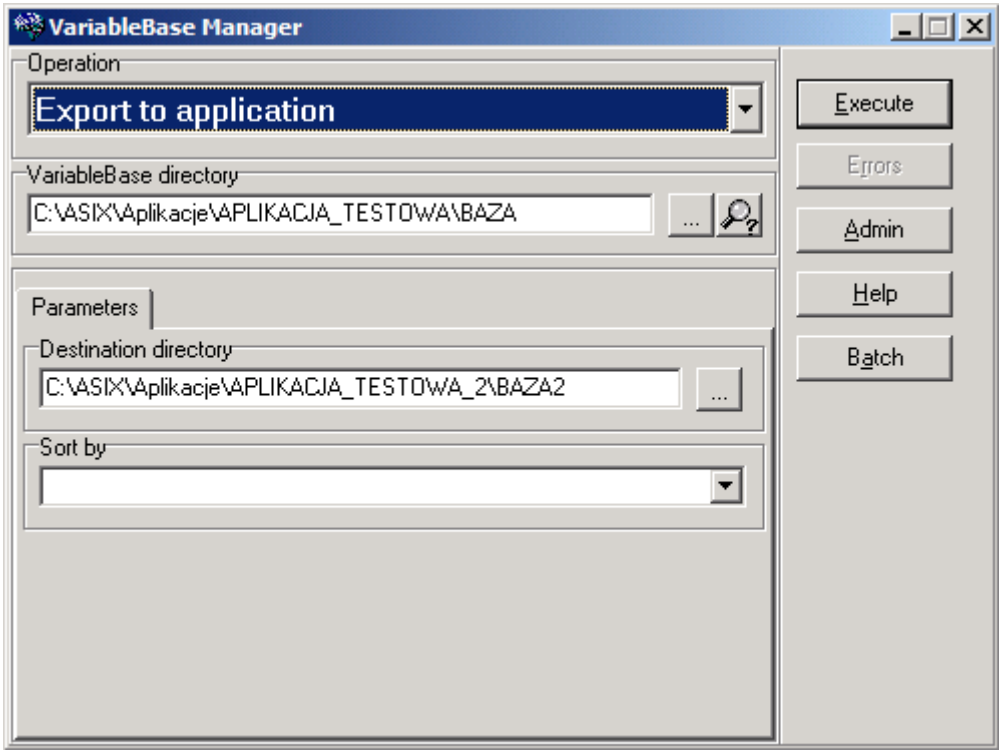
VariableBase Manager
Manual

ASKOM Sp. z o. o., ul. Józefa Sowińskiego 13, 44-121 Gliwice,
tel. +48 (0) 32 3018100, fax +48 (0) 32 3018101,
http://www.askom.com.pl, e-mail: office@askom.com.pl

1. VariableBase Manager

VariableBase Manager is a program designed for creating VariableBase of **asix** system and to perform in it the auxiliary operations such as:

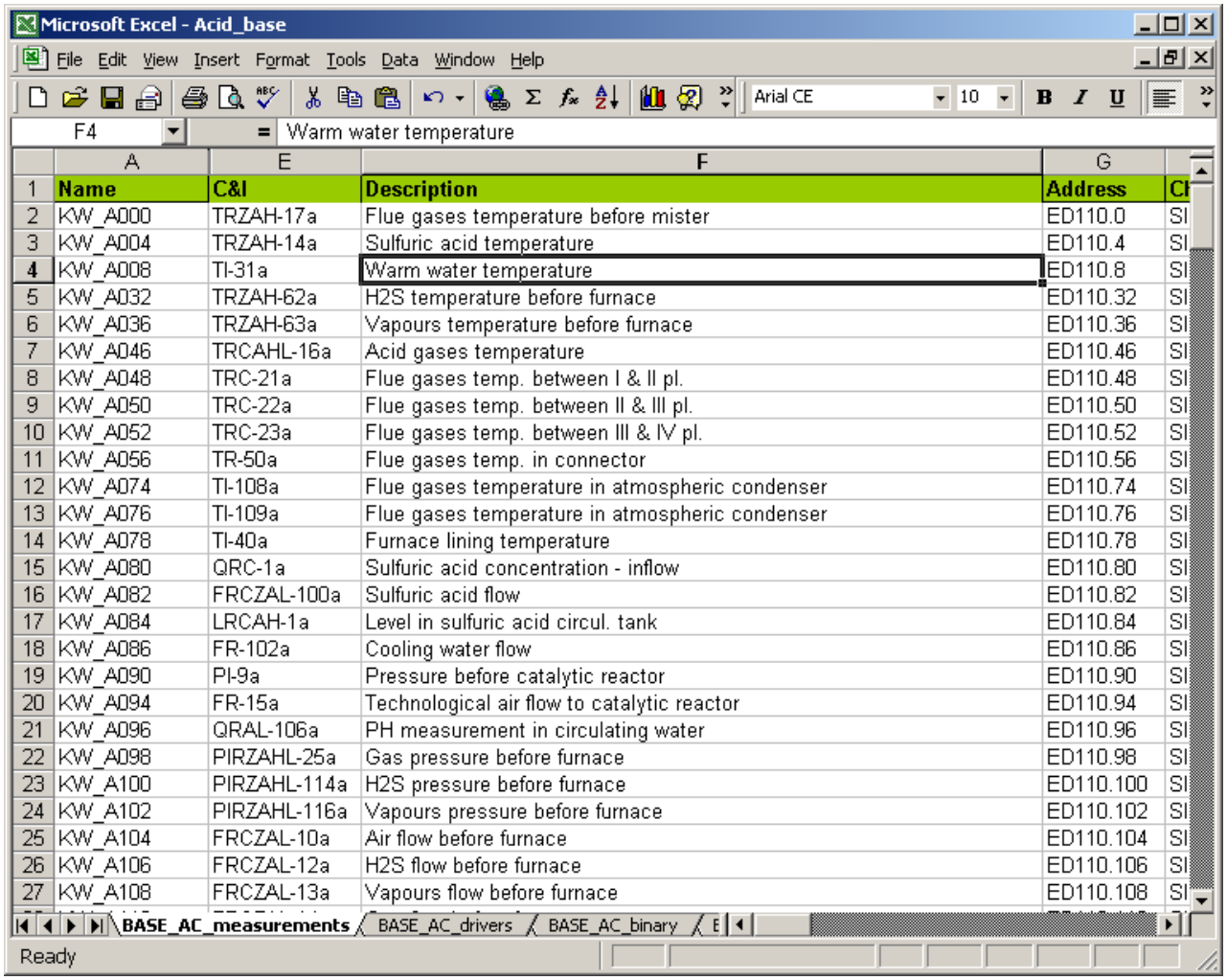
- generating default set of variables,
- generating auxiliary data base,
- generating files of variable definitions of **asix** system.



