn 180°).



Direction of Harmonic

The basic oscillation to the 30th harmonic is displayed as a bar on the "Direction of harmonic load" tab. If the effective power of the harmonics is positive (+) the bar is above the zero line, if the effective power is negative (-), it is under the zero line.





A. Eberle GmbH & Co. KG
Frankenstraße 160
D-90461 Nürnberg
Tel.: +49 (0) 911 / 62 81 08-0
Fax: +49 (0) 911 / 62 81 08 99
E-Mail: info@a-eberle.de
<http://www.a-eberle.de>

Software - Version: WinPQ 5.1
