CEM-DAS
Data acquisition and handling system for continuous emission monitoring – Software version 1.2.4

Performance-tested program system for
acquisition and handling of continuous
emission data

Measurement made easy

ABB

CEM-DAS

Data acquisition and handling system for continuous emission monitoring – Software version 1.2.4

System manual

TD/CEM-DAS-EN
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1 Introduction

CEM-DAS (Continuous Emission Monitoring Data Acquisition System) is a qualified programming system for acquisition and management of continuous emission data. CEM-DAS is designed for application as an intranet application and includes the data acquisition system DAA (Data Acquisition Application) as well as the software component CEM-DAS running on a common PC or two separate PCs.

CEM-DAS consists of a data server, a web server and a database.

CEM-DAS acquires the data from the qualified DAA acquisition systems.

CEM-DAS transmits the emission data of the measuring points selected by the operator to the appropriate authorities via remote emissions monitoring.

CEM-DAS stores the data in a relational database. Therefore, the data are accessible to the operator for the purpose of developing their own applications.

CEM-DAS displays the data released for the authorities as well as the operational data in a web browser with graphics and reports.

CEM-DAS protects data access by allocation of user profiles. Prior to application, users must log in with their user name and password.

CEM-DAS is based on standard developer tools and includes interfaces to standard Windows applications (e.g. Office).

CEM-DAS acquires measured values, short terms values, running slow averages and last slow averages as well as status messages from the qualified acquisition system DAA.

CEM-DAS also includes bar charts and line charts to display short term values and running slow averages.

CEM-DAS represents messages in the form of lists. Users can limit the display of messages based on various criteria.

CEM-DAS can be administered by remote maintenance.

2   System overview

2.1   Functions overview
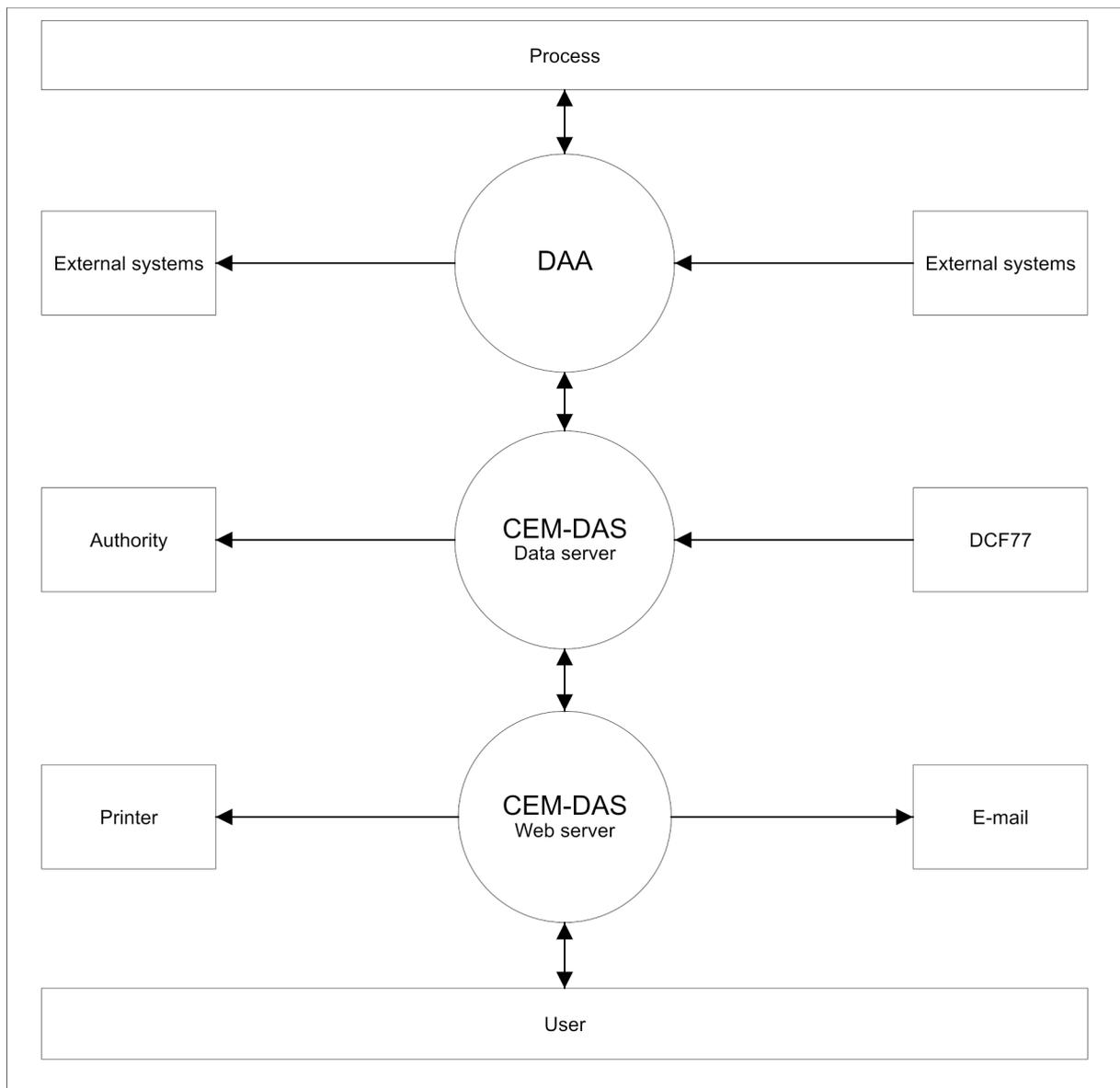
Figure 1: CEM-DAS and its environment

The interfaces of CEM-DAS are summarized in the context diagram depicted above.

CEM-DAS acquires the data from one or more DAA acquisition systems via a network.

CEM-DAS synchronizes the time of all connected DAA systems with the official time via a DCF77 interface.

CEM-DAS can be used at the operator and provides the data of the measuring points released by the operator to the authorities via switch lines. Transmission is effected pursuant to one of the following interfaces for remote emissions monitoring (see /3/):
- Federal Guideline for Remote Emissions Monitoring EFÜ 95
- Federal Guideline for Remote Emissions Monitoring EFÜ 2005

CEM-DAS provides the data in a relational database to one or more users.

CEM-DAS displays the data to the user via tables and graphics. For documentation purposes, the data can be printed as reports.

2.2 System configuration

CEM-DAS runs on PCs with the operating systems Windows 7 or Windows 8, Windows Server 2008 R2 or Windows Server 2012 R2.
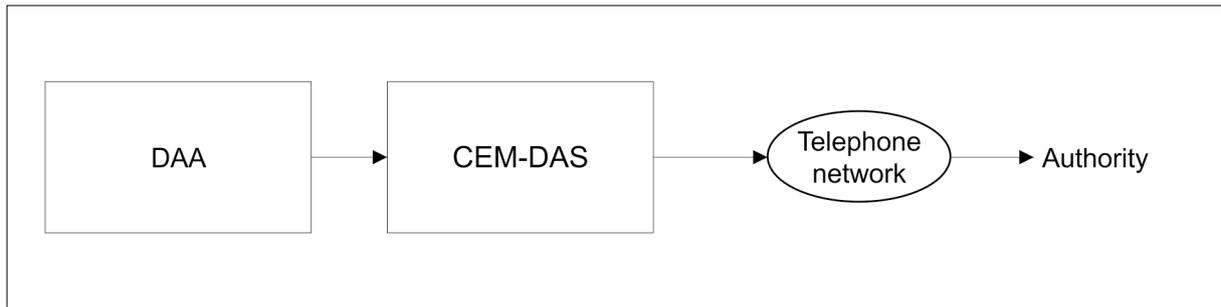
Figure 2: System configuration 1

In Figure 2, DAA is connected to a PC with CEM-DAS installed. The PC is also used as a work station. In addition, the authorities can be connected via telephone network and remote emissions monitoring.
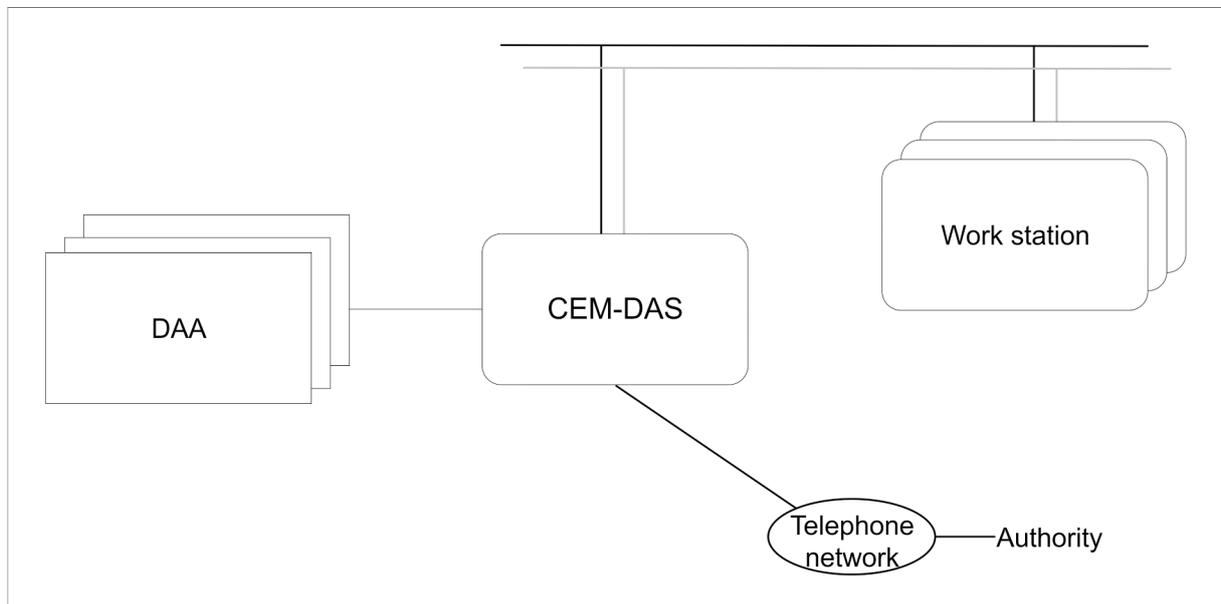
Figure 3: System configuration 2

In Figure 3, several DAA are connected to the CEM-DAS PC, which assumes the central data processing.

In addition, the authorities can be connected via telephone network and remote emissions monitoring. Other PCs in the network serve as work stations.
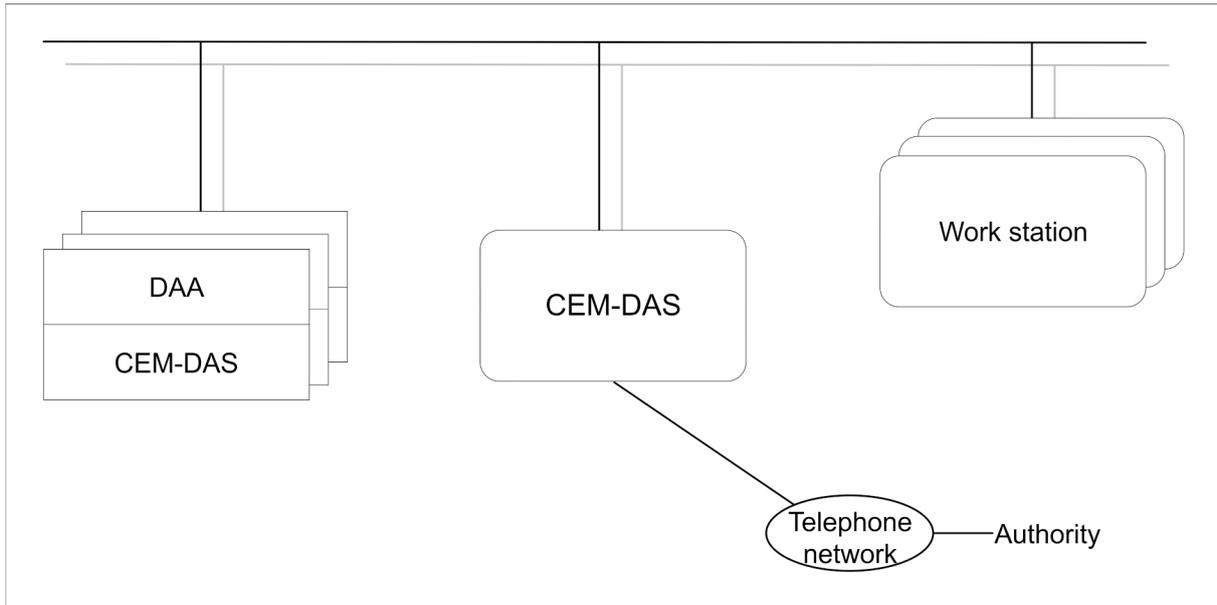
Figure 4: System configuration with replication 1

In Figure 4, several DAA are connected to a local CEM-DAS and additionally equipped with a central CEM-DAS and integrated in a network.

The data are stored on the local as well as on the central PC. Other PCs integrated in the network are used as work stations with access to the local CEM-DAS systems as well as to the central CEM-DAS.

Parameterization is effected on the central CEM-DAS and is replicated to the local CEM-DAS systems.
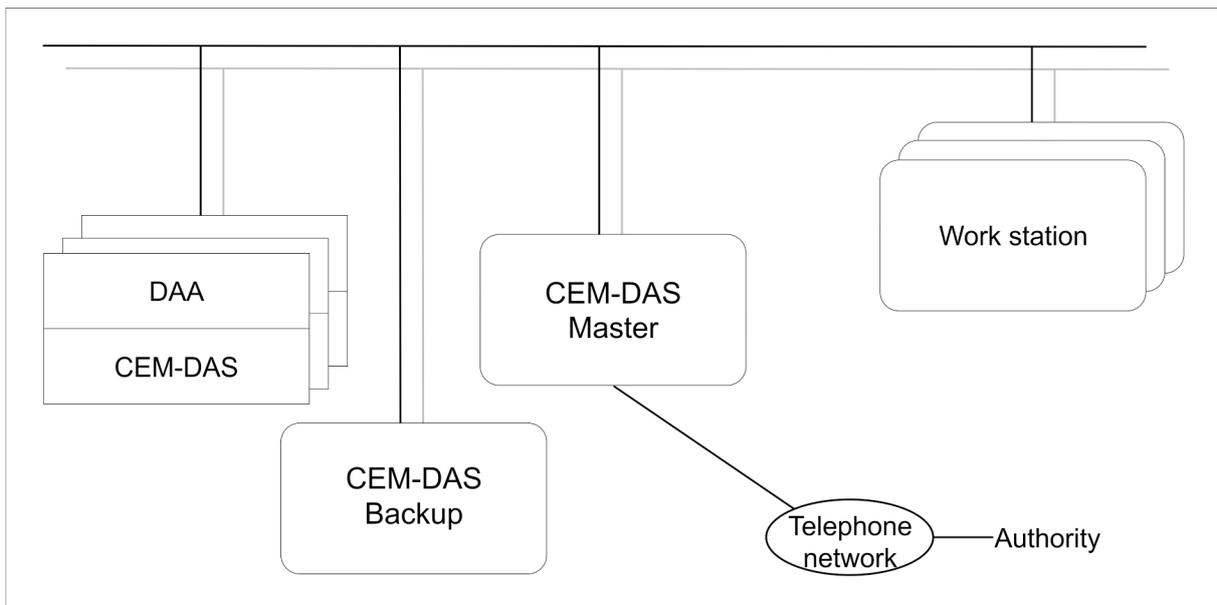
Figure 5: System configuration with replication 2

In Figure 5, several DAA are connected to two CEM-DAS systems. The data are stored on both systems. Other PCs integrated in the network are used as work stations with access to both CEM-DAS systems.

Parameterization is effected on the central CEM-DAS (master) and is replicated to the back-up CEM-DAS.