2. VariableBase of asix

In **asix** system VariableBase is a place where all information on process variables is stored. It includes Variable Attribute Base, VariableBase Structure and Variable Collections.

Attribute Base being the main part of VariableBase, includes information on the process variables themselves. This information includes such items as name, text description, engineering unit or measuring limits. This information is referred to as variable attributes. You may imagine the structure of this information as a table including rows and columns:



Microsoft Excel - Acid_base

File Edit View Insert Format Tools Data Window Help

Arial CE 10 B I U

F4 = Warm water temperature

	A	E	F	G	
1	**Name**	**C&I**	**Description**	**Address**	**Cl**
2	KW_A000	TRZAH-17a	Flue gases temperature before mister	ED110.0	SI
3	KW_A004	TRZAH-14a	Sulfuric acid temperature	ED110.4	SI
4	KW_A008	TI-31a	Warm water temperature	ED110.8	SI
5	KW_A032	TRZAH-62a	H2S temperature before furnace	ED110.32	SI
6	KW_A036	TRZAH-63a	Vapours temperature before furnace	ED110.36	SI
7	KW_A046	TRCAHL-16a	Acid gases temperature	ED110.46	SI
8	KW_A048	TRC-21a	Flue gases temp. between I & II pl.	ED110.48	SI
9	KW_A050	TRC-22a	Flue gases temp. between II & III pl.	ED110.50	SI
10	KW_A052	TRC-23a	Flue gases temp. between III & IV pl.	ED110.52	SI
11	KW_A056	TR-50a	Flue gases temp. in connector	ED110.56	SI
12	KW_A074	TI-108a	Flue gases temperature in atmospheric condenser	ED110.74	SI
13	KW_A076	TI-109a	Flue gases temperature in atmospheric condenser	ED110.76	SI
14	KW_A078	TI-40a	Furnace lining temperature	ED110.78	SI
15	KW_A080	QRC-1a	Sulfuric acid concentration - inflow	ED110.80	SI
16	KW_A082	FRCZAL-100a	Sulfuric acid flow	ED110.82	SI
17	KW_A084	LRCAH-1a	Level in sulfuric acid circul. tank	ED110.84	SI
18	KW_A086	FR-102a	Cooling water flow	ED110.86	SI
19	KW_A090	PI-9a	Pressure before catalytic reactor	ED110.90	SI
20	KW_A094	FR-15a	Technological air flow to catalytic reactor	ED110.94	SI
21	KW_A096	QRAL-106a	PH measurement in circulating water	ED110.96	SI
22	KW_A098	PIRZAHL-25a	Gas pressure before furnace	ED110.98	SI
23	KW_A100	PIRZAHL-114a	H2S pressure before furnace	ED110.100	SI
24	KW_A102	PIRZAHL-116a	Vapours pressure before furnace	ED110.102	SI
25	KW_A104	FRCZAL-10a	Air flow before furnace	ED110.104	SI
26	KW_A106	FRCZAL-12a	H2S flow before furnace	ED110.106	SI
27	KW_A108	FRCZAL-13a	Vapours flow before furnace	ED110.108	SI

BASE_AC_measurements BASE_AC_drivers BASE_AC_binary

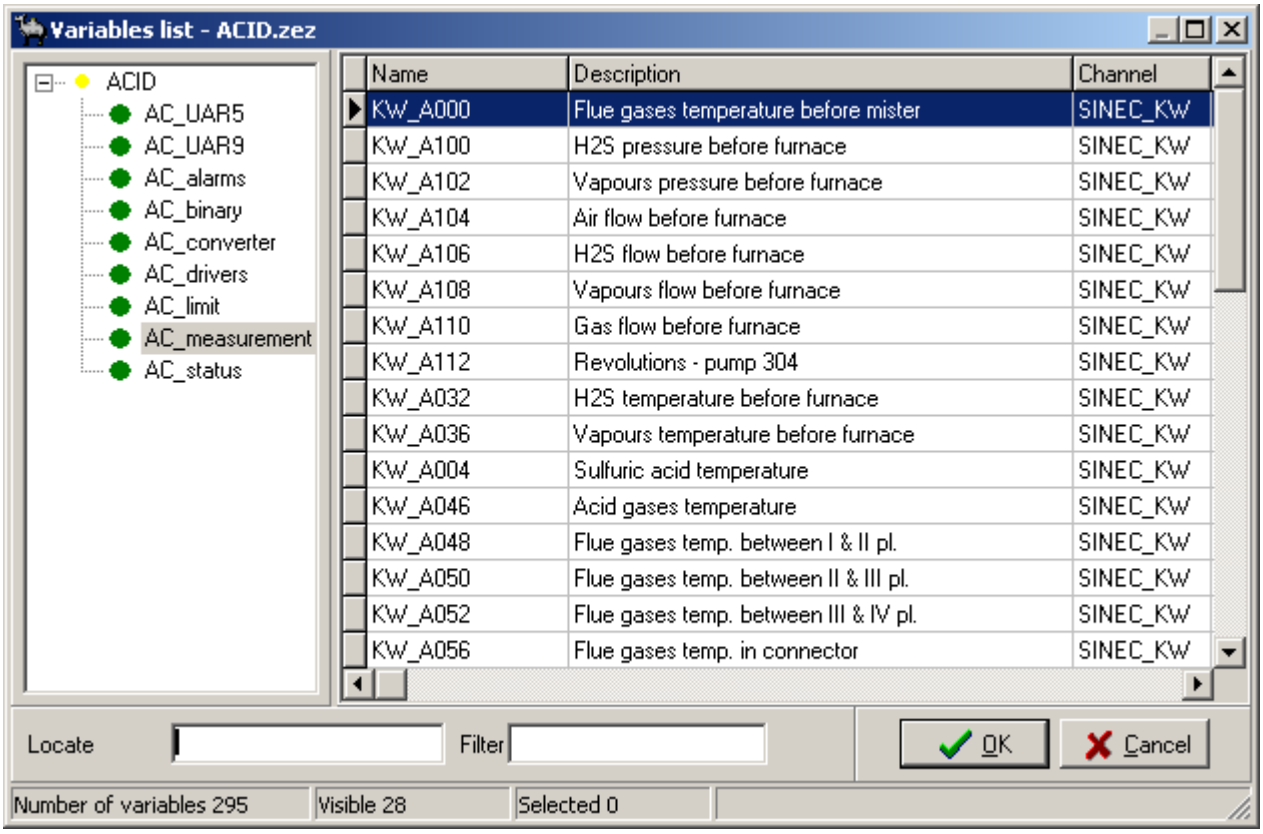
Ready

Each row of the table includes all information concerning one variable; each column includes value of one attribute for all variables.

Structure of attribute VariableBase a namely list of all attributes the specified variable may take is described in the VariableBase structure file. Structure of attribute base may be extended and may be adapted to requirements of current application of **asix** system**.**

The file of VariableBase structure includes also information on average values of process variables and names of variable attributes and names of averages translated to local language.

The programs included in the package of **asix** system retrieve variable attributes from VariableBase in order to display the technological synoptic diagrams and for that purpose attributes base alone is sufficient. However, for operator or designer, who likes to inspect the contents of the VariableBase, inspection of complete VariableBase at once would be cumbersome. A way is necessary to monitor the segments of VariableBase including the variables that are linked together. For that reason the VariableBase of **asix** system is provided with feature that enable splitting the variables into groups, assigning names to groups and arranging names of groups into a hierarchical tree-structured namespace representing the structure of industrial process, of company department or structure of company.



File including definition of structure of variable groups is referred to as Variable Collection (file with .ZEZ extension) and composes the third item of the VariableBase. One VariableBase may be assigned any number of variable collections.

3. Variable Collections

VariableBase of **asix** system is provided with feature that enables splitting the variables into groups, assigning names to groups and arranging names of groups into a hierarchical tree-structured namespace representing the structure of industrial process, of company department or structure of company

Variable collection is a file including definition of variable group structure of variables in VariableBase.

The individual items of variable collection, representing the variable groups and arranged in tree structure are referred to as leaves.

Basing on information of individual variables you may generate default variable collection. It includes all variable collections included in the VariableBase. In general, manual editing the default variable collection is required, in order it well corresponds to real variable group structure and includes descriptive name of groups and not their identifiers only.

Variable collection is a text file where each line describes one leaf of the tree. Each line may have the following syntax:

<Name of leaf> : <Name of group>

or

< Name of leaf > : < Name of group> {, <Name of group> }

or

< Name of leaf>:

It is assumed, that to every leaf "belong" the variables included in at least one group stated in leaf definition. If no group is assigned to the leaf, then no variables belong to the leaf.

In order the leaf be drawn on the required level of plunging you should put before its name as many Tab characters as level of plunging in the tree. The first leaf is the only leaf that is not plunged and therefore there are no Tab characters before its name.

EXAMPLE

Contents of file including definition of structure of VariableBase:

```
Power Plant
        Unit 1:Unit1
                AverageValue 1h:Unit1_1h
                AverageValue 5m:Unit1_5m
        Unit 2:Unit2
                AverageValue 1h:Unit2_1h
                AverageValue 5m:Unit2_5m
        Unit 3:Unit3
                AverageValue 1h:Unit3_1h
                AverageValue 5m:Unit3_5m
        Unit 4:Unit4
                AverageValue 5m:Unit4_1h
                AverageValue 5m:Unit4_5m
        Unit 5:Unit5
                AverageValue 1h:Unit5_1h
                AverageValue 5m:Unit5_5m
        Unit 6:Unit_06
                AverageValue 1h:Unit_06_1h
                AverageValue 5m:Unit_06_5m
                Signals:B06_sygnals
```

4. Generating VariableBase

In current applications of **asix** system or new ones created with old-fashioned method you should create at first INI file for application and files including definitions of variables and then generate VariableBase.

At present it is recommended to prepare VariableBase with use of such tools as spreadsheet or database and next generate VariableBase of **asix** system. It is also possible to generate VariableBase with data included in text file. After VariableBase has been generated you can generate variable definition files for applications of **asix** system.