3 Functional model

3.1 CEM-DAS – Data server

3.1.1 Overview

The functions of the CEM-DAS data server are realized by the programs depicted in Figure 6.
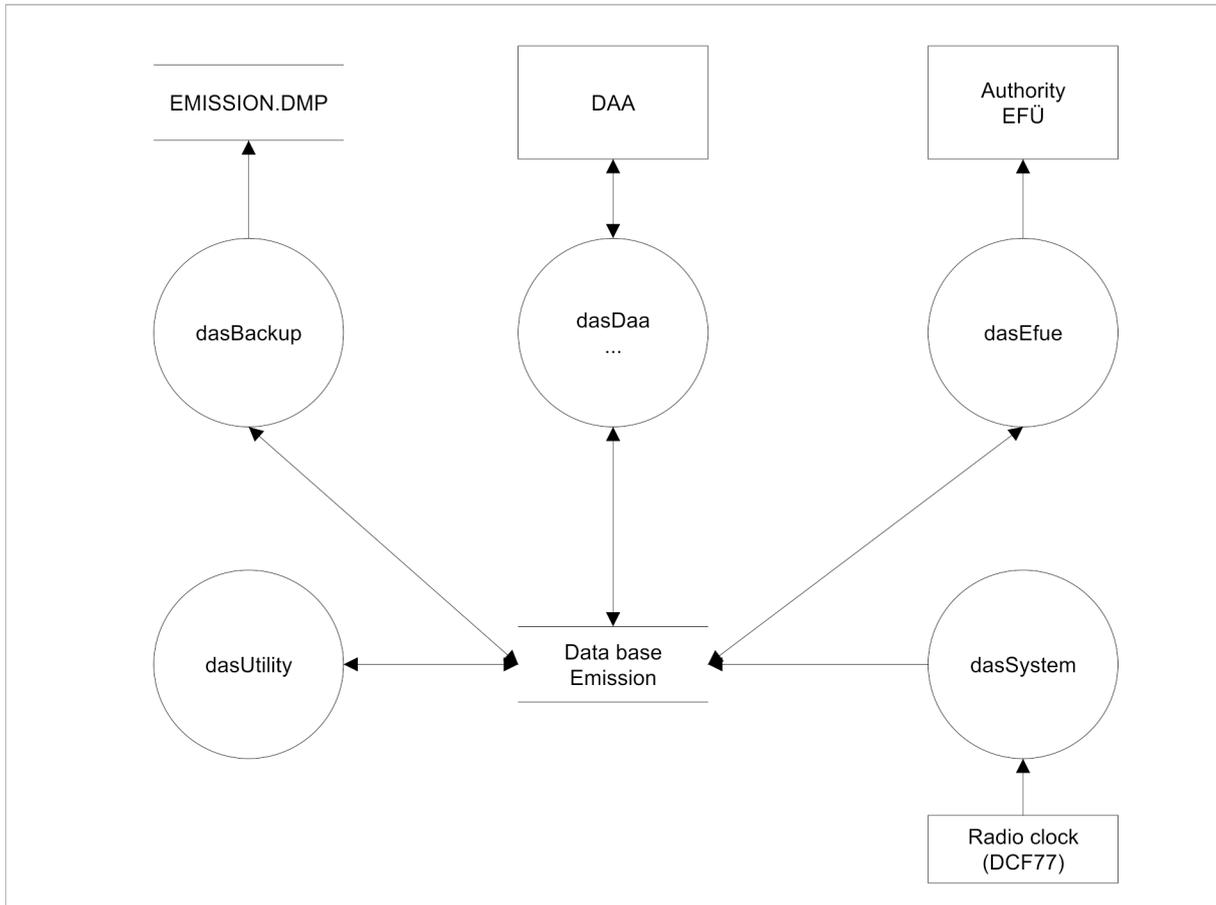
Figure 6: CEM-DAS – Data server programs

3.1.2 dasDaa – Communication with DAA

In normal operation, the program transmits the measured values, short term values, running slow averages, last slow averages and messages from DAA and stores them in the data base EMISSION.

At the same time, the DAA settings are checked and changes are automatically reported.

Also, the time is synchronized between DAA and CEM-DAS.

The program communicates with DAA via a network connection (TCP/IP).

3.1.3 dasEfue – Communication with the authorities

The program transmits the data released by the operator to a system of the authorities. The mode of data transmission can be selected pursuant to the various standards for remote emissions monitoring (see 2.1).

3.1.4 dasSystem – Monitoring

This program starts the other programs. In addition, it monitors the system time and the started programs. In case of a functional error, it can trigger a restart of the operating system, if necessary.

3.1.5 dasUtility – Classification, messages

The program calculates the daily, monthly and annual values and classifies the last slow averages and the daily values. In addition, it generates messages.

3.1.6 dasBackup – Database storage

The program stores the EMISSION database in the file EMISSION.DMP in an adjustable interval. The number of copies to be managed by the program can be adjusted.

For this purpose, the program generates, for every copy, a subdirectory named SNAPnnnn (nnnn = number of the copy) in the main directory assigned for data storage.

This main directory must be located on a local hard drive of the PC. Direct storage on an external hard drive (USB, NAS, file server) is not possible; it is however possible to transmit the backup as a compressed (ZIP) file to an external storage device.

Storage of the EMISSION database is conducted in a circulative manner, which means that after the predefined number of copies is reached, the SNAP0001 copy will be overwritten.

The copies can be copied to external storage devices by using the operating system's tools. If the hard drive becomes defective, the EMISSION database can be restored from the copy.

3.1.7 dasSpecial

This program (not depicted in Figure 6) executes customer-specific applications.

3.2 CEM-DAS – Web server

3.2.1 Overview
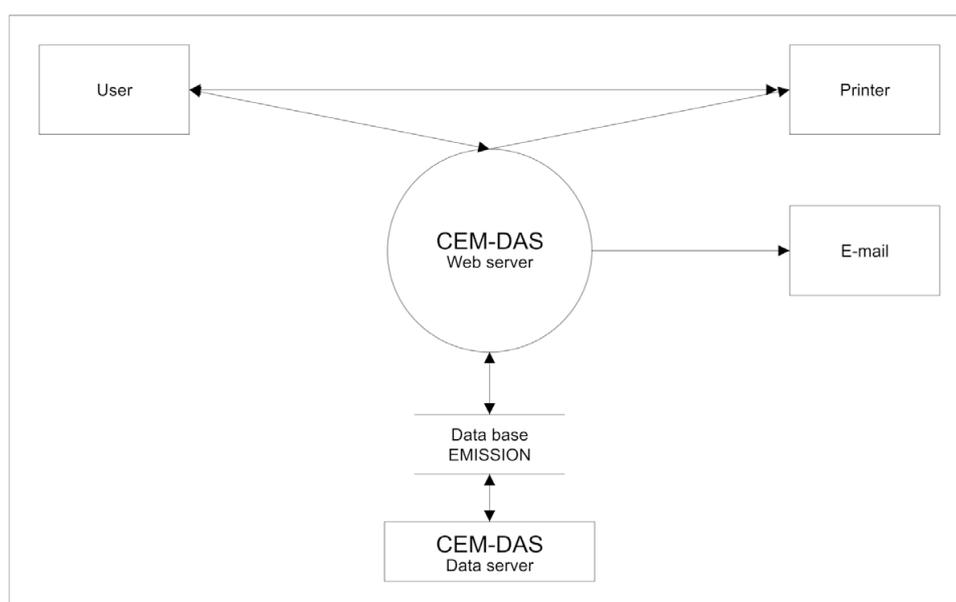
Figure 7: CEM-DAS – Web Server

CEM-DAS displays the user interface as websites via a web server. The web server used is "Tomcat" of the "Apache Software Foundation".

Only TCP port 80 is necessary for communication between CEM-DAS and the work stations.

Required database accesses only happen on the server PC.

3.2.2 Visualization

CEM-DAS provides the following displays:

- Lists of measured values, short term values and daily values incl. status
- Lists of frequency distributions (classifications)
- Lists of messages of limit value violations etc.
- Curve chart with short term values, last slow averages and daily values for quick detection of limit value violations and to identify trends
- Bar charts for current short terms values, running slow averages and daily averages
- DAA status messages in the system messages

In addition, the following operating functions are available:

- Manual status input of last slow averages and system operation over freely selectable time frames
- Input of messages, i.e. comments and reports, for transmission to the authorities

Displays and inputs are based on selections, in which the user defines groups of measuring points that shall be displayed together.

All displays can be printed.

3.2.3 Parameterization

Parameterization of CEM-DAS is realized via the user's web browser. Operation and parameterization is described in /1/.

3.3 CEM-DAS – DAA

Parameterization of DAA is integrated in CEM-DAS and can be performed via the web browser (see /1/).

The hardware used by DAA is described in the DAA System manual (see /2/).

4 Data storage

4.1 Current data

The data currently captured and transmitted from DAA to CEM-DAS are stored in an Oracle database. Reading access for remote applications is possible via a standardized interface. Other unauthorized access to the database is securely locked. Access to the database for Oracle system administrators is prohibited.

The online storage depth is adjustable for all data and fulfils, in delivery condition, the legal requirements (at least 5 years for last slow averages, daily, monthly and annual values as well as protocols).

Online storage of the 5s values is generally limited to a few weeks. They are, however, permanently stored in the raw value files.

4.2 File storage

All automatically generated daily protocols are stored in the server's hard drive in fixed directories in the backup drive[1] under „file storage". This structure is depicted in the following illustration. The illustration shows descriptions of the individual directories as well as, on the right side, examples of the files included in the directories.

Each directory contains a file 0.<SystemName>. The file name contains the name of the affected system in clear text.

The daily protocols are stored as pdf and txt files and can be directly read out and printed.

The remote emissions monitoring files *.ML, *.MW und DMOD.nnn are solely text files that can be directly read out and printed.

The raw value files „jjjjmmtt.RAW" or „jjjjmmtt.DB7" in the \Tnnnn directories contain, in binary form, all data transmitted from DAA to CEM-DAS in the course of one day. There are special tools outside the user interface of CEM-DAS to access the content of these files, in particular the permanently stored 5s measured values. The service of ABB will be glad to assist if it becomes necessary to access the raw data.

File storage is generally not accessible on CEM-DAS work stations (clients), unless there is a remote desktop connection or a shared network connection to the server.

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[1] Drive D: if CEM-DAS is set up in its standard file structure.

Volume (D:)
  Backup   Backup directory, generally on volume D:
  Dateiablage   Storage of protocols, EFÜ data models, parameters
    2015   Yearly directory
      04   ◄──────   Monthly directory
      05
      06   ┌ Storage of the daily, monthly and yearly protocols *.PDF, *.TXT   0.Linie 1
      07   └ Storage of the binary DAA 5s values *.db7   20151001.db7
      08   Output by means of the CEM-DAS user interface is   20151002.db7
      09   not possible. Please ask the supplier for assistance.
      10   ◄──────   Monthly directory   20151002.db7-journal
        B1001   0.ABB_17. BImSchV
        P1008   Storage of the daily, monthly and yearly protocols   ──►   2015.pdf
        P1009   Files are available in text as well as pdf format.   2015.txt
        P1010   201510.pdf
        P1011   201510.txt
        P1012   20151001.pdf
        P1013   20151001.txt
        P1014   EFÜ B-system directory with associated EFÜ G-system directories
        P1015   Directory of an associated EFÜ G-system   ──────►   0.LABOR
        P1016   Here the transmitted EFÜ transfer files YYYYMMTT.ML or *.MW   20151001105509_20150930.ML
        T1000   and the consecutively numbered data model file DMOD.nnn
        T1003   are stored. Prefix is the date of transmission YYYYMMTThhmmss.   20151001105509_20150930.MW
        T1004   The files are available in text format.   20151002105539_20151001.ML
        T1017   20151002105539_20151001.MW
    CEMDASParameter ◄──── Storage or the CEM-DAS parameter files *.dmp   20151002105539_DMOD.001
      EMISSION   PARAMETER.DMP
    DaaParameter   PARAMETER.LOG   0.Linie 1
      T1000   PARAMETER.ZIP   6_parameter.db7
      T1003   6_parameter.db7.hash
      T1004   Storage of the DAA parameters
      T1017   DAA parameters for System 1000   ──────────►   8_parameter.db7
    EfueDatenmodelle ◄──── Directory of the EFÜ data models   8_parameter.db7.hash
      B1001   Data model of B-system 1001 (multiple G-systems if applicable) ──► 0.LABOR
        G1008   Directory for the data models of B-system 1001 to G-system 1008   DMOD.001

5 System requirements

5.1 General

The following two points have to be observed for application of CEM-DAS / DAA and selection of hardware:

- The evaluation systems may only be used for the purpose of emission monitoring and remote emission data transmission..
- The CEM-DAS / DAA license permits installation and execution only on physical hardware with a maximum of 2 processor sockets. An application in a virtual environment is not covered with the included license.

5.2 Server

Characteristic	Configuration
Processor	At least Intel Pentium G3420 or comparable CPU
Operating system	Windows 7 Professional (64 Bit) Windows 8 Professional (64 Bit) Windows 10 Professional (64 Bit) Windows Server 2008 R2 (64 Bit) Windows Server 2012 R2 (64 Bit)
RAM	At least 4 GB System reaction time can be increased with a larger central memory and faster processors.
Hard drive	Two individual hard drives (C: and D: partitions) with at least 250 GB each Two RAID1 systems (C: and D: partitions) with at least 250 GB each One RAID5 system (C: partition) with at least 500 GB One RAID1 system (C: partition) with at least 500 GB The required hard drive capacity may be higher depending on the number of connected DAA and/or measuring points. Data and parameters must be stored for 5 years.
Network interface	Yes. If DAA is executed on the CEM-DAS PC, a second network interface is required to connect the TALAS/7-IO modules.
USB interfaces	Yes. The evaluation system must include an interface to connect an external printer.
Serial interface	1 per DAA (for each serially connected DAA) 1 per modem (for every serial modem) Extension is possible with additional interface cards or Ethernet COM servers.
Modem	Analog modem (serial/USB) for remote emission data transmission to the authorities. Analog or IDSN modem for remote maintenance, if VPN access via internet is not possible.
Radio-controlled clock	DCF77 card by Meinberg (PCI Express slot) The evaluation system must include a DCF77 receiver.
Acrobat Reader	Version 9 or higher (for automatic readout of protocols)

5.3 Work stations

Characteristic	Configuration
Processor	at least Intel Pentium G3420 or comparable CPU
Operating system	Windows 7 or Windows 8
RAM	at least 2 GB
Hard drive	at least 80 GB
Network interface	Yes
Internet Explorer	Version 9 or higher
Java for graphics	Java Runtime (JRE) of Oracle Version 7 or higher If a 64 Bit Internet Explorer is used the 64 Bit version of JRE must be installed.
Acrobat Reader	Version 9 or higher

5.4 Networks

CEM-DAS is currently qualified for application in networks with the TCP/IP protocol.

The network topology is represented via corresponding network cards. CEM-DAS can thus be used in all topologies, as long as a network card with drivers for the used operating system is available.

6 Maintenance

6.1 System messages

CEM-DAS records errors and faults as system messages. You should therefore regularly check these system messages in order to ensure that your CEM-DAS operates as intended.

6.1.1 Various programs

Program start version {0}

> {0}: Version number of the program[2]
> This system message is displayed upon startup of every program.

Program start finished

> Program start initializing phase was successfully completed.

Program stop

> This system message is display upon (normal) program end.

System with ID {0} does not exist

> {0}: System ID
> There is no parameterized system (DAA, remote emission monitoring) with this ID.

Invalid System type {0}

> {0}: System type
> The given system (DAA, remote emission monitoring) is of the wrong type, for example if dasDaa is started with the ID of the B-System.

6.1.2 dasDaa

Processing DAA with ID {0}

> {0}: DAA name or identifier
> This system message is displayed after the connection parameters are read out.

Wrong DAA ID {0}

> {0}: DAA name or identifier
> The program is not connected to the parameterized DAA.

No DAA with version {0} connected

> {0}: DAA version
> The connected DAA is not in the version required for CEM-DAS.

Time difference {0} min too large

> {0}: Time difference in minutes
> The time difference between PC and DAA is more than 90 minutes. There is no more synchronization of DAA anymore.

Time lag normal again

> The time difference between PC and DAA is within the correct range again. Synchronization of DAA is resumed.

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[2] Certified installations of CEM-DAS (see 8) display a version number like 7.2.4. Non-certified installations display a build date like 2017.02 (year.month).

New parameter change of DAA as at: {0}

{0}: Status of the DAA parameters
New parameters were detected on DAA.

No connection to DAA

Connection to DAA is interrupted for a "longer" period. Short connection interruptions are not reported.

Connection to DAA available again

Connection to DAA over a "longer" period is resumed.

Status DAA: {0}

{0}: no communication, parameter monitoring or data service with parameter monitoring
The parameterized communication status is displayed.

DAA {0} requires at least the version {1} of CEM-DAS

{0}: DAA identification
{1}: Minimum version of CEM-DAS
The connected DAA requires at least the indicated CEM-DAS version. It does not correctly work with "older" versions of CEM-DAS.

CEM-DAS version is sufficient for the DAA {0}

{0}: DAA identification
The version of CEM-DAS is sufficient to ensure correct functionality of the connected DAA.

CEM-DAS requires at least the version {1} of DAA {0}

{0}: DAA identification
{1}: Minimum version of DAA
The version of the connected DAA is not sufficient for correct operation with CEM-DAS.

DAA {0} version sufficient for CEM-DAS

{0}: DAA identification
The version of the connected DAA is sufficient for CEM-DAS.

DAA {0} synchronization is starting now

{0}: DAA identification
If the program runs on a backup system (replication), it does generally not set the time of the connected DAA. However, in case the master system fails, the backup server takes over synchronization of DAA.

DAA {0} is no longer synchronized

{0}: DAA identification
The master system resumes synchronization of DAA and the backup system ends its synchronization of DAA.

No valid time of radio controlled clock received from DAA

CEM-DAS shall synchronize itself to the radio-controlled clock installed in DAA, but not radio-controlled time is transmitted from DAA to CEM-DAS.

No valid time of radio controlled clock available from DAA

Radio-controlled time of DAA is invalid and cannot be used for synchronization of CEM-DAS.

Time lag to radio controlled clock in DAA too large {0} min

{0}: Time difference in minutes

The radio-controlled time transmitted by DAA differs by more than 90 minutes from the system time of CEM-DAS.

Time of radio controlled clock from DAA under control of emitter

The radio-controlled clock of DAA receives the DCF77 signal and is set by the signal.

Time of radio controlled clock from DAA under quartz control

The radio-controlled clock of DAA does not receive a DCF77 signal and runs with its installed quartz.

Failure by writing to raw file

An error occurred during writing of the DAA values into the raw values file.

Failure by writing to raw file

No error occurred during writing of the DAA values into the raw values file. After the error condition this message is generated.

6.1.3   dasEfue

Modem ready (DSR signal available)

The DSR signal of the modem is available and the modem can be used.

Modem not ready (DSR signal not available)

No DSR signal of the modem is available (modem defective, cable interrupted, modem not available or incorrectly set).