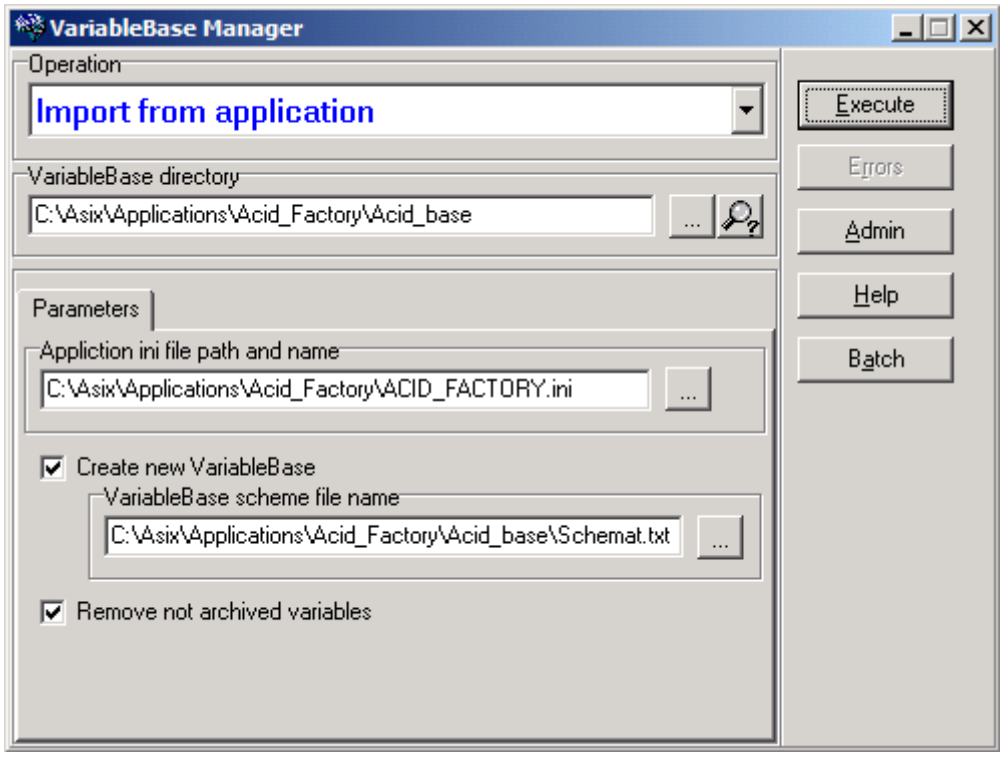
Generating the VariableBase may comprise more then one step. Data used to generate VariableBase may be split to several sheets, tables or files that are successively added to the VariableBase. In this case you have to create new VariableBase with use of data from the first source and in the following steps only add new data to the base.

After new VariableBase has been generated you may generate default set of variables. You may use default variable collection as a point of origin to create your own set of variables. You can also use it to inspect the VariableBase.

If the VariableBase is large (>5 MB) or used on computer provided with slow processor or small operating memory you should generate auxiliary VariableBase. This will accelerate inspection of the VariableBase.

5. Importing Data from Applications of asix

In order to import data from **asix** to the VariableBase you should select *Import from application*, enter directory of VariableBase, choose INI file of application and click on *Execute* button.



In place to enter the name of INI file you may choose it in dialog window, clicking on ... button.

During data import operation as a default, new VariableBase is created but the variables to be archived are added only. If you would like to change this, select the appropriate option boxes.
Name of variable group to which the variable belongs to is the same as that of file of current variables, where variable is defined (file name without extension and directory path). In order to force the name of group which variable should belong to, you have to put

lines defining the variable group to file including definitions of current variables. You may find names of these files in section ASMEN of INI file of application of **asix** system.

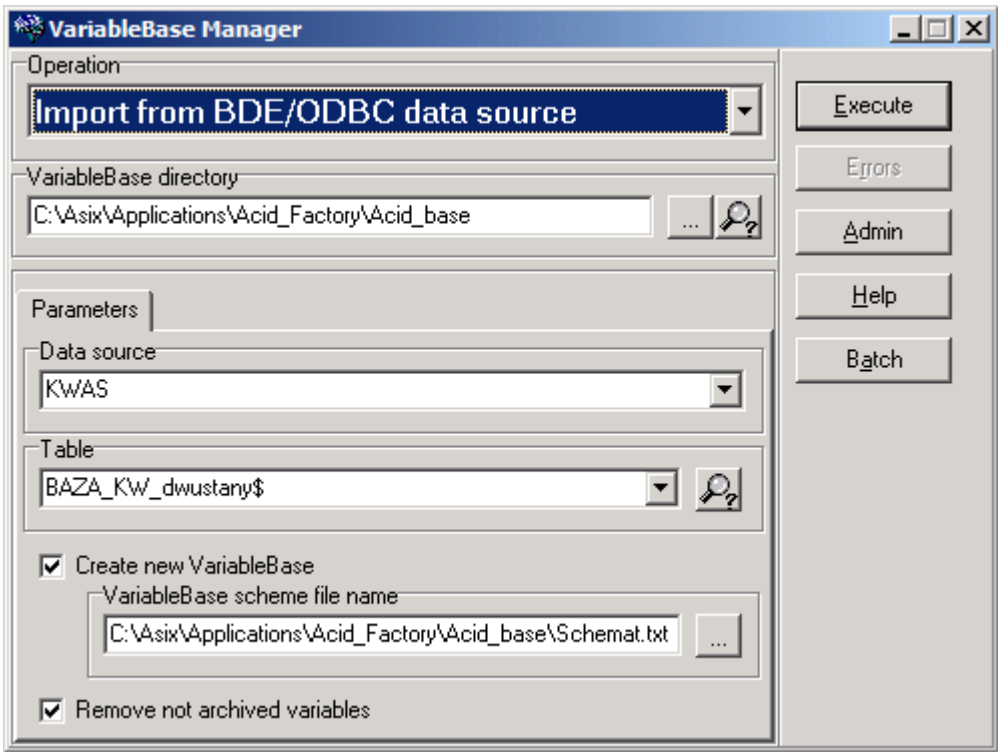
Line defining the variable group has the following format:

Attributes: <Name of group>

Group definition begins from place of the declaration line and follows up to the next definition or end of file.

6. Importing from BDE or ODBC Data Source

In order to import data to variable from BDE/ODBC data source you should select *Import from BDE/ODBC data source*, enter directory of VariableBase, select data source, choose table in the data source and click on *Execute* button.



After the *Data Source Combobox* has been dropped-down you see all data sources assigned to BDE and ODBC. In order to define new data source use BDE or ODBC configuration utility from *Control Panel* of Windows. These utilities are also available in local menu, and are displayed when you click *Admin* button in the window of VariableBase Manager.

If the data source was defined as Excel Spreadsheet or as Microsoft FoxPro database, you have to define the data source in ODBC system.

If the data source is Borland Paradox or Borland dBase, you will better define the data source (alias) in BDE system. In BDE system alias term is used in place of data source.

During data import operation as default, new VariableBase is created but variables to be archived are added only. If you would like to change this option, you should select the appropriate option boxes.

It is assumed that every row in table of data source includes attributes of one process variable. Identifier of column has to be the same as name of variable attribute that the column includes. The table must not include columns containing attributes non-defined in the VariableBase structure.

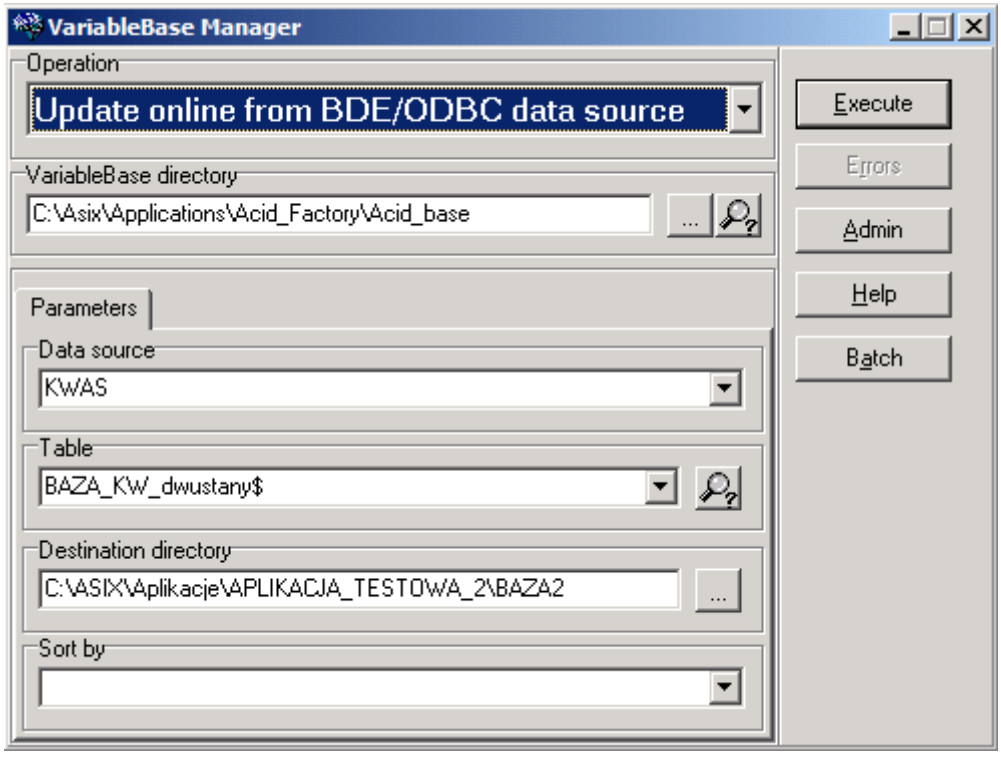
The first column of the table must take *Name* identifier and contain the name of variable. Name of variable group must be contained in *Group* column.

NOTE: d*uring import of BDE/ODBC data, Id attribute is omitted. It makes possible import of Paradox VariableBase files.*

7. On-line Updating from BDE or ODBC Data Source

To update on-line the VariableBase from BDE/ODBC data source you should:

- select On-line Updating operation from BDE or ODBC data source,
- enter directory of VariableBase,
- choose data source, select one table in data source containing modifications,
- enter directory, where the generated files of applications of **asix** system **(**Asmen and Aspad files),
- choose attribute according to which variables in files of applications of **asix** system should be sorted,
- click on *Execute* button.



Manager of VariableBase will compare contents of the table from data source with that of VariableBase and output report of modifications that were introduced. This report includes names of variables divided into four groups:

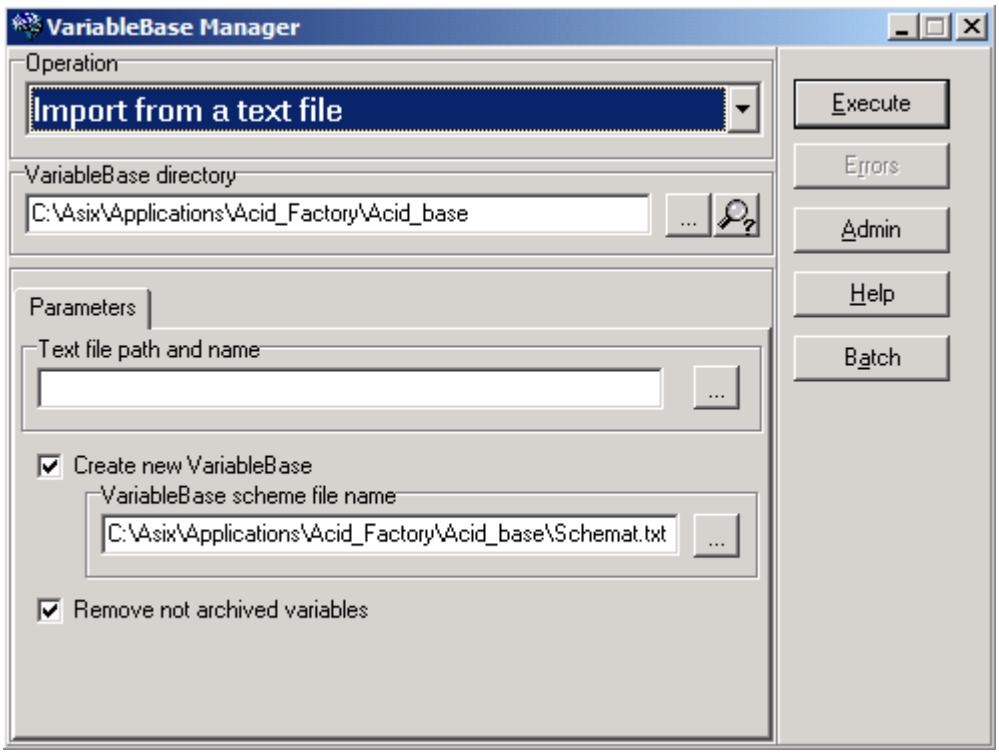
- new variables,
- deleted variables,
- modified variables. Modifications allowed to be introduced in on-line mode to **asix** system,
- modified variables. Modifications allowed to be introduced in off-line mode to **asix** system (restart of system is required).

If you accept the report, then modifications will be introduced to the VariableBase and information on modification of the VariableBase broadcasted in the Local Area Network. **asix** system running on other computers in LAN, having received this information checks whether its pattern VariableBase was modified and if it is the case it will copy the base to local disk, retrieve modifications and introduce them to system.