Error while establishing connection with modem: [0} >> {1}

No DSR signal of the modem is available (modem defective, cable interrupted, modem not available or incorrectly set).

Error {0} during data transfer to G-System {1}

{0}: Error number from Remote Emissions Monitoring (see Annex D)

An error occurred during transmission of a transfer file via ZMODEM.

Error during creation of the transfer file: DM {0} of B-System {1}

{0}: Data model number

{1}: Identifier of the B-System (operator)

An error occurred during creation of the data model file on CEM-DAS.

Error during creation of the transfer file: AD {0} of B-System {1}

{0}: Date of the archive file

{1}: Identifier of the B-System (operator)

An error occurred during creation of the archive file on CEM-DAS.

B-System identification <{0}> refused by G-System <{1}>

    {0}: Identifier of the B-System (operator)
    {1}: Identifier of the G-System (authorities)
    The identifier of the B-System is unknown to the authorities.

G-System identification <{0}> refused by B-System <{1}>

    {0}: Identifier of the G-System (authorities)
    {1}: Identifier of the B-System (operator)
    The identifier of the G-System is not known on the B-System.

Incoming call but no connection established

    A call was received by the modem, but the connection for remote emissions monitoring was not established.

Incoming call from unknown system {0} (wrong ID)

    {0}: Identifier of the G-System (authorities)
    An unknown G-System called.

Request from G-System {0} not authorized

    No requirements for the G-System are possible because no requirements were allowed (parameterized) by the operator from this G-System.

Request from G-System {0} currently not possible (token)

    No token is currently available, the B-System must first request and receive a new token from the G-System. New requests are only possible after that.

Request for data model {0} from G-System {1} (not found)

    {0}: Number of the requested data model
    {1}: Identifier of the G-System (authorities)
    The requested data model does not exist.

Request for data model {0} from G-System {1}

    {0}: Number of the requested data model
    {1}: Identifier of the G-System (authorities)
    A data model was requested from the G-System.

Request for archive data {0} - {1} from G-System {2} (wrong period)

    {0}: Start date
    {1}: End date
    {2}: Identifier of the G-System (authorities)
    The requested time frame is not permitted.

Request for archive data {0} - {1} from G-System (2)

    {0}: Start date
    {1}: End date
    {2}: Identifier of the G-System (authorities)
    Archive data for a time frame were requested from the G-System.

Cyclic data {0} - {1} to G-System {2} not available

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
No data are available for the total time frame.

Cyclical data {0} - {1} sent to G-System {2}

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
The available data for the time frame were successfully transmitted to the G-System.

Cyclical data transfer {0} - {1} to G-System {2} not possible

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
The available data for the time frame could not be sent to the G-System (connection error, rejection from the G-System, …)

Alarm data of day {0} to G-System {1} not available

{0}: Date
{1}: Identifier of the G-System (authorities)
Alarm data shall be sent to the G-System, but no alarm data are available.

Alarm data for day {0} sent to G-System {1}

{0}: Date
{1}: Identifier of the G-System (authorities)
The daily alarm data were successfully transmitted to the G-System.

Alarm data transfer for day {0} to G-System {1} not possible

{0}: Date
{1}: Identifier of the G-System (authorities)
The daily alarm data could not be sent to the G-System (connection error, rejection from the G-System, …)

Data model {0} to G-System {1} not available

{0}: Number of the data model
{1}: Identifier of the G-System (authorities)
The requested data model does not exist.

Data model {0} sent to G-System {1}

{0}: Number of the data model
{1}: Identifier of the G-System (authorities)
The requested data model was successfully sent to the G-System.

Request deleted for data model {0} to G-System {1}

{0}: Number of the data model
{1}: Identifier of the G-System (authorities)
The requested data model could not be sent to the G-System.

Data model {0} sent to G-System {1} (archive data)

{0}: Number of the data model
{1}: Identifier of the G-System (authorities)
The data model with the archive files was automatically and successfully sent to the G-System.

Archive data{0} - {1} to G-System {2} not available

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
No data are available for the total requested time frame.

Archive data {0} - {1} sent to G-System {2}

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
All available data for the requested time frame were successfully sent to the G-System.

Request deleted for archive data {0} - {1} to G-System {2}

{0}: Start date
{1}: End date
{2}: Identifier of the G-System (authorities)
The available data for the requested time frame could not be sent to the G-System (connection error, rejection from the G-System, …).

Initial registration on G-System {0} requested

{0}: Identifier of the G-System (authorities)
Initial registration with the G-System was successfully requested.

Initial registration on G-System {0} not possible

{0}: Identifier of the G-System (authorities)
Initial registration with the G-System could not be requested (connection error, rejection from the G-System, …).

Initial registration on G-System requested after invalid token

After the G-System has rejected the token of the B-System, the B-System automatically requests a new token.

Initial registration acknowledged by G-System {0}

{0}: Identifier of the G-System (authorities)
The requested initial registration was confirmed by the return call of the G-System.

New time slot received from G-System {0}

{0}: Identifier of the G-System (authorities)
A new time window was determined by the G-System for cyclical transmission.

Token refused by G-System {0}

{0}: Identifier of the G-system (authorities)
The token sent by the B-System was rejected by the G-System. The B-System automatically requests a new token.

No change of current data model {0} for owner {1} needed

{0}: Number of the data model
{1}: Operator identification
The new revision of the CEM-DAS parameters has no influence on the data model for the authorities / G-System. No parameters were changed that are applied to the data model. The previous data model is still valid.

New data model {0} created for operator {1}

{0}: Number of the data model
{1}: Operator identification
The new revision of the CEM-DAS parameters has an influence on the data model for the authorities / G-System. Parameters were changed that are applied to the data model. The new data model for the authorities was generated.

6.1.4   dasBackup

Backup finished

Data backup was successfully completed.

Backup with errors {0}

{0}: Error number from operating system (see Annex D)
An error occurred during data backup.

Data export with errors: {0}

{0}: Error number from database (see Annex D) or
,not found' Program for export was not found
,time out'   Program for export does not stop
,log file'   See LOG-file of the export program
An error occurred during data export from database.

ZIP file successfully copied

The ZIP file that contains the backup was successfully stored on an external drive.

Error {0} while creating the ZIP file

{0}: Error number of the ZIP program (see Annex D)
An error occurred during creating the ZIP file.

Error {0} while copying the ZIP file

{0}: Error number from operating system (see Annex D)
An error occurred during copying of the ZIP file that contains the backup to an external drive.

Check of tables finished without errors

Check of database tables was successfully completed.

Error {0} while checking table {1}

{0}: Error number from database (see Annex D)
{1}: Table name
An error occurred during check of database tables.

Folder {0} to {1} archived
> {0}: Directory name
> {1}: Archive name
> Changed files in the directory were copied to the external drive.

Folder {0} cannot be archived to {1} (Error {2})
> {0}: Directory name
> {1}: Archive name
> {2}: Error number from operating system (see Annex D)
> Changed files in the directory could not be copied to the external drive.

Error while deleting data in table {0}
> {0}: Table name
> An error occurred during deletion of data in a database table.

Deleting data in table {0} successful
> {0}: Table name
> The data in the database table were successfully deleted.

Folder {0} deleted
> {0}: Directory name
> The given directory was deleted in the file storage.

Folder {0} cannot be deleted (Error {1})
> {0}: Directory name
> {1}: Error number from operating system (see Annex D)
> The given directory could not be deleted in the file storage.

File {0} could not be archived
> {0}: File name
> The given file could not be copied from the file storage to the archive.

Current partition for table {0}: {1}
> {0}: File name
> The given file could not be copied from the file storage to the archive.

Partitions for table {0} renewed
> {0}: Name of database table
> The storage depth for measured values or short term values was changed and the partitioning of the table also had to be adapted.

System {0} insert no more import data
> {0}: System identifier
> No more data are entered in the database table DATA_IMPORT by the given system.

System {0} insert import data again
> {0}: System identifier
> Data are again entered in the database table DATA_IMPORT by the given system.

6.1.5 dasSpecial (Replication)

System {0}: Error on access to database

{0}: Name of backup system

An error occurred during access to the database of the backup system.

System {0}: The table CONFIGURATION is missing

{0}: Name of backup system

This table is missing in the backup system.

System {0}: The CEM-DAS versions are different

{0}: Name of backup system

The CEM-DAS version on the master differs from that on the backup system.

System {0}: Configuration failure (local, backup, standby)

{0}: Name of backup system

The backup system was not correctly configured, the parameterized type in the master system does not correspond to the type of the backup system.

System {0}: Name/alias are not consistent

{0}: Name of backup system

The parameterized name of the backup system in the master system does not correspond to the name of the backup system.

System {0}: The response times are too long

{0}: Name of backup system

The response times of the backup system (via network) are too long, replication cannot be conducted.

System {0}: The time difference is too large

{0}: Name of backup system

Time difference between master and backup system is too large. The backup system will always synchronize to the master. No external synchronization may be conducted there (NTP, …).

System {0}: The table structures are not consistent

{0}: Name of backup system

The table structures in the database of master and backup system do not match.

System {0}: Adjustment of parameter/data failed

{0}: Name of backup system

An error occurred during replication.

System {0}: Adjustment was successful

{0}: Name of backup system

Replication was (again) conducted successfully.

6.1.6 dasSystem

No connection to computer {0}

{0}: Computer name

CEM-DAS synchronizes to the given computer, but has no connection to it.

Successfully reconnected to computer {0}

{0}: Computer name

CEM-DAS synchronizes to the given computer and is again connected to it.

Time corrected by {0} h /old {1} new {2}

{0}: Time correction

{1}: System time before correction

{2}: System time after correction

The system time of CEM-DAS (PC) was corrected.

Error {0} when setting the system time {1}

{0}: Error number from operating system (see Annex D)

{1}: New system time

An error occurred during setting of the system time of CEM-DAS (PC).

Time difference {0} too large / old {1} new {2}

{0}: Time correction

{1}: System time before correction

{2}: System time after correction

The system time of CEM-DAS (PC) will not be set, because the time difference is more than 90 minutes.

Automatic adjustment of system time is active again

The system time was reset after an error.

The master system is not available

The backup system (replication) is no longer connected (time synchronization) to its master system.

The master system is available again

The backup system (replication) is again connected (time synchronization) to its master system.

6.1.7 Client / Web server

Program start version {0}

{0}: Version number of the client / web server

The web server was started.

Parameter of revision {0} for operator {1} released

{0}: Revision number

{1}: Operator identification

A new revision was released for the operator.

Email successfully forwarded: {0} / {1}

{0}: Subject line of E-Mail

{1}: Internal ID of E-Mail

The E-Mail was successfully sent from CEM-DAS to the SMTP server.

Email failed: {0} / {1} / {2}

> {0}: Subject line of E-Mail
> {1}: Internal ID of E-Mail
> {2}: Error number from operating system (see Annex D)
> An error occurred during transmission of the E-Mail from CEM-DAS to the SMTP server.

Email canceled: {0} / {1}

> {0}: Subject line of E-Mail
> {1}: Internal ID of E-Mail
> The E-Mail could not be sent to the SMTP server after several attempts. No more attempts will be made.

Special program {0} start up

> {0}: Name of special program
> The given special program was started by the web server.

Special program {0} stopped

> {0}: Name of special program
> The given special program was ended by the web server.

6.2   Connection of an additional DAA

An additional DAA that shall be connected must be registered in CEM-DAS. If required, a new operator profile and a new plant can be created. Also, the measuring points (entities) must be created.

6.3   Change of DAA parameters

CEM-DAS monitors parameterization of the connected DAA systems and records a system message in case of changes (see 6.1). You should consider if and when you should perform any changes in the parameterization of CEM-DAS. You must perform changes in CEM-DAS if one of the following conditions is fulfilled:

- A new measuring point was generated that must be transmitted to the authorities.
- A new measuring point was generated that shall be displayed in CEM-DAS.
- One of the following parameters was changed in DAA:
  - The physical unit
  - The lower or the upper physical plausibility
  - The uncertainty (validation)

In case you want to perform changes on the existing measuring points in CEM-DAS, please observe the following:

- You have to create a new revision of the operator that the measuring point belongs to. After completion of the changes you also have to validate (release) the new revision.

6.4   Connection of an additional EFÜ-G-System

CEM-DAS can emulate several EFÜ-B-Systems (operator systems) and transmit data to several EFÜ-G-Systems (authorities systems). The following has to be observed:

- Each EFÜ-B-System must have its own modem.
- Several EFÜ-G-Systems can be allocated to one EFÜ-B-System.
- Only measuring points from exactly one operator can be allocated to one EFÜ-B-System.
- Several EFÜ-B-Systems can be allocated to one operator.

6.5   Archiving and deletion of data

Pursuant to BEP the last slow averages and classifications must be directly accessible to the authorities in the current database for 2 years.

6.6   Updating of CEM-DAS

When loading updated versions of CEM-DAS, please observe the following:
- Compare the versions on the old and the new storage device.
- Only install the storage devices with a newer version.
- Perform the installation according to the corresponding steps in section 7.
- For site-specific variations you should perform the installation in the same way as the previous installation. Use your old copies of the installation steps!
- Document all steps in a copy of section 8.

Important: If you received a new system manual with your storage device, please observe the chapter "Installation" in the new system manual.

7 Installation

7.1 Introduction

This chapter describes initial installation of the CEM-DAS system. For an update of the system, only steps 7.5 and 7.11 have to be performed.

7.2 Preparation

If two independent hard drives or two RAID1 systems are used, then these have to be configured as partition C: and D:. This way, every hard drive or RAID1 only contains one partition. If a single RAID5 or RAID1 is used, then this is configured as partition C:.

7.3 Windows

After the configuration of the hard drives the operating system is installed on partition C:. Then a user profile "CEM-DAS" is created. All following installations (Oracle, CEM-DAS, …) have to be performed with this user profile. The password is marked as "always valid". The user is allocated to the group of administrators.

7.3.1 Installation instructions for MCERTS

For an installation according to MCERTS, the points B10.2 to B10.4 from /4/ must be observed:

- Anti-virus protection
- Protection of open interfaces (USB, ...)
- Precautionary measures if the system is connected to the Internet

7.3.2 Firewall

In order to allow access to the web server, a rule has to be parameterized in the Windows firewall. If external programs shall receive access to the Oracle database, the rule has to be extended. Please refer to Annex B for configuration of the firewall.

7.4 Oracle

CEM-DAS is using a database. The following databases are supported:

- Oracle 12.1 Standard Edition (SE2)
- Oracle 11.2 Standard Edition (SE1)
- Oracle 11.2 Express Edition[3]

The installation is performed under Windows. Please keep in mind to only use the Oracle version suitable for the operating system.

The databases listed above can be used for Windows 7 Professional (64 Bit), Windows 8 Professional (64 Bit), Windows Server 2008 R2 (64 Bit) and Windows Server 2012 R2 (64 Bit).

Oracle 12.1 Standard Edition can be used for Windows 10 Professional (64 Bit).

The detailed installation is described in Annex A.

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[3] Oracle 11.2 Express Edition makes use of up to 1GB of memory and can administrate up to 11 GB data.

7.5 CEM-DAS

CEM-DAS comes in an installation file with its version included in the file name.

For example, the installation file for version 1.2.4 is named "CEM-DAS 1.2.4.exe".

This file needs to be executed to start the installation. A running CEM-DAS system must be stopped.
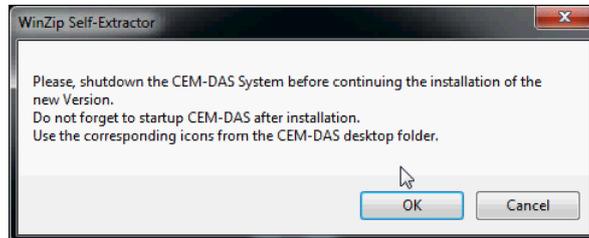
Figure 9: Dialog window for installation

Click OK if CEM-DAS is stopped.

The following message will appear to install CEM-DAS.
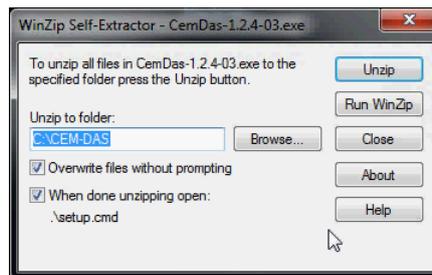
Figure 10: Installation of CEM-DAS

The files must be installed to "C:\CEM-DAS". This directory should be set by default.

Installation starts by clicking UNZIP. The two options "Overwrite files without prompting" and "When done unzipping …" must not be disabled, since otherwise the installation cannot be correctly executed.

Further steps will be executed after installation. These are displayed in messages, which require keyboard entries at certain points.

During installation, a folder "CEM-DAS" is created on the desktop with several icons.
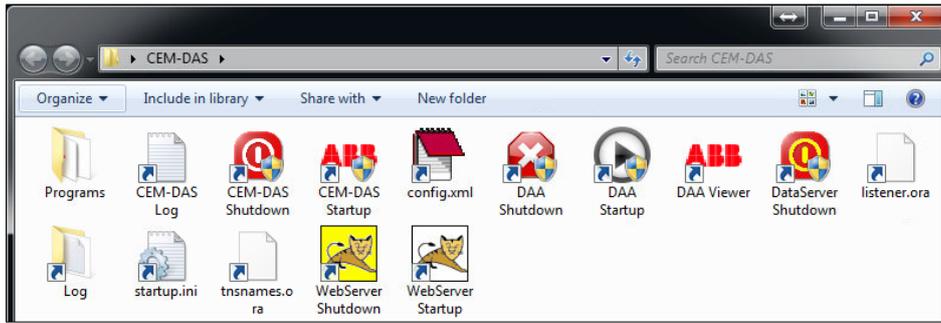
Figure 11: Folder CEM-DAS on desktop

The CEM-DAS programs can be started as Windows services upon system start, or as programs after user registration.