NOTE: *during one session of on-line updating the VariableBase you may modify up to 10 variables.*

8. Importing Data from Text File

In order to import data to the VariableBase from text file you should select *Import from a text file*, enter directory of the VariableBase, select name of file and click on *Execute* button.



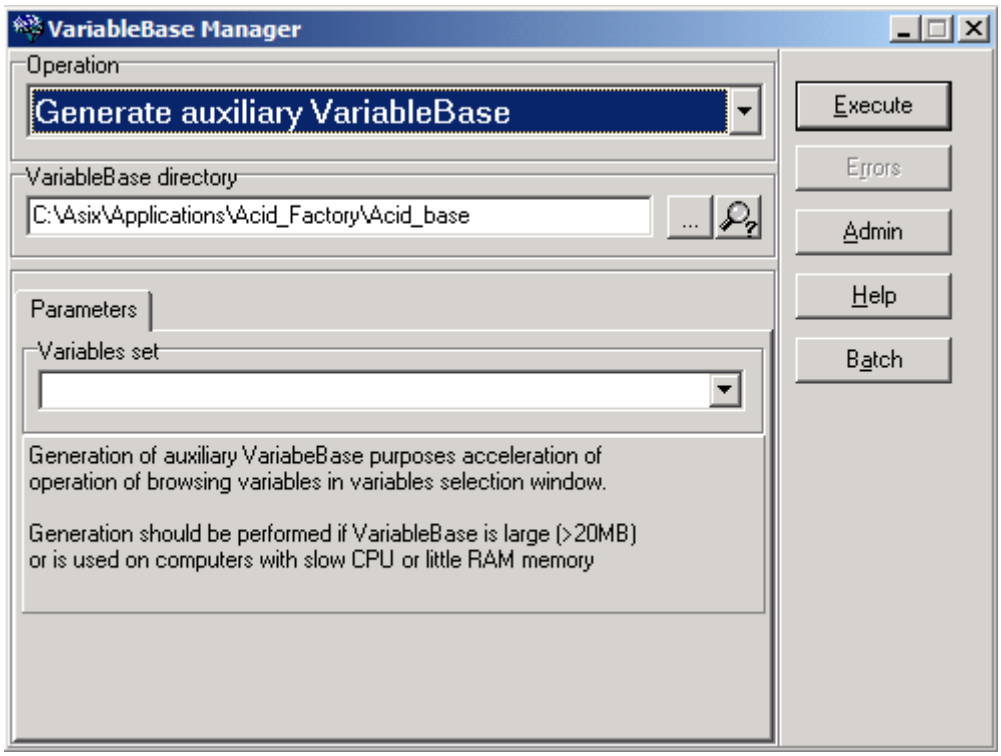
During data import operation as a default, new VariableBase is created but only archived variables are added. If you would like to change this property, select the appropriate option boxes.

It is assumed that every row of text file includes attributes of one process variable. The individual fields must be separated by commas; period must be a decimal separator in floating point numbers.
The first row of text file fill the special role and includes definition of format of text file. In place of values of attributes it contains names of attributes separated with commas. Name of attribute used in any column of text file defines what attributes are contained in the following rows. File doesn't contain non-defined attributes in structure of VariableBase.

The first column of the table must have identifier *Name* and contain name of variable. Name of group of variables must be contained in *Group* column.

9. Auxiliary VariableBase

To generate auxiliary VariableBase you should select operation *Generate auxiliary VariableBase*, enter directory where VariableBase is saved, select variable collection and click on *Execute* button.



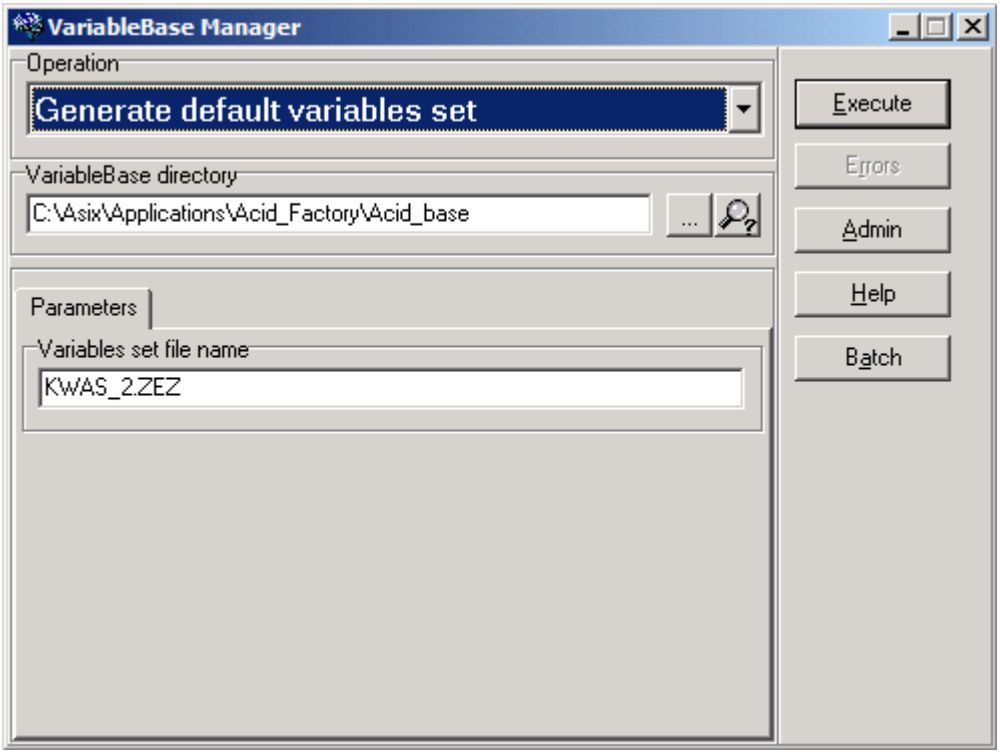
You should generate auxiliary VariableBase when VariableBase is large (>5MB) or is used in computer provided with not so speed processor and small operating memory. Generation of auxiliary VariableBase will accelerate operation of window for selection of variables. For any variable collection you should generate separate auxiliary VariableBase.