During the installation the two required Windows services (CEM-DAS and CEM-WEB) are already registered, but not yet automatically started during system startup (set to "manual"). If CEM-DAS shall be started as a Windows service, the start type must be set to "automatic".
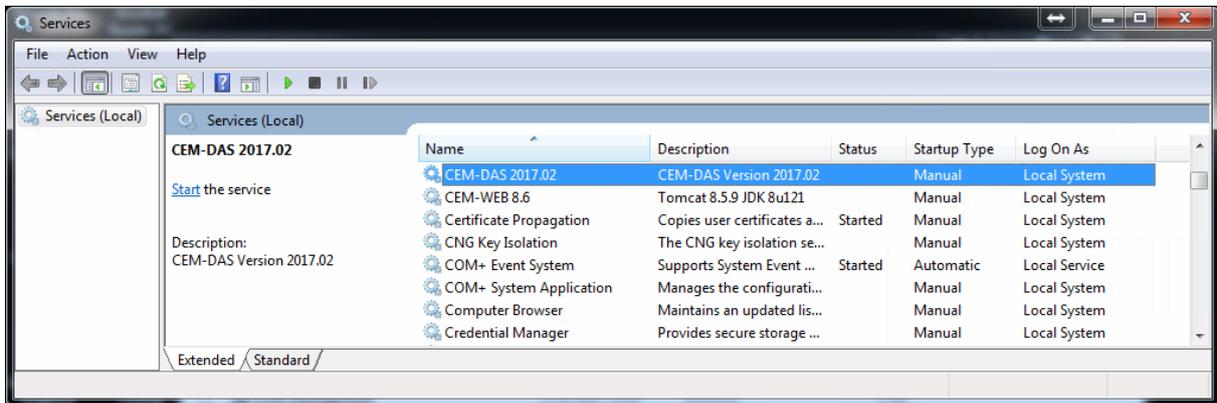
Figure 12: Installed service for CEM-DAS

If CEM-DAS shall be executed as a program under the user profile "CEM-DAS", then this user must be automatically registered upon system start. Furthermore, the "Start CEM-DAS" icon must be copied into their autostart folder. User account control must be switched off, since CEM-DAS programs require administrator rights.

After the start of CEM-DAS the computer will automatically be locked, so that no access to the computer is possible in case of an automatic system restart.

7.5.1 Database

A database is automatically generated during installation of CEM-DAS. The database is initialized according to QAL1 / BEP or MCERTS / IED depending on the location of the computer. The current location from Windows is used.
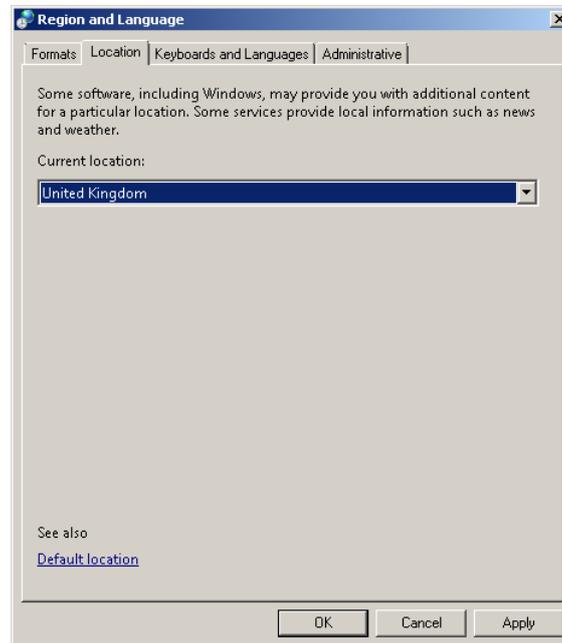
Figure 13: Location for CEM-DAS

The database is initialized according to QAL1 / BEP for the location "Germany". The database is initialized according to MCERTS/IED for the location "United Kingdom". The database is initialized according to IED for all other locations. It is not possible to change the database from BEP to IED and vice versa without initialization.

7.5.2 Supported languages

CEM-DAS supports the following languages in the web browser:

- Deutsch / German
- Englisch / English
- Französisch / French
- Russisch / Russian
- Rumänisch / Romanian
- Bosnisch / Bosnian

The language preference of the web browser defines the language used to display the websites. The presentation is in English if not supported languages preferences are selected.

7.6 Parameterization

After the installation is successfully completed the parameterization of CEM-DAS can start, see /1/.

7.7 Graphic files

The optional graphics for EFÜ transmission must be available in PCX format with a size of 400x280 pixels.

7.8 Modems

The initializing string in the menu "Operator System" is used for setup of the modem. This will cyclically initialize the modem.

The data are generally transmitted to the authorities with 8 bits/character, no parity and 1 stop bit. Deviations from this have to be coordinated with the authorities.

7.9 Radio-controlled clock

The radio-controlled cards used are from manufacturers Meinberg and Hopf. These require one PC slot.

A suitable driver must be installed on Windows. This driver will then synchronize the CEM-DAS PC with the radio-controlled clock.

7.10 Serial interfaces

DigiBoard cards can be used to increase the number of serial interfaces. Alternatively, USB-to-serial converters or COM servers can be used.

7.11 DAA

Please refer to the DAA system manual for installation of DAA on the CEM-DAS PC (see /2/).

It is important to install DAA only after Oracle and CEM-DAS have been installed, so that DAA can detect whether it is running on the CEM-DAS PC or on its own external PC.

8   Licensing

A license file is required for using CEM-DAS. The following parts of CEM-DAS are subject to license:

- Number of parameterized active users
- Number of parameterized DAA systems
- Number of parameterized devices „Digital interface"
- Module upgrading
- Certificate QAL1, MCERTS or no certificate
- Number of used database interfaces

After installation the system is not licensed and not certified. The system is useable for two users and one DAA system in the time limit of 30 days. Beyond this time limit it is not possible to release a new revision.

The license of CEM-DAS is hardware-related. The license file is compiled after installation of CEM-DAS.

The required users, systems and modules are registered in the license request file. The obtained valid license file must be activated in CEM-DAS. The system is now licensed and if necessary certified.

8.1   SmallEdition

There is a SmallEdition beside the full version of CEM-DAS.

The following restrictions apply:
- Maximum one DAA system
- Maximum 12 AIN (analog inputs)
- No EFÜ transmission
- No replication
- No module upgrading
- No database interface
- Only database Oracle 11.2 Express is supported

9   Related documents

No.	Document No.	Title
/1/	OI/CEM-DAS-EN	CEM-DAS User's manual
/2/	TD/DAA-EN	DAA System manual
/3/		Emissionsfernübertragung (EFÜ) Schnittstellendefinition i. d .F. des Beschlusses des LAI vom 28.09.2005 (korrigierte Fassung vom 15. November 2006)
/4/		Quality and Performance Standards for Environmental Data Management Software, Environment Agency, November 2015

10 Annex A: Installation of Oracle

10.1 Installation of Oracle 11.2 Standard Edition

The following message appears after the "Setup.exe" file is started:
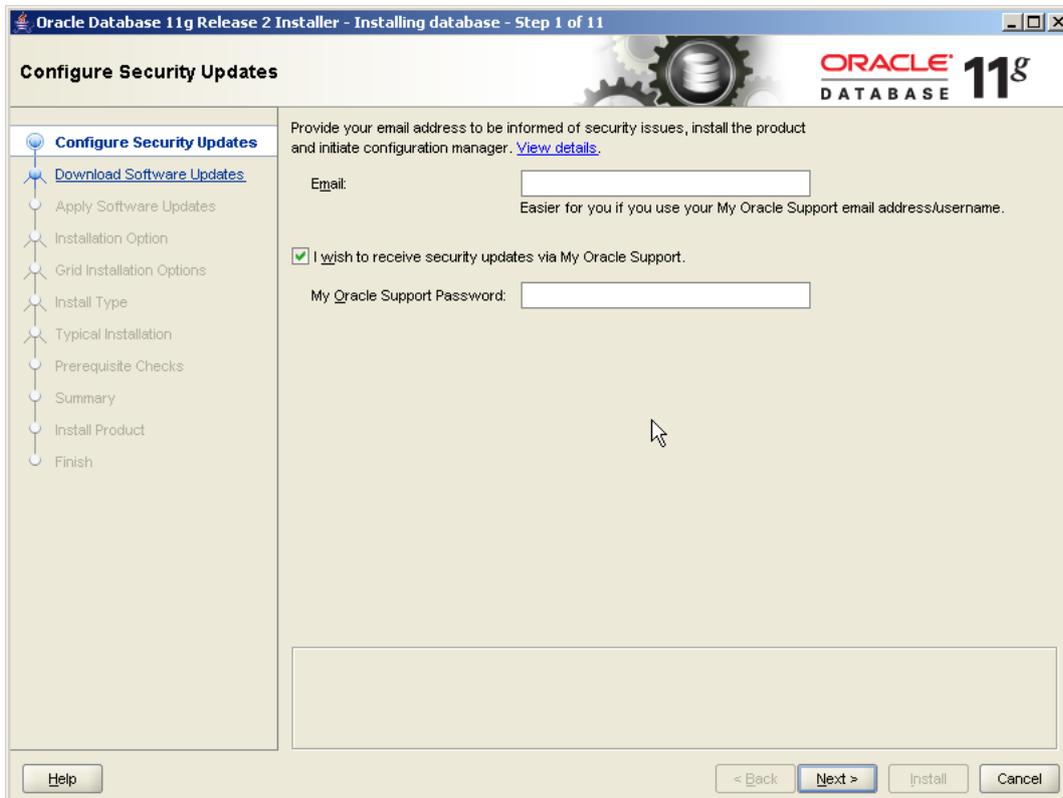
Uncheck "I wish to receive security updates via …" and click NEXT.

After that, the following message appears.

Confirm this message with YES.
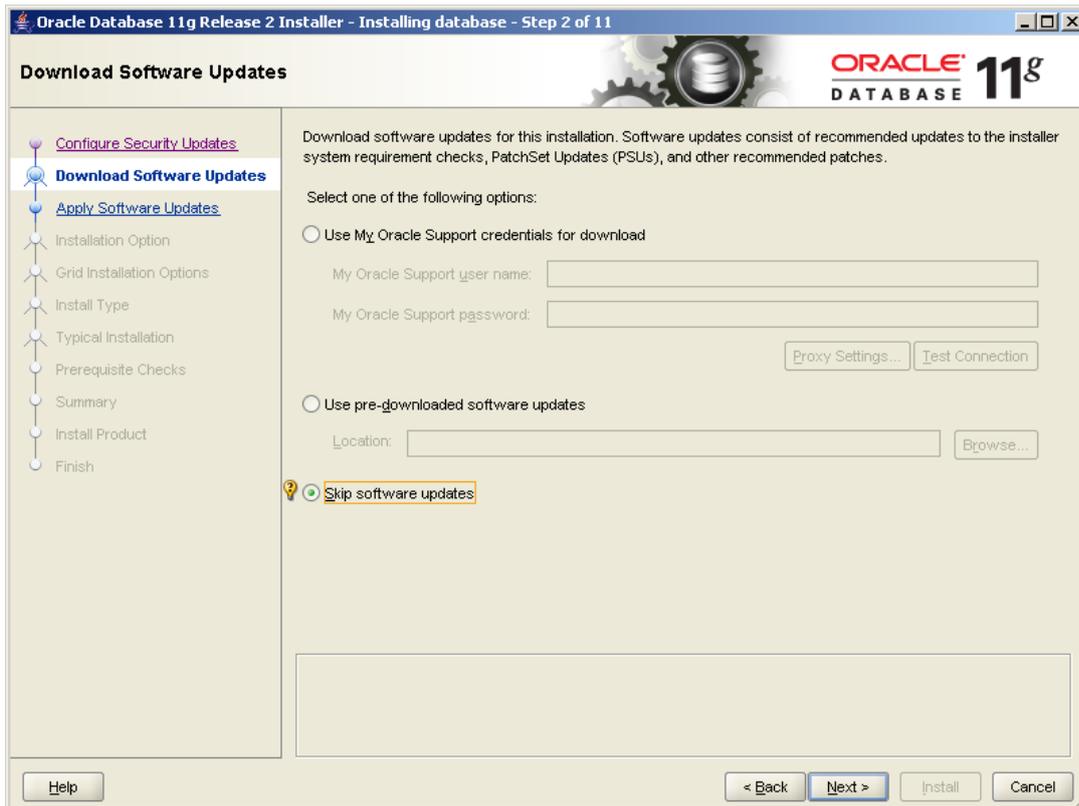
Select "Skip software updates" and click NEXT.
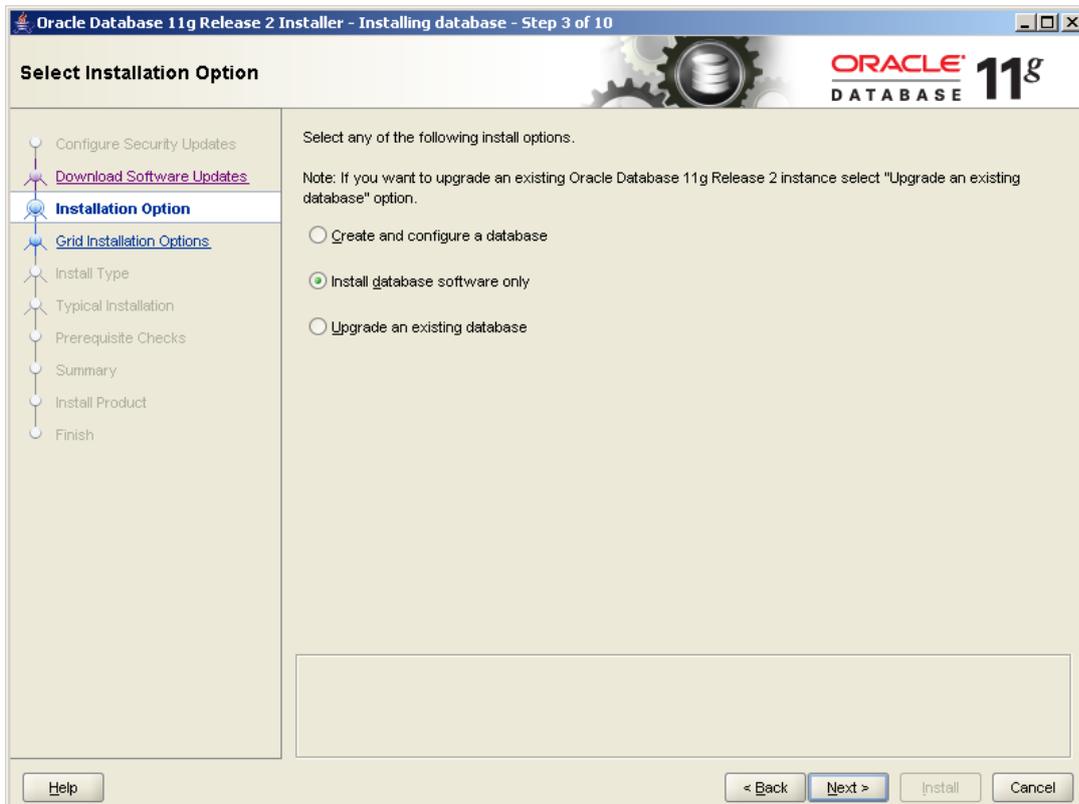
Select "Install database software only" and click NEXT.
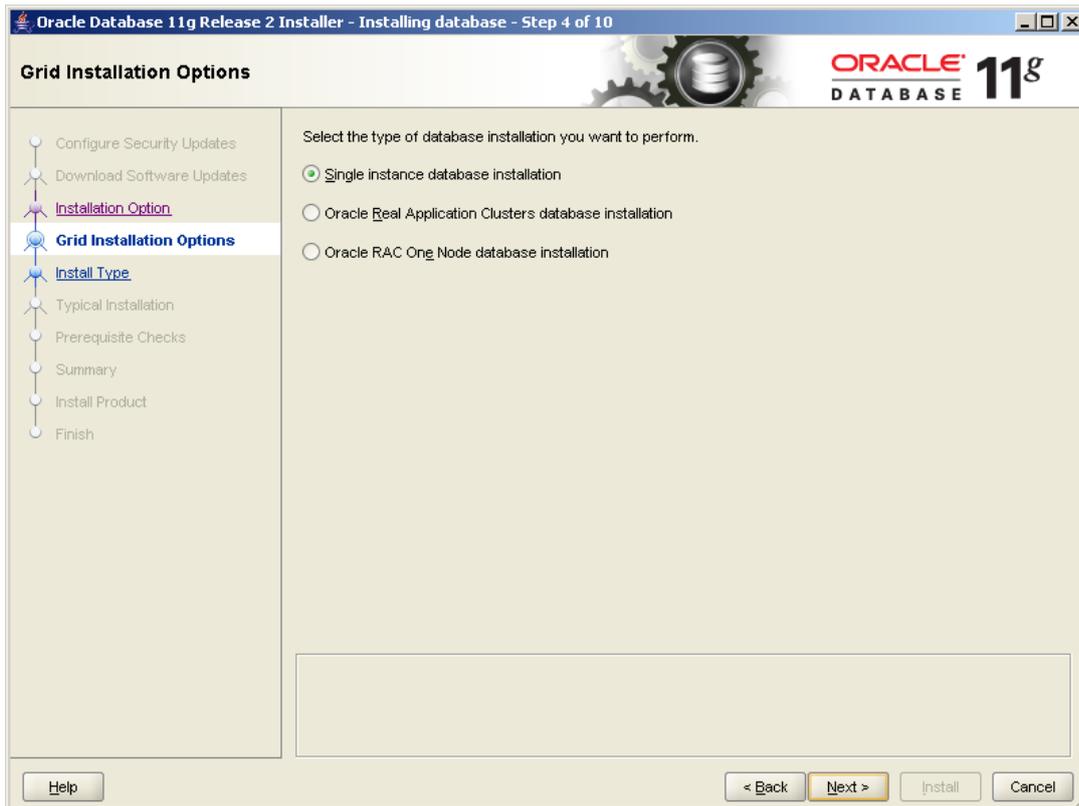
Select "Single instance database installation" and click NEXT.
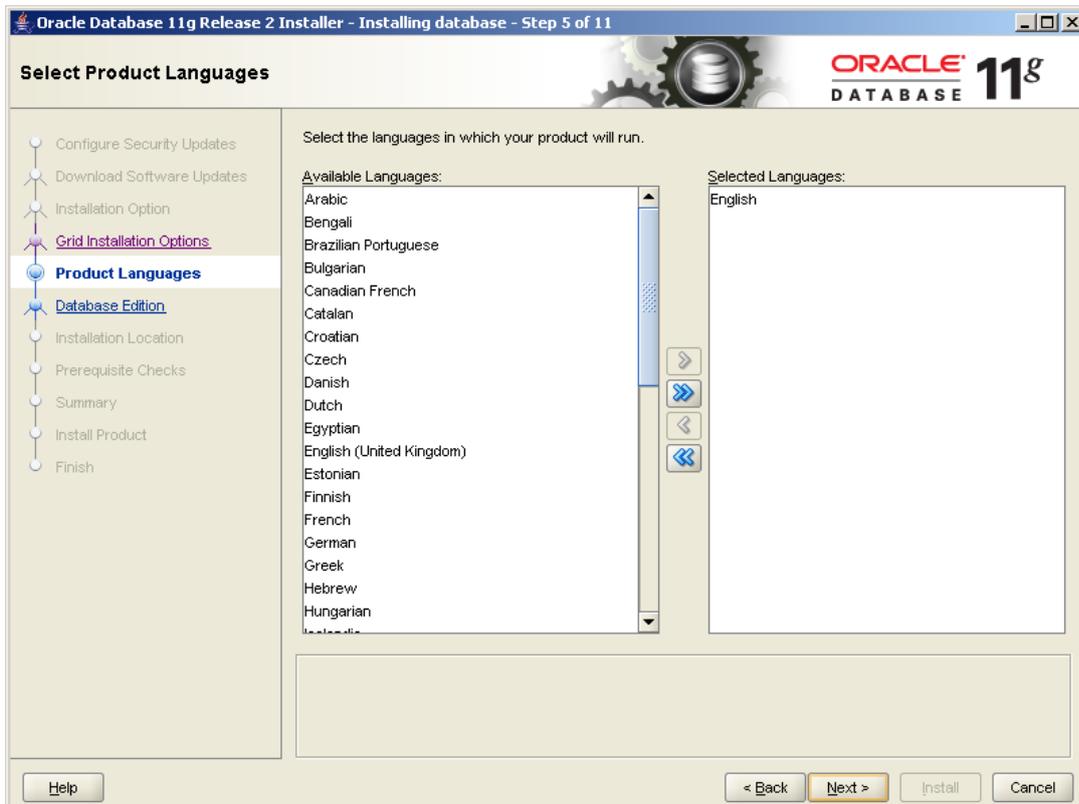
Choose your desired product languages. As a minimum, German and English should be selected. Click NEXT.
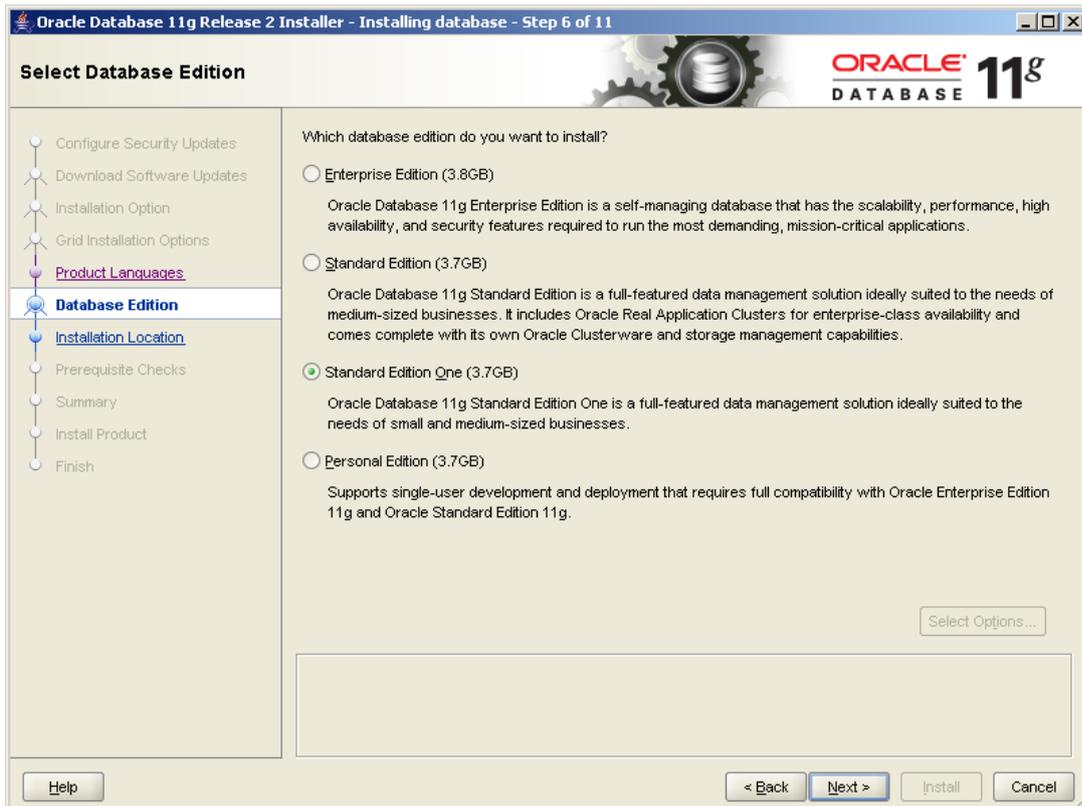
Select "Standard Edition One (3,7GB)" and click NEXT. CEM-DAS only includes a license for this edition, which allows you to install Oracle on a system with a maximum of two processor sockets.

Change "Oracle Base" to C:\Oracle and click NEXT. The "Software Location" input should then automatically be updated.
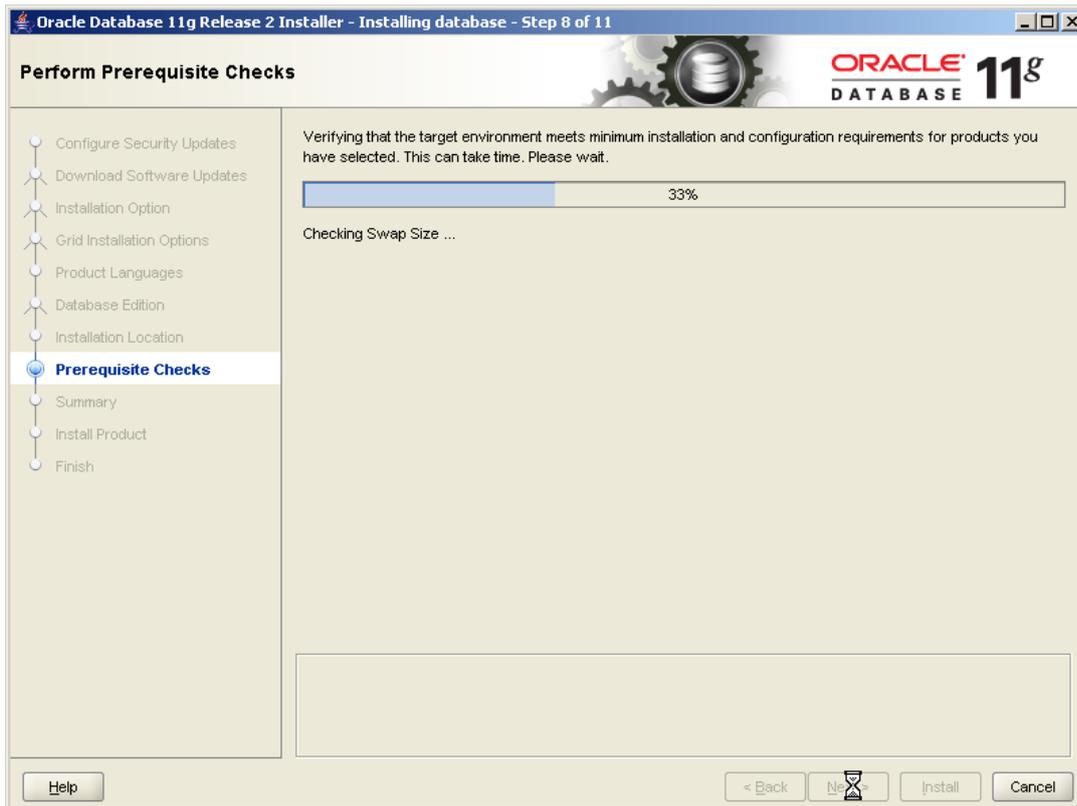
Oracle now checks the requirements, so that the installation can be performed.

The requirements check was successful and installation can commence. All important information is summarized again. The directory from which the installation is performed is displayed under "Source Location".

If the information displayed is correct the installation can be started by clicking INSTALL.

Display during installation.
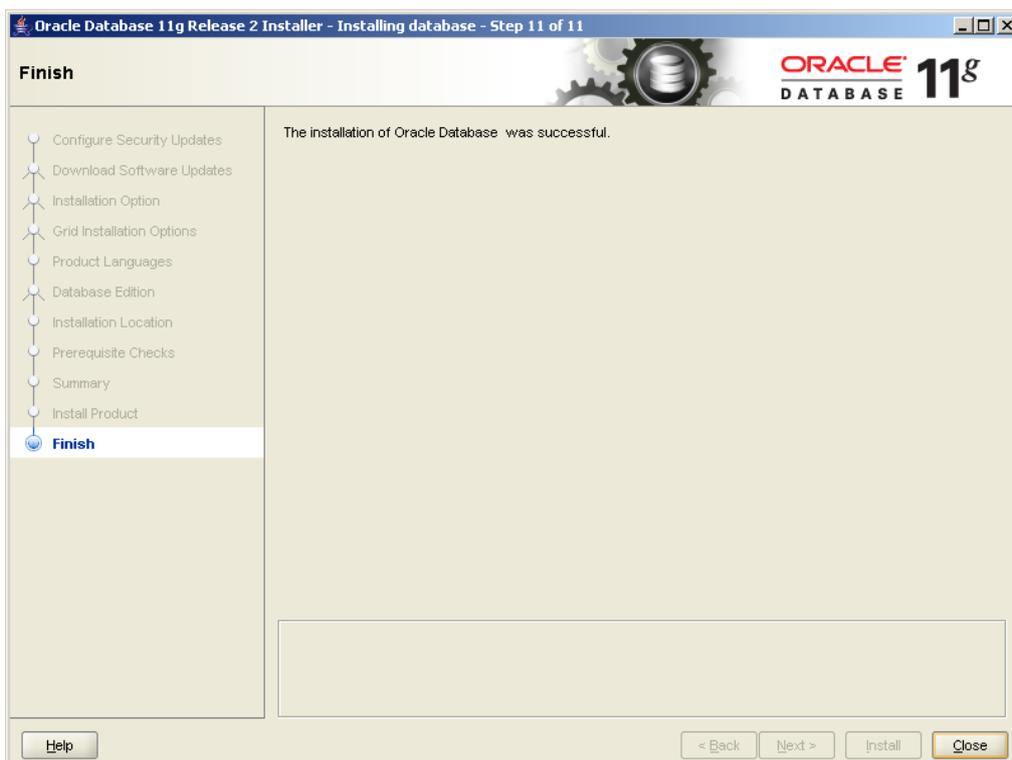
The installation was successfully completed and can be confirmed by clicking CLOSE.

The following Oracle services must be stopped and set to DEACTIVATED after installation:

- OracleMTSRecoveryService
- OracleOraDb11g_home1ClrAgent
- OracleRemExecService

The „OracleRemExecService" will be disappear from services.