The auxiliary VariableBase is created in sub-directory of directory of VariableBase. Name of this directory is the same as that of variable collection from which the auxiliary VariableBase is generated. Directory of the auxiliary VariableBase includes sub-directories numbered with successive positive numbers corresponding to successive leaves of variable collections. During process of generation of auxiliary VariableBase the subsets of variables are created, which appears after selection of first, second, etc. leaf of variable collection. These subsets are placed in successive sub-directories of auxiliary VariableBase.

Due to generation of auxiliary VariableBase, such operations as searching or sorting during inspection of VariableBase are performed on subset of VariableBase only, and therefore are shorter.

10. Generating Default Variable Collection

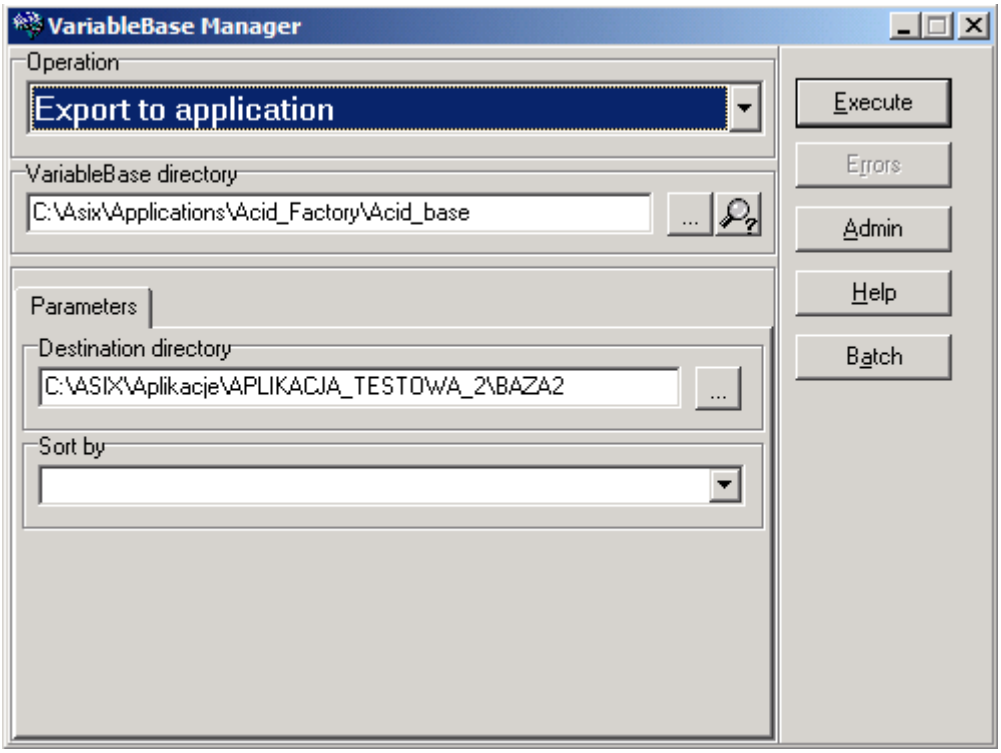
In order to generate default variable collection you should select operation *Generate Default Variables Set*, enter name of directory where VariableBase is saved, enter the name of variable collection and click on *Execute* button.



Default variable collection includes all variable group contained in VariableBase. In general, additional manual editing of default variable collection is necessary in order it well corresponds to real structure of variable group and includes descriptive name of groups and not their identifiers only.

11. Exporting to Applicatios of asix

To generate files including definitions of current and historical variables of applications of **asix** system, you should select operation *Export to Application*, enter name of directory where VariableBase is saved, enter name of directory where output files will be saved, choose attribute according to which definitions of variables are to be sorted and click on *Execute* button.



In order generation of files with variable definitions would be possible, the attribute base should include *PlikAsmena* (filename of current variables) and *PlikAspada* (filename of historical variables) attributes.

12. Names of Attributes

Standard variable attributes
Additional variable names
Information of variables
Limits
Alarm Limits
Location from process side

Structure of attribute base that was described in structure file of VariableBase may be expanded. It may be adapted to the requirements of applications of **asix** system by either introduction of new attributes or modification of dimension of standard.

Attributes contained in basic structure file of the VariableBase are as follow:

Standard Variable Attributes

Name of variable attribute	**Type**
Name	A
Description	A
Channel	A
Address	A
ElementsNumber	N
Sample Rate	N
Conversion Function	A

Archive	A	
Archiving Parameters	A	
PlikAsmena	A	Asmen file
PlikAspada	A	Aspad file
Group	A	

In column Type ‘A’ denotes alphanumeric and ‘N’ numeric type respectively.

Recommended attribute names added to the structure of VariableBase follow:

Additional Variable Names

NameKKS	A
NameAKPiA	A

Information of Variables

Format	A	
Unit	A	
StatusLabel0	A	name of status 0 of binary variable
StausLabelNon0	A	name of status non 0" of binary variable

Limits

PhysicalRangeLo	N	normal operating range
PhysicalRangeHi	N	
MaxPhysicalRangeLo	N	maximal physical range of transducer
MaxPhysicalRangeHi	N	
AsmenFunctionRangeLo	N	e.g. range of ANALOG_FP function
AsmenFunctionRangeHi	N	
TransducerUnit	A	
TransducerRangeLo	N	
TransducerRangeHi	N	
DisplayRangeLo	N	
DisplayRangeHi	N	
DisplayRangeStep	N	

NOTE: to determine the range of displaying variable, first, *DisplayRangeLo* and *DisplayRangeHi* are read. *DisplayRangeLo* is read as first.

Alarm Limits

LimitLoLo	A
LimitLo	A
LimitHi	A
LimitHiHi	A

Location from Process Side

Cabinet	A
Strip	A
TerminalIN	A
TerminalPlus	A

13. Structure of VariableBase

Structure of attribute VariableBase or in other words list of all attributes, is described in file of structure of VariableBase. This file is named schemat.txt and is saved in directory of VariableBase.