10.2 Installation of Oracle 11.2 Express Edition

The following message appears after the "Setup.exe" file is started:
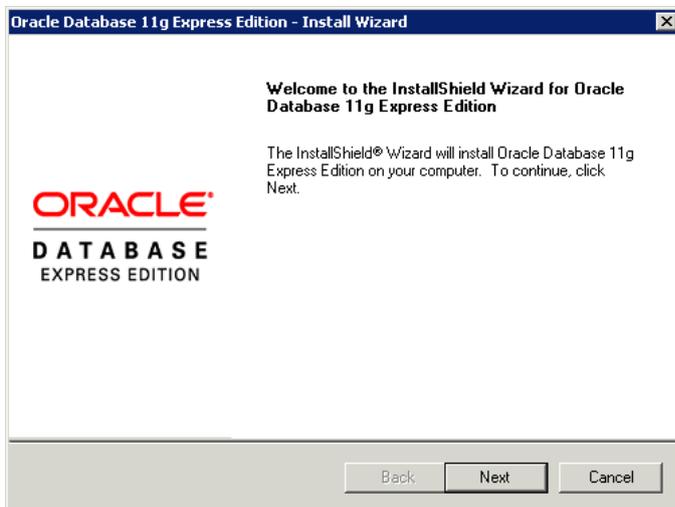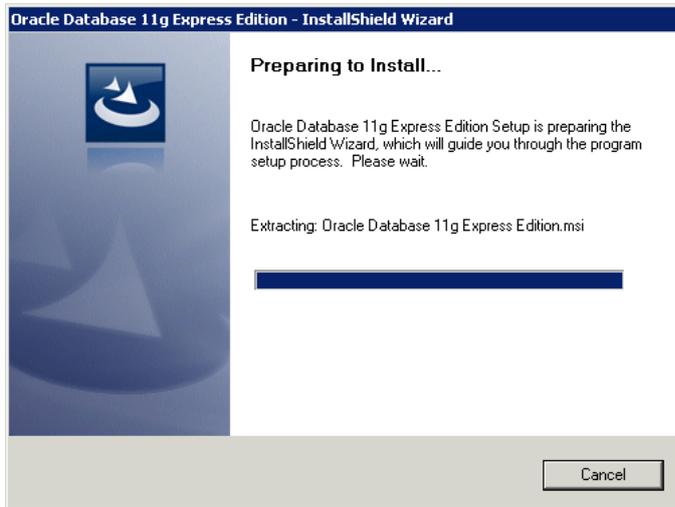
Click NEXT.
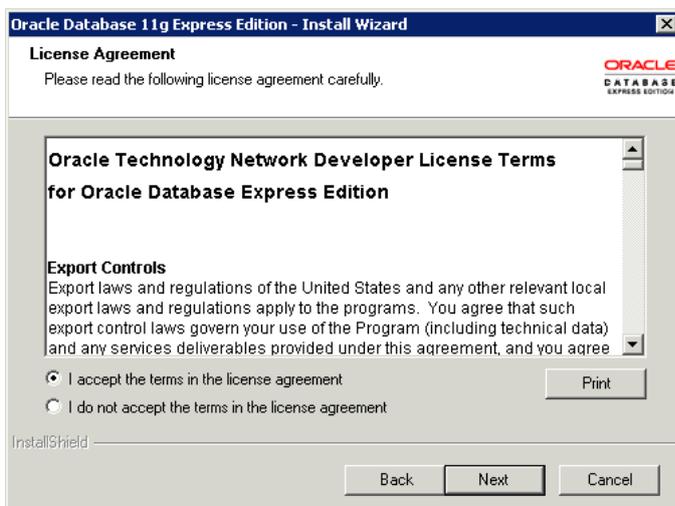
Select „I accept …." and click NEXT.
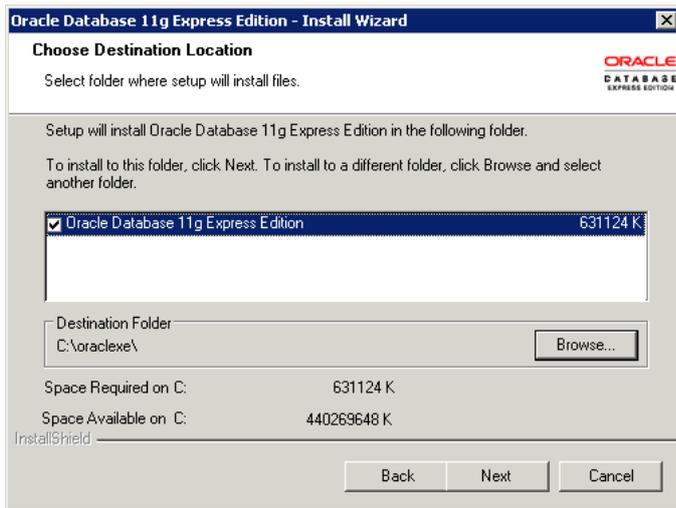
Accept default „C:\oraclexe" and click NEXT.
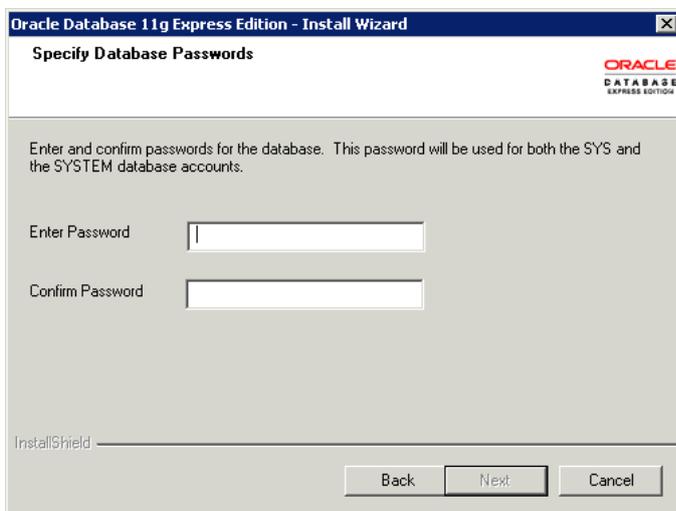
Enter password „dummy" and click NEXT.
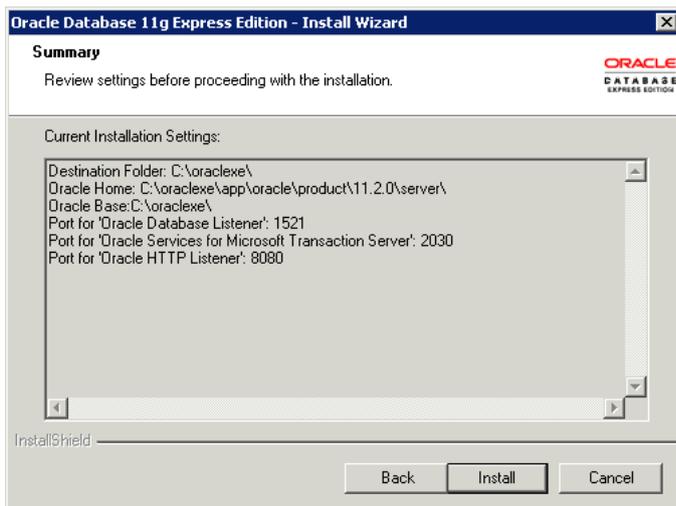
Click INSTALL.
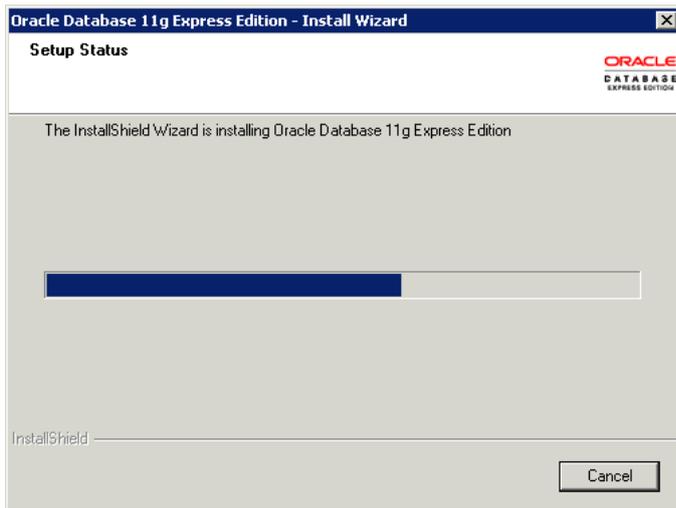
Installation is performed.
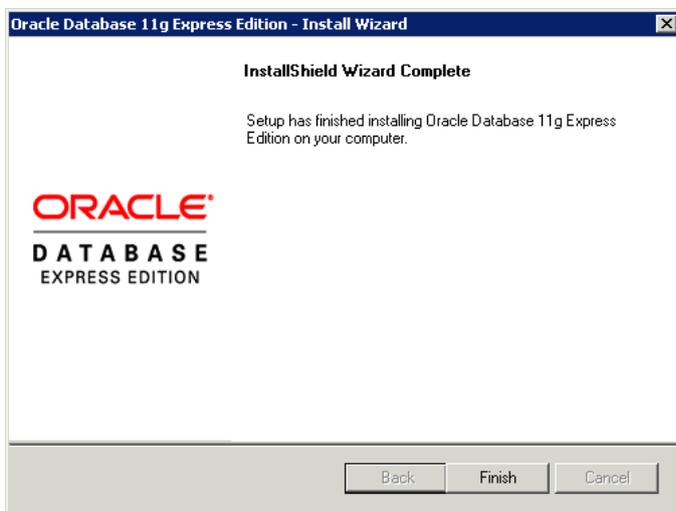
Complete with FINISH.

With installation of Oracle 11.2 Express Edition a database is created. CEM-DAS deletes this default database and generates its own database. Only one Oracle database is licensed.

The services "OracleMTSRecoveryService" and "OracleXEClrAgent" must be stopped and set to DEACTIVATED. The services „OracleServiceORCL" and „OracleXETNSListener" are set to „Automatic".

10.3 Installation of Oracle 12.1 Standard Edition

The following message appears after the "Setup.exe" file is started:
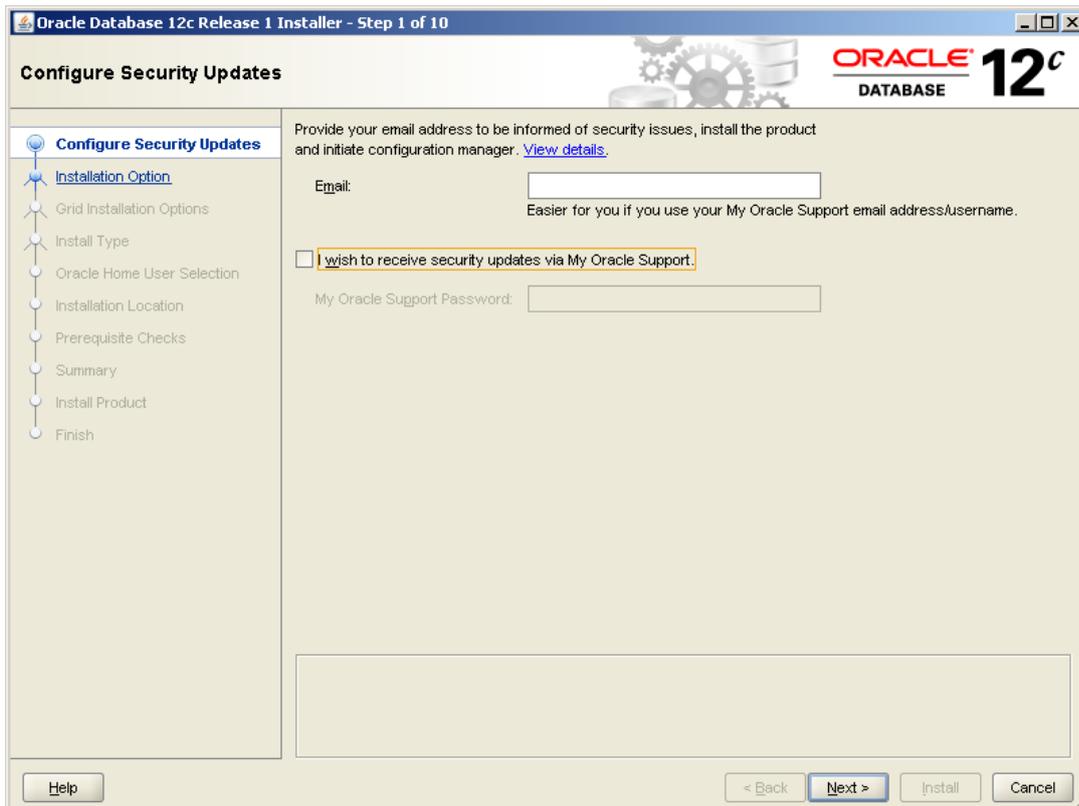
Uncheck „I wish to receive security updates …" and click NEXT.

After that, the following warning message appears.
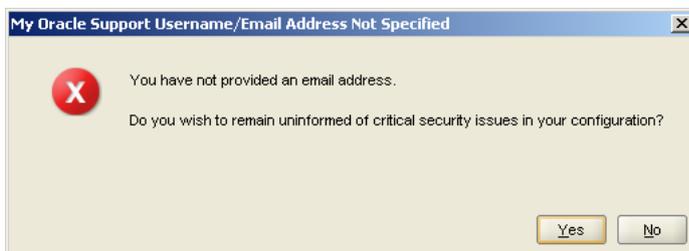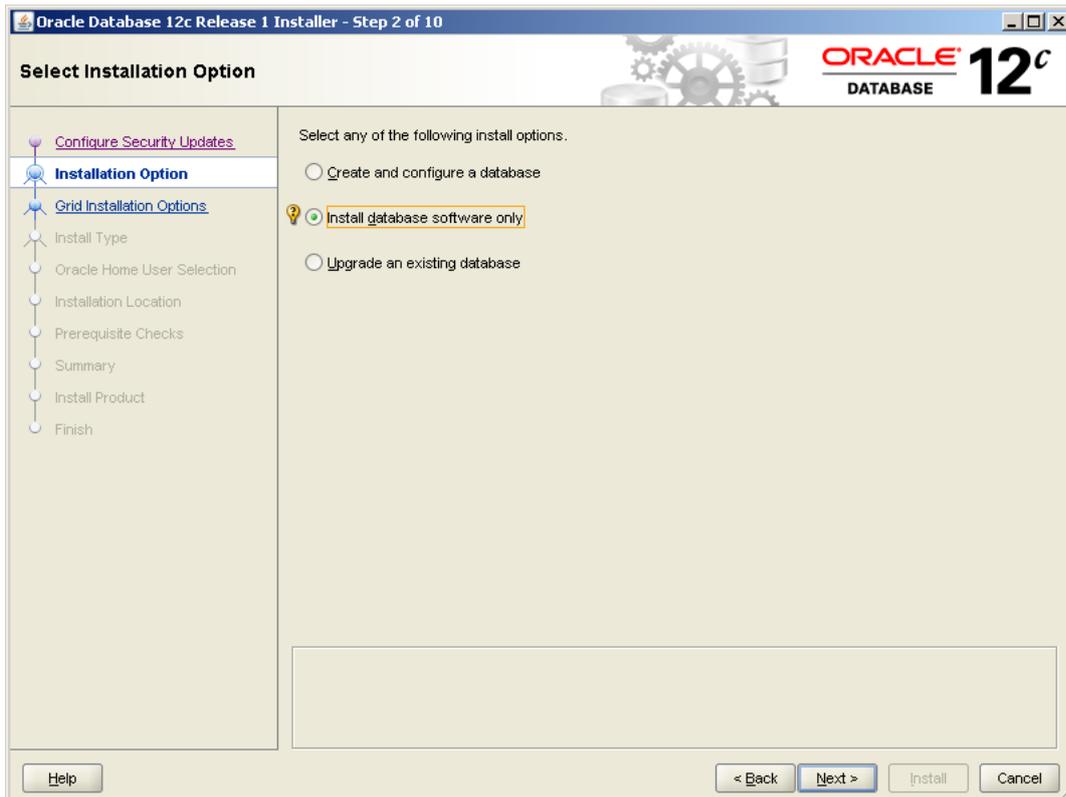
Confirm this message with YES.

Select „Install database software only" and click NEXT.
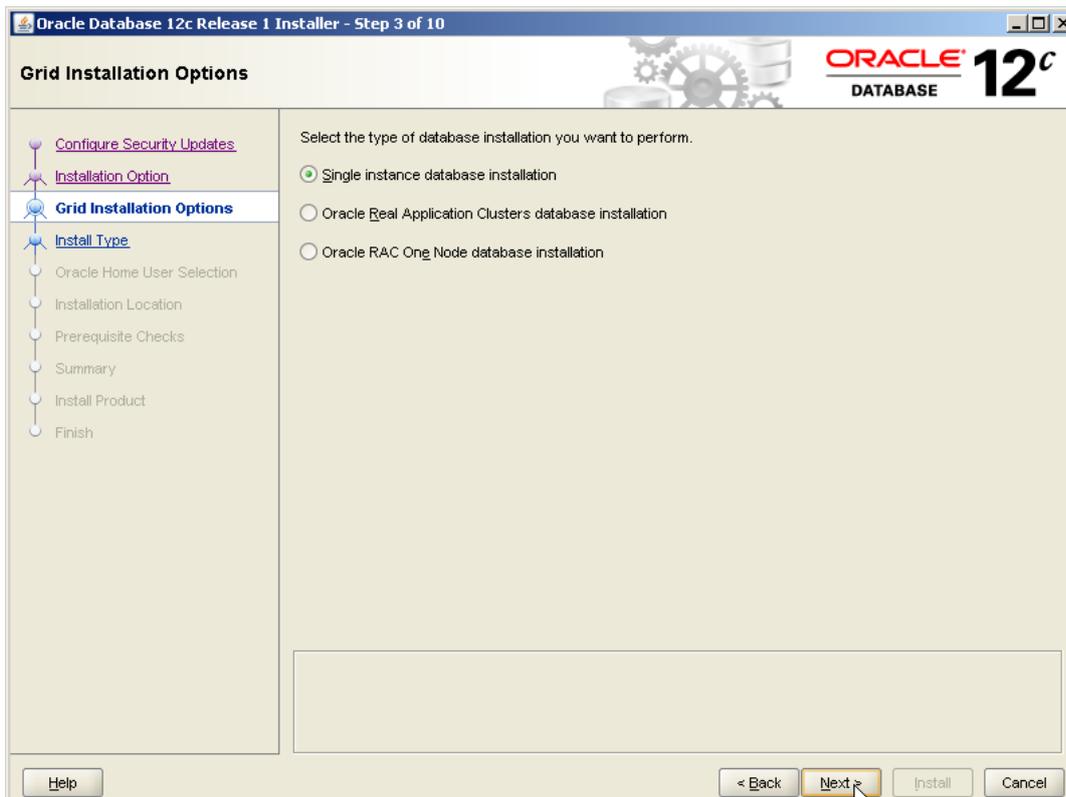
Select „Single instance database installation" and click NEXT.
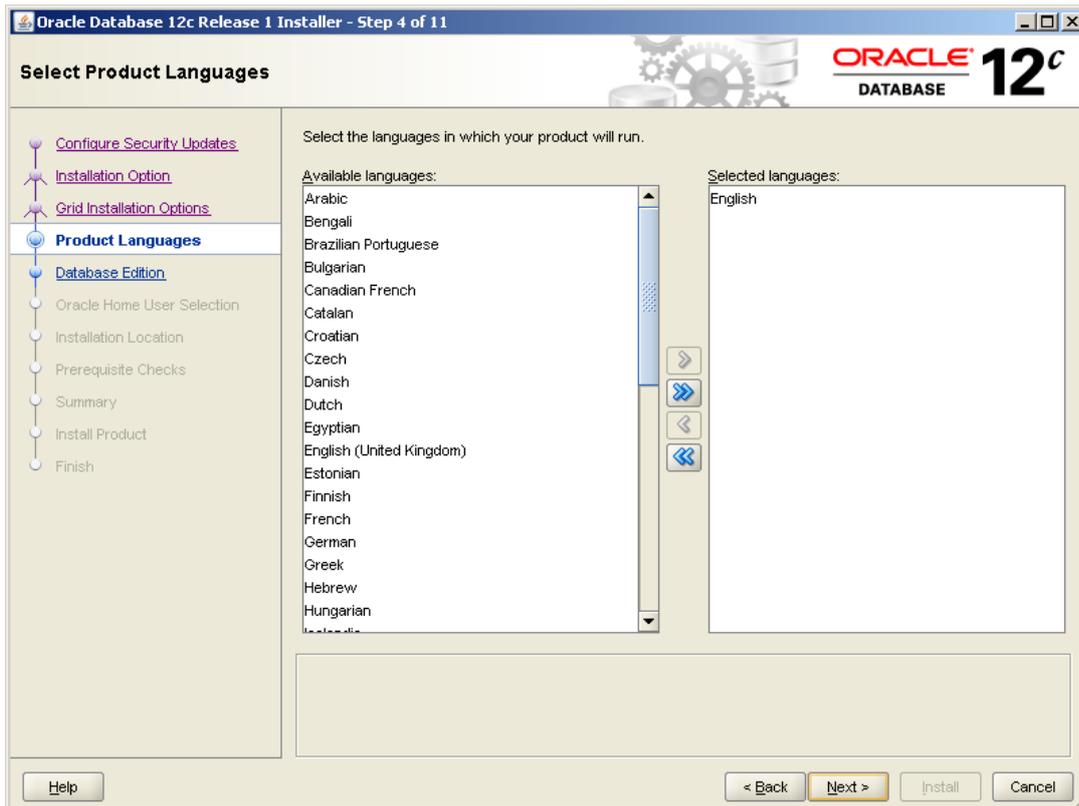
Choose your desired product languages. As a minimum, German and English should be selected. Click NEXT.
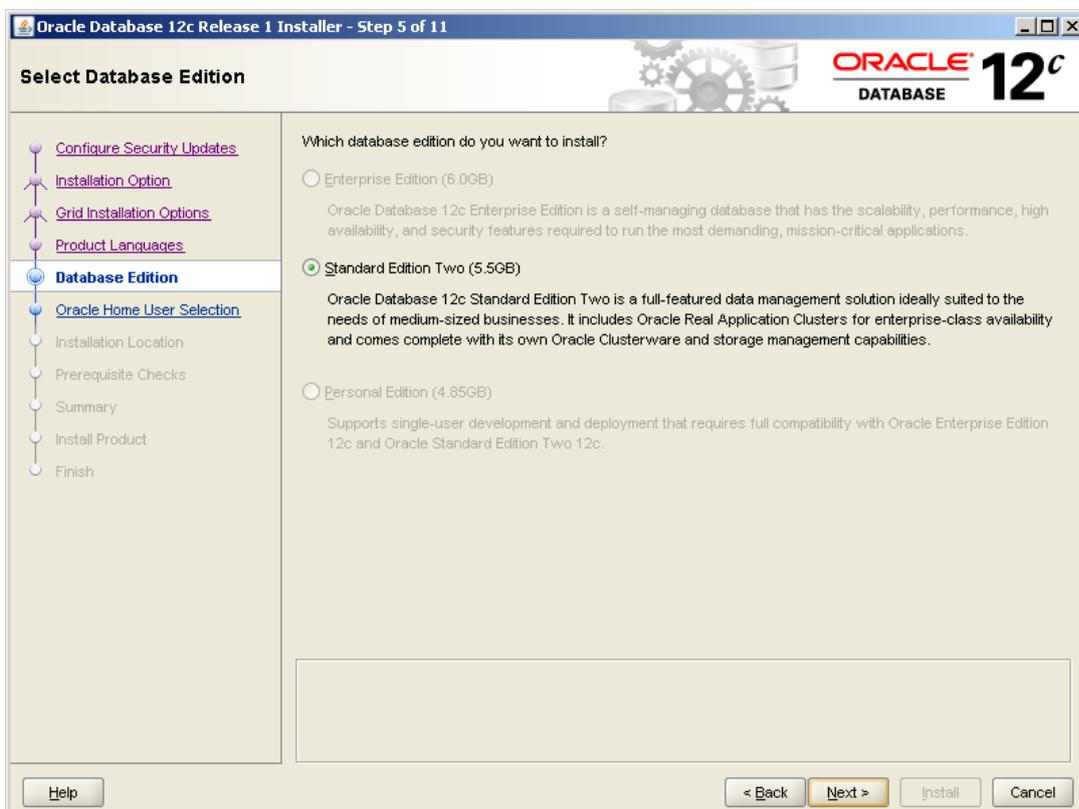
Select „Standard Edition Two (5,5GB)" and click NEXT.
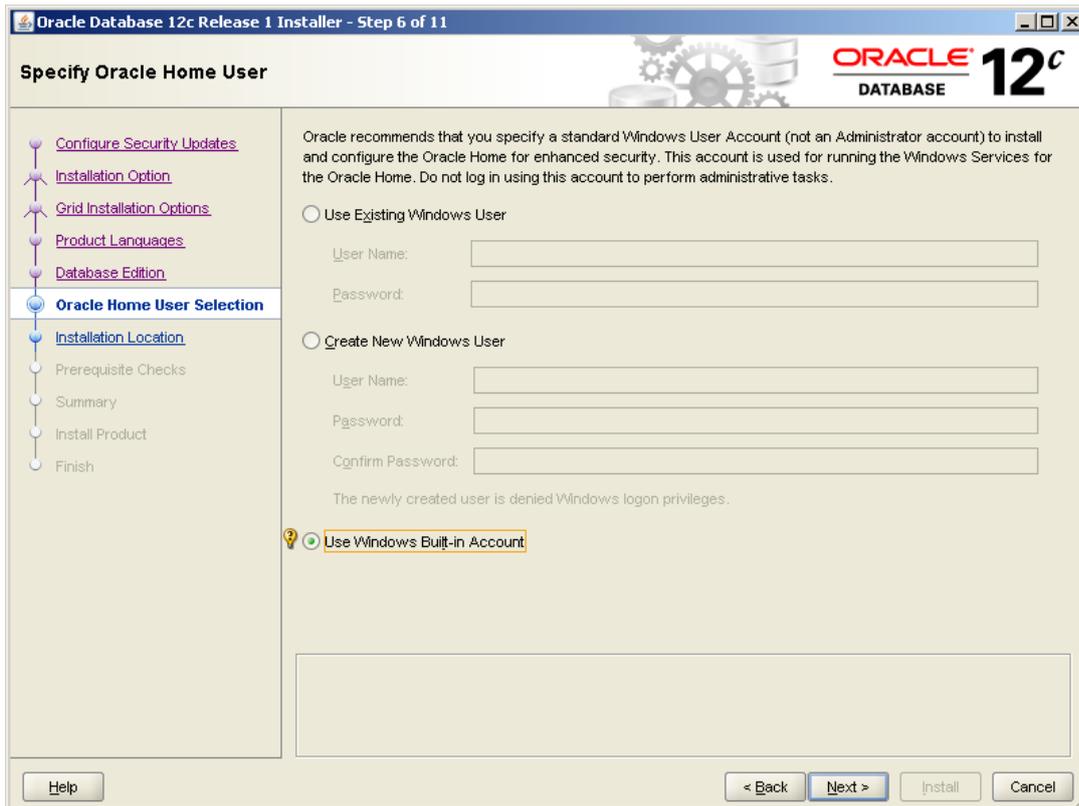
Select „Use Windows Built-in Account" and click NEXT.

After that, the following message appears.
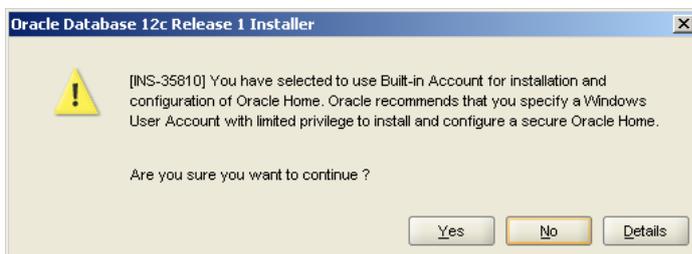
Confirm this message with YES.
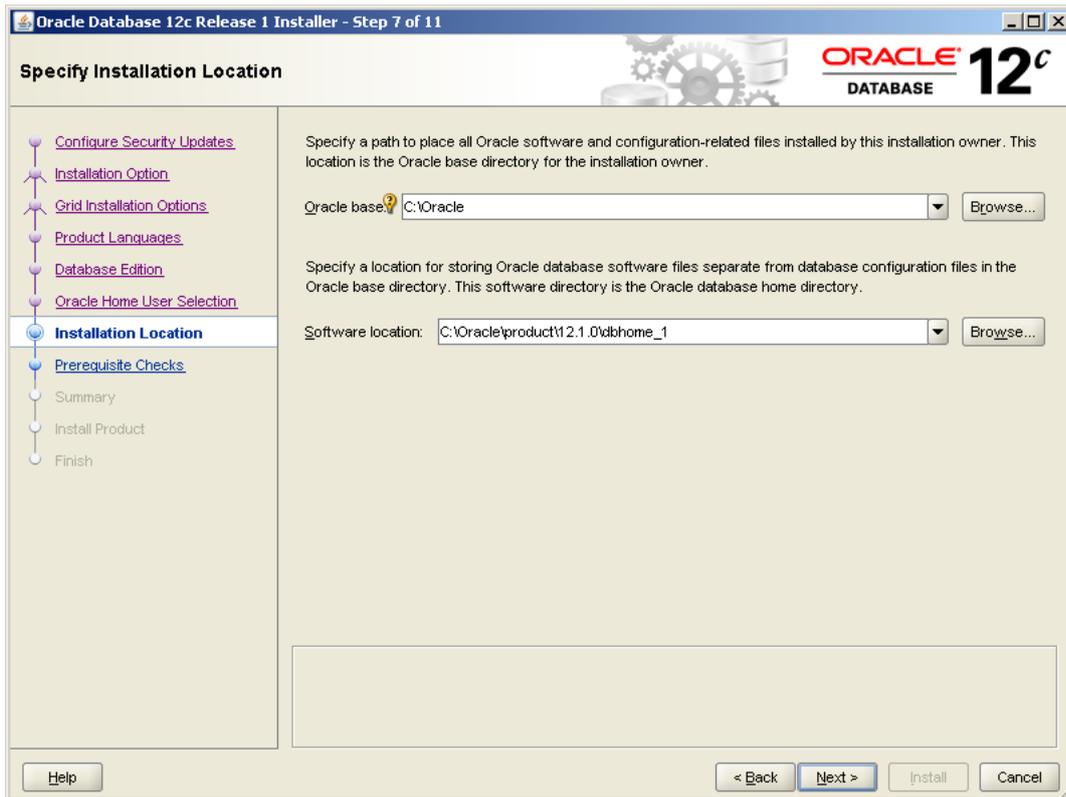
Change "Oracle Base" to C:\Oracle and click NEXT. The "Software Directory" input should then automatically be updated.
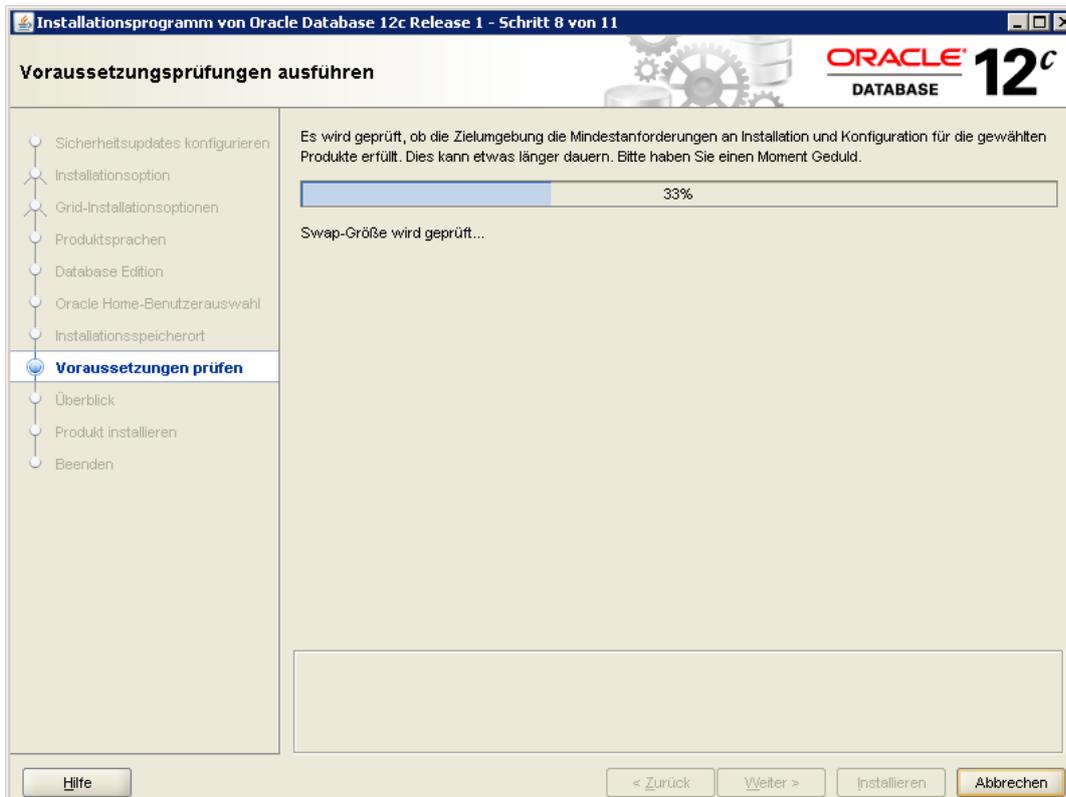
Oracle now checks the requirements, so that the installation can be performed.

The requirements check was successful and installation can commence. All important information is summarized again. The directory from which the installation is performed is displayed under "Source Location".

If the information displayed is correct the installation can be started by clicking INSTALL.

Display during installation.

The installation was successfully completed and can be confirmed by clicking CLOSE.

The Oracle service "OracleRemExecServiceV2" must be stopped and set to DEACTIVATED.

11 Annex B: Setup of the firewall
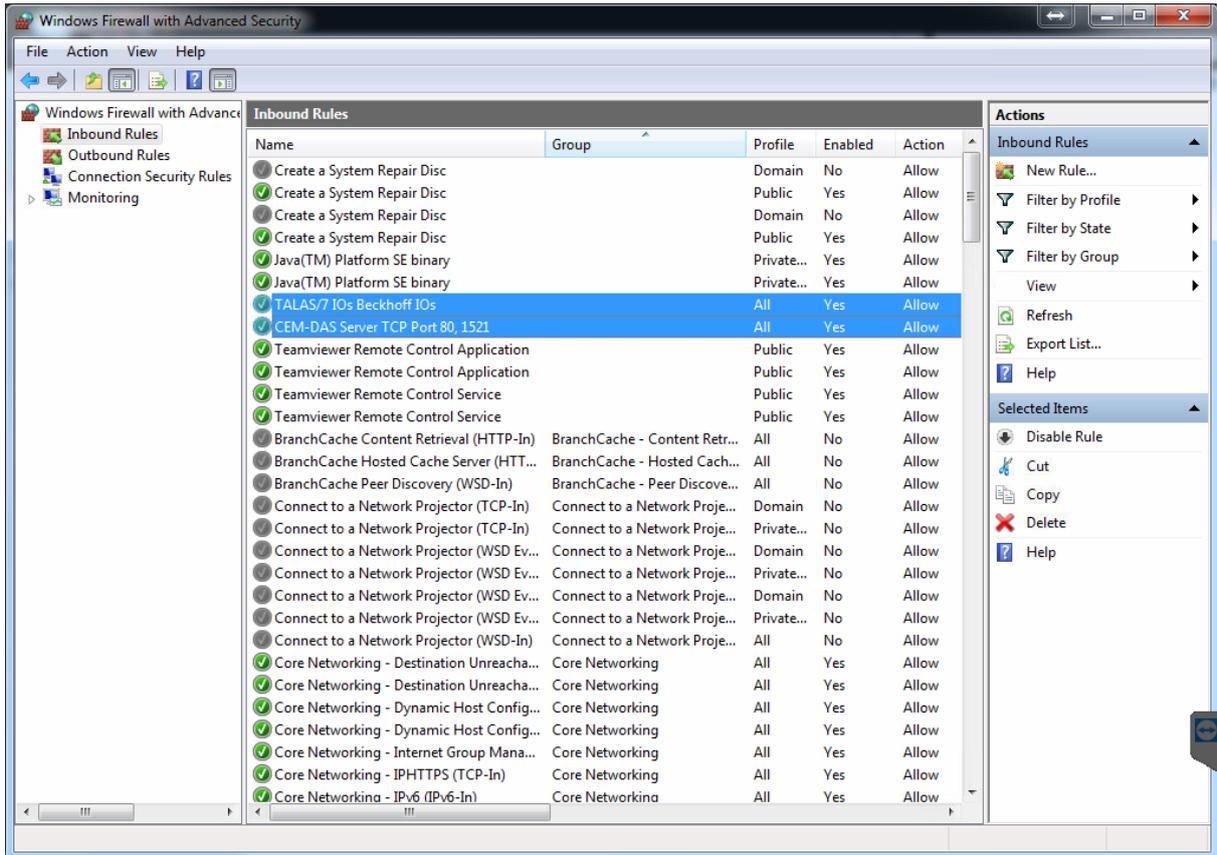
Create an incoming rule via "Actions / Inbound Rules / New Rule …", so that access to the web server and the database are not blocked by the firewall.