File containing the basic structure of VariableBase is saved in the same directory where VariableBase Manager program is installed. This file is used as default one during creating new VariableBase but selection of another structure file is also possible. During creation process of a new VariableBase, structure file is copied to VariableBase directory and on its base the new attribute VariableBase is created.

File containing the structure of VariableBase is of type INI. The most important and only mandatory section in this file is 'Attributes' one. Other sections with names LocalAttributesNames, Averages and AttributesSets contain additional information on variables.

13.1. Variable Attributes

Section *Attributes* contains one line of the following syntax:

<Name of Attribute> = <Type>, <Width>,<DisplayMode>,<DefaultDisplayWidth>

Accepted types of attributes: A (text) i N (numeric).

Field *Width* concerns to text type only and defines maximum number of characters of variable attribute.

Field DisplayMode is optional and may be equal to one of values: -1, 0 or 1 that have the following meaning:
-1 - the attribute can not be displayed in a variable selection window and similar windows;
0 - the attribute can be displayed in a variable selection window and similar window but is not displayed initially;
1 - the attrribute is dispalyed in a variable selction window and similar windows by default.

Field *DefaultDisplayWidth* is an optional field and includes column width (in characters) in a variable selection window displaying the given atrribute. The fields should be filled in, if attribute width is as large as it does not fit dimensions of variable selection window, e.g. attribute *Description* demands declaration of default displaying width. If *DefaultDisplayWidth* field value is not declared, the attribute is displayed with max width.

Modification of some attributes in base structure file is limited. Attribute *Id* must not be modified at all. Type and name of attributes *Name*, *Description*, *Group*, *Channel*, *ConversionFunction* and *Archive* must not be modified, but you can modify parameters *Width*, *DisplayMode* and *DefaultDisplayWidth*. At present modification of type and name of attribute *Address*, *ElementsNumber*, *SamplingPeriod*, *ArchivingParameters*,

PlikAsmena and *PlikAspada* because it may make impossible generating files of definitions of current and historical variables for applications of **asix** system.

13.2. LocalAttributesNames

LocalAttributesNames section contains local names of attributes and names of averages, translated to national language. Local names appear as column titles in variable selection window and as names of attributes in variable description window. Local average names appear in average menu of Trendy2 program. Section *LocalAttributesNames* contain line of the following syntax:

<Attribute Name> = <Langid>, <Local Attribute Name>

or

<Average Name> = <Langid>, <Local Average Name >

Langid is internal language identifier in Windows. It is recommened to use ISO codes (pl, en), but also 1045 (for Polish) and 1033 (for English) codes may be used.

13.3. Average Values of Process Variables

Section *Averages* contain declarations describing naming convention for average process values in application of **asix** system.

Average is a process variable, which current value is an average of current values of other variable (referred to as base variable) from a certain period of time. This method of calculation is sometimes referred to as 'moving average'.

When you define averages, it is recommended to follow the naming convention to create average name by attaching to the name of base variable a suffix defining to some extent period of time of calculation of average. If this convention is observed and section *Averages* then AsTrend program will make possible easy switching between charts of current values of variables and those of their averages.

Section *Averages* contain lines of the following syntax:

<Average Name> = <Suffix Added to Name of Variable Database>

EXAMPLE

[Average]
Hour = _1h
5 minute = _5m

13.4. Collections of Attributes

Using the VARIABLE_DESCRIPTION action in the application of **asix** you can display window including all variable attributes or some of them only when you define a list of attributes you need. To make using this action easier you can define collection of attributes in the VariableBase and pass its name as action parameter. The declarations of such collections of attributes are included in „ AttributesSets" in the structure file of VariableBase
„ AttributesSets" section includes lines of the following syntax:

<Name of Collection of Attribute> = <List of attribute names>, <Default width of window of attributes>

where:

< List of attribute names > = <Attribute name >, < Attribute name>, ...

Default width of window of attributes should be declared in pixels.

14. Batch Execution of VariableBase Manager Program

If you like to perform currently selected operation in main program window in batch mode with parameters just introduced, then program can automatically generate respective command line. In order to perform this operation click on button *Batch* in program main window. This place program name of VariableBase Manager and its parameters to clipboard of Windows. Then start any text editor, enter text from clipboard and save text to the file with .bat extension.

The .bat file may contain any number of calls of VariableBase Manager and due to this batch generation of VariableBase from several data sources is possible.

NOTE: *If you use .bat files to control the VariableBase manager program then program parameters must not contain polish diacritical characters.*

Syntax of parameters of VariableBase Manager is as follows:

Help	-?-help-pomoc
Import fromBDE/ODBC data source	-ImportBDEODBC
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Data source	-DataSource <*name of data source*>
Table	-Table <*name of table*>
Create new base	-New
Filename with structure of VariableBase	-Scheme <*path\filename of structure*>
Delete non-archived variables	-RemoveNotArchived
Import from **asix** application	-ImportAsix
Directory of VariableBase	-Variable Database <*directory name*>

Path\filename for INI file of application	- INIFile <*path\filename*>
Create new base	-New
Filename with structure of VariableBase	-Scheme <*path\filename of structure*>
Delete non-archived variables	-RemoveNotArchived
Import from text file	-ImportText
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Path and filename for text file	-TextFile <*path\directory of text file*>
Create new base	-New
Filename with structure of VariableBase	-Scheme <*path\filename of structure*>
Delete non-archived variables	-RemoveNotArchived
Generate default variable collection	-GenDefaultZEZ
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Filename of variable collection	-Zez < *filename of variable collection* >
Generate helper VariableBase	-GenHelper
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Filename of variable collection	-Zez < *filename of variable collection* >
Export to application of **asix**	-ExportAsix
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Target directory	-DestDir <*target directory*>
Sort according to	-SortBy <*name of attribute*>
Update online from BDE/ODBC data source	-Online
Directory of VariableBase	-Variable Database <*directory of Variable Database*>
Data source	- DataSource <*name of data source*>
Table	-Table <*name of table*>
Target directory	-DestDi <*target directory*>
Sort according to	-SortBy <*name of attribute*>

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