An assistant will then guide the user through the required information.
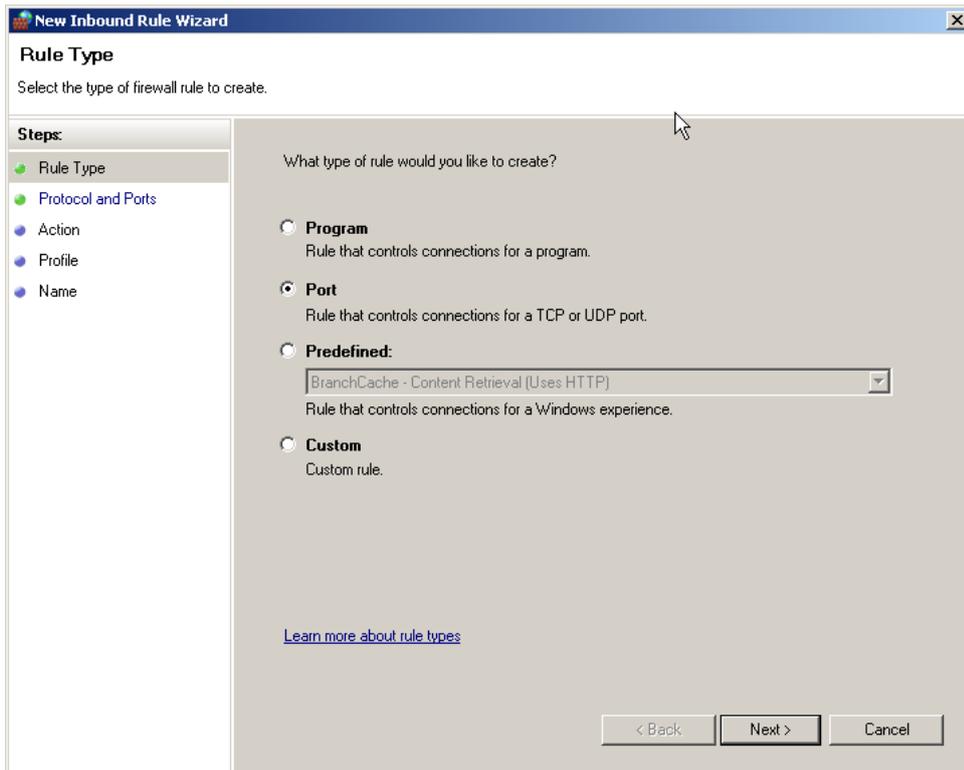
Select rule type PORT and click NEXT>
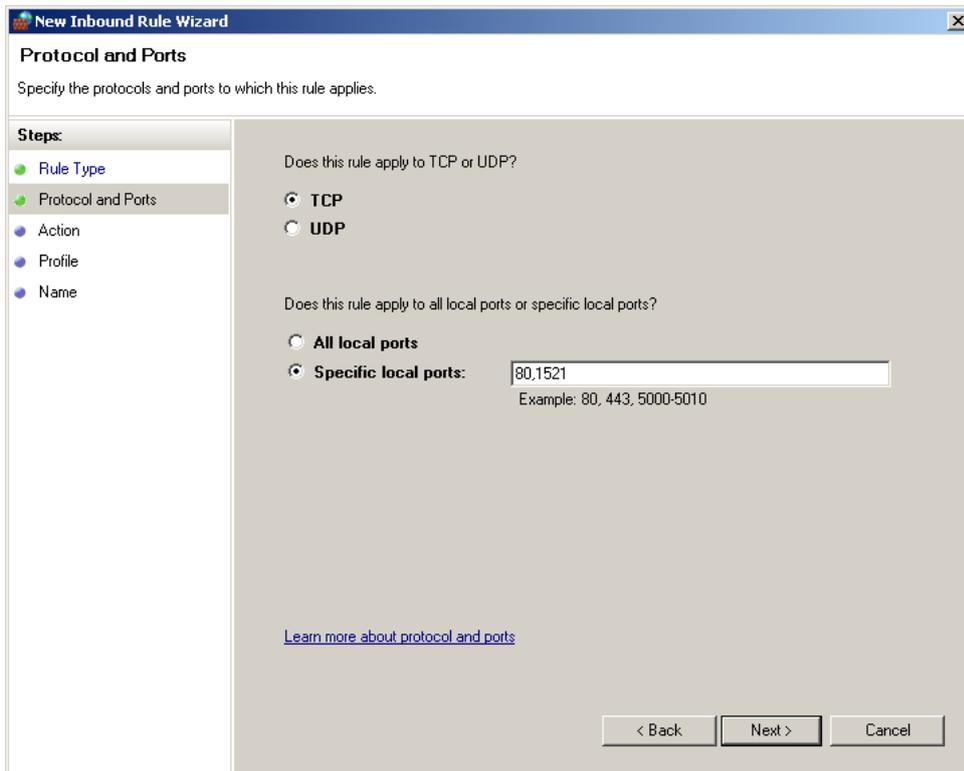
Select TCP and enter ports 80 and 1521 as specific local ports. NEXT>
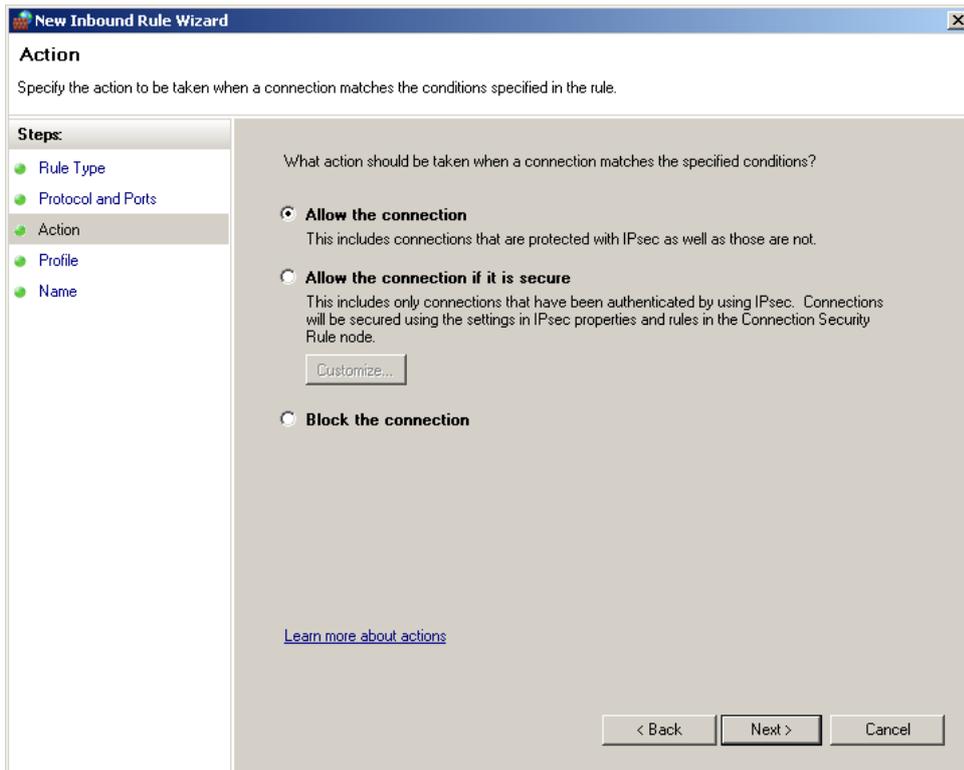
Select "ALLOW CONNECTION". NEXT>
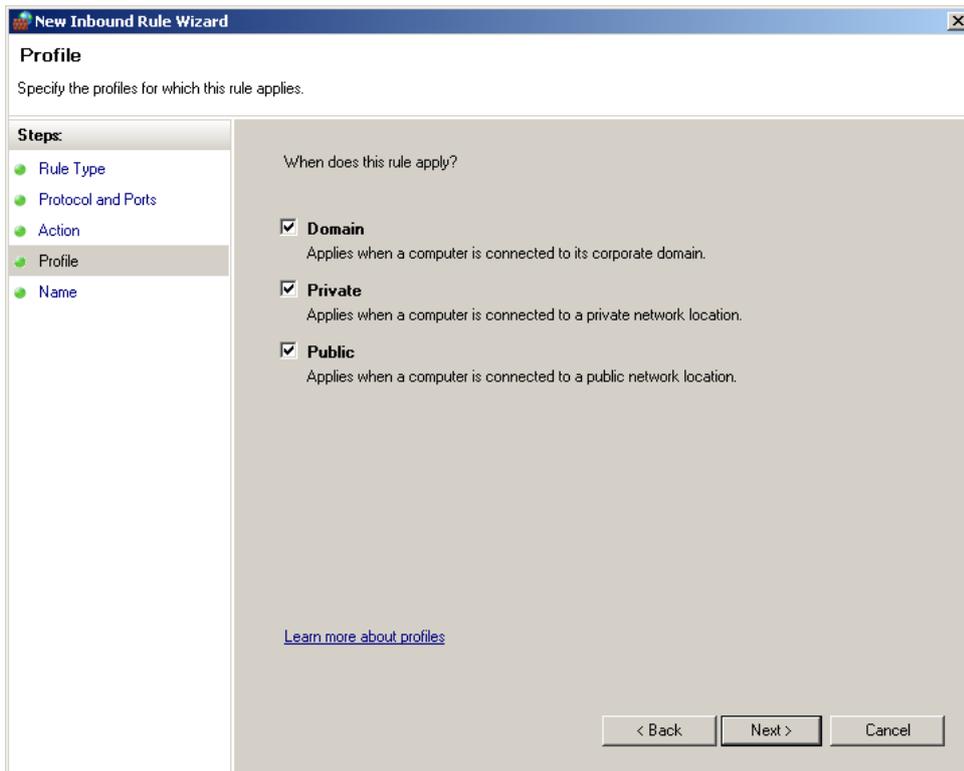
Check all three items and NEXT>
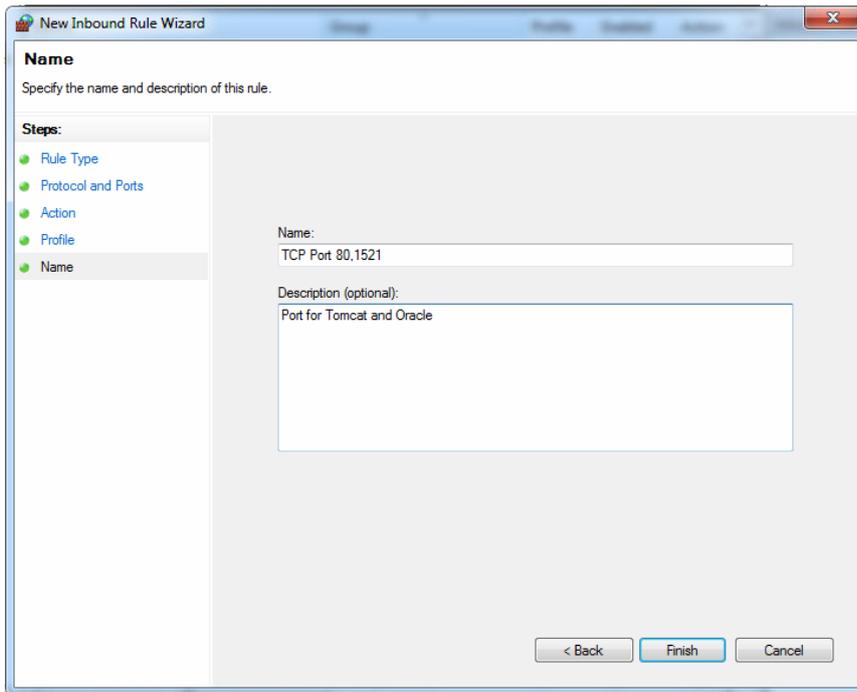
Enter name and description and complete the rule by clicking FINISH.
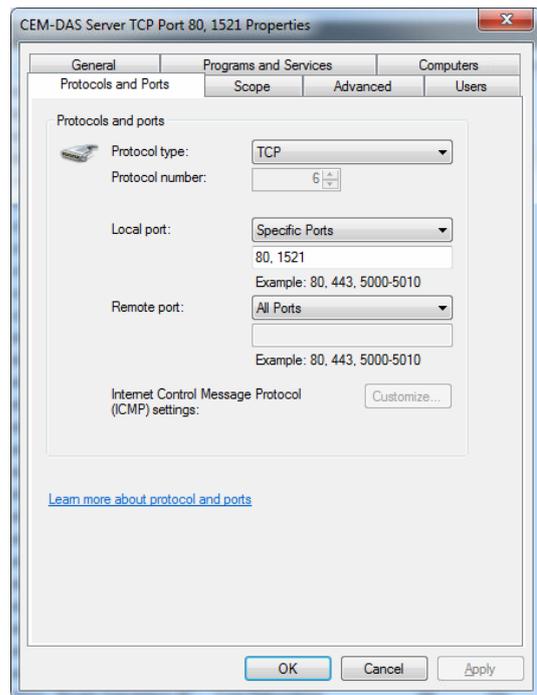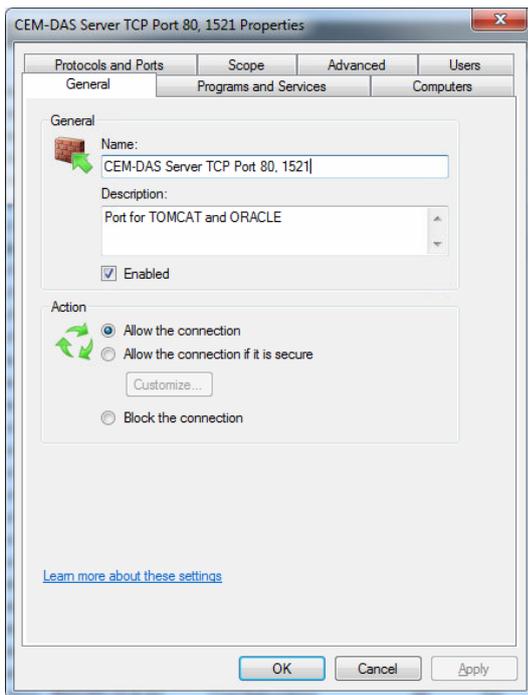
It is important that the rule is "enabled" and the connection is allowed. Name and description are for information only.

It is important that port 80 (1521) and protocol TCP are entered. Also, all remote ports (= users) must be allowed.

12 Annex C: Output of raw value files

The DAA communication program will create a daily raw value file *.raw. In this file, the 5s raw values as well as other data (last slow averages, digital inputs and outputs etc.) are saved. CEM-DAS provides an instrument to put out some contents of these files. This instrument is the command:

```
Umofadmin scan-record-file <FileName> [BIN|MV|PIM|LSA] fromTime toTime Id1 Id2 … Idn [options]
```

which is started in the \UmweltOffice directory. By default, the 5s raw values are stored in these files in the directory:

```
[Laufwerk, z.B. D:]\Dateiablage\[Jahr]\[Monat]\T[nnnn]
```

where T[nnnn] corresponds to the DAA device ID. The following data must be known in order to put out the raw value files of a DAA:

What is necessary?	Where to get it?
DAA device ID	CEM-DAS / Parameterization / Systems / DAA
DAA measuring points ID	DAA parameters list, reference list DAA ID: Id1, Id2, …
Data type	MV: 5s raw values (other data types see command Help)
Time frame	Any time frame of a day, see file name of the raw value file: 20110329.RAW = Year 2011, Month 03, Day 29
Raw value file	\ File Storage \ [Year] \ [Month] \ T[nnnn] \ *.raw

Output occurs in a Windows command shell. Start a shell ("DOS window") with CMD and enter the command according to the following illustration. The complete syntax is then read out, and after that the command can be repeated with the required parameters (see table above).

For more extensive readouts it is recommended to write the command in a batch file:

Figure 14: Command for interactive raw value data readout

By default the readout comes in the window. It can be redirected to any text file using the last parameter ([opts]), e.g. with "> filename.txt". The following Figure 15 shows a batch file with an example, and afterwards the ensuing readout into a text file:


```
REM 28.04.2011                    --------------------FILE------ TYPE ---FROM TIME-- ----TO TIME--- --TALAS ID -- -- OUT-TO-- ------- Out file-----
umofadmin scan-record-file D:\RohdatenListe\Kunde\20110211.raw  MV  11022011000000 11022011000300 7 164 165 166       >     Raw_MV_20110211.txt
pause
```

Figure 15: Batch file for raw value readout

```
        TALAS-ID,    7,         7,     164,      164,     165,      165,     166,      166,
       Bezeichnung, Stromwert,CO TO3701 10  , Stromwert,DUST IN1931  , Stromwert,NOx IN1931  , Stromwert,NOx IN1951  ,
        Einheit,    mA,      mg/m^3 ,     mA,    mg/m^3 ,   mA,   mg/m3 ,     mA,    mg/m3 ,
   11.02.2011 00:00:05,    0,       -62.5,   4.03748,   0.175687,  5.99192,   124.495,     0,       -250,
   11.02.2011 00:00:10,    0,       -62.5,   4.04645,   0.217744,  5.9979,    124.869,     0,       -250,
   11.02.2011 00:00:15,    0,       -62.5,   4.04795,   0.224753,  5.98145,   123.841,     0,       -250,
   11.02.2011 00:00:20,    0,       -62.5,   4.04346,   0.203725,  5.97547,   123.467, 0.00149536,   -249.907,
   11.02.2011 00:00:25,    0,       -62.5,   4.05243,   0.245782,  5.96799,     123,       0,       -250,
   11.02.2011 00:00:30,    0,       -62.5,   4.04496,   0.210734,  5.95154,   121.972,     0,       -250,
   11.02.2011 00:00:35,    0,       -62.5,   4.05243,   0.245782,  5.95304,   122.065, 0.00149536,   -249.907,
   11.02.2011 00:00:40,    0,       -62.5,   4.05094,   0.238772,  5.95154,   121.972,     0,       -250,
   11.02.2011 00:00:45,    0,       -62.5,   4.03748,   0.175687,  5.94556,   121.598,     0,       -250,
   11.02.2011 00:00:50,    0,       -62.5,   4.05243,   0.245782,  5.95454,   122.158,     0,       -250,
   11.02.2011 00:00:55,    0,       -62.5,   4.04795,   0.224753,  5.95902,   122.439,     0,       -250,11.02.2011 00:01:00,    0,       -62.5,
   4.05094,    0.238772,  5.96799,     123,       0,       -250,
   11.02.2011 00:01:05,    0,       -62.5,   4.04496,   0.210734,  5.98145,   123.841, 0.00149536,   -249.907,
   11.02.2011 00:01:10,    0,       -62.5,   4.05243,   0.245782,  5.99042,   124.401,     0,       -250,
```

Figure 16: Text file with raw values list

13 Annex D: Error numbers

The programs of CEM-DAS record errors and faults as system messages. The relevant error numbers of operating system, database and other applications are summarized in the following table.

Error number	Explanation / Measures
2	A directory or a file could not be found. The path for backup or storage is not available.
5	The program has no permissions to access to the path or the file.
53	The network path could not be found. The UNC (\\Server\release\...) path for backup or archiving does not exist. IP address cannot be used for server. The name must be entered in ‚host' if the name cannot be resolved.
112	There is not enough free space.

